



(12)

EUROPEAN PATENT APPLICATION

(21) Application number : **93301324.5**

(51) Int. Cl.⁵ : **B65D 47/24**

(22) Date of filing : **23.02.93**

(30) Priority : **25.02.92 GB 9203980**

(43) Date of publication of application :
01.09.93 Bulletin 93/35

(84) Designated Contracting States :
AT BE CH DE DK FR GB LI NL SE

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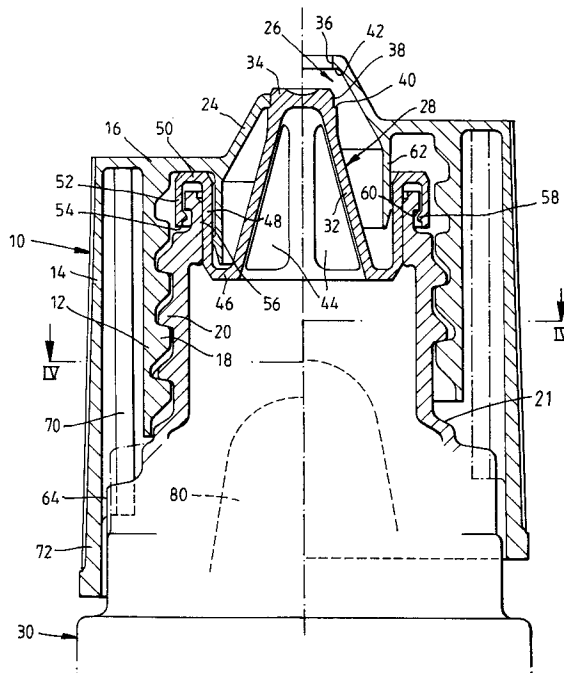
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(54) **Container provided with a closure for dispensing liquids.**

(57) A dispensing screw closure with a dispensing aperture 26 is mounted on the neck of a squeeze bottle 30 for limited angular and axial movement. In a lowered position of the closure a dispensing aperture 26 is closed by a plug member 28 of the container.

The closure has an outer skirt which carries elongate flexible fins 70 for engagement with lugs 64 on the container neck for child-resistance. The fins are disengageable from the lugs by pinching the outer skirt at pads 80 spaced angularly by 90° from the lugs. Further lugs on the container neck are engaged by the fins to provide a limit to closure movement in the opening direction. At this angular position the outer skirt is restrained against deformation, and it is therefore not possible to release the engagement by pinching the outer skirt.

Fig. 3



This invention relates to container/closure combinations, in particular such combinations in which the closure is required to dispense a liquid product from the container which is typically a squeeze bottle. For brevity, container/closure combinations of this kind will hereinafter be referred to as "dispensing container/closure combinations".

In dispensing container/closure combinations it is known for the closure to be rotatable on the container between limiting angular positions, and with such rotation to move axially between a raised position (in relation to the container) at which a dispensing aperture of the closure is open and product can be dispensed, and a lowered position at which the aperture is closed and dispensing or leakage is prevented. To achieve the opening and closing of the aperture the container usually includes a snap-fitted plug member which directs product to the aperture for dispensing, but which engages the closure internally so as to close off the aperture when dispensing is no longer required and the closure is accordingly turned to its lowered position.

There is a commercial need to provide a dispensing container/closure combination as defined in the previous paragraph with child-resistance, so as to make it difficult or impossible for a young child to gain access to the contents of the container. In accordance with the invention from one aspect there is therefore provided a dispensing closure in combination with a container, the closure and container having cooperable thread formations adapted to move the closure axially on the container between raised and lowered positions when the closure is rotated, the container including a plug member adapted for closing a dispensing aperture of the closure when the closure is in its lowered position but allowing dispensing of product through the aperture when the closure is raised, the closure having a tubular skirt which is formed with at least one inward projection operable by engagement with an outward projection of the container to prevent movement of the closure from its lowered position and which is deformable to allow the projection thereon to pass that of the container and so allow closure movement towards its raised position, characterised by stop means which determine the raised position of the closure, the stop means comprising the said projection on one of the closure and the container and, on the other one of the closure and the container, a further projection which is spaced both axially and angularly from the first said projection thereon.

Preferably the closure has an elongate fin and the container has first and second lugs, the fin and the first and second lugs constituting the first-mentioned said projections and the further projection respectively.

