(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

PCT

(43) International Publication Date
7 February 2008 (07.02.2008)

(10) International Publication Number
WO 2008/014605 A1

(51) International Patent Classification:
*B67B 7/86* (2006.01) *B65D 75/58* (2006.01)
*B65D 47/06* (2006.01) *B67B 7/20* (2006.01)

(21) International Application Number:
PCT/CA2007/001344

(22) International Filing Date: 30 July 2007 (30.07.2007)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/834,458 31 July 2006 (31.07.2006) US

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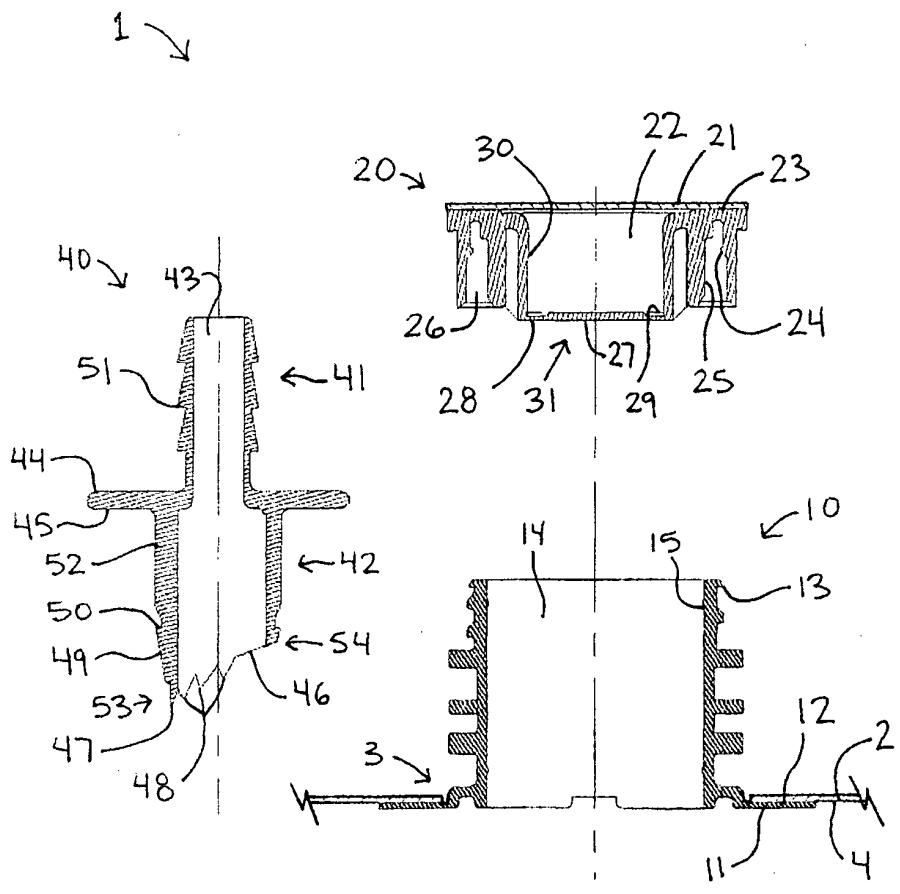
(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM,

*[Continued on next page]*

(54) Title: A PIERCING FITMENT ASSEMBLY




(57) Abstract: An improved piercing fitment assembly for mounting to a flexible container is provided, whereby the contents of the container are dispensed by piercing a pierceable portion of a cap using a fluid transfer device. The piercing fitment assembly is easy to use as a relatively minimal amount of force is required for piercing and establishing fluid transfer. It also has a locking system which locks the fluid transfer device into a dispensing state and also forms a reliable seal between the cap and the fluid transfer device which minimizes the risk of unwanted spillage. The fitment assembly comprises: a spout connected in fluid communication to the container; a cap having a pierceable portion sealing an end of the spout and a fluid transfer device having a leading tooth to initiate piercing of the pierceable portion of the cap.

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ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

**Published:**
— *with international search report*

# A Piercing Fitment Assembly

## RELATED APPLICATION

[0001] This application claims the benefit of U.S. Provisional Application No. 60/834,458, filed on July 31, 2006, entitled "A Piercing Fitment Assembly", with listed inventor, James W. Johnson. The entire teachings of the above application are incorporated herein by reference.

## FIELD OF INVENTION

[0002] This invention relates to a piercing fitment assembly for use with flexible containers for flowable materials, such as liquids, and including aseptically-packaged flexible containers.

## BACKGROUND OF THE INVENTION

[0003] Flexible polymeric containers are extensively used throughout the food service industry for storing and dispensing soft drink syrups and other such beverages, as well as wine, dairy products, enteral feeding solutions, fruit juices, tea and coffee concentrates, puddings, cheese sauces, and many other flowable materials, including those that must be filled aseptically. Flexible polymeric containers typically have walls made of polymeric films with either a monolayer or multiple layer structure. The particular polymers constituting the container film layers vary depending on the type of material to be placed in the container. The film layers may also include an oxygen barrier material layer to prevent contact between such materials and oxygen or other gas sensitive contents. The walls of the containers may be metallized, or coated with a metallic layer such as aluminum to prevent incursion of oxygen or other gases.

[0004] The flexible polymeric containers may have inlets and/or spouts for filling and dispensing the container contents. The containers are also often placed within a corrugated paper box. Such packaging systems are commonly referred to as "bag-in-box" systems wherein the spout extends through an opening in the box to dispense the contents. Bag-in-box packaging systems are often used in restaurants, institutional food service centres, and convenience stores to facilitate service of liquid food products such as syrups, toppings, condiments, beverages and dairy products. These containers typically have a capacity of 1 to 6 gallons.

[0005] Once the container is filled with a desired flowable material, the spout is capped to seal the container and protect the contents from contamination. Depending on the type of contents, the container, spout and cap may be sterilized using steam, hydrogen peroxide ($H_2O_2$), radiation or other suitable sterilizing methods prior to, during and after filling. In order to maximize the shelf life of such products, it is crucial that fitment assemblies provide a hermetic seal for the entire life cycle of the container.

[0006] One convenient method of dispensing the contents of flexible containers is to open the containers by piercing the cap used to seal the container or by piercing the container directly using a fluid transfer device. Examples of dispensing systems that use piercing are disclosed in the following U.S. Patents: No. 4,325,496, No. 6,971,548 and No. 6,378,730.

[0007] Since flexible containers are typically intended for one-time use and are discarded once the contents of such containers have been completely dispensed, the fitment assembly must be made of inexpensive material, easy to manufacture, quick to market and preferably recyclable. It is also desirable that the fitment assembly for use with such packaging systems simplifies access to the container's contents while also minimizing the potential for contamination of the contents. Preferably, the contents of the flexible containers can also be easily dispensed without tools or the like. It is also desirable that the fitment assembly can be adapted to standard and widely-used spout configurations and can be easily adapted to a flexible hose or tube. The dispensing mechanism must be reliable such that dispensing of the contents is achieved without wasting the liquid through leakage or uncontrolled opening of the connection component and the like.

## SUMMARY OF INVENTION

[0008] Accordingly, the present invention provides a fitment assembly which can be mounted to a flexible container, whereby contents of the container are dispensed by piercing a portion of the cap using a fluid transfer device. The piercing fitment assembly is easy to use as a relatively minimal amount of force is required for piercing and establishing fluid transfer. It also has a locking system which locks the fluid transfer device into a dispensing state and also forms a reliable seal between the cap and the fluid transfer device which minimizes the risk of unwanted spillage.

[0009] The piercing fitment assembly may be used, for example, with flexible containers that are filled or that are formed and filled using suitable commercial packaging systems known in the art. Such packaging systems may include vertical form film seal filling machines sold under the trade-marks PREPAC, IMPACO and ELECSTER, and, the Liqui-Box™ Filler Model 2000C1T-A that is used for filling flexible containers used in bag-in-box systems. The fitment assembly may also be used with flexible containers that are aseptically filled.

[0010] According to one broad aspect, the present invention provides a fluid transfer device for dispensing flowable material from a container by piercing. The fluid transfer device comprises a hollow body having: a longitudinal axis, a through internal passage, a piercing end and a dispensing end. The piercing end has a peripheral extremity that is tapered in relation to the longitudinal axis of the hollow body and the piercing end also has a leading tooth that is located at a distal extrema of the peripheral extremity to initiate piercing of a cap secured to a spout of a container.

[0011] In another embodiment of the invention, the leading tooth may comprise an exterior surface that is substantially parallel to the longitudinal axis of the hollow body and an interior surface that is inclined inwardly and forms an angle of 10° to 45° with the exterior surface.

[0012] Advantageously, the piercing end of the fluid transfer device may further comprise a plurality of additional teeth that are disposed around the peripheral extremity. The additional teeth facilitate piercing as they reduce the amount of force that is required for piercing a pierceable portion of the cap of the spout of the container and cause a circular membrane within the pierceable portion to be peeled back in order to establish fluid transfer.

[0013] According to another aspect, the present invention also provides a cap for securing to a spout of a container. The cap comprises a spout receiving side adapted for securing the cap to the spout of the container and a pierceable portion adapted to be pierced by a fluid transfer device. The pierceable portion of the cap comprises an indentation defining a circular membrane surrounded by a plurality of petaloid elements. Advantageously, the pierceable portion may be located within a central opening of the cap and a barrier may be used to cover the central opening

and hence the pierceable portion so as to keep the pierceable portion in a substantially sterile state prior to dispensing.

[0014] According to a further aspect, the present invention also provides a fitment assembly for a container. The fitment assembly comprises: a spout connected in fluid communication to the container; a cap sealing a dispensing end of the spout, the cap having a pierceable portion; and a fluid transfer device including a piercing end and a dispensing end. The fluid transfer device has a longitudinal axis and a through internal passage and is used for piercing the cap at the pierceable portion to permit fluid communication from the container through the spout and the fluid transfer device. The piercing end of the fluid transfer device includes a leading tooth to initiate piercing of the pierceable portion of the cap.

[0015] The piercing end of the fluid transfer device may have a peripheral extremity that is tapered in relation to the longitudinal axis of the fluid transfer device wherein the leading tooth is located at a distal extrema of the tapered peripheral extremity so as to initiate piercing of the pierceable portion of the cap during piercing. Advantageously, the piercing end may further comprise additional teeth disposed around the peripheral extremity of the piercing end so as to subsequently and progressively puncture the pierceable portion of the cap during piercing.

[0016] Preferably, the pierceable portion of the cap also comprises an indentation defining a circular membrane surrounded by a plurality of petaloid elements. Advantageously, the pierceable portion is further adapted to cooperate with the fluid transfer device such that the circular membrane remains attached to the cap by a hinge-like connection that is formed during piercing.

[0017] The fitment assembly may further comprise a locking mechanism adapted to secure the fluid transfer device to the cap as a result of a pushing force exerted on the fluid transfer device in an essentially axial direction within the spout, whereby the piercing end is in piercing engagement with the cap. The locking mechanism may comprise an annular recessed portion on the piercing end of the fluid transfer device adapted to cooperate with the petaloid elements of the pierceable portion of the cap so as to prevent removal of the fluid transfer device from the cap once the piercing fitment assembly is in a dispensing state and thereby prevent unwanted spillage.

[0018] According to another aspect, the present invention also provides a pierceable port for a flexible container comprising: a pierceable portion adapted to be pierced by a fluid transfer device. The pierceable portion comprises an indentation defining a circular membrane surrounded by a plurality of petaloid elements. The pierceable port can be secured to the flexible container. The pierceable port may further comprise a skirt extending outwardly from a container side of the pierceable port and surrounding the pierceable portion. The skirt serves as a spacer to keep any portion of any adjacent container wall away from the pierceable portion thereby preventing the container walls from being pierced by the fluid transfer device.

[0019] According to a further aspect, the present invention also provides a flexible container comprising the pierceable port described above. The pierceable port may be secured to the flexible container by a flange secured to a wall surface of the flexible container. The pierceable port may also be secured to the flexible container so that the pierceable portion is aligned with an opening in the flexible container. Alternatively, if the pierceable portion is not aligned with an opening in the flexible container and the flange is secured to an outside wall surface of the container, a portion of the pierceable portion may also be secured to the outside wall surface. This prevents excessive stretching of the container material in the area of the pierceable portion during piercing and allows the container to be pierced more easily by the fluid transfer device.

[0020] According to yet another aspect, the present invention also provides a fitment assembly for a container comprising a pierceable port and a fluid transfer device. The pierceable port is secured to a wall of the container and includes a pierceable portion. The port may include a flange by which it may be secured to the container. The fluid transfer device comprises a through internal passage, to permit fluid communication from the container through the fluid transfer device. The fluid transfer device may be of the type previously described.

## BRIEF DESCRIPTION OF THE FIGURES

[0021] Fig. 1 shows a cross-sectional side elevation view of a piercing fitment assembly, in a disassembled state, according to one embodiment of the invention.

[0022] Fig. 2 shows a perspective view of the fluid transfer device of the piercing fitment assembly of Fig. 1.

[0023] Fig. 3 shows a cross-sectional side elevation view of a piercing end of the fluid transfer device of the piercing fitment assembly of Fig. 1.

[0024] Fig. 4 shows a top plan view of the cap of the piercing fitment assembly of Fig. 1 without a barrier.

[0025] Fig. 5 shows a cross-sectional side elevation view of the piercing fitment assembly of Fig. 1 in a ready-to-pierce state.

[0026] Fig. 6 shows a cross-sectional side elevation view of the piercing fitment assembly of Fig. 1 in a dispensing state.

[0027] Fig. 7 shows a top plan view of a cap of a piercing fitment assembly according to another embodiment.

[0028] Fig. 8 shows a side elevation view of a fluid transfer device of a piercing fitment assembly according to another embodiment.

[0029] Fig. 9 shows a perspective view of a fluid transfer device according to another embodiment of the invention.

[0030] Fig. 10 shows a perspective view of a fluid transfer device according to another embodiment of the invention.

[0031] Fig. 11 shows a cross-sectional perspective view of a piercing fitment assembly, in a disassembled state, according to a another embodiment of the invention.

[0032] Fig. 12A shows a cross-sectional side elevation view of a piercing fitment assembly according to another embodiment of the invention.

[0033] Fig. 12B shows a cross-sectional side elevation view of the piercing fitment assembly of Fig. 12A in a dispensing state.

[0034] Fig. 13A shows a cross-sectional side elevation view of a piercing fitment assembly according to another embodiment of the invention.

[0035] Fig. 13B shows a cross-sectional side elevation view of the piercing fitment assembly of Fig. 13A in a dispensing state.

[0036] Fig. 14A shows a cross-sectional side elevation view of a piercing fitment assembly according to another embodiment of the invention.

[0037] Fig. 14B shows a cross-sectional side elevation view of the piercing fitment assembly of Fig. 14A in a dispensing state.

[0038] Fig. 15A shows a cross-sectional side elevation view of a piercing fitment assembly according to another embodiment of the invention.

[0039] Fig. 15B shows a cross-sectional side elevation view of the piercing fitment assembly of Fig. 15A in a dispensing state.

[0040] Fig. 16A shows a cross-sectional side elevation view of a piercing fitment assembly according to another embodiment of the invention.

[0041] Fig. 16B shows a cross-sectional side elevation view of the piercing fitment assembly of Fig. 16A in a dispensing state.

## DETAILED DESCRIPTION OF THE INVENTION

[0042] Referring particularly to the drawings, the figures are for the purpose of illustrating the present invention only and not for the purpose of limiting the scope of the appended claims.

[0043] Referring now to Fig. 1, there is illustrated a piercing fitment assembly shown generally at 1 according to the invention for use with flexible containers for flowable materials, such as liquids, and particularly for aseptically-packaged flexible containers. The piercing fitment assembly 1 comprises a spout shown generally at 10 mounted to a flexible container 2, a cap shown generally at 20 and a fluid transfer device shown generally at 40.

[0044] The configuration of the spout 10 shown in Fig. 1 is widely-used, commercially available and is conventionally adapted for mounting to flexible containers such as bag-in-box containers, namely bags. However, it is understood that the piercing fitment assembly of the present invention could easily be modified to comprise other configurations of spouts. The spout 10 has a generally cylindrical shape and has a through central opening 14. The central opening 14 of the spout 10 is in communication with the container 2 (a top portion of which is shown) via an opening 3 in the container 2. At its base, the spout 10 also has a relatively thin

outwardly projecting flange 11 that is used to secure the spout 10 to an inside wall surface 4 of the container 2. The top surface 12 of the flange 11 is bonded to form a hermetically sealed connection with the inside wall surface 4 of the container 2 by known means such as heat sealing, adhesive or the like.

[0045] The cap 20 has a generally cylindrical shape but could be made to adapt other shapes of spouts such as oval or polygon-shaped. The cap 20 has a central opening 22 which has an interior circumferential surface 30. The cap 20 also has, within the central opening 22, a pierceable portion 31 which has an indentation which comprises a circular portion 33 and several radial portions 34 as shown in Fig. 4. The indentation formed by portions 33 and 34 is an area of reduced material thickness within the pierceable portion 31 which defines a circular membrane 27 surrounded by a plurality of petaloid elements 29 within the pierceable portion 31. The cap 20 also has an annular opening 26 which is adapted for receiving the spout 10 and hermetically securing the cap 20 to the spout 10. Located inside the annular opening 26 is an inside surface 25 and an annular bead 24. The cap 20 may further comprise a barrier 21 secured to a top surface 23 of the cap 20 for sealing the central opening 22.

[0046] The fluid transfer device 40 also has a generally cylindrical shape and comprises, a dispensing end shown generally at 41, a piercing end shown generally at 42, a through internal passage 43 and a handle 44 between the dispensing end 41 and the piercing end 42. The handle 44 comprises an outwardly projecting flange and has a bottom surface 45. The dispensing end 41 has a ribbed exterior portion 51 which is adapted to be secured to a dispensing tube (not shown). The piercing end 42 has an exterior cylindrical surface 52 and an annular recessed portion 50 which is part of a snap-fitting locking mechanism. The piercing end 42 also comprises a guiding surface 49 which has an inwardly extending conical profile which leads to a peripheral extremity 46 that is tapered in relation to a longitudinal axis of the fluid transfer device 40.

[0047] The fluid transfer device 40 further comprises at a minimum, a leading tooth 47 located at a distal extrema 53 of the tapered peripheral extremity 46 and in a preferred embodiment, includes a plurality of additional teeth 48 which are disposed around the peripheral extremity 46 of the piercing end 42. The configuration of the teeth (47 and 48) is shown in details in Figs. 2 and 3. The leading tooth 47 comprises

an exterior surface 56 which is relatively parallel to the longitudinal axis of the fluid transfer device 40 and an interior surface 55 which is inwardly inclined and forms an angle of 10° to 45° with the exterior surface 56. The additional teeth 48 may have the same or different geometric features as the leading tooth 47. The leading tooth 47 and the additional teeth 48 may comprise a total number of teeth of 3, 5, 7, etc. Fig. 9 shows a fluid transfer device having 3 teeth and Fig. 10 shows a fluid transfer device having 5 teeth.

[0048] Filling of flexible containers such as the ones used in bag-in-box systems may be performed on any suitable aseptic filler known to those skilled in the art, and is typically performed using commercial packaging systems such as, for example, the Liqui-Box™ Filler Model 2000C1T-A (not shown). Before filling and aseptic packaging, the container 2 is supplied to the packaging system in a state where the inside of the container has been pre-sterilized using Cobalt gamma irradiation or any other suitable means of sterilization. The spout 10, cap 20 and fluid transfer device 40 are also sterilized using Hydrogen Peroxide ($H_2O_2$), steam or any other suitable means. Once the container 2 has been filled via the spout 10 with flowable material, the cap 20, comprising a barrier 21 hermetically bonded to the top surface 23, is secured to the spout 10. The fluid transfer device 40 is provided to the customer together with the filled and capped container in a separate sterilized plastic bag (not shown) which is only opened when the contents of the container 2 are to be dispensed.

[0049] Fig. 5 shows the cap 20 installed on the spout 10 of the flexible container 2. The cap 20 is installed in a snap-fitting manner by firstly positioning the cap 20 and the spout 10 such that the spout-receiving annular opening 26 receives the end of the spout 10. An inward axial force is applied to the cap 20 such as to press the cap 20 against the spout 10. The annular bead 15 forcefully and resiliently slides against the inside surface 25 and forms a substantially hermetic seal between the cap 20 and the spout 10. Once the cap 20 is installed on the spout 10, the annular bead 24 on the cap 20 cooperates with the outwardly projecting flange 13 on the spout 10 such as to lock the cap 20 into position.

[0050] The barrier 21 maintains the central opening 22 and the pierceable portion 31 of the cap 20 in a substantially sterile state during shipping and storage of the container. Preferably, the barrier 21 may be substantially gas or oxygen

impermeable and may include any suitable material such as foil, ethylene vinyl alcohol, polyvinyl alcohol, polyethylene or a metalized polyester laminate. The barrier 21 may be attached to the top surface 23 of the sterilized cap 20 by heat sealing, ultrasonic welding or other known methods. The barrier 21 may be removed prior to piercing the pierceable portion 31 of the cap 20 or it may be left on the cap 20 and pierced using the fluid transfer device 40.

[0051] The container 2 would usually be placed in a dispensing position wherein the fitment assembly 1 extends outwardly or downwardly from the container so as to allow gravity to aid in dispensing of the contents. The contents of the container 2 are dispensed by firstly removing the barrier 21 from the cap 20. The fluid transfer device 40 is then removed from the sterilized plastic bag (not shown) and the dispensing end 41 may be connected to a dispensing tube (not shown) or other fluid delivery systems. The piercing end 42 of the fluid transfer device 40 is inserted into the central opening 22 and pressed axially inwardly towards the cap 20, using the handle 44, such as to pierce the pierceable portion 31. Fig. 5 shows the fluid transfer device 40 positioned within the central opening 22 of the cap 20 in a position ready to pierce the pierceable portion 31 of the cap 20. Fig. 6 shows the fluid transfer device 40 in a dispensing position within the cap 20 wherein the pierceable portion 31 has been fully pierced. Alternatively, depending on the type of material used for the barrier 21, the barrier 21 may be left in place and pierced using the fluid transfer device 40 before piercing the pierceable portion 31 of the cap 20.

