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(54) **Dispensing closure improvement**

(57) A one-piece dispensing closure 1 comprising a body 2 and a spout 5 pivotable on the body 2 between open and closed positions and connected to the body via a flexible membrane 7 which inverts as the spout 5 moves to its open position. The end of the spout 5 adjacent to the hinge axis 6 is provided with a sealing skirt 52, which seals against a sealing plate 21 defined on

the closure body 2. A foil cutting arrangement is provided by two barbs 53 on either side of the spout 5, which pivot with the spout 5, cutting the foil membrane covering a container mouth. A bracing means 22, 55 is arranged between the two barbs 53 to provide support and prevent them being deflected towards one another when they first contact the film membrane.

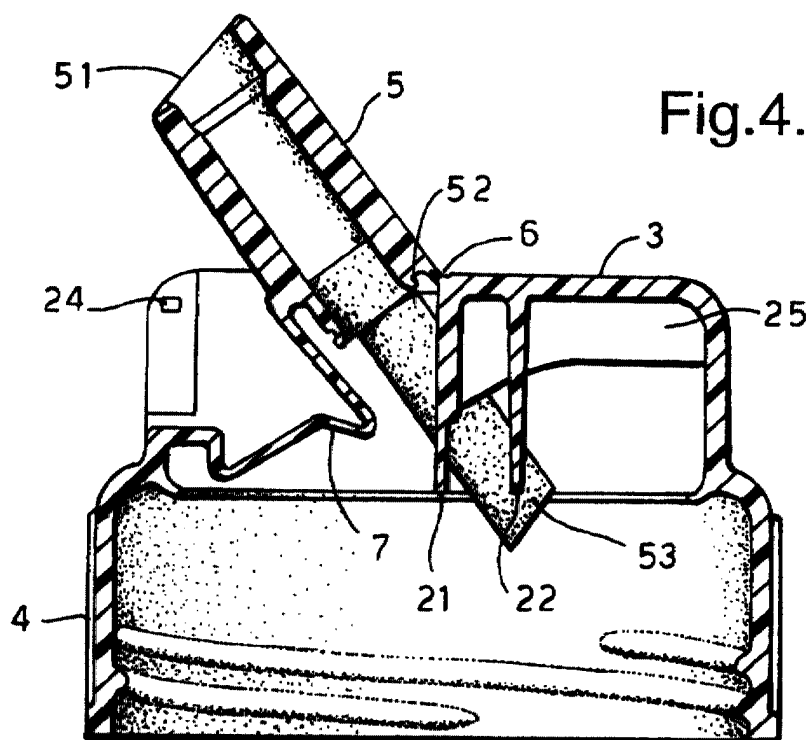


Fig.4.

Description

[0001] The present invention relates to an improvement to dispensing closures having an end plate, a peripheral side wall depending from the end plate and a spout, which is arranged to pivot between a closed position, where the spout lies flush with the end plate, and an open position, where the spout projects at right angles to the end plate. In particular, the invention relates to an improvement for a pivotable spout, dispensing closure, which incorporates a cutting system for piercing a barrier film sealed over the mouth of a container, as the spout is swivelled to its open position for the first time.

[0002] It is common when packaging some products, to seal the mouth of the container with a barrier layer, such as a foil, for example. The barrier layer helps prevent deterioration of the product and also provides tamper evidence. Usually, a user has to remove the closure from the container to remove or tear the barrier layer before the product can be dispensed. However, recently closures have been proposed which contain a barrier piercing system within the closure, so that a user can break the container seal without removing the closure from the container.

[0003] US Patent Application No.09/376,521 describes a pivotable spout dispensing closure having a foil piercing system associated with the pivotable spout. As the spout is swivelled to its open position for the first time, the foil piercing system penetrates the barrier layer over the mouth of a container, allowing the product to be dispensed through the spout.

[0004] In particular, US 09/376,521 describes a one-piece, pivotable spout dispensing closure, incorporating a foil piercing system. Such one-piece, pivotable spout, dispensing closures are well known from the prior art. For example, US 4,440,327 describes a dispensing closure comprising a body and a spout pivotably mounted on the body and connected thereto by a flexible membrane. The flexible membrane has a concave configuration when the spout is in its closed position but inverts to a convex configuration when the spout is opened. In order to prevent leaks, the base of the spout is usually provided with a sealing portion which is pressed against a seat on the body when the spout is in its closed position. The spout is held in its closed position by means of a latch between the spout and the closure body.

[0005] US 09/376,521 describes a foil piercing system comprising two barbs, which extend from either side of the spout inside the closure. When the spout is in its closed position, the barbs lie parallel to the end plate of the closure. However, when the spout is pivoted to its open position, the barbs swing towards the inside of the container, cutting any barrier layer over the container mouth. The barbs are displaced from the base of the spout so that they do not interfere with the sealing arrangement described previously.