Advantageously, stop means are also provided for determining the lowered position of the closure on

the container. These further stop means are preferably associated with the thread formations of the container and the closure.

In order that the invention may be more fully understood a dispensing closure/container combination in accordance with the invention will now be described by way of example and with reference to the accompanying drawings, in which:-

Fig.1 is a view in side elevation showing the neck of the container body;

Fig.2 is a view of the container neck as seen looking in the direction of the arrow A in Fig.1;

Fig.3 is a view taken generally in central vertical section of the container neck with the plug member and closure fitted thereon, the container neck having the orientation shown in Fig.2; and

Fig.4 is a sectional view of the assembly shown in Fig.3, taken on the radial plane IV - IV of that Figure.

Referring now to the drawings, a child-resistant dispensing closure 10 is injection-moulded from a suitable plastics material to have inner and outer spaced and concentric tubular skirts 12, 14 which extend concentrically from an annular closure panel 16 at one end. The inner skirt 12 is somewhat shorter than the outer skirt 14 and is internally formed with a two-start screw thread 18. This screw thread is capable of engagement with a complementary two-start thread 20 formed on the neck 21 on the body 30 of a plastics container, typically a squeeze bottle. The two parts of the screw thread 20 are individually indicated in Figs. 1 and 2 by the reference numerals 20A, 20B. By rotation on the container in the appropriate direction the closure is accordingly axially movable between the lowered position depicted on the left hand side of Fig.3, and the raised position shown on the right hand side of that drawing.

As shown in Fig.3, the closure has a generally frustoconical projecting boss 24 located on its centre-line within the closure panel 16. A dispensing aperture 26 is formed at the centre of the boss, as can clearly be seen to the right of Figure 3.

A plug member 28, which forms part of the container but which is injection-moulded from a suitable plastics material separately from the container body 30, is located within the closure. It has a projecting central position 32 with a closed end 34. When the closure is in its lowered position (i.e. as shown on the left hand side of Fig.3) this end is capable of making sealing engagement with the boss 24 so as to close the dispensing aperture 26 against escape of product. It will be seen that the cooperating sealing faces 36, 38 of the closure and the plug member are substantially cylindrical. A small degree of interference between the faces ensures liquid tightness; also, an annular shoulder 40 at the bottom end of the sealing face 38 ensures positive location of the sealing faces in the axial sense, by abutment with a corresponding

interior shoulder 42 of the boss assisted by natural resilience of the plug member in particular.

To allow product from the container body 30 to flow to the dispensing aperture 26 for dispensing the central portion 32 of the plug member 28 is formed with a number (e.g. four) of large apertures 44 of which two are visible in Fig.3. Other than the central portion the plug member comprises, in sequence, a first annular portion 46 joined to the central portion, a first cylindrical portion 48, a second annular portion 50, and a second cylindrical portion 52 which extends to the free edge 54 of the plug member.

The first cylindrical portion 48 is arranged to make sealing engagement over a cylindrical interface with the bore 56 of the container neck as shown. The two cylindrical portions 48, 52 form an inverted annular channel within which the free top end of the container neck is located, the outer cylindrical portion serving to hold the plug member captive on the container body by snap-engagement of a bead 58 beneath a shoulder 60 on the container neck.

The sealing engagement of the portion 48 of the plug member and the container neck prevents escape of product between the plug member and the container neck to the region of the screw threads 18, 20. Product escape to the screw thread region via the outside of the plug member (but within the dispensing aperture 26) is provided by a cylindrical spigot 62 which extends integrally from the underside of the closure panel 16 at its junction with the boss 24 and into sealing engagement with the inside surface of the cylindrical portion 48.

The closure/container combination is of a child-resistant kind, and for that purpose the container neck 21 is formed with a pair of diametrically opposed, substantially rigid lugs 64 which are carried on an upper enlarged diameter portion 65 of the neck below the screw threads 20. As clearly shown in Fig.4, each lug has a ramp face 66 and a generally radially directed stop face 68. The stop face is located at the trailing end of the lug in the direction in which the closure is screwed onto the container.

For cooperation with the lugs 64 the outer skirt 14 of the closure carries a pair of diametrically opposed elongate and flexible fins 70 which are located between the skirts 12, 14. The fins extend for substantially the length of the outer skirt, but stop short of the free edge of the outer skirt to leave a marginal end portion 72 from which the fins are lacking. When the closure is in its lowered (closed) position this end portion lies closely adjacent a lower enlarged diameter portion 73 of the container neck for the reasons to be discussed later.

