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11759/101A

PATENT

Declaration in Support of an Application for a Patent

*Strike out for
non-convention

In support of the *Convention** application made for a ~~patent~~
~~patent of addition~~ for an invention entitled
DISPENSING CLOSURE

Insert full
name and address
of declarant

K. We, Robert J. Bolen, Jr. of 10 Gwynn Court, Closter, New Jersey 07624,
XX United States of America and Thomas R. Bolen of 64 Wheeler Avenue,
Westwood, New Jersey, 07675, United States of America
do solemnly and sincerely declare as follows:

- ~~I am~~
We are the applicant(s) for the ~~patent~~
~~patent of addition~~
(or in the case of an application by a body corporate)
- ~~I am authorised by~~
~~the applicant for the~~ ~~patent~~
~~patent of addition~~ to make this declaration on its behalf.
- The basic application(s) as defined by section 141 of the Act ~~is~~
~~are~~

Strike out Para. 2
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Filing Date	Country	Applicant(s)
1 July 1988	U.S.A.	Robert J. Bolen, Jr and Thomas R. Bolen

Insert details
for the/or EACH
basic application

Strike out Para. 3
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- The basic application(s) referred to in this Declaration ~~was~~
~~were~~ the first application(s) made in a
Convention country in respect of the invention the subject of the application.
- ~~I am~~
We are the actual inventor(s) of the invention.
(or, where a person other than the inventor is the applicant:)

Insert full
name(s) and
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inventor(s)

~~4.~~
~~of~~
~~is~~
~~are~~ the actual inventor(s) of the invention and the facts upon which the applicant is entitled to make the
application are as follows:

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No Legalization
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DECLARED AT *Closter 10 Gwynn Court 07624*
this *5* day of *March* 19*90*
Declared at: *Closter 10 Gwynn Court 07624*
this *5* day of *March* 1990
Signature of Declarant
Signature of Declarant

To: The Commissioner of Patents.

(12) PATENT ABRIDGMENT (11) Document No. AU-B-38613/89
(19) AUSTRALIAN PATENT OFFICE (10) Acceptance No. 632053

(54) Title
DISPENSING CLOSURE

International Patent Classification(s)
(51)⁴ **B65D 047/08 B65D 047/04**

(21) Application No. : **38613/89**

(22) Application Date : **28.06.89**

(87) PCT Publication Number : **WO90/00140**

(30) Priority Data

(31) Number	(32) Date	(33) Country
214676	01.07.88	US UNITED STATES OF AMERICA

(43) Publication Date : **23.01.90**

(44) Publication Date of Accepted Application : **17.12.92**

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(56) Prior Art Documents
AU 29481/84 B65D 41/18
US 43999

(57) Claim

1. A two-piece dispensing closure for a container, said closure including: a generally circular base having a cover portion and a skirt depending downwardly from said cover portion, said cover portion having a generally open, smooth, semi-circular forward front section extending fully across said cover portion and an elevated rear land contiguous with and disposed above said generally semi-circular front section, a dispensing orifice in said generally semi-circular forward top surface of said cover portion, said dispensing orifice having a rim wherein said generally semi-circular forward front section does not extend above said rim; and a lid having a plug on its underside for sealing said dispensing orifice, wherein said elevated rear land has a pivot recess for pivotally receiving said lid, said pivot recess being disposed to align said plug with said dispensing orifice and thereby allow mating of said plug and orifice when said lid is in the closed position.

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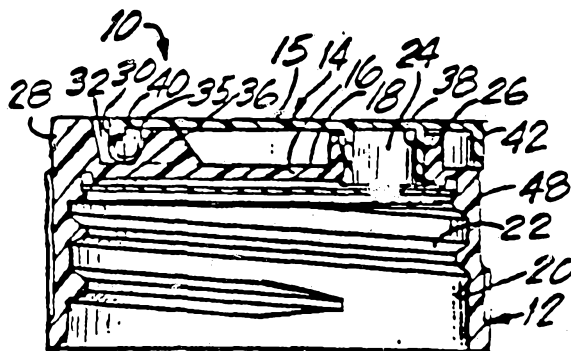
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**ANNOUNCEMENT OF THE LATER PUBLICATION OF AMENDED CLAIMS
(AND, WHERE APPLICABLE, STATEMENT UNDER ARTICLE 19)**

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁵ : B65D 47/08, 47/04	A1	(11) International Publication Number: WO 90/00140 (43) International Publication Date: 11 January 1990 (11.01.90)
(21) International Application Number: PCT/US89/02822 (22) International Filing Date: 28 June 1989 (28.06.89) (30) Priority data: 214,676 1 July 1988 (01.07.88) US (71)(72) Applicants and Inventors: BOLEN, Robert, J., Jr. [US/US]; 10 Gwynn Court, Closter, NJ 07624 (US). BOLEN, Thomas, R. [US/US]; 6421 Wheeler Avenue, Westwood, NJ 07675 (US). (74) Agent: SKLAR, Brandon, N.; Davis, Hoxie, Faithfull & Hapgood, 45 Rockefeller Plaza, New York, NY 10111 (US). (81) Designated States: AT (European patent), AU, BE (European patent), BR, CH (European patent), DE (European patent), DK, FI, FR (European patent), GB (European patent), IT (European patent), JP, KR, LU (European patent).		632053 NL (European patent), NO, SE (European patent). Published <i>With international search report</i> <i>With amended claims.</i> Date of publication of the amended claims: 25 January 1990 (25.01.90)

