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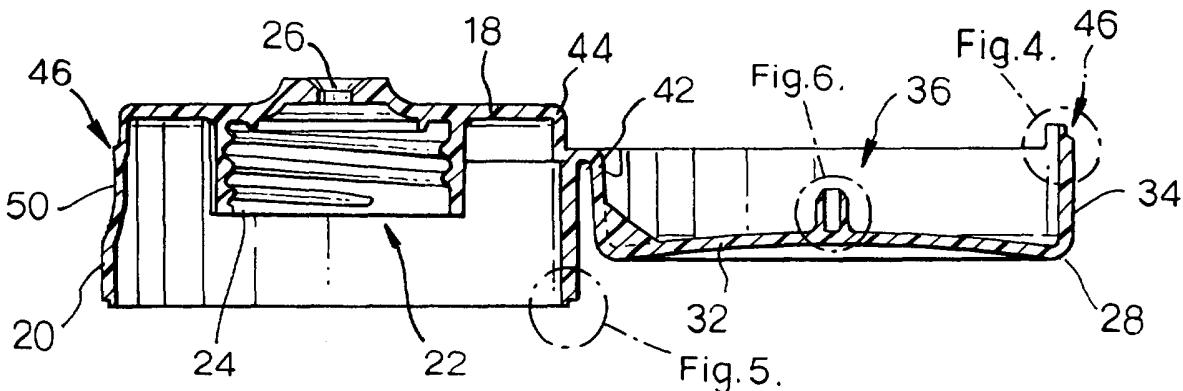
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(54) Water-tight closure

(57) A dispensing closure 10 for a container 12 containing a flowable product, such as bath gel. The closure 10 comprises a body 16, adapted to secure the closure 10 to the container 12, and defines a dispensing orifice 26, through which product may be dispensed by a user of the container. The closure 10 further includes a lid 28, connected to the body 16 by a hinge 30. The body 16 has an upper deck portion 18 and the lid 28 includes a cover portion 32 and a downwardly depending sidewall

portion 34. The downwardly depending sidewall portion 34 of the lid 28 and the upper deck portion 18 of the body 16 are configured to form therebetween a watertight seal when the lid 28 is in its closed position on the body 16. To achieve this, the lid 28 and the upperdeck portion 18 may have complimentary structures 42, 44 adjacent to the hinge 30 and preferably additional complimentary structures 46,48, adjacent to a thumb tab area, which cooperate to form a watertight seal in these areas.

Fig.2.



Description

[0001] The present invention relates to a hinged closure for containers of flowable products, such as bath gels, shampoo, conditioners and skin care creams. In particular, the present invention proposes an enhanced design of hinged closure, which is adapted to minimise the ingress of water into the closure when it is in its closed configuration. The closure has particular utility for use with soft plastic tube containers into which many personal care products are now packaged.

[0002] A large consumer market exists for flowable personal care products, such as those mentioned above. One of the preferred packaging configurations for such products includes a soft, squeezable, plastic, tube container having a moulded shoulder, with a threaded finish portion incorporated therein. Such containers and their method of manufacture are well known to those skilled in the art. Typically such tube containers are used in combination with a closure having a threaded portion, which cooperates with the threaded finish on the container. Recently, such simple screw closures have often been replaced by a hinged closure having a body and a lid connected together by a hinge. Such containers are more convenient for the user, because the closure is not removed from the container to dispense the product and is thus less likely to be lost during repeated use. The body of the closure is adapted to be attached to the container (either using a co-operating screw thread arrangement as described above or using a conventional snap fit arrangement). A lid is attached to the body by a hinge. A dispensing opening is ordinarily defined in the body and the lid includes a complementary member that both plugs the dispensing opening and releasable locks the lid onto the body when the lid is closed and the product is not being used.