[0006] However, because the barbs are made from the same material as the closure, this arrangement has

the disadvantage that the barbs tend to flex when they encounter the resistance of the barrier layer. This is a particular problem where the barrier layer is plasticised and therefore more resistant to tearing. In these cases the barbs do not reliably cut the barrier layer to allow the product to be dispensed satisfactorily.

[0007] Hence, the aim of the present invention is to provide a one-piece, pivotable spout dispensing closure with a barrier piercing system which will cut the barrier layer over a container mouth consistently without interfering with the normal sealing arrangement provided in such one-piece closures.

[0008] Accordingly, the present invention provides a dispensing closure comprising

- a rigid body defining a sealing surface and having a peripheral side-wall adapted to co-operate with the neck of a container,
- a rigid spout defining a dispensing passageway and pivotable on the body between open and closed positions, the spout having a first, dispensing end and a second end having a sealing skirt arranged to provide a fluid tight seal against the sealing surface of the body,
- a flexible diaphragm connected between the second end of the spout and the body, the diaphragm arranged to have a concave configuration when the spout is in its closed position and to invert when the spout is pivoted to its open position, and
- a cutting arrangement, connected to the spout and arranged to puncture a membrane on the container as the spout is pivoted from its closed to its open position, characterised in that the closure further comprises bracing means, arranged to limit the deflection of the cutting arrangement when it first contacts the membrane.

[0009] The bracing means according to the invention increases the rigidity of the cutting arrangement, particularly at the point when it first makes contact with the barrier layer on the container. The bracing means may be provided as an integral part of the cutting arrangement, provided the integrated structure is adapted to pass over the sealing surface of the body and does not interfere with the support for the sealing surface on the body. However, in some closure designs, there is not sufficient clearance between the body sealing surface and the barrier over the container mouth to provide an integral bracing means without the risk that the bracing means will snag on the body sealing surface as the spout is pivoted.

[0010] In a preferred embodiment of the invention, the cutting arrangement comprises two barbs, connected on either side of the spout and displaced sufficiently to ensure that they do not foul the spout sealing skirt. The provision of two barbs ensures that the barrier layer is torn away in the region of the spout aperture, allowing satisfactory dispensing of the product. In this arrange-

ment, the bracing means is advantageously defined on the closure body and comprises a structure between the barbs, which is arranged to prevent the barbs being deflected towards each other when they first make contact with the barrier layer. Once the barbs have penetrated the barrier layer, they will then tend to hold their pitch and puncture the barrier satisfactorily.

[0011] The bracing means and sealing face on the closure body may be integrated. In this arrangement, a single structure defined on the closure body has a sealing face, positioned so that the sealing skirt on the spout can be pressed against it to provide the seal, and a flank portion which braces the two barbs of the cutting arrangement and prevents them being deflected as they pierce the barrier layer over a container mouth.

[0012] In a first arrangement the integrated sealing plate/bracing means may take the form of a thickened plate which extends from the sealing end of the spout when it is in its closed position to the point on the closure body which corresponds to the position between the barbs at the instant when they first contact the barrier layer. However, a disadvantage of this arrangement is that if the plate becomes too thick, this will cause sink marks on the top of the closure as the plate cools, the plate will take longer to cool increasing cycle times for the manufacture of the closure and material costs will be greater.

[0013] Alternatively, the support structure behind the sealing plate may be adapted to provide the bracing means for the barbs. Due to the forces acting on the sealing plate when the spout is in its closed position, support means, such as buttresses, for example, may be provided behind the sealing plate to support it and prevent it deflecting. The buttresses in turn may require at least one cross member to prevent them from distorting as they are ejected from the mould. It is therefore practical to adapt the buttress / cross member structure to brace the barbs at the instant when they first contact the barrier layer.

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

Fig.1 shows an external isometric view of a one-piece, pivotable spout, dispensing closure, according to both the prior art and the invention, with the spout in its open position.

Fig.2 shows a side cross section view of a first embodiment of the invention, with the spout in its closed position.

Fig.3 shows an internal view of the closure shown in Fig.2, looking from the base of the closure towards the top plate.

Fig.4 shows a side cross section view of the closure shown in Figs. 2 & 3, with the spout partially open, in a position where the cutting arrangement has just started to pierce the barrier layer on a container (not shown).

Fig.5 shows an internal view of the closure shown in Fig.4, looking from the base of the closure towards the top plate.

Fig.6 shows a side cross section view of the closure shown in Figs. 2 - 4, with the spout in its fully open position.

Fig.7 shows an internal view of the closure shown in Fig.6, looking from the base of the closure towards the top plate.

Fig.8 shows a side cross section view of a second embodiment of the invention, with the spout partially open.