(54) Title: DISPENSING CLOSURE



(57) Abstract

A two piece dispensing closure for a container having an internally threaded base (12) with a dispensing orifice (24) in the front section and an elevated rear land (28) that has a pivot recess (39) adapted to receive a separate lid (14) that rotates at least 90° from the closed position. The front section of the lid is generally circular with a pivot post (40) at its rear, and when closed the upper surfaces of the lid and base are coplanar, and the closure has the appearance of a conventional screw cap.

-1-

DISPENSING CLOSURE

BACKGROUND OF THE INVENTION

5 The present invention relates generally to a dispensing closure for containers and more particularly to a two piece dispensing closure, wherein a hinged lid is moved from a base of the closure to uncover an orifice through which the container contents are dispensed. This type of closure is made from molded plastic and used extensively in dispensing food products, such as salad dressings, and for personal care and household
10 products.

15 The typical dispensing closure for a container comprises a generally circular base with a dispensing orifice in the front section of the upper surface and an annular skirt depending downwardly from the upper surface that is adapted to engage and secure the base to the container, usually by means of internal threads that are screwed onto the neck of the container. A lid having a plug on its underside for sealing the dispensing orifice is adapted to be pivotally moved

-2-

with respect to the base to be opened and closed by the pressure of the finger or thumb.

5 In many instances the base and lid of the closure are molded as a single unit, the lid being connected to the base by a flexible hinge, which is known in the industry as a "living hinge". A disadvantage of the "living hinge" is that the hinge portion of the closure has a tendency to crack, and eventually break, separating the lid from the base. Also, when the lid 10 is rotated from the open position, it reaches a point from which it tends to snap rapidly to the closed position, and can splash liquid product, or even catapult one or more drops toward the user's face or clothing, thus presenting some danger if the product 15 is an irritant.

Moreover, in the "living hinge" design, at least a portion of the hinge necessarily extends beyond the circumferential periphery of the closure of the rear of the base and creates problems during the assembly 20 line filling of the container in that such an eccentric shape is subject to bumping and breakage, and can interfere with the highly automated equipment used during assembly of the closure and container of the product to be marketed.

25 The "living hinge" design has been replaced to some extent by a dispensing closure design where the base has a notch located at the approximate center of

-3-

top, and a relatively narrow rectangular channel extends from the notch to the front edge of the base with a dispensing orifice positioned in the channel proximate the front edge. A lid having a generally flat upper surface which terminates in a downwardly depending flange and indented end pieces is adapted to be received in a snap-fit into the notch, and when rotated to the closed position, lies entirely within the channel. The underside of the lid has an annular plug which mates with, and seals the orifice. The lid is maintained in the open position by means of an interference fit between the bottom edge of the flange and lugs located at the forward edge of the bottom of the notch where it intersects the rear of the channel. The lid is maintained in the notch in the open position by contact between a groove in the leading edge of the flange and a tab protruding upwardly from the intersection of the front wall and bottom of the notch.

Another type of dispensing closure has been developed where the base and a dispensing nozzle, or spout, comprise two separate components that are interconnected through a modified ball and socket joint, or protruding pin or post from one component mating with a corresponding recess in the other component to form a pin/recess hinge structure between the two components. In one form of the pin/recess

-4-

hinge design, the outer surface of the base of the closure has a notch formed therein, said notch being shaped to receive one end of a hollow dispensing type nozzle of ^{the} lid which has a passageway for the liquid product. In the fully open position the nozzle communicates with the inside of the container by means of an orifice through the base located in the bottom of the notch. The nozzle end portion mates in a modified ball and socket configuration when press fit into the notch in the base. This latter ball and socket hinge design further relies upon a key-slot configuration in the notch of the base and the portion of the dispensing nozzle to be disposed within the notch, respectively, to limit the open position of the dispensing nozzle type lid, as well as interfering projections on the forward face of the notch and on the portion of the nozzle disposed within the notch to maintain the nozzle in an open position during the dispensing of product from the container. The interference fit yields to finger pressure to move the nozzle through the interference fit and return the lid to a closed position on the base of the closure.

In another form of two piece dispensing closure, the lid is circular and the end of the lid opposite the orifice contains two slots which mate with two posts extending upwardly from the surface of the base



-5-

of the circular closure at its periphery. In this slot and post design, the posts are flexible and exposed, and are therefore subject to damage during handling of the closure or container. In addition, 5 the lid is insecurely held in place, is subject to twisting and lateral movement, and is easily pulled from the posts when the lid is in the open position.