[0003] Such hinge closures are well known in the prior art and are fairly effective at preventing escape of the flowable product when the container is not in use. However, less viscous liquids, such as water, can often penetrate or escape from such closures, causing unwanted results. For example, a product such as bath gel, which is often kept within a wet shower or bathtub area by consumers is susceptible to having water trapped within the container and/or closure after use. Water can sometimes seep between the closure body and lid, even when the lid is closed. This can lead to dilution of the product and in serious cases, trapped water can stagnate and over time lead to the growth of bacteria, mould or fungus within the closure. This is of course undesirable and unhygienic and can lead to increased waste.

[0004] The problems with the known closure/container combinations described above can generally be attributed to the failure of conventional closures to seal effectively with the container and also for such hinge closures to effectively provide a watertight seal between the outer peripheries of the lid and the body. This long standing problem has been difficult to solve for a number

of reasons, the foremost of which is the need for certain irregularities to be moulded into the body and/or lid in order to form the hinge and to provide a gripping structure with which the user can open the lid of the closure.

5 **[0005]** Therefore, an object of the present invention is to provide an improved container/closure package for flowable products, that is watertight when closed and reduces or eliminates the problems created by poor sealing between the lid and the body of the closure and

10 between the closure body and the neck of the container.

[0006] Accordingly, the present invention provides a dispensing closure for a container of flowable product, comprising a body, having an upper deck portion and a skirt depending from the periphery thereof, the skirt having a structure defined on its interior or exterior surface and adapted to co-operate with a complimentary structure on the neck of the container, the body further having a dispensing orifice defined in the upper deck portion, a lid, connected to the body by a hinge, and moveable be-

20 tween an open position, to expose the dispensing orifice, and a closed position in which the dispensing orifice is sealed, the lid having a cover portion and a sidewall portion depending from the periphery thereof, characterised in that the sidewall portion of the lid and the upper

25 deck portion of the body are configured to form therebetween a watertight seal, when the lid is in its closed position.

[0007] In the closure according to the invention, a watertight seal is obtained between the lid and the deck 30 portion of the body, because they are sized and configured to fit snugly together. The deck portion of the body effectively forms a bore seal within the sidewall portion of the lid. This can be contrasted with the face seal arrangement often present in the closures according to the prior art.

35 Where dimensional tolerances make it difficult to achieve good size matching between the deck portion of the body and the internal size of the lid sidewall, a bead may be provided on either of the co-operating faces of the deck portion or the lid sidewall, to compensate 40 for any dimensional mismatch. It will be apparent to those skilled in the art that any such bead must be sized and shaped to compensate for extremes of dimensional tolerance, without causing fouling of the lid on the body, when dimensional similarity is achieved.

45 **[0008]** Preferably, the lid includes a releasable locking means, which is adapted to positively engage in the dispensing orifice defined in the deck portion of the closure body. The releasable locking means serves to seal the dispensing orifice when the closure lid is in its closed

50 position, preventing product leakage from the container. This is particularly important when the container is designed to be stored either standing on the closure (as in the case of hair conditioner) or is suspended with the closure pointing downwardly (as in the case of many

55 shower gels). The releasable locking means further provides an indication to the user that the closure lid is positively located in its closed position and therefore a watertight seal has been achieved between the lid and

body of the closure.

[0009] As mentioned above, one of the problems associated with obtaining a watertight seal between the lid and body of a hinged closure occurs because of the leakage flow path that is formed in the hinge area of the closure. This is a particular problem in conventional snap hinge closures where the structure of the hinge does not lend itself to conforming surfaces between the body and lid of the closure. In the hinge area, a certain amount of slack occurs between the opposed surfaces of the body and the lid, to allow the hinge to operate effectively. This "slack" provides a leakage path through which water can penetrate the closure, even when the lid is in its closed position.

[0010] In the closure according to the invention, this problem is overcome by modifying the shape of the sidewall of the lid adjacent to the hinge and further providing a complimentary feature on the body of the closure to seal the potential flow path in the hinge area. The sidewall of the lid is provided with a recess into which the hinge structure is received and the upper deck portion of the body is provided with a radially extending projection in the hinge area, which has a complimentary shape to the recess in the lid sidewall. These two structure operate together to provide a watertight seal in the hinge area of the closure, sealing the potential leakage flow paths around the hinge.

