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(54) CARBONATED BEVERAGE CONTAINER WITH SUCTION SPOUT

BEHÄLTER FÜR KOHLENSÄUREHALTIGE GETRÄNKE MIT AUSGIESSTÜLLE

ELEMENT DE COMMANDE D'ÉCOULEMENT ANTI-GOUTTE DESTINÉ À UN CONTENANT DE
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(56) References cited:
WO-A-99/44915 **US-A- 5 079 013**
US-A- 6 050 444

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Description

FIELD OF THE INVENTION

[0001] The invention relates to completely closed carbonized beverage cans, bottle or closed drinking cups used to prevent spilling of fluid, contained in the can, bottle or drinking cup, while in action and fluid is withdrawn from the can, drinking cup or handheld container, US class 220/706; 220/85; 222/214; 220/713; 220/714 etc. (International Patent Classification A47G 19/22; BD65d 1/00; BD65D 25/48 etc.)

OBJECT OF THE INVENTION

[0002] Carbonated beverages are supplied in aluminum cans, bottles or other containers for consumption. As soon as the can or bottle is opened, the fluid starts deteriorating and becomes flat in short time thereafter. If supplied in bottles, the beverage is normally poured into a cup for immediate drinking, while the rest is kept under pressure in the bottle for future use by a screw cap. Aluminum cans, however, are commonly opened by pulling away a piece of the top closure and cannot be closed thereafter. This means that the fluid needs to be consumed more or less immediately after opening. Also when poured from a bottle into a cup the amount may be too much for immediate consumption and someone may want to use it over an extended period of time. In prior art solutions it became apparent that no pressure can be maintained in a so called non spilling cup or handheld container and does not prevent spilling of fluid, while in action with carbonized or hot fluids.

[0003] The object of the invention is thus maintaining the beverage carbonized in a container that is in use, while access to the fluid is easy and spilling is prevented during motion, under all positions of the container. The same applies for hot drinking fluids, thereby keeping the fluid inside the cup or container, while the air pressure rises due to expansion of the enclosed air.

BACKGROUND OF THE INVENTION

[0004] Drinking cups and handheld containers with leak tight top-covers, combined with drip-less spout and air vent are provided throughout the years in many shapes and forms, in order to prevent spilling of the liquid, contained therein for temporarily storage. The spout and vent are provided with valves that enable fluid to be withdrawn from the container or cup, when suction is applied to the spout. The reduction in fluid content in the container is replaced by air that flows through a second opening in the cover. This air vent holds a control valve that opens when the pressure sinks below the atmospheric outside pressure, due to the suction action at the spout. As an example; a drip less feeding/ training container of this nature has been described by Belanger in U.S. patent description 5,079,013 ; U.S. PAT. 5,542,670 by Morano;

U.S. PAT. 5,186,347 by Freeman etc. For all these inventions the application was primarily made for babies and toddlers with the objective of eliminating spillage of the fluid by throwing over the cup or container and while drinking during movement. In the above patent descriptions other references are made to other inventors, all with the same or similar goals in mind of eliminating spillage of fluid.

[0005] The thus described applications are suitable for non-carbonized fluids and cold drinks only. If carbonized fluids are applied, the pressure in the container will built-up thereby pushing the valve open and leakage and spilling is not prevented. The same applies for hot drinking fluids, whereby the air above the fluid is heated and expands, causing the pressure in the container to rise and will push out the fluid, if not held in the upright position. Spilling could be prevented, however, by using a stronger resilient valve material in the case of Morano U.S. PAT. 5,542,670 or a stronger spring in the case of Belanger, U.S. PAT. 5,079,013. The draw back, however, is that suction to the spout has to increase appreciably, even beyond human capacity and opening of the valve would be impossible or at least cumbersome.

[0006] For beverage cans, as nowadays are commonly available to the consumer with carbonized drinking fluids, adapters are provided that clips onto the top of the can to close off the beverage can after opening and/ or make drinking easier than directly from the can. Such features are provide for in the following descriptions: U.S. PAT. 4,796,774 by Nabinger; U.S. PAT. 4,852,776 by Patton; U.S. PAT. 4,883,192 by Krugman; U.S. PAT. 5,071,042 by Esposito, U.S. PAT. 5,947,324 by Palinchak, EP 0870 685 A1 by Igor etc. These applications have the disadvantage that the pressure is immediately released from the can after opening and in the shortest possible time the carbon dioxide is released from the fluid and becomes flat and much less attractive to drink.

[0007] This means that all previous described applications are not suitable for carbonized beverages or hot drinking fluids.

[0008] The present invention overcome all these problems as well as for beverage cans, bottles as for closed non-spilling drinking cups combining a number of advantages over prior art solutions, in the same application being: Maintaining the gas pressure to keep the fluid carbonized; easy transport of partially filled containers and no fluid is spilled while drinking and used in action. For the beverage can the present invention has an additional advantage of being more hygienic than using a beverage can closure and/or drinking adapter as provided for in e.g. U.S. PAT. 4,883,192 of Krugman and other inventions thereafter.

BRIEF SUMMARY OF THE INVENTION

[0009] The present invention presents two main embodiments mainly defined in claims 1 and 2. One embodiment comprises a flow control element with a spout for

sucking fluid from a pressurized cup, metal beverage can, bottle or handheld container, whereby the fluid is a carbonized beverage or hot drink such as coffee or tea. The flow control element is activated by sucking on the spout, whereby a membrane type element lifts a valve that closes off the inside of the container from the outside. The inside of the container normally has a higher gas pressure than the atmospheric outside pressure caused by the carbonized fluid or expanding air that is heated by a hot drinking fluid within the confinement of the drinking cup. The flow control element comprises a spout, gas tight connected to a housing, a spring, a centrally perforated membrane shape element connected to a valve stem, which is hollow in nature, to enable fluid to flow from the container to the spout through the opening in the membrane; a valve stem guide with valve seat, which is an extrude part of the housing and a valve of soft resilient material. The valve is held firmly in the closed position by a spring that pushes onto the membrane and valve stem, towards the valve seat. As the valve is connected through the valve stem with the membrane, movement of the membrane in axial direction, results in the same movement of the valve. By reducing the pressure on one side of the membrane by suction on the spout, the membrane will displace the valve thereby opening up the inside of the container and allowing fluid to flow. The fluid flows from the container through a thin flexible tube in the form of a straw inside the container, that reaches from the bottom of the container to the valve opening, through the valve stem, through the membrane into the spout to the mouth. The valve closing area is substantially smaller than the active surface area of the membrane. A small suction pressure difference over the membrane will result in a relative large force to open the valve against the pressure of the spring, that normally keeps the valve closed. The combination of the valve, spring and membrane is therefore an essential part of the invention enabling the flow control element to work. The housing of the flow control element is either gas tight fit in a hole in the cover of an aluminum beverage can, or bottle or is an integral part of a gas tight cover of a drinking cup. The lower side of the membrane is held at atmospheric pressure by an opening in the housing of the flow control element. When the pressure in the can or cup sinks below atmospheric pressure by the reducing fluid level, an air vent is provided in the valve guide that only opens when this is the case, to replace the reduced fluid amount. The invention includes also an embodiment whereby a membrane is used that pushes a valve open rather than pulling, as described above. In this case the membrane is reversed, having a sliding airtight seal, which is part of an extruded tubular extension within the spout that mates with the extruded tubular extension of the centrally perforated membrane. The embodiment further holds a valve, that is part of the pressure boundary of the container, which valve is pushed open against the inside pressure of the container, by a sucking action on the spout.