Fig.9 shows an internal view of the closure shown in Fig.8, looking from the base of the closure towards the top plate.

Fig.10 shows a side section view of a third embodiment of the invention, with the spout partially open.

Fig.11 shows an internal view of the closure shown in Fig.10, looking from the base of the closure towards the top plate.

[0015] Referring to Fig.1, the present invention provides an improved barrier piercing arrangement for a one-piece dispensing closure 1 comprising a body 2, having an end plate 3 with a peripheral side wall 4 depending therefrom, and a spout 5, which is pivotable between open and closed positions about a main hinge axis 6. The spout 5 is joined to the remainder of the closure body 2 via a flexible membrane 7 which is adapted to invert as the spout 5 is opened. A recess 8 is provided in the side-wall 4 and is arranged to receive the spout 5 when it is in its closed position, thus allowing the spout 5 to lie flush with the end plate 3 of the closure. A latch arrangement 24 (shown in Figs. 2,4 and 6) may be provided on the side-wall of the recess 8, to hold the spout 5 in its closed position.

[0016] Referring to Figs.2 and 3, the spout 5 has a dispensing aperture 51 at one end (distant from the main hinge axis 6) and a sealing skirt 52 at the other end (adjacent to the main hinge axis 6). A sealing plate 21 is defined on the body 2 and is arranged to provide a surface against which the sealing skirt 52 abuts when the spout 5 is in its closed position, forming a fluid tight seal. The sealing plate 21 is supported by two buttresses 25 which take the form of ribs, moulded on the underside of the top plate 3 of the closure. Two barbs 53 are provided attached to either side of the spout 5, adjacent to the sealing skirt 52. When the spout 5 is in its closed position, the flexible membrane 7 takes up a folded configuration and the barbs 53 lie parallel to the end plate 3 of the closure. A bracing plate 22 is also defined on the closure body 2, between the two barbs 53. Clearance is provided between the bracing plate 22 and the barbs 53 so that the barbs 53 can move past the bracing plate 22 as the spout is pivoted towards its open position. Finally, a cover 23 extends from the side-wall 4 of the body 2 to cover the dispensing aperture 51 in the spout 5 before first opening of the closure. The cover 23

is connected to the body 2 via a line of weakening 54, so that it can be torn away by a user to allow the spout 5 to be opened for the first time. Thus, the cover 23 acts both as a dust cover to prevent the ingress of dirt into the spout 5 and as a tamper evidence feature, to indicate if the spout has been opened.

[0017] As the spout 5 is pivoted towards its open position, the barbs 53 swing towards the interior of the container past the bracing plate 22 and the sealing arrangement (52,21) (as shown in Figs. 4 & 5). The bracing plate 22 is arranged so that it is interposed between the two barbs 53 when they first contact the membrane over the container mouth (not shown).

[0018] Referring to Figs. 6 & 7 (as the spout 6 moves to its open position,) the barbs 53 swing through approximately 90°, cutting the membrane over the mouth of the container. When the spout 5 is in its open position, the flexible membrane 7 is in its inverted configuration, the barbs 53 point towards the interior of the container and the dispensing passageway 55 in the spout 5 makes a fluid connection with the inside of the container.

[0019] When the spout 5 is returned to its closed position, it latches under the latch member 24, the sealing skirt 52 forms a fluid tight seal against the sealing plate 21 and the barbs 53 return to their position parallel to the closure end plate 3.

[0020] Figs. 8 & 9 show a closure according to a second embodiment of the invention, having a bracing means formed integrally with the cutting arrangement. Where possible, like components have been given the same reference numerals as those in Figs. 1 to 7. The cutting arrangement comprises two barbs 53, which are connected to the spout 5 adjacent to the sealing skirt 52, as previously described. A bracing spar 55 is connected between the two barbs 53 to prevent them deflecting towards one another as they start to pierce the barrier layer on the container (not shown). The spar 55 is arranged to lie over the buttresses 25 supporting the closure sealing plate 21, when the spout is in its closed position, allowing the barbs 53 to take up a position parallel to the closure end plate 3. Furthermore, the spar 55 is adapted to pass over the sealing plate 21, ensuring that it does not snag on the sealing plate 21 when the spout is opened and closed.

[0021] Figs. 10 & 11 show a closure according to a third embodiment of the invention, having a bracing means defined on the closure body, the bracing means adapted to provide the sealing surface against which the spout seals in its closed position. Again, like components have been given the same reference numerals as those in the earlier figures. In this embodiment of the invention, the sealing surface 21 and bracing means 22 are integrated in a single structure. The bracing means 22 projects from the closure body 2 and is arranged between the barbs 53, ensuring that there is sufficient clearance between the barbs 53 and the bracing means 22, for the barbs 53 to pass the latter as the spout 5 is pivoted between its open and closed positions. The face

of the bracing means 22, facing the sealing skirt 52 when the spout is in its closed position, is arranged to provide the sealing surface 21, against which the sealing skirt 52 seals.