[0011] Another area of potential leakage is the thumb tab area provided in many conventional hinge closures. The thumb tab is normally provided by a recess in the body of the closure, which allows a user to open the lid of the closure by placing a thumb or finger under the peripheral edge of the lid of the closure. The disadvantage of this arrangement is that in the area of the thumb tab, the interface between the lid and the closure takes the form of a face seal, which is less effective than a bore seal for prevention of the ingress of water or other less viscous fluids. Therefore, advantageously, in the closure according to the invention, the thumb tab recess in the closure body is matched by a downwardly depending thumb tab projection from the sidewall of the lid. The thumb tab projection is complimentary in shape to the thumb tab recess and defines the preferred watertight bore seal arrangement in the thumb tab area of the closure. Alternatively, the cover of the closure may be extended radially to provide a projection or tab, which the user can use to prise open the lid of the closure, breaking the bore seal formed between the deck of the closure and the depending side wall of the lid. In this arrangement, it is important that the sidewall of the lid forms a continuous, uninterrupted bore seal with the body of the closure, even in the area of the projection or tab.

[0012] Preferably, a watertight seal is also formed between the free end of the closure body and the adjacent area of the neck of the container to which the closure is attached. This is a major area of water ingress in conventional hinged closure/container combinations. In a

first embodiment, a flexible extension is provided from the free edge of the closure body. The co-operating structures attaching the closure and container together are positioned to ensure that the flexible extension is

5 deformed against the adjacent surface of the container, to achieve a watertight seal. The flexibility of the extension may be provided by moulding the extension from a different, more flexible material to the remainder of the body of the closure, using known sequential moulding techniques for example. However, preferably the flexibility of the extension is provided by using the same material for the body and extension but reducing the thickness of the extension in comparison with the thickness of the adjacent portion of the closure skirt.

10 **[0013]** In a second embodiment the extension is adapted to penetrate the adjacent surface of the container, to form the watertight seal. In this arrangement, the extension has to be sufficiently rigid to "dig in" to the adjacent material of the container. Furthermore, the extension is provided with a sharpened edge to achieve a "point" contact around the sharpened edge and thereby a good watertight seal. This embodiment is particularly suitable for a container/closure combination, where the closure body is not designed to be removed from the 15 container and the container and closure body are connected by a snap-fit arrangement.

20 **[0014]** The present invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

25 **FIGURE 1** shows a top plan view of a dispensing closure according to a preferred embodiment of the invention.

30 **FIGURE 2** shows a cross sectional view of the closure shown in **FIGURE 1**, taken along line 2-2.

35 **FIGURE 3** shows a cross sectional view of the closure shown in **FIGURE 1**, taken along line 3-3.

40 **FIGURE 4** is an enlarged view of the area indicated by the circle marked 4-4 in **FIGURE 1**.

45 **FIGURE 5** is an enlarged view of the area indicated by the circle marked 5-5 in **FIGURE 1**.

50 **FIGURE 6** is an enlarged view of the area indicated by the circle marked 6-6 in **FIGURE 1**.

55 **FIGURE 7** is a fragmentary cross sectional view showing the seal between the free edge of the closure and the adjacent area of a container according to a first embodiment of the invention.

FIGURE 8 is a fragmentary cross sectional view showing the seal between the free edge of the closure and the adjacent area of a container according to a second embodiment of the invention.

[0015] Wherever possible, like reference numerals have been used to indicate similar structural features throughout the figures.

[0016] Referring to FIGURE 1, a dispensing closure 10 according to the invention includes a body 16 that has an upper deck portion 18 and a downwardly depending skirt 20, projecting from the periphery thereof. The skirt 20 has a mounting structure 22 defined thereon, for mounting the closure 10 to the neck of a container (not shown), having a complimentary mounting structure. The mounting structure 22 may take the form of a plurality of threads 24 that are defined on the interior surface of the downwardly depending skirt 20. The threads 24 are arranged to co-operate with complimentary threads (not shown) on the exterior surface of the neck of the container. It will be readily apparent to those skilled in the art that alternatively, the screw threads 24 may be provided on the exterior surface of the skirt 20 and the complimentary threads on the container neck may be provided on the interior surface thereof. Alternatively the mounting structure 22 may take the form of a plurality of snap beads that are designed to snap into engagement with complimentary structures on the container neck, to prevent the closure body from being removed from the container.

