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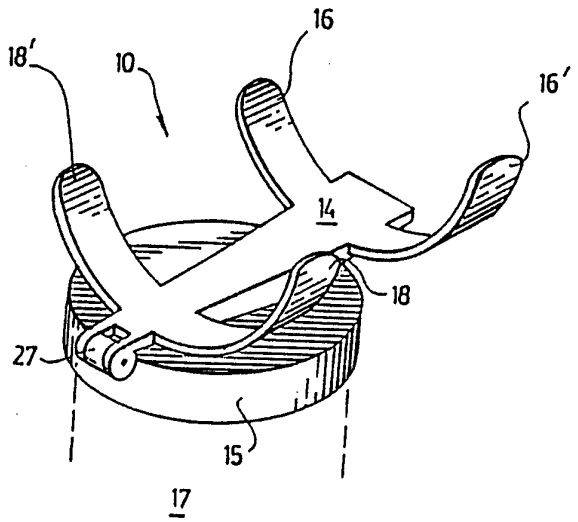
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(54) Title: FOREARM OPENABLE CLOSURE FOR CONTAINERS



(57) Abstract

To assist a person having reduced manual dexterity in removing a twist closure (15) from a container (17), the closure comprises a first tab (16) extending upright from an upper surface (12) of the closure to a height suitable to engage the forearm near a central portion of the ulna, and a second upright tab (18) having the same height and being positioned on the upper surface to be on an opposite side of the forearm and longitudinally offset to allow the forearm to press against the tabs and provide an opening torque. A forearm of the person is positionable on the closure with the ulna of the forearm over the upper surface and the first and second tabs extending upright on opposite sides of the forearm, such that the closure can be opened by putting weight using the forearm on the upper surface with the container on a fixed surface and turning the forearm within the first and second tabs. No forcefull digital, manual or carpal movements are required to remove the closure. A fold-down pry-off lever device for use with the forearm is also disclosed.

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FOREARM OPENABLE CLOSURE FOR CONTAINERS

FIELD OF THE INVENTION

The present invention relates to a closure with forearm engaging tabs for containers. The present invention also relates further to an apparatus to assist a person having reduced manual dexterity, such as an arthritic patient, in removing a closure from a container, such as a medication bottle. The apparatus is to be attached to or made integral with the closure of the container.

BACKGROUND OF THE INVENTION

Arthritic patients commonly have difficulties in removing closures from medication containers since the operation of removing the closures from medication containers requires a manual dexterity which is beyond the ability of arthritic patients who no longer have full use of their hands. It has been observed that arthritic patients have more control over the movement of the arm and forearm than the movement of the wrist and fingers.

It is known to provide cap removers for medication containers, as is disclosed in US patents 4,760,763, 4,770,069 and 3,885,478. In the case of US patent 4,760,763, a device is disclosed for gripping the cap of a child resistant medication container which facilitates removal of the cap by an arthritic patient by reducing the amount of gripping action that needs to be carried out by the hand and provides a device which will enable opening a cap using the palm of one's hand. US patent 4,770,069 discloses a hand-held cap opener for child resistant containers of the kind which are to be pried off, in which the cap opener fits into the palm of the

hand and prevents the user from having to use delicate finger action to remove the cap. US patent 4,731,512 discloses a two-piece, press-twist, child resistant closure which is formed with upwardly extending lugs to assist in holding the outer closure against rotation while being manually pressed and turned using the bottle. US patent 4,469,235 describes a closure with upwardly extending tabs to enable manual application of torque to the closure without gripping the side wall thereof.

In the prior art devices, use of the wrist or fingers is required in order to remove the closure. As mentioned above, for arthritic patients it can be impossible to comfortably use the wrist or finger joints to carry out a controlled movement, whereas the use of the forearm and arm can be carried out with greater ease.

It is therefore an object of the present invention to provide a closure with forearm engaging tabs for medication containers which does not require the use of forceful manipulation by the wrist or finger joints.

SUMMARY OF THE INVENTION

According to the invention, there is provided an apparatus to assist a person having reduced manual dexterity in removing a closure from a container using a forearm, comprising a base having means for connecting to the closure, a first tab extending upright from the base to a height equivalent to a central portion of an ulnar bone of the forearm, and a second upright tab parallel to the first tab and extending upright from the base to the central portion height, and located on an opposite side of the forearm and spaced longitudinally with respect to the first tab to allow a torque to be transferred to the base by applying force with the forearm to the first and

second tabs. The forearm of the person is positionable on the apparatus with the ulnar bone of the forearm over the base and the first and second tabs extending upright on opposite sides of the forearm, such that the apparatus can be used to twist open the closure by placing weight with the forearm on the base with the container supported on a fixed surface and turning the forearm within the first and second tabs.

The invention also provides a closure for a container, the closure having an upper surface provided with a first upstanding tab extending to a height with respect to the upper surface equivalent to a central portion of an ulnar bone of the forearm, a second upstanding tab extending upright from the upper surface to the central portion height, and being parallel to the first tab and located on an opposite side of the forearm and spaced longitudinally with respect to the first tab to allow a torque to be transferred to the closure by applying force by the forearm to the first and second tabs.

The invention also provides an apparatus to assist a person having reduced manual dexterity in removing a cap from a container, the apparatus to be attached to or made integral with the cap, and comprising: a first lever arm to extend to a given distance to one side of the cap; a first tab extending upright from the first lever arm; and a second upright tab located substantially along a line of the first lever arm on an opposite side of the cap, whereby a forearm of the person is positionable on the apparatus with an elbow side of the forearm over the first lever, a wrist side of the forearm over the cap and the first and second tabs extending

upright on opposite sides of the forearm, such that the apparatus can be used to pry open the cap by pushing down on the first lever arm or to twist open the cap by turning the forearm with the first and second tabs.

