



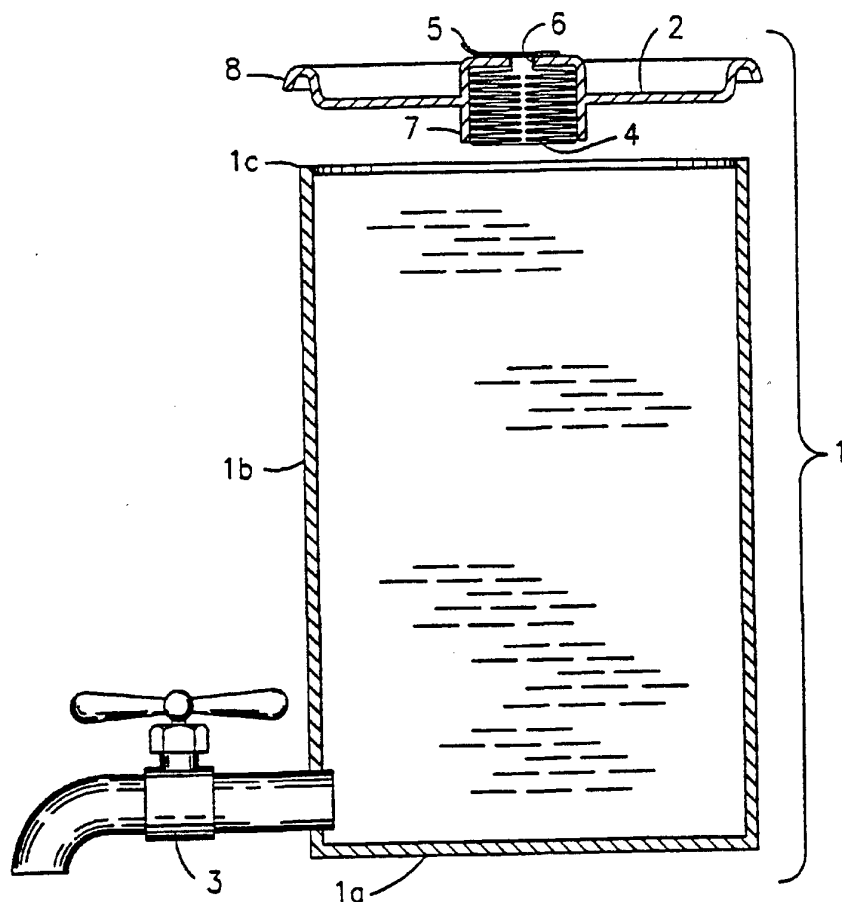
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(54) Title: DISPENSER FOR FLOWABLE MATERIALS

(57) Abstract

A flowable material dispenser comprising an enclosed volume casing (1b) having an upper (1c) and lower (1a) end enclosing a flowable material. There is a spigot (3) for withdrawal of the flowable material, and a pliable pouch (4) disposed within the casing. The pouch (4) is in communication with the atmosphere such that it expands to fill the void of the material dispensed from within the casing. The pouch thus isolates the flowable material remaining in the casing from the atmospheric air that enters the casing to replace the material which has been dispensed.



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DISPENSER FOR FLOWABLE MATERIALS

Summary of the Invention

The present invention concerns a dispenser for storing and dispensing liquids and flowable materials, and particularly liquids and flowable materials which are adversely influenced by contact with air.

Background of the Invention

A number of fluids are not stable in the presence of air, and are prone to accelerated deterioration upon introduction of air into containers in which they are contained. For example, certain fluids such as wine, fruit juices, blood or plasma and certain medications may be oxidized with atmospheric oxygen when in contact with air. In the case of medications, the oxidized form of the medication may be ineffective or even harmful. Other common liquids such as milk are very susceptible to airborne microbes. Carbonated beverages go flat, not because of reaction with the air, but simply because of the escape of carbonation into the air space above the beverage. Other materials, such as paint or glue, harden upon exposure to air. Fine powders such as sugar and non-dairy creamer tend to absorb moisture from the air and can agglomerate and lose their flowability.

For those fluids which deteriorate or are otherwise adversely affected by contact with air, once the container in which they are packaged has been opened and air introduced, the contents remaining in the container must soon be used or else discarded. As a result, it is often the case that only a portion of the contents of the container is used.

A variety of methods are available to overcome some of the foregoing deficiencies. One can purchase only fluids that come in small containers, or transfer the contents of opened larger containers into smaller containers. Such methods have drawbacks in terms of convenience, consumption of time and expense. Any method or device for overcoming the foregoing problems must be relatively inexpensive and convenient, not only to use, but in initial incorporation during manufacture and/or bottling.

The most successful solution to the problem has been referred to as the "bag in the box" technique, which involves placing the liquid to be dispensed into an inner tubular collapsible bag like

container made of plastic or other pliable material, and retaining the bag like container in a rigid housing made of cardboard, injection molded plastic or other non-deformable material. The liquid can be withdrawn from the bag through a discharge spout. An opening is provided in the "box" so that as liquid is withdrawn from the "bag", air at ambient pressure is drawn in to the space between the bag and the box, gradually collapsing the bag.

Various modifications or improvements have been made to this type of container. For example, United States Patent 4,330,066 (Berliner) teaches a receptacle comprising an outer substantially rigid container and an inner collapsible fluid-holding container. The mouths of the containers are connected. Apertures in the neck of the outer container admit air into a space between the inner and outer containers. As fluid is dispensed, the inner container collapses about the fluid which remains, minimizing the intrusion of air into contact with the fluid and isolating the fluid from air that enters the outer container. The inner and outer containers can be sealed by a cap which is fitted to close both the mouths and the side apertures.

United States Patent 4,671,428 (Spatz) teaches a body member for receiving a pouch, the body member having a pump chamber for dispensing of fluid masses such as toothpaste, lotions, chemicals and the like. The power for dispensing the fluid masses is provided by the pump.

United States Patent 4,854,483 (Haggart) teaches the provision of a carbonated beverage in a plastic bag. The bag is received inside a reinforced cardboard and plastic carton. An elastic diaphragm is used to compress the plastic bag, preserving the carbonation of the beverage. United States Patent 4,756,450 (Negaty-Hindi) utilizes resilient means such as a giant rubber band to power a disk for exerting pressure on the bag in which the carbonated beverage is contained.

United States Patent 5,135,137 (Rudick) teaches a package for dispensing carbonated beverages in micro-gravity conditions. A plastic bag is provided inside a rigid container, and a valve is provided in communication with the plastic bag and the exterior of the container. Pressurized gas is injected into a space between the rigid container and the plastic bag.

While each of the above dispensers solves some problem, each is based upon the same fundamental "bag in the box" technique, and thus each of the above dispensers is subject to the same drawbacks. First, in each of these dispensers, the fluid or flowable material is provided in a plastic or plastic like pouch or bag. In order to manufacture a fluid dispenser such as a bottle with a collapsible interior liner, it is first necessary to insert a plastic bag through the mouth of a relatively rigid container, to inflate the bag so that fluids can be inserted into the plastic container, and to provide an air-tight seal where the mouth of the inner and outer containers meet. Then, fluid must be filled into the container through the relatively narrow mouth, the container must be evacuated to insure that no air remains, and a valve or dispensing means must be attached at the mouth. The seal between the bag and the mouth is subject to stresses as the bag begins to collapse and the internal fluid causes the bag to pull against the mouth seal. This problem becomes acute as the inner volume of the container is as large as 5 gallons. The arrangement is prone to leakage, and hermeticity can not be guaranteed. Accordingly, such a dispenser is complex to manufacture, care must be used in filling so as not to damage or disarrange the delicate inner container, and isolation of fluids from air during use by the consumer can not be guaranteed.

A further problem with the above type of container is that the fluids may be stored for months or years in contact with the pliable inner container, which is usually a plastic material. A number of fluids, such as fine wines, are adversely effected by prolonged contact with plastic. Further, plastics provide nucleation sites for carbon bubbles, thus containers in which carbonated beverages are provided in contact with a large surface area of plastic would be expected to foster decarbonization of carbonated beverages.

Yet a further problem with the above techniques is that construction becomes increasingly difficult as the volume of flowable materials is increased, due to increased stresses of the weight of materials against the various seals.

Summary of the Invention

The present invention is based on a revolutionary concept which is contrary to the accepted techniques for providing

dispensers capable of isolating the flowable contents from air. In the present invention the fluids or other flowable materials are not placed into the bag of the conventional bag-in-a-box container. Rather, the fluids or flowable materials are placed directly into the container part. A deflated air-impermeable bag is placed inside the container. Vent means, preferably one-way vent means, are provided so that the bag is in communication with the atmosphere when the dispenser is in use. As fluid is dispensed from the container, air is drawn into the container through the vent means and into the bag. The fluid is isolated from the air, which is contained in the air-impermeable bag.

In a broad form, the present invention is achieved by a flowable material dispenser comprising: (a) an enclosed volume means having an upper end and a lower end for enclosing a flowable material; (b) means for withdrawing said enclosed flowable material; and (c) a pliable pouch disposed within the casing, which pouch when in use is in communication with the atmosphere, such that when withdrawal of said flowable material from said enclosed volume means causes a reduction of pressure inside said enclosed means below atmospheric pressure, atmospheric pressure will cause air to enter said bag, said bag isolating remaining flowable materials from air that enters said enclosed volume means.

