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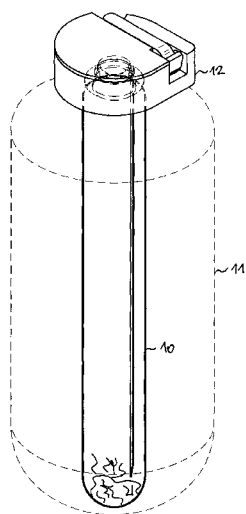


Fig. 1

(57) **Abstract:** A gas cartridge for a liquid dispensing device using a propellant gas to dispense a liquid from a liquid container is disclosed. The gas cartridge comprises a substantially cylindrical gas container for storing said propellant gas at a high pressure and a coupling means for coupling the gas cartridge to said liquid dispensing device. The gas container comprises at least one continuous indentation formed on the lateral surface of the gas container and extending from one end of the gas container to the other end thereof. The lateral surface of the gas container is surrounded by an envelope whereby at least one fluid channel is defined along the at least one indentation, said at least one fluid channel having a first opening adjacent to one end of the gas container and a second opening adjacent to the other end of the gas container.



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GAS CARTRIDGE PROVIDING A DIP TUBE FOR LIQUID DISPENSING DEVICES

The present invention relates to a gas cartridge for liquid dispensing devices using a propellant gas to dispense a liquid from a liquid container. More particularly, the present invention relates to a gas cartridge with an integrated dip tube.

For pressurized liquid containers, such as a bottles filled with a gaseous beverage, a gas cartridge containing a propellant gas at a relatively high pressure (e.g. 8 to 10 bars absolute) may be used to drive the liquid from the liquid container at dispensing. The high pressure of the propellant gas contained in the gas cartridge is reduced to a lower predetermined dispensing pressure prevailing in the head space of the liquid container (typically to 1,1 to 1,2 bar absolute) by a pressure regulator device. Although an overpressure of even a few tenth bar relative to the ambient pressure is normally enough for driving the liquid from the liquid container, the use of a dip tube is always necessary in the liquid container if the dispensing unit is arranged at the top of the liquid container.

WO 99/47451 discloses a dispensing apparatus wherein the gas containing cartridge is accommodated inside the liquid container and coupled to a pressure regulator adapted to generate a preset reduced pressure in the liquid container. A separate dip tube is also arranged inside the liquid container so as to allow for the substantially entire amount of the liquid to be dispensed from the liquid container. The upper end of the dip tube is connected to a dispensing duct of a dispensing unit that is equipped with an operating member.

Another dispensing apparatus is disclosed in Hungarian Patent Application No. P1000286, wherein a substantially cylindrical gas cartridge containing a propellant gas is arranged inside a liquid container and coupled to a dispensing unit arranged at the top of the liquid container. The pressure regulator is integrated into the dispensing unit. A separate dip tube is also connected to the dispensing unit.

The above solutions have the drawback that the use of a separate dip tube makes the assembly of the dispensing apparatus complicated and thus also increases the production costs thereof.

- 2 -

It is therefore one object of the present invention to eliminate the above problems and to allow the production of such dispensing apparatuses with reduced manufacturing costs in a more convenient way by using a gas cartridge having an entirely innovative construction.

- 5 Another object of the present invention is to provide a gas cartridge for such dispensing apparatuses with increased mechanical strength and gas-proof wall.

These and other objects are achieved by providing a gas cartridge as defined in claim 1. Preferred embodiments of the gas cartridge according to the invention are defined by the appended dependent claims.

- 10 The present invention will now be described in more detail through preferred embodiments thereof with reference to the accompanying drawings, in which:

Figure 1a is a general perspective view of the gas cartridge according to the invention with an exemplary dispensing unit coupled thereto,

- 15 Figures 2a to 2e are various views of a first preferred embodiment of the gas cartridge according to the invention,

Figures 3a to 3e are various views of a second preferred embodiment of the gas cartridge according to the invention,

Figures 4a to 4e are various views of a third preferred embodiment of the gas cartridge according to the invention, and

- 20 Figure 5 is a partial longitudinal cross-sectional view of an assembled dispensing apparatus including the dispensing unit shown in Figure 1, the first embodiment of the gas cartridge and a bottle filled with a gaseous beverage.

In Figure 1, a general design of the gas cartridge 10 according to the present invention is shown with the gas cartridge 10 being coupled to a dispensing unit 12.