The invention further provides an apparatus to assist a person having reduced manual dexterity in removing a cap from a container, the apparatus to be attached to or made intergral with the cap, and comprising a lever arm to extend to one side of the cap, and articulation means for hingedly connecting the lever arm to the cap. The lever arm is foldable between a pry position for prying off the cap and a storage position in which the lever arm is positioned with respect to the container such that a total packing volume of the container with the apparatus is reduced.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be better understood by way of the following detailed description of a preferred embodiment with reference to the appended drawings in which:

Figure 1 shows a perspective view of the preferred embodiment attached to a pill bottle;

Figure 2 shows a side view of the preferred embodiment;

Figure 3 is a front view showing the forearm in cross-section of the preferred embodiment;

Figure 4 is a perspective view of second embodiment in which the base is hingedly placed on top of the cap, and the tabs are made much larger;

Figure 5 shows a perspective view of the third embodiment attached to the cap of a pill bottle;

Figure 6 shows a perspective view of the apparatus

according to the third embodiment with a forearm of an arthritic patient shown in dashed lines placed over the apparatus;

Figure 7 is a top view of fourth embodiment of the invention;

Figure 8 is a perspective view of a fifth embodiment;

Figure 9 is a perspective view of a sixth embodiment in which a lever arm is hingedly placed on top of the cap for prying off the cap;

Figure 10 shows a perspective view similar to Figure 9 in which the lever arm is folded down along side the bottle;

Figure 11 shows a perspective view of the seventh embodiment in which the lever arm is folded down along side the bottle; and

Figure 12 is a perspective view similar to Figure 11, in which the lever arm is folded on top of the cap.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

As shown in Figures 1, 2 and 3, the closure (15) which is of the push-and-turn type is provided with two upstanding tabs (16) and (18), such that when the forearm (11) is placed on base (12) between the tabs (16) and (18), the latter are engaged in order to turn the closure or cap (15) anticlockwise (for removal). The tabs (16) and (18) have parallel surfaces and are spaced apart in width W which corresponds to the width of the lower part of the forearm (11), and a lengthwise distance between tabs (16) and (18) is chosen to be as long as possible while remaining on base (12) of cap (15). The height H of the tabs as shown in Figure 3 is chosen to correspond to an average middle of the ulnar bone (28) in order that

as forearm (11) is twisted the force transmitted by the ulnar bone (28) does not cause the forearm (11) to rise over tabs (16) and (18). It has been found that for smaller boned patients, as is common with more elderly female patients, the minimum height of tabs (16) and (18) is 3/8" (roughly 10 mm). The same tests have shown that a suitable width is 1-1/4" (32 mm), and a suitable lengthwise distance between tabs (16) and (18) is also 1-1/4" (32 mm). The ulnar bone (28) extends from the wrist to the elbow, and the user may use any portion of the forearm that feels comfortable.

Container (17) is to be placed on a surface which is preferably at waist height with respect to the arthritic patient, and the forearm (11) is placed on base (12) with the tabs protruding upwardly on each side of the forearm to a height approaching or near the center of the ulnar bone (28) with the radial bone (19) positioned above the ulnar (28) (a relaxed position), and while some weight is applied to base (12), usually coming from the shoulder and transferred through the elbow, a small turning force is applied to loosen cap (15) from container (17). Once the cap (15) is loose, additional turning of cap (15), if required, can be carried out using a minimum of force and without use of the fingers or hands by pushing against the tabs with the forearm to cause the cap (15) to turn. In this preferred way, the container (17) does not need to be held using the other hand in order to prevent it from slipping or turning since most counter top surfaces provide sufficient friction on the base of container (17) when a little bit of weight is applied to base (12) by forearm (11). If extra friction is required, then the container (17) can

be placed on a cloth or rubber surface which will offer a better frictional contact. The placing of weight by forearm (11) and in particular by ulnar bone (28) does not cause discomfort to the patient and more importantly does not require the use of the wrist joint or finger joints.

As can be understood, it would be possible to join tabs (16) or (18) to tabs (18′) or (16′) respectively. It is also possible to angularly shift tabs (16′) and (18′) with respect to tabs (16) and (18) as long as the pair of tabs (16) (18) and (16′) (18′) engage forearm (11) in such a way that turning the forearm (11) causes the ulnar bone (28) to turn base (12) and thus cap (15) in the desired direction.

Although in the preferred embodiment the base (12) is provided integrally with cap (15), it is of course possible to make an attachment apparatus in which base (12) is provided separate from cap (15) and merely attaches to an ordinary cap (15). Snaps, adhesive strips or a friction fit over the cap (15) are some of the possible ways to connect the base (12) to the cap (15). The twist cap or closure (15) can be an ordinary screw cap, a push-and-turn one piece cap in which the base is usually locked until depressed, or a two-piece push-and-turn closure in which the outer base slips until depressed when it will engage an inner screw cap.

In the second embodiment shown in Fig. 4, tabs (16) and (18) as well as tabs (16′) and (18′) are connected to a base (12) which is hingedly connected to cap (15) by articulation hinge (27). When base (12) is folded down into the storage position (not shown), it does so with rounded tabs (16) (16′) (18) and (18′)

"hugging" bottle (17). The tabs in the alternative embodiment are much larger, and are curved to conform to the contour of the forearm (11). The articulated base (12) allows the larger tabs to be lowered in order to reduce the storage volume of the container (17) provided with the tabs (16) and (18). The larger curved tab arrangement of Fig. 4 works not only with the ulnar side of the forearm but also with the fleshy, inside surface of the forearm.