[0052] The leading tooth 47 and the additional teeth 48 permit a relatively effortless piercing of the pierceable portion 31 by concentrating the force at distinct points on the pierceable portion 31 and hence facilitating the piercing process. The leading tooth 47 firstly punctures the circular portion 33 of the indentation and as the piercing end 42 of the fluid transfer device 40 is further inserted, the additional teeth 48 subsequently come in contact with and puncture the circular portion 33 in a progressive manner so as to leave the circular membrane 27 hingedly attached to the cap 20. The additional teeth 48 need not have the same geometric configuration as the leading tooth 47. In the present embodiment, the leading tooth 47 and the additional teeth 48 are shown to have a generally pyramidal geometry, however, any other suitable geometric configurations which minimize the force required to pierce the pierceable portion may be used.

[0053] As the leading tooth 47 punctures the circular portion 33 of the indentation, it proceeds in tearing the circular portion 33 as the interior surface 55 presses downwardly and radially inwardly on the circular membrane 27 so as to peel back the circular membrane 27 from the pierceable portion 31. As the guiding surface 49 proceeds to enter the pierceable portion 31, the petaloid elements 29 are pushed and deflected downwardly and thereby cause the material within the radial portions 34 of the indentation to become stretched. Consequently, this creates a tight fit between the piercing end 42 and the pierceable portion 31 of the cap 20 and thereby prevents unwanted leakage. In Fig. 4, the petaloid elements 29 are shown to have a generally square profile but a more rounded profile as shown in Fig. 7 can also be used.

[0054] Once the fluid transfer device 40 is fully inserted, the bottom surface 45 of the handle 44 comes in contact with the top surface 23 of the cap 20 and the fluid transfer device 40 becomes locked into a dispensing position within the cap 20 via a snap-fitting mechanism. The petaloid elements 29 and the stretched radial portions 34 of the indentation become engaged with the annular recessed portion 50 of the fluid transfer device 40 as shown in Fig. 6. This prevents the fluid transfer device 40 from being pulled out from the cap 20 once the piercing fitment assembly 1 is in a dispensing state and also maintains a tight fit between the cap 20 and the fluid transfer device 40 to prevent unwanted spillage.

[0055] Fig. 6 clearly shows how the circular membrane 27 remains connected to the cap 20 via a hinge 32. Through the cooperation of the piercing end 42 of the fluid transfer device 40 and the pierceable portion 31 of the cap 20, the hinge 32 is automatically formed upon piercing and comprises a portion of the pierceable portion 31 which remains unbroken once the fluid transfer device 40 has been fully inserted and locked into the dispensing position. The circular membrane 27 is thereby prevented from becoming loose and potentially obstructing the flow or being dispensed together with the contents.

[0056] The location of the hinge 32 within the pierceable portion 31 is dependent on the orientation of the fluid transfer device 40 when piercing occurs as the hinge 32 is automatically formed at a location adjacent to a proximal extrema 54 of the peripheral extremity 46. Therefore, the piercing end 42 of the fluid transfer

device 40 does not have to be inserted into the cap 20 in any particular orientation for the hinge 32 to be formed.

[0057] The ribbed exterior portion 51 of the dispensing end 41 shown in the preferred embodiment is adapted to receive a dispensing tube (not shown). Obviously, other types of adapters could also be used for connecting the fluid transfer device 40 to a delivery system. The dispensing end 41 could also be in fluid communication with a dispensing tap which could be used to regulate the flow of flowable material. In another embodiment, the dispensing end 41 may also comprise a dispensing tap 57 as shown in Fig. 8 that is integral to the fluid transfer device 40.

[0058] Fig. 11 shows a piercing fitment assembly according to another embodiment that is mainly used for dairy applications. The cap 20 in this case has a slightly different geometric configuration but still comprises the pierceable portion 31 adapted to be pierced by the fluid transfer device 40.

[0059] In yet another embodiment, the present invention also provides a piercing fitment assembly wherein a pierceable port is secured directly to a wall of a flexible container. Examples of such pierceable ports are shown generally at 80 in Figs. 12A to 16B. This type of pierceable port can be used, for example, on containers that are filled on vertical form film seal filling machines where no spout is needed for filling the containers. The pierceable port 80 comprises a flange 81 that is adapted for securing the pierceable port 80 to an outside wall surface 5 (shown in Figs. 12A to 15B) or an inside wall surface 4 (shown in Figs 16A and 16B) of the container 2. The pierceable port also comprises an exterior side generally shown at 83, a container side generally shown at 84, and, a pierceable portion 31 that is adapted to be pierced by the fluid transfer device 40 as previously described. Similarly, the pierceable port may also comprise the barrier 21 secured to the exterior side 83 in order to keep the pierceable portion 31 in a substantially sterile state prior to dispensing the contents of the container 2.

[0060] Figs. 14A and 14B show the pierceable port 80 according to another embodiment which comprises a skirt 82. The skirt extends outwardly from a container side 84 of the pierceable port 80 and surrounds the pierceable portion 31. The skirt 82 serves as a spacer or guard to keep any portion of any adjacent container wall

away from the pierceable portion 31 thereby preventing the container 2 from being pierced by the fluid transfer device 40.

[0061] Figs. 13A, 13B, 14A, 14B, 16A and 16B show embodiments of pierceable ports 80 that are secured to the container 2 either on an outside wall surface 5 or an inside wall surface 4 at a location where the pierceable portion 31 is aligned with an opening 3 in the container 2. However, as shown in Figs. 12A, 12B, 15A and 15B, the pierceable portion does not have to be aligned with an opening 3 in the container 2 if the flange 81 is secured to the outside wall surface 5. In such a case, it is preferable that at least a portion of the pierceable portion 31 also be secured to the outside wall surface 5. This prevents excessive stretching of the container material in the area of the pierceable portion during piercing and allows the container 2 to be pierced more easily by the fluid transfer device 40.

[0062] Since these containers are typically intended for one-time use and are discarded once the contents of such containers have been completely dispensed, it is preferable that the fitment assembly for use in such systems be easy to manufacture, inexpensive, easy to install and use, and recyclable. It is also important that the components are of sufficient quality and robustness. Accordingly, the construction of the components required to produce the piercing fitment assembly of the present invention is relatively simple and economical. The spout 10, cap 20, pierceable port 80 and fluid transfer device 40 can all be produced from commonly used and recyclable thermoplastic materials and formed using conventional plastic injection molding processes. For example, the cap 20 and pierceable port 80 may preferably be made using a blend of 85% medium density linear low density polyethylene (LDPE) and 15% high density polyethylene (HDPE). The fluid transfer device 40 may be produced using high density polyethylene (HDPE) or polypropylene (PP). Alternatively, the fluid transfer device 40 may be made using a commercially available low density polyethylene. It was found that the use of a softer low density polyethylene for the fluid transfer device 40 in comparison with HDPE causes the force required to pierce the cap 20 or pierceable port 80 to be reduced. It is believed that the use of a softer material for the fluid transfer device 40 allows the piercing end 42 of the fluid transfer device 40 to be more accommodating to a rupture path, in the piercing portion 31, that offers less resistance during piercing. The

reduction in piercing force was more notable on caps 20 and pierceable ports 80 having a pierceable portion 31 of comparatively smaller diameter.

[0063] Thinner regions of injection molded parts typically impose challenges with respect to suitable mold and process design for injection molding. Accordingly, the thinner circular potion 33 and radial portions 34 of the pierceable portions 31, may be formed using a separate punch (not shown) used to score or indent the cap 20 or pierceable port 80 once it has been molded with thicker dimensions. The punch can preferably be integrated within the mold wherein the forming of the thinner regions may take place prior to or as the part is ejected from the mold. The specific configuration of such a mold with integrated punch would be apparent to one skilled in the art.

[0064] From the foregoing description, it can be seen that the present invention comprises a piercing fitment assembly which is used with flexible containers. It will be appreciated by those skilled in the art that obvious changes can be made to the embodiments described in the foregoing description without departing from the broad inventive concept thereof. It is understood, therefore, that this invention is not limited to the particular embodiments disclosed, but is intended to cover all obvious modifications thereof which are within the scope and the spirit of the invention as defined by the appended claims.

**CLAIMS:**

1. A fluid transfer device for dispensing flowable material from a container by piercing comprising:

   a hollow body having: a longitudinal axis, a through internal passage, a piercing end and a dispensing end; wherein

   the piercing end has a peripheral extremity that is tapered in relation to the longitudinal axis of the hollow body; and

   the piercing end also has a leading tooth that is located at a distal extrema of the peripheral extremity so as to initiate piercing.

2. A fluid transfer device as claimed in claim 1, wherein the piercing end further comprises a plurality of additional teeth disposed around the peripheral extremity.

3. A fluid transfer device as claimed in claim 2, wherein the total number of teeth comprises 3, 5 or 7.

4. A fluid transfer device as claimed in claim 1, wherein the dispensing end is adapted to receive a dispensing tube.

5. A fluid transfer device as claimed in claim 1, wherein the dispensing end comprises a tap.

6. A fluid transfer device as claimed in claim 1, wherein the leading tooth comprises an exterior surface substantially parallel to the longitudinal axis of the hollow body and an interior surface inclined inwardly and forming an angle of 10° to 45° with the exterior surface.

7. A fluid transfer device as claimed in claim 1, wherein the piercing end of the hollow body comprises an annular recessed portion used for locking the fluid transfer device in a dispensing position, cooperatively with a cap of the container.

8. A fluid transfer device for dispensing flowable material from a container by piercing a pierceable portion of a cap secured to a spout of the container comprising:

a hollow body having: a longitudinal axis, a through internal passage, a piercing end and a dispensing end; wherein

the piercing end has a peripheral extremity that is tapered in relation to the longitudinal axis of the hollow body;

the piercing end also has a leading tooth that is located at a distal extrema of the peripheral extremity such as to initiate piercing of the pierceable portion of the cap, and, additional teeth disposed around the peripheral extremity such as to subsequently and progressively puncture the pierceable portion of the cap;

the piercing end of the hollow body further has an annular recessed portion used to lock the fluid transfer device in piercing engagement with the cap;

the leading tooth comprises an exterior surface substantially parallel to the longitudinal axis of the hollow body and an interior surface inclined inwardly and forming an angle of 10° to 45° with the exterior surface; and,

the dispensing end of the hollow body is adapted for receiving a dispensing tube.

9. A cap for securing to the spout of a container comprising:

a spout receiving side adapted for securing the cap to the spout of the container;

a pierceable portion adapted to be pierced by a fluid transfer device; wherein

the pierceable portion comprises an indentation defining a circular membrane surrounded by a plurality of petaloid elements.

10. A cap as claimed in claim 9, wherein the pierceable portion is located within a central opening.

11. A cap as claimed in claim 9, wherein the cap further comprises a barrier covering the pierceable portion.

12. A cap as claimed in claim 11, wherein the barrier includes a substantially gas impermeable material selected from one of the following: ethylene vinyl alcohol, polyvinyl alcohol, foil, polyethylene, and metalized polyester laminate.

13. A cap for securing to the spout of a container comprising:

a spout receiving side adapted for securing the cap to the spout of the container, and, an exterior side;

a pierceable portion, located within a central opening, comprising an indentation defining a circular membrane surrounded by a plurality of petaloid elements; and

a barrier secured to the exterior side of the cap such as to cover the central opening.

14. A fitment assembly for a container comprising:

a spout connected in fluid communication to the container;

a cap sealing an end of the spout, the cap having a pierceable portion; and

a fluid transfer device, having a longitudinal axis and a through internal passage, for piercing the cap at the pierceable portion to permit fluid communication from the container through the spout and the fluid transfer device; wherein

the fluid transfer device comprises a piercing end and a dispensing end, the piercing end comprises a leading tooth to initiate piercing of the pierceable portion of the cap.

15. A fitment assembly as claimed in claim 14, wherein the piercing end has a peripheral extremity that is tapered in relation to the longitudinal axis of the fluid transfer device, wherein the leading tooth is located at a distal extrema of the tapered peripheral extremity so as to initiate piercing of the pierceable portion of the cap during piercing.

16. A fitment assembly as claimed in claim 15, wherein the piercing end further comprises a plurality of additional teeth disposed around the peripheral extremity of the piercing end such as to subsequently and progressively puncture the pierceable portion of the cap during piercing.

17. A fitment assembly as claimed in claim 16, wherein the total number of teeth comprises 3, 5 or 7.

18. A fitment assembly as claimed in claim 14, wherein the leading tooth comprises an exterior surface substantially parallel to the longitudinal axis of the fluid transfer device, and, an interior surface inwardly inclined and forming an angle of 10° to 45° with the exterior surface.

19. A fitment assembly as claimed in claim 14 further comprising a tube fitted to the dispensing end of the fluid transfer device.

20. A fitment assembly as claimed in claim 14, wherein the dispensing end comprises a dispensing tap.

21. A fitment assembly as claimed in claim 14, wherein the pierceable portion comprises an indentation defining a circular membrane surrounded by a plurality of petaloid elements.

22. A fitment assembly as claimed in claim 21, wherein the pierceable portion is adapted to cooperate with the fluid transfer device such that the circular membrane remains hingedly connected to the cap after piercing.

23. A fitment assembly as claimed in claim 14, wherein the cap further comprises a barrier covering the pierceable portion.

24. A fitment assembly as claimed in claim 14 further comprising a locking mechanism adapted to secure the fluid transfer device and the cap together as a result of a pushing force exerted on the fluid transfer device in an essentially axial direction within the spout, whereby the piercing end is in piercing engagement with the cap.

25. A fitment assembly as claimed in claim 24, wherein the locking mechanism comprises an annular recessed portion on the piercing end of the fluid

transfer device adapted to cooperate with the petaloid elements of the pierceable portion of the cap.

26. A pierceable port for a flexible container comprising:

a pierceable portion adapted to be pierced by a fluid transfer device; wherein

the pierceable portion comprises an indentation defining a circular membrane surrounded by a plurality of petaloid elements.

27. A pierceable port as claimed in claim 26, wherein the pierceable portion is located within a central opening.

28. A pierceable port as claimed in claim 26 further comprising a barrier on an exterior side of the pierceable port and covering the pierceable portion.

29. A pierceable port as claimed in claim 26 further comprising a skirt extending outwardly from a container side of the pierceable port and surrounding the pierceable portion.

30. A flexible container comprising the pierceable port of claim 26, wherein the pierceable port is secured to the flexible container and the pierceable portion is aligned with an opening in the flexible container.

31. A flexible container comprising the pierceable port of claim 26, wherein the pierceable port is secured to the flexible container by a flange secured to a wall surface of the flexible container.

32. A flexible container of claim 26, wherein the pierceable port is secured to an outside wall surface of the flexible container and a portion of the pierceable portion is also secured to the outside wall surface.

33. A fitment assembly for a container comprising:

a pierceable port secured to a wall of the container, and, having a pierceable portion; and

a fluid transfer device having a through internal passage to permit fluid communication from the container through the fluid transfer device.

34. A fitment assembly as claimed in claim 33, wherein the pierceable port includes a flange by which it is secured to the container.

35. A fitment assembly as claimed in claim 33, wherein the pierceable portion comprises an indentation defining a circular membrane surrounded by a plurality of petaloid elements.

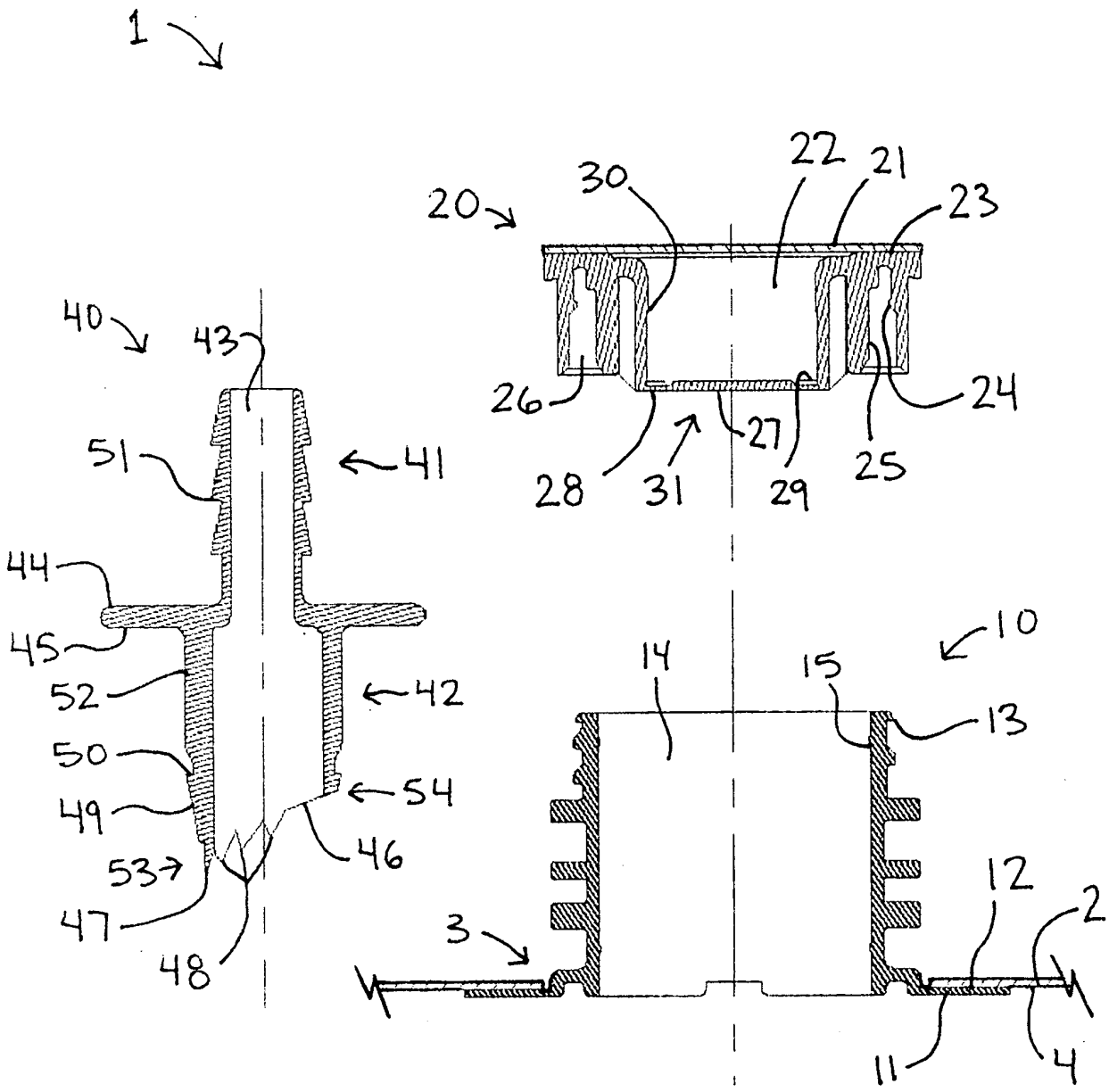
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FIG. 1