The present invention is also accomplished by a process for manufacturing a dispenser containing a flowable material, said dispenser comprising a casing comprising a body and at least one end member, said body capable of receiving said flowable material and seating said end member, said casing provided with means for withdrawing flowable materials contained in said casing, and said casing provided with vent means for allowing entry of air into the interior of said casing upon withdrawal of fluids therefrom, said dispenser further comprising a pliable air-tight pouch having an interior and an exterior and a mouth, said pouch disposed within said dispenser, and said mouth of said pouch being sealed against said casing such that any air entering the casing by means of said vent enters the pouch and is isolated thereby from said flowable material, said process comprising the steps of filling said body with fluid, and seating said end member onto said body.

The foregoing has outlined rather broadly the more pertinent and important features of the present invention in order that the

detailed description of the invention that follows may be better understood and so that the present contribution to the art can be more fully appreciated. Additional features of the invention will be described hereinafter which form the subject of the claims of the invention. It should be appreciated by those skilled in the art that the conception and the specific embodiments disclosed may be readily utilized as a basis for modifying or designing other dispensing devices for carrying out the same purposes of the present invention. It should also be realized by those skilled in the art that such equivalent structures do not depart from the spirit and scope of the invention as set forth in the appended claims.

Brief description of the Figures

The present invention will become more fully understood from the detailed description given hereinbelow and the accompanying drawings which are given by way of illustration only and, thus, are not limitative of the present invention, and wherein:

Fig. 1a is a front perspective cut-away view showing the dispenser of the present invention prior to assembly of a top portion and a main body portion, with the plastic bag in a collapsed state;

Fig. 1b is a partial front perspective of the same dispenser after assembly of the top portion and main body portion and after withdrawal of a portion of the fluids of flowable materials from the dispenser, with the plastic bag partially filled;

Fig. 2 is an elevated view of the top portion of the dispenser of Fig. 1 prior to assembly;

Fig. 3 is a front perspective showing a preferred dispenser of the present invention when filled with fluid or flowable material;

Fig. 4 is a front perspective of the dispenser of Fig. 3 after partial dispensing of the fluid or flowable material;

Fig. 5 is an elevated front perspective a dispenser of the present invention in the form of a transparent bottle;

Fig. 6 is a perspective view showing the pouring of fluid from the bottle of Fig. 5;

Fig. 7 is a perspective cross-sectional view of a spray-pump type dispenser in accordance with the present invention;

Fig. 8 is a perspective cross-sectional view of a spray bottle in accordance with the present invention;

Fig. 9 is a schematic cross-sectional representation showing the filling procedure (proceeding from Fig. 9a to 9c);

Fig. 10 is a schematic cross-sectional representation showing the discharging of fluid (proceeding from Fig. 10b to 10c);

Fig. 11a and 11b show a sectional view of the container shown schematically in Figs. 9 - 11 and corresponding to the tank embodiment shown in Fig. 14;

Fig. 12 is a detailed sectional view showing the fixing of the bag to the container;

Fig. 13 shows an embodiment wherein the container is provided with an easily removable cap; and

Fig. 14 is a partial frontal view, partial frontal sectional view of the outer housing of a container which may be used in a preferred embodiment of the invention.

Detailed Description of the Invention

It is believed that the manner in which the dispenser according to the present invention is utilized will be readily apparent from the foregoing description, but the following description will serve to further explain various and preferred modes of construction and utilization.

With reference to the figures, casing body 1 is of conventional construction and may be of materials which are themselves impervious to fluids, such as glass, ceramic, metal such as aluminum or tin, or blow molded rigid, high-impact plastic such as polycarbonate, nylon or the like. Alternatively, the dispenser may be made of paper or cardboard and provided with an inner liner which renders the dispenser liquid-proof. A tubular casing may be manufactured from spirally wound cardboard strips. Container materials are well known in the art and can be readily selected by those working in the art to satisfy the demands for storage and dispensing of any given flowable material.

The dispenser may be in the form of a cylinder, a bottle, a box, a cone, an inverted cone, or any other form in which flowable materials can be stored and from which they can be dispensed. The dispenser may be the volume of a 12 oz. can, a 2 liter bottle, or an even larger container, such as a 5-gallon container for containing sauces or other flowable materials as used in the

restaurant or manufacturing trade, or any other suitable size. However, the dispenser is preferably of glass or other transparent or translucent material whereby the contents of dispenser may be viewed through at least one wall of the dispenser. As shown in Fig. 3, the dispenser is preferably provided with markings indicating the volume of liquids remaining to be dispensed. These markings facilitate the dispensing of precise amounts of flowable materials, which is of importance in, e.g., a restaurant where precise amounts of various sauces, oils, or other fluid materials must be withdrawn from dispensers.

A pliable air-impermeable or semi-impermeable membrane in the form of a pouch or bag 4, hereafter simply referred to as a bag or bag member, is provided inside the dispenser 1 and in communication with the atmosphere. As fluid is withdrawn through withdrawal means 3, a slight vacuum is created in the pliable bag, and atmospheric air is drawn into the bag. The air drawn into the dispenser is thus contained in the bag 3. The bag serves to isolate the flowable materials contained in the dispenser from the air which enters the container to fill the void left by withdrawn fluids.

In the case that the dispenser 1 is intended for reuse, the bag is constructed of a material that will be easily and readily removed from the dispenser after the contents of the dispenser have been removed. The bag 3 may be made from polyethylene, metallized polyester or any other easily deformable material used in the above-referenced "bag-in-the-box" art. The bag is the same size and shape as, or slightly larger than, the dispenser, so that it will conform with the inner contour of a dispenser when the dispenser is emptied of fluids or other materials contained therein and the bag is filled with air.

The flexible bag 3 may be made entirely of any easily deformable material. Alternatively, the bag may be provided with ribs which ensure a controlled unfolding of the bag, and to give the bag additional support when it is expanded and serve to keep the bag firmly pressed against the dispenser as the contents of the dispenser are poured from the same. In an even more preferred embodiment of the invention, the bag is in the form of a cylinder 9 which is affixed at the top end 9a to the upper end of the dispenser and which is affixed at the lower end to a rigid disk 10

or other shape having the same cross-sectional shape as the dispenser. The disk 10 may be made of a light-weight material such as plastic, or may be made of a heavier material such as ceramic, glass or metal. When desired, the casing body 1 and the disk 10 are made of a material which is substantially inert to the liquid contained in the dispenser. In this way, for example, expensive wines may be stored without fear of adverse taste due to prolonged contact with the container, and without fear of spoilage due to contact with air during storage or after opening and dispensing.

If desired, the bag 4 may be composed of material on which advertising messages may be printed or otherwise affixed. In the case that at least a portion of dispenser is transparent or semitransparent, the printed message or other display will become readily visible to the consumer after some or all of the contents of the dispenser have been dispensed and the bag is inflated. For example, the value of random prizes may be indicated on the bag, and not be visible prior to purchase but only after consumption of the contents of the dispenser.

Also, it is readily apparent that the bags can be easily removed, and by the mere changing of bags a single dispenser can be utilized to advertise a variety of contents and sources of materials.

A valve or tap 3 is provided for removing fluid or other flowable materials from the dispenser. Preferably, the tap is of a simple and economical construction, such as the construction shown in Figs. 7-9. In Figs. 7-9, a flexible or rigid tube-like member 18 is provided with one end 20 in communication with the interior of the container and the other end 24 projecting from the container. The end of tube 18 projecting from the container 1 may be provided with a simple one-way valve arrangement 25 with openings 16. As fluid pressure is applied from the container, fluid forces the front of the valve 15 to open 15a. The valve arrangement may be provided with a cap 17 to prevent discharge during shipping. The valve may be attached to a threaded orifice of the dispenser 1 by means of threads 21 on the inside and at the rim 27 of an attaching means or fitting 14. The valve member 13 may be comprised of one slit 16, or slits in the form of a cross 31 as shown in Fig. 8.

The tap 3 may be in any form, such as in the form of a drinking spout as shown in Fig. 1. Such taps and methods of providing taps on a dispenser are well known and do not independently constitute a feature of the invention. The tap has open and close positions and is preferably provided with a one-way valve to insure that no air enters the dispenser through the tap. To ensure that the tap is not inadvertently opened, a replaceable safety cap (not shown) may be provided.

Vent 6 is provided to permit the introduction of air into the inside of the bag as flowable material is withdrawn from the inside of the dispenser. Vent 6 is preferably provided with seal 5 which prevents any entry of air into vent 6 during shipping and thus minimizes any chances of leakage through either vent 6 or tap 3 during shipping. Seal 5 is removed by the consumer prior to use.

Vent 6 may also be provided with a one way valve, which is conventional and not shown in the figures, so that carbonated beverages may be withdrawn from the dispenser with the contents of the dispenser remaining under some pressure. This is different from normal carbonated beverage dispensers, where the orifice from which the fluid is to be withdrawn must be opened and pressure is released prior to dispensing the beverage. That is, in accordance with one embodiment of the present invention, as small amounts of fluids are withdrawn from the dispenser via the tap 3, some pressure may remain in the dispenser. On the other hand, if during withdrawal of carbonated beverage the pressure inside the dispenser of the present invention is reduced to below atmospheric pressure, air will be drawn into bag. As pressure begins to build back up in the dispenser, the one way valve prevents egress of air from the bag. The presence of the air-filled bag has two effects: first, it takes up space and thus reduces the amount of carbon dioxide or other gas which can escape from the fluid, and second, it prevents contact of the fluid with air. This prevention of contact with air is important in the case of carbonated beverages, since the partial pressure of carbon dioxide in the atmosphere is low, and the carbon dioxide would show an increased tendency to leave the fluid for the air.

