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(54) **CAPS CONSISTING OF A PLASTIC MATERIAL**

(57) The invention relates to a plastic cap comprising a fixing projection on the inner face of the side wall thereof, for interfering with a collar of the neck of the bottle, said fixing projection having a surface for interfering with the collar, an interference face that forms an angle larger than the right angle in relation to the side wall of the cap, characterised in that it also comprises, at the end of the

side wall of the cap, an inwardly foldable flexible strip that has an inner supporting face corresponding to said interference surface, and an outer interference face forming a right angle or a smaller angle in relation to said wall when said interference surface and said inner supporting face come into contact, the strip comprising a skirt on the free end thereof.

EP 2 960 173 A1

Description

[0001] The present invention relates to a plastic bottle cap of the type that is anchored to the neck of the bottle by being clipped or snapped in place, also referred to as the "snap-on" type.

[0002] This type of cap has on its inner face a fixing projection that creates an interference with a collar situated in the neck of the bottle. The said projection and the said collar create an interference that makes it impossible to remove the cap, the latter having been inserted under pressure. When an attempt is made to extract the cap by means of a movement along the axis of symmetry of the cap (i.e. the axis of revolution of the bottle), the collar and the fixing projection interfere with its movement and prevent the removal of the cap.

[0003] Ideally, both the projection and the collar have a surface of interference (i.e. contact) between each other that is perpendicular to the aforesaid axis. However, this result cannot be obtained in caps produced by moulding, since in order to allow its release from the mould, the fixing projection and the inner side wall of the cap must form an angle greater than 90° . The value by which this angle exceeds 90° is known as the mould release angle.

[0004] As a consequence of the above, it is possible to force the removal of the cap by combining the extraction movement with an eccentric force exerted by a lever. The said leverage force becomes more easily exerted as the height of the cap increases. This effect is undesirable, since it allows closed bottles to be opened without breaking the seal of the cap and can result, for example, in food fraud.

[0005] Screw caps are also known which have a seal that is broken at the moment of the first unscrewing of the cap, the seal being trapped by a collar on the neck of the bottle. Usually, the seal is fixed by a flexible band (also known as a "flexband") situated in the tailpiece of the cap, which is inwardly foldable and interferes on its exit with the collar of the neck. The band may be continuous, forming a ring, or intermittent, being formed as a plurality of band pieces arranged circumferentially. This type of cap is susceptible to being violated in two ways, either by effecting a horizontal displacement (i.e. in the plane perpendicular to the axis of the cap) or by making the flexible band slide between the inner face of the wall of the cap and the wall of the neck until it is sufficiently far removed that it does not perform its function (similar to the mechanism of removing a sock).

[0006] An aim of the present invention is to describe a cap using a snap-on fixing system that does not present the violability problems of the known caps.

[0007] In particular, the present invention consists of a cap made from plastic material, of the type that comprises a fixing projection for snapping on the inner face of its side wall, the said fixing projection having a surface for interfering with the collar, the said surface forming an angle greater than a right angle in relation to the side wall

of the cap. The cap further comprises, situated at the end of the side wall of the cap, an inwardly foldable flexible band, the said band having an inner supporting face that corresponds with the said interference surface, and an outer interference face that forms an angle equal to or less than 90° in relation to the said wall when the said interference surface and the said inner supporting face come into contact, the band terminating at its free end in a skirt that is arranged parallel to the said wall when the said interference surface and the said inner supporting face come into contact.

[0008] This arrangement allows all of the cited problems to be solved, as described below:

- When the band is folded, the outer interference face replaces the interference face of the projection, but presenting a right angle or an acute angle in relation to the side wall of the cap (in other words, in relation to the axis of symmetry of the cap). This removes the possibility of violation of the cap by using the mould release angle, which makes it necessary for the interference face of the projection to be greater than the right angle.
- The combination of the interference produced between the interference face of the projection and the inner contact face of the band (at an oblique angle in relation to the axis of the cap) and the interaction of the said skirt with the wall of the cap and the collar of the bottle prevent violation of the cap by means of the mechanisms usual in flexible band systems. Preferably, therefore, the collar of the neck of the bottle (preferably the same collar that creates the interference) pushes the skirt against the inner side wall of the cap. To this end, the skirt of the band will preferably have a geometry such that it comes into contact with the inner wall of the cap when the said interference surface and the said inner supporting face come into contact.