- 25 The dispensing unit 12 is mounted to a liquid container, in this example onto the neck portion of a bottle 11 (shown by dashed lines). Although the dispensing unit 12 illustrated in Figure 1 is similar to that disclosed in the Hungarian Patent Application No. P1000286, the particular design of the dispensing unit that may be used for the

gas cartridge 10 may be different. As the gas cartridge 10 according to the invention is intended for using inside a liquid container, the dispensing unit has the only limitation that it has to have a gas channel for establishing a gas communication path between the internal space of the gas cartridge 10 and the head space of the liquid container.

The gas cartridge contains a propellant gas to a relatively high pressure, typically at least 8 to 10 bars absolute. The propellant gas may be carbon dioxide, nitrogen or any other suitable pressurizing gas.

The dispensing unit 12 may have an integrated pressure regulator for generating a preset reduced dispensing pressure (preferably 1,1 to 1,2 bar absolute) in the liquid container. However, the use of a pressure regulator either integrated in the dispensing unit (as described in HU P 1000286) or connected to the gas cartridge (as described in WO 99/47451) is not a need, but in absence of a pressure regulator, the liquid can be dispensed only at a high pressure which has several adverse effects well-known in the art. The use of a pressure regulator for the propellant gas stored in the gas cartridge 10 is therefore optional (but recommended) and depends on the structure of the particular dispensing apparatus in which the gas cartridge according to the invention is applied.

As shown in Figure 1, the gas cartridge 10 has a substantially cylindrical shape extending from the dispensing unit 12 to the bottom of the liquid container. In this context, the term "substantially cylindrical" means that the end portions of the gas cartridge may have a specific design. For example, the upper end portion of the gas cartridge 10 may be formed so as to be adapted for sealingly coupling to the dispensing unit 12, i.e. its upper end portion comprises appropriate coupling means, such as coupling threads or snap fitting members.

In case the dispensing apparatus, in which the gas cartridge 10 is used, comprises a pressure regulator, the gas cartridge 10 is also connected to the pressure regulator itself.

It is a novel feature of the gas cartridge according to the present invention that it has an integrated dip tube formed as at least one fluid channel on its lateral surface. For

this reason, during dispensing, the gas cartridge 10 should always be oriented so that its lower end adjacent to the bottom of the liquid container be immersed in the liquid to be dispensed.

Various preferred embodiment of the gas cartridge according to the present invention will now be described in detail with reference to Figures 2a to 2e, 3a to 3e and 4a to 4e showing different views for each embodiments.

In Figures 2a to 2e, a first preferred embodiment of the gas cartridge with one linear fluid channel formed on its lateral surface is illustrated in different views. Figure 2a is a perspective view of the inner gas container 21 of the gas cartridge 20, Figure 2b is a side view of the gas cartridge 20, Figure 2c is a cross-sectional view of the gas cartridge 20 taken along the line A-A of Figure 2b, Figure 2d is a longitudinal sectional view of the gas cartridge 20 taken along the line X-X of Figure 2c and Figure 2e is an enlarged sectional view of the upper end portion 25 of the gas cartridge 20.

The gas cartridge 20 comprises an inner gas container 21 made of a material suitable for storing a propellant gas at a relatively high pressure, typically at least 8 to 12 bars absolute. The gas container 21 is preferably made of a high-density polymer, e.g. polyethylene, by a blow moulding technology widely used in the production of plastic containers.

Along the lateral surface of the gas container 21, a longitudinal and continuous indentation 23 is formed during the production thereof. The entire lateral surface of the gas container 21 is laminated by an envelope 22, preferably made of a gas-proof material, e.g. polyethylene naphthalene (PEN), in order to provide a long term gas-tight sealing for the wall of the gas cartridge 20. The longitudinal indentation 23 of the gas container 21 and the surrounding envelope 22 define a longitudinal fluid channel 24 for the liquid between the two ends of the gas cartridge 20. This fluid channel 24 provides the function of a conventional dip tube and thus eliminates the need for a separate dip tube.

As shown in Figure 2d, the lower end portion of the gas container 21 may have an inwardly conical shape in order to better match to the dome-shaped bottom of a conventional beverage bottle.

The upper end portion 25 of the gas cartridge 20 comprises coupling means 26 for
5 coupling to a dispensing unit. The coupling means may comprise a snap fitting member 26 (as shown in Figure 2e) or a threaded head portion or any other means suitable for coupling the gas cartridge to the dispensing unit in a gas-tightly sealed manner. At its upper end, the gas container 21 can be closed by a puncturable closure (not shown) that is formed and used in a conventional manner.

