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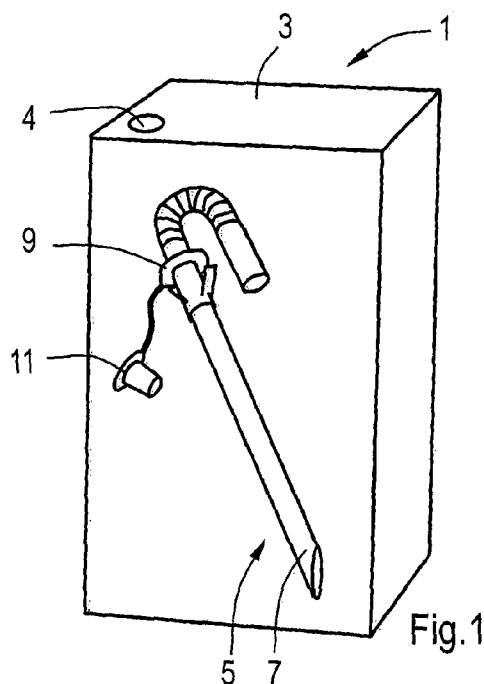
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(54) **Title:** CONTAINER ASSEMBLY



(57) **Abstract:** A device, a connector and an assembly according to the appended claims are provided herewith. The assembly comprises a container for a fluid and the device, the container having a wall to be penetrated by the device. The device is for dispensing fluid to or from the container and comprises a tube with a first end, a second end and a lumen, a connector, and a closure. The device is configured to penetrate the container wall to transfer the fluid to or from the container through the tube. The closure and the first end of the tube are configured to open and sealingly close the tube reversibly. The connector is configured to be inserted into and/or through the container wall forming a seal between the tube and the container and attaching the device substantially irreversibly to the container, with the device penetrating the wall and the first end of the tube extending out of the container.

Container assembly

#### TECHNICAL FIELD

The present disclosure relates to packaging material and consumption utensils, in particular to (containers with) straws for drink containers.

5

#### BACKGROUND

Straws and sealed drink containers are commonly known. Generally, both are provided together as an assembly, wherein the straw is formed to puncture (a predetermined portion of) the container for obtaining access to its contents for consumption. Similar arrangements may be provided for other flowable media such as oils, powders etc. The resultant opened assembly may however leak and/or lead to spilling of the contents, which are undesired.

15 E.g., EP 1 362 800 discloses a straw adapted to be removably inserted into a press deformable container through a straw insert opening of the container, which is characterized by having a stopping part for stopping itself from being inserted through the straw insert opening, and an inlet hole at a position distant from the position of the stopping part by a distance substantially equal to the thickness of the container-forming material having the straw insert opening. The straw may comprise two tubes slidably fitted into each other so that the inlet hole can be opened and closed.

25 WO 03/049583 also discloses a straw having an inner tube provided with a bellows within an outer tube, one end of the inner tube being terminated as a valve, whereby the suction force from the user provides a pressure difference across the bellows, causing the bellows to move the valve with sufficient force to open. When the suction force ceases, the valve closes, and it remains closed, even when the liquid in the drinking container is pressurized with pressure.

30

US 2009/0065605 discloses an extensible straw for incorporation as an integral component of a disposable or collapsible beverage container, which has telescoping tubes extensible from the container, a screw cap and multiple seals preventing inadvertent leakage from the container whether the container is maintained upright or not.

Such multi-part and telescoping straws consume much material, are prone to malfunctioning and leaking, and they are relatively complex and expensive to manufacture. Also, the movable tube may become detached from the rest of the assembly, undoing the desired benefits.

Another strategy is provided in US 2006/0196895 (and WO 2005/092780), which relates generally to a sealable straw and ventable closure assembly which provides multiple dispensing techniques designed to be attached to the opening of a variety of known sealable containers and container closures. Here, the straw is closed by folding the straw and anchoring or biasing the straw in/towards the folded state. This weakens and possibly damages the straw so that it may lead to leaking after all. Also, the corners of the fold tend to become sharp and thus unsuitable for young children. Further, the easy opening of the embodiment of Figs. 4 and 9 (pars. 81-86) causes a risk of accidental opening and subsequent leaking. The straw also causes easy leaking between the wall of the straw and the wall of the container.

A further known option is a cap over the free end (drinking end) of the straw, e.g. see Fig. 19 of US 2006/0196895, US 2009/0065605 and JP 2000-095272. Such cap is generally cumbersome to apply and it may fall off, inadvertently re-opening the straw so that it may leak.

Improvements are therefore desired.

#### SUMMARY

Inter alia view of the above, a device, a connector and an assembly according to the appended claims is provided herewith.