The form of the fins 70 in cross-section can be seen from Fig.4 from which it will be seen that they have a tapering base portion 74 at which they are integrally carried from the outer skirt, and a parallel-faced free edge portion 76 with a rounded free edge 78

capable of engaging the stop face 68 of a respective lug 64.

The closure 10 is capable of being screwed onto the container neck 21 by a conventional capping machine. The plug member may be fitted to the container neck prior to the capping operation, or alternatively it may be pre-assembled to the closure, the capping operation then achieving the snap-engagement of the plug member on the container neck simultaneously with movement of the closure towards its lowered (closed) position. As the closure is approaching its closed position its fins 70 come into engagement with the lugs 64 on the container neck and ride resiliently over their ramp faces 66 in succession until the closed position of the closure is reached. Engagement of the fins with the stop faces 68 of respective lugs will thereafter prevent movement of the closure from its closed position unless and until the fins are moved radially outwardly sufficiently to allow them to pass the lugs as the closure is unscrewed. This radial movement of the fins is achieved by ovality of the outer skirt 14 created by the user by pinching the outer skirt at a pair of pressure pads 80 spaced by 90° from the fins.

In order to control the deformation and resilience of the outer skirt 14 required for the closure to properly perform its child-resistant function, the thickness of the outer skirt is increased progressively in the direction of its free edge (See Fig.3). Also, the outer skirt at the pressure pads is made somewhat thicker than the remainder of the periphery of the outer skirt to give increased local rigidity in those regions.

In order to define accurately the closed position of the closure on the container and so prevent possible overscrewing, a stop 82 is formed on the container neck at the trailing end of each part 20A, 20B of its screw thread 20. Each stop provides a stop face 84 (Fig.2) for engagement by the stop face 85 (Fig.4) of a similar stop which is located at the trailing end of a respective part of the closure thread 18. Such engagement occurs a small angular distance after the fins 70 have passed their associated lugs 64 in readiness for providing child-resistance.

In addition to the pair of the lugs 64 described above, the portion 65 of the container neck is formed with a pair of additional lugs 86 for cooperation with the fins 70. These additional lugs have substantially the same cross-sectional form as the lugs 64, likewise having a ramp face 88 and a stop face 90. As can be seen from Fig.4, they are diametrically opposed to one another and spaced angularly from the lugs 64. Their axial height on the container neck is greater than that of the lugs 64, and such that as the closure is being screwed onto the container by a capping machine, each fin will engage and ride over a respective one of the additional lugs and after a further 135° of angular movement will engage and ride over the lug 64 with which it is associated for child-resistance; af-

ter a further small movement further rotation will be halted by engagement of the stops 82 with the associated stop faces 85 on the closure as described in the previous paragraph. For ease of moulding, the additional lugs are extended (as shown) to the intersection of the portions 65, 73 of the container neck. Their bottom ends therefore terminate on the same radial plane as those of the lugs 64.

Reference is now made particularly to Figs 2 and 4, which show a pair of opposed, substantially plane and axially extending flats 92 which are formed in the upper and lower enlarged portions 65, 73 of the container neck. The enlarged neck portion 73 is cylindrical except at these flats, and is coincident with the cylindrical envelope of the apices of the lugs 64.

The flats 92 are located at 90° to the child-resistant lugs 64, and lie beneath the pressure pads 80 when the closure is in its closed position. They then provide clearance sufficient to allow deformation of the outer skirt 14 to cause the fins to be moved radially clear of the lugs 64 as described above. However, in the rotary position of the closure at which the fins 70 lie adjacent the stop faces 90 of the additional lugs 86, the flats are no longer located beneath the pressure pads, and inward movement of the pressure pads to create ovality of skirt is substantially prevented by the close adjacency of the marginal end portion 72 of the skirt with the underlying cylindrical surface of the enlarged portion 73 of the container neck. It will therefore be understood that under these circumstances deformation of the outer skirt adequate to enable the fins to clear the additional lugs is not possible; the additional lugs accordingly provide an impassable barrier to movement in the open direction of the closure, at a position when the dispensing aperture 26 is open to a degree appropriate to the contents of the container and the method used for dispensing. When in this position the closure is restrained against unwanted movement in the closing direction by latching bumps 94 moulded on the container neck.