In an alternative embodiment as shown in Fig. 5 and 6, a bottle may be provided with a one-way mouth fitting 12. In order to show vent 6 and tab 5, a bag is not shown, but is provided in

the same manner as in the Fig. 1a. As the container is inverted and fluid flows out through the one-way mouth fitting 12, air enters the bag (not shown) through vent 6. Vent 6 is preferably provided with a one-way valve in order to contain air in the bag.

In more complex embodiments of the invention, water or other pressurized gaseous or liquid may be introduced into the bag for the purpose of pressurizing the bag as fluids are dispensed from the dispenser, so that the contents of the dispenser may remain under pressure at all times or at least when stored.

In the embodiments shown in Figs. 10 and 11, the parts which are identical to prior figures are not numbered. In Fig. 10 spray nozzle 32 is provided in association with trigger pump 33 and tube 34 in a conventional manner. As fluid is sprayed from the dispenser, air is drawn through vent 6 into bag 4. Fig. 11 is a dispenser capable of spraying fluids, such as paint, under high pressure. A conventional spray nozzle 35 is provided on the container. Means are provided for introducing a gas or fluid under pressure, which may be a simple pump attached directly to and integral with the casing. A pump 36, such as a conventional piston pump as shown, or a squeeze-ball pump, or an electrical pump, or a carbon dioxide cartridge, or other means for providing pressure, is attached to the container for introducing fluid or gas under pressure into bag 4. Such means are well known to those working in this art as shown in, e.g., United States Patent 5,135,137 and need not be discussed in detail here. One way valve 37 insures that the pressure generated by the pump or pressure providing means is retained in the dispenser chamber. This embodiment is particularly preferable where it is desired to use air to propel fluid through nozzle 35, but the fluid is one which is adversely affected by air. For example, for the dispensing of paint, high pressure must be used to force the paint through nozzle 35. However, air adversely effects the storage stability of paint. In accordance with the present invention, the paint is insulated from the air by means of the bag 4.

The flowable material containing dispenser of the present invention can be manufactured using much simpler process than heretofore possible. In a preferred embodiment of the present invention, the empty dispenser is provided to a packager or bottler in two parts: the casing body which preferably is provided with the

valve or tap for dispensing fluids, and which has at least one opening adapted to seating an end member and through which opening flowable materials may be received into said casing body, said opening preferably being horizontal and at the uppermost portion of the casing body, and an end member which is provided with a vent hole and a pliable bag member on the side of the end member which will be on the inside of the dispenser, said pliable bag member having a mouth, an inner surface and an outer surface, the mouth being sealed against the end member. Preferably said end member 2 is manufactured from plastics by an injection molding or other suitable technique and has means formed integrally therewith to locate and lock it in its fitted position on the casing. For example, said locking means may be inwardly directed detente members equispaced around the periphery of a lip of the member intended to engage corresponding recesses or apertures in the casing near its end. Alternatively said locking means may comprise an inwardly directed resilient flange on the end member intended to engage a circumferential groove formed in the casing near its end. Alternatively, the locking means may be of the type used to place the lids onto cans in the canned beverage industry.

With reference to Figs. 1a, 1b, and 2, the casing body 1 to be filled can be placed under a filling machine where the fluid product is dispensed directly into the casing body. Seating of the end member 2 on the casing body insures the expulsion of any air. When the end member 2 is affixed to the casing body 1, it squeezes rim 7 against the outer rim of the opening of the casing body 1c thus forming an air-tight seal therebetween. Clearly a method of this type is suitable in an automated filling operation.

When it is desired to dispense liquid from dispenser, seal 5 is peeled off and tap 3 is opened. In the case that dispenser 1 is provided with a capped orifice instead of a tap, the cap may be replaced by any conventional dispensing means such as tap prior to use. For example, the casing body may be provided with an orifice having convoluted threads, and a tap would screw onto the convoluted threads of the casing body in a manner to maintain the air-tight seal at the orifice.

According to a further aspect of the present invention there is provided a dispenser for liquids including an outer tubular casing, a one-way orifice for dispensing liquids, and a deflated

bag within the casing but in communication with the atmosphere when in use. The dispenser is in the shape of a bottle with the dispensing orifice on the top of the bottle. When the bottle is inverted for pouring, fluid flows out of the mouth of the bottle and air flows through vent means into the bag, inflating the bag but not contacting the fluid. As the bottle is set upright, the one-way valve is closed, such as by atmospheric pressure pressing against the one-way orifice. A cap may be placed over the orifice. The vent through which air passed into the bag may be provided with a one-way valve so that the fluid in the bottle can not dispel air from the bag back out through the vent.

The manner in which the bag is fitted to the dispenser is not particularly important. The bag may be disposed along one side of the casing, or substantially across one end member of the casing. In the embodiment illustrated in Fig. 1a, bag 4 is folded and contained within a recess 7 built into end member 2. Such an arrangement keeps bag 4 out of the way during the manufacturing process.

A further advantage of the present invention is that the bag of the present invention is filled by atmospheric pressure. The atmospheric pressure will act to open any folds in the bag.

Fig. 9 shows the filling of a more rugged, large scale embodiment of the invention which is particularly suitable for the storage and pumping of volatile or flammable fluids, or substances which are gaseous under atmospheric pressure but which can be pressurized and stored in a liquid state. The container comprises a casing 38, an air pump 39, and a bag member comprising a flexible tubular member 40 and a rigid disk 41. The tubular member is constructed of an impermeable material which is also resistant to any fluid for which the container is intended to be used. The tubular member may be a bag to which disk 41 is attached; however, in practice a tubular section of impermeable material is easily obtained and secured to disk 41 by, e.g., a metal gasket and metal fasteners. One end of the rim of the tubular member 40 is attached to the rim of disk 41 in an air-tight manner. The other end of the tubular member is attached to the inside of the casing 38, approximately horizontally to define an impermeable separation of an upper chamber and a lower chamber. The tubular flexible membrane is sufficiently long to permit the disk to touch the floor

of the casing when the lower chamber is evacuated of fluids, and long enough to permit the disk to reach near to the ceiling of casing 38. Additional elements include an evacuator hose 42, inlet means 43 for introducing fluids and outlet means 44 for withdrawing of fluids. In the embodiment shown in Fig. 9 the disk is in the shape of an overturned bowl. The disk may be a variety of shapes and geometries, but an advantage of this shape is that any air or gas in the fluid rises and is channeled to evacuator hose 42, and any fluids to be withdrawn are drawn downward to outlet means 44. Thereby the accumulation of stagnant fluids or gasses is avoided.

In operation, liquid 45 is first filled into the lower chamber of casing 38 as defined by disk 41. Air or gas in the lower chamber is vented or evacuated through evacuator hose 42. Air in the upper chamber is vented or evacuated through pump 39 either passively as pressure in the upper chamber exceeds atmospheric pressure, or actively with the aid of the pump 39. Fig. 9a shows the procedure in the starting position. Fig. 9b shows the filling procedure at the half-way stage. Fig. 9c shows the filled container.

Once the container has been filled, fluid inlets and outlets and the evacuation hose are closed off and air is forced into the upper chamber by and a pressure is built up. The pressure may vary depending upon the particular requirements, and may be a low pressure when mere pumping of non-volatile fluids is desired, or may be under several or several tens of atmospheric pressures when it is desired to store a compressed, liquified gas such as propane or butane, or to pump under high pressure such as in fire-fighting equipment or agricultural equipment. The air pressure in the upper chamber pushes down on the disk 41 to cause fluid or fluidized contents to be discharged through either discharge outlet 44 or through evacuator hose 42.

Figs. 11a and 11b show a sectional view of the container shown schematically in Figs. 9 - 11 and corresponding to the tank embodiment shown in Fig. 14. In Figs. 11a and 11b metal fasteners 46 can be seen as a means for fixing one end of flexible tubular member 40 to the mid-section of casing 38. A "U" shaped gasket may be provided between the metal fasteners 46 and tubular flexible member 38. As shown in greater detail in Fig. 12, metal fasteners 46 may be comprised of a bolt 49 and a nut 50. Figs. 11a and 11b

substantially correspond, but show a first disk construction wherein the lower surface of the disk is concave and the top is convex (Fig. 11a), and a second disk construction wherein the bottom is concave and the top is flat (Fig. 11b).

Also shown in Figs. 11a and 11b and Fig. 14 is an embodiment of the invention in which the casing is not constructed entirely of a rigid material such as metal. Rather, the container is divided into a generally rigid upper section 54, a generally rigid lower section 55, and an elastic, resilient generally tubular section 53 which can be fastened to upper and lower casing sections 54, 55 by means of, e.g., metal bands 51, 52. The two main varieties of this preferred embodiment include:

(a) an embodiment wherein the material 53 is a semi-hard but resilient elastic material such as rubber. This embodiment is adapted to cope with materials such as volatile liquids which may tend to expand. Further, the elastic construction minimizes vertical impacts and shocks to the fluid. The material is preferably uniaxially constructed so as to be able to expand only in the axial or upward direction, and not in the radial or outward direction.

(b) an embodiment wherein the material 53 is constructed in the manner of an accordion, to permit the container to be expanded when it is desired to accommodate a greater amount of materials, and to permit the container to be condensed when, e.g., the fluid is expended and it is desired to minimize the size of the casing, as in the conditions where the casing is used on fire trucks, agricultural equipment, as a fire fighting material container for use under a fire-fighting helicopter, etc. In this case, the pumping effect of the container is advantageous in that only a small pump is required to build up pressure, and pressure is stored not only by compressed air, but also by stretching of resilient material 53.

Fig. 14 further shows that a manhole cover can be provided for access to the upper chamber.