The assembly comprises a container for a fluid and the device. The container has a wall to be penetrated by the device.

The device is for dispensing fluid to or from the container for a fluid having a wall to be penetrated by the device. The device comprises a tube with a first end, a second end and a lumen, a connector, and a closure, and the device is configured to penetrate the wall of the container to transfer the fluid to or from the container through the tube. The closure and the first end of the tube are configured to open and sealingly close the tube reversibly. The connector is configured to be inserted into and/or through the wall of the container forming a seal between the tube and the container and attaching the device substantially irreversibly to the container, with the device penetrating the wall and the first end of the tube extending out of the container.

The tube facilitates accessing the contents of the container, e.g. for drinking a beverage contained in the container from the free first end of the tube. The second end of the tube may be sharpened, e.g. cut obliquely, to pierce the container wall. The closure prevents accidental leaking and/or spilling from the tube. The seal between the device and the container prevents leaking and/or spilling from an aperture in the wall through which the device extends. The substantially irreversible attachment of the device, in particular the connector thereof, i.e. detachment being only possible by application of significant force and/or (at least partial) destruction of the device and/or the container, prevents accidental disconnection of the device and the container, which could result in leaks and spilling. The latter aspect is particularly relevant for use of the device as a drinking straw for young children, as it withstands their tendency to play and withdraw straws from drink containers and thus cause spills.

Further, the connector may engage and at least partly close against a relatively firm portion of the container wall when that has a weakened portion for facilitating penetration by the device. This reduces chances of leaking along the tube due to a damaged weakened wall portion.

The connector may comprise a snapping arrangement for snap-fixing the device to, and in particular through, the container wall. Such snapping arrangement may comprise latches, barbs, flanges, etc., which may extend radially from the tube with respect to a direction of longitudinal extension of the tube. Such latches, barbs, flanges, may, but need not necessarily, fully encircle the tube; one or two opposite radial barbs may suffice. This reduces material consumption and facilitates manufacture, transport and storage etc.

The connector may comprise a screw thread for fixing the device to the container wall. The thread may have a varying thread pitch, a blind end and/or a gap towards the first end of the tube, such that the device may be screwed into and through the container wall, but cannot be screwed back out again.

The connector may comprise an at least partially conical body, in particular flaring out towards the first end of the tube, allowing tightening the connection with increasing insertion depth of the device into the container. The conical body may be provided with the aforementioned screw thread.

The connector may comprise a flange for abutting the container wall, to limit an insertion depth of the device into and/or through the container wall, and/or to provide the seal of the device to the container.

The tube may be insertable into the connector and attachable thereto, to be fixed to each other or such that the tube is movable within the connector over a restricted distance in a longitudinal direction of extension of the tube. This facilitates manufacture, transport and/or assembly of the device. Fixation increases robustness and reliability. Freedom of motion may facilitate closing the first end of the tube.

The closure may comprise a plug that is insertable into the lumen of the tube to seal the tube and block fluid egress from it. This facilitates closing of the tube. A plug is generally easier to use for sealing an orifice such as the open end of a tube than a cap since a cap must fit around the tube whereas a plug may benefit from a rounded, tapered, conical and/or otherwise self-seeking shape. Further, a cap tends to be

larger, to require more material and to be more difficult to manufacture than a plug that may be a solid body and/or comprise one or more deformable flanges. Also, a hollow tube tends to be more robust against outward forces than inward forces, whereas  
5 (relatively) significant forces against the tube wall may be required to provide a fluid-tight seal; a cap or a clamp having a such sealing inward force component is likely to deform and possibly buckle the tube which may result in losing the locking effect and leaking of the tube. A plug provides an outward force  
10 and assists maintaining shape of the tube.

The closure and the connector may be configured to open and sealingly close the connector reversibly with the closure. If the connector comprises no tube or if the first end of the tube is located within the connector and not extending out of  
15 it, the connector would provide an opening to the interior of the container and liquid may leak and/or be spilled from it. Such leaking and/or spilling from the connector may be prevented by closing the connector with the closure.

The closure may be attached to a portion of the connector, which facilitates manufacture and use of the device and prevents loss of the closure, which may itself be only a small part. The closure may be substantially rigidly attached to a portion of the connector, which provides a well defined shape and therewith provides or at least conveys a notion of stability  
20 and robustness.

At least two of the tube, the connector, and the closure may form an integral object, in particular being a unitary object. In particular, all three parts may form one integral, possibly unitary, object. This increases robustness and security of the device and it can facilitate manufacture of the integral portion. In case the connector and the closure form a unitary object, but separate from the tube, the separate objects may easily comprise different material properties, e.g. the tube being generally rigid and the closure and connector  
30 being generally elastic, so that they may close off and seal reliably against appropriate portions of the tube. E.g., the

connector and closure may comprise or be of (silicone) rubber, whereas the tube comprises or is of polyethylene.