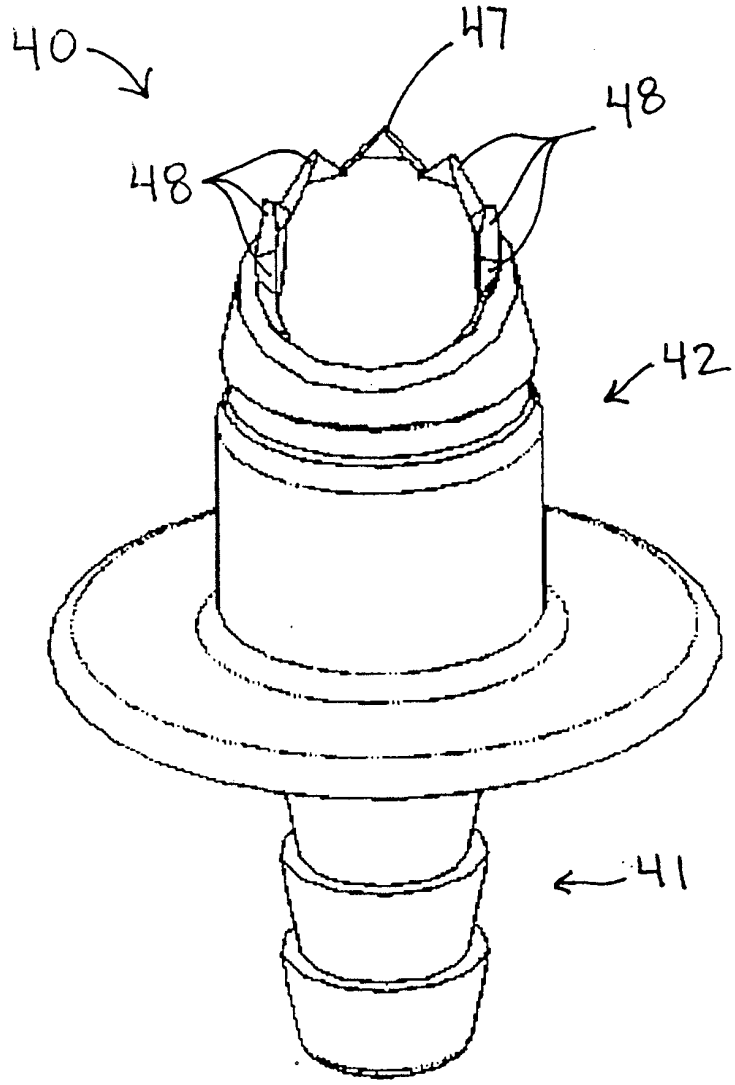



FIG. 2

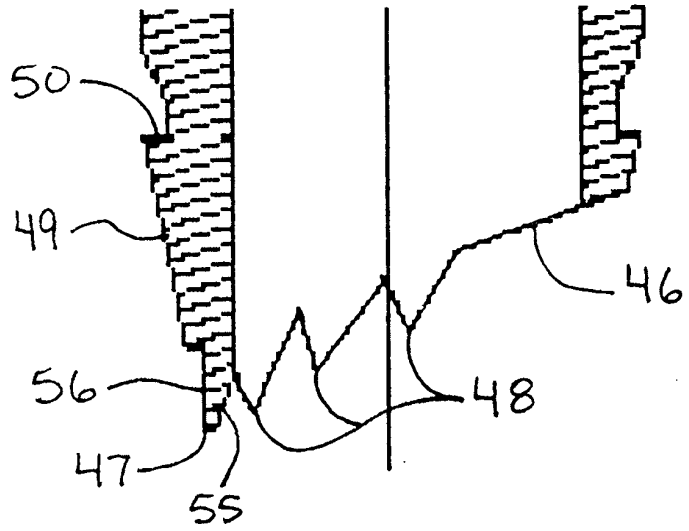



FIG. 3

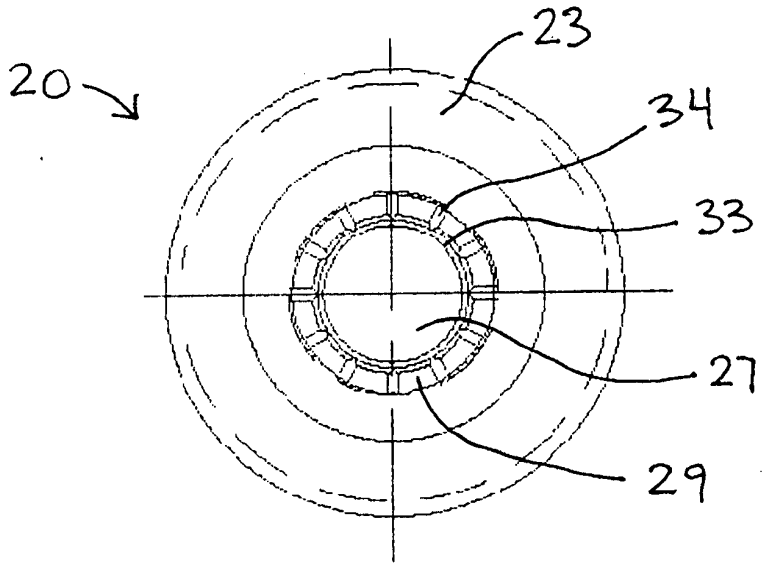



FIG. 4

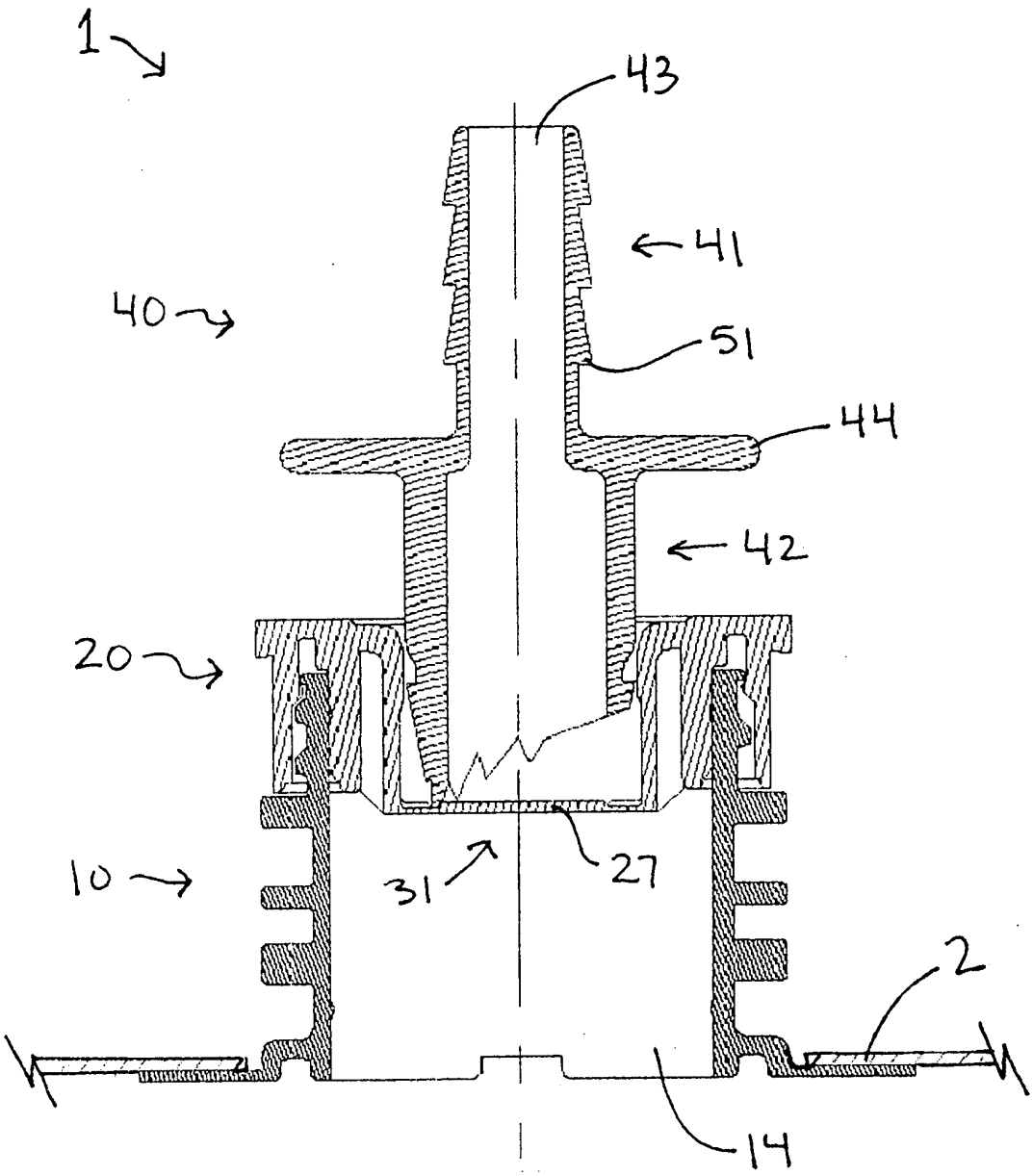



FIG. 5

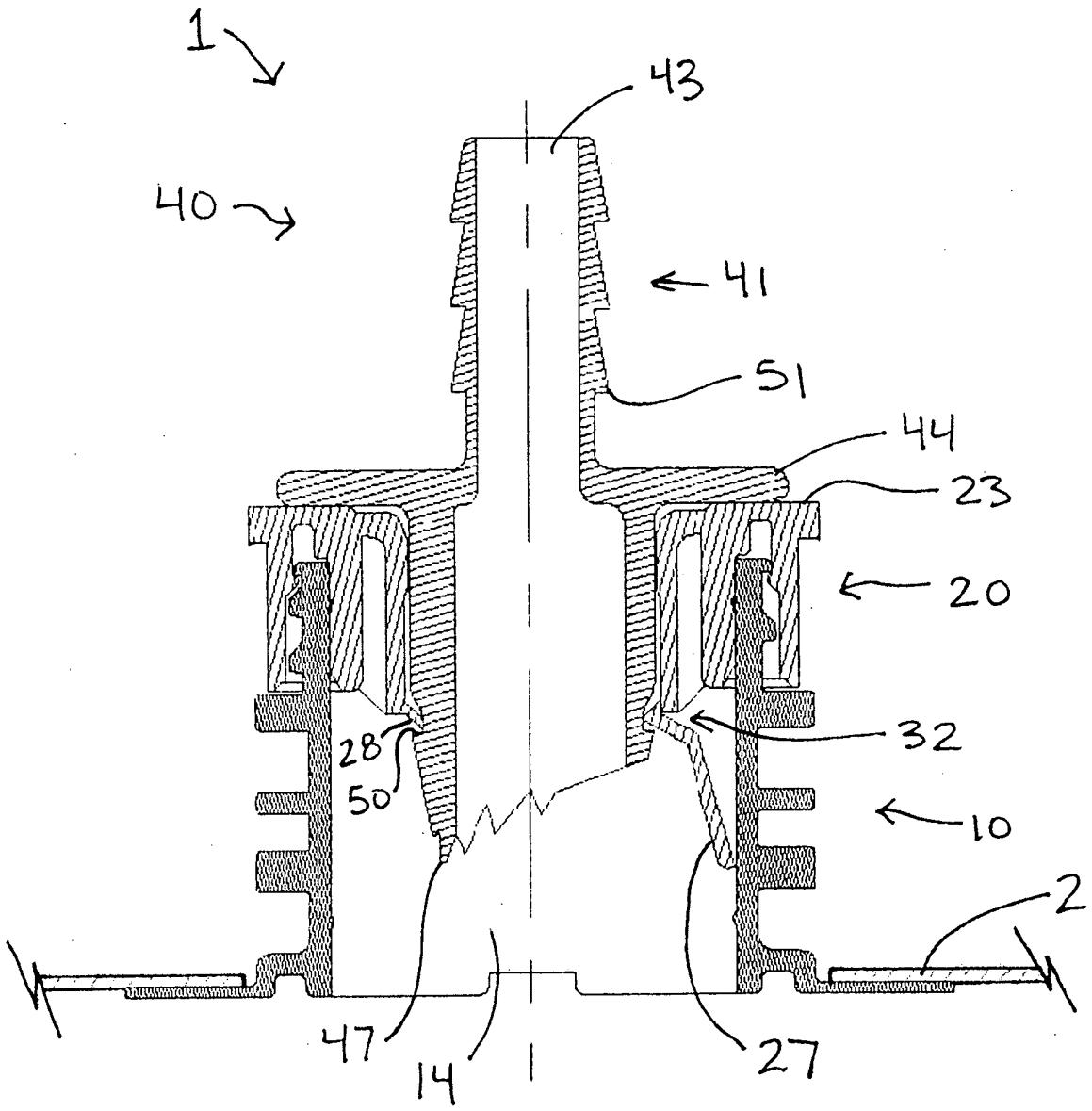



FIG. 6

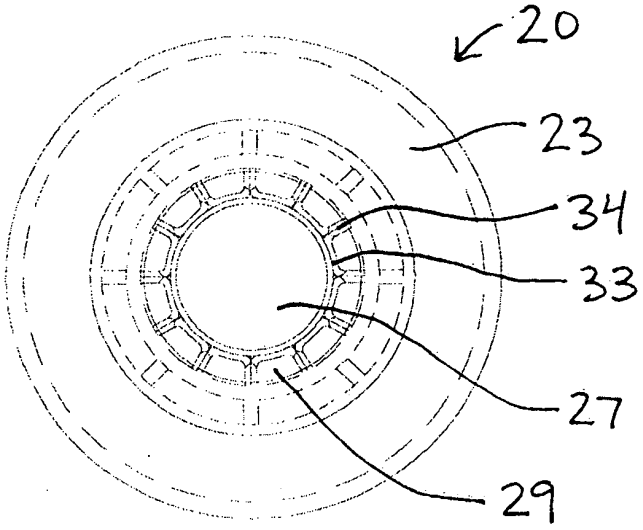



FIG. 7

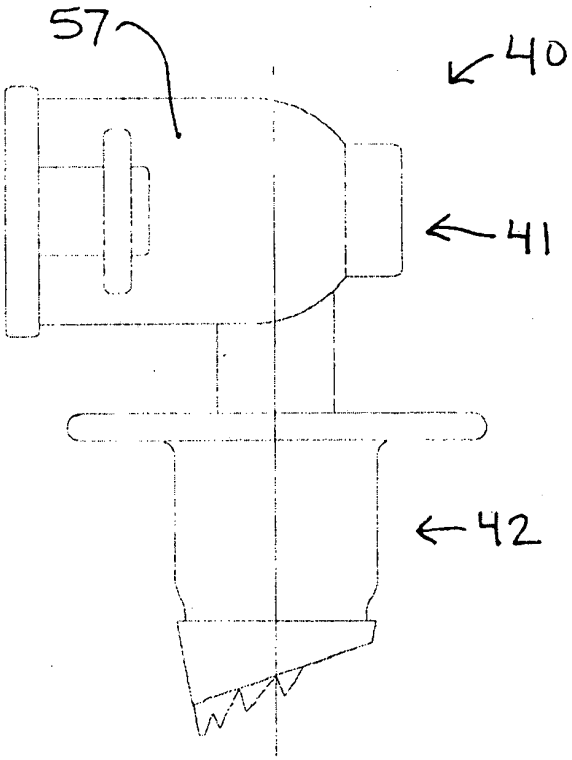



FIG. 8

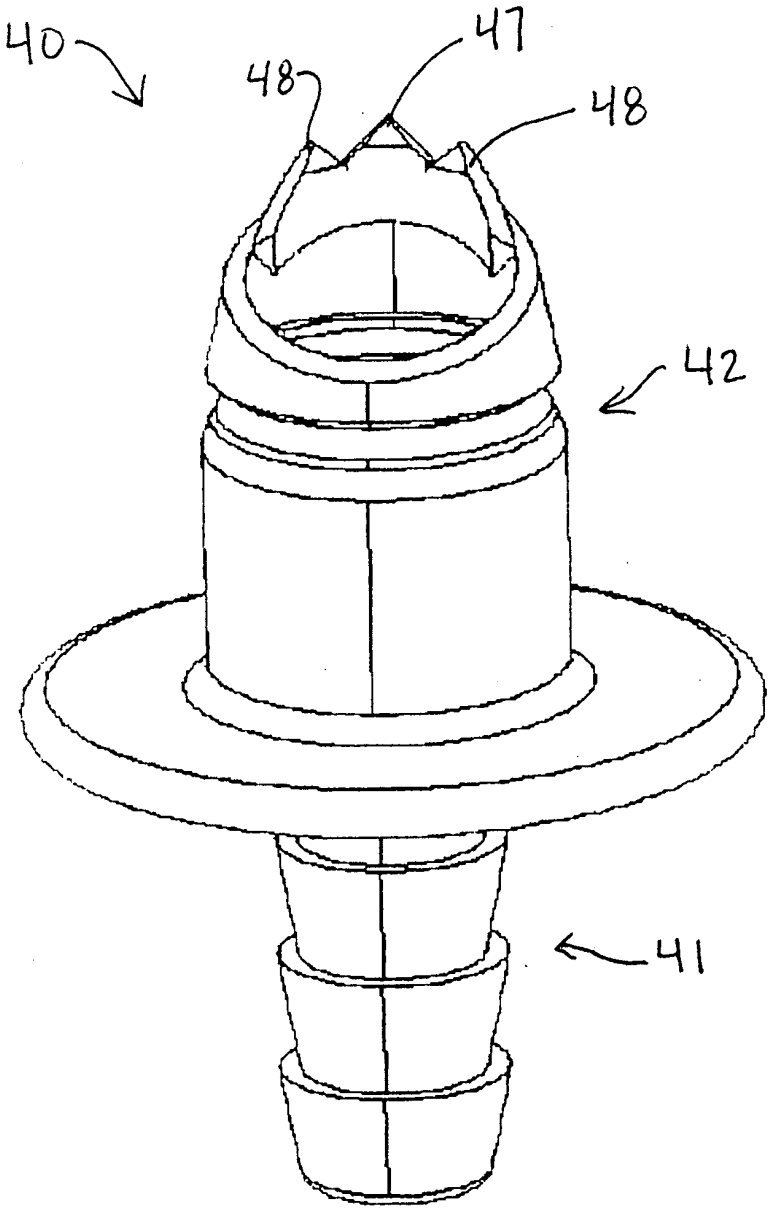



FIG. 9

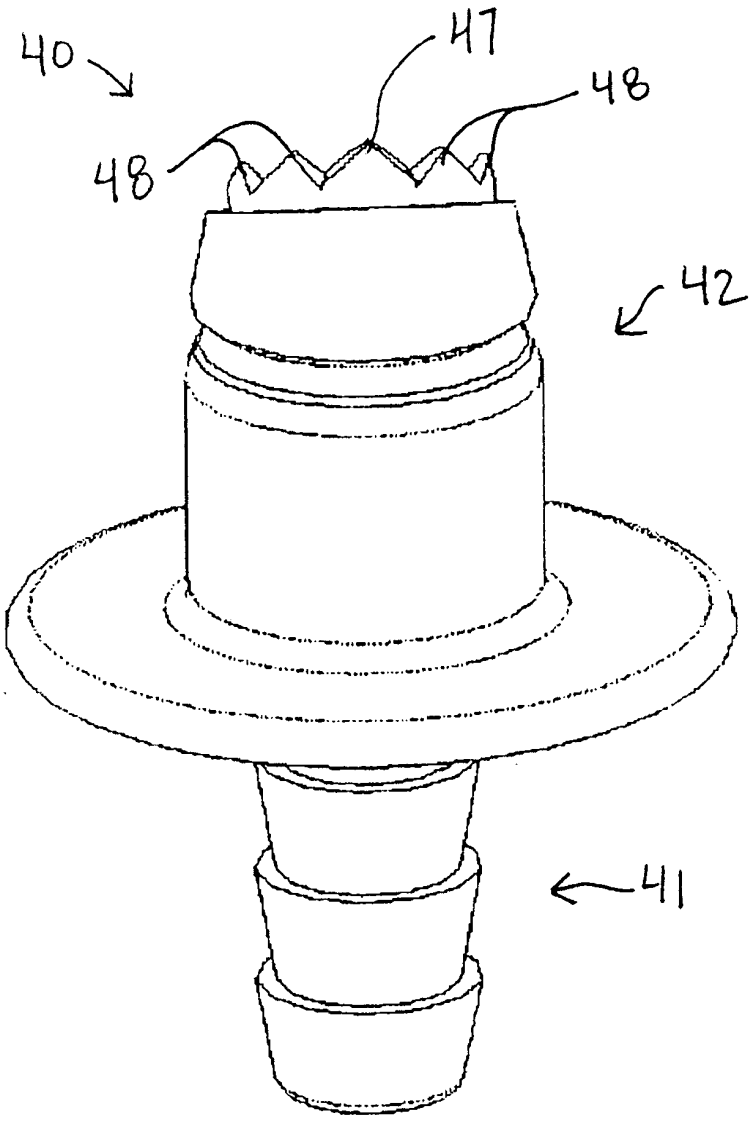



FIG. 10

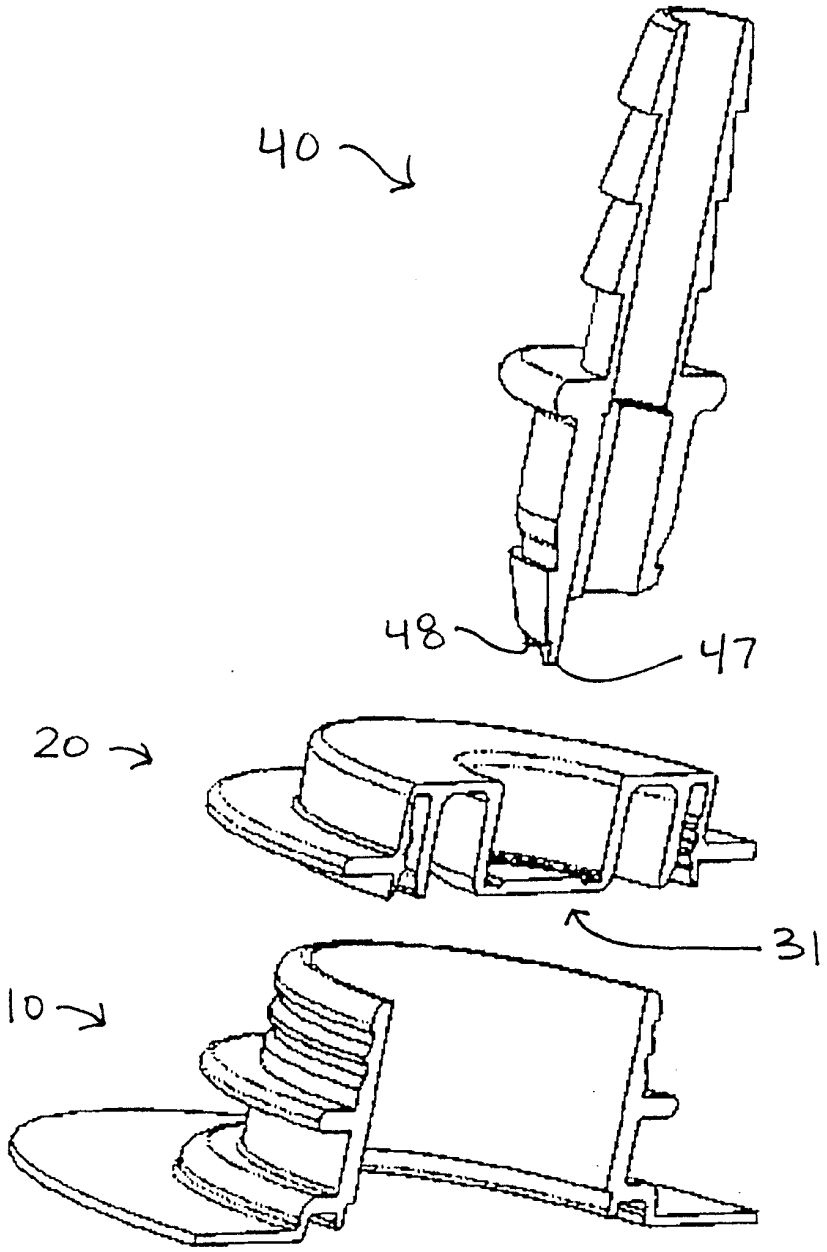



FIG. 11

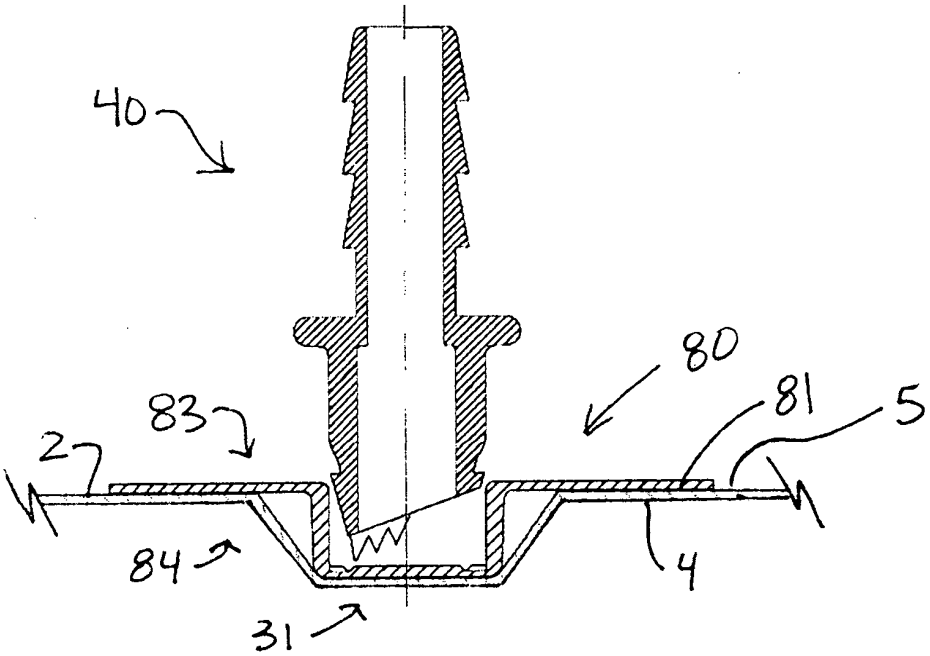



FIG. 12A

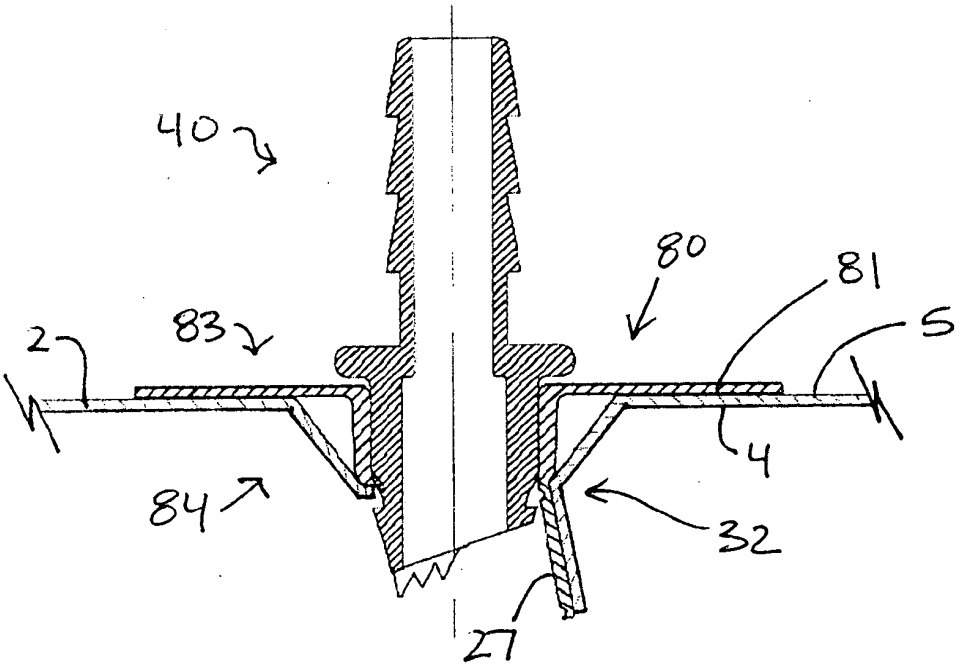



FIG. 12B

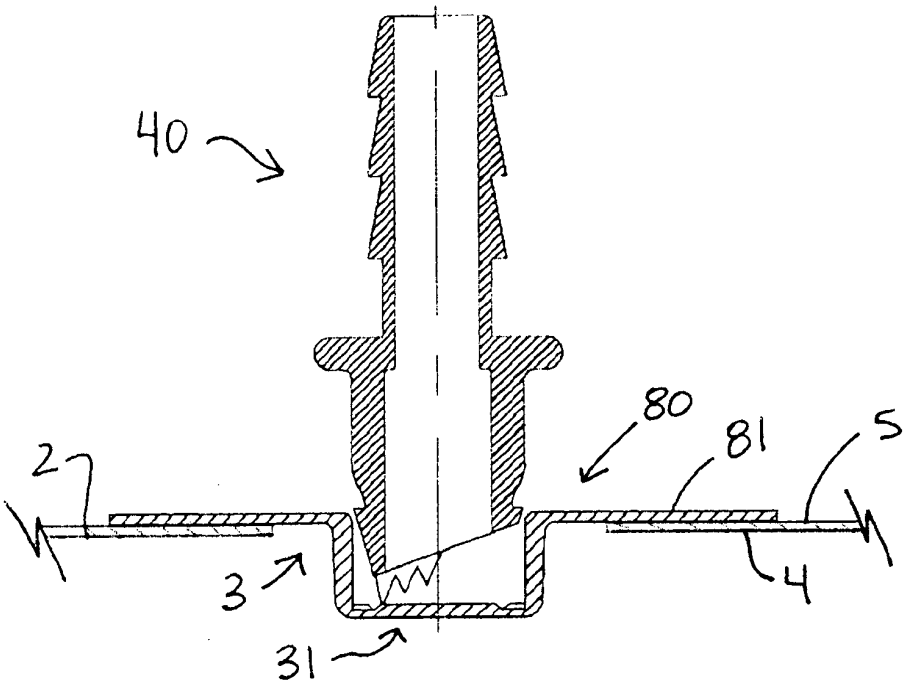



FIG. 13A

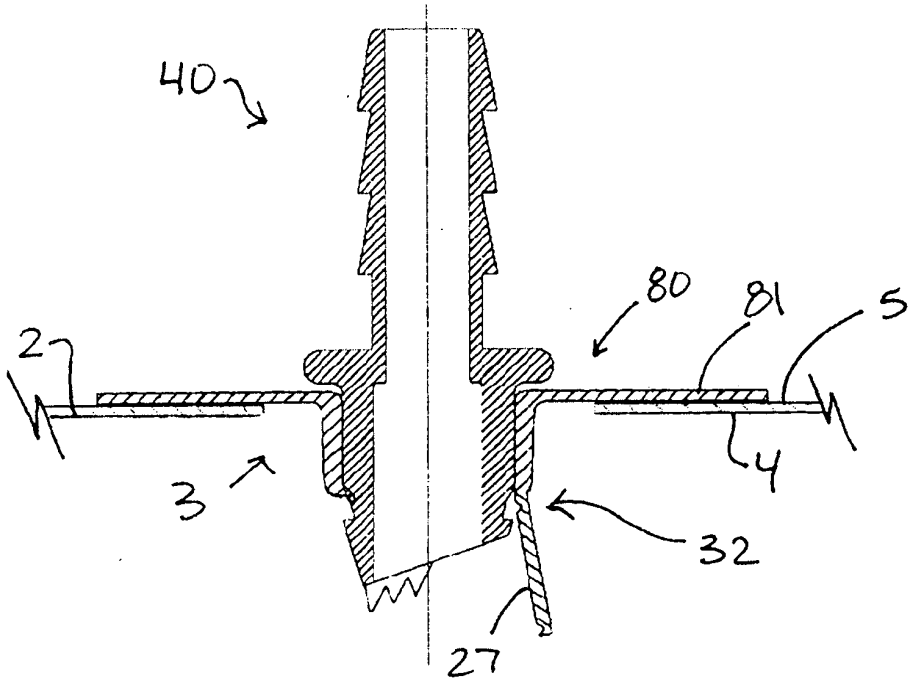



FIG. 13B

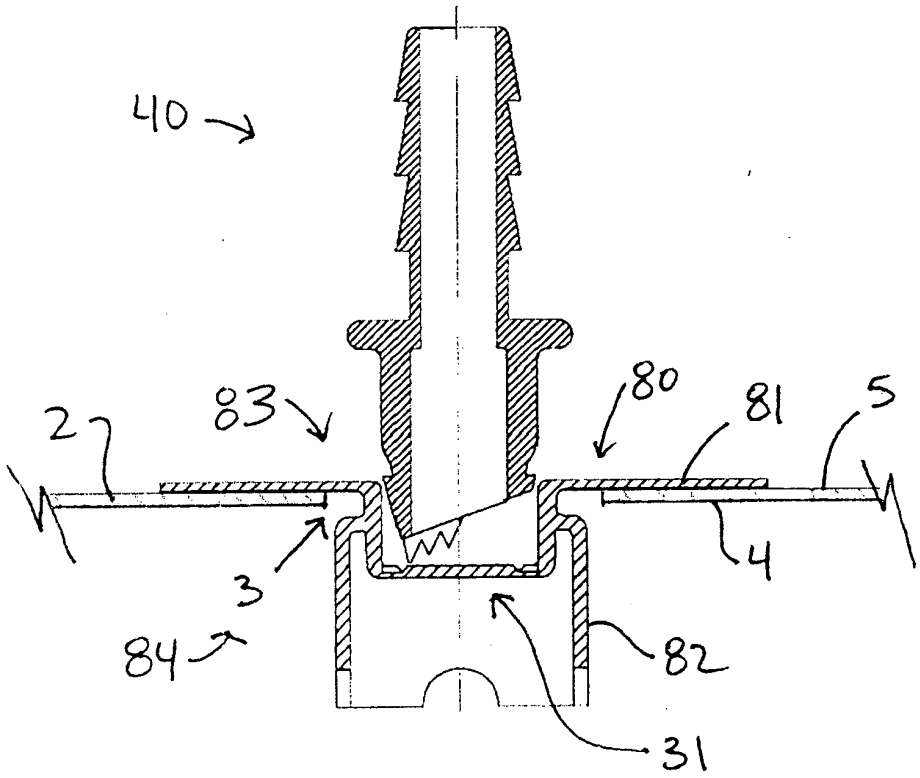



FIG. 14A

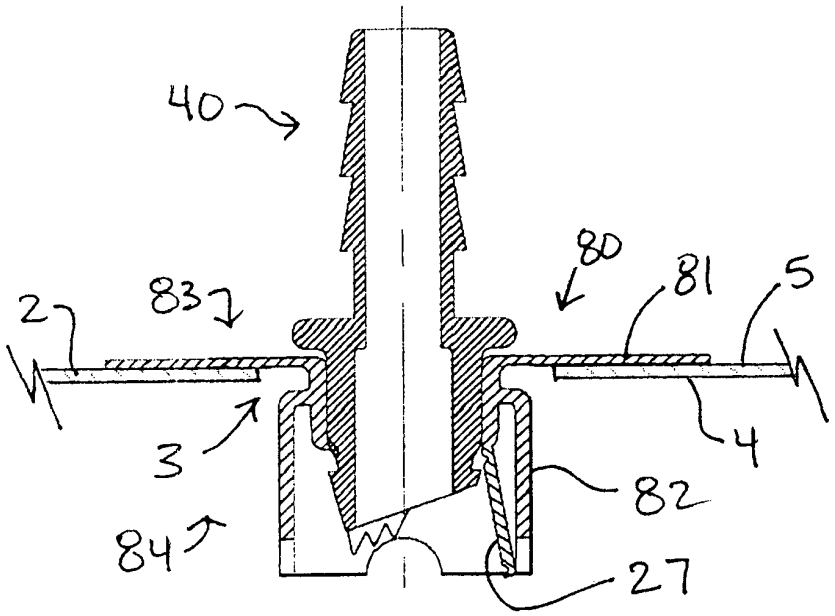



FIG. 14B

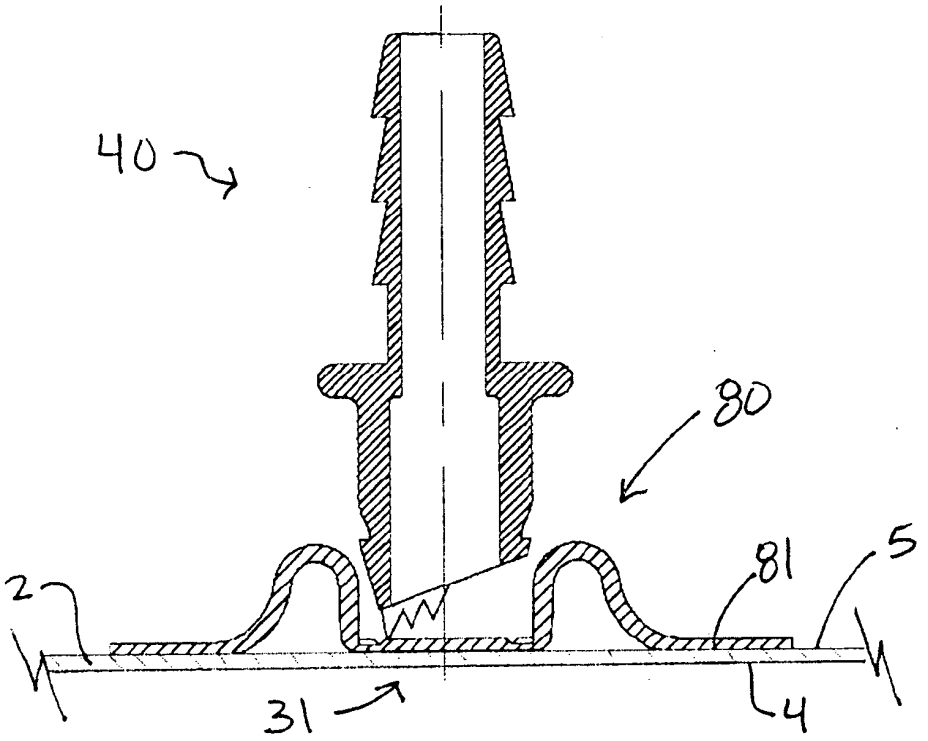



FIG. 15A

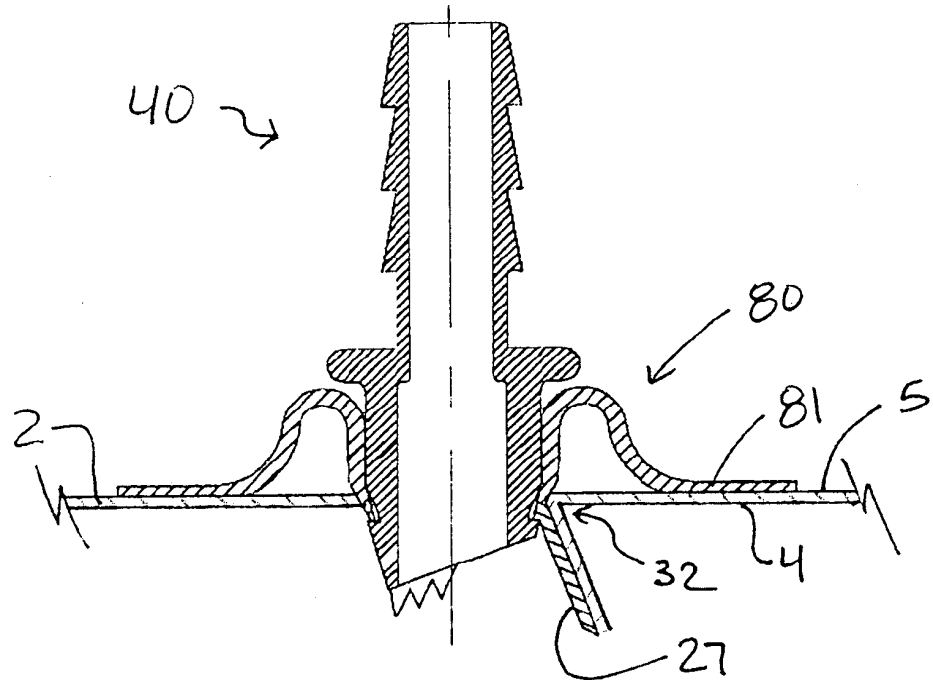



FIG. 15B

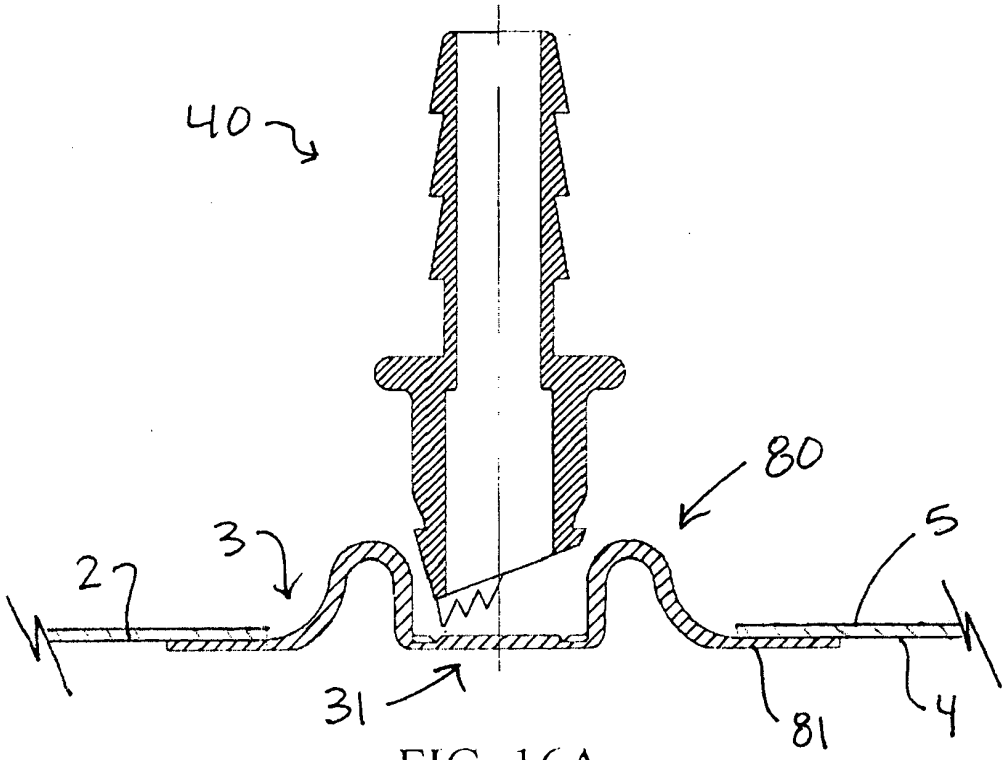



FIG. 16A

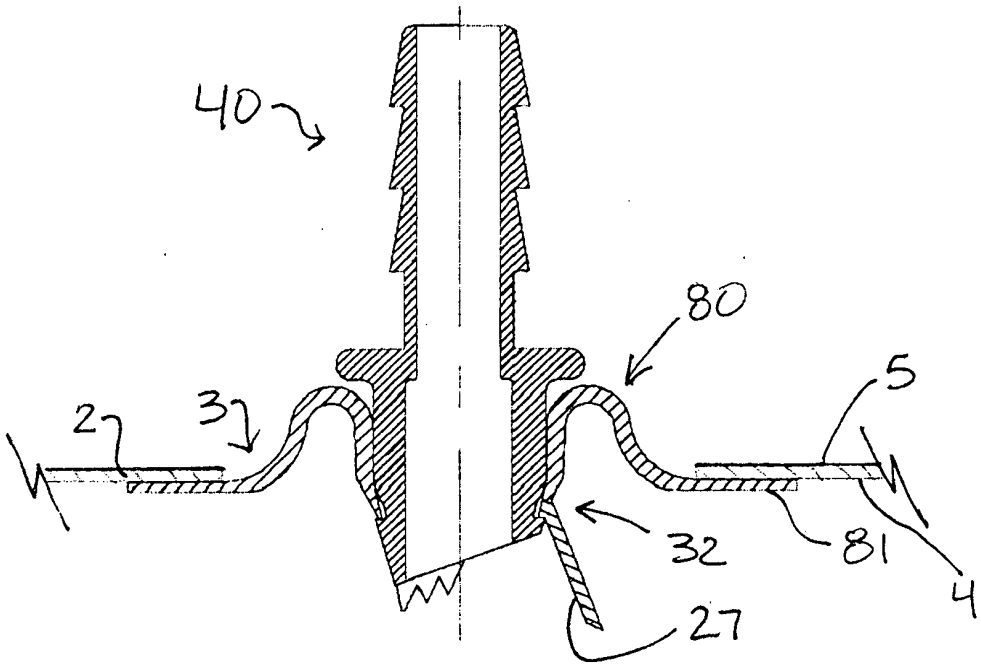



FIG. 16B

## INTERNATIONAL SEARCH REPORT

International application No.
PCT/CA2007/001344

A. CLASSIFICATION OF SUBJECT MATTER
IPC: ***B67B 7/86*** (2006.01) , ***B65D 47/06*** (2006.01) , ***B65D 75/58*** (2006.01) , ***B67B 7/20*** (2006.01)