[0009] This innovative system can be used in any type of cap, including caps with a tearable precut seal integrated into their side wall. However, it offers greater advantages in snap-on caps, which have no tearable precut seal integrated into their side wall.

[0010] In a preferred embodiment, the projection has a second face at an angle of less than 180° to the interference surface, and the band has a second inner contact face that corresponds with and comes into contact with the second face of the projection when the band is folded towards the inside of the cap.

[0011] A possible way of making the band flexible is by means of a weakening of the thickness in the area where the band joins with the cap.

[0012] For a clearer understanding, by way of explanatory but non-limitative example, some drawings are attached of an example of embodiment of a plastic cap according to the present invention.

Figure 1 shows an elevation view of an example cap according to the present invention.

Figure 2 shows a plan view of the cap of Figure 1.

Figure 3 shows a transverse cross-section of the cap of Figure 1.

Figure 4 shows a magnified detail of the cross-section of Figure 3.

Figure 5 shows schematically an elevated view of the example cap of Figure 1, illustrated in place on a bottle, with the flexible band folded towards the inside of the cap.

Figure 6 shows a transverse cross-section of Figure 5.

Figure 7 shows a magnified detail of the cross-section of Figure 6.

Figure 8 is a cross-section similar to that of Figure 7, in which the neck of the bottle has been omitted for the sake of improved clarity, showing the band in the folded position.

Figure 9 is another transverse cross-section through a plane perpendicular to the plane of the cross-section shown in Figure 6.

[0013] The figures show an example of a cap according to the present invention. In particular, Figure 1 shows a cap consisting of a pouring cap of the type often used for bottles of vegetable oil. The cap -1- has an upper cover -2- and a lower part -3- intended to be anchored to the neck of the bottle -100- (see Figure 5). The lower part -3- is anchored by means of a clipping or snap-on system, being placed under pressure in the neck -100- of a bottle.

[0014] Once the cap is in place, the interference created by a clipping or snap-on system prevents the extraction of the whole of the cap.

[0015] In Figure 3 it can be seen that the lower part -3- has a liquid outflow channel formed by the wall -33-. The channel is stopped by a tearable membrane -36- created according to known techniques. The tearable seal may be similar to that shown in the Spanish patent documents ES10002900U or ES2162585.

[0016] For its part, as can be seen in Figure 3, the upper part -2- has a cylindrical fin -23- for stopping the channel formed by the wall -33- when the cap is in the closed position, thus preserving the sealing of the cap.

[0017] The system for anchoring the cap -1- to the bottle -100- is situated in the lower part -3-. The first element of the system consists of a projection -31- situated in the inner side wall of the cap -32-. As shown in Figure 4, the projection -31- has a first interference face -311-, which forms an obtuse angle with the inner side wall -32- and

a second face -312- that forms an acute angle with the interference face -311-.

[0018] The inner lower edge of the side wall of the lower part -3- has a continuation in the form of a flexible band -4-. The name "flexband" is used in the industry to indicate that the band is foldable towards the inside of the cap, without being an additional indication of any other characteristics or areas of the band, which could, for example, be rigid in nature. The said flexible band -4- or "flexband" has a geometry that corresponds with the conjugate geometry of the projection -31- and the inner face -32- of the side wall of the cap. In particular, in the example shown, the flexible band -4- has an inner supporting face -411- that comes into contact with the interference face -311- of the projection -31- when the flexible band folds towards the inside of the cap, and a second inner face -412- conjugate with the form of the second face -312- of the projection -31-. In addition, the flexible band -4- of the example finishes in a skirt -42-, such that when the flexible band is folded towards the inside of the cap, and the interference face -311- of the projection -31- and the first inner contact face -411- of the flexible band -4- come into contact, the skirt -42- is parallel with the inner face -32- of the side wall of the cap.