The first end of the tube may have a predetermined bending portion, e.g. harmonica section, and the tube and the  
5 closure may be arranged so that the tube must be bent at the bending portion to be closed by the closure. A bent tube reduces size (e.g. height) of an assembly of a container and the device. A harmonica section facilitates bending without folding and prevents protruding sharp objects. By bending a resilient tube  
10 the tube is urged towards the unbent state, which may be employed to urge the tube and the closure together for reliable closing. Further, a bent tube may clearly signal an open or closed state of the device.

In an embodiment, at least part of the tube, in  
15 particular the first end, has a longitudinal direction of extension out of and away from the connector portion in a first direction, and the closure extends in a direction for closing the tube that is substantially parallel to the direction of extension of the tube. Thus, the tube must make a U-turn to be  
20 closed, which can be readily done on purpose, but is hard to (un)do by accident, providing user friendliness and anti-leaking at the same time. A U-bent device also has a smaller volume.

In other aspects a device and a connector for a device disclosed herein are provided, the connector comprising a lumen,  
25 with an inner size, for sealingly receiving at least part of a correspondingly sized, with respect to its outer size, tube and comprising a plug that is insertable into the lumen of the tube to seal the tube and block fluid egress from it. In an embodiment the plug protrudes from the connector.

30 Thus, an aspect is an assembly comprising a container for a fluid and a device as provided herein, the container having a wall to be penetrated by the device, possibly in a predetermined perforation portion such as foil section in a drink carton.

35 The assembly may comprise a sealed container comprising a fluid, in particular a beverage.

## BRIEF DESCRIPTION OF THE DRAWINGS

The above-described aspects will hereafter be more explained with further details and benefits with reference to the drawings showing an embodiment of the invention by way of example.

Fig. 1 is a perspective view of an assembly comprising a container for a fluid and a device as disclosed herein in the form of a drinking straw;

Fig. 2 is a partial cross section view of an assembly comprising a container and a drinking straw device;

Fig. 3 is a side view of another embodiment of a device;

Fig. 4 is a partial side view of a further embodiment of a device;

Figs. 5A-5C are different views of a different embodiment of a device;

Fig. 6 is a partial cross section view of an assembly comprising a container and yet another drinking straw device;

Figs 7 and 8 are top and perspective views, respectively, of a unitary connector and closure assembly.

## DETAILED DESCRIPTION OF EMBODIMENTS

It is noted that the drawings are schematic, not necessarily to scale and that details that are not required for understanding the present invention may have been omitted. The terms "upward", "downward", "below", "above", and the like relate to the embodiments as oriented in the drawings, unless otherwise specified. Further, elements that are at least substantially identical or that perform an at least substantially identical function are denoted by the same numeral, where useful increased by 100, 200, etc, and/or individualised with alphabetic suffices.

Fig. 1 is a perspective view of an assembly 1 comprising a container 3 and a drinking straw device 5, in inoperable configuration, e.g. ready for sale. The device 5 has a tube 7, a connector 9 and a closure 11. The shown container 3 is in the form of a brick-shape carton, having liquid tight

walls defining an interior volume containing a beverage (not indicated), here having film-coated cardboard walls. The container has a penetration portion 4 with an opening in the cardboard wall but being sealed by a film for penetration by the tube 7.

Fig. 2 is a partial cross section view of an assembly 100 comprising a container 103 having a wall 113 coated with a film 114 on the interior side and a drinking straw device 105 attached by a connector 109 to the container 103 in operable configuration, i.e. the device 105 extends through the wall 113 of the container 103 with a first end 115 extending out of the container 103 and a second end 117 located within the container 103, so that fluid can be transferred to or from the interior volume V of the container 103 through a lumen 119 of the tube 105.

The tube 107 is cylindrical with a longitudinal direction of extension A. The second end 117 of the tube 107 is sharply pointed, for punctuating the wall 113 of the container 103 and inserting the device 105 through it 103. The connector 109 comprises a plurality of barbs 121 extending from the tube 107 generally radially with respect to the direction of extension A and a flange 123. The free ends 125 of the barbs 121 and the flange 123 are separated by a distance comparable to the thickness of the container wall 113, wherein the barbs 121 have an outwardly curved surface towards the flange 123. Thus, the device may be inserted into and through the container wall 113 until the flange 123 abuts the outside of the wall 113, and the barbs 121 snap outwards behind the wall 113 so that the device is fixed, at least in the direction of extension A, to the container wall 113 and cannot be removed from it without force and/or damage. The device 105 may also be rotationally fixed, which further reduces chances of leaking between the container wall 113 and the connector 109.