[0010] By so described, the flow element closes off the inside of the handheld container from the outside under all circumstances and position of the container when not in use for drinking.

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BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The following accompanying drawings of four preferred embodiments will clarify all features of the present invention to those skilled in the art of reading the drawings and accompanying specification.

10 FIG. 1 is a perspective view of an assembled beverage can, that embodies one of the preferred embodiments of the present invention. Further details of this embodiment are shown in FIG. 3, 4 and 5

15 FIG. 2 is a perspective view of an assembled non-spilling drinking cup or container of a second embodiment of the invention of which further details are shown in FIG. 6

20 FIG. 3 is a partial cross-sectional view and a top view of the first preferred embodiment showing all parts required for the flow control element of the invention

FIG. 4 shows a cross-section of an enlarged part of FIG. 3, for better view of the assembly of the flow control element

25 FIG. 5-a) through 5-e) shows cross-sections of the individual parts that make-up the flow control element of the invention

30 FIG. 6 shows a partial cross-section with top view of a non-spilling drinking cup of the second embodiment of the invention of which FIG. 2 shows a perspective view.

35 FIG. 7 shows a cross-section of a third embodiment of the invention, whereby the valve is pushed open, when a suction pressure is applied to the spout, rather than that the valve is drawn from its seat in the first two embodiments.

40 FIG. 8 shows a cross-section of a fourth embodiment of the invention, which is similar to the third embodiment of FIG. 7 except that the extruded portion of the membrane encompasses also the spout.

DETAILED DESCRIPTION OF THE INVENTION

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[0012] With reference to the drawings, the invention will be described for application with a beverage can (teen), commonly available for consumption of carbonized beverages, however, with a modified top cover, adjusted for accommodation of the "flow control element" or "Spout assembly" subject of the present invention. The invention, as described in the embodiments below is for clarification only, without trying to restrict the application of the invention to these embodiments.

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[0013] FIG. 1 shows a partially opened-up, outside perspective view of a beverage can with a centrally located flow control element in the top cover, extending from the outside to the inside of the can, of the first preferred em-

bodiment. Details of this embodiment are shown in a partially cross-sectional drawing of FIG. 3, while FIG. 4 shows an enlarged cross section of the flow control element, for clarification. The beverage can, enclosed by a cylindrical wall 1, a bottom 2, a top cover 3 and a flow control element 4 holds a carbonized beverage 5 that remains under a gas pressure (P3) 6 by the carbonization process. This gas pressure can be substantially higher than the outside atmospheric pressure (P1) to keep the beverage carbonized for the pleasure of drinking the fluid. The flow control element 4 maintains this gas pressure as long as needed, while access to the fluid in the can remains possible. This is accomplished by a housing 9 that fits tightly into the upper cover 3 of the beverage can and forms part of the barrier between the inside and outside of the can. A spout 7 is gas tight connected to this housing and keeps a centrally perforated membrane 8 in place, that fits on the suction side gas tight into the housing 9, while on the other side an atmospheric pressure is maintained. Above and below the membrane, adequate space is available to allow the membrane to move a few millimeters up and down at the center area, while fixed at the periphery. The membrane 8 is integrally connected to a valve stem 10, while the valve stem is hollow in nature for allowing the fluid to pass through, while also the membrane has a central hole at which location the valve stem is gas tight connected to the membrane. The valve stem 10 fits into the lower cylindrical part 14, acting as a valve stem guide, forming an integral part with housing 9, providing little clearance between these parts. This clearance is slide fit, allowing movement of the valve stem on one side but being tight enough, not to allow fluid or gas to pass through. The lower part of the valve stem guide 14 holds also the valve seat 13. On the lower side of the valve stem, a valve 11 of resilient material, is held in place that closes off the access opening 12 to the valve seat 13, to the inside of the beverage can. In order to enable emptying the can completely, a flexible tube (straw) 15 is used, that is tightly fixed to the valve opening 12 and reaches down to the bottom of the can. The valve is closed by an urging member which can be a spring 16 on the suction side of the flow control element, that pushes the membrane 8 and therewith the valve 11 to its rest position. The hollow valve stem is narrowed down in the lower part 17, while in this tapered section one or more holes 18 are made, through which the fluid passes when the valve 11 is lifted from its seat 13. A small air passage 19 is provided in the housing 9 to assure that the back-pressure on the lower side of the membrane remains atmospheric (P1).

[0014] The flow control element 4 is thus activated: Suction by mouth to the spout 7 will move the membrane 8 upwards, thereby lifting the valve from its seat against the spring pressure. The magnitude of the force to activate the valve can be determined from the pressure difference over the membrane times the active surface area of the membrane plus the pressure difference over the valve times the active surface area of the valve minus

the urging force (F) of the spring, which is $(P1-P2) * A + (P3-P2) * a - F$. Herein is "A" the active surface area of the membrane; being $\frac{1}{4}\pi.D^2$ in which " π " (π) is 3.14 and "D" is the active membrane diameter and "a" is the active surface area of the valve being $\frac{1}{4}\pi.d^2$ in which " π " (π) is 3.14 and "d" is the active valve diameter. "F" is the urging force of the spring in combination with the resilient force of the membrane. When the valve is lifted from its seat, the fluid in the can will be forced outwards by the pressure difference $(P3 - P2)$, which is respectively the gas pressure in the can and the suction pressure in the spout. When suction is applied, the fluid flows through the flexible tube 15 to nozzle 12, passes the valve 11, through the hole(s) 18 into the hollow valve stem 10 to the upper side of the membrane 8 into the spout 7, to the mouth. As soon as the suction action stops, the pressure difference $(P1-P2)$ ceases, leaving only the urging force "F" of the closing member (spring) 16 and the resilient force in the membrane left, which will push the valve 11 back to its seat 13 and thus closes off the fluid passage.