[0022] It will be apparent to those skilled in the art that numerous configurations of the sealing arrangement, cutting arrangement and bracing means are possible within the scope of the present invention.

Claims

1. A dispensing closure comprising

- a rigid body defining a sealing surface and having a peripheral side-wall adapted to co-operate with the neck of a container,
- a rigid spout defining a dispensing passageway and pivotable on the body between open and closed positions, the spout having a first, dispensing end and a second end having a sealing skirt arranged to provide a fluid tight seal against the sealing surface of the body,
- a flexible diaphragm connected between the second end of the spout and the body, the diaphragm arranged to have a concave configuration when the spout is in its closed position and to invert when the spout is pivoted to its open position, and
- a cutting arrangement, connected to the spout and arranged to puncture a membrane on the container as the spout is pivoted from its closed to its open position, characterised in that the closure further comprises bracing means, arranged to limit the deflection of the cutting arrangement when it first contacts the membrane.

2. A dispensing closure according to claim 1, wherein the cutting arrangement comprises two barbs, arranged on either side of the spout.

3. A dispensing closure according to claim 2, wherein the bracing means is connected between the two barbs and pivots with the barbs and the spout.

4. A dispensing closure according to claim 2, wherein the bracing means is defined on the closure body and is adapted to prevent the barbs being deflected as they move past it.

5. A dispensing closure according to claim 4, wherein the bracing means defines the sealing surface on the closure body.

6. A dispensing closure according to claim 4, wherein the sealing surface is provided with support means defined on the closure body and the support means

are arranged to prevent the barbs being deflected when they first contact the membrane.

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Fig.1.

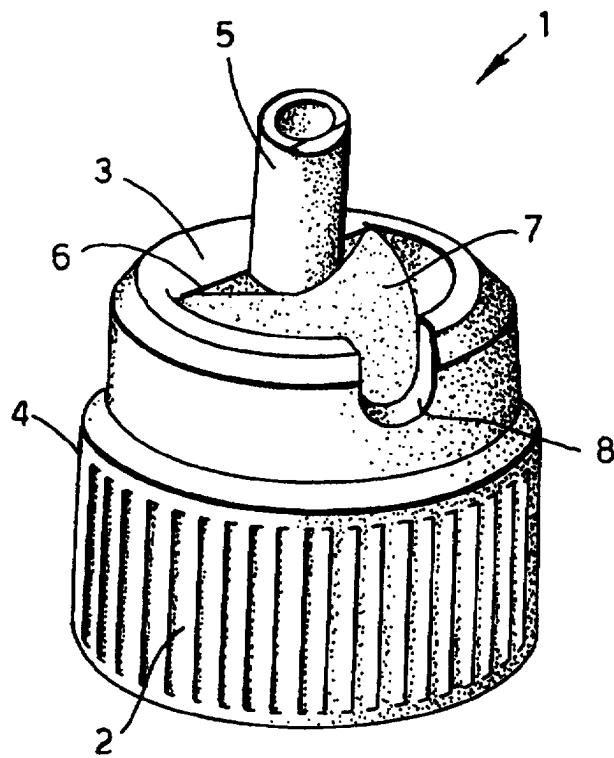


Fig.2.