The closure 111 comprises a plug with flanges 127 encircling a main body 128 that is attached to the flange 123 by a connection in the form of a flexible beam 129, arranged so that the closure 111 can be inserted into the lumen 119 of the

first end 115. The outer cross sectional shape of the closure 111 corresponds with the interior cross sectional shape of (the lumen 119 of) the tube 107 to provide a reliable seal (not shown). The flexible beam 129 may be provided with symbols, e.g. advertisement and/or brand indicia.

Fig. 3 is a side view of a straw device 205 generally comparable to the embodiments of Figs. 1-2. Here, however, the connector 209 comprises a generally round conical main body 231 with increasing diameter from the second end 217 towards the first end 215 of the tube 107 terminating on a flange 223 and outwardly provided with a screw thread 221 for attachment to the wall of a container (not shown). The screw thread 221 has an upper end 225 at a distance  $d$  from the flange 223, which may be comparable to the thickness of the container wall through which the device is to extend. Here, the upper end 225 of the screw thread 221 extends at a smaller angle to the flange 223 than the remainder of the screw thread 223 so that the connector may be screwed into and through the container wall, but once the upper end 225 has passed the container wall it does not extend towards the interior surface of the container wall at a noticeable angle, so that the upper end 225 does not engage readily engage the container wall and the connector cannot readily be screwed back out of the wall again. The conical body 231 ensures an increasing deformation pressure against the container wall, so that a tight seal is provided between the connector and the container wall, preventing leakage there.

Instead of one screw thread 221, plural coaxial screw threads with more or less than 360 degrees turn may be provided, e.g. down to a general bayonet-like connection.

This embodiment 205 comprises a closure 211 in the form of a cap with a skirt wall 233 to be put over the first end 215 of the tube 207 for sealing that. The cap comprises an internal plug body 228 for insertion into the lumen of the tube 207 for easy closing and counteracting radially inwards forces by the cap onto the tube walls. The skirt wall 233 of the cap covers, in closed configuration, the very end of the tube 207,

protecting it, e.g. to increase hygiene in the case of use as a drinking straw.

The first end 215 of the tube comprises a flexible section 235, here formed as a bellows, for easily bending the tube 207 without kinking or folding it. This increases user friendliness of the tube 207 and facilitates (arranging the tube 207 and cap 211 for) closing the tube 207 with the closure 211.

Fig. 4 is a side view of a detail of another embodiment 305 of a tube device, comprising a connector 309 with a main body 331 with varying diameter, here comprising a plurality of separate generally radially extending flanges 321 facilitating attachment of the device 205 into and through the container wall by simple straight insertion.

Figs. 5A and 5B are perspective (partial) views of a further embodiment of a device 405. Generally comparable to the embodiment Fig. 2, the connector 409 comprises barbs 421. Here, the barbs 421 extend somewhat tangential to the axis A of the tube 407, as shown in cross section view in Fig. 5C (see indications "VC" in Fig. 5B). This facilitates both straight insertion and insertion with a screwing motion through the container wall, the latter being found to be a natural movement for insertion, but not a straightforward motion for detachment, in particular not for children.

The connector 409 has a flange 423 which is relatively elongated in one lateral direction with respect to the tube axis A, and relatively narrow in a perpendicular direction, reducing bulk and material consumption of the device 405. On the flange 425 an upwardly tapering closure plug 428 is fixed, extending generally parallel to the tube axis A adjacent the plug 428 towards the first end 415 of the tube 407. The tubes first end 415 is provided with a bending portion 435, here a harmonica section, for bending the tube 407. The bending portion 435 is made so long and resilient that (the aperture of) the first end 415 can be arranged over the plug 428 as shown in Fig. 5B and is urged towards a sealed position. To facilitate closing the tube 407, the tube 407 and the connector 409 may be movable in a

direction along A for small distance, e.g. about the height of the connector.

Fig 6 shows, similar to Fig. 2, an embodiment of a device 500, wherein a connector 509 on a tube 505 is provided with a flange 523 (like the device of Fig. 2), to engage the wall 513 of a container 503. The flange 523 is adhered to the wall 503. Here, an amount of adhesive 537 is provided around the tube 507. Suitable adhesion techniques are providing the container 503 and/or the bottom side of the flange 523 with an adhesive layer, possibly protected with a peel-off layer. A two-component adhesive, with a first component on the container 503 and a second component on (the connector 509 of) the device 505 forming an adhesive layer on contacting together are also conceivable and may provide a securer seal than an adhesive layer on a single side.