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: B67B 7/48 (2006.01), B67B 7/86 (2006.01), B65D 17/00 (2006.01), B65D 17/28 (2006.01), B65D 47/06 (2006.01), B65D 47/36 (2006.01)
ECLA: B67B 7/24, B67B 7/26, B67B 7/28, B65D51/00B, B65D47/06C

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

Electronic database(s) consulted during the international search (name of database(s) and, where practicable, search terms used)
DELPHION, ESP@CENET, CPD

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| X | GB2116152 A (ELEY, E) 21 September 1983 (21-09-1983) * Whole document * | 1-3, 6, 7, 33 |
| Y | | 8, 16-18, 24 |
| X | US4022258 A (STEIDLEY, R) 10 May 1977 (10-05-1977) * Whole document * | 1, 4, 5, 14, 15, 19, 20, 33, 34 |
| Y | | 8, 16-18, 21-24 |
| X | US6806094 B2 (ANDERSON, B et al) 19 October 2004 (19-10-2004) * Whole document * | 9-13, 26-31, 33-35 |
| Y | | 21-23 |
| X | CA2321689 C (LEVY, A) 10 September 1999 (10-09-1999) * Whole document * | 9, 10, 26, 27, 29-31, 33-35 |
| X | WO2004/096656 A1 (KRAUTKRAEMER, G) 11 November 2004 (11-11-2004) * Abstract, figures 1 and 2 * | 9-13, 26-31, 33-35 |

[ ] Further documents are listed in the continuation of Box C. [X] See patent family annex.