[0017] The closure body 16 further includes a dispensing orifice 26 defined therein for dispensing the product from the container to which the closure is attached.

[0018] The dispensing closure 10 further includes a lid 28, which is connected to the body 16 by a hinge 30. The lid 28 includes a cover portion 32 and a downwardly depending sidewall portion 34 projecting from the periphery thereof. In a preferred embodiment, the body 16 and the sidewall portion 34 of the lid are generally cylindrical in shape, although other shapes such as "oval" may be considered.

[0019] In a preferred embodiment, the body 16, lid 28 and hinge 30 are integrally moulded and of unitary construction. Preferably, the closure 10 is integrally moulded from polypropylene or other plastic material such as high density polyethylene. The hinge 30 is of conventional construction for closures of this general type.

[0020] Referring now to FIGURES 2 and 6a, releasable locking structure 36 is provided for releasably locking the lid 28 in its closed position with respect to the body 16. In a preferred embodiment, the structure 36 is defined as a plug member 38 that is slightly larger at its distal end than its base end. Accordingly (as is conventional in closures of this general type) plug member 38 will be retained in the dispensing orifice 26, in a snap fit configuration, when the lid 28 is in its closed position. Thus, when the lid 28 is closed, the plug member 38 will seal the dispensing orifice 26, preventing leakage. However, in the closure according to the invention the positive engagement of the snap fit between the plug member 38 and the dispensing orifice 26 also serves to indicate to the user that the lid 28 is properly closed and a

watertight seal has been formed between the lid 28 and the body 16.

[0021] According to an important aspect of the invention, the downwardly depending sidewall 34 of the lid 28

5 and the upper deck portion 18 of the body 16 are configured to form a watertight seal therebetween when the lid 28 is in its closed position with respect to the body 16. To achieve this, the outer core 48 of the upper deck portion 18 is formed as an angled annular surface 40, 10 that may be described as having a truncated conical shape (as shown in FIGURE 3). Surface 40 is preferably angled at an angle α with respect to the vertical. The presence of the angled, annular surface 40 will, when the lower free edge of the sidewall 34 of the lid 28 is 15 pressed thereagainst, to form a pressurised circular area of contact that optimises sealing between the upper deck portion 18 of the body 16 and the downwardly depending sidewall 34 of the lid 28. The angle α is chosen such that the annular surface 40 forms a "guide surface" 20 to direct the sidewall 34 of the lid 28 into sealing engagement with the upper deck portion 18 of the body 16, but sufficiently angled towards the vertical to form a bore seal type engagement with the sidewall 34 of the lid 28.

[0022] Referring now to FIGURE 2, advantageously, 25 the downwardly depending sidewall 34 has a recess 42 defined therein, orientated and sized to receive and accommodate the geometry of the hinge 30 and the upper deck portion 18 of the body 16 includes a projection 44 that is complimentary in shape with the recess 42, so as 30 to ensure a watertight seal in the area about the hinge 30, when the lid 28 is in its closed position with respect to the body 16. The upper deck portion 18 of the body 16 has a substantially flat upper surface and the projection 44 has an upper surface that lies substantially flush 35 with the upper surface of the deck portion 18. As best illustrated in FIGURE 1, the projection 44 extends outwardly in a radial direction with respect to adjacent areas of the upper deck portion 18.