As shown in Figure 5, apparatus (10) according to the third embodiment is a single piece of moulded plastic including a first lever arm (14), a first tab (16) extending upright from an end T portion (20) of the first lever arm (14), and a second upright tab (18) extends upright from a plastic disk (12) which interconnects the first lever arm (14) to the opposed second upright tab (18). As shown by the arrows in Figure 5, apparatus (10) may be pushed down on first lever arm (14) in order to pry off cap (15) from container or medicine bottle (17). If cap (15) is of the push-and-turn tamper proof or child resistant type, then the manipulation that is required to remove cap (15) from bottle (17) is a twisting action as shown by the arrows indicating a clockwise turn, and upright tabs (16) and (18) are used in combination with a downward pushing action to push and turn cap (15).

Figure 7 illustrates how a forearm (11) of an arthritic patient may be placed over apparatus (10) in order to carry out either a pry or push and turn action. The T-end (20) of lever arm (14) provides a larger area over which a lower surface of forearm (11) may push against during prying action, and also the larger area of the T-end (20) makes it easier for the arthritic patient

to locate the forearm (11) on apparatus (10). Although apparatus (10) is shown as comprising a moulded piece separate from cap (15), it is of course possible to mould arm (14), end (20) and first tab (16) integrally extending from one side of cap (15) with upright tab (18) integrally moulded with cap (15) and extending upright on a side of cap (15) opposite lever arm (14). Of course, tabs (16) and (18) are offset from the vertical plane of lever arm (14) sufficiently such that as forearm (11) is placed on apparatus (10), the tabs (16) and (18) lie on opposite sides of forearm (11).

As shown in Figure 7, according to the fourth embodiment, it is alternatively possible to provide second tab (18) at the end of a second lever arm (22), thus providing a relatively large separation between tabs (16) and (18) without having either arm (14) or (22) extending at a great radial distance from cap (15).

In the third embodiment, lever arm (14) extends a distance from cap (15) equal to the diameter of cap (15) and end (20) is elevated by about one sixth the diameter of cap (15) in order to provide a comfortable angle at which forearm (11) rests on apparatus (10).

In the fourth embodiment shown in Figure 7, tabs (16) and (18) are parallel but slightly angled with respect to arms (14) and (22) so that as forearm (11) is placed over them, the sides of tabs (16) and (18) make flush contact with forearm (11).

In the fifth embodiment shown in Figure 8, the apparatus (10) comprises base (12) on which the two tabs (16) and (18) are pivotally connected. The two tabs (16) and (18) are arranged in such a position that a person's forearm (11) can be placed therebetween in order to

provide a twisting action. In the fifth embodiment, the cap (15) of the bottle (17) is a relatively large cap having a diameter of approximately 8 to 16 cm. Each tab (16) and (18) includes a stop (24) which holds the tabs (16) and (18) in the upper position when being twisted by forearm (11). When the apparatus (10) is not in use, the tabs (16) and (18) can be folded down such that the tabs lie substantially flat on base disk (12).

In the fifth embodiment, the apparatus (10) is shown as being an attachment to cap (15), however, it is of course possible to incorporate tabs (16) and (18) directly into a base being provided by formations in cap (15). In order to prevent bottle (17) from twisting while being turned by apparatus (10) a rubber pad (25) can be used underneath bottle (17) since bottle (17), which is usually made of a plastic construction, would have the tendency to slip on most smooth counter top surfaces. Using the rubber pad (25), a little bit of weight applied by forearm (11) will secure a non-slip holding for bottle (17) and the twisting action provided by apparatus (10) will facilitate opening of cap (15) without requiring manual dexterity.

In the sixth and seventh embodiments, the apparatus (10) comprises a lever arm (14) which is articulated by a hinge joint (27) to be foldable between a position on top of cap (15) to a position alongside bottle (17). In these embodiments, the apparatus (10) is convenient for storage in the medicine cabinet (not shown) or in a packaging box in which medicine bottle (17) may be sold.

The articulation joint (27) is shown in the drawings as comprising a pinned hinge, however, in the

case that apparatus (10) is integrally molded with cap (15), the articulation joint (27) may comprise what is termed "a live hinge", i.e. a flexible membrane hinge, extending between cap (15) and lever (14). Lever (14) snaps onto a formation (26) provided on cap (15). The snapping feature of lever (14) onto cap (15) provided by means of formation (26) has the advantage that in the case where a resilient live hinge (27) is used, the lever arm (14) will remain securely in place on cap (15).

The lever arm (14) of the third preferred embodiment is not provided with tabs (16) and (18) since it is intended only for prying off snap on caps. The triangularly shaped lever arm (14) provides a good lever action on cap (15) without needing to make lever arm (14) much longer than a width of cap (15).

In the seventh embodiment shown in Figures 11 and 12, the tabs (16) and (18) are rounded so as to conform to the shape of bottle (17) which is cylindrical. In the lowered position of Figure 11, the tabs (16) and (18) "hug" bottle (17). In the raised position of Figure 12, the four tabs (16), (16'), (18), (18') form a convenient and comfortable forearm cradle which allows the arthritic patient to push and turn cap (15) either clockwise or anticlockwise depending on whether cap (15) is being removed or put back on. The cradle can be designed to engage the ulnar bone (28) as shown in Fig. 3 or it could be made wide enough to engage forearm (11) transversely with the tabs engaging bones (28) and (19).