[0019] As shown in Figure 7, on its outer face, the band 4 defines an outer interference face -43-. This face is made to coincide approximately with the area of the band corresponding with the inner contact face -411-, and its function is to create an interference surface with a collar -101- on the neck of the bottle -100-. The use of a foldable flexible band -4- makes it possible, in the folded position, for the interference surface -43- to be perpendicular to the axis of revolution of the cap or, which comes to the same thing, to the inner wall -32- of the cap, so that the interference with the interference surface -103- of the said interference collar -101- is completely perpendicular to an axial extraction movement. It would even be possible for the outer interference face -43- of the band -4- to form with the wall -32- an angle smaller than a right angle when the interference face -311- of the projection -31- and the inner contact face -411- of the band come into contact.

[0020] Moreover, as can be seen in the example, the present invention allows the said interference collar -101- situated in the neck of the bottle -100- to come into contact with the skirt -42- and hold it fast against the inner wall -32- of the cap. To favour this effect, it is possible to lower the wall -32- in the area that receives the skirt -42-.

[0021] As can be seen in Figure 4, the band -4- is joined to the lower part -3- of the cap -1- by means of a narrowing -41- of the wall, which allows the band to be flexible and provides a degree of resistance and rigidity in the other areas of the band -4-.

[0022] As can be seen in Figure 6, in the example shown, the cap rests on a larger collar -102- of the bottle -100-. This collar -102- also helps, additionally, to prevent violation of the cap by access to the area between the bottle and the cap.

[0023] During the cap manufacturing process, for example by injection, or by any other known technique such as compression, the cap can be released from the mould without any problems, since the standard mould release angles can be observed. Once the cap has been released from the mould, the flexible band -4- can be folded inwards, leaving the cap ready for fixing to a bottle -100- by snapping in place.

[0024] There are numerous possible variants on the example shown. The type of cap, particularly its upper part, may for example be of any known type. It is also possible, in particular, to omit the second inner contact face of the band, in which case the narrowing where the band is joined to the cap can be minimised or completely eliminated, among other examples.

[0025] Although the invention has been described with respect to examples of preferred embodiments, these must not be regarded as limitative in relation to the invention, which will be defined by the broadest interpretation of the following claims.

5. Cap according to any one of claims 1 to 4, **characterised in that** it has no tearable precut seal integrated into its side wall.

Claims

1. Cap made from plastic material, of the type that comprises a fixing projection for snapping on the inner face of its side wall, the said fixing projection having an interference surface that forms an angle greater than 90° in relation to the side wall of the cap, **characterised in that** it also comprises an inwardly foldable flexible band situated at the end of the side wall of the cap, the said band having an inner supporting face conjugate with the said interference surface and an outer interference face that forms an angle equal to or less than 90° in relation to the said wall when the said interference surface and the said inner supporting face come into contact, the band terminating at its free end in a skirt that is arranged parallel to the said wall when the said interference surface and the said inner supporting face come into contact.
2. Cap according to claim 2, **characterised in that** the skirt of the band comes into contact with the inner wall of the cap when the said interference surface and the said inner supporting face come into contact.
3. Cap according to claim 1 or 2, **characterised in that** the fixing projection of the inner face of its side wall has a second face that forms an angle with the interference surface, and the band has a second inner contact face, conjugate with the second face of the projection, with which it comes into contact when the band is folded towards the inside of the cap.
4. Cap according to any one of claims 1 to 3, **characterised in that** the band has a weakening of its thickness in the area where it joins with the cap in order to allow it to be folded towards the inside of the cap.