[0015] Under certain circumstances it is possible that by emptying the can, the internal pressure P3 is substantially reduced and even becomes less than the atmospheric outside pressure P1. In that case the suction pressure will be able to open the valve, but is not sufficient to empty the beverage can completely. For this situation a vent 20 is provided, which consists of one or more holes in the upper part of the valve stem guide 14. These vents are normally closed off by a rubber band 21 of adequate width to cover the holes completely and which will act as a valve, allowing air to pass from the air passage 19 into the area under the membrane, along the upper portion of the valve stem guide through the vent holes 20 into the can. This feature will take care that the inside pressure P3 of the can will never drop substantially below atmospheric outside pressure P1. The upper portion of the valve stem guide 14 is therefore slightly enlarged to allow air to pass-by. For the application of the flow control element for beverage cans as described above, a hygienic cap 21 is provided that tightly fits onto the shoulder of housing 9 to keep the spout from getting dirty during transport and when not in use.

[0016] In FIG 5-a) through 5-e) the individual parts are drawn that makes up the flow control element as described of the first preferred embodiment. This embodiment, however, is not meant to limit the invention to other configurations, whereby the same principle of force enlargement is applied by using a perforated membrane that activates a valve.

[0017] In FIG 2 and 6 second preferred embodiment is shown in applying a flow control element to a non-spilling drinking cup, whereby the top cover is tightly screwed onto the cup or container. In this case the housing 9' of the flow control element 4' is an integral and leak tight element of the top cover, whereby the cup can be filled with carbonized beverages, hot and cold drinks without spilling after closure. In the case of hot drinks, the air above the fluid will expand, building up pressure

in the cup or handheld container. For this application a perspective view of a partly opened cup or container is shown in FIG. 2, while a partial cross-section of the same embodiment is shown in FIG. 6. As the principle of operation of the flow control element 4 for this application, is exactly the same as described for the first preferred embodiment, this part will not be repeated and only the changes will be described.

[0018] FIG. 6 applies to a metal or plastic container 22, with a removable top cover 23 that is screwed onto the container 22 and having a gas tight seal of resilient material 24, preventing the container from leaking when filled with a beverage, hot or cold drink. In this second embodiment, the housing 9' of the flow control element 4' is now integrally molded with the top cover 23, thereby differing slightly from the flow control element of the beverage can. The spout 25 is removable to provide access to the inside of the flow control element for cleaning purposes. The remaining parts are substantially the same as used for the (aluminum) beverage can of FIG 1, 3,4 and 5.

[0019] In FIG. 7 a third embodiment of the flow control element 4" is shown, which can be applied to beverage cans, bottles or drinking cups. The prime difference with the previous described embodiments of the invention is that the valve is pushed open by the suction pressure, rather than that the valve is drawn from its seat. The third embodiment comprises the following parts: A centrally perforated membrane 8" having an extruded seal tube 40" and a seal structure 26" that fits gas tight but moveable in axial direction in a cylindrical tube 27", that forms part of the spout 7". Spout 7" holds the membrane 8" in place and forms at the rim a gas tight connection with a valve housing 9" having a seal 30". The flow control element assembly is fixed to the top of a beverage can, bottle or drinking cup 1" with a screw cap connection 31". The valve holder 14", which is an integral part of the valve housing, holds a valve seat 13" with a valve 11" forming a hermetically sealed barrier of the inside of the beverage holder 1" with the outside, letting no fluid to pass, when not in use. The valve 11" is connected through the valve stem 10" with the membrane 8" by a valve stem holder 17", which is large enough to cover the central opening of the membrane and can even be part thereof, but at the same time allows fluid to pass. The valve stem holder 17" on which an urging force or spring 32" acts, holds the valve 11" gas tight to its seat 13" when no suction is applied to the spout 7", but allows fluid to pass when set in operation during suction. An open-air passage 29" is provided in a part of the spout, thereby assuring that space above the membrane is kept at atmospheric pressure. A spring 32" can be added helping to keep the valve in its closed position, if the spring action of the membrane prove to be inadequate. The working of this embodiment of the invention is as follows: When suction is applied to the spout 7", the pressure P2 in space 28" will reduce relative to outside pressure P1 above the membrane. This causes the membrane 8" to move downwards,

thereby pushing the valve 11" from its seat 13" and opening a fluid flow path from the inside of the beverage container to the mouth. Incase the pressure within the container drops below the atmospheric outside pressure, by sucking the beverage from the container, the valve 11" may open up against the spring-loaded membrane pressure, after the suction has seized.

[0020] The thus described embodiment requires a gas tight moveable connection 26" of the extruded seal tube 40" of the membrane with the cylindrical tube 27" within the spout 7". Air leakage at this location could cause the flow control element to malfunction. A solution would be to place a bellows between the membrane and spout or a so-called O-ring, but this might prove to be cumbersome. It is therefore thinkable that the spout 7" may be omitted all together, leaving the extruded seal tube 40" of the membrane 8" as a spout, thereby simplifying this embodiment of the invention considerably. This fourth embodiment is shown in FIG. 8 comprising the same parts as shown in FIG. 7 except for the spout 7". Also the working is the same and needs no further explanation.

Claims

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1. A flow control element (4) for emptying a fluid under pressure, from a container, which flow control element comprises:
 - a) a spout (7), that connects to a housing (9) which holds a membrane device (38) and a valve (11);
 - b) said housing comprises a valve stem guide (14) ending in a valve seat (13), closed by said valve;
 - c) said membrane device comprising (i) a membrane (8) with a central opening and (ii) a hollow valve-stem (10), which has an opening (18) in the lower part thereof;
 - d) said membrane device has a fixed seal (39) at the rim of the membrane and a sliding seal structure (40) at the center, between the hollow valve-stem and the lower part (17) of said valve stem guide;
 - e) said housing having an air-passage (19) in the upper part thereof, that connects the space below the membrane to the outside, keeping the lower side of the membrane that faces the interior of the container, at atmospheric pressure;
 - f) said valve stem guide has an enlarged inside diameter (41) in the upper part thereof, provided with vents holes (20) for air to pass from the space below the membrane to the inside of the container (6);
 - g) said vent holes are blocked off by a closing member (21), in order to close the vent holes when the gas pressure (P3) inside the container, is higher than the atmospheric outside pressure