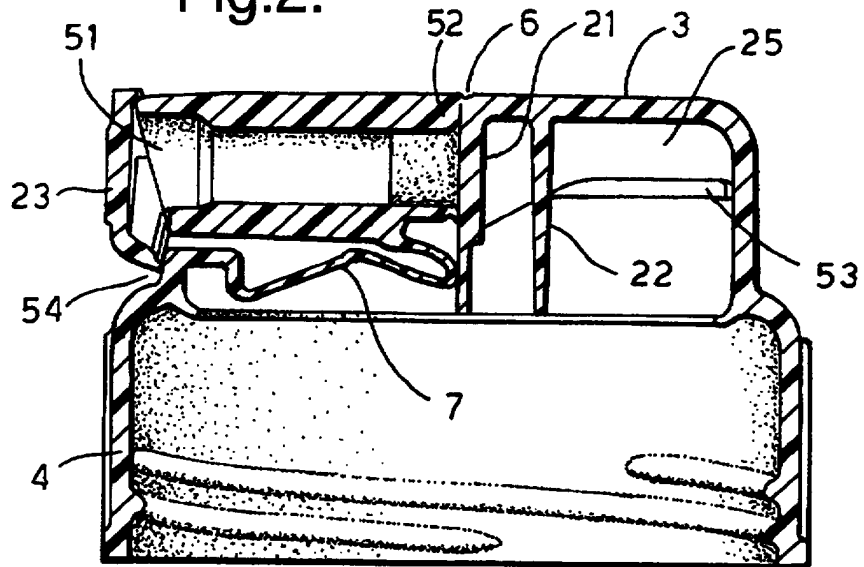
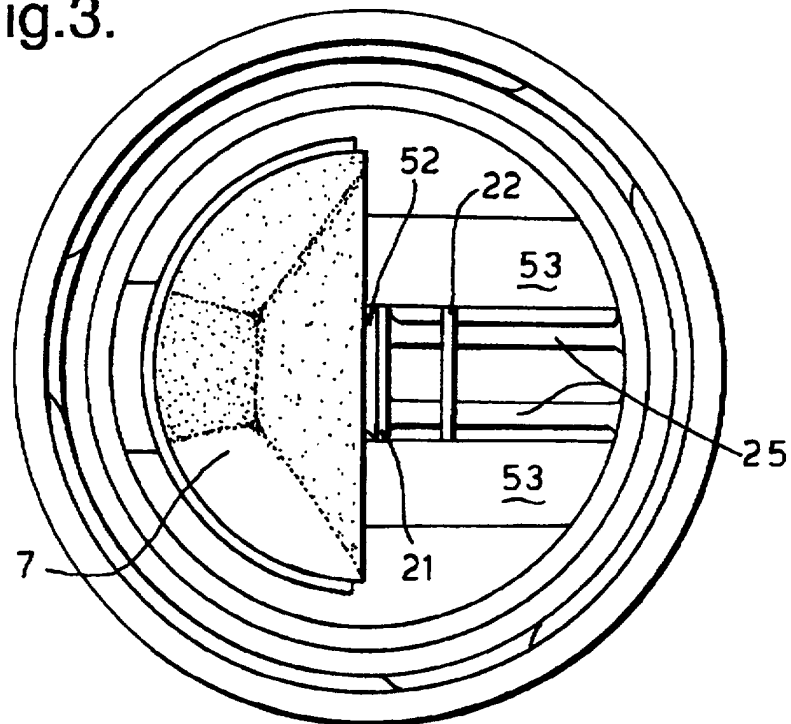


Fig.3.



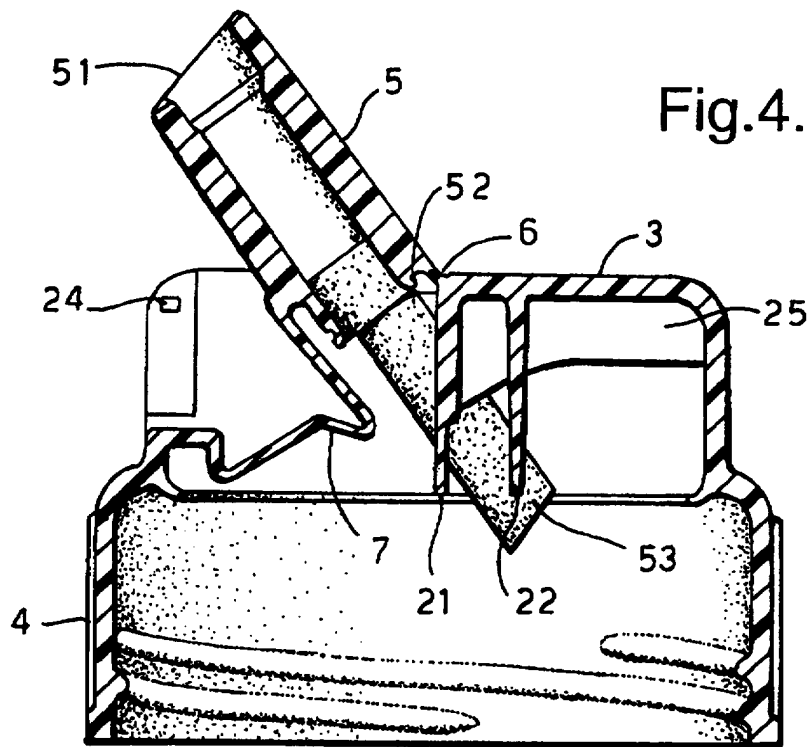


Fig.5.