Many modifications and variations are possible within the scope of the present invention. For example, instead of making screw threaded engagement with a complementary formation on the container body as described, the closure may be arranged to make screw-threaded engagement with the plug member, which for that purpose should be mounted in a non-rotary manner on the container body. Also, whilst in the described embodiment two lugs are provided on the container body for engagement with an elongate fin on the closure, these or equivalent formations may be transposed if desired. Moreover, a formation such as a lug or fin may be provided either on the container body or on the plug member. However, and as in the described embodiment, Applicants prefer for ease of manufacture that the screw thread and other formations required for engagement with the closure be located on the container body rather

than on the plug member.

Whilst the invention has been particularly described in relation to a closure having two skirts, it may also have application to closures/container combinations in which the closure has only a single skirt.

In the described embodiment the heights of the lugs 64, 86 on the container neck are related to the pitch of the screw threads 18, 20 so that the lugs individually engage the associated fin 70 at the same point along its length. However, this relationship is not essential; if desired, the lugs may be of such effective heights that they engage different points of the fin 70.

Claims

1. A dispensing closure in combination with a container, the closure and container having cooperable thread formations (18,20) adapted to move the closure axially on the container between raised and lowered positions when the closure is rotated, the container including a plug member (28) adapted for closing a dispensing aperture of the closure when the closure is in its lowered position (26) but allowing dispensing of product through the aperture when the closure is raised, the closure having a tubular skirt (14) which is formed with at least one inward projection (70) operable by engagement with an outward projection (64) of the container to prevent movement of the closure from its lowered position and which is deformable to allow the projection thereon to pass that of the container and so allow closure movement towards its raised position, characterised by stop means which determine the raised position of the closure, the stop means comprising the said projection (70) on one of the closure and the container and, on the other one of the closure and the container, a further projection (86) which is spaced both axially and angularly from the first said projection thereon.
2. A combination as claimed in claim 1, characterised in that the closure has an elongate fin (70) and the container has first and second lugs (64, 86), the fin and the first and second lugs constituting the first-mentioned said projections and the further projection respectively.
3. A combination as claimed in any preceding claim, characterised by stop means (84, 85) which determine the lowered position of the closure on the container.
4. A combination as claimed in claim 3, characterised in that the stop means for determining the lowered position of the closure on the container are associated with the thread formations (18,

20) of the closure and the container.

5. A combination as claimed in claim 2, characterised by latch means for latching the closure releasably in its open position, the latch means comprising a protrusion (94) on the container over which the fin (70) rides when approaching the further projection (86). 5
6. A combination as claimed in any preceding claim, characterised in that in order to allow the skirt to deform to allow the projection thereon to pass that of the container the container is formed with a relieved face (92). 10 15
7. A combination as claimed in claim 6, characterised in that the closure skirt (14) has a free end portion at which it extends beyond the projection or projections thereon, the container having a portion to which the relieved face extends and which except at its relieved face lies closely adjacent the free end portion of the skirt. 20
8. A combination as claimed in claim 2, characterised in that the thread formations (18, 20) of the closure and container are two-start threads, the closure having a pair of elongate fins (70) which are diametrically opposed, and the container correspondingly having diametrically opposed pairs of first and second lugs (64, 86). 25 30
9. A combination as claimed in claim 8, characterised in that each first lug (64) is angularly spaced from the associated second lug (86) by substantially 135°. 35