[0023] Furthermore, as may be best seen in FIGURES 1, 2 and 4, the downwardly depending skirt 20 of the body 16 has a thumb tab recess 46 defined therein and the lid 28 includes a thumb tab projection 48 (see FIGURE 4), which has a smooth inner surface 48. According to one advantageous feature of the invention,

45 the thumb tab recess 46 and the thumb tab projection 48 are substantially complimentary in shape, so that a watertight seal is created in the area about the thumb tab projection 48, when the lid 28 is in its closed position with respect to the body. In this closed position, the 50 smooth inner surface 48 of the thumb tab projection 46 presses tightly against a corresponding smooth outer surface 50 (see FIGURE 2) on the outer surface of the skirt 20 of the body 16 that defines the thumb recess 46.

[0024] According to another advantageous feature of 55 the invention, the downwardly depending skirt 20 of the body 16 includes an extension 52 at its lowermost distal end, as best illustrated in FIGURE 5. In one preferred embodiment (as shown in FIGURE 7), extension 52 is

flexible and adapted to deform against the adjacent surface of the container 12, when the closure 10 is mounted on the container 12, thereby forming a seal between the contact surface of the container 12 and the extension 52 on the closure 10. In a preferred arrangement, the flexible extension 52 forms a narrow annular ring at the free end of the body 16 and has a thickness that is less than the thickness of the adjacent portion of the skirt 20.

[0025] In another embodiment (as shown in FIGURE 8), the container 12 takes the form of a squeeze type, tubular container having a shoulder section formed from a plastic that is softer than the material from which the closure is fabricated. In this embodiment, the extension 52 from the skirt 20 of the body 16 is designed to be substantially rigid and its free edge has a sharpened profile. When the projection 52 is pressed against the contact surface of the container 12, the sharp edge of the projection 52 penetrates and "digs in" to the contact surface of the container 12, forming a watertight seal between the Closure 10 and the container 12.

[0026] It will be understood by those skilled in the art that although numerous characteristics and advantages of the present invention have been described in the above specific examples, alternative arrangements that vary in details such as size, shape and arrangement of parts may equally be employed, within the principles of the present invention.

Claims

1. A dispensing closure 10 for a container 12 of flowable product, comprising

- a body 16, having an upper deck portion 18 and a skirt 20 depending from the periphery thereof, the skirt 20 having a structure 22 defined on its interior or exterior surface and adapted to co-operate with a complimentary structure on the neck 13 of the container 12
- the body 16 further having a dispensing orifice 26 defined in the upper deck portion 18
- a lid 28, connected to the body 16 by a hinge 30 and moveable between an open position, to expose the dispensing orifice 26, and a closed position in which the dispensing orifice 26 is sealed,
- the lid 28 having a cover portion 32 and a sidewall portion 34 depending from the periphery thereof,

characterised in that

- the sidewall portion 34 of the lid and the upper deck portion 18 of the body are configured to form therebetween a watertight seal, when the lid 28 is in its closed position.

2. A dispensing closure 10 according to claim 1, wherein the lid has a releasable locking means 36, adapted to engage with the dispensing orifice 26 in the body 16, to realeasably lock the lid 28 in its closed position and seal the dispensing orifice 26.

3. A dispensing closure 10 according claim 1 or claim 2, wherein the sidewall portion 34 of the lid 28 has an annular rim, with an interior size

- and the upper deck portion 18 of the body has an outer size, substantially the same as the interior size of the annular rim,
- whereby the upper deck portion 18 and the annular rim co-operate to form a substantially watertight seal.

4. A dispensing closure 10 according to any one of the preceding claims, wherein the sidewall portion 34 of the lid 28 has a recess 42 defined therein, for receiving the hinge 30, and the upper deck portion 18 of the body 16 includes a projection 44 that is complementary with the recess 42, whereby a watertight seal is maintained in an area about the hinge 30, when the lid 28 is in its closed position.

5. A dispensing closure 10 according to any one of the preceding claims, wherein the body 16 has a thumb tab recess 46 defined therein and the sidewall portion 34 of the lid 28 has a downwardly depending thumb tab projection 48, which is complimentary in shape to the thumb tab recess 46 in the body 16, whereby the watertight seal is maintained in the area of the thumb tab recess 46.

6. A dispensing closure 10 according to any one of the preceding claims, wherein the skirt 20 of the body 16 comprises an extension 52 from its free edge, the extension 52 adapted to seal against the adjacent surface of the container 12 to which it is attached.