Although cap (15) is to be of the push and turn type, a very small lever action by lever (14) is made possible by its triangular shape and the fact that it is slightly longer than the diameter of cap (15). This

lever action enables an easy lifting off of cap (15) once opened in order to remove it from bottle (17) by simply pushing down on the forearm. The only digital dexterity required when using the apparatus (10) according to the sixth and seventh embodiments is the raising or lowering of lever arm (14) from the lowered to the raised position and the removal and replacement of cap (15) from bottle (17). Due to the light weight components, these operations require almost no force and cause the patient very little hardship in carrying them out. It is noted that the prying action and the push and turn action however, do require much more significant force which comes from the forearm.

In the embodiments of Figs. 9 to 12, it has been shown that the articulation means (27) are provided opposite the raised end of lever (14). It is also possible to hinge lever (14) in its middle part, such that the raised end folds up and over down on top of the lower end of lever (14), making the bottle (17) and apparatus (10) more compact for storage or packaging. The sixth and seventh embodiments also provide additional child safety, since an additional mental step of placing the lever arm (14) in an active position must be carried out before using apparatus (10) to remove the cap (15) from bottle (17).

It is to be understood that the above description of the preferred embodiment is not intended to limit the scope of the present invention as defined in the appended claims.

CLAIMS

1. An apparatus to assist a person having reduced manual dexterity in removing a twist closure from a container using a forearm, comprising:

a base having means for connecting to the closure;

a first tab extending upright from the base to a height equivalent to a central portion of an ulnar bone of the forearm; and

a second upright tab parallel to the first tab and extending upright from the base to said height, and located on an opposite side of the forearm and spaced longitudinally with respect to the first tab to allow a torque to be transferred to said base by applying force with the forearm to the first and second tabs, whereby the forearm of the person is positionable on the apparatus with the ulnar bone of the forearm over the base and the first and second tabs extending upright on opposite sides of the forearm, such that the apparatus can be used to twist open the cap by placing weight on the base using the forearm with the container supported on a fixed surface and turning the forearm within the first and second tabs.

2. Apparatus as claimed in claim 1, further comprising a third tab extending upright from the base to said height, and a fourth tab extending upright from the base to said height, said fourth tab being parallel to said third tab and being located on an opposite side of the forearm with respect to said third tab and spaced longitudinally with respect to the third tab to allow a closing torque to be transferred to said base by applying

force by the forearm to the third and fourth tabs, said third and fourth tabs being positioned such that when the forearm is placed between them there is no interference with said first and second tabs.

3. Apparatus as claimed in claim 2, wherein said first, second, third and fourth tabs are all parallel, said first and third tab being longitudinally joined, and said second and fourth tabs also being longitudinally joined.

4. Apparatus as claimed in claim 1, wherein said height is at least approximately one centimeter high.

5. Apparatus as claimed in claim 1, wherein said connecting means comprise a hinge for pivotally connecting the base to the closure about a horizontal pivot axis near an edge of the closure, whereby said base and said tabs may be moved from being on top of said closure to being along a side of said container.

6. Apparatus as claimed in claim 5, wherein said rotation axis is perpendicular to a longitudinal direction of said first and second tabs, said first and second tabs being curved upwardly from said base in order to conform to a shape of said forearm.

7. Apparatus as claimed in claim 6, further comprising third and fourth tabs provided oppositely said first and said second tabs respectively whereby said third and fourth tabs engage the forearm for applying a torque to twist shut the closure.

8. Apparatus as claimed in claim 1, wherein the first and second tabs are hingedly attached to the base and are each provided with a stop to secure them upright while allowing the tabs to be able to pivot to rest substantially flat on the base.

9. A twist closure for a container, the closure having an upper surface provided with a first upstanding tab extending to a height with respect to the upper surface equivalent to a central portion of an ulnar bone of the forearm, a second upstanding tab extending upright from the upper surface to said height, and being parallel to the first tab and located on an opposite side of the forearm and spaced longitudinally with respect to the first tab to allow a torque to be transferred to the closure by applying force by the forearm to the first and second tabs, whereby the forearm of the person is positionable on the apparatus with the ulnar of the forearm over the upper surface and the first and second tabs extending upright on opposite sides of the forearm, such that the closure can be twisted open by placing weight on the upper surface with the container supported on a fixed surface and turning the forearm within the first and second tabs.

10. Closure as claimed in claim 9, further comprising a third tab extending upright from the base to said height, and a fourth tab extending upright from the base to said height, said fourth tab being parallel to said third tab and being located on an opposite side of the forearm with respect to said third tab and spaced longitudinally with respect to the third tab to allow a

closing torque to be transferred to said base by applying force by the forearm to the third and fourth tabs, said third and fourth tabs being positioned such that when the forearm is placed between them there is no interference with said first and second tabs.

11. Closure as claimed in claim 10, wherein said first, second, third and fourth tabs are all parallel, said first and third tab being longitudinally joined, and said second and fourth tabs also being longitudinally joined.

12. Closure as claimed in claim 9, wherein said height is at least approximately one centimeter high.

13. An apparatus to assist a person having reduced manual dexterity in removing a cap from a container, the apparatus to be attached to or made integral with the cap, and comprising:

a first lever arm to extend to a given distance to one side of the cap;

a first tab extending upright from the first lever arm; and

a second upright tab located substantially along a line of the first lever arm on an opposite side of the cap, whereby a forearm of the person is positionable on the apparatus with an elbow side of the forearm over the first lever, a wrist side of the forearm over the cap and the first and second tabs extending upright on opposite sides of the forearm, such that the apparatus can be used to pry open the cap by pushing down on the first lever arm or to twist open the cap by turning the forearm

within the first and second tabs.