* Special categories of cited documents :
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"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)
"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 | Date of mailing of the international search report |
|---|---|
| 9 November 2007 | 20 November 2007 (20-11-2007) |
| Name and mailing address of the ISA/CA<br>Canadian Intellectual Property Office<br>Place du Portage I, C114 - 1st Floor, Box PCT<br>50 Victoria Street<br>Gatineau, Quebec K1A 0C9<br>Facsimile No.: 001-819-953-2476 | Authorized officer<br>Daniel Rempel 819- 934-3465 |

**INTERNATIONAL SEARCH REPORT**

International application No.
PCT/CA2007/001344

**Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of the first sheet)**

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons :

1. [ ] Claim Nos. :
because they relate to subject matter not required to be searched by this Authority, namely :

2. [ ] Claim Nos. :
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically :

3. [ ] Claim Nos. :
because they are dependant claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

**Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)**

This International Searching Authority found multiple inventions in this international application, as follows :

Group A - Claims 1-8 are directed to a fluid transfer device with a leading tooth.
Group B - Claims 9-13 and 26-32 are directed to a pierceable port or cap with an indented membrane surrounded by petaloid elements.
Group C - Claims 14-25 and 33-35 are directed to fitment assemblies with both a fluid transfer device and pierceable ports or caps.

Group C may be included with either Group A or Group B. The claims must be limited to one inventive concept as set out in Rule 13 of the PCT.

1. [X] As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. [ ] As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.

3. [ ] As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claim Nos. :

4. [ ] No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim Nos. :

**Remark on Protest**
[ ] The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
[ ] The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
[ ] No protest accompanied the payment of additional search fees.

**INTERNATIONAL SEARCH REPORT**
Information on patent family members

International application No.
PCT/CA2007/001344

| Patent Document Cited in Search Report | Publication Date | Patent Family Member(s) | Publication Date |
|---|---|---|---|
| GB 2116152 A | 21-09-1983 | NONE | |
| US 4022258 A | 10-05-1977 | AT 371999 B | 25-08-1983 |
| | | AT 801176 A | 15-01-1983 |
| | | AU 507719 B2 | 28-02-1980 |
| | | AU 1905476 A | 04-05-1978 |
| | | CA 1091626 A2 | 16-12-1980 |
| | | CA 1093019 A1 | 06-01-1981 |
| | | CH 610854 A5 | 15-05-1979 |
| | | DE 2647624 A1 | 12-05-1977 |
| | | GB 1515616 A | 28-06-1978 |
| | | GB 1536949 A | 29-12-1978 |
| | | GB 1536950 A | 29-12-1978 |
| | | JP 52054585 A | 04-05-1977 |
| | | PH 12879 A | 25-09-1979 |
| US 6806094 B2 | 19-10-2004 | AT 343427 T | 15-11-2006 |
| | | AU 770972 B2 | 11-03-2004 |
| | | AU 4846800 A | 05-12-2000 |
| | | CA 2373572 A1 | 23-11-2000 |
| | | DE 60031526 D1 | 07-12-2006 |
| | | EP 1183104 B1 | 25-10-2006 |
| | | EP 1495811 A2 | 12-01-2005 |
| | | ES 2272285 T3 | 01-05-2007 |
| | | JP 2002544076 T | 24-12-2002 |
| | | US 6716396 B1 | 06-04-2004 |
| | | US 6723289 B2 | 20-04-2004 |
| | | US 7276383 B2 | 02-10-2007 |
| | | US 2001039058 A1 | 08-11-2001 |
| | | US 2001041336 A1 | 15-11-2001 |
| | | US 2003207463 A1 | 06-11-2003 |
| | | US 2004105786 A1 | 03-06-2004 |
| | | US 2004151634 A1 | 05-08-2004 |
| | | US 2004152205 A1 | 05-08-2004 |
| | | US 2005059161 A1 | 17-03-2005 |
| | | WO 0069389 A2 | 23-11-2000 |
| | | WO 0069389 A3 | 22-02-2001 |

## INTERNATIONAL SEARCH REPORT

International application No.
PCT/CA2007/001344

| Patent Document Cited in Search Report | Publication Date | Patent Family Member(s) | Publication Date |
|---|---|---|---|
| CA 2321689 C | 10-09-1999 | AU 6976298 A | 20-09-1999 |
| | | CN 1134655 C | 14-01-2004 |
| | | CN 1294675 A | 09-05-2001 |
| | | CN 1495420 A | 12-05-2004 |
| | | EP 1070241 A1 | 24-01-2001 |
| | | IL 138278 D0 | 31-10-2001 |
| | | JP 2003522318 T | 22-07-2003 |
| | | US 6030582 A | 29-02-2000 |
| | | US 6361744 B1 | 26-03-2002 |
| | | US 6752965 B2 | 22-06-2004 |
| | | US 2002131902 A1 | 19-09-2002 |
| | | WO 9945360 A1 | 10-09-1999 |
| | | WO 03064044 A1 | 07-08-2003 |
| WO 2004/096656 A1 | 11-11-2004 | US20070158296 A1 | 2007-07-12 |
| | | EP1618044 A1 | 2006-01-25 |
| | | DE10319428 A1 | 2004-11-18 |

[19] 中华人民共和国国家知识产权局

[51] Int. Cl.
*B67B 7/86 (2006.01)*
*B65D 47/06 (2006.01)*
*B65D 75/58 (2006.01)*
*B67B 7/20 (2006.01)*

# [12] 发明专利申请公布说明书

[21] 申请号 200780035400.4

[43] 公开日 2009 年 8 月 26 日

[11] 公开号 CN 101516762A

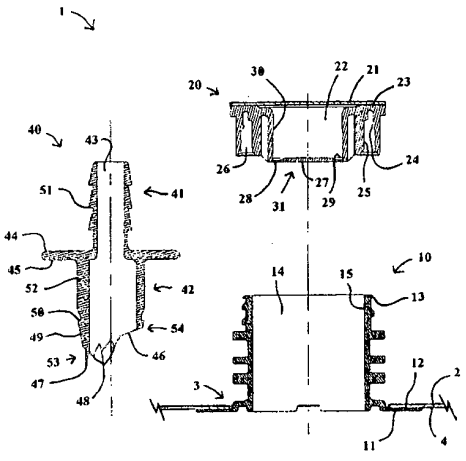
[22] 申请日 2007.7.30
[21] 申请号 200780035400.4
[30] 优先权
[32] 2006. 7.31 [33] US [31] 60/834,458
[86] 国际申请 PCT/CA2007/001344 2007.7.30
[87] 国际公布 WO2008/014605 英 2008.2.7
[85] 进入国家阶段日期 2009.3.24
[71] 申请人 利魁包装加拿大有限公司
地址 加拿大安大略
[72] 发明人 J·约翰逊
[74] 专利代理机构 北京北翔知识产权代理有限公司
代理人 杨 勇 郑建晖
权利要求书 4 页 说明书 11 页 附图 14 页

[54] 发明名称

一种穿孔设备组件

[57] 摘要

提供一种改进的、用于安装到柔性容器的穿孔设备组件，借此通过使用一种流体转移装置将对盖子的可穿孔部分穿孔，容器的内含物被分配。该穿孔设备组件容易使用，因为要求相对小的力量来穿孔和建立流体转移。它也具有将流体转移装置锁定在分配状态的锁定系统，并且也在盖子与流体转移装置之间形成可靠的封堵，这使不想要的溢出的风险最小化。该设备组件包括流体连通到容器的喷嘴、具有封堵喷嘴的一端的可穿孔部分的盖子、以及流体转移装置，该流体转移装置具有导齿，以发起对盖子的可穿孔部分的穿孔。



1. 一种用于通过穿孔从容器分配可流动材料的流体转移装置，其包括:

中空体，其具有纵轴、内部贯通道、穿孔端和分配端；其中

穿孔端具有外围末端，其沿着中空体的纵轴逐渐变细；和

穿孔端还具有导齿，其位于外围末端的远端，以发起穿孔。

2. 如权利要求 1 中要求的流体转移装置，其中穿孔端还包括多个附加齿，其被布置在外围末端周围。

3. 如权利要求 2 中要求的流体转移装置，其中齿的总数包括 3、5 或 7。

4. 如权利要求 1 中要求的流体转移装置，其中分配端适于接收分配管。

5. 如权利要求 1 中要求的流体转移装置，其中分配端包括龙头。

6. 如权利要求 1 中要求的流体转移装置，其中导齿包括基本平行于中空体的纵轴的外表面，和向内倾斜并与外表面成 10° 至 45° 角的内表面。

7. 如权利要求 1 中要求的流体转移装置，其中中空体的穿孔端包括环形凹部，其用于与容器的盖子协作将流体转移装置锁定在分配位置。

8. 一种用于通过给固定到容器的喷嘴的盖子的可穿孔部分穿孔从容器分配可流动材料的流体转移装置，其包括:

中空体，其具有纵轴、内部贯通道、穿孔端和分配端；其中

穿孔端具有外围末端，其沿着中空体的纵轴逐渐变细；

穿孔端也具有导齿和附加齿，导齿位于外围末端的远端，以发起对盖子的可穿孔部分的穿孔，附加齿被布置在外围末端周围，以随后渐进地刺破盖子的可穿孔部分；

中空体的穿孔端还具有环形凹部，其用于将流体转移装置锁定在与盖子穿孔接合的状态；

导齿包括基本平行于中空体的纵轴的外表面，和向内倾斜并与外表面成 10° 至 45° 角的内表面；和

中空体的分配端适于接收分配管。

9. 一种用于固定到容器的喷嘴的盖子，其包括：

喷嘴接收侧，其适于将盖子固定到容器的喷嘴；

可穿孔部分，其适于被流体转移装置穿孔；其中

该可穿孔部分包括压印，其限定了被多个花瓣状组成部分围绕的圆形隔膜。

10. 如权利要求 9 中要求的盖子，其中可穿孔部分位于中央开口内。

11. 如权利要求 9 中要求的盖子，其中盖子还包括覆盖可穿孔部分的挡板。

12. 如权利要求 11 中要求的盖子，其中挡板含有基本不透气体的材料，该材料选自下列之一：乙烯-乙烯醇、聚乙烯醇、箔、聚乙烯和金属化聚酯压板。

13. 一种用于固定到容器的喷嘴的盖子，其包括：

喷嘴接收侧和外侧，该喷嘴接收侧适于将盖子固定到容器的喷嘴；

位于中央开口内的可穿孔部分，其包括压印，该压印限定了被多个花瓣状组成部分围绕的圆形隔膜；和

挡板，其固定到盖子的外侧，以覆盖中央开口。

14. 一种用于容器的设备组件，其包括：

与容器流体连通的喷嘴；

封堵喷嘴的一端的盖子，该盖子具有可穿孔部分；和

流体转移装置，其具有纵轴和内部贯通道，用于在可穿孔部分给盖子穿孔，以允许从容器经过喷嘴和流体转移装置的流体连通；其中

流体转移装置包括穿孔端和分配端，穿孔端包括导齿，以发起对盖子的可穿孔部分的穿孔。

15. 如权利要求 14 要求的设备组件，其中穿孔端具有外围末端，其沿着流体转移装置的纵轴逐渐变细，其中导齿位于渐细的外围末端的远端，以在穿孔期间发起对盖子的可穿孔部分的穿孔。

16. 如权利要求 15 要求的设备组件，其中穿孔端还包括多个附加齿，其被布置在穿孔端的外围末端周围，以在穿孔期间随后渐进地刺破盖子的可穿孔部分。

17. 如权利要求 16 要求的设备组件，其中齿的总数包括 3、5 或

7。

18. 如权利要求 14 要求的设备组件，其中导齿包括基本平行于流体转移装置的纵轴的外表面，和向内倾斜并与外表面成 10° 至 45° 角的内表面。

19. 如权利要求 14 要求的设备组件，还包括配合到流体转移装置的分配端的管子。

20. 如权利要求 14 要求的设备组件，其中分配端包括分配龙头。

21. 如权利要求 14 要求的设备组件，其中可穿孔部分包括压印，其限定了被多个花瓣状组成部分围绕的圆形隔膜。

22. 如权利要求 21 要求的设备组件，其中可穿孔部分适于与流体转移装置协作，以使得圆形隔膜在穿孔之后铰合地连接到盖子。

23. 如权利要求 14 要求的设备组件，其中盖子还包括覆盖可穿孔部分的挡板。

24. 如权利要求 14 要求的设备组件，还包括锁定机构，其适于作为在喷嘴内基本上轴向地施加到流体转移装置上的推力的结果，将流体转移装置和盖子固定到一起，从而穿孔端与盖子穿孔接合。

25. 如权利要求 24 要求的设备组件，其中锁定机构包括流体转移装置的穿孔端上的环形凹部，该环形凹部适于与盖子的可穿孔部分的花瓣状组成部分协作。

26. 一种用于柔性容器的可穿孔端口，其包括:

可穿孔部分，其适于被流体转移装置穿孔；其中

可穿孔部分包括压印，其限定了被多个花瓣状组成部分围绕的圆形隔膜。

27. 如权利要求 26 要求的可穿孔端口，其中可穿孔部分位于中央开口内。

28. 如权利要求 26 要求的可穿孔端口，还包括挡板，其在可穿孔端口的外侧上，并覆盖可穿孔部分。

29. 如权利要求 26 要求的可穿孔端口，还包括裙部，其从可穿孔端口的容器侧向外延伸并且围绕可穿孔部分。

30. 一种包括权利要求 26 的可穿孔端口的柔性容器，其中可穿孔端口固定到该柔性容器，可穿孔部分与该柔性容器上的开口对准。

31. 包括权利要求 26 的可穿孔端口的柔性容器，其中可穿孔端口通过固定到该柔性容器的壁表面的法兰而固定到该柔性容器。

32. 权利要求 26 的柔性容器，其中可穿孔端口固定到该柔性容器的外壁表面，可穿孔部分的一部分也固定到该外壁表面。

33. 一种用于容器的设备组件，其包括：

可穿孔端口，其固定到容器壁并具有可穿孔部分；和

流体转移装置，其具有内部贯通道，以允许从容器经过流体转移装置的流体连通。

34. 如权利要求 33 要求的设备组件，其中可穿孔端口包括法兰，借助该法兰，可穿孔端口固定到容器。

35. 如权利要求 33 要求的设备组件，其中可穿孔部分包括压印，其限定被多个花瓣状组成部分围绕的圆形隔膜。

# 一种穿孔设备组件

## 相关申请

本申请要求2006年7月31日提交的、题为“一种穿孔设备组件”、所列发明人为James W. Johnson的美国临时申请第60/834,458号的权益。上述申请的全部教导通过引用纳入本说明书。

## 发明领域

本发明涉及一种穿孔设备组件，其用于那些用于诸如液体等易流动材料的柔性容器，该柔性容器包括无菌包装的柔性容器。

## 发明背景

柔性聚合容器在整个食品行业被广泛用于存储和分配软饮糖浆及其他这类饮料，还有酒、乳制品、肠内喂养溶液、果汁、茶和咖啡浓缩物、布丁、奶酪沙司，及许多其他可流动材料，该可流动材料包括必须被无菌填充的可流动材料。柔性聚合容器典型地具有由单层或多层结构的聚合膜制成的壁。组成容器膜层的具体聚合物根据要被置入容器的材料类型的不同而改变。膜层也可以包括氧气阻隔材料层，以防止这类材料与氧敏或其他气敏内含物接触。容器壁可以被金属化，或涂有诸如铝等的金属层，以防止氧气或其他气体侵入。

柔性聚合容器可以具有用于填充和分配容器内含物的入口和/或喷嘴。容器也经常被置于瓦楞纸盒中。这类包装系统被统称为“盒内袋（bag-in-box）”系统，其中喷嘴延伸穿过盒上的开口，以分配内含物。盒内袋包装系统经常用在饭店、机构食品服务中心和便利店，以方便液体食品的服务，液体食品诸如糖浆、浇头（topping）、调味品、饮料和乳制品。这些容器典型地具有1至6加仑的容量。

一旦容器填充有所需的可流动材料，喷嘴就被加盖，以密封容器并保护内含物免受污染。根据内含物类型的，容器、喷嘴和盖子可以在填充之前、期间以及之后使用蒸汽、过氧化氢（$H_2O_2$）、射线或其他合适的消毒方法消毒。为了使这类产品的保质期最长，设备组件在容

器的整个生命周期内提供密封是至关重要的。

分配柔性容器的内含物的一个便利的方法是，通过给用来密封容器的盖子穿孔或通过直接使用流体转移装置给容器穿孔来打开容器。使用穿孔的分配系统的实例被公开在下列美国专利中：第 4,325,496 号、第 6,971,548 号和第 6,378,730 号。

因为柔性容器典型地用于一次性使用并且一旦这类容器的内含物被完全分配，这类容器就被丢弃，所以该设备组件必须由廉价材料制成、容易生产、对市场响应迅速并且优选地可回收。还希望，用于这类包装系统的设备组件在将对内含物的污染的可能性最小化的同时，也简化对容器内含物的存取。优选地，该柔性容器的内含物能够在没有工具或类似物的情况下被容易地分配，而不用工具或类似物。还希望，该设备组件可以适于标准的且广泛使用的喷嘴构造，且可以容易地适于柔性软管或管子。该分配机构必须是可靠的，以使实现内含物的分配，而不因连接组件的渗漏或不受控制的打开及类似现象而浪费液体。

发明内容

因此，本发明提供一种可以被安装到柔性容器的设备组件，借此通过使用一种流体转移装置对盖子的一部分穿孔来分配容器的内含物。该穿孔设备组件容易使用，因为需要相对小的力来穿孔和建立流体转移。它也具有锁系统，该锁系统将流体转移装置锁定在分配状态，并且也在盖子与流体转移装置之间形成可靠的密封，这使不想要的溢出的风险最小化。

该穿孔设备组件例如可以用于柔性容器，该柔性容器是使用本领域公知的、合适的商业包装系统填充或形成并填充的。这类包装系统可以包括用商标 PREPAC、IMPACO 和 ELECSTER 销售的垂直式膜密封填充机（vertical form film seal filling machines），和 Liqui-Box™ 2000C1T-A 型填充器，该填充器用于填充用在盒内袋系统中的柔性容器。该设备组件也可以用于无菌填充的柔性容器。

根据一广义方面，本发明提供一种用于通过穿孔从容器分配可流动材料的流体转移装置。该流体转移装置包括中空体，该中空体具有

纵轴、内部贯通道、穿孔端和分配端。穿孔端具有外围末端，其沿着中空体的纵轴逐渐变细；穿孔端也具有导齿，其位于外围末端的远端，以发起对固定到容器喷嘴的盖子的穿孔。

在本发明的另一个实施方案中，导齿可以包括基本平行于中空体的纵轴的外表面，和向内倾斜并与外表面成10°至45°角的内表面。

有利地，流体转移装置的穿孔端还可以包括多个附加齿，其被布置在外围末端周围。附加齿方便穿孔，因为它们可以减少对容器喷嘴的盖的可穿孔部分进行穿孔所需要的力，并使可穿孔部分内的圆形隔膜被向后剥，以建立流体转移。

根据另一方面，本发明也提供一种用于固定到容器的喷嘴的盖子。该盖子包括适于将盖子固定到容器喷嘴的喷嘴接收侧，和适于被流体转移装置穿孔的可穿孔部分。该盖子的可穿孔部分包括压印，其限定了被多个花瓣状组成部分围绕的圆形隔膜。有利地，可穿孔部分可以位于盖子的中央开口内，一个挡板可以用于覆盖中央开口并因此覆盖可穿孔部分，从而在分配之前将可穿孔部分保持在基本无菌的状态。

根据又一方面，本发明也提供了一种用于容器的设备组件。该设备组件包括：与容器流体连通的喷嘴；封堵喷嘴的分配端的盖子，该盖子具有可穿孔部分；以及包括穿孔端和分配端的流体转移装置。该流体转移装置具有纵轴和内部贯通道，用于在可穿孔部分给盖子穿孔，以允许从容器经过喷嘴和流体转移装置的流体连通。流体转移装置的穿孔端包括导齿，以发起对盖子的可穿孔部分进行穿孔。

流体转移装置的穿孔端可以具有外围末端，其沿着流体转移装置的纵轴逐渐变细，其中导齿位于渐细的外围末端的远端，以在穿孔期间发起对盖子的可穿孔部分进行穿孔。有利地，穿孔端还可以包括附加齿，其被布置在穿孔端的外围末端周围，以在穿孔期间随后渐进地刺破盖子的可穿孔部分。

优选地，盖子的可穿孔部分也包括压印，其限定了被多个花瓣状组成部分围绕的圆形隔膜。有利地，可穿孔部分还适于与流体转移装置协作，以使得圆形隔膜通过在穿孔期间形成的铰链状连接仍然附着到盖子。

该设备组件还可以包括锁定机构，其适于作为在喷嘴内基本上轴

向地施加到流体转移装置上的推力的结果，将流体转移装置固定到盖子，从而穿孔端与盖子穿孔接合。锁定机构可以包括流体转移装置的穿孔端上的环形凹部，该环形凹部适于与盖子的可穿孔部分的花瓣状组成部分协作，以便一旦穿孔设备组件处于分配状态，就防止流体转移装置从盖子移走，并从而防止不想要的溢出。

根据另一方面，本发明也提供一种用于柔性容器的可穿孔端口，该可穿孔端口包括适于被流体转移装置穿孔的可穿孔部分。可穿孔部分包括压印，其限定了被多个花瓣状组成部分围绕的圆形隔膜。可穿孔端口可以固定到柔性容器。可穿孔端口还可以包括裙部，其从可穿孔端口的容器侧向外延伸并且围绕可穿孔端口。该裙部充当间隔物以保持任何邻近的容器壁的任何部分都远离可穿孔端口，从而防止容器壁被流体转移装置穿孔。

根据又一方面，本发明也提供一种包括上述可穿孔端口的柔性容器。可穿孔端口可以通过固定到柔性容器的壁表面的法兰而固定到柔性容器。可穿孔端口也可以固定到柔性容器，以使可穿孔部分与柔性容器上的开口对准。可替换地，如果可穿孔部分没有与柔性容器上的开口对准且法兰固定到容器的外壁表面，则可穿孔部分的一部分也可以固定到外壁表面。这防止在可穿孔部分区域中的容器材料在穿孔期间过度拉伸，并允许容器更容易地被流体转移装置穿孔。