10 The lower end opening of the fluid channel 24 is adjacent to the bottom of the liquid container and therefore practically, it is always immersed in the liquid until the liquid container gets empty. The upper end opening of the fluid channel 24 is formed so as to be in fluid communication with a dispensing duct of the dispensing unit. To this end, the upper opening of the fluid channel 24 may be directly connected to said
15 dispensing duct or it may be connected thereto through any appropriate additional element (e.g. a connecting pipe). Alternatively, when the gas cartridge 20 is designed for using with the dispensing unit described in HU P1000286, the upper end portion 25 of the gas cartridge 20 has a specific design as illustrated in Figures 2a to 2e and also in Figure 5. In this case, the fluid channel 24 opens into a first
20 intermediate space 28a defined between the envelope 22 and the outer wall surface of the gas container 21, then the liquid can traverse through one or more openings or slots 29 formed in a separating wall 27 of the upper end portion 25, into a second intermediate space 28b (shown in Figure 5), which, in turn, comprises the opening of a dispensing duct 50 of the dispensing unit 12.

25 In Figures 3a to 3e, a second preferred embodiment of the gas cartridge according to the invention is illustrated in the same views as shown in Figures 2a to 2e. This embodiment of the gas cartridge 30 comprises a helical fluid channel 34 between the upper and lower ends of the gas container 31. The helical fluid channel 34 is defined by a helically extending indentation 33 formed on the lateral surface of the gas
30 container 31 and an envelope 32 laterally surrounding the gas container 31. Other features of this embodiment are the same as those of the first embodiment.

In Figures 4a to 4e, a third preferred embodiment of the gas cartridge according to the invention is illustrated in the same views as shown in Figures 2a to 2e. This embodiment of the gas cartridge 40 comprises two helical fluid channels 44a and 44b between the upper and lower ends of the gas container 41. The helical fluid channels 44a and 44b are defined by two respective, helically extending indentations 43a and 43b formed on the lateral surface of the gas container 41 and an envelope 42 laterally surrounding the gas container 41. Other features of this embodiment are the same as those of the previous ones.

In case the gas cartridge comprises multiple fluid channels, it is preferred that each of the fluid channels are directly coupled to a respective opening of the dispensing duct of the dispensing unit, or alternatively, the fluid channels are connected to the dispensing duct through intermediate spaces as introduced with reference to Figure 5.

The one or more fluid channel formed along the lateral surface of the gas container has the additional advantage that each fluid channel also constitutes a rib on the lateral wall of the gas container which provides an improved mechanical strength for the gas container. This enhanced strength of the wall of the gas container has particular importance when the gas cartridge is used to store the propellant gas at a very high pressure, e.g. 70 to 80 bars, typically used for gaseous water or beverages to be dispensed from a dispensing apparatus without a pressure regulator.

Although in the foregoing, several preferred embodiments of the gas cartridge according to the invention have been illustrated, the present invention is not in any way limited to the exemplary embodiments shown in the description and the drawings, and many variations thereof are possible within the scope of the invention defined by the attached claims.

Claims

1. A gas cartridge for a liquid dispensing device using a propellant gas to dispense a
5 liquid from a liquid container, said gas cartridge comprising a substantially cylindrical
gas container for storing said propellant gas at a high pressure and a coupling
means for coupling the gas cartridge to said liquid dispensing device,
wherein
- said gas container comprises at least one continuous indentation formed on the
10 lateral surface of the gas container and extending from one end of the gas container
to the other end thereof, and
 - the lateral surface of the gas container is surrounded by an envelope thereby at
least one fluid channel is defined along the at least one indentation, said at least one
fluid channel having a first opening adjacent to one end of the gas container and a
15 second opening adjacent to the other end of the gas container.
2. The gas cartridge according to claim 1, wherein each of the at least one fluid
channels extends linearly.
3. The gas cartridge according to claim 1, wherein each of the at least one fluid
channels extends helically.
- 20 4. The gas cartridge according to any one of claims 1 to 3, comprising multiple fluid
channels.
5. The gas cartridge according to any one of claims 1 to 4, wherein the gas container
is made of polyethylene.
6. The gas cartridge according to any one of claims 1 to 5, wherein envelope is
25 made of a gas-proof material.

7. The gas cartridge according to any one of claims 1 to 6, wherein one of the first and second openings of the at least one fluid channel is adapted to be in fluid communication with a liquid dispensing duct of said liquid dispensing device.

5 8. The gas cartridge according to claim 7, wherein said opening of the at least one fluid communication channel is coupled to the liquid dispensing duct of said liquid dispensing device through a first intermediate space defined between the wall of the gas container and the envelope, and a second intermediate space defined between
10 the gas cartridge and the dispensing unit and comprising an opening into a dispensing duct of the dispensing unit, said first and second intermediate spaces being separated by a wall of the gas cartridge, said separation wall comprising at least one opening for providing a fluid communication between said first and second intermediate space.