- (P1) and opens the vent holes when, by fluid displacement from the container, the gas pressure may drop below atmospheric outside pressure;
- h) said membrane device is urged towards the inside of the container by an urging member (16) in order to keep the valve closed, when the valve is in its rest position;
- i) said membrane device flexing away from the interior of the container against the urging force applied by the urging member, when suction is applied to the spout, thereby opening the valve for fluid to pass.
2. A flow control element (4") for emptying a fluid under pressure from a container, which flow control element comprises:
- a) a spout (7") with a cylindrical tube (27"), a membrane device (38"), a valve housing (9") and a valve assembly (41");
 - b) said membrane device comprising (i) a membrane (8") with a central opening and (ii) a seal tube (40") having a flexible seal structure (26") with the cylindrical tube (27") of the spout;
 - c) in said flow control element, an air passage (29") is provided, promoting retention of atmospheric pressure between the spout and a side of the membrane that faces away from the interior of the container;
 - d) said valve housing comprises a valve holder (14") with a valve seat (13") holding said valve assembly;
 - e) said valve assembly comprising a valve stem (10"), a valve (11") fixed to the valve stem and a perforated valve stem holder (17");
 - f) said valve is resiliently urged against the valve seat by an urging member (32"), which is held in place by the perforated valve stem holder on one side, and by a horizontal part of the valve seat on the other side;
 - g) said membrane device is leak tight fixed at its periphery (30") of said membrane, but flexes at its center, towards the interior of the container, when suction is applied to the spout, thereby forcing the valve away from the valve seat in opposition to the urging force applied by the urging member.
3. The flow control element of claim 1, wherein said closing member comprises an elastic band.
4. The flow control element of claim 1 or 2, wherein the membrane has an undulating shape in cross section and is of a resilient material.
5. The flow control element of claim 1 or 2, wherein the urging member comprises a spring.
6. The flow control element of claim 1 or 2, wherein the urging member comprises the resilient force of the membrane.
- 5 7. The flow control element of claim 1 or 2, wherein the surface area of the membrane on which the suction pressure acts, is substantially larger than the surface area of the valve on which the inside gas pressure of the container acts.
- 10 8. The flow control element of claim 2, wherein the seal structure comprises a bellows between the cylindrical tube of the spout and the seal tube of the membrane.
- 15 9. A combination, comprising:
- 20 a container that can hold a fluid, having an opening at the top and the flow control element of claim 1 or 2, attached to the container and covering the opening.
- 25 10. The combination of claim 9, wherein the container is made of metal or plastic material that can hold a fluid under gas pressure or at elevated temperature.
- 30 11. The combination of claim 9, wherein the fluid is a beverage, hot drink or any other drinking fluid.
12. The combination of claim 9, wherein the flow control element is removably attached to the container by a screw thread connection.
- 35 **Patentansprüche**
1. Ein Durchflussregelelement (4) zum Entleeren einer Flüssigkeit unter Druck aus einem Behälter. Das Durchflusselement besteht aus folgenden Teilen:
- 40 a) einem Abfluss (7), der mit einem Gehäuse verbunden ist (9), in dem ein Membrangerät (38) und ein Ventil (11) untergebracht sind;
- 45 b) besagtes Gehäuse umfasst eine Ventilschaftführung (14), die in einen Ventilsitz (13) einmündet, der von besagtem Ventil geschlossen wird;
- c) besagtes Membrangerät besteht aus (i) einer Membran (8) mit einer mittigen Öffnung und (ii) einem hohlen Ventilschaft (10), der in seinem unteren Teil eine Öffnung (18) aufweist;
- 50 d) besagtes Membrangerät verfügt am Rande der Membran über eine feste Dichtung (39) sowie über eine Gleitdichtstruktur (40) im Zentrum zwischen dem hohlen Ventilschaft und dem unteren Teil (17) besagter Ventilschaftführung;
- 55 e) das besagte Gehäuse verfügt in seinem oberen Teil über einen Luftdurchlass (19), der den Raum unterhalb der Membran mit dem Äußeren

- verbindet und die untere Membranseite, die auf das Behälterinnere zeigt, auf Atmosphärendruck hält;
- f) die besagte Ventilschaftsführung verfügt in ihrem oberen Teil über einen vergrößerten Innen-durchmesser (41) mit Entlüftungsöffnungen (20), so dass die Luft aus dem Raum unterhalb der Membran ins Behälterinnere strömen kann (6);
- g) besagte Entlüftungsöffnungen werden durch ein Schließelement (21) blockiert, um die Öffnungen zu schließen, wenn der Gasdruck (P3) im Behälterinneren über dem atmosphärischen Außendruck (P1) liegt, bzw. um die Öffnungen zu öffnen, wenn durch die Flüssigkeitsverdrängung vom Behälter aus der Gasdruck ggf. unter den atmosphärischen Außendruck fällt;
- h) besagtes Membrangerät wird mittels eines Schiebelements (16) in Richtung Behälterinneres gedrückt, damit das Ventil geschlossen bleibt, wenn es sich in seiner Ruheposition befindet;
- i) besagtes Membrangerät biegt sich vom Behälterinneren entgegen der Druckkraft des Schiebelementes fort, wenn am Abfluss eine Saugwirkung anliegt, wodurch das Ventil geöffnet wird, damit Flüssigkeit hindurchfließen kann.
2. Durchflussregelelement (4") zum Entleeren einer Flüssigkeit unter Druck aus einem Behälter. Das Durchflusselement besteht aus folgenden Teilen:
- a) einem Abfluss (7") mit einem zylindrischen Rohr (27"), einem Membrangerät (38"), einem Ventilgehäuse (9") und einem Ventilsystem (41");
 - b) besagtes Membrangerät besteht aus (i) einer Membran (8") mit einer mittigen Öffnung und einem (ii) Dichtungsverschluss (40"), der über eine flexible Dichtungsstruktur (26") mit dem zylindrischen Rohr (27") des Abflusses verfügt;
 - c) im besagten Durchflussregelelement ist ein Luftpumphahn (29") vorhanden, der die Aufrechterhaltung des atmosphärischen Drucks zwischen dem Abfluss und einer Seite der Membran fördert, die dem Behälterinneren abgewandt ist;
 - d) besagtes Ventilgehäuse umfasst einen Ventilhalter (14") mit einem Ventilsitz (13"), der das besagte Ventilsystem hält;
 - e) besagtes Ventilsystem umfasst einen Ventilschaft (10"), ein am Ventilschaft angebrachtes Ventil (11") und einen perforierten Ventilschaftshalter (17");
 - f) besagtes Ventil wird federnd gegen den Ventilsitz mittels eines Schiebelements (32") gedrückt, das durch den perforierten Ventilschaftshalter an einer Seite und durch ein horizontales
- 5 Teil des Ventilsitzes auf der anderen Seite an Ort und Stelle gehalten wird;
- g) besagtes Membrangerät ist leckdicht an seiner Peripherie (30") der besagten Membran angebracht, ist jedoch an seinem Zentrum in Richtung Behälterinneres beweglich, wenn am Abfluss eine Saugwirkung anliegt, wobei das Ventil vom Ventilsitz entgegen der vom Schiebelement verursachten Druckkraft fortgedrückt wird.
- 10 3. Das Durchflussregelelement aus Patentanspruch 1, in dem besagtes Schließelement ein elastisches Band beinhaltet.
- 15 4. Das Durchflussregelelement aus Anspruch 1 oder 2, in dem die Membran im Querprofil eine gewellte Form aufweist und aus einem nachgiebigen Material besteht.
- 20 5. Das Durchflussregelelement aus Anspruch 1 oder 2, in dem das Schiebelement eine Feder beinhaltet.
- 25 6. Das Durchflussregelelement aus Anspruch 1 oder 2, in dem das Schiebelement die Federkraft der Membran realisiert.
- 30 7. Das Durchflussregelelement aus Anspruch 1 oder 2, in dem der Oberflächenbereich der Membran, auf den der Saugdruck wirkt, beträchtlich größer als der Oberflächenbereich des Ventils ist, auf den der Innengasdruck des Behälters wirkt.
- 35 8. Das Durchflussregelelement aus Anspruch 1 oder 2, in dem die Dichtungsstruktur zwischen dem zylindrischen Rohr des Abflusses und dem Dichtungsrohr der Membran ein Gebläse umfasst.
- 40 9. Eine Kombination aus folgenden Teilen:
ein Behälter, der eine Flüssigkeit aufnehmen kann und der über eine Öffnung im oberen Bereich verfügt, sowie das Durchflussregelelement aus Anspruch 1 oder 2, das am Behälter angebracht ist und die Öffnung abdeckt.
- 45 10. Die Kombination aus Anspruch 9, in dem der Behälter aus Metall- oder Plastikmaterial besteht und eine Flüssigkeit unter Gasdruck oder bei einer angehobenen Temperatur halten kann.
- 50 11. Die Kombination aus Anspruch 9, in dem die Flüssigkeit ein Getränk, ein heißer Drink oder eine beliebige andere Trinkflüssigkeit ist.
- 55 12. Die Kombination aus Anspruch 9, in dem das Durchflussregelelement am Behälter mittels einer Gewindestverbindung abnehmbar angebracht ist.