14. Apparatus as claimed in claim 13, wherein the first lever arm is elevated, such that it extends from the cap upwardly and sideways to said given distance on said one side of the cap.

15. Apparatus as claimed in claim 13, wherein said first lever arm comprises a narrow lever arm and a wide end portion providing a greater contact area between the end of the first lever arm and an undersurface of the forearm.

16. The apparatus as claimed in claim 13, further comprising a second lever arm extending oppositely to the first lever arm along said line, the second upright tab being provided on the second lever arm.

17. The apparatus as claimed in claim 13, further comprising articulation means for hingedly connecting the first lever arm to the cap, whereby the first lever arm is foldable betwen an active position for remove the cap and a storage position in which the first lever arm is positioned with respect to the container such that a total packing volume of the container with the apparatus is reduced.

18. The apparatus as claimed in claim 17, wherein the articulation means comprise a hinge on another side opposite said one side of the cap, the storage position being one in which the lever arm depends vertically from the other side of the cap.

19. The apparatus as claimed in claim 17, wherein snap means are provided on the cap which engage with the lever arm so that the lever arm snaps into the pry position.

20. Apparatus as claimed in claim 17, wherein the lever arm is provided with a fulcrum on the cap at a distance from the one side towards a center of the cap.

21. The apparatus as claimed in claim 18, further comprising third and fourth tabs opposite said first and second tabs, said first through fourth tabs generally conforming to a shape of said container when the base is in the storage position.

22. An apparatus to assist a person having reduced manual dexterity in removing a cap from a container, the apparatus to be attached to or made integral with the cap, and comprising:

a lever arm to extend to one side of the cap;

articulation means for hingedly connecting the lever arm to the cap; whereby

the lever arm is foldable between a pry position for prying off the cap, and a storage position in which the lever arm is positioned with respect to the container such that a total packing volume of the container with the apparatus is reduced.

23. Apparatus as claimed in claim 22, wherein the articulation means comprise a hinge on another side opposite said one side of the cap, the storage position

being one in which the lever arm depends vertically from the other side of the cap.

24. Apparatus as claimed in claim 22, wherein snap means are provided on the cap which engage with the lever arm so that the lever arm snaps into the pry position.

25. Apparatus as claimed in claim 22, wherein the lever arm is provided with a fulcrum on the cap at a distance from the one side towards a center of the cap.