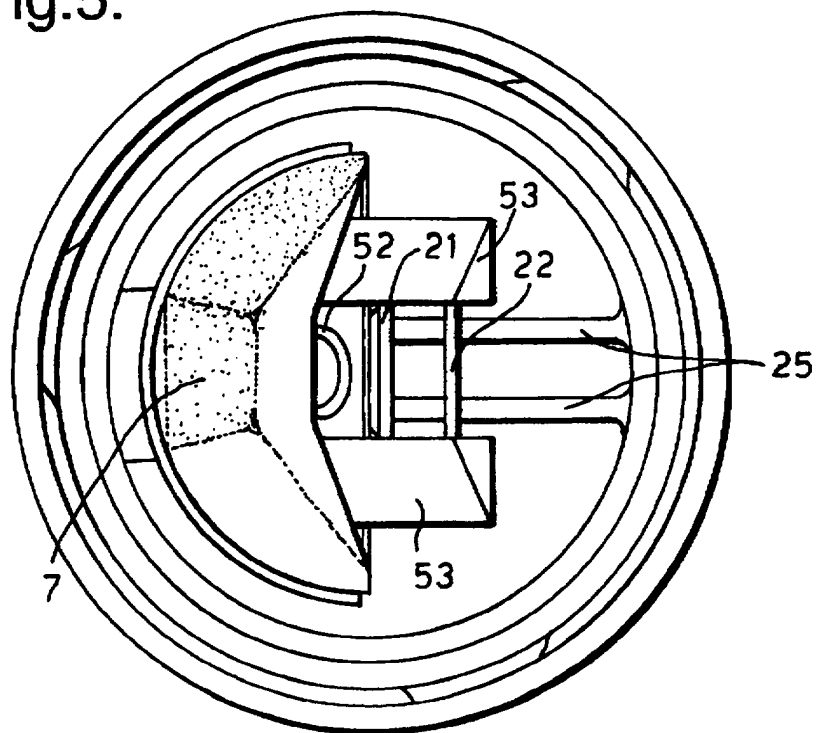


Fig.6.