A further construction possibility of the invention is shown in Fig. 13, wherein the casing is divided into an upper rigid section 58 and a lower rigid section 59. The upper and lower sections are adapted to mating flush with each other, and can be secured to each other by means of buckles or snap lock fasteners

61. The tubular member 38 can be attached to the casing by insertion of one end into a "U" shaped gasket corresponding to the mating surfaces of upper and lower casing sections 58, 59, so that an air-tight seal is formed between the upper and lower casing sections 58, 59, the gasket 60, and the flexible tubular member 38 upon fastening of the fastener means 61.

The container and disk may be used in either an upright or a horizontal or an intermediate orientation.

The disk may be made of any

Various modifications can be made without departing from the scope of the invention. In a further modification the end members can have any suitable shape and means for fixing them to the casing. Various alternative end member, bag and tap arrangements can be employed and the casing body can have a different initial shape. The means for attaching the end member to the casing can be modified; for example, it could be glued to the inner surface of the casing at or near one end thereof.

Although the dispenser was first designed for dispensing of fluids, and thus is particularly suited for dispensing precise amounts of fluids which are adversely effected by air, it will be readily apparent that the dispenser is capable of dispensing all manner of flowable materials, such as sugar, non-dairy creamer, paint, etc., and is thus capable of use in a number of industrial applications. Although this invention has been described in its preferred form with a certain degree of particularity with respect to dispensing of fluids, it is understood that the present disclosure of the preferred form has been made only by way of example and that numerous changes in the details of structures and the arrangement of the casing, tap, end member, bag and vent member may be resorted to without departing from the spirit and scope of the invention.

Now that the invention has been described,

I claim:

1. A flowable material dispenser comprising:
 - (a) a casing for enclosing a flowable material, said casing having at least one end member which is fixed in use to the casing;
 - (b) a pouring tap in communication with said enclosed flowable material; and
 - (c) an at least partially deflated pliable bag member disposed within the casing, with one side of said bag in communication with the inside of the container and the other side of said bag in communication with the atmosphere.
2. A flowable material dispenser as in claim 1, wherein said pliable bag member is in communication with the atmosphere by means of a one way valve.
3. A flowable material dispenser as in claim 1, wherein said pouring tap is provided with a one way valve.
4. A flowable material dispenser as in claim 3, wherein said one way valve is at least one flap within said pouring tap to impede backflow of air into said bag.
5. A flowable material dispenser as in claim 1, wherein said bag member is provided with printing or illustration.
6. A flowable material dispenser as in claim 1, wherein said bag member includes a rigid portion having a geometry corresponding to the internal cross-section of the material dispenser.
7. A flowable material dispenser as in claim 1, wherein at least a portion of the casing is constructed of a resilient elastic material capable of stretching in at least one direction to increase the internal volume of the flowable material dispenser.
8. A flowable material dispenser comprising:
 - (a) an enclosed volume means having an upper end and a lower end for enclosing a flowable material;
 - (b) means for withdrawing said enclosed flowable material; and
 - (c) a pliable membrane in the shape of a bag disposed within said enclosed volume means, said membrane having an inner surface, an outer surface, and a mouth sealed to said enclosed volume means, the inner surface of the membrane when in use being in communication with the atmosphere by means of a vent through said enclosed volume means, such that when withdrawal of said flowable material from said enclosed volume means causes the pressure in the

enclosed means to drop below atmospheric pressure, atmospheric pressure will cause air to enter said bag, said bag isolating remaining flowable materials from air that enters said enclosed volume means.

9. A process for manufacturing a dispenser containing a flowable material, said dispenser comprising a casing comprising a body and at least one end member, said body capable of receiving said flowable material and adapted for seating said end member, said casing provided with means for withdrawing flowable materials contained in said casing, and said casing provided with vent means for allowing entry of air into the interior of said casing upon withdrawal of fluids therefrom, said dispenser further comprising a pliable air-tight pouch having an interior and an exterior and a mouth, said pouch disposed within said dispenser, and said mouth of said pouch being disposed against said casing such that any air entering the casing by means of said vent enters the interior of said pouch and is isolated thereby from said flowable material,

said process comprising the steps of filling said body with flowable material, and seating said end member onto said body to form an air-tight seat.

10. A flowable material dispenser comprising:

(a) a casing for enclosing a flowable material, said casing having at least one end member which is fixed in use to the casing;

(b) a spray nozzle in communication with said enclosed flowable material;

(c) an at least partially deflated pliable bag member disposed within the casing and in communication with a means for providing a fluid or gas under pressure.

11. A flowable material dispenser as in claim 10, wherein said pressure providing means is a hand operated air pump.

12. A flowable material dispenser comprising:

(a) a casing for enclosing a flowable material, said casing having at least one end member which is fixed in use to the casing;

(b) a hand pump spray nozzle in communication with said enclosed flowable material; and

(c) an at least partially deflated pliable bag member disposed within the casing and in communication with the atmosphere.