Fig. 7 shows an embodiment, generally similar to that of Figs. 2 and 3, of a connector 609 and a plug closure 611 with plug body 628 attached together as a unitary device by a connection in the form of a flexible beam 629, arranged so that the closure 611 can be inserted into a lumen 637 of the connector 609. Fig. 8 is a top view of the embodiment of Fig. 7 with the flexible beam 629 unbent. The outer cross sectional shape of the closure 611 corresponds with the interior cross sectional shape of (the lumen 637 of) the connector 609 to provide a reliable seal (not shown), further, the outer cross sectional shape of the closure 611 corresponds with the interior cross sectional shape of (the lumen of) a tube (not shown) to be inserted through the connector 609 to complete a device 605. Thus, the closure 611 may close either aperture (connector and/or tube) and therewith close the container. This may be facilitated by providing at least part of (the lumen 637 of) the connector 609 and/or the plug closure 611 tapered and/or deformable, e.g. being elastically deformable and/or having flanges, like the closure 111 of Fig. 2, providing a particularly reliable seal (not shown). A pull tab 639 facilitates removing the plug 611 when inserted in an aperture and opening the connector or tube, respectively.

The disclosure is not restricted to the above described embodiments which can be varied in a number of ways within the scope of the claims. For instance, instead of a connector as a relatively bulky portion distinct from the tube 407, the tube wall may be provided with local outward and/or inward diameter variations, similar to formation of a harmonica portion for a bending portion.

A flange may be larger, smaller, or absent altogether. It is noted that sealing foils in common containers tends to be flexible up to a degree that a seal may be readily provided against a generally straight and constant-diameter tube. Opposite oriented barbs and/or flanges (cf. Fig. 4 but without a varying-diameter core) may serve to fix the tube (at least in longitudinal direction of extension) to the container wall, a seal being provided by the container wall material. The device may comprise more than one bending portion. A connector portion, e.g. a flange, may be provided with an adhesive to attach and seal the device to the container, e.g. an adhesive with a tear-off tab. Preferably the tab remains attached to the device so that loose trash is prevented.

The container may be shaped as a cup with a lid or a pouch, e.g. containing a soft drink or a fruit juice.

Elements and aspects discussed for or in relation with a particular embodiment may be suitably combined with elements and aspects of other embodiments, unless explicitly stated otherwise.

**CLAIMS**

1. An assembly (1) comprising a container (3) for a fluid and a device (5), the container having a wall to be  
5 penetrated by the device, wherein the device (100, 200, 300, 400, 500) is for dispensing a fluid to or from the container (3, 103, 503), wherein the device comprises a tube (7, 107, 207, 307, 407, 507) with a first end (115, 215, 415), a second end (117, 217, 417) and a lumen (119, 419), a connector (109, 209,  
10 309, 409, 509, 609), and a closure (11, 111, 211, 311, 411, 511, 611), and the device is configured to penetrate the wall of the container to transfer fluid to or from the container through the tube, wherein the closure and the first end of the tube are configured to open and sealingly close the tube reversibly, and  
15 wherein the connector is configured to be inserted into and/or through the wall of the container forming a seal between the tube and the container and attaching the device substantially irreversibly to the container, with the device penetrating the wall and the first end of the tube extending out of the  
20 container.

2. The assembly of claim 1, wherein the connector comprises a snapping arrangement (121, 321) for snap-fixing the  
25 device to the container wall.

3. The assembly of any preceding claim, wherein the connector comprises a screw thread (221) for fixing the device  
to the container wall.

30 4. The assembly of any preceding claim, wherein the connector comprises a flange (123, 223, 423, 523, 623) for abutting the container wall.

35 5. The assembly of any preceding claim, wherein the tube is insertable into the connector and attachable thereto, to be fixed to each other or such that the tube is movable within

the connector over a restricted distance in a longitudinal direction of extension of the tube.

5       6. The assembly of any preceding claim, wherein the closure comprises a plug (11, 111, 211, 311, 411, 511, 611) that is insertable into at least one of the lumen (119, 419) of the tube and a lumen (637) of the connector (609) to seal the tube or the connector, respectively, and block fluid egress from it.

10       7. The assembly of any preceding claim, wherein the closure is attached to a portion of the connector.

15       8. The assembly of any preceding claim, wherein at least two of the tube, the connector, and the closure form an integral object.

20       9. The assembly of any preceding claim, wherein the first end of the tube has a predetermined bending portion (235, 435) and wherein the tube and the closure are arranged so that the tube must be bent at the bending portion to be closed by the closure.