The closure of this invention is an improvement over these prior art closures.

~~10 It is a principal object of the invention to provide a two piece dispensing closure which has a hinge structure that provides a smooth peripheral symmetry, a planar top, and one which is less susceptible to damage than existing dispensing~~
15 ~~closures.~~

A further object to the present invention is the provision of a two piece dispensing closure which is simple in construction, pleasing in appearance and capable of a long, useful service life.

20 It is another object of the invention to provide a container closure in which the lid will remain in the open position and resist closing even when the container is inverted and vigorously shaken.

25 Another object of the invention is to provide a dispensing closure with a lid that remains in a stable working position without cracking or separating from the base.



In accordance with the present invention, therefore, there is provided a two-piece dispensing closure for a container, said closure including: a generally circular base having a cover portion and a skirt depending downwardly from said cover portion, said cover portion having a generally open, smooth, semi-circular forward front section extending fully across said cover portion and an elevated rear land contiguous with and disposed above said generally semi-circular front section, a dispensing orifice in said generally semi-circular forward top surface of said cover portion, said dispensing orifice having a rim wherein said generally semi-circular forward front section does not extend above said rim; and a lid having a plug on its underside for sealing said dispensing orifice, wherein said elevated rear land has a pivot recess for pivotally receiving said lid, said pivot recess being disposed to align said plug with said dispensing orifice and thereby allow mating of said plug and orifice when said lid is in the closed position.

In one preferred embodiment, the pivot recess in the elevated rear land portion of the base and the pivot post of the lid are configured to provide an interference fit between the rear wall of the recess and the pivot post of the lid as the lid is rotated to the open position.

Further, the plug on the lid preferably has means for securing the lid to the dispensing orifice in the base when it is pressed firmly into the closed position.

The closure can be moulded from any of a variety of resilient polymeric materials well known to those in the art, including polypropylene, polyethylene and polyvinylchloride and copolymers and blends of said polymers.



In order that the invention may be more clearly understood and put into practical effect there shall now be described in detail preferred embodiments of a two-piece dispensing closure for a container in accordance with the invention. The ensuing description is given by way of non-limitative example only and is with
5 reference to the accompanying drawings.

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-8-

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be best understood by reference to one of its structural forms, as illustrated by the accompanying drawings, in which:

5 FIG. 1 is a front elevational view of a two piece dispensing closure embodying the features of the present invention;

 FIG. 2 is a left hand elevational view of the closure;

10 FIG. 3 is a plan view of the closure, with cut-away sections;

 FIG. 4 is a vertical cross-sectional view of the closure taken along line IV-IV of FIG. 3, and looking in the direction of the arrows;

15 FIG. 5 is a front elevational view of the closure with the lid in the open portion;

 FIG. 6 is a vertical cross-sectional view similar to FIG. 4, and showing the lid in the open position;

20 FIG. 6A is an enlarged sectional view of the hinge portion of the closure of FIG. 6; and

 FIG. 6B is an enlarged sectional similar to FIG. 6A, illustrating a different embodiment of the lid.

25 FIG. 7 is a vertical cross-sectional view of the closure taken along the line VII-VII of FIG. 3, and looking in the direction of the arrows.

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-20-DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings, the two piece dispensing closure of the present invention is generally indicated by reference numeral 10 and comprises a base which is generally indicated by the reference numeral 12 and a lid which is generally indicated by the reference numeral 14. The base 12 includes a circular cover portion 16 which has a top or semi-circular forward front section surface 18 and an annular skirt, or side wall, 20 which is provided with internal threads 22 to enable the cap to be threaded onto the threaded neck of a container.

Other means of affixing the closure to a container may be employed. Such means are well known to those skilled in the art. The cover portion 16 of the base 12 has dispensing orifice 24 having an upstanding annular rim 26.

The cover portion 16 has an elevated rear land section 28 extending upwardly on the side of the cover portion 16, ^{opposite} ~~disposed over~~ the dispensing orifice 24. The land portion 28 has a substantially rectangular pivot recess ³⁰ ~~39~~. The pivot recess 30 is defined by a pair of vertical side walls 32, each wall 32 having a circular indent 34, a rear wall 31, and an outwardly sloping front wall 35 forming a



¹⁰
-21-

portion of a ridge 36. The height of the ridge 36 is slightly less than the height of the elevated rear section 28 in order to accommodate the thickness of the lid, as described in detail below, to provide a
5 uniformly flat upper surface to the closure when the lid is in the closed position.

The lid 14 has a top portion 15 and a skirt portion 42 that is best shown in Figs. 5 & 6. The skirt portion closes down on the periphery of the
10 base 12 when the lid 14 is in the closed position. The lid 14 is further provided with an annular plug 38 which extends downwardly from the bottom surface of the lid so that it mates with and seals the orifice
15 FIG. 4. The end of plug 38 is preferably provided with a bead, or flange, 39 that provides a secure interference fit with the narrowed throat²⁵~~41~~ as it is pressed into orifice 24.