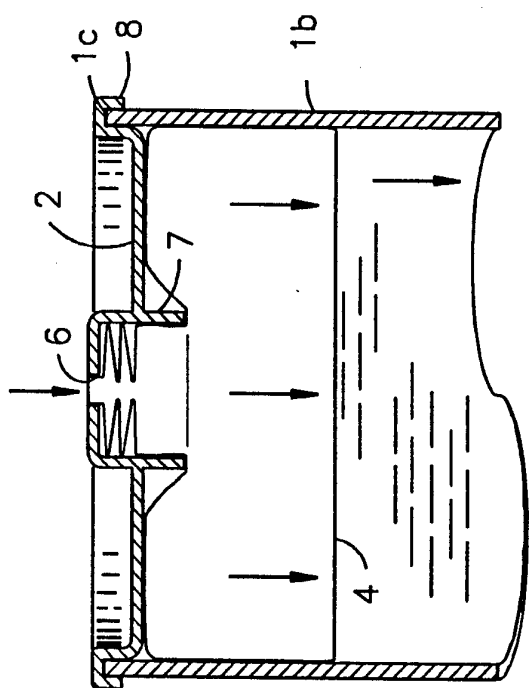


Fig. 1b

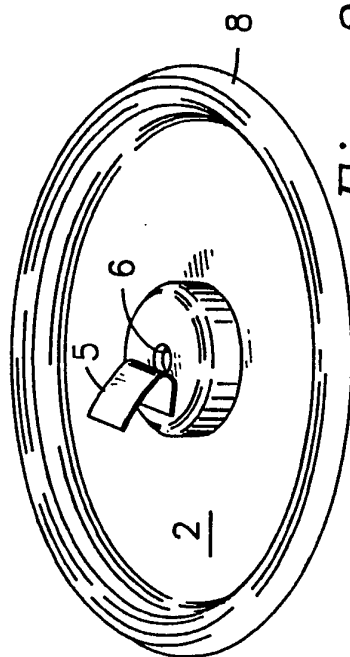


Fig. 2

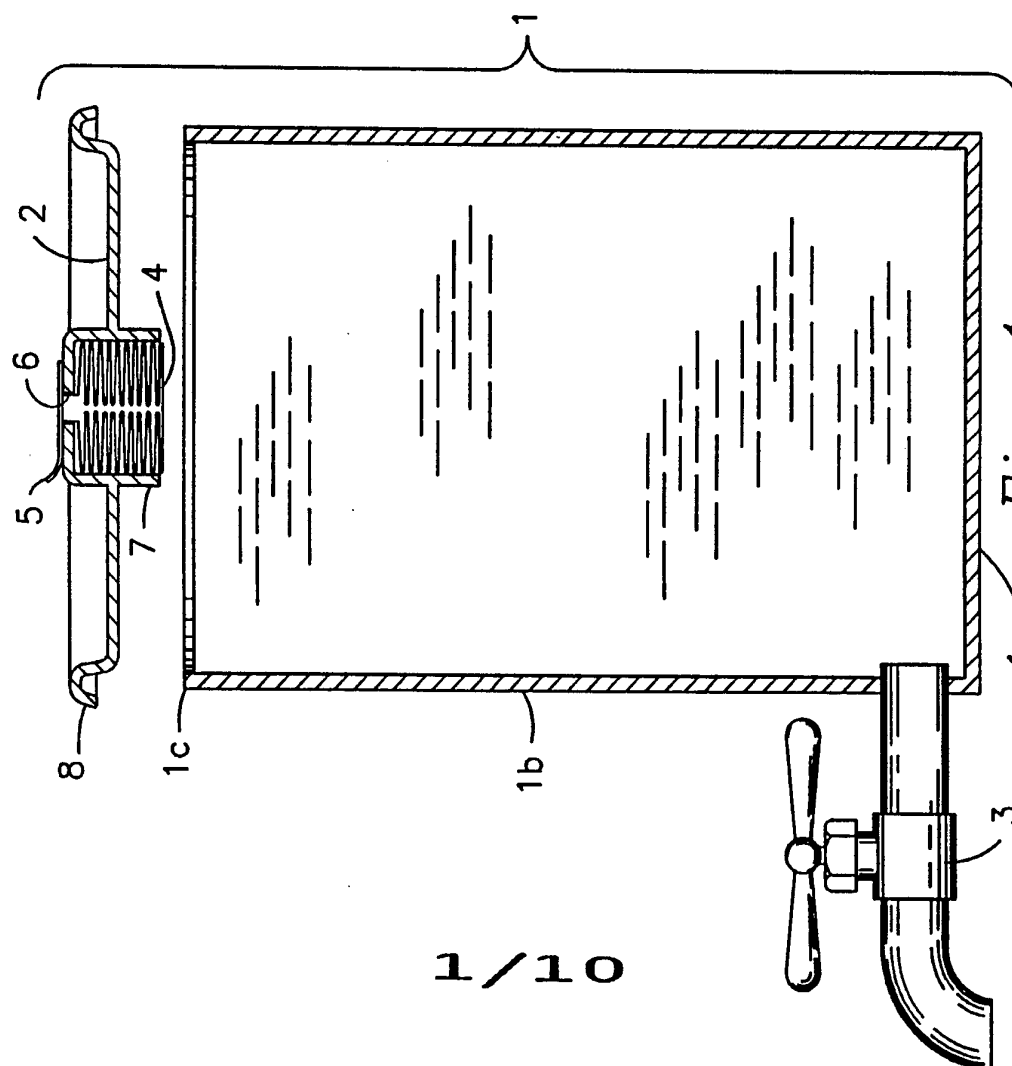


Fig. 1a

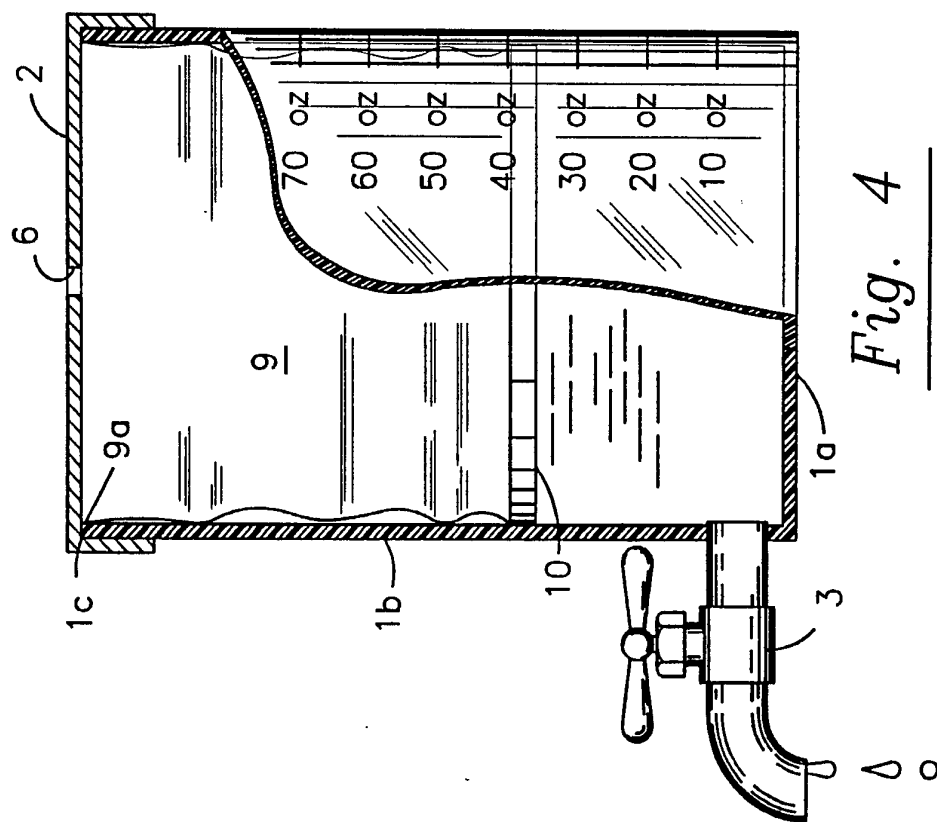


Fig. 4

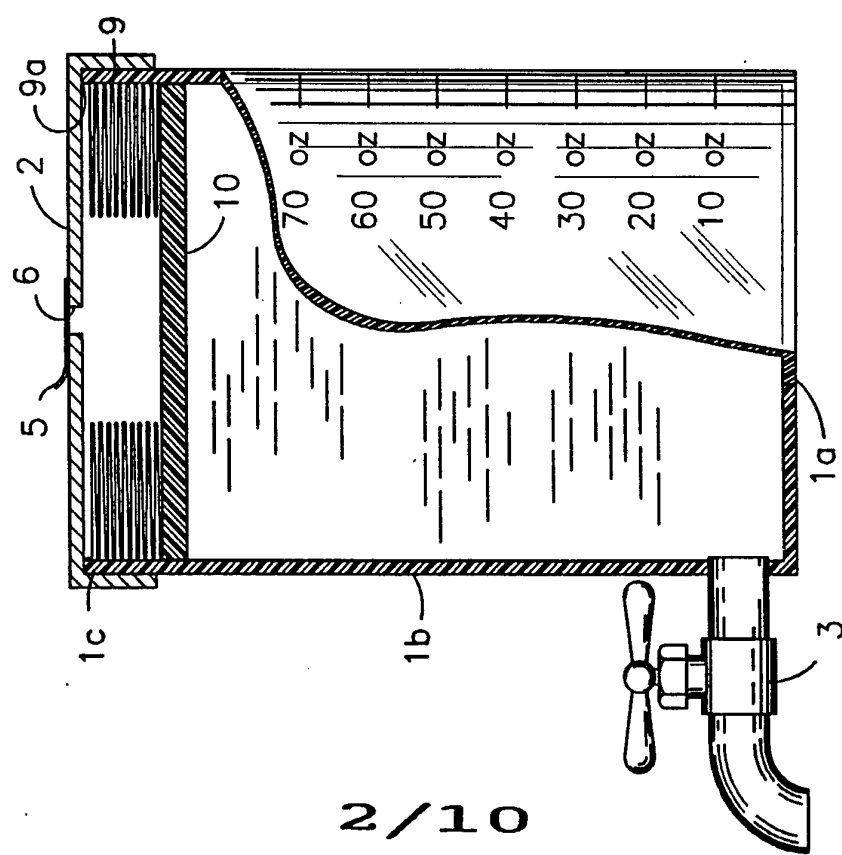


Fig. 3

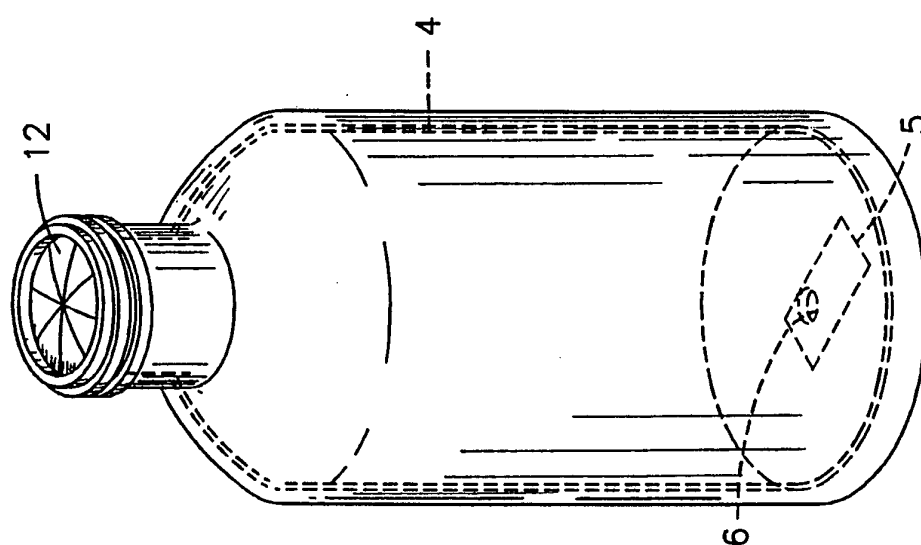


Fig. 5

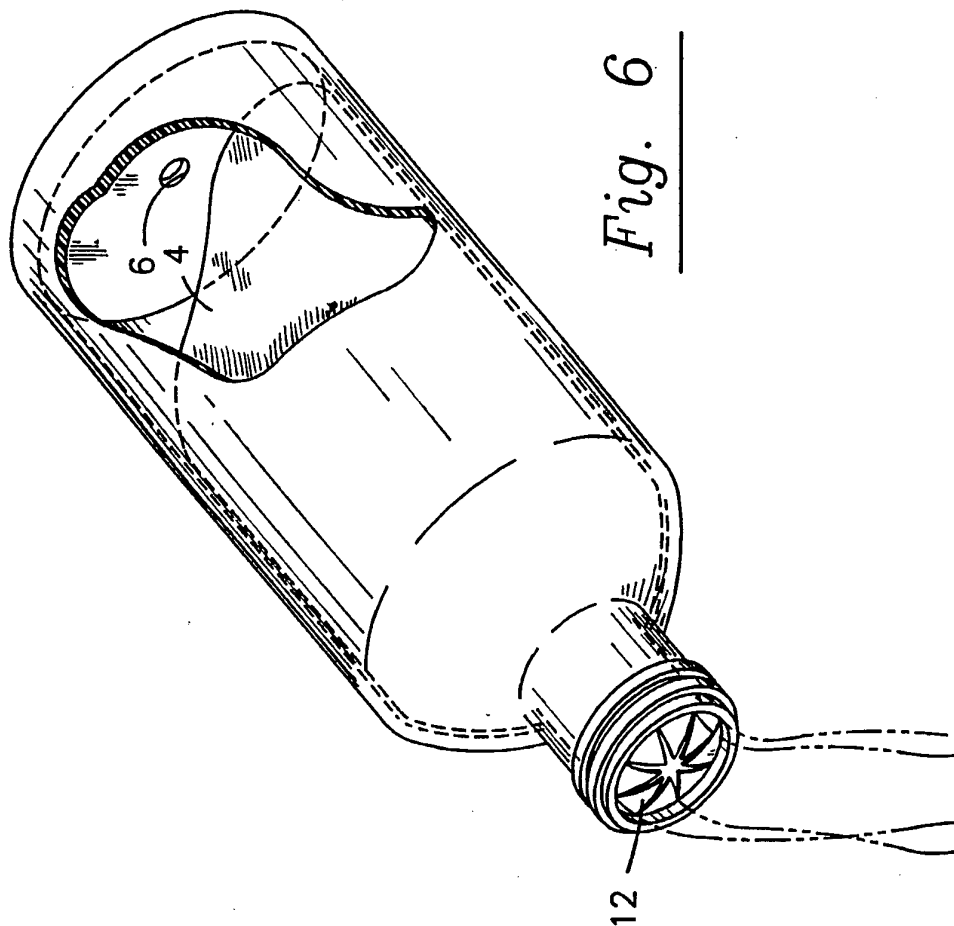


Fig. 6

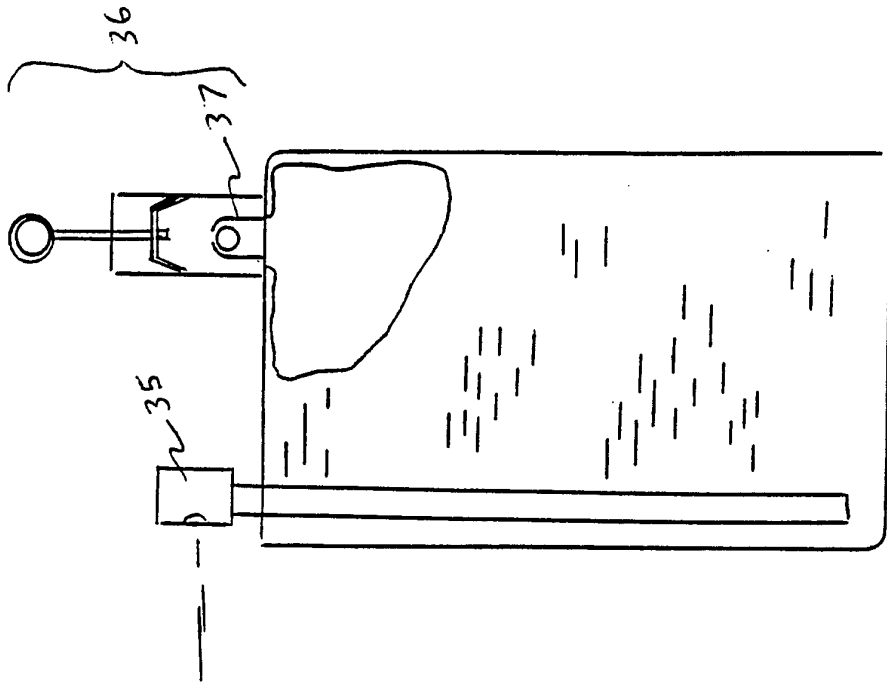


Fig. 8

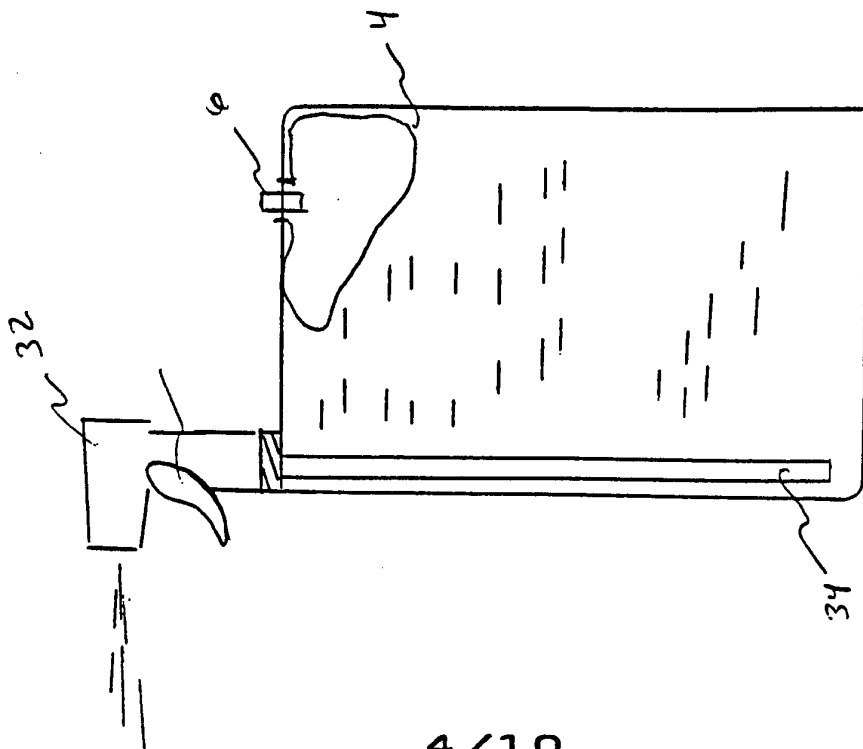


Fig. 7

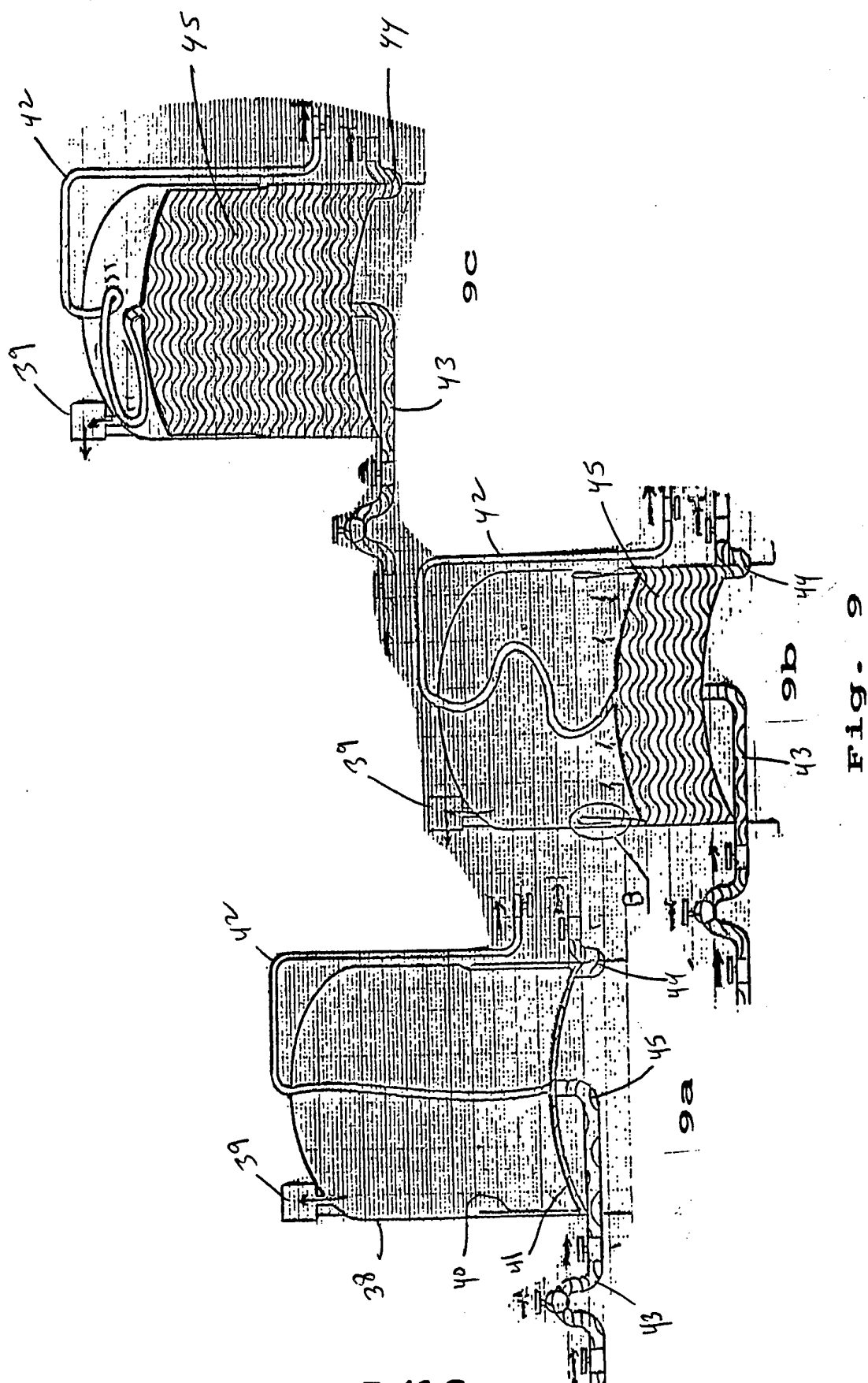


Fig. 9

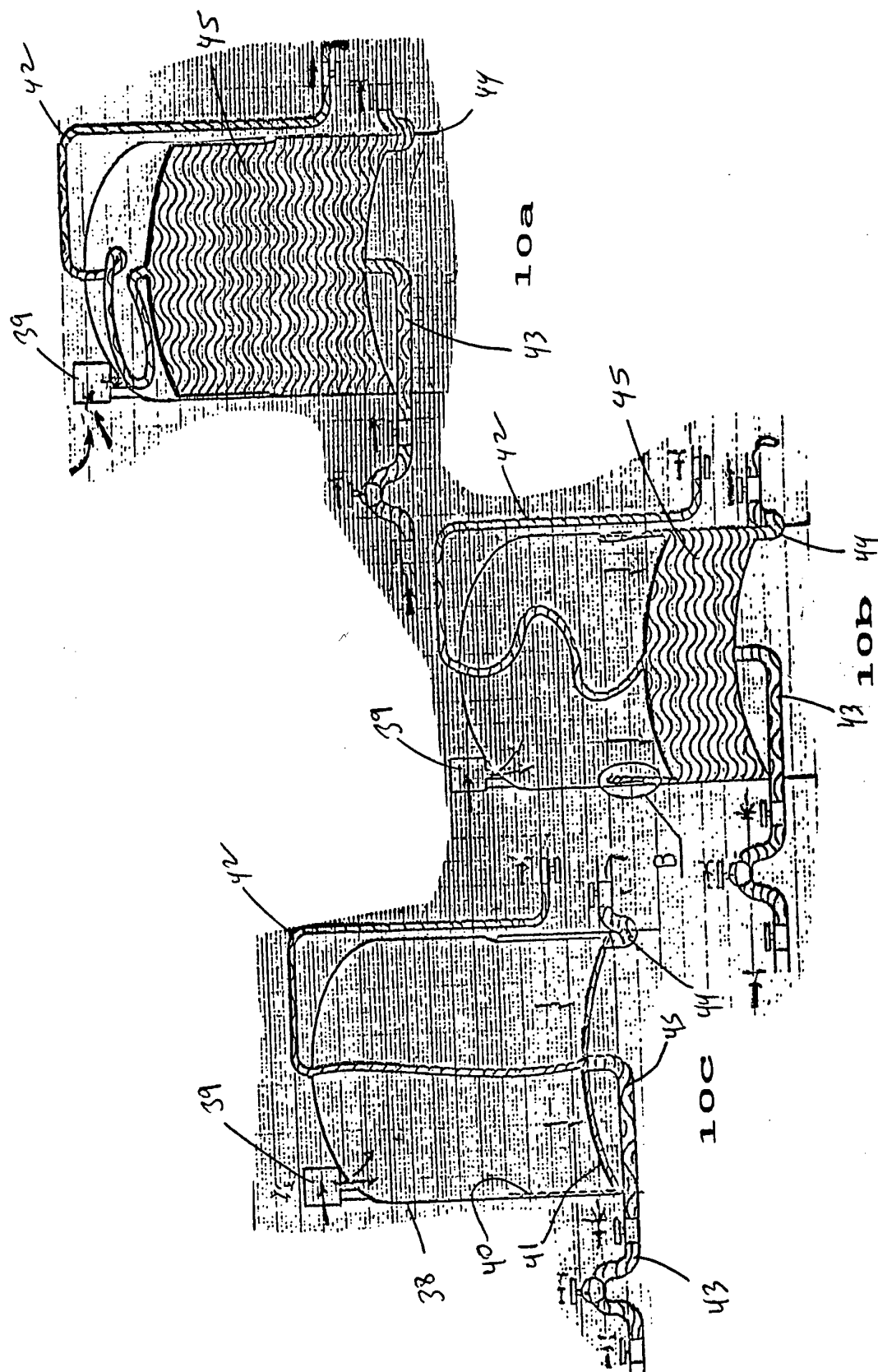


Fig. 10

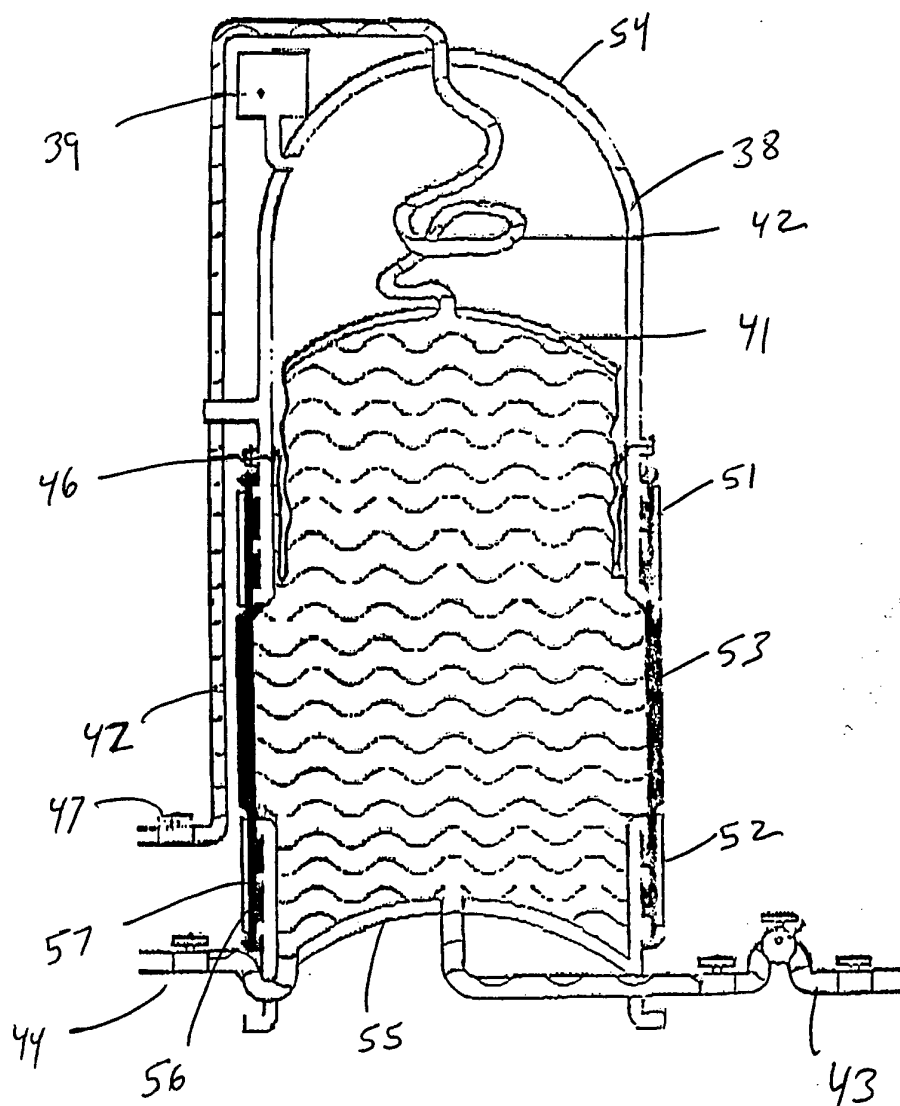


Fig. 11a