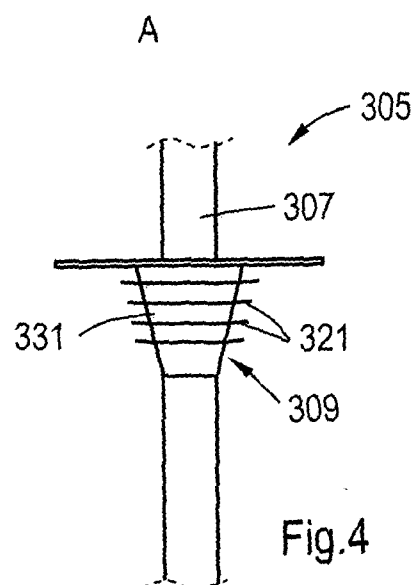
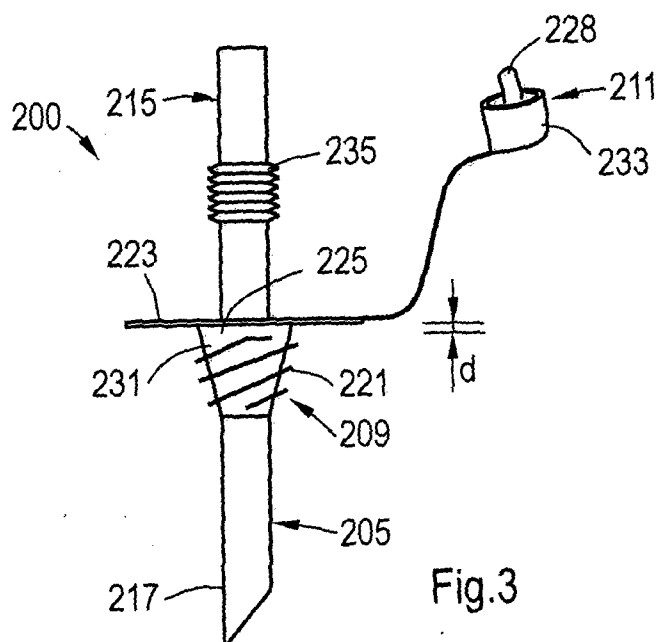
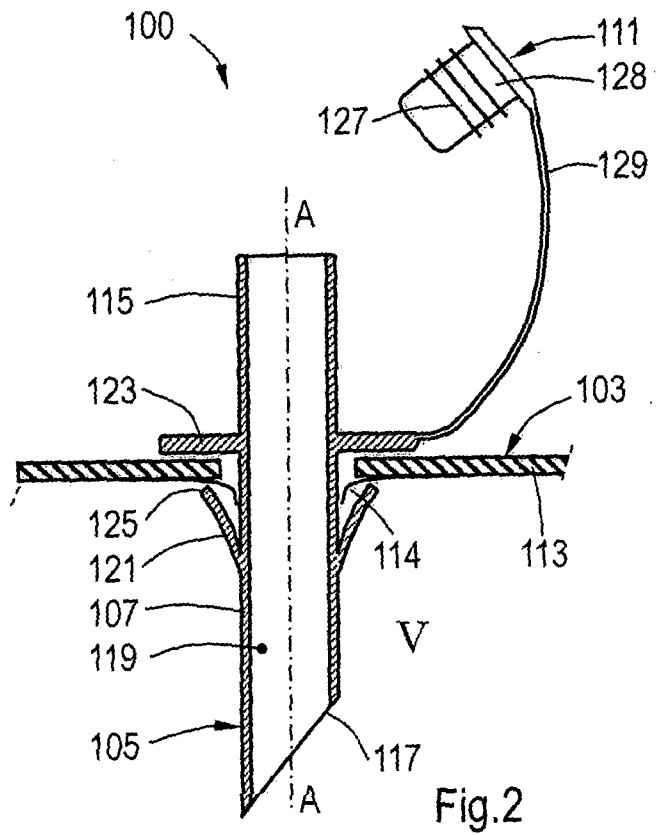
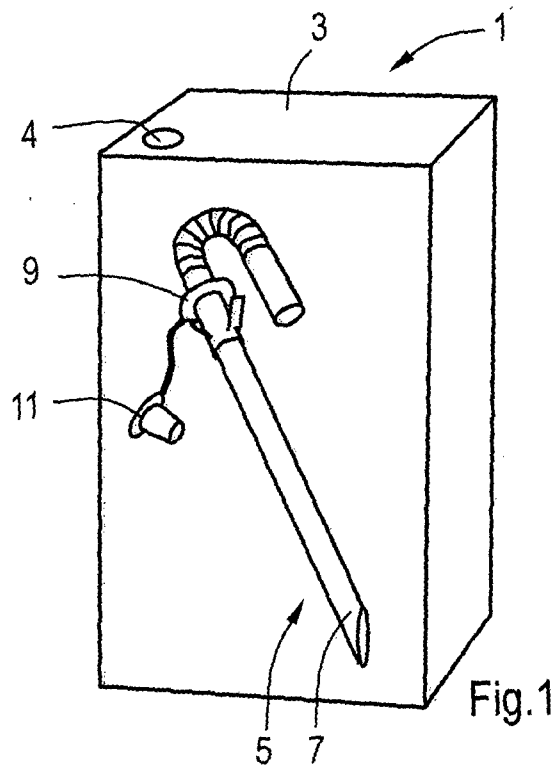
25       10. The assembly of claim 9, wherein at least part of the tube has a longitudinal direction of extension out of and away from the connector portion in a first direction (A) and the closure extends in a direction for closing the tube that is substantially parallel to the direction of extension of the tube.