At the opposite end of the lid, pivot post 40 is
20 dimensioned so as to be securely received in recess 30, and terminates in an end portion which has side

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-22-

one or both of the indents are on the pivot post of the lid. This configuration enables the lid 14 to be pivoted from a closed position as shown in FIG. 4, in which the lid is flush with the top surface^{18a of the rear land 28} and

5 the orifice 24 is sealed by the plug 38, to an open position shown in FIG. 6, in which the lid is at least 90° from the position shown in FIG. 4. When the lid 14 is in the closed position as shown in FIG. 4, the top surfaces of the lid 14, including the pivot post 10 40, and the elevated section 28, all lie in the same horizontal plane. In addition, the configuration also provides the means for securely holding the cap in the base.

When the lid is in closed position, the skirt of 15 the lid continues the line of the side wall of the elevated rear section, or land, to give the appearance of a continuous vertical wall to the closure. The longitudinal and vertical continuity of the closure thus provides an aesthetically pleasing appearance, 20 and to some degree provides a child-resistant safety feature in that the means of gaining entry to the

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-13-

substantial height may be used. It is desirable to have the rim defining the pour orifice of substantial height to permit cleaner dispensing that is less prone to dripping. Also, the hinge elements of the closure are well protected within the confines of the recess 30, and the underside of the base is planar.

An important aspect of the structure of the closure of the subject invention resides in the hinge interconnection of the lid 14 and the base 12 at recess 30. It is desirable that the rear wall 31 of the recess 30 be substantially flat so as to provide a surface against which the upper surface of the pivot post 40 may abut in the open position. This abutment, together with the stable frictional interfit of the projections and indents of the hinge, provides a rigid mounting that is substantially aided in retaining its lateral stability due to inability of the side walls of the recess to move away from the mating side walls of the pivot post. This interfit stability is far superior to the relatively unstable interfit between the posts and lid of the prior art in which the open lid can easily be separated from the base.

In a preferred embodiment of the invention mostly clearly shown in the detail of FIG. 6A, the lower terminus of pivot post 40 is generally circular in cross section, with a tangential surface intersecting



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~~-14-~~

the upper surface of the pivot at essentially a right angle along edge ⁴³~~51~~. As the lid is rotated from the closed position, edge ⁴³~~51~~ of the pivot post 40 contacts the rear wall 31 in an interference fit and then

5 again freely rotates to the fully open position. This interference fit prevents the open lid from closing unless a slight finger pressure is applied. This feature is most desirable when dispensing products from the container with an accompanying

10 shaking motion, which would otherwise tend to move the lid to a closed position. If this occurred during dispensing so as to interfere with the flow path of the product, the undesired consequences are obvious - the product would likely be directed to the user

15 rather than the zone of desired impingement. This means for retaining the lid in the open position also eliminates the potential for splashing which can occur with the spring action "living hinge" of the prior one-piece closures which snap to a closed

20 position. This interference fit is thus accomplished in general by employing an eccentric-concentric design for the rear wall of the recess and pivot post end.

Also as best illustrated in FIG. 6A, the rear wall 31 is inclined from the vertical toward the rear

25 of the base to permit the cap to be opened more than 90° from the closed position. As will be apparent to those skilled in the art the extent of the incline of



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-25-

the rear wall 31 can be from a few degrees up to 45°, depending upon the geometry of the recess, the relative position of the pivot post in the recess, and the maximum angle desired between the lid and the upper surface of the base. In general, it is desirable from the stand point of utility, as well as ease of molding of the base part, that the rear wall 31 make an angle of at least 90° with the base, and most preferably, an angle of from 100° to 120° with the base.

FIG. 6B illustrates another modification of the pivot post in which the rear edge⁴³~~51~~ of the lid is rounded, so that there is no interference fit with the rear wall 31 as the lid is raised and lowered.

In the configuration of FIG. 6B, the lid is maintained in the open position by virtue of the frictional fit of the ends of the pivot post in the recess.

As will also be appreciated by one skilled in the art the configurations of the recess and pivot post can be modified in various ways to produce the functionally equivalent relationship with the base of the closure. Thus, the pivot post can take the configuration which more nearly resembles a conventional ball joint and the recess likewise modified to the shape of a socket adapted to receive the ball. Other configurations known in the art can be adapted to configure the downwardly depending



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~~26~~

extension 40 from the rear of the generally circular front section 15 of the lid 14 to mate with the pivot recess 30 in a hinge relationship which has a center of rotation located within the recess.

5 As will be apparent from the drawings, the axis of rotation of the lid is along a chord, or line, which is perpendicular to the diameter passing through the center of the dispensing orifice. Further, the axis of the recess is displaced on the opposite side
10 of a diameter drawn between the recess and the dispensing orifice. In a preferred embodiment, the length of the recess along the axis of rotation is approximately one-third to one-half the diameter of the closure and it is located at a distance of
15 approximately two-thirds to three-quarters of the diameter from the front skirt or wall of the closure nearest the dispensing orifice.