Revendications

1. Un élément de contrôle de débit (4) servant à vider un fluide sous pression à partir d'un récipient, lequel élément de contrôle de débit comprend : 5
- a) un bec (7) qui est relié à un boîtier (9) qui contient un dispositif à membrane (38) et une vanne (11);
 - b) ledit boîtier comprend un guide de tige de vanne (14) prenant fin dans un siège de vanne (13), fermé par ladite vanne ; 10
 - c) ledit dispositif à membrane comprenant (i) une membrane (8) avec une ouverture centrale et (ii) une tige de vanne creuse (10), qui a une ouverture (18) à sa partie inférieure ; 15
 - d) ledit dispositif à membrane a un joint d'étanchéité fixe (39) au bord de la membrane et une structure à joint d'étanchéité coulissant (40) au centre, entre la tige de vanne creuse et la partie inférieure (17) dudit guide de tige de vanne ; 20
 - e) ledit boîtier ayant un passage d'air (19) à sa partie supérieure, qui relie l'espace en dessous de la membrane à l'extérieur, maintenant à la pression atmosphérique la face inférieure de la membrane qui est orientée vers l'intérieur du récipient ; 25
 - f) ledit guide de tige de vanne a un diamètre intérieur élargi (41) à sa partie supérieure, doté d'orifices de ventilation (20) permettant à l'air de passer de l'espace en dessous de la membrane à l'intérieur du récipient (6) ; 30
 - g) lesdits orifices de ventilation sont obstrués par un organe de fermeture (21) servant à fermer les orifices de ventilation lorsque la pression du gaz (P3) à l'intérieur du récipient est supérieure à la pression atmosphérique extérieure (P1) et à ouvrir les orifices de ventilation lorsque la pression du gaz est susceptible de chuter en deçà de la pression atmosphérique extérieure, par refoulement du fluide à partir du récipient ; 35
 - h) ledit dispositif à membrane est sollicité vers l'intérieur du récipient par un organe de sollicitation (16) en vue de maintenir la vanne fermée, lorsque la vanne est dans sa position de repos ; 40
 - i) ledit dispositif à membrane fléchissant à partir de l'intérieur du récipient contre la force de sollicitation exercée par l'organe de sollicitation, lorsqu'une aspiration est appliquée au bec, ouvrant par ce moyen la vanne et permettant au fluide de passer. 45
2. Un élément de contrôle de débit (4") servant à vider un fluide sous pression à partir d'un récipient, lequel élément de contrôle de débit comprend : 55
- a) un bec (7") avec un tube cylindrique (27"), un dispositif à membrane (38"), un corps de vanne (9") et un ensemble vanne (41");
 - b) ledit dispositif à membrane comprenant (i) une membrane (8") avec une ouverture centrale et (ii) un tube d'étanchéité (40") ayant une structure à joint d'étanchéité flexible (26") avec le tube cylindrique (27") du bec ;
 - c) dans ledit élément de contrôle de débit, un passage d'air (29") est prévu pour favoriser la rétention de la pression atmosphérique entre le bec et une face de la membrane qui n'est pas orientée vers l'intérieur du récipient ;
 - d) ledit corps de vanne comprend un support de vanne (14") avec un siège de vanne (13") maintenant ledit ensemble vanne ;
 - e) ledit ensemble vanne comprenant une tige de vanne (10"), une vanne (11") fixée à la tige de vanne et un support de tige de vanne perforé (17") ;
 - f) ladite vanne est sollicitée de manière élastique contre le siège de vanne par un organe de sollicitation (32"), qui est maintenu en place par le support de tige de vanne perforé d'un côté et par une pièce horizontale du siège de vanne de l'autre côté ;
 - g) ledit dispositif à membrane est fixé de manière étanche à sa périphérie (30") de ladite membrane, mais fléchit en son centre vers l'intérieur du récipient, lorsqu'une aspiration est appliquée au bec, forçant par ce moyen la vanne à s'écartier du siège de vanne en opposition avec la force de sollicitation exercée par l'organe de sollicitation.
3. L'élément de contrôle de débit de la revendication 1, dans lequel l'organe de fermeture comprend une bande élastique. 35
4. L'élément de contrôle de débit de la revendication 1 ou 2, dans lequel la membrane a une forme ondulante dans sa section transversale et est faite d'un matériau élastique. 40
5. L'élément de contrôle de débit de la revendication 1 ou 2, dans lequel l'organe de sollicitation comprend un ressort. 45
6. L'élément de contrôle de débit de la revendication 1 ou 2, dans lequel l'organe de sollicitation comprend la force élastique de la membrane. 50
7. L'élément de contrôle de débit de la revendication 1 ou 2, dans lequel la surface de la membrane sur laquelle agit la pression d'aspiration, est considérablement plus grande que la surface de la vanne sur laquelle agit la pression gazeuse intérieure du récipient. 55
8. L'élément de contrôle de débit de la revendication

2, dans lequel la structure à joint d'étanchéité comprend un soufflet entre le tube cylindrique du bec et le tube d'étanchéité de la membrane.