30       11. The assembly of any preceding claim, wherein at least one of the container and the device comprises an adhesive layer and/or a portion of the container comprises a first component and the connector comprises a second component of a two-component adhesive for forming an adhesive layer on contact  
35       of the first and second components.

12. The assembly of any preceding claim, wherein the container is a sealed container comprising a fluid, in particular a beverage.

5 13. A device (100, 200, 300, 400, 500) for an assembly according to any preceding claim, comprising a tube (7, 107, 207, 307, 407, 507) with a first end (115, 215, 415), a second end (117, 217, 417) and a lumen (119, 419), a connector (109, 209, 309, 409, 509), and a closure (11, 111, 211, 311, 411, 511), and the device is configured to penetrate the wall of the  
10 container to transfer fluid to or from the container through the tube, wherein the closure and the first end of the tube are configured to open and sealingly close the tube reversibly, and wherein the connector is configured to be inserted into and/or through the wall of the container forming a seal between the  
15 tube and the container and attaching the device substantially irreversibly to the container, with the device penetrating the wall and the first end of the tube extending out of the container.

20 14. A connector for an assembly according to any one of the claims 1-12 or the device of claim 13, having a lumen for sealingly receiving at least part of a correspondingly sized tube and a plug that is insertable into the lumen of at least one of the tube and the connector to seal the tube or the  
25 connector, respectively, and block fluid transport through it.