 The configuration of the abutting wall is not critical, and as shown in FIG. 6A, is inclined from
20 the vertical toward the rear, which provides an aesthetically pleasing appearance and facilitates removal of the base from the mold.

 In addition, the base skirt 20 is provided with knurling to facilitate removal, and the upper surfaces
25 of the base and lid can be embossed during molding with decorative designs, the brand name of the product and instructions for use.



16
-27-

Although the closure is illustrated with internal threads, other means such as bayonet lugs and channels, or a snap-fit bead and recess, can be employed to secure the closure to the container.

5 The configuration of the closure with the elevated rear land with the pivot recess disposed therein permits an inner safety seal to be installed on the container in contact with the underside of the base. Typically, the circular foil and polyethylene seal is
10 placed inside the closure base, which is then screwed onto the container and then treated ultrasonically to melt and fuse the seal to the upper rim of the container. In closures wherein the hinge structure extends beneath the underside of the cover portion,
15 the placement of an inner seal on the container is foreclosed. Moreover, disposing the hinge structure of the closure out of contact with the container contents avoids potential product contamination.

Referring particularly to FIGS. 1 and 4, the
20 front of the annular skirt 20 is provided with a recess 48 at the juncture of the base skirt 20, and the upper surface 16. The downwardly extending lid skirt 42 overhangs the annular side wall 20 above the recess 48, as shown in FIG. 4, to facilitate raising
25 of the lid 14 by the user's finger or fingernail.

It is obvious that minor changes may be made in the form and construction of the invention without



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~~18~~

departing from the material spirit thereof. It is not, however, desired to confine the invention to the exact form herein shown and described, but it is desired to include all such as properly come within the scope claimed.

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The invention having been thus described, what is claimed as new and desired to secure by Letters Patent is:



The claims defining the invention are as follows:-

1. A two-piece dispensing closure for a container, said closure including: a generally circular base having a cover portion and a skirt depending downwardly from said cover portion, said cover portion having a generally open, smooth, semi-circular forward front section extending fully across said cover portion and an elevated rear land contiguous with and disposed above said generally semi-circular front section, a dispensing orifice in said generally semi-circular forward top surface of said cover portion, said dispensing orifice having a rim wherein said generally semi-circular forward front section does not extend above said rim; and a lid having a plug on its underside for sealing said dispensing orifice, wherein said elevated rear land has a pivot recess for pivotally receiving said lid, said pivot recess being disposed to align said plug with said dispensing orifice and thereby allow mating of said plug and orifice when said lid is in the closed position.

2. The dispensing closure of claim 1, wherein the dispensing orifice is defined by a portion extending from and above said forward front section, said dispensing orifice extending through said portion.

3. The dispensing closure of claim 1 or claim 2, wherein said lid further includes a rearwardly extending, downwardly depending pivot post adapted to frictionally engage said pivot recess.

4. The dispensing closure of claim 3, wherein said pivot recess includes two side walls and a rear wall.



5. The dispensing closure of any one of claims 1 to 4, wherein said lid has a generally circular forward section.

6. The dispensing closure of any one of claims 1 to 5, wherein said elevated land surrounds said pivot recess.

5 7. The dispensing closure of any one of claims 4 to 6, wherein said pivot recess further includes a front wall.

8. The dispensing closure of any one of claims 3 to 7, wherein said pivot post has opposite vertical side surfaces which engage the side surfaces of said recess.

9. The dispensing closure of any one of claims 3 to 8, wherein said pivot post is engaged by means of rounded projections, and where each side wall of said recess has a complementary rounded mating indentation.

10. The dispensing closure of any one of the preceding claims, wherein the upper surface of said elevated land is joined to said base by an abutting wall.

11. The dispensing closure of claim 10, wherein said abutting wall is continuous across said base member.

12. The dispensing closure of claim 11, wherein said abutting wall is continuous across said base and forms a front wall of said pivot recess.

13. The dispensing closure of any one of claims 10 to 12, wherein said abutting wall lies on the opposite side of a diameter of said lid from the dispensing orifice.

20 14. The dispensing closure of claim 13, wherein said lid has a front edge and said abutting wall is approximately three-quarters of the diameter from said front edge of said lid.

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15. The dispensing closure of any one of the preceding claims, wherein said lid further includes a downwardly depending skirt which extends from proximate said elevated land when said lid is closed and encloses an area under a front section of said closed lid.

5 16. The dispensing closure of claim 15, wherein said downwardly depending skirt of said lid has a recess in its outer surface at the front section of said lid and said depending skirt of said lid overhangs the lid side wall above said recess.

17. The dispensing closure of any one of the preceding claims, wherein said pivot recess is centred about a diameter passing through said dispensing orifice.

10 18. The dispensing closure of any one of claims 10 to 17, wherein said pivot recess is generally rectilinear and the axis of rotation is parallel to said abutting wall.