9. Une combinaison comprenant : 5

un récipient qui peut contenir un fluide, ayant une ouverture à la partie supérieure et l'élément de contrôle de débit de la revendication 1 ou 2, fixé au récipient et couvrant l'ouverture. 10

10. La combinaison de la revendication 9, dans laquelle le récipient est fait de métal ou d'un matériau plastique, qui peut contenir un fluide sous pression gazeuse ou à température élevée. 15

11. La combinaison de la revendication 9, dans laquelle le fluide est une boisson, une boisson chaude ou tout autre fluide à boire. 20

12. La combinaison de la revendication 9, dans laquelle l'élément de contrôle de débit est fixé de manière amovible au récipient par un raccord fileté. 25

30

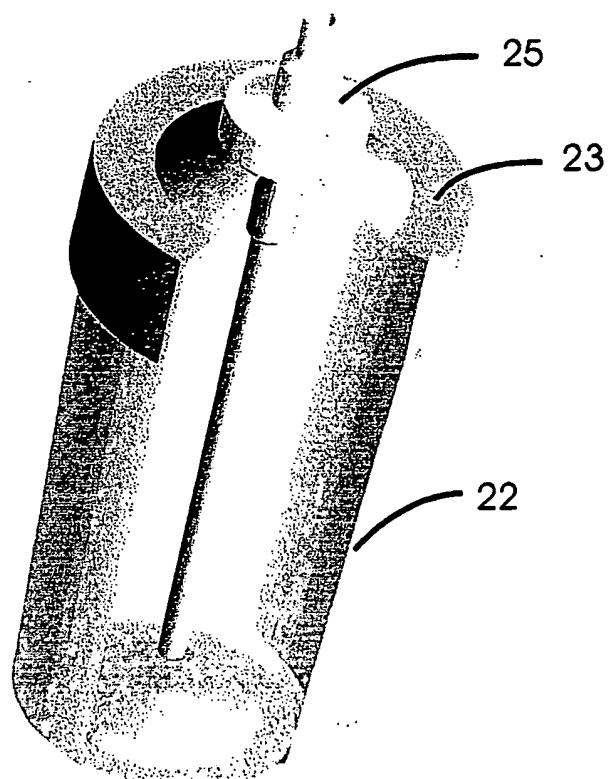
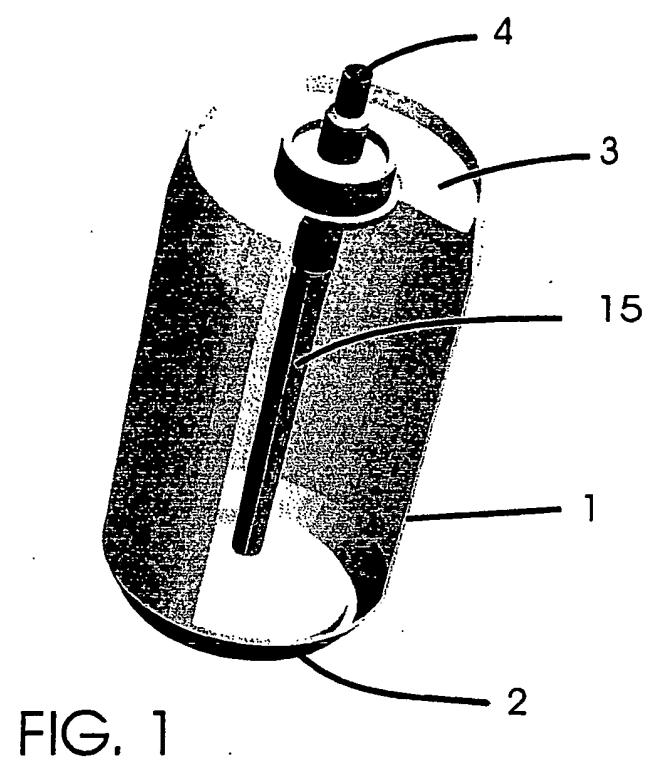
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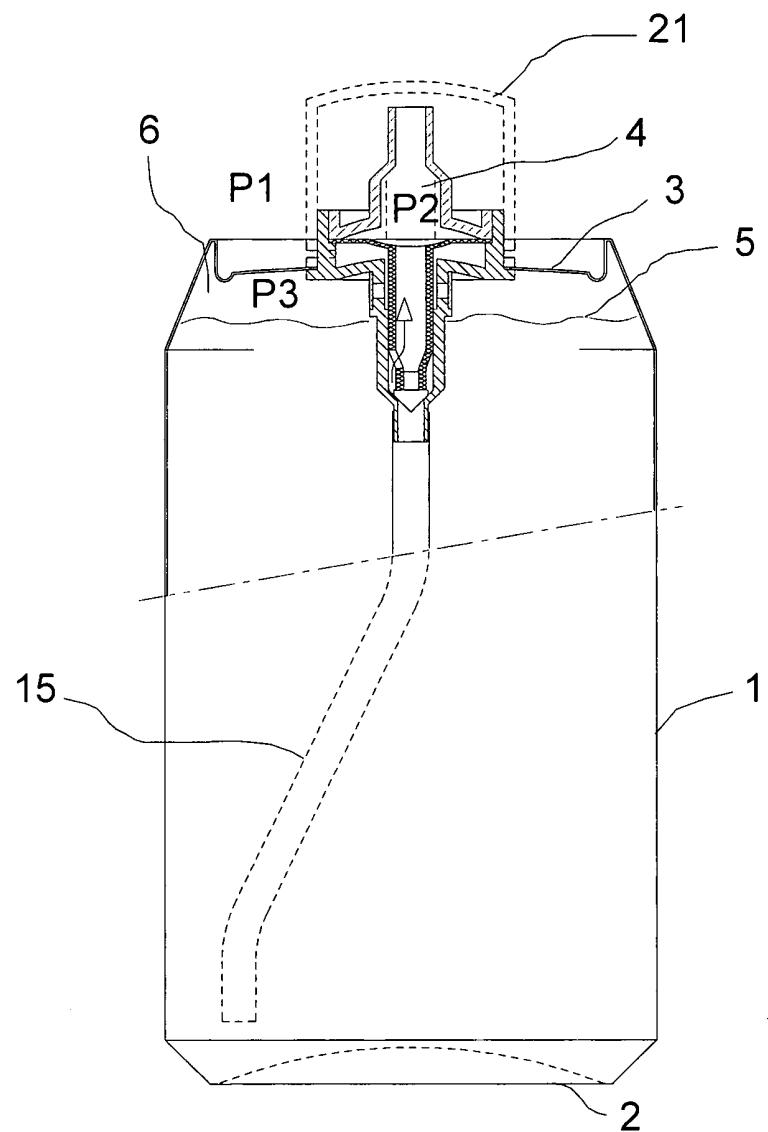
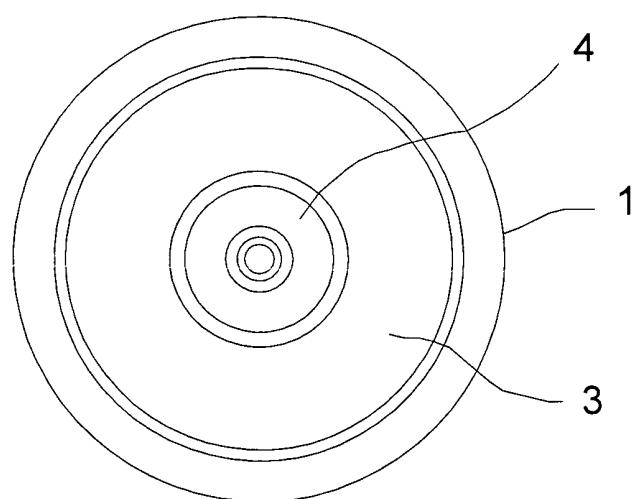
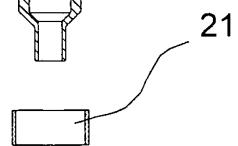
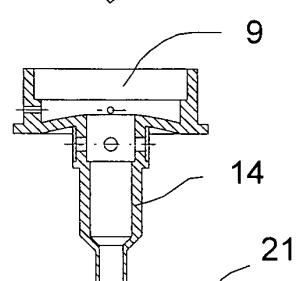
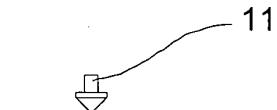
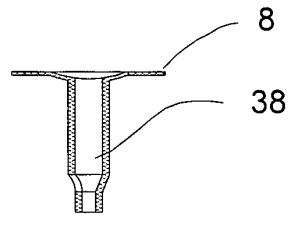
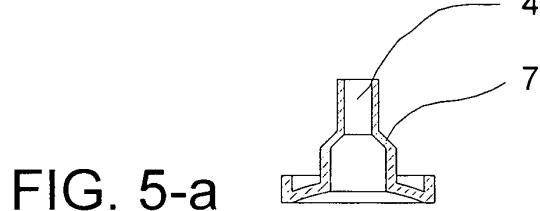
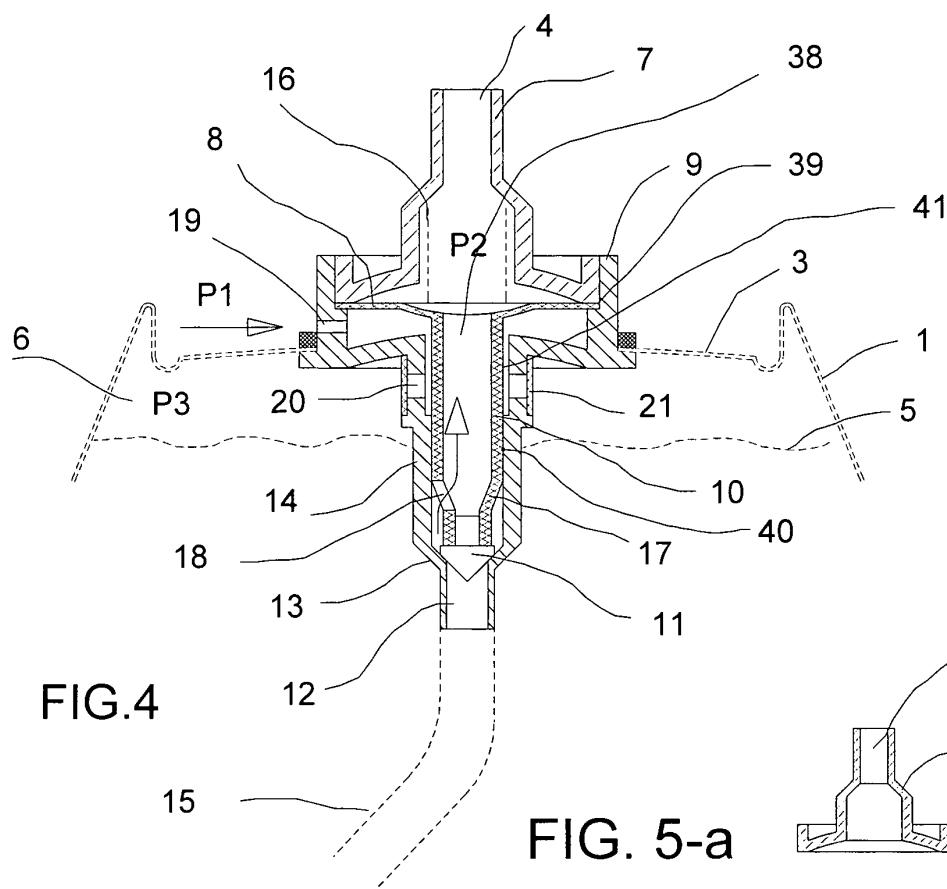