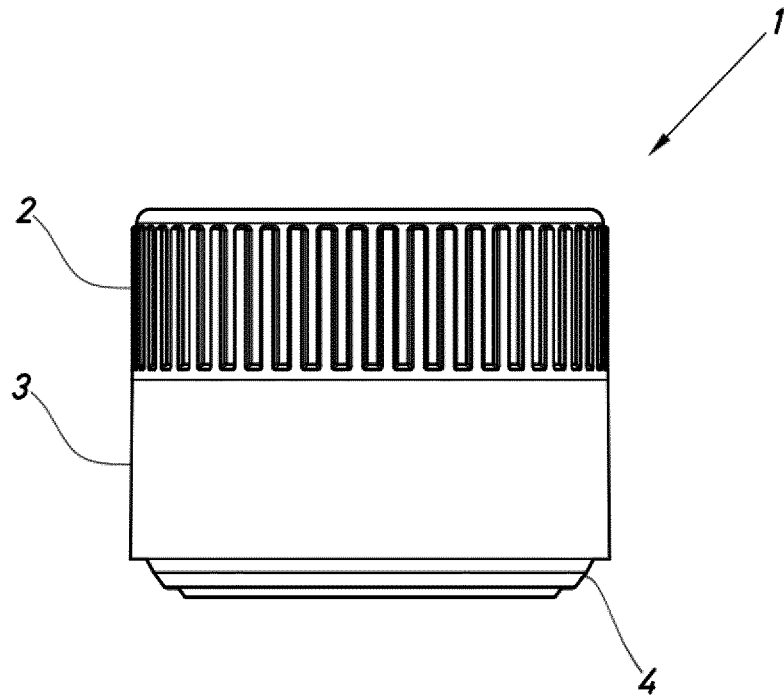


Fig.1

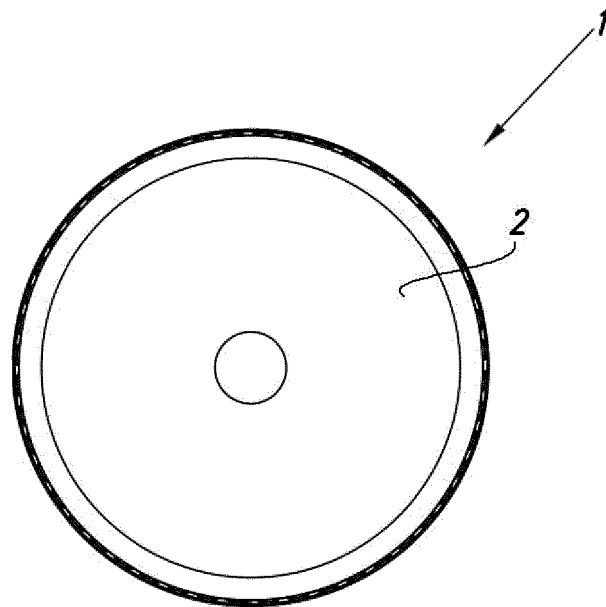


Fig.2

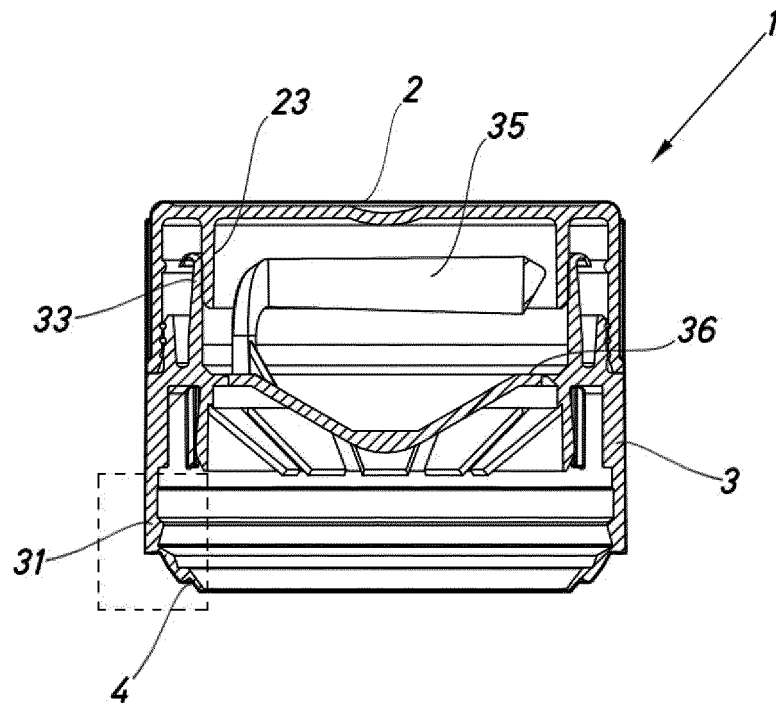


Fig.3

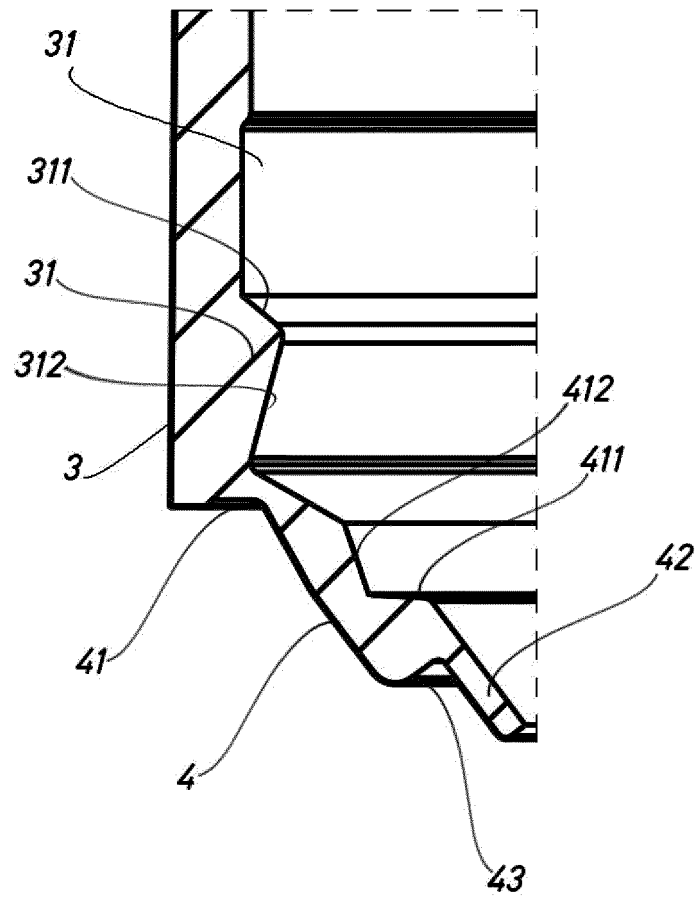


Fig. 4

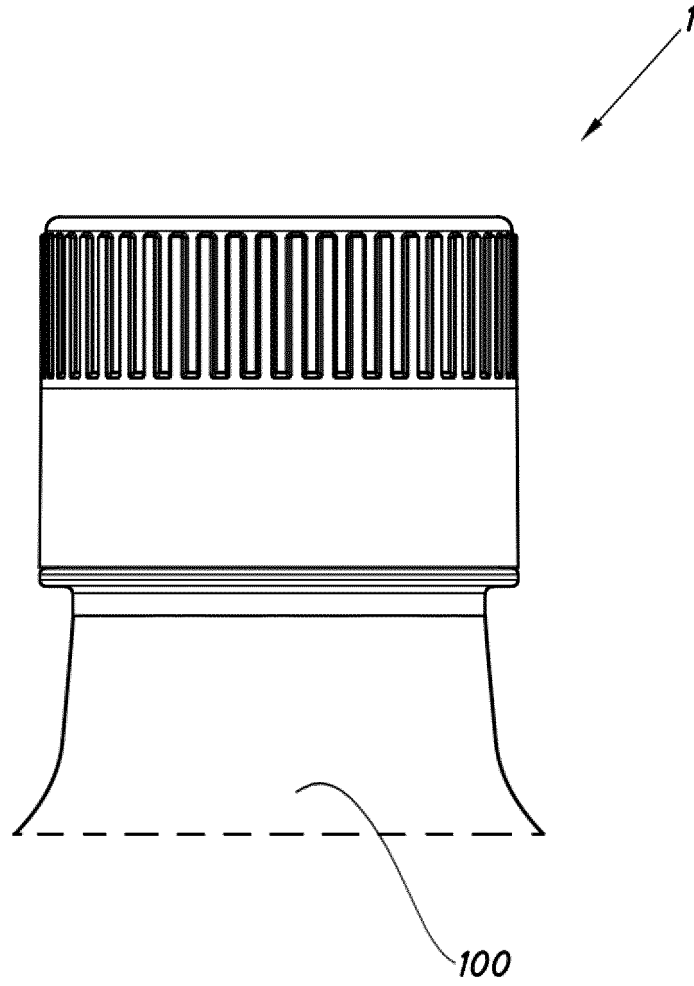


Fig.5

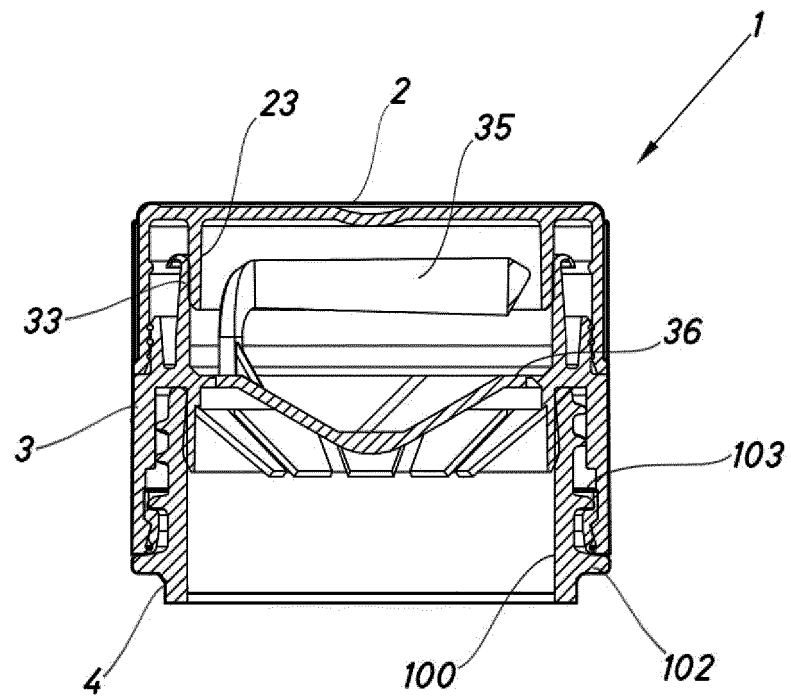


Fig.6

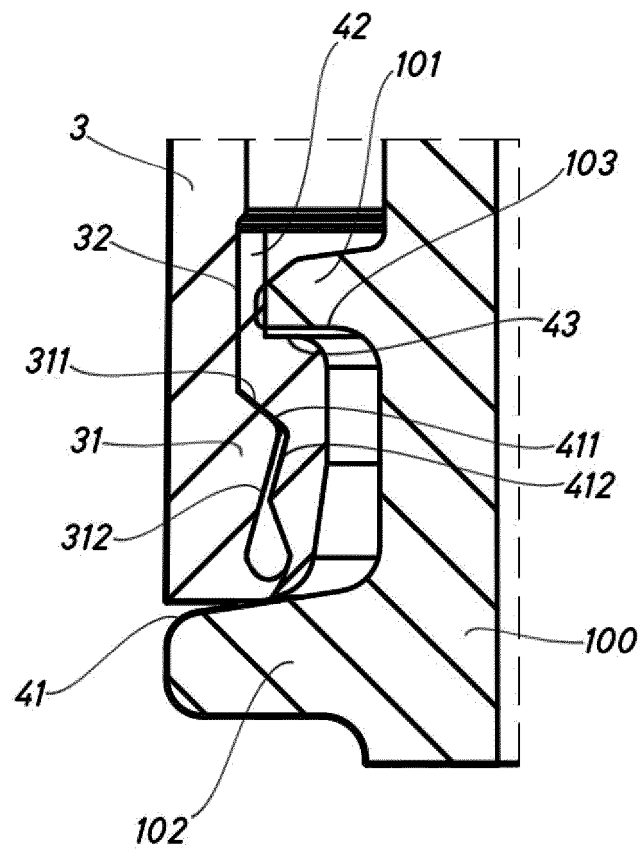


Fig. 7

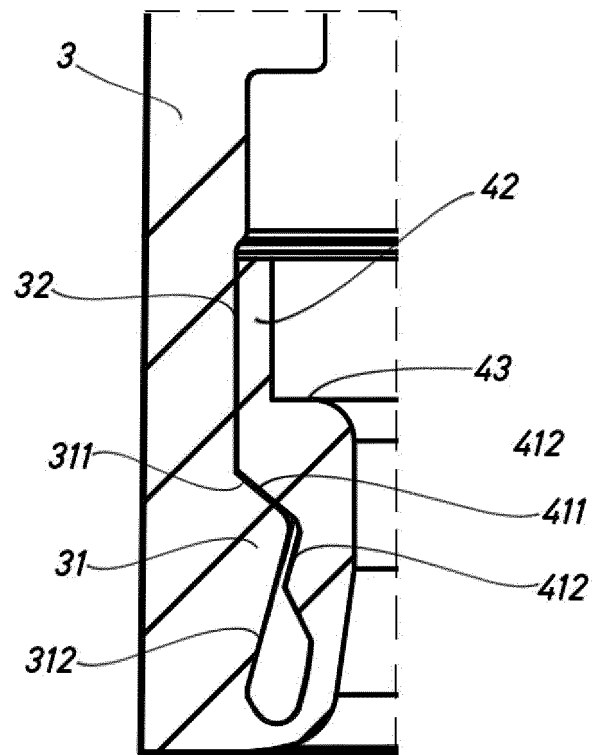


Fig.8

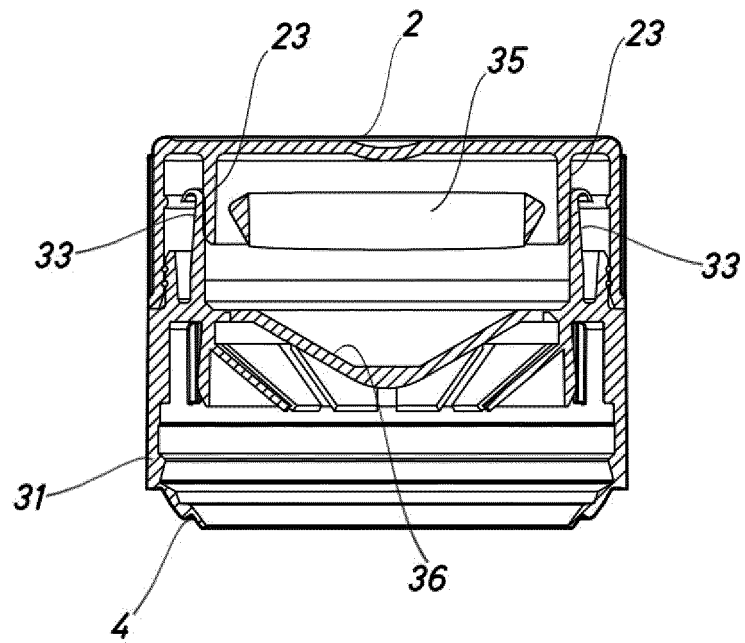


Fig.9

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES2014/070083

A. CLASSIFICATION OF SUBJECT MATTER

See extra sheet