15 9. The gas cartridge according to claim 7, wherein said opening of each fluid communication channel is directly coupled to a respective liquid dispensing duct of said liquid dispensing device.

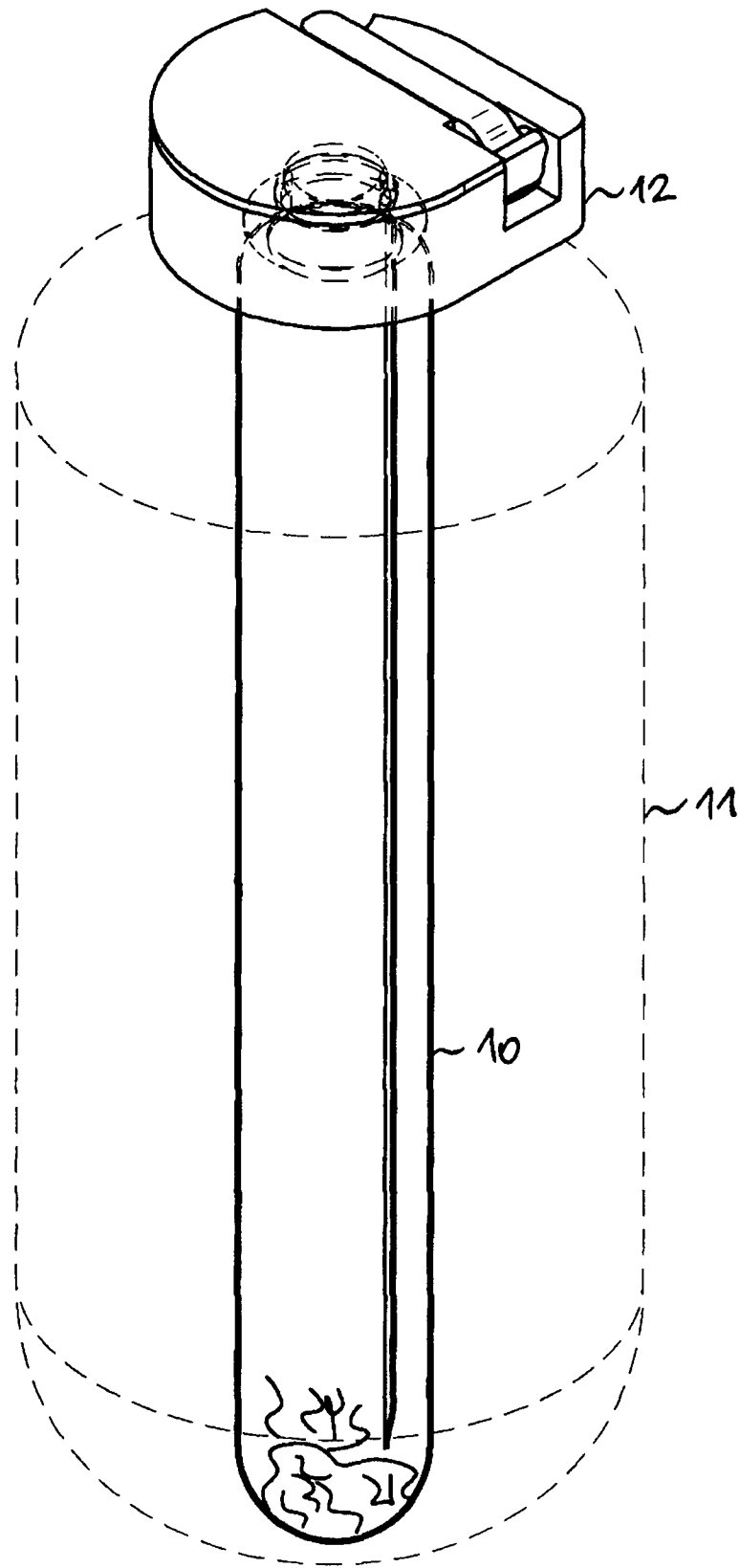


Fig. 1

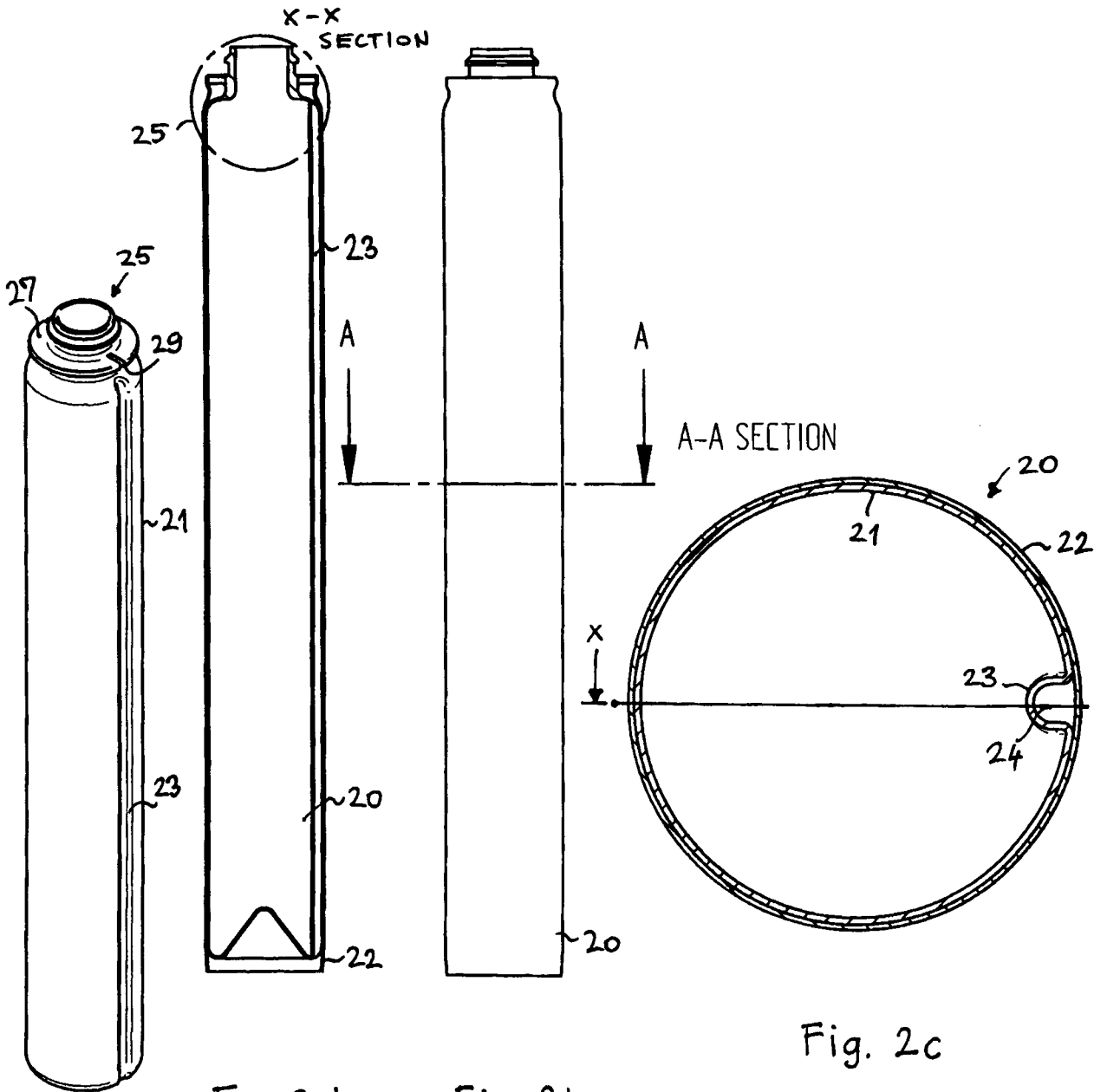
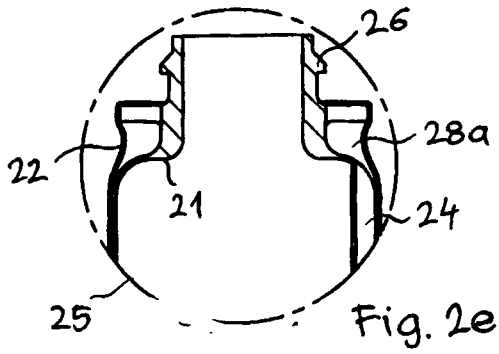