FIG. 3





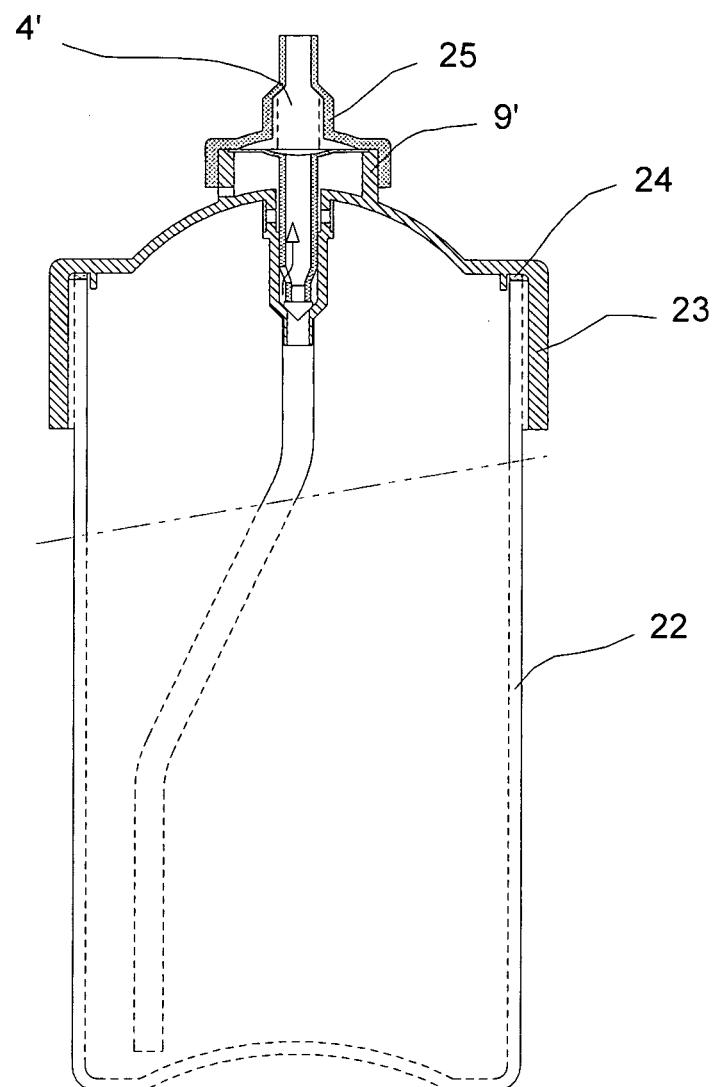
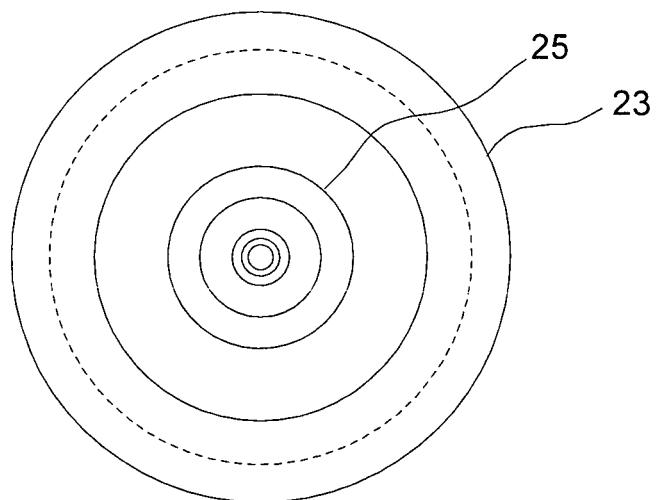