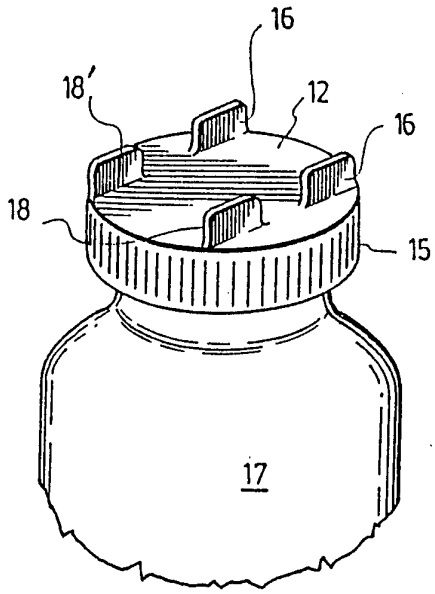


FIG. 1

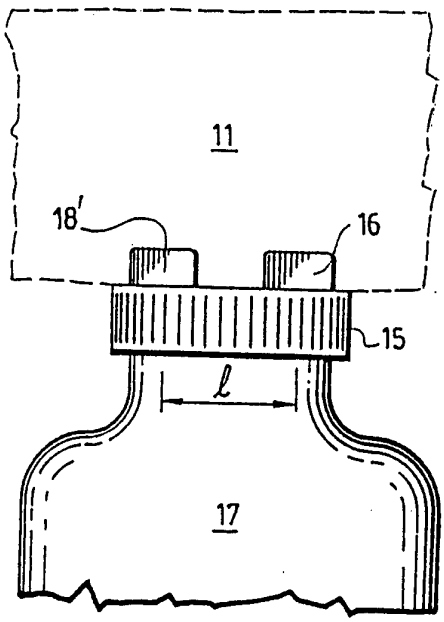


FIG. 2

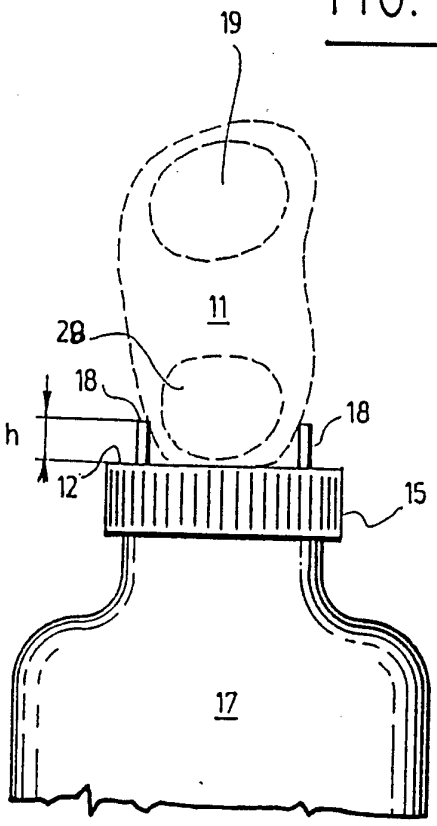


FIG. 3

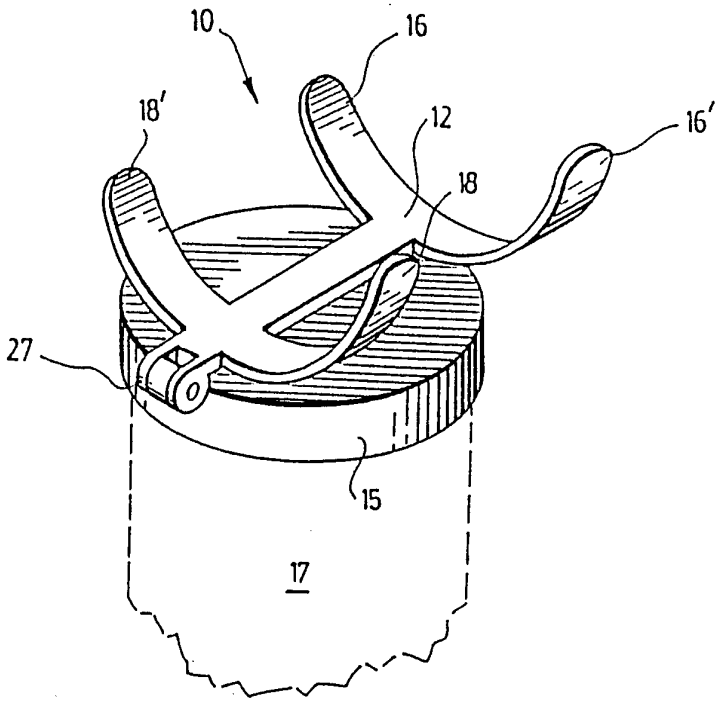


FIG. 4

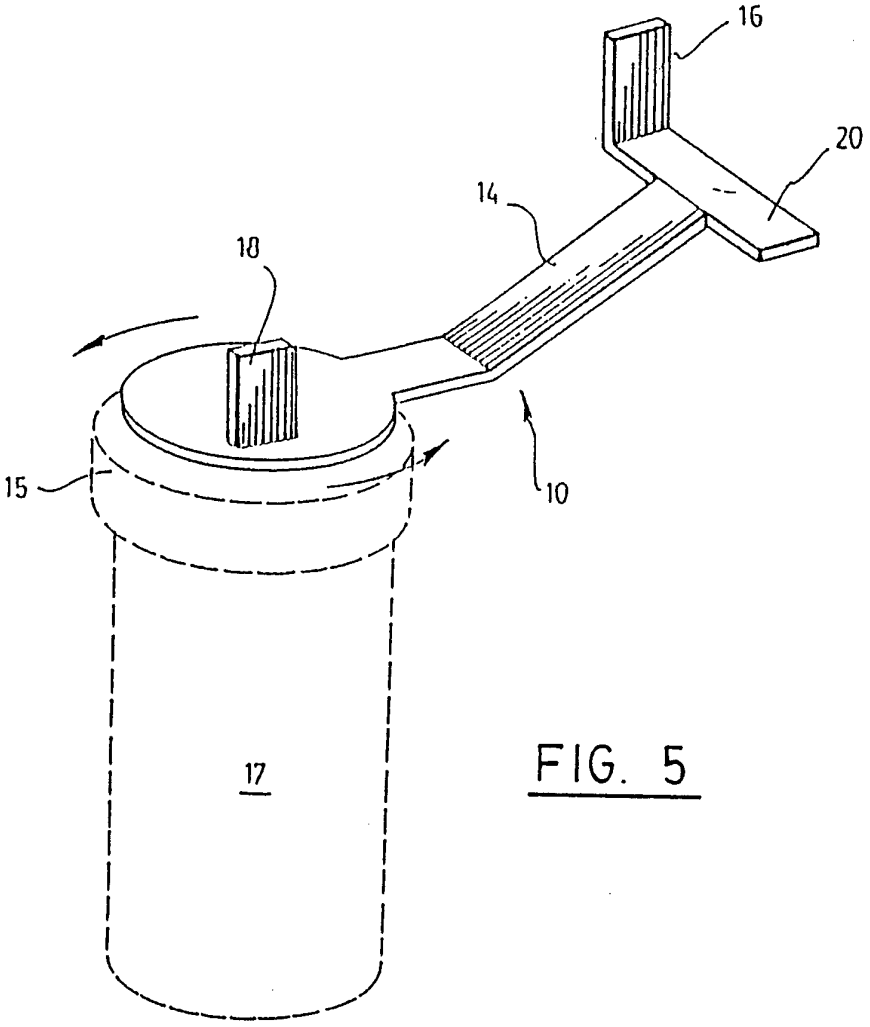


FIG. 5

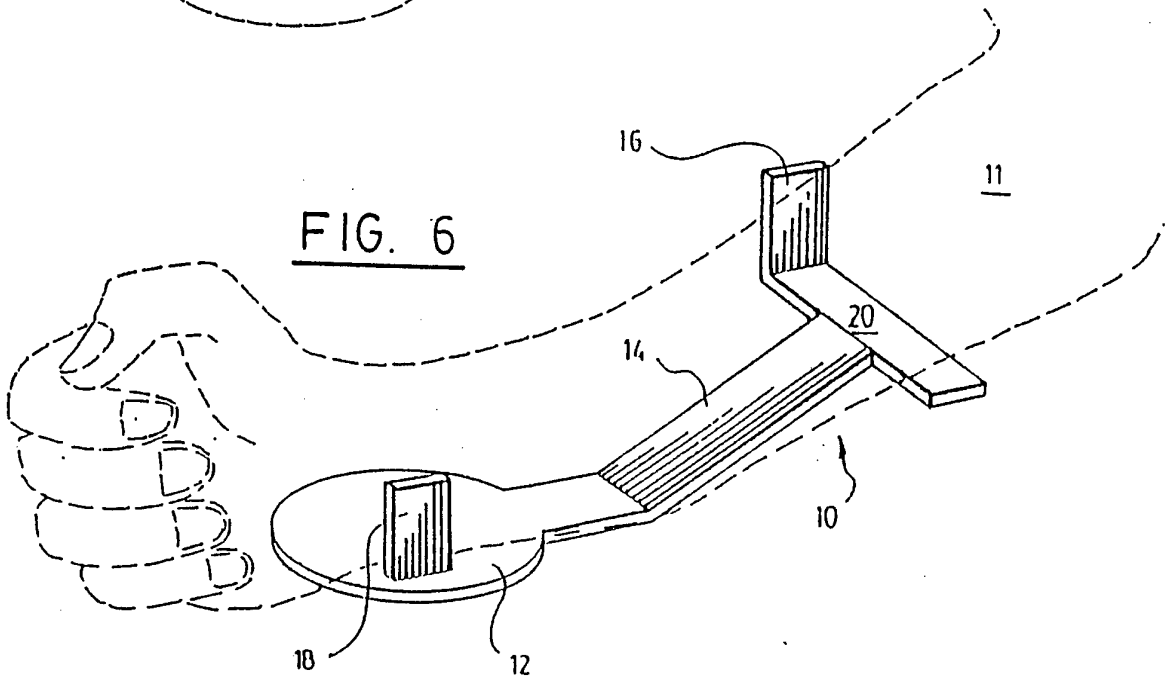


FIG. 6

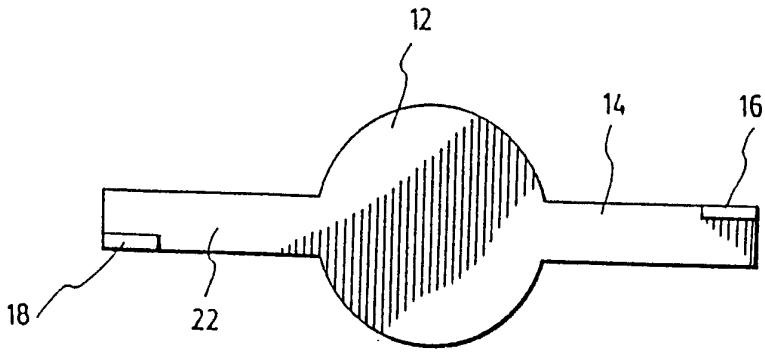


FIG. 7

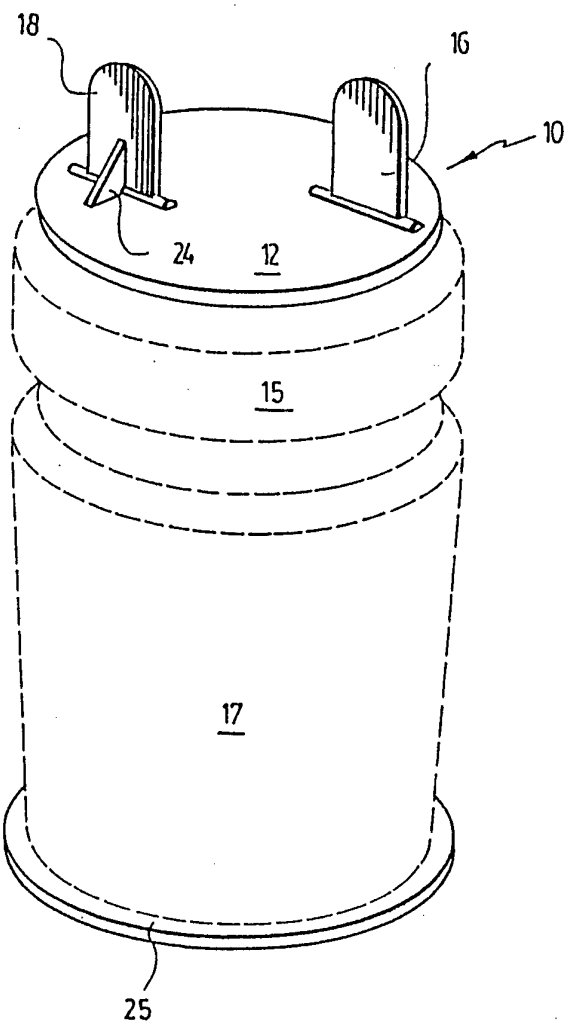


FIG. 8

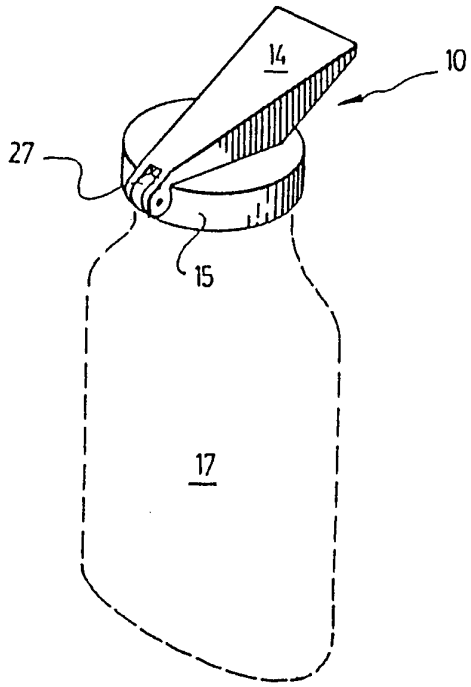


FIG. 9

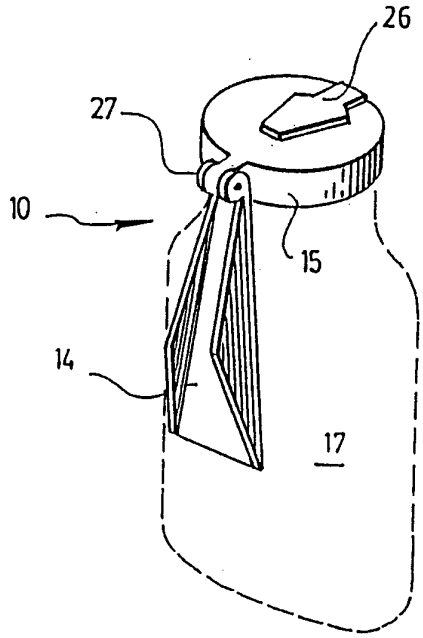


FIG. 10

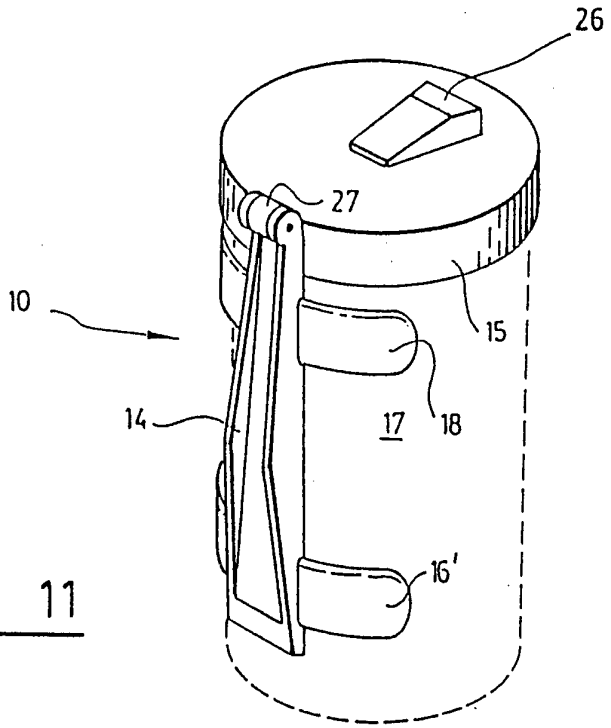


FIG. 11

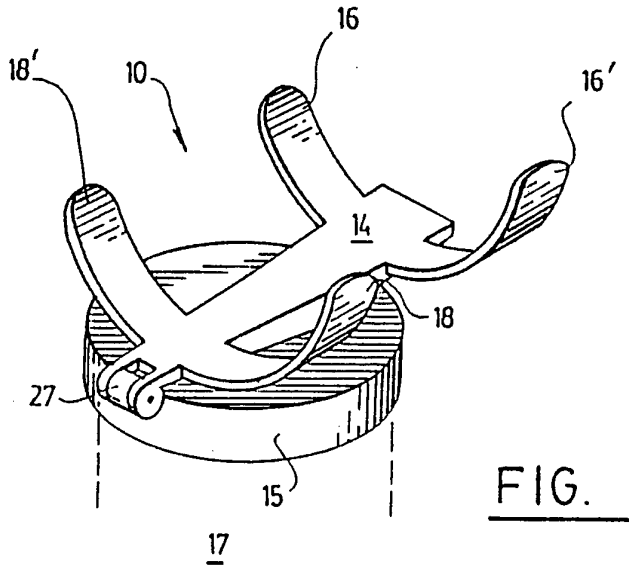


FIG. 12

INTERNATIONAL SEARCH REPORT

International Application No PCT/CA 93/00205