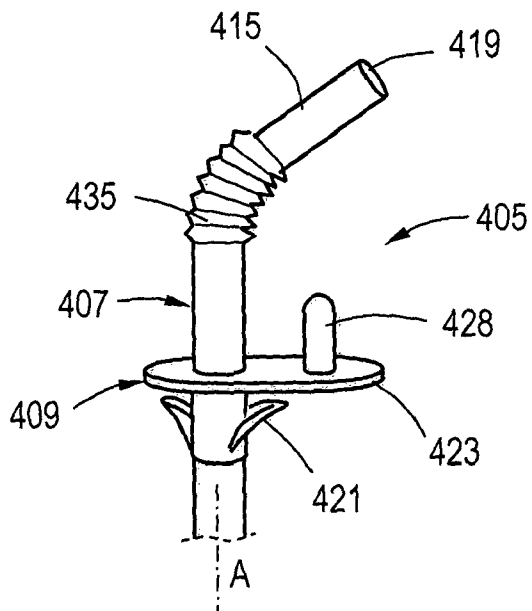


Fig. 5A

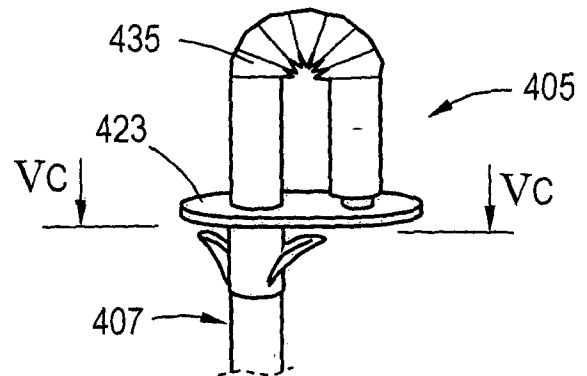


Fig. 5B

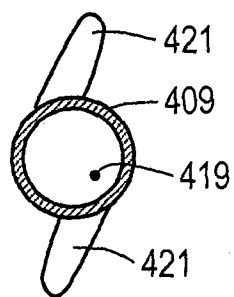


Fig. 5C

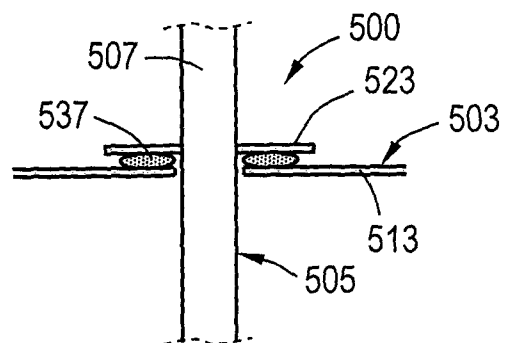


Fig. 6

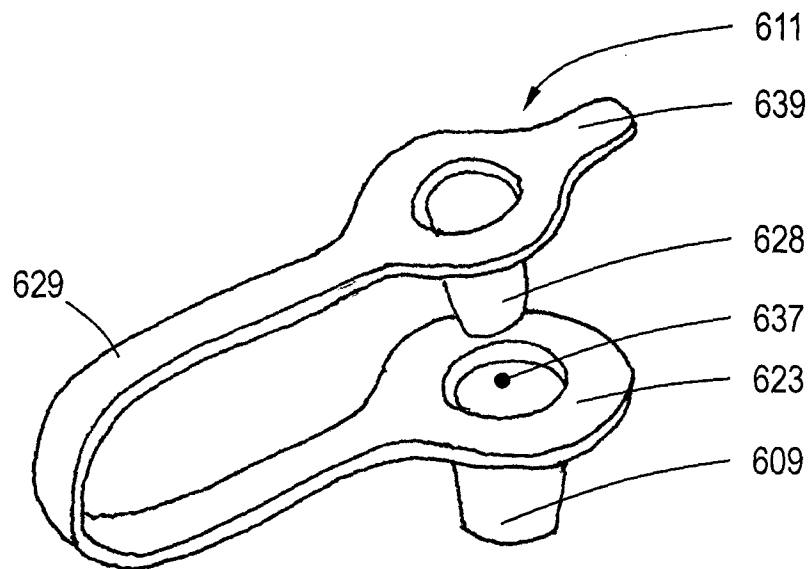


Fig. 7

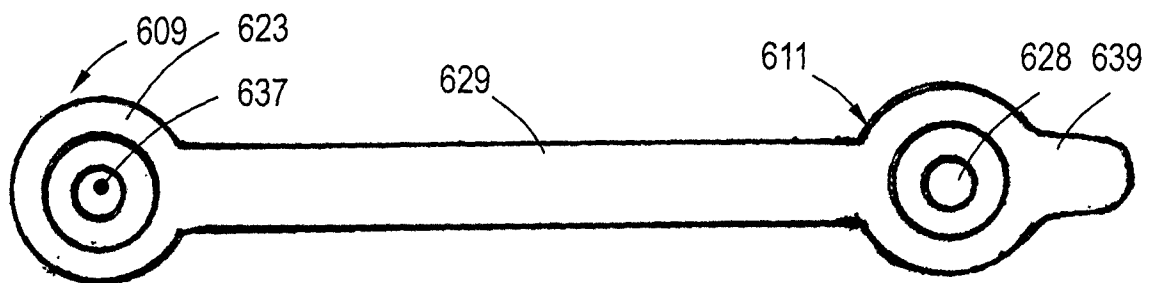


Fig. 8

# INTERNATIONAL SEARCH REPORT

International application No  
PCT/NL2014/000004

A. CLASSIFICATION OF SUBJECT MATTER  
INV. A47G21/18 B65D77/28  
ADD.

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)  
A47G B65D

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)

EP0-Internal

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages                                          | Relevant to claim No. |
|-----------|-----------------------------------------------------------------------------------------------------------------------------|-----------------------|
| X         | US 2009/065605 A1 (ROCHE SHARLA D [US] ET AL) 12 March 2009 (2009-03-12) paragraphs [0079] - [0097]; figures 18-27<br>----- | 1-8,<br>11-14         |
| X         | US 5 071 019 A (SIZEMORE DAVID W [US]) 10 December 1991 (1991-12-10) figures<br>-----                                       | 1-3,5,<br>11-13       |
| X         | JP 2000 095272 A (SHIKOKU KAKOKI CO LTD) 4 April 2000 (2000-04-04) figures<br>-----                                         | 1,4,6,<br>11-13       |

☐

Further documents are listed in the continuation of Box C.

☒

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

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

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

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

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

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

"&" document member of the same patent family

Date of the actual completion of the international search

9 May 2014

Date of mailing of the international search report

15/05/2014

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/NL2014/000004

| Patent document<br>cited in search report | Publication<br>date | Patent family<br>member(s) | Publication<br>date |
|-------------------------------------------|---------------------|----------------------------|---------------------|
| US 2009065605 A1                          | 12-03-2009          | US 2009065605 A1           | 12-03-2009          |
|                                           |                     | US 2011233297 A1           | 29-09-2011          |
| -----                                     |                     |                            |                     |
| US 5071019 A                              | 10-12-1991          | NONE                       |                     |
| -----                                     |                     |                            |                     |
| JP 2000095272 A                           | 04-04-2000          | NONE                       |                     |
| -----                                     |                     |                            |                     |