FIG. 6



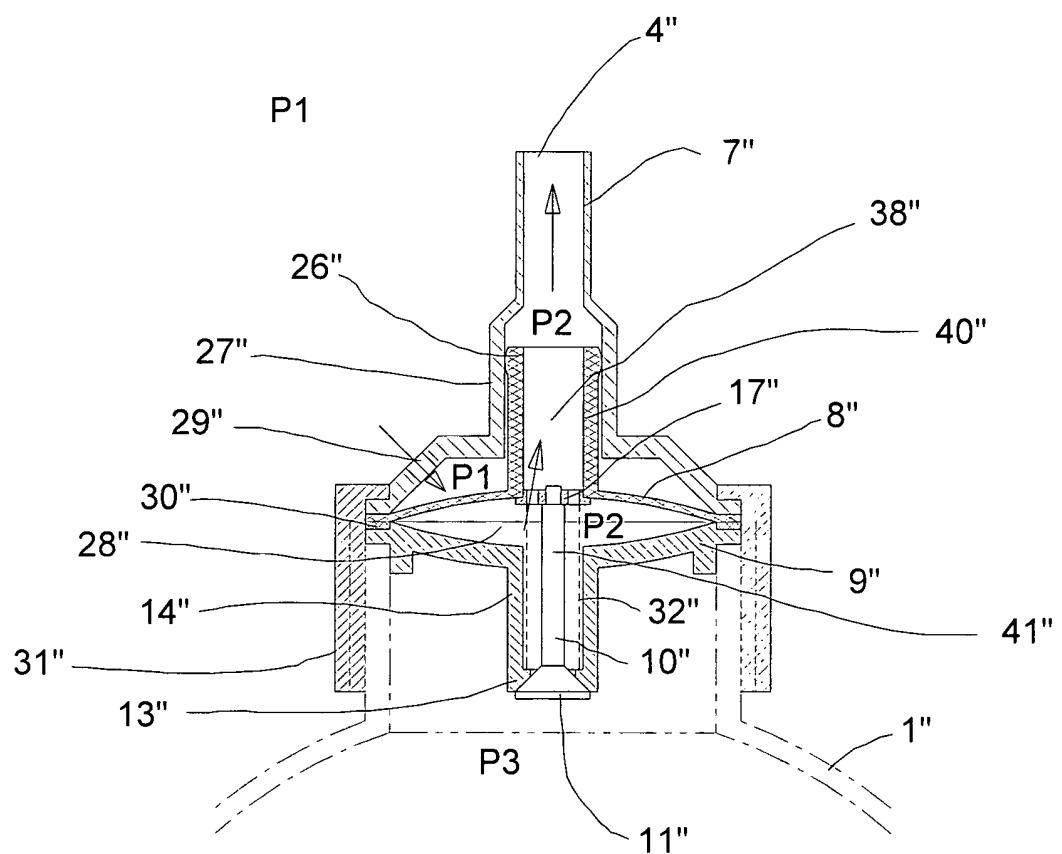


FIG. 7

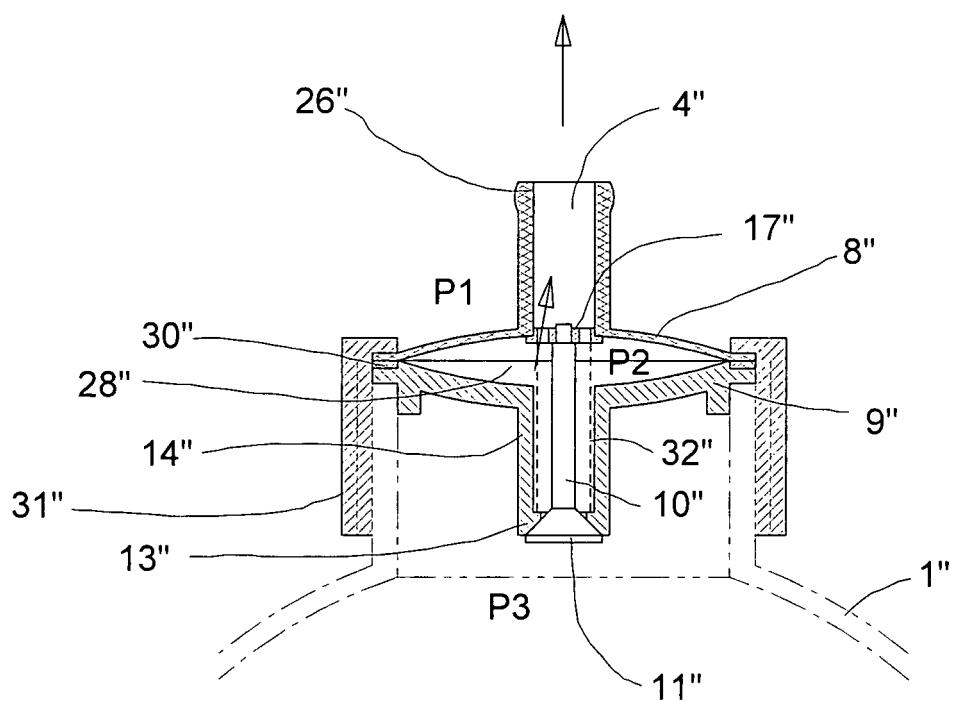


FIG. 8