7. A dispensing closure 10 according to claim 6, wherein the extension 52 is flexible and is adapted to deform against the adjacent surface of the container 12, when the closure 10 is attached to the container 12, thereby forming a watertight seal.

8. A dispensing closure according to claim 7, wherein the thickness of the extension 52 is less than the adjacent portion of the skirt 20.

9. A dispensing closure 10 according to claim 6, wherein the extension 52 is adapted to penetrate the adjacent surface of the container 12, thereby forming a watertight seal.

10. A closure/container combination 10,12, comprising

- a container 12 for holding a flowable product and having a neck portion 13 adapted to co-operate with a closure 10 according to any one of the preceding claims.

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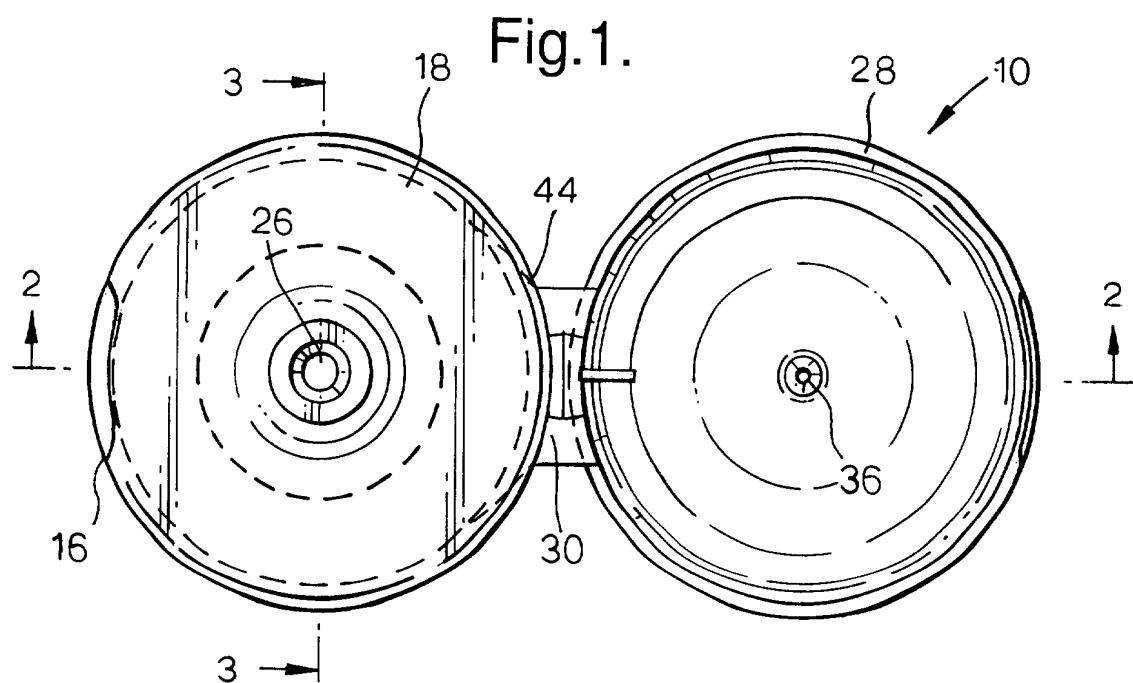


Fig.2.