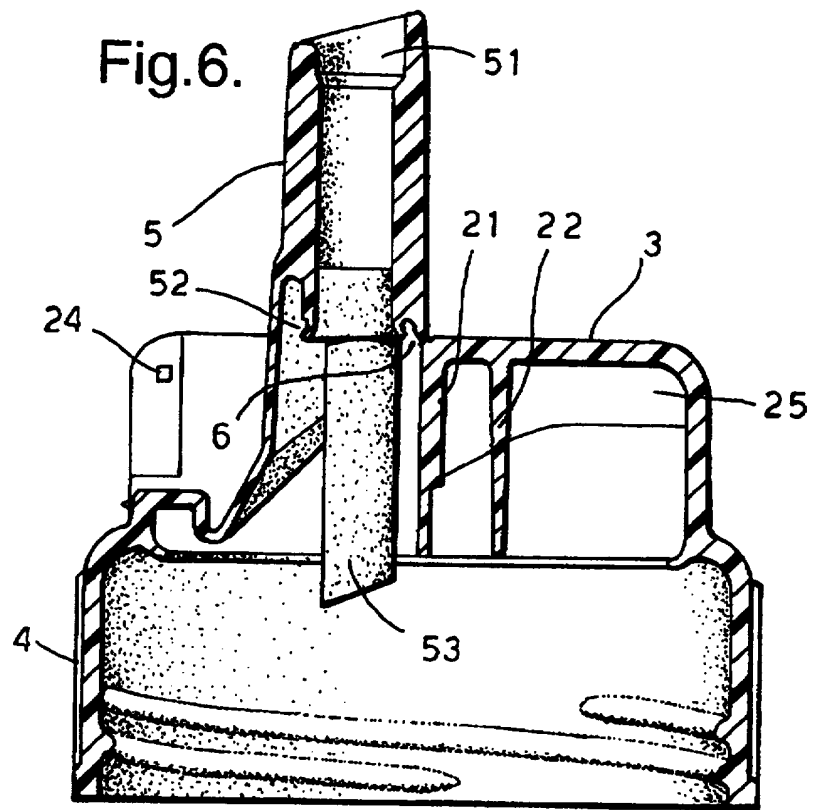
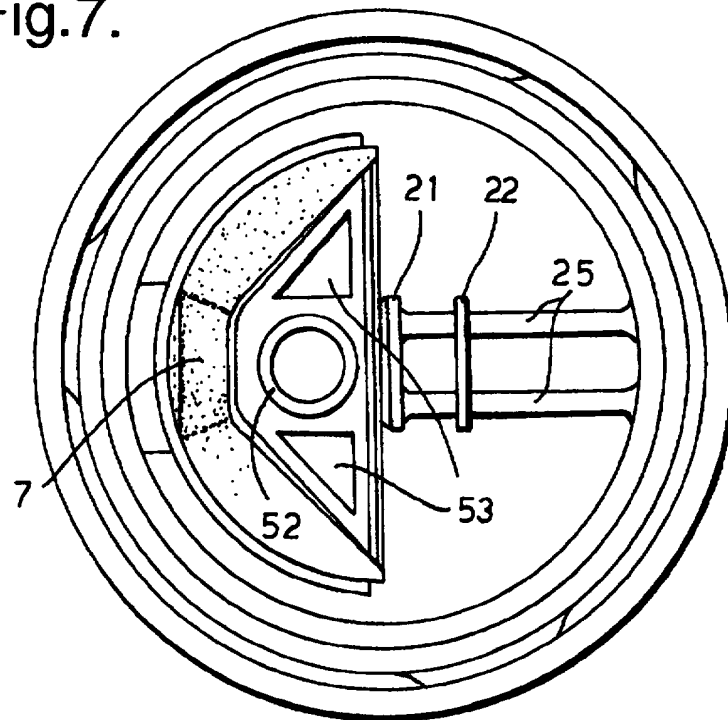
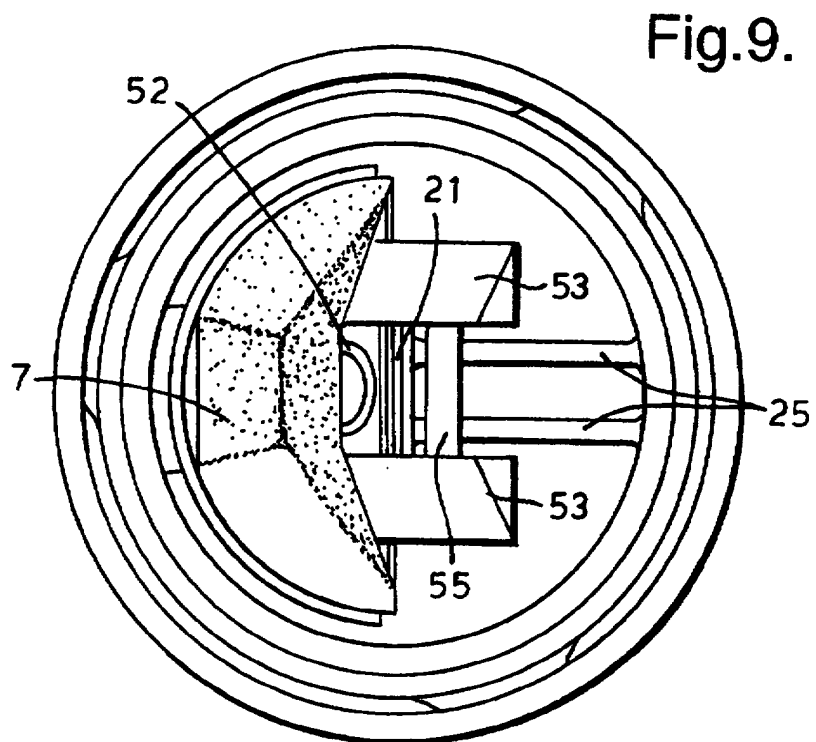
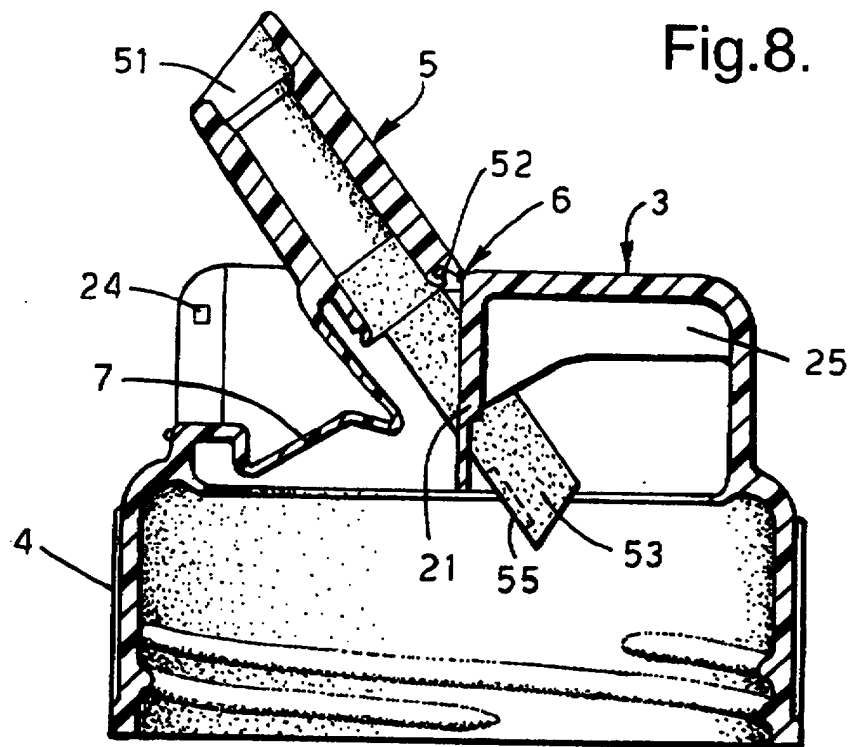


Fig.7.