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Fig.1

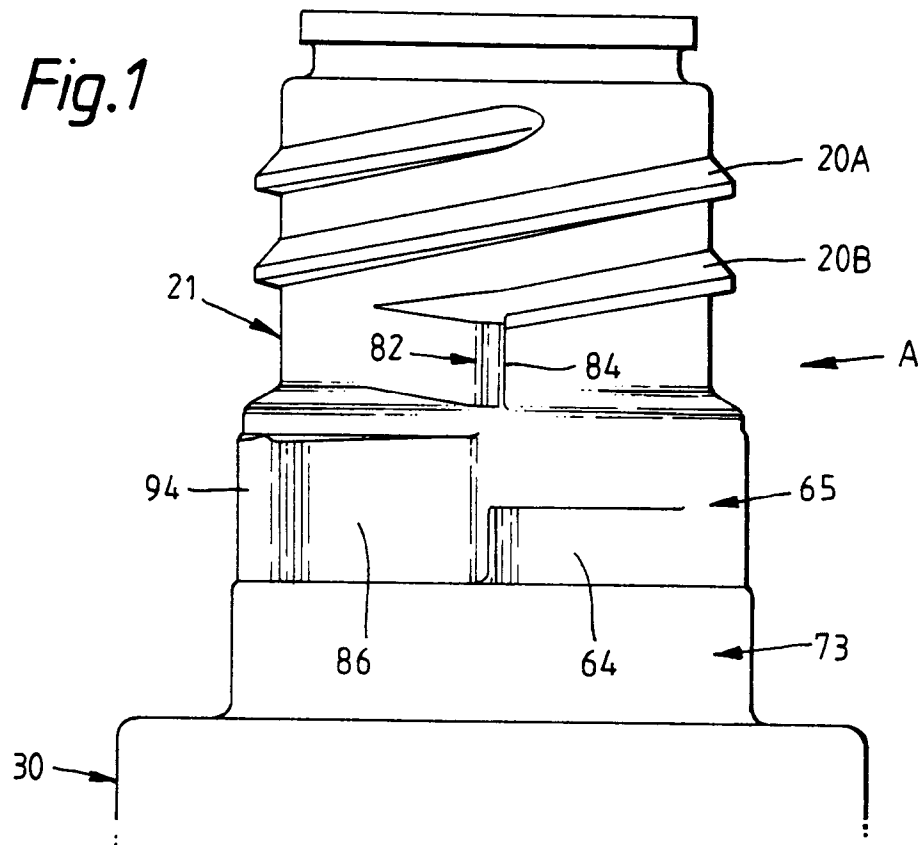


Fig. 2

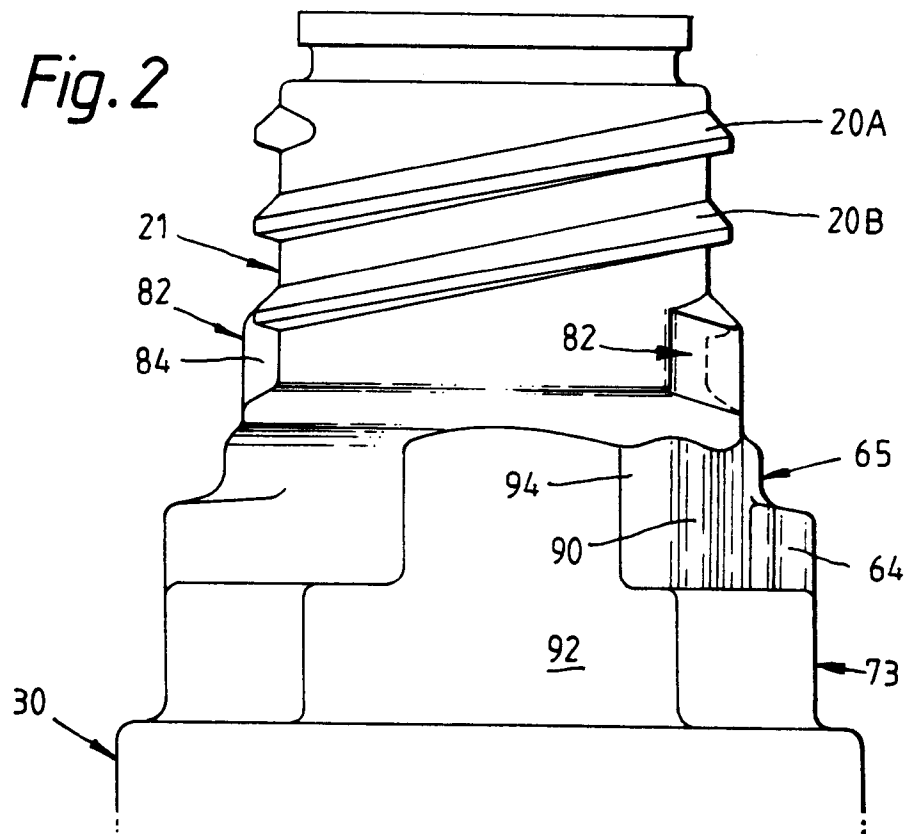


Fig. 3

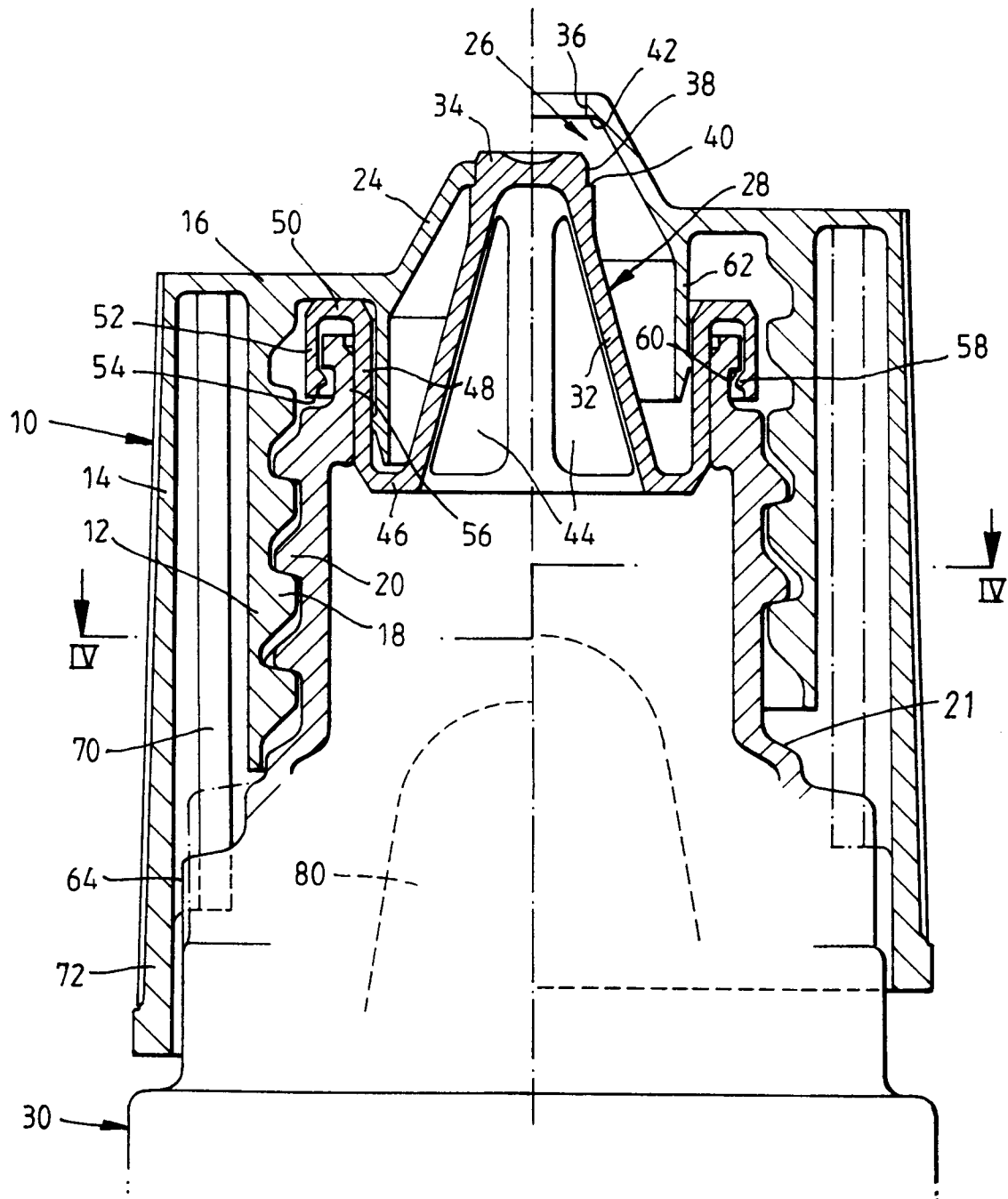
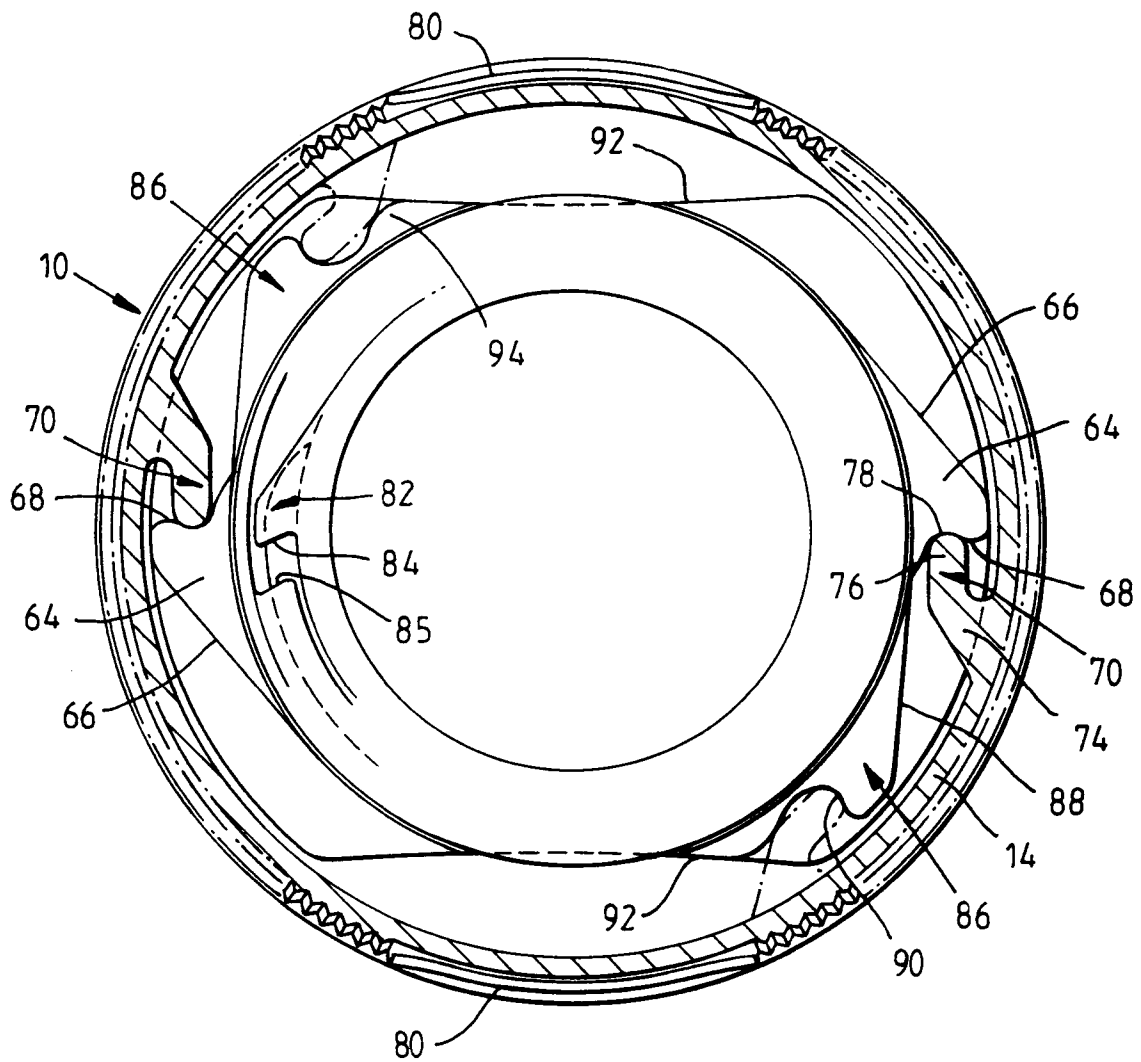


Fig. 4





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 93 30 1324

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
Y	US-A-4 358 031 (LOHRMAN) * column 3, line 38 - column 4, line 9; figures 1-2 *	1-2,8	B65D47/24
Y	EP-A-0 265 243 (POLTEC) * column 2, line 4 - line 23; figures 1,3 *	1-2,8	
A	EP-A-0 452 232 (ASTRA PLASTIQUE) * column 3, line 18 - column 4, line 53; figures 2-4 *	1	
A	US-A-5 038 967 (BRAUN) * column 11, line 27 - line 50; figures 35-37 *	3-5	
A	US-A-4 116 351 (UHLIG) * column 8, line 51 - column 9, line 42; figure 15 *	6-7	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B65D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 04 MAY 1993	Examiner Alain BRIDAULT
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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