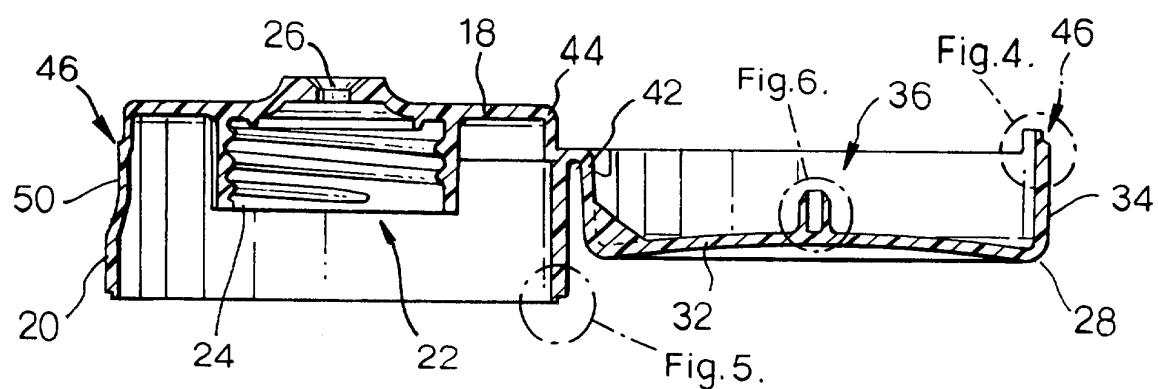


Fig.3.

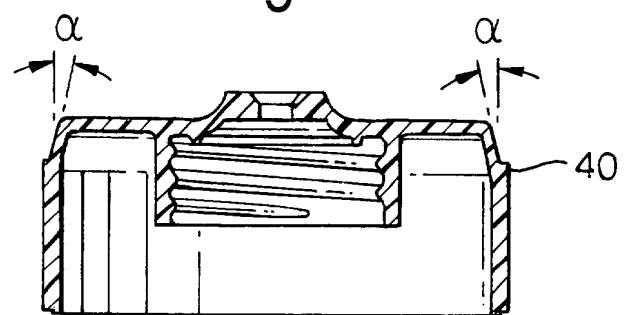


Fig.4.

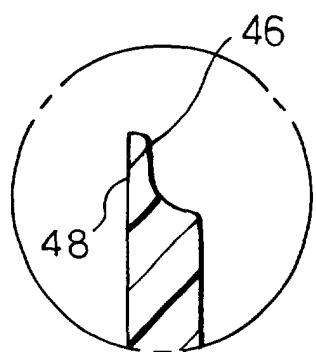


Fig.5.

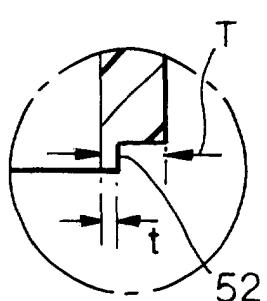


Fig.6.

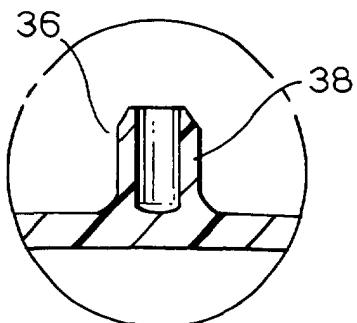


Fig.7.

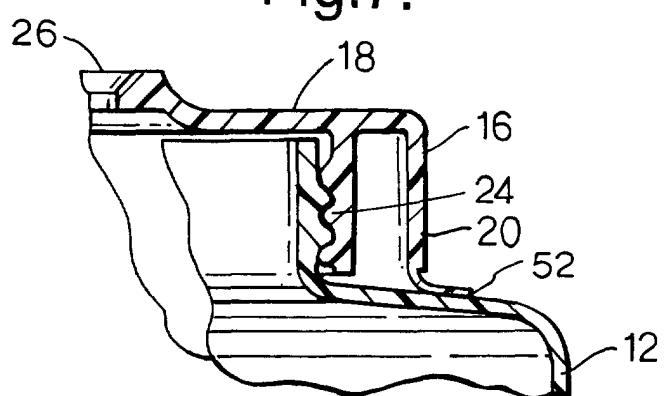
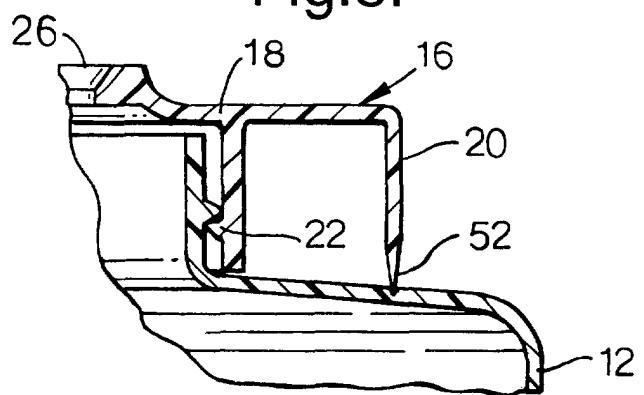


Fig.8.