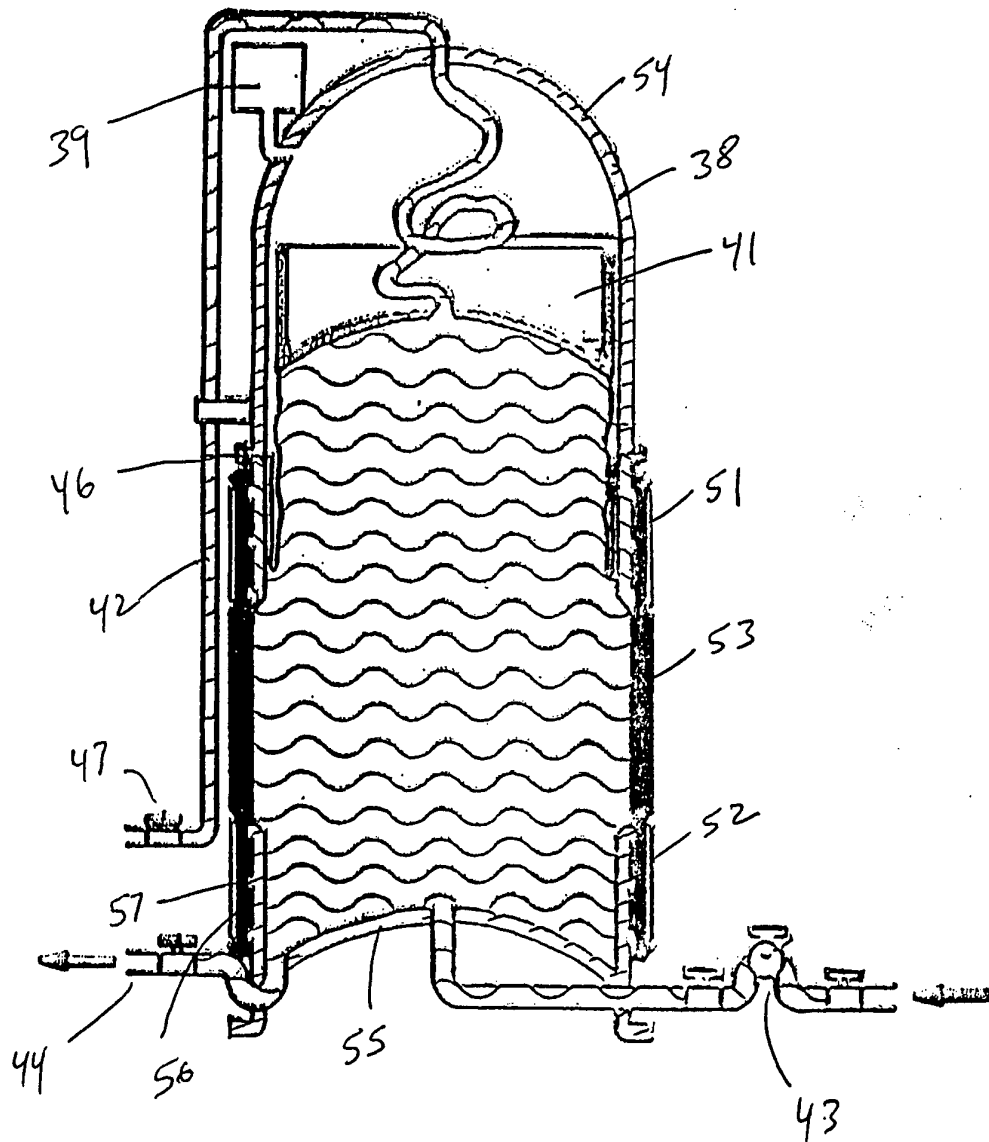


Fig. 11b

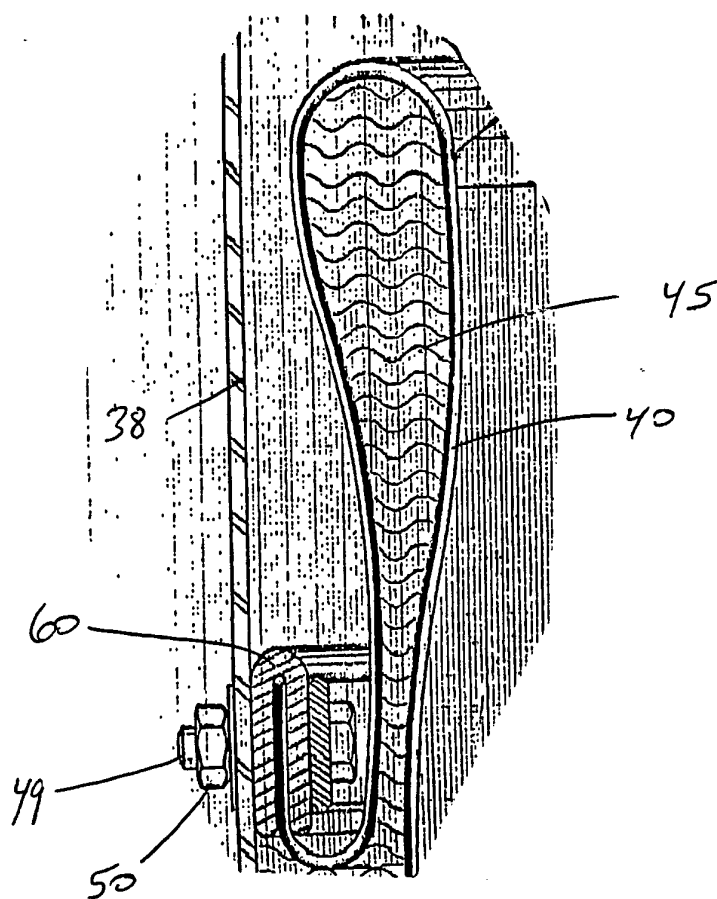


Fig. 12

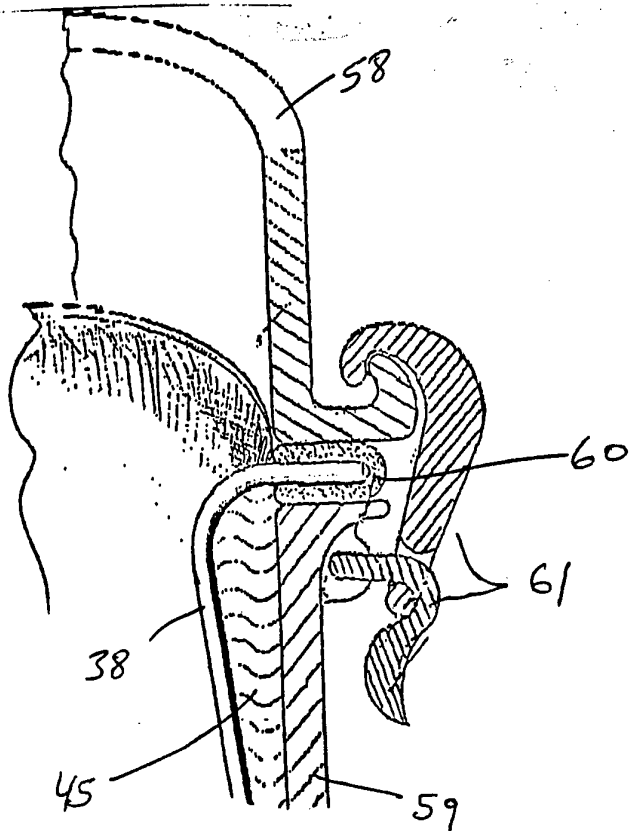


Fig. 13

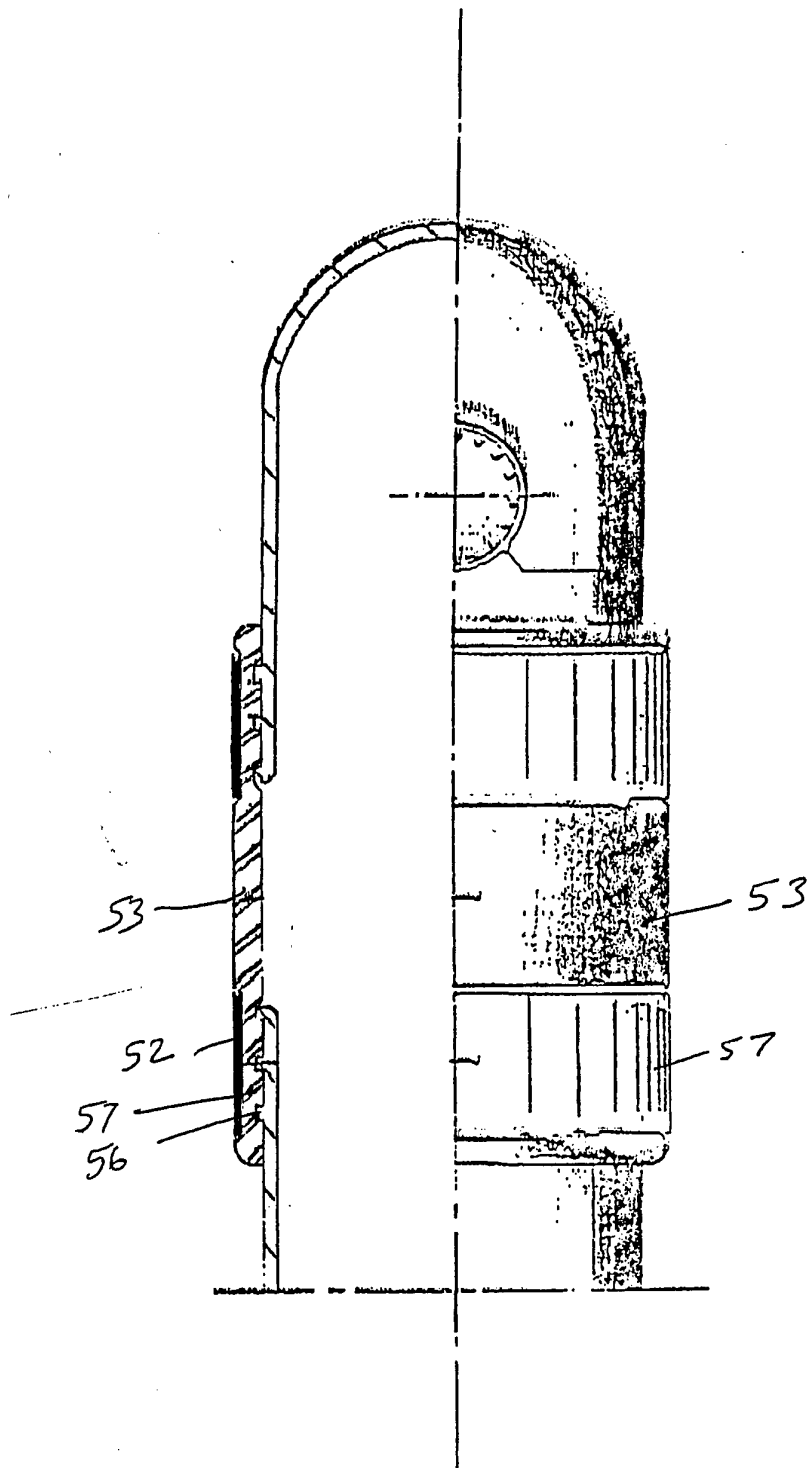


Fig. 14

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US94/09283

A. CLASSIFICATION OF SUBJECT MATTER

IPC(5) :B67D 5/42; B65B 7/00

US CL :222/386.5; 53/471

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)

U.S. : 222/158, 185, 212, 386.5, 478, 494; 53/471,473; 137/903

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

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

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, A, 4,723,688 (Munoz) 09 February 1988, see the entire document	1-3, 8 ----- 4-7, 9-12
Y	US, A, 5,108,007 (Smith et al.) 28 April 1992, see the entire document	4
Y	US, A, 5,067,501 (Auger) 26 November 1991, see the entire document	5
Y	US, A, 4,886,189 (Vanderjagt) 12 December 1989, see the entire document	6, 7
Y	US, A, 5,180,085 (Schmid) 19 January 1993, see the entire document	10-12
Y	US, A, 4,771,918 (Haggart) 20 September 1988, see the	9

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:	"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
"A" document defining the general state of the art which is not considered to be of particular relevance	"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
"E" earlier document published on or after the international filing date	"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
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"I" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

18 NOVEMBER 1994

Date of mailing of the international search report

DEC 02 1994

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US94/09283

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US, A, 4,828,126 (Vinciguerra) 09 May 1989	
A	US, A, 5,060,826 (Coleman) 29 October 1991	
A	DE, A, 33 39 877 (Miller) 10 May 1984	