根据再一方面，本发明也提供一种用于容器的设备组件，其包括可穿孔端口和流体转移装置。可穿孔端口固定到容器壁并包括可穿孔部分。可穿孔端口可以包括法兰，借助该法兰，可穿孔端口可以固定到容器。流体转移装置包括内部贯通道，以允许从容器经过流体转移装置的流体连通。流体转移装置可以是先前所述的类型。

附图简述

图 1 示出了根据本发明的一个实施方案的穿孔设备组件处于拆卸状态的侧视剖面图。

图 2 示出了图 1 的穿孔设备组件的流体转移装置的立体图。

图 3 示出了图 1 的穿孔设备组件的流体转移装置的穿孔端的侧视剖面图。

图 4 示出了图 1 的穿孔设备组件的盖子不带挡板的俯视图。

图 5 示出了图 1 的穿孔设备组件处于预备穿孔状态的侧视剖面图。

图 6 示出了图 1 的穿孔设备组件处于分配状态的侧视剖面图。

图 7 示出了根据另一个实施方案的穿孔设备组件的盖子的俯视图。

图 8 示出了根据另一个实施方案的穿孔设备组件的流体转移装置的侧视图。

图 9 示出了根据本发明的另一个实施方案的流体转移装置的立体图。

图 10 示出了根据本发明的另一个实施方案的流体转移装置的立体图。

图 11 示出了根据本发明的另一个实施方案的穿孔设备组件处于拆卸状态的立体剖视图。

图 12A 示出了根据本发明的另一个实施方案的穿孔设备组件的侧视剖面图。

图 12B 示出了图 12A 的穿孔设备组件处于分配状态的侧视剖面图。

图 13A 示出了根据本发明的另一个实施方案的穿孔设备组件的侧视剖面图。

图 13B 示出了图 13A 的穿孔设备组件处于分配状态的侧视剖面图。

图 14A 示出了根据本发明的另一个实施方案的穿孔设备组件的侧视剖面图。

图 14B 示出了图 14A 的穿孔设备组件处于分配状态的侧视剖面图。

图 15A 示出了根据本发明的另一个实施方案的穿孔设备组件的侧视剖面图。

图 15B 示出了图 15A 的穿孔设备组件处于分配状态的侧视剖面图。

图 16A 示出了根据本发明的另一个实施方案的穿孔设备组件的侧视剖面图。

图 16B 示出了图 16A 的穿孔设备组件处于分配状态的侧视剖面图。

## 发明详述

特别参见附图，这些图仅为了说明本发明，而不是为了限制所附

权利要求的范围。

现在参见图 1，图示了根据本发明的、总体以 1 示出的穿孔设备组件，其用于那些用于诸如液体的可流动材料的柔性容器，特别用于无菌包装的柔性容器。穿孔设备组件 1 包括安装到柔性容器 2 的总体以 10 示出的喷嘴、总体以 20 示出的盖子以及总体以 40 示出的流体转移装置。

图 1 所示的喷嘴 10 的构造是广泛使用的、市场上可买到的，并一般适于安装到柔性容器，诸如盒内袋容器，即袋子。然而，应理解，本发明的穿孔设备组件可以容易地被修改，以包括其他构造的喷嘴。喷嘴 10 大致为圆柱形，并具有贯通中央开口 14。喷嘴 10 的中央开口 14 经由容器 2 上的开口 3 与容器 2（其上部被示出）连通。在基部，喷嘴 10 也具有相对薄的外突法兰 11，其用来将喷嘴 10 固定到容器 2 的内壁表面 4。通过诸如热封、粘合剂或类似手段等的公知手段来结合法兰 11 的上表面 12，以与容器 2 的内壁表面 4 形成密封连接。

盖子 20 大致为圆柱形，但可以被制得适诸如椭圆或多边形等其他形状的喷嘴。盖子 20 具有中央开口 22，其具有内圆周表面 30。在中央开口 22 内，盖子 20 也具有可穿孔部分 31，该可穿孔部分具有压印（indentation），该压印包括圆形部分 33 和几个放射状部分 34，如图 4 所示。由部分 33 和 34 形成的压印是可穿孔部分 31 内的材料厚度减小的区域，该区域在可穿孔部分 31 内限定被多个花瓣状组成部分 29 围绕的圆形隔膜 27。盖子 20 也具有环形开口 26，其适于接收喷嘴 10，并将盖子 20 密闭地固定到喷嘴 10。位于环形开口 26 内的是内表面 25 和环形缘 24。盖子 20 还可以包括用于密封中央开口 22 的挡板 21，其被固定到盖子 20 的上表面 23。

流体转移装置 40 也大致为圆柱形，并包括总体以 41 示出的分配端、总体以 42 示出的穿孔端、内部贯通道 43 以及分配端 41 与穿孔端 42 之间的手柄 44。手柄 44 包括外突法兰，并具有下表面 45。分配端 41 具有有棱纹的外部 51，其适于固定到分配管（未示出）。穿孔端 42 具有外圆柱表面 52 和环形凹部 50，环形凹部 50 是咬合锁机构（snap-fitting locking mechanism）的一部分。穿孔端 42 也包括引导表面 49，其具有向内延伸的圆锥轮廓，该圆锥轮廓通向外围末端 46，

外围末端 46 沿着流体转移装置 40 的纵轴逐渐变细。

流体转移装置 40 还至少包括导齿 47，其位于渐细的外围末端 46 的远端 53。在一个优选实施方案中，流体转移装置 40 包括多个附加齿 48，其布置在穿孔端 42 的外围末端 46 周围。齿（47 和 48）的构造在图 2 和 3 中详细示出。导齿 47 包括外表面 56 和内表面 55，外表面 56 相对地平行于流体转移装置 40 的纵轴，内表面 55 向内倾斜并与外表面 56 成 10° 至 45° 角。附加齿 48 可以具有与导齿 47 相同或不同的几何特征。导齿 47 和附加齿 48 可以包括总数为 3、5、7 等的齿。图 9 示出了具有 3 个齿的流体转移装置，图 10 示出了具有 5 个齿的流体转移装置。

可以在本领域技术人员公知的任何合适的无菌填充器上对诸如用在盒内袋系统中的柔性容器等的柔性容器进行填充，并典型地使用诸如 Liqui-Box™ 2000C1T-A 型填充器（未示出）等的商业包装系统进行填充。在填充和无菌包装之前，容器 2 以下述状态被供应给包装系统：容器的内侧已经被使用钴伽玛射线或其他合适的消毒手段预消毒。喷嘴 10、盖子 20 和流体转移装置 40 也使用过氧化氢（$H_2O_2$）、蒸汽或其他合适的手段消毒。一旦容器 2 已经经由喷嘴 10 填充有可流动材料，包括密闭地结合到上表面 23 的挡板 21 的盖子 20 固定到喷嘴 10。将流体转移装置 40 以在单独的消毒塑料袋（未示出）中的方式与已经被填充并加盖的容器一起提供给用户，该塑料袋仅当容器 2 的内含物要被分配时才被打开。

图 5 示出了安装在柔性容器 2 的喷嘴 10 上的盖子 20。通过首先安置盖子 20 和喷嘴 10 以使接收喷嘴的环形开口 26 接收喷嘴 10 的端部，以咬合方式安装盖子 20。将向内的轴向力施加到盖子 20，以将盖子 20 压向喷嘴 10。环形缘 15 有力地且回弹地顶着内表面 25 滑动，并在盖子 20 与喷嘴 10 之间形成基本密封的封闭。一旦盖子 20 安装在喷嘴 10 上，盖子 20 上的环形缘 24 就与喷嘴 10 上的外突法兰 13 协作，以将盖子 20 锁定到位。

在容器的运送和存储期间，挡板 21 使中央开口 22 和盖子 20 的可穿孔部分 31 维持在基本无菌的状态。优选地，挡板 21 可以是基本不透气体或氧气的，并可以包含任何合适的材料，诸如箔、乙烯-乙烯醇、

聚乙烯醇、聚乙烯或金属化聚酯压板。挡板 21 可以通过热封、超声焊接或其他已知方法附着到已消毒的盖子 20 的上表面 23。可以在给盖子 20 的可穿孔部分 31 穿孔之前移除挡板 21，或可以将挡板 21 留在盖子 20 上并使用流体转移装置 40 对其穿孔。

容器 2 通常置于分配位置，其中设备组件 1 从容器向外或向下延伸，以允许重力辅助分配内含物。通过首先将挡板 21 从盖子 20 移除，来分配容器 2 的内含物。然后，从已消毒的塑料袋（未示出）取出流体转移装置 40，分配端 41 可以连接到分配管（未示出）或其他流体传输系统。使用手柄 44 将流体转移装置 40 的穿孔端 42 插入中央开口 22，并将其轴向地向内压向盖子 20，以给可穿孔部分 31 穿孔。图 5 示出了被安置在盖子 20 的中央开口 22 内的流体转移装置 40，其处于预备给盖子 20 的可穿孔部分 31 穿孔的位置。图 6 示出了在盖子 20 内处于分配位置的流体转移装置 40，其中可穿孔部分 31 已经被完全穿孔。可替换地，取决于用于挡板 21 的材料的类型，可以将挡板 21 留在原地，并在给盖子 20 的可穿孔部分 31 穿孔之前使用流体转移装置 40 对其进行穿孔。

通过将力集中在可穿孔部分 31 上的特定点从而方便穿孔过程，导齿 47 和附加齿 48 允许相对不费力地给可穿孔部分穿孔。导齿 47 首先刺破压印的圆形部分 33，随着流体转移装置 40 的穿孔端 42 的进一步插入，附加齿 48 随后接触并以渐进方式刺破圆形部分 33，以将圆形隔膜 27 铰合地附着到盖子 20。附加齿 48 不需要具有与导齿 47 相同的几何构造。在本实施方案中，导齿 47 和附加齿 48 被示为大致为锥体几何形状，然而，可以使用任何其他使给可穿孔部分穿孔所要求的力最小化的合适的几何构造。

随着导齿 47 刺破压印的圆形部分 33，随着内表面 55 向下并向内放射状地在压在圆形隔膜 27 上，导齿 47 继续撕裂圆形部分 33，以从可穿孔部分 31 向后剥圆形隔膜 27。随着引导表面 49 继续进入可穿孔部分 31，花瓣状组成部分 29 被推并向下偏转，从而使压印的放射状部分 34 内的材料被拉伸。因此，这在穿孔端 42 与盖子 20 的可穿孔部分 31 之间产生紧密的配合，由此防止不想要的渗漏。在图 4 中，示出花瓣状组成部分 29 具有大致方形轮廓，但也可以使用如图 7 所示的更

圆的轮廓。

一旦流体转移装置 40 完全插入，手柄 44 的下表面 45 就与盖子 20 的上表面 23 接触并且流体转移装置 40 经由咬合机构锁定在盖子 20 内，处于分配位置。压印的花瓣状组成部分 29 和被拉伸的放射状部分 34 与流体转移装置 40 的环形凹部 50 接合，如图 6 所示。这就防止了，一旦穿孔设备组件 1 处于分配状态，流体转移装置 40 被从盖子 20 处拉出，也维持了盖子 20 与流体转移装置 40 之间的紧密配合，以防止不想要的溢出。

图 6 清晰地示出圆形隔膜 27 如何经由铰链 32 维持连接到盖子 20。通过流体转移装置 40 的穿孔端 42 与盖子 20 的可穿孔部分 31 的协作，在穿孔时自动地形成铰链 32，并且该铰链 32 包括可穿孔部分 31 的一部分，一旦流体转移装置 40 已经完全插入并锁定在分配位置，可穿孔部分 31 的这部分维持不破。由此，防止了圆形隔膜 27 松动，以及潜在地阻塞流动或与内含物一起被分配。

因为铰链 32 自动地形成在与外围末端 46 的近端 54 邻近的位置，当穿孔发生时，铰链 32 在可穿孔部分 31 内的位置取决于流体转移装置 40 的取向。因此，不必以任何特殊取向将流体转移装置 40 的穿孔端 42 插入盖子 20 来形成铰链 32。

该优选实施方案中示出的分配端 41 的有棱纹的外部 51 适于接收分配管（未示出）。明显地，其他类型的转接器也可以用于将流体转移装置 40 连接到传输系统。分配端 41 也可以与分配龙头流体连通，该分配龙头可以用于调节可流动材料的流动。在另一个实施方案中，分配端 41 也可以包括如图 8 所示的整合到流体转移装置 40 的分配龙头 57。

图 11 示出了根据另一个实施方案的主要用于乳品应用的穿孔设备组件。在此情形下，盖子 20 具有稍许不同的几何构造，但仍包括可穿孔部分 31，其适于被流体转移装置 40 穿孔。

在再一个实施方案中，本发明也提供一种穿孔设备组件，其中可穿孔端口直接固定到柔性容器的壁。这类可穿孔端口的实例在图 12A 至 16B 中的总体以 80 示出。例如，这种类型的可穿孔端口可以用在在垂直式膜封填充机上被填充的容器上，在该填充机上不需要喷嘴来填

充容器。可穿孔端口 80 包括法兰 81，其适于将可穿孔端口 80 固定到容器 2 的外壁表面 5（在图 12A 至 15B 示出）或内壁表面 4（在图 16A 和 16B 中示出）。可穿孔端口也包括总体以 83 示出的外侧、总体以 84 示出的容器侧以及可穿孔部分 31，该可穿孔部分 31 适于被如前文所述的流体转移装置 40 穿孔。类似地，可穿孔端口也可以包括固定到外侧 83 的挡板 21，以在分配容器 2 的内含物之前将可穿孔部分 31 保持在基本无菌的状态。

图 14A 和 14B 示出了根据另一个实施方案的包括裙部 82 的可穿孔端口 80。该裙部从可穿孔端口 80 的容器侧 84 向外延伸，并围绕可穿孔部分 31。裙部 82 充当间隔物或防护物，以保持任何邻近的容器壁的任何部分远离可穿孔部分 31，由此防止容器 2 被流体转移装置 40 穿孔。

图 13A、13B、14A、14B、16A、16B 示出了可穿孔端口 80 的实施方案，该可穿孔端口 80 固定到容器 2 的外壁表面 5 或内壁表面 4，处于可穿孔部分 31 与容器 2 上的开口 3 对准的位置。然而，如图 12A、12B、15A、15B 所示，如果法兰 81 固定到外壁表面 5，可穿孔部分不必与容器 2 上的开口 3 对准。在这类情形下，优选地，可穿孔部分 31 的至少一部分也固定到外壁表面 5。这防止在可穿孔部分的区域的容器材料在穿孔期间过度拉伸，并允许容器 2 更容易地被流体转移装置 40 穿孔。

因为这些容器典型地意在一次性使用，并且一旦内含物已经被完全分配，这类容器就被丢弃，所以优选地，用在这类系统中的设备组件要容易生产、廉价、容易安装和使用以及可回收。部件具有足够的品质和结实度也是重要的。相应地，生产本发明的穿孔设备组件所要求的部件的结构相对简单且经济。喷嘴 10、盖子 20、可穿孔端口 80 和流体转移装置 40 都可以由常用且可回收的热塑材料生产，并使用常规的塑料注塑成型工艺形成。例如，盖子 20 和可穿孔端口 80 可以优选地使用 85%的中密度线性低密度聚乙烯（LDPE）和 15%的高密度聚乙烯（HDPE）的混合物制成。流体转移装置 40 可以使用高密度聚乙烯（HDPE）或聚丙烯（PP）生产。可替换地，流体转移装置 40 可以使用市场上可买到的低密度聚乙烯制成。发现，与 HDPE 比较，将更柔软的

低密度聚乙烯用于流体转移装置40使得给盖子20或可穿孔端口80穿孔所要求的力减小。相信，将更柔软的材料用于流体转移装置40允许流体转移装置40的穿孔端42更适应于可穿孔部分31中的破裂路径，这在穿孔期间产生更小的阻力。在盖子20和具有较小直径的可穿孔部分31的可穿孔端口80上，穿孔力的减小更显著。

注塑成型零件的较薄区域典型地提出了有关用于注塑成型的合适的模具及工艺设计的挑战。相应地，可以使用单独的压印器（未示出）来形成可穿孔部分31的较薄的圆形部分33和放射状部分34，所述压印器用于对盖子20或可穿孔端口80进行刻痕或进行压印，一旦该盖子或可穿孔端口被模制为具有较厚的尺寸。优选地，压印器可以集成到模具内，其中在从模具喷出零件之前或同时，可以进行较薄区域的形成。

从前述中可以看到，本发明包括用于柔性容器的穿孔设备组件。本领域技术人员应意识到，可以对前述中描述的实施方案做出明显的改变，而不脱离这些实施方案的总发明构思。因此，应理解，本发明不局限于所公开的具体实施方案，而是意在覆盖这些实施方案的那些落在如所附权利要求限定的本发明的范围和精神内的各种明显的改型。