Fig 2a

Fig. 2d

Fig. 2b

Fig. 2c

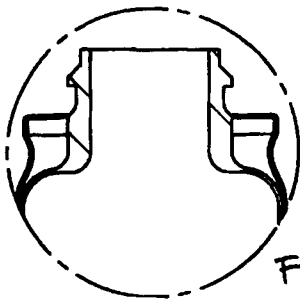


Fig. 3e

Y-Y SECTION

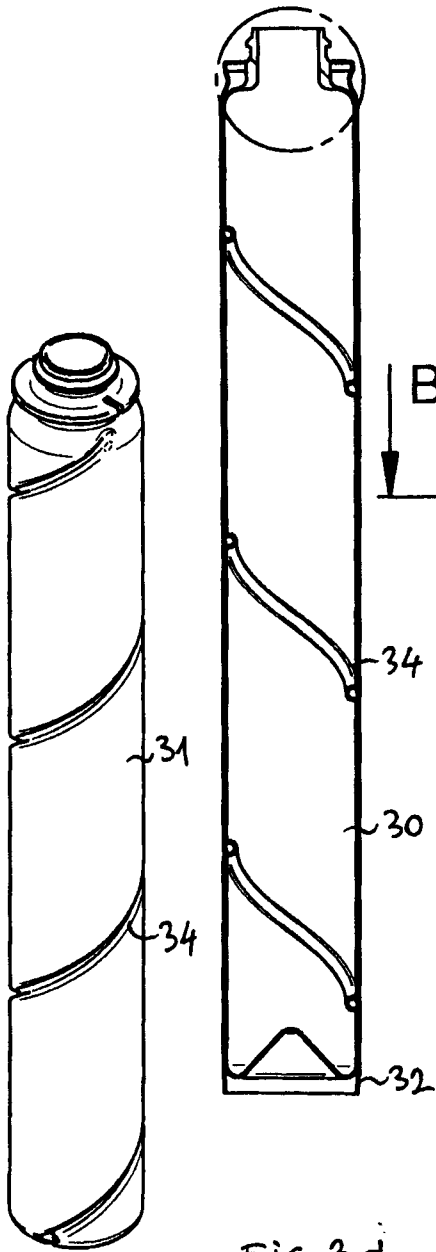


Fig. 3a

Fig. 3d

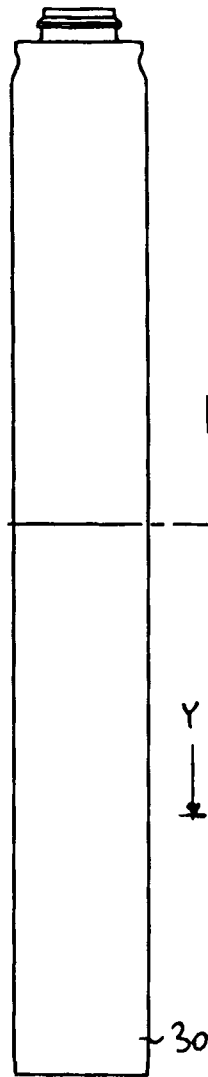


Fig. 3b

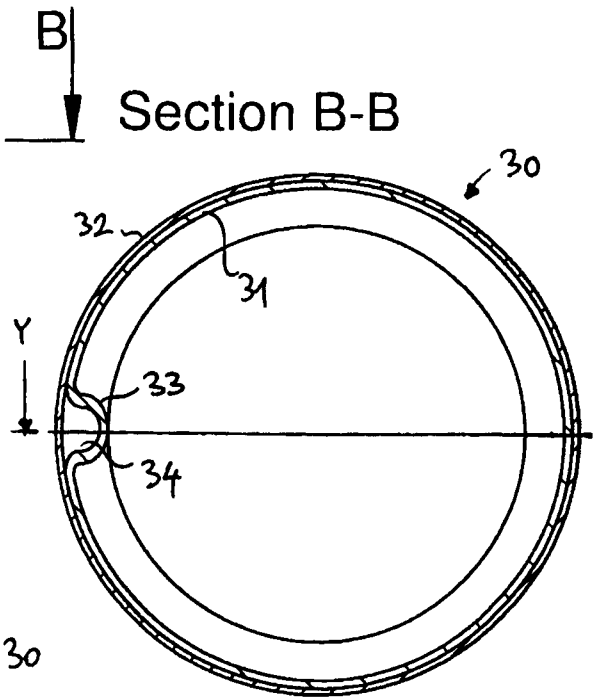


Fig. 3c

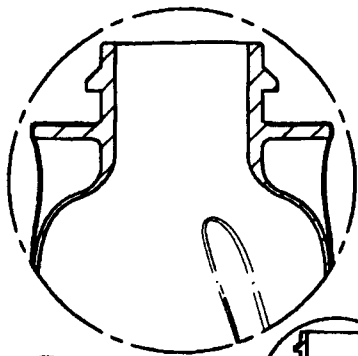


Fig. 4e

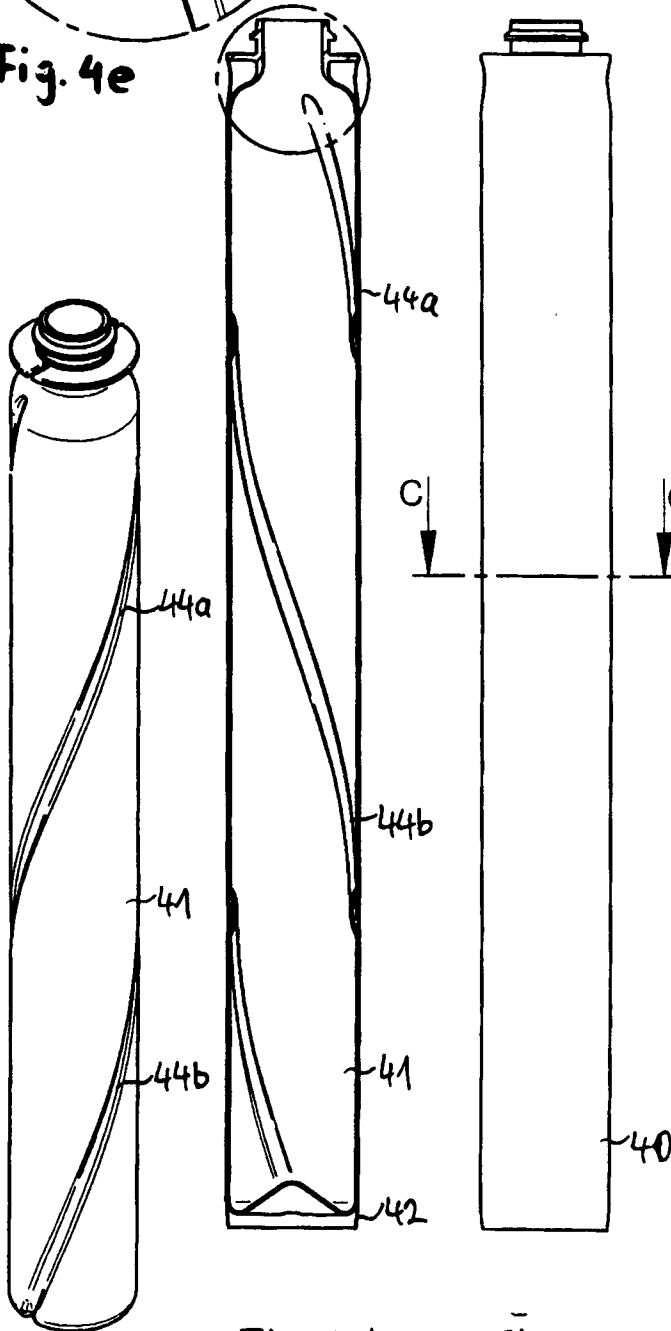


Fig. 4a

Fig. 4d

Fig. 4b

C-C SECTION

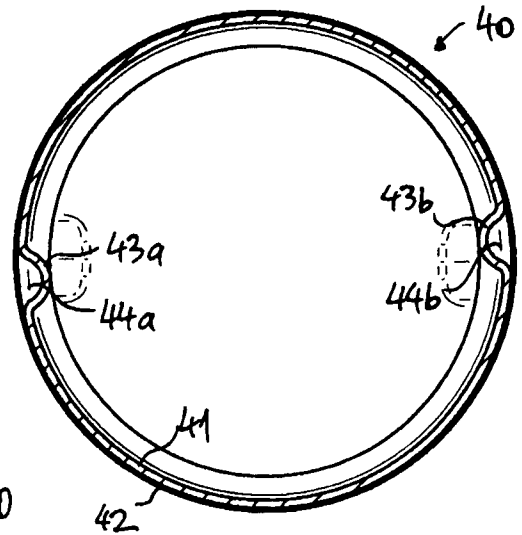


Fig. 4c

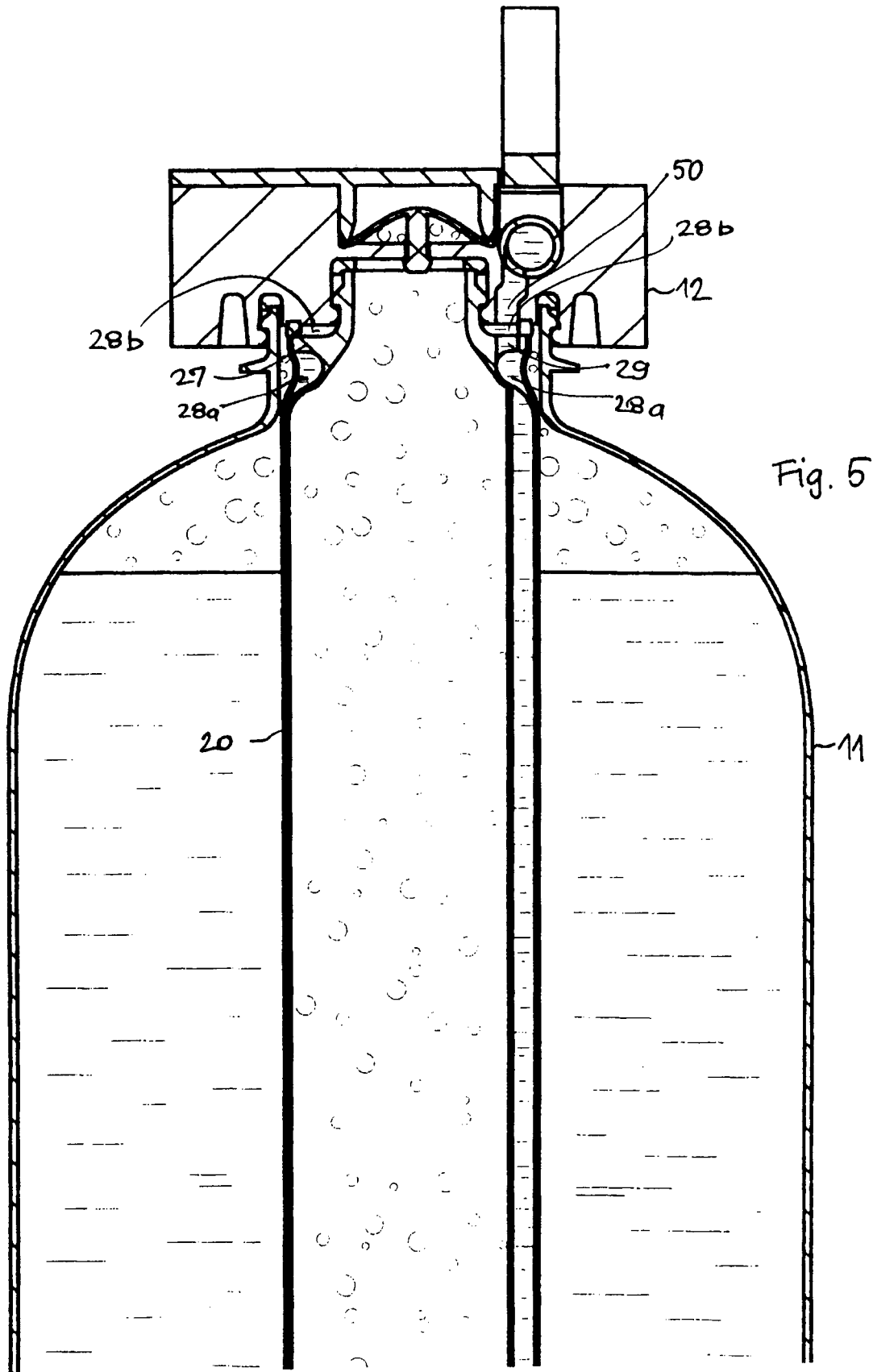


Fig. 5

INTERNATIONAL SEARCH REPORT

International application No
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A. CLASSIFICATION OF SUBJECT MATTER
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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)
B65D B67D

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 practical, search terms used)
EPO-Internal , WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3 774 810 A (CORSETTE, D.) 27 November 1973 (1973-11-27) col umn 2, line 31 - col umn 5, line 60; claim 5; figures -----	1-9
A	US 4 793 527 A (DI STEFANO, ALFONSO [US] ET AL) 27 December 1988 (1988-12-27) col umn 5, line 7 - col umn 7, line 56; figures 1-7 -----	1
A	FR 2 828 480 AI (L'OREAL SA [FR]) 14 February 2003 (2003-02-14) page 6, line 30 - page 10, line 18; figures -----	1

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

Date of the actual completion of the international search 26 October 2011	Date of mailing of the international search report 03/11/2011
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Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Innecken, Axel
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/HU2011/00Q061

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 3774810	A	27-11-1973 CA 959461 A1	17-12-1974
US 4793527	A	27-12-1988 NONE	
FR 2828480	A1	14-02-2003 NONE	