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)[6]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.Cl. 5 B67B7/18; B67B7/16; B65D41/04

II. FIELDS SEARCHED

Minimum Documentation Searched[7]

Classification System	Classification Symbols
Int.Cl. 5	B67B ; B65D

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 °	Citation of Document,[11] with indication, where appropriate, of the relevant passages[12]	Relevant to Claim No.[13]
X	FR,E,38 477 (VENDRIN) 6 June 1931 see figures 1,2,6,7	1,9
A	---	13
A	CH,A,158 786 (POLAK) 16 February 1933	
A	---	
A	DE,U,8 508 220 (PHARMACIA AB) 14 August 1985	
A	---	
A	US,A,4 731 512 (BARRIAC) 15 March 1988 cited in the application	
X	---	
X	US,A,1 993 141 (HARTWELL) 5 March 1935 see the whole document	22-25

° Special categories of cited documents :[10]

"A" document defining the general state of the art which is not considered to be of particular relevance

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"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
25 AUGUST 1993	07.09.93
International Searching Authority	**Signature of Authorized Officer**
EUROPEAN PATENT OFFICE	DEUTSCH J.P.M.

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

CA 9300205
SA 74504

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information. 25/08/93

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
FR-E-38477		None	
CH-A-158786		None	
DE-U-8508220	14-08-85	None	
US-A-4731512	15-03-88	None	
US-A-1993141		None	