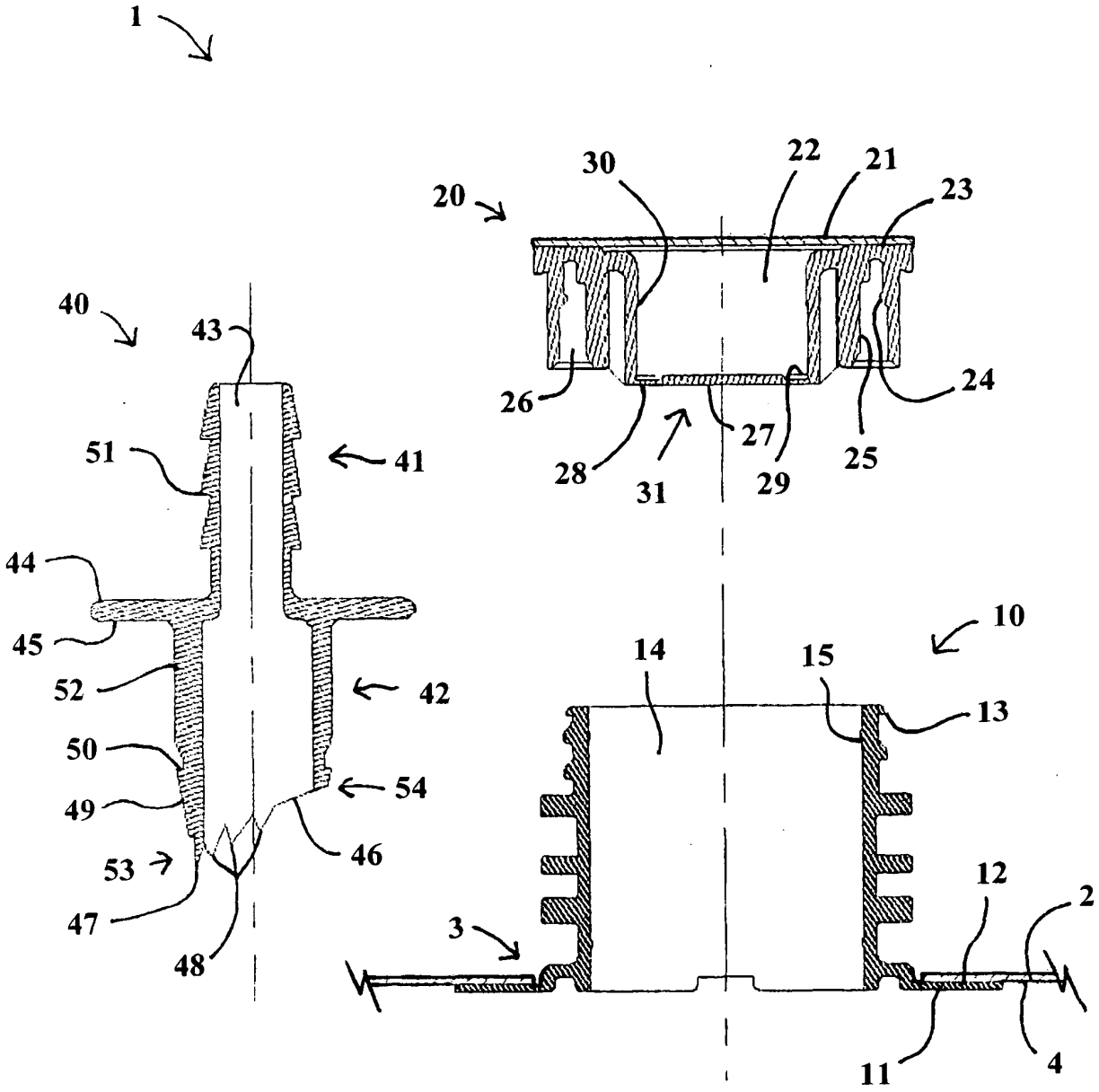

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图 1

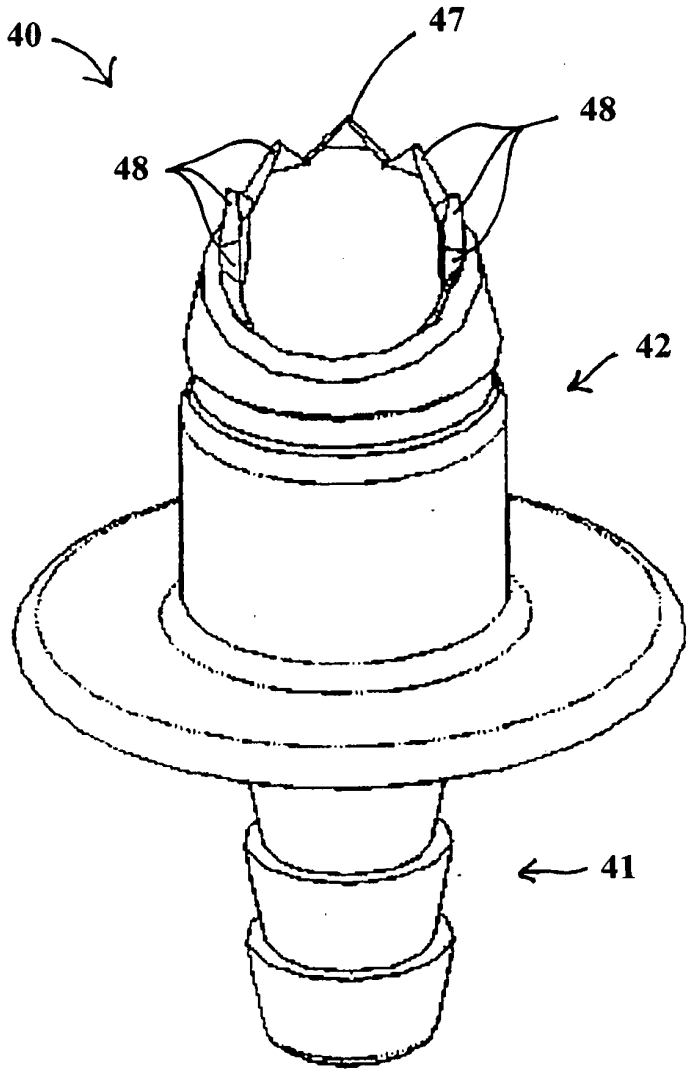


图 2

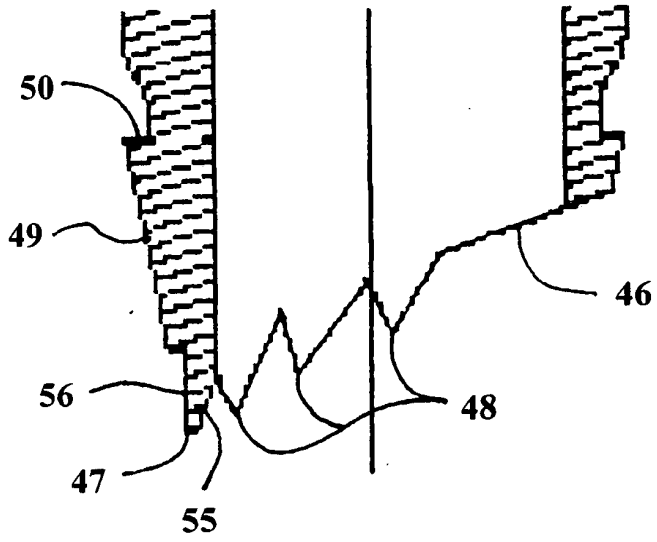


图 3

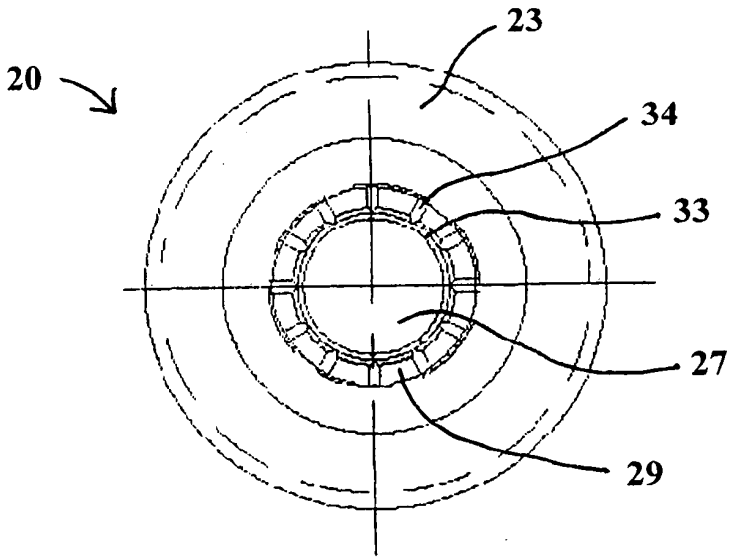


图 4

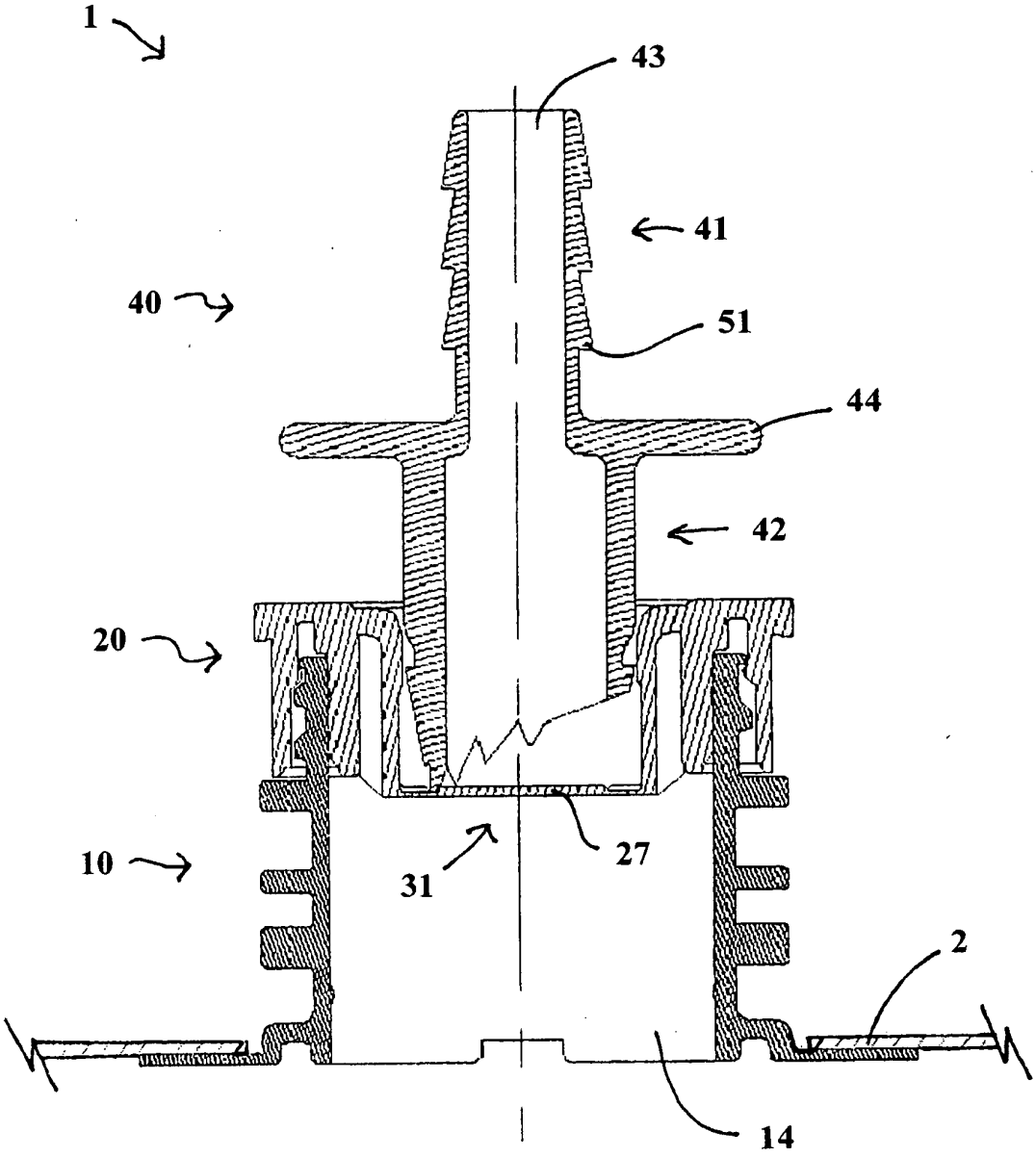


图 5

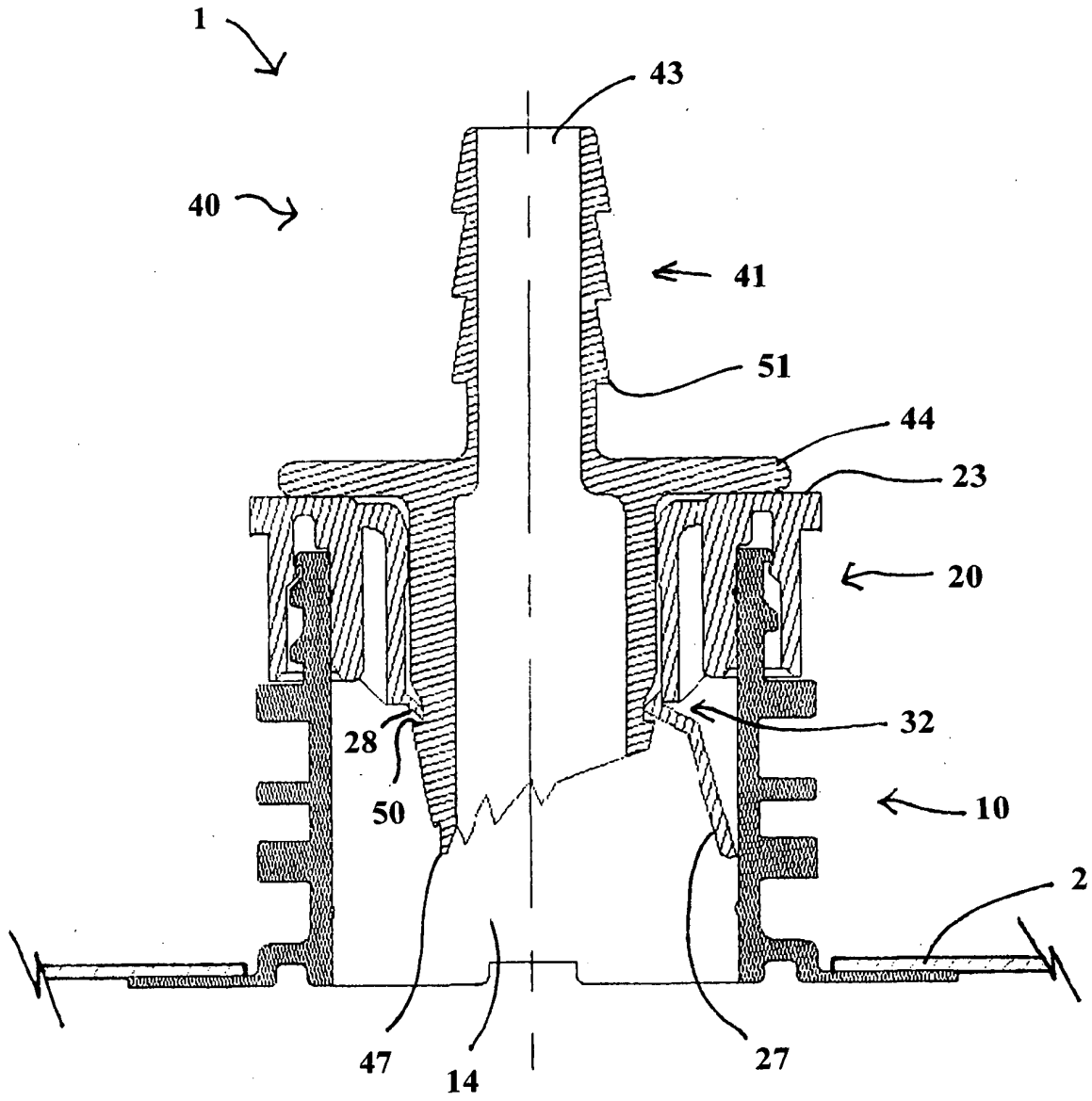


图 6

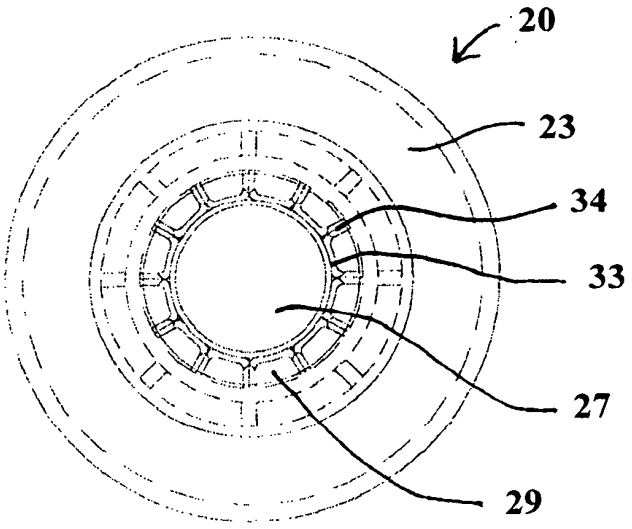


图 7

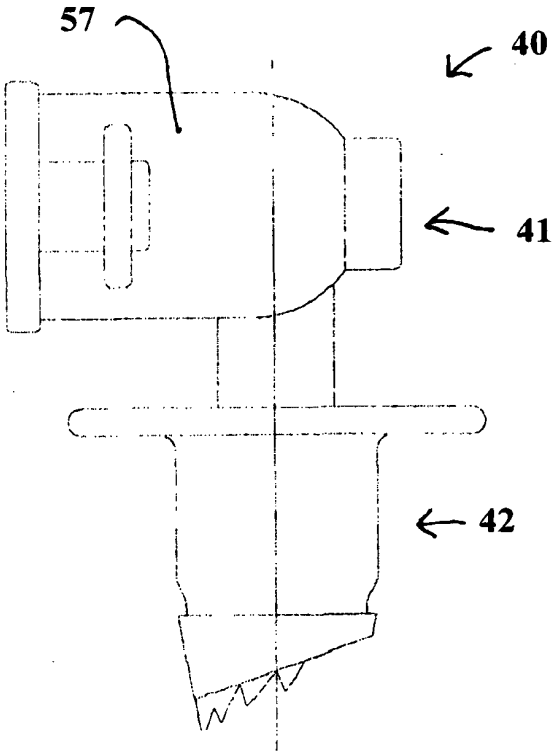


图 8

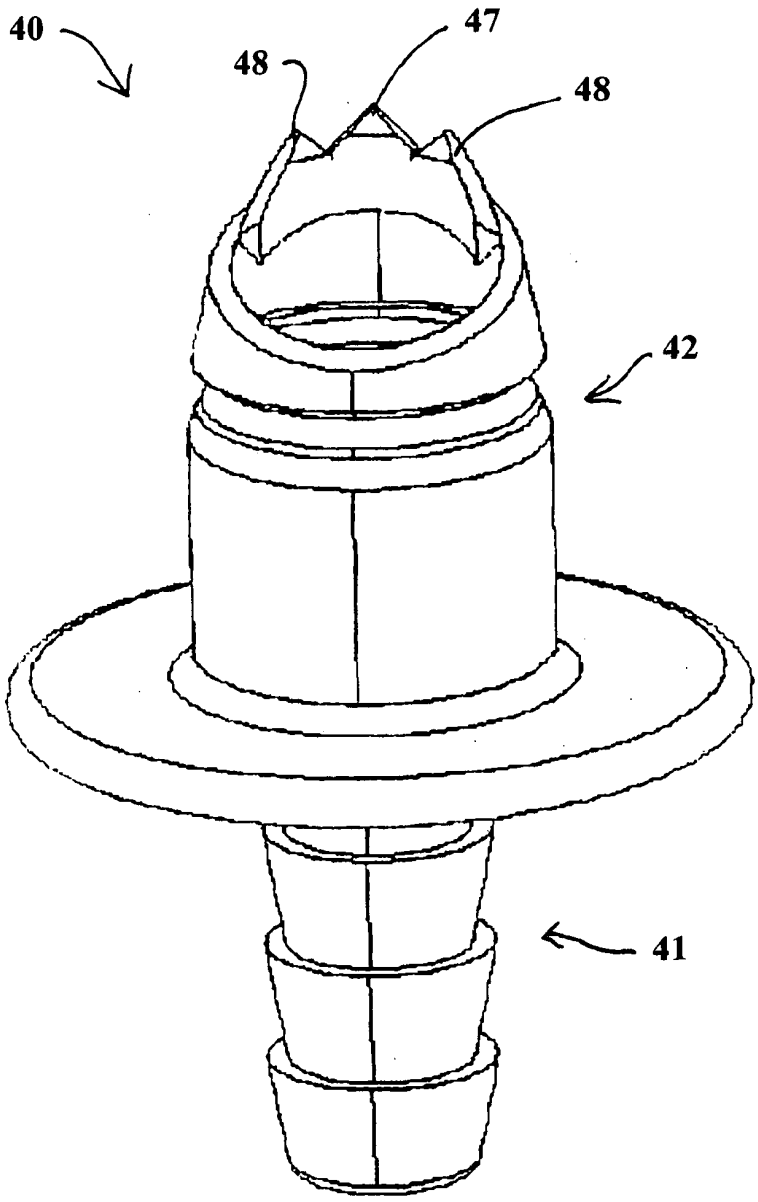


图 9

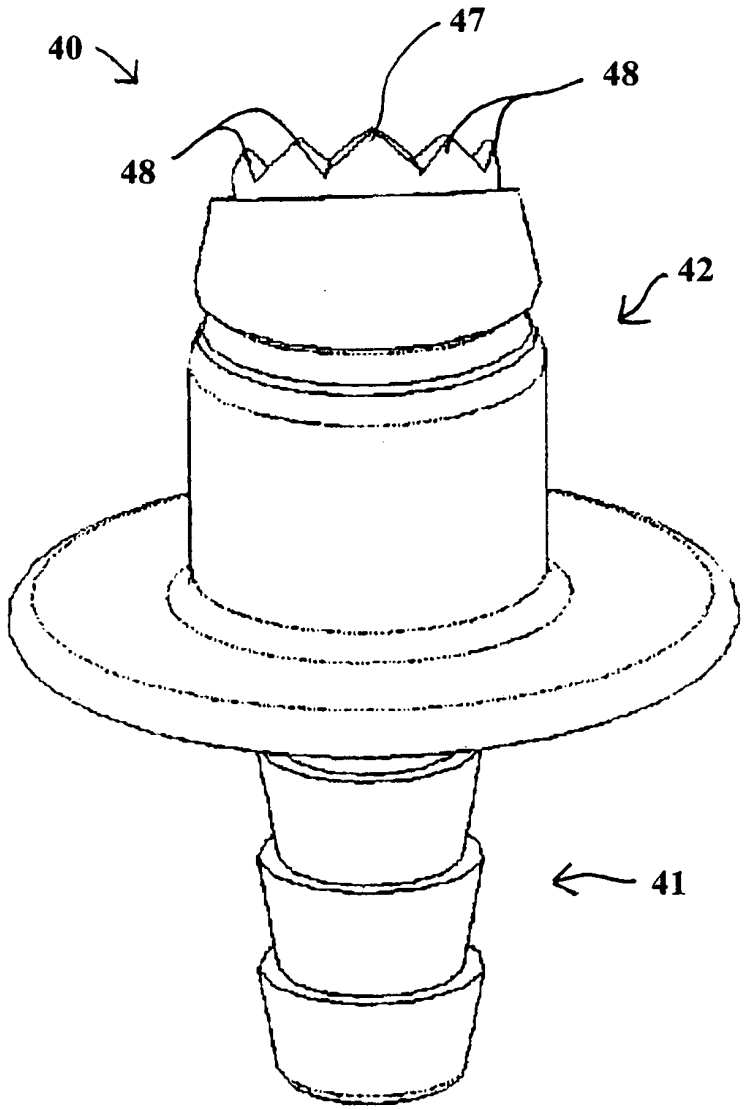


图 10

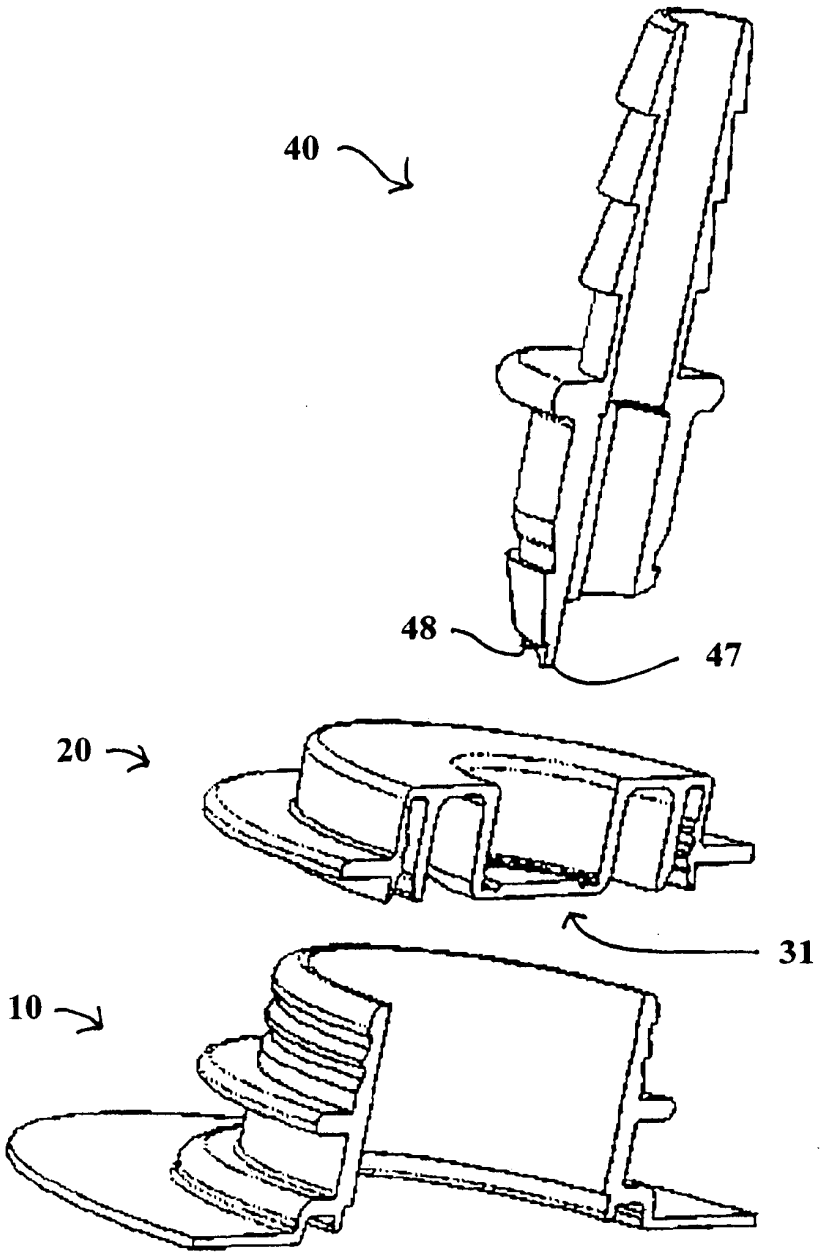


图 11

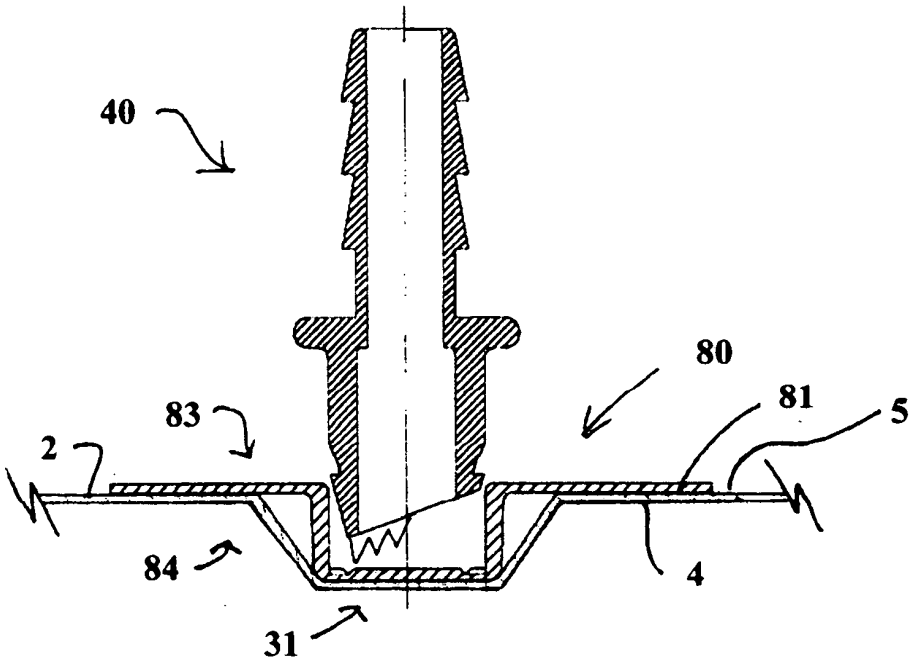


图 12A

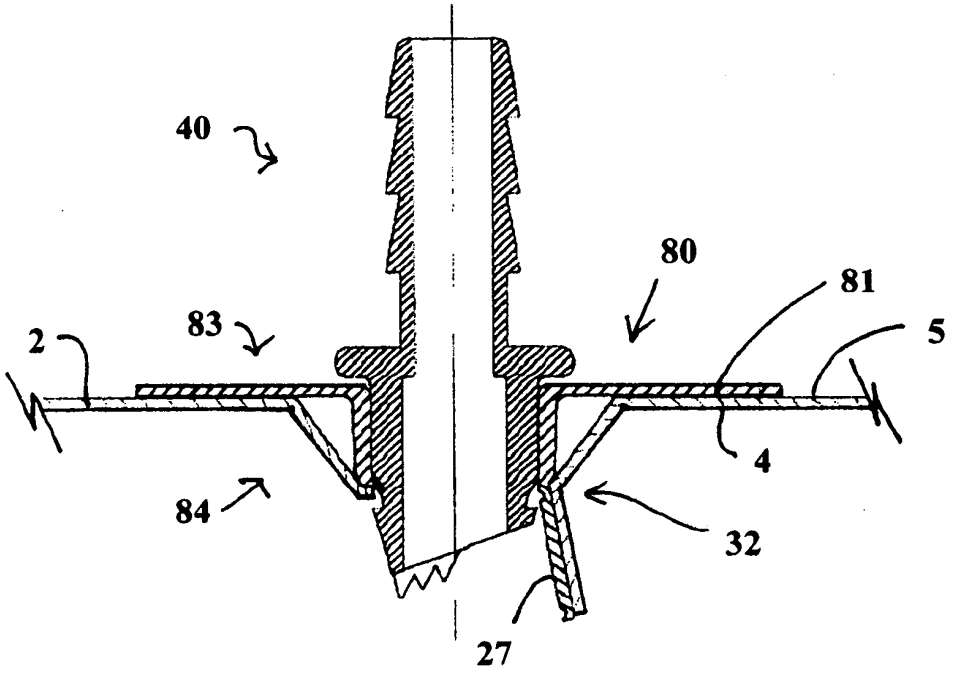


图 12B

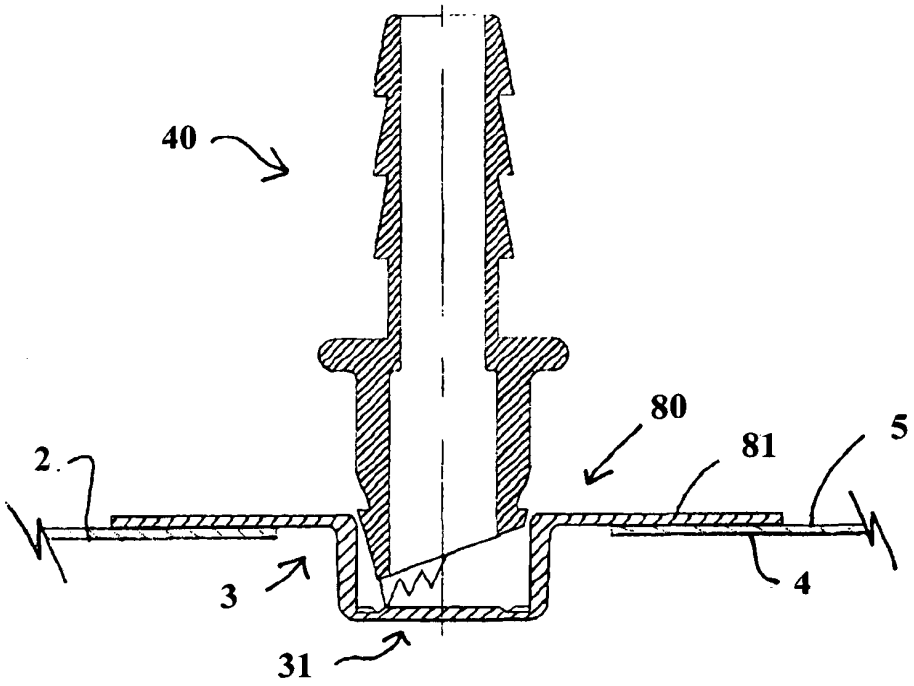


图 13A

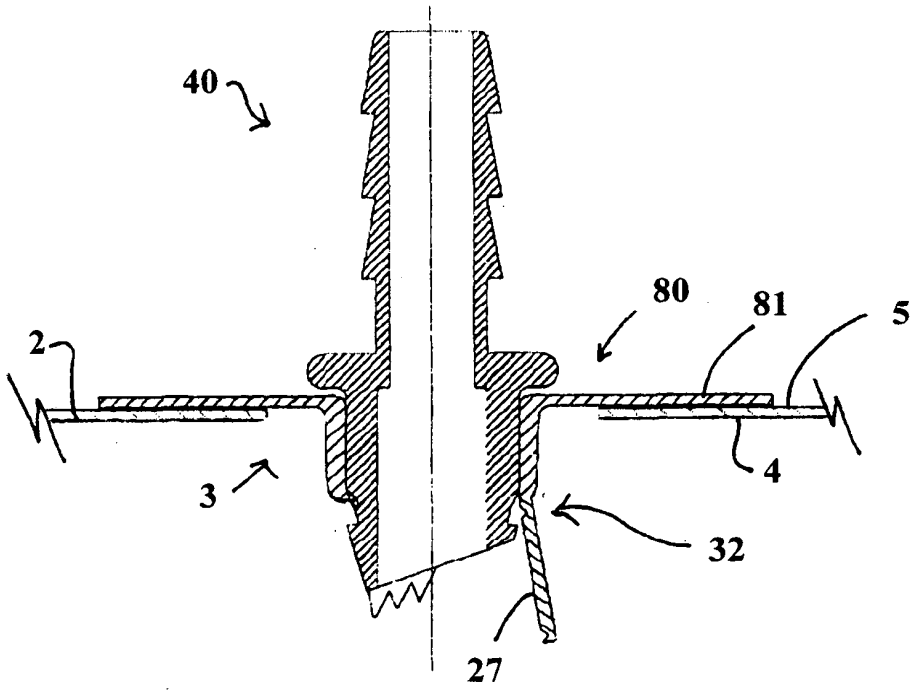


图 13B

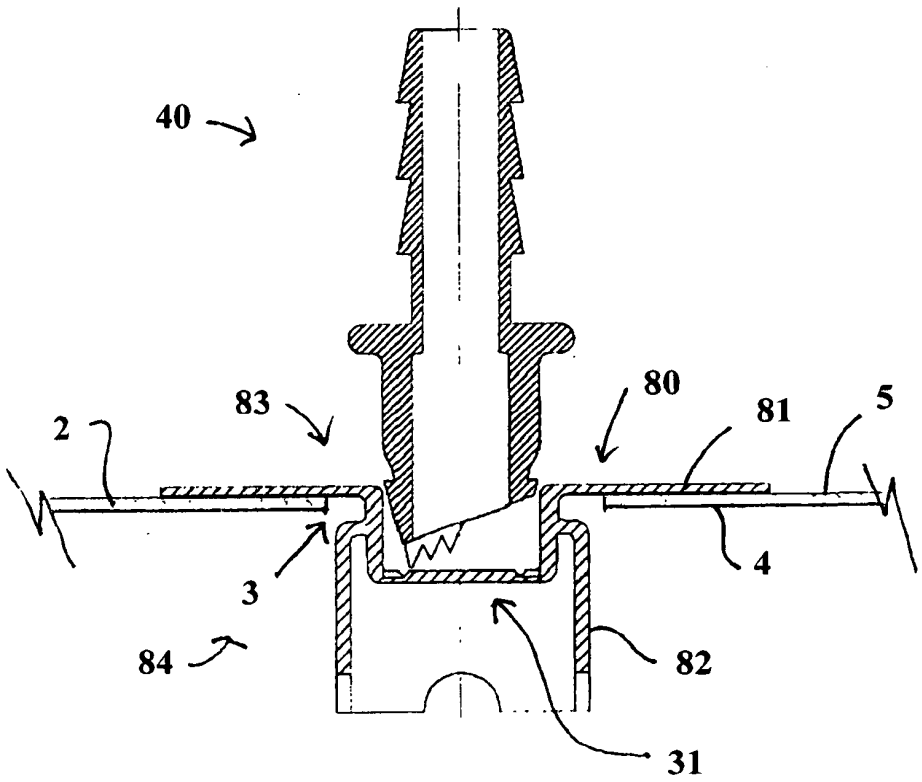


图 14A

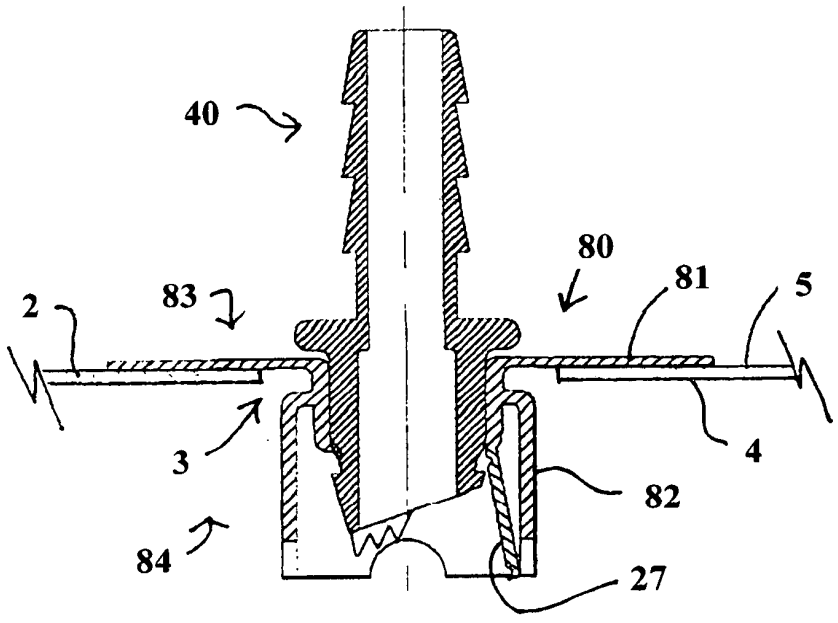


图 14B

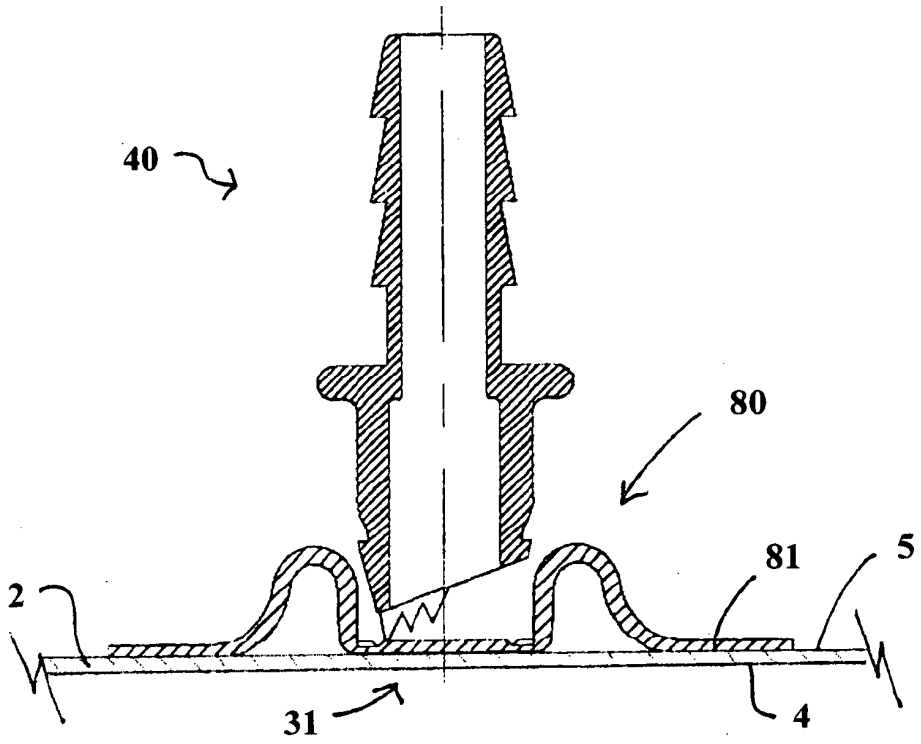


图 15A

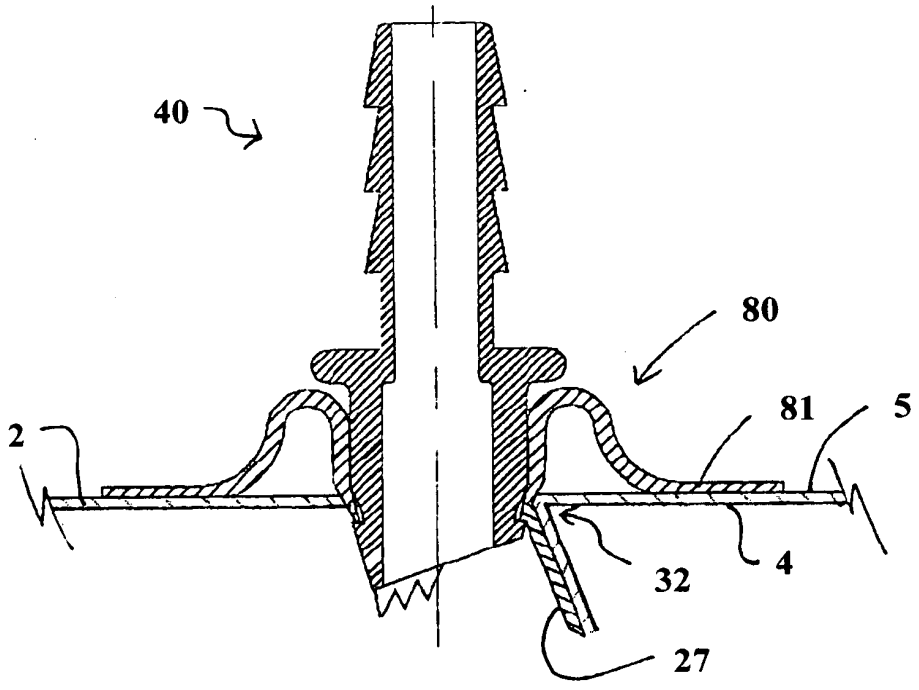


图 15B