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

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)

EPODOC, INVENES

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2011036839 A1 (GARDNER) 17/02/2011, Paragraph [0075]; figures 1C - 1G, 2F	1-5
A	US 6382444 B1 (NYMAN) 07/05/2002, column 4, line 43 - column 7, line 43; figures 7-11	1-5
A	ES 280195 U (PLASTIVIT) 16/12/1984, Page 5; figures	1-5
A	WO 2009002291 A1 (ZABELLO) 31/12/2008, Abstract; figures	1-5

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

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance.	
"E" earlier document 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)	"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
"O" document referring to an oral disclosure use, exhibition, or other means.	"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 documents, such combination being obvious to a person skilled in the art
"P" document published prior to the international filing date but later than the priority date claimed	"&" document member of the same patent family

Date of the actual completion of the international search
20/05/2014

Date of mailing of the international search report
(22/05/2014)

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/ES2014/070083

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CLASSIFICATION OF SUBJECT MATTER

B65D41/00 (2006.01)

B65D47/14 (2006.01)

B65D41/16 (2006.01)

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Information on patent family members

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WO2009002291 A1	31.12.2008	UA87717 C2	10.08.2009

Form PCT/ISA/210 (patent family annex) (July 2009)

REFERENCES CITED IN THE DESCRIPTION

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- ES 10002900 U [0015]
- ES 2162585 [0015]