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 02 25 5436

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
X	US 5 437 383 A (STULL GENE) 1 August 1995 (1995-08-01) * column 4, line 27 - line 49 * * column 6, line 21 - line 29; figure 2 * -----	1-3,10	B65D47/08
A	US 4 638 916 A (BECK JAMES M ET AL) 27 January 1987 (1987-01-27) * figure 1 * -----	4	
A	US 5 865 354 A (BANSAL VINOD KUMAR) 2 February 1999 (1999-02-02) * column 2, line 19; figures 1-3 * -----	5	
A	EP 0 316 269 A (SOPLAR SA) 17 May 1989 (1989-05-17) * column 3, line 45 - line 47; figure 4 * -----	6	
A	US 5 096 077 A (ODET PHILIPPE ET AL) 17 March 1992 (1992-03-17) * column 3, line 24 - line 27; figure 1 * -----	6	
A	DE 197 34 874 A (ALPLA DESIGN LEHNER GMBH) 18 February 1999 (1999-02-18) * figures 14,16 * -----		TECHNICAL FIELDS SEARCHED (Int.Cl.7) B65D
The present search report has been drawn up for all claims			
Place of search	Date of completion of the search	Examiner	
THE HAGUE	4 July 2003	Sundell, O	
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone	T : theory or principle underlying the invention		
Y : particularly relevant if combined with another document of the same category	E : earlier patent document, but published on, or after the filing date		
A : technological background	D : document cited in the application		
O : non-written disclosure	L : document cited for other reasons		
P : intermediate document	& : member of the same patent family, corresponding document		

**CLAIMS INCURRING FEES**

The present European patent application comprised at the time of filing more than ten claims.

Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):

No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:



European Patent
Office

LACK OF UNITY OF INVENTION
SHEET B

Application Number

EP 02 25 5436

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims: 1-4,10

Water-tight hinge in a closure

2. Claim : 5

Gripping means in a water-tight closure

3. Claims: 6-9

Water-tight contact surface between a closure and a container

ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.

EP 02 25 5436

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

04-07-2003

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
US 5437383	A	01-08-1995	CA GB	2123547 A1 2278837 A ,B	12-12-1994 14-12-1994
US 4638916	A	27-01-1987	AT AU AU AU BR CA CN DE EP IN JP JP MX NZ PH SG	68148 T 2509988 A 577701 B2 5880086 A 8603256 A 1258657 A1 86103884 A 3681837 D1 0208413 A2 167339 A1 3053182 B 62016354 A 166869 B 216194 A 23618 A 119393 G	15-10-1991 09-03-1989 29-09-1988 15-01-1987 24-02-1987 22-08-1989 07-01-1987 14-11-1991 14-01-1987 06-10-1990 14-08-1991 24-01-1987 10-02-1993 30-03-1988 11-09-1989 21-01-1994
US 5865354	A	02-02-1999	US	5996849 A	07-12-1999
EP 0316269	A	17-05-1989	AT DE EP ES GR	71907 T 3868010 D1 0316269 A1 2028361 T3 3003642 T3	15-02-1992 05-03-1992 17-05-1989 01-07-1992 16-03-1993
US 5096077	A	17-03-1992	FR AT CA DE DE EP ES	2665140 A1 90057 T 2047514 A1 69100101 D1 69100101 T2 0468902 A1 2041198 T3	31-01-1992 15-06-1993 26-01-1992 08-07-1993 09-09-1993 29-01-1992 01-11-1993
DE 19734874	A	18-02-1999	DE	19734874 A1	18-02-1999