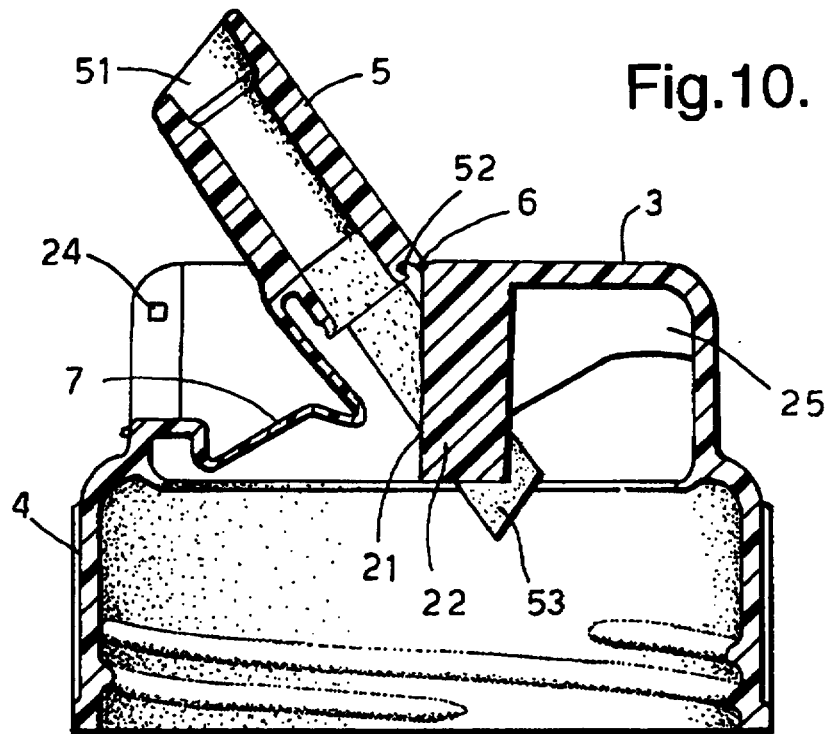
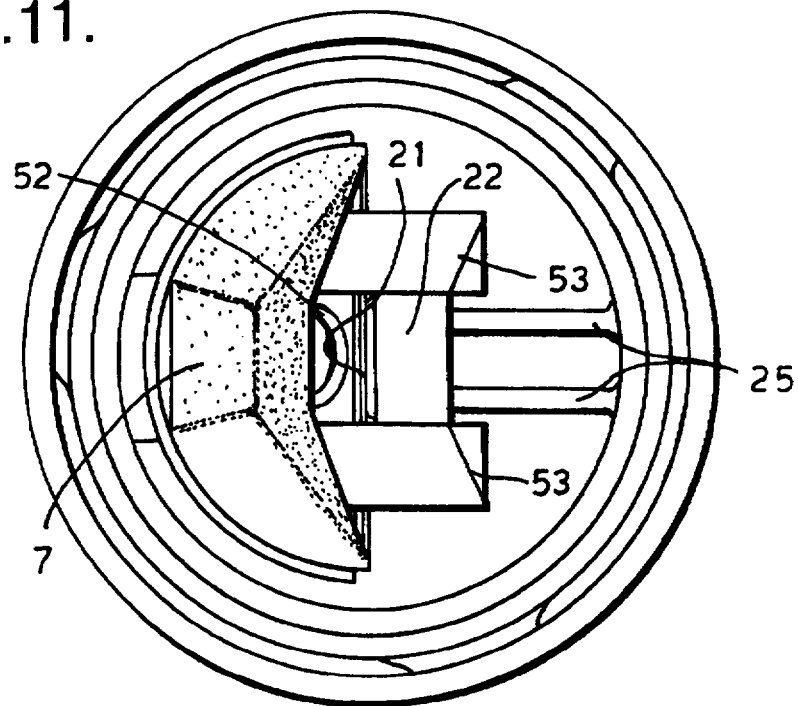


Fig.11.





European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 00 30 1245

| 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.7) |
| A | EP 0 957 035 A (PROCTER & GAMBLE) 17 November 1999 (1999-11-17) * column 2, line 49 - line 56; figures 1-7 * | 1 | B65D47/06 |
| A | US 5 884 793 A (WANG WEN-PIN) 23 March 1999 (1999-03-23) * column 2, line 15 - line 36; figures 1-5 * | 1 | |
| A | US 5 393 968 A (WATANABE MITSUO ET AL) 28 February 1995 (1995-02-28) * column 7, line 46 - line 55; figures 1-25 * | 1 | |
| A | FR 1 185 244 A (RAPEAUD) 31 July 1959 (1959-07-31) * page 1, right-hand column, line 21 - line 31; figures 1-6 * | 1 | |
| | | | 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 | | 8 June 2000 | Fournier, J |
| 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 | | | |

EPO FORM 1503 03.82 (P04C01)

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

EP 00 30 1245

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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