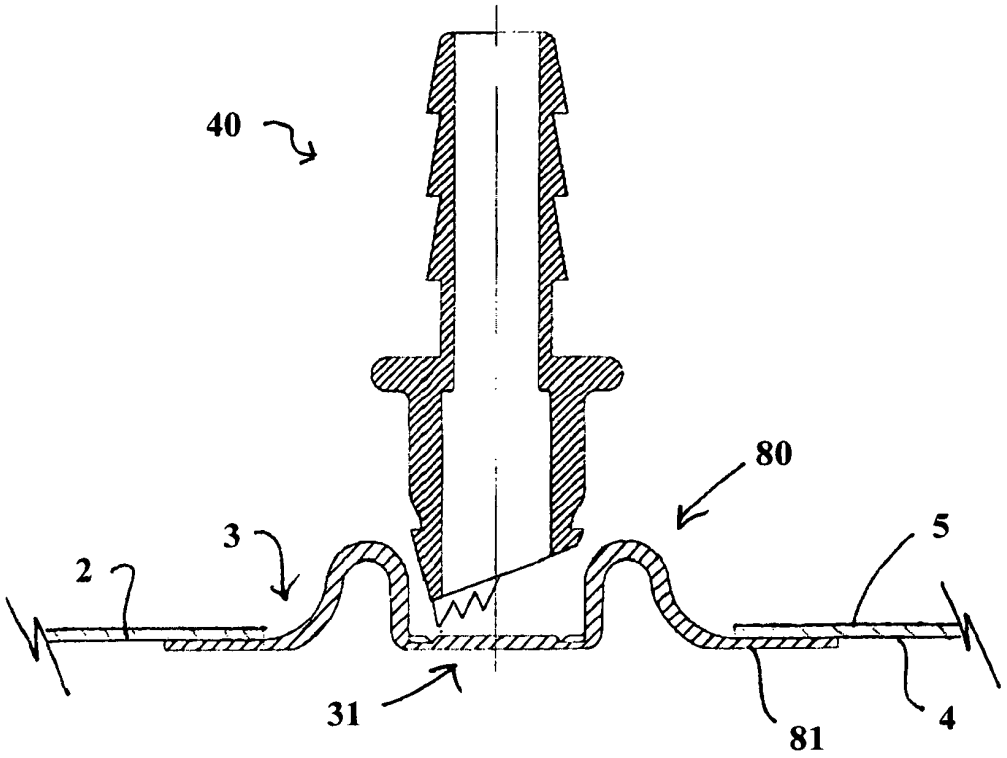


图 16A

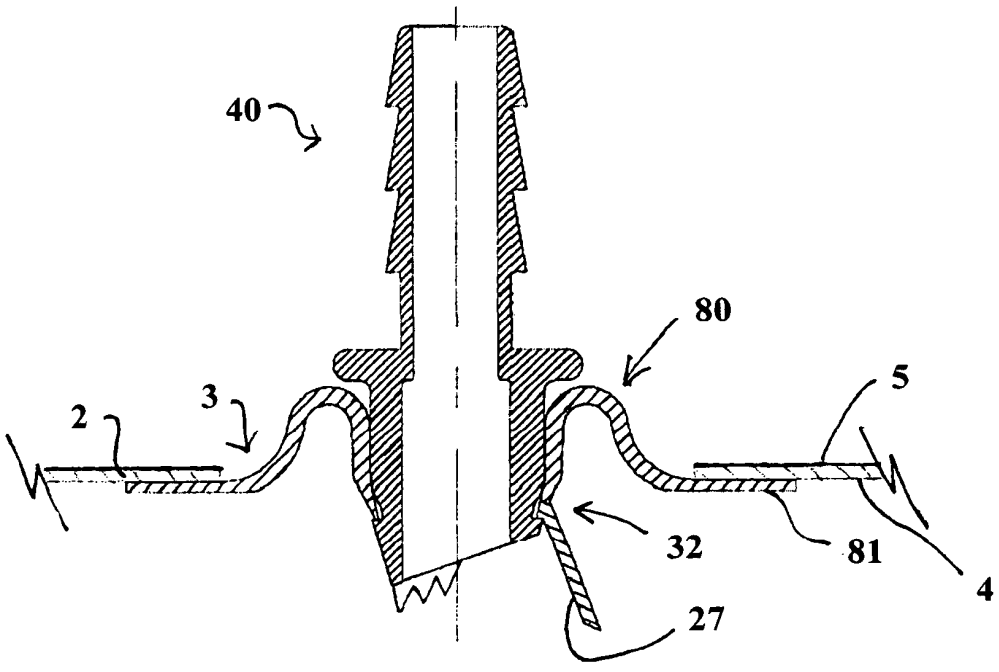


图 16B

[54] TITLE

A PIERCING FITMENT ASSEMBLY

[57] ABSTRACT

An improved piercing fitment assembly for mounting to a flexible container is provided, whereby the contents of the container are dispensed by piercing a pierceable portion of a cap using a fluid transfer device. The piercing fitment assembly is easy to use as a relatively minimal amount of force is required for piercing and establishing fluid transfer. It also has a locking system which locks the fluid transfer device into a dispensing state and also forms a reliable seal between the cap and the fluid transfer device which minimizes the risk of unwanted spillage. The fitment assembly comprises: a spout connected in fluid communication to the container; a cap having a pierceable portion sealing an end of the spout and a fluid transfer device having a leading tooth to initiate piercing of the pierceable portion of the cap.