15 19. The dispensing closure of claim 18, wherein the length of said pivot recess along said axis of rotation is from one-third to one-half of the diameter of said closure.

20 20. The dispensing closure of any one of the preceding claims, wherein the interior surfaces of said pivot recess are generally planar.

21. The dispensing closure of any one of claims 3 to 20, wherein said pivot post extends below the underside of a front section of said lid.

20 22. The dispensing closure of any one of claims 3 to 21, wherein said pivot recess has side walls adapted to securely engage the facing adjacent surfaces of said pivot post in a frictional fit sufficient to maintain said lid in an open position.



23. The dispensing closure of any one of claims 4 to 22, wherein said rear wall of said pivot recess is at an angle of from 90° to 135° to the forward front section of said base.

24. The dispensing closure of claim 23, wherein the angle of said rear wall is approximately 110°.

25. The dispensing closure of any one of claims 3 to 24, wherein the upper surface of said rearwardly extending portion of said pivot post lies in the same plane as the forward section of said lid.

26. The dispensing closure of any one of claims 4 to 25, wherein said pivot post includes a terminating edge and there is an interference fit between said rear wall of said recess and said terminating edge of said pivot post as said lid is rotated, to thereby restrain the movement of said lid from the open to the closed position during use.

27. The dispensing closure of any one of claims 15 to 26, wherein said skirt of said base has a recess in its outer surface at the front of said base so that said depending skirt of said lid overhangs said base member above said recess.

28. The dispensing closure of any one of the preceding claims, wherein said dispensing orifice includes an upwardly extending annular rim which is engaged by said plug of said lid in the closed position.

29. The dispensing closure of any one of the preceding claims, wherein said base has an annular skirt and said elevated land extends upwardly from said annular skirt.



30. The dispensing closure of any one of the preceding claims, wherein said pivot recess extends below the forward front section of said base.

31. The dispensing closure of any one of the preceding claims, wherein said lid follows the contour of the forward front section of said base.

5 32. The dispensing closure of any one of the preceding claims, wherein said lid is moulded from a resilient polymeric material.

33. A two piece dispensing closure, substantially as hereinbefore described with reference to the accompanying drawings.

10 D A T E D this 20th day of October, 1992.

ROBERT J. BOLEN JR. and THOMAS R. BOLEN

By their Patent Attorneys:

CALLINAN LAWRIE



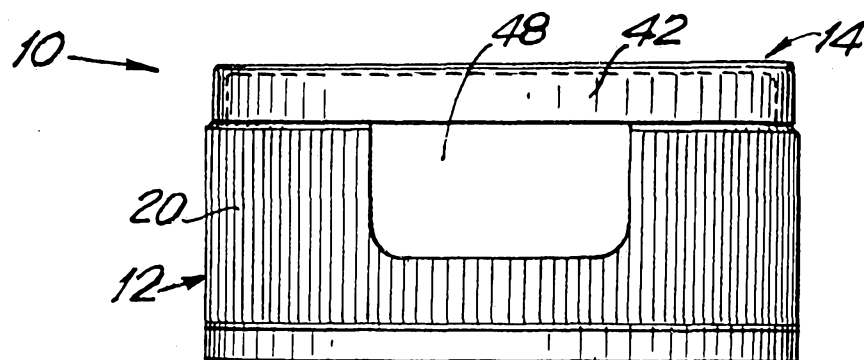


FIG. 1

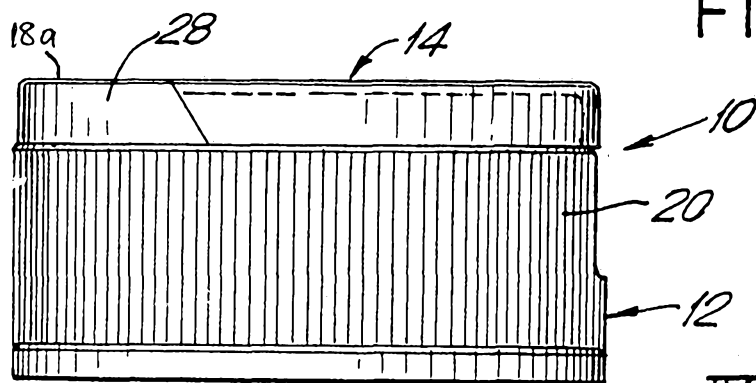


FIG. 2

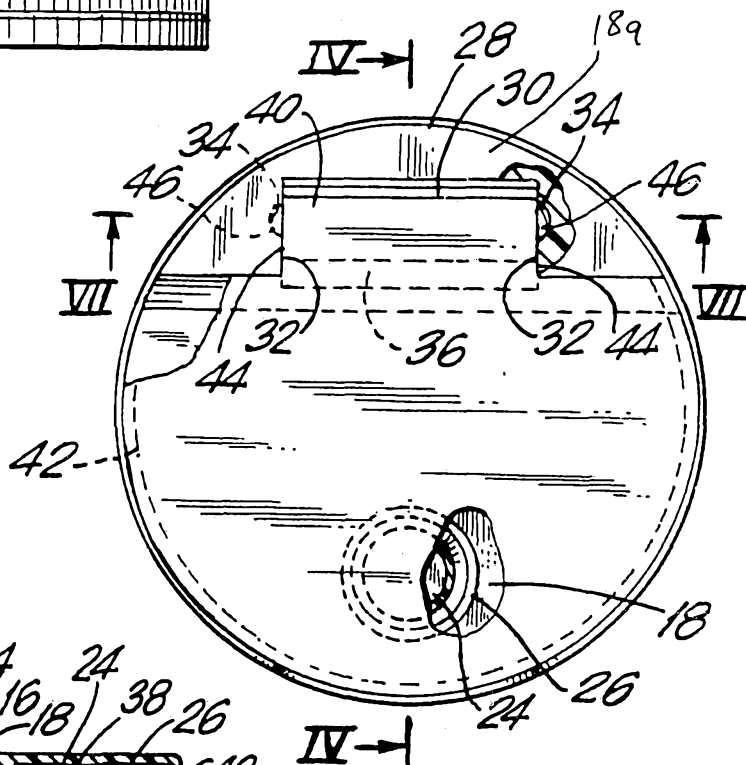


FIG. 3

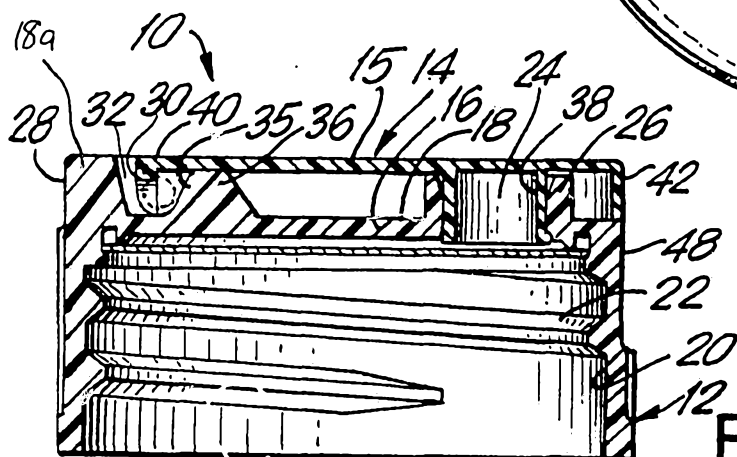


FIG. 4

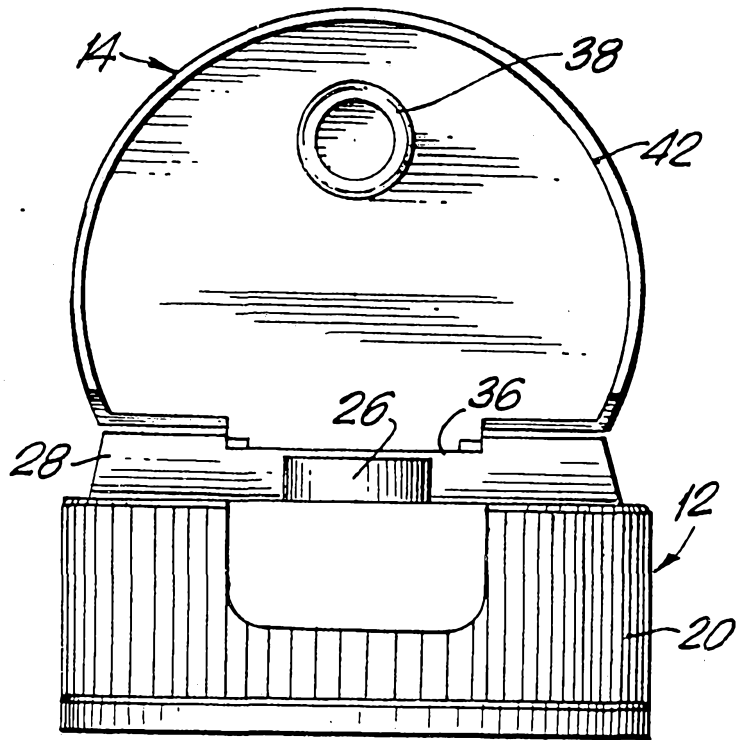


FIG. 5

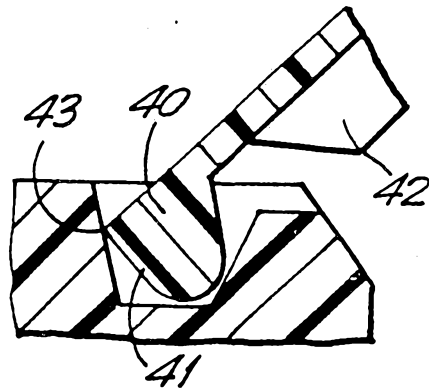


FIG. 6A

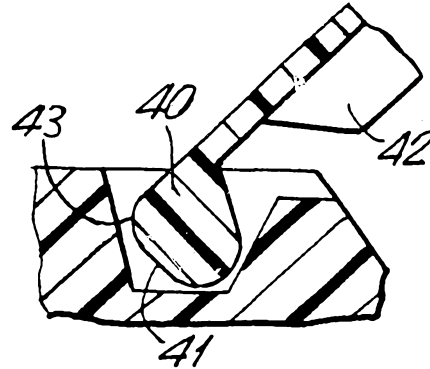


FIG. 6B

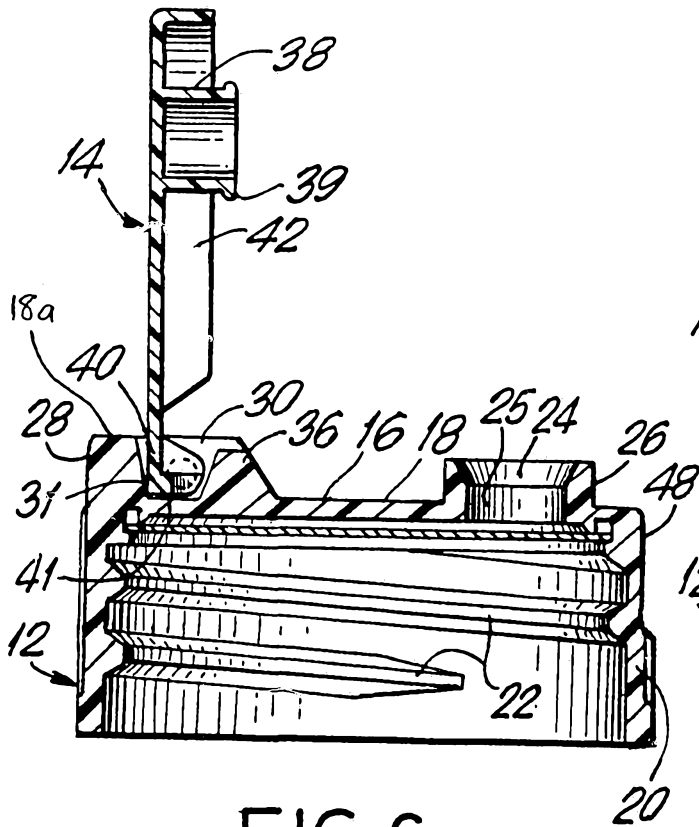


FIG. 6

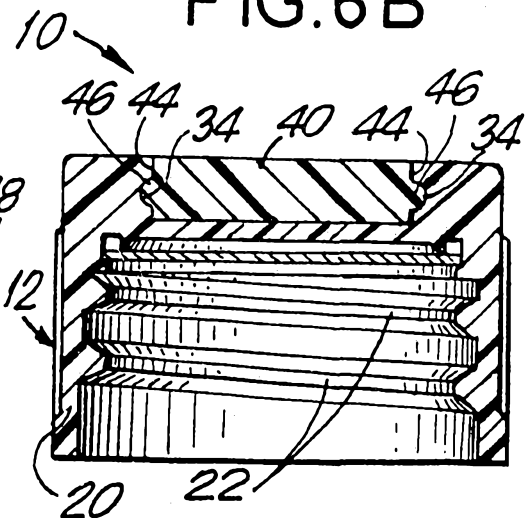


FIG. 7

INTERNATIONAL SEARCH REPORT

International Application No PCT/US89/02822

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) *		
According to International Patent Classification (IPC) or to both National Classification and IPC		
IPC ⁵ : B 65 D 47/08, B 65 D 47/04		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
IPC ⁵	B 65 D	
Documentation Searched other than Minimum Documentation to the extent that such Documents are included in the Fields Searched ⁸		
III. DOCUMENTS CONSIDERED TO BE RELEVANT ⁹		
Category ⁹	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
A	WO, A, 82/04028 (LIBIT) 25 November 1982 see page 5, line 21 - page 12, line 28; figures --	1-26
A	GB, A, 2166123 (SUNBEAM PLASTICS CORP.) 30 April 1986 see the whole document --	1-26
A	US, A, 4399928 (KLINGLER) 23 August 1983 see column 3, lines 13-64; figures -----	12,13,17
* Special categories of cited documents: ¹⁰ "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 doubt on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "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 "X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step "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 such documents, such combination being obvious to a person skilled in the art. "&" document member of the same patent family		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search		Date of Mailing of this International Search Report
5th October 1989		06.11.89
International Searching Authority		Signature of Authorized Officer
EUROPEAN PATENT OFFICE		T.K. WILLIS

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

US 8902822

SA 29744

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 31/10/89. The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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		US-A- 4441637	10-04-84
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		AU-A- 3815785	01-05-86
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		DE-A- 3523657	30-04-86
		FR-A- 2572368	02-05-86
		JP-A- 61104961	23-05-86
		US-A- 4666068	19-05-87
US-A- 4399928	23-08-83	None	