

PATENT SPECIFICATION (11)

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DRAWINGS ATTACHED

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(54) IMPROVEMENTS IN CONTAINER CLOSURE ARRANGEMENTS

(71) I, LYLE CLAUD AFFLECK, a British subject, citizen of Australia, of 30 Albert Parade, Ashfield, in the State of New South Wales, Commonwealth of Australia, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to closure arrangements for containers such as bottles and more particularly concerns an arrangement incorporating a re-usable cap which is placed over the neck of a container to seal the same. The cap cannot be accidentally removed from the container and the closure arrangement may incorporate features which make it very difficult for a child to remove the cap from a sealed container.

With the growth of pharmacology and the increased prescription by doctors of medicines which are beneficial when used in specific doses for particular illnesses but which are dangerous, even fatal when the dosage is exceeded, the need to prevent children having access to drugs is especially important. Equally important is the necessity to protect children against access to hazardous substances so often to be found in cupboards or on shelves, benches, or the like, in and around most dwelling places and outbuildings. Unfortunately, many people do not always take the trouble to ensure that these hazardous substances are kept safely out of the reach of children and those that do take such precautions may occasionally forget to do so.

Also, there are those people who have to carry drugs with them and should the container of the drugs, for example, in pill or capsule form fall open in their pocket, handbag or briefcase, the drugs may be spilled onto the floor when removing a handkerchief or other object. A child could then pick up a dangerous tablet and swallow the same, perhaps mistaking it for a sweet.

Numerous preparations are specially sweetened, for example, children's aspirins,

to assist in their administration, which is all very well when the dosage is controlled by a parent or other responsible person but it is well known that children who are able to get possession of a container and can open it may consume an excessive dosage with disastrous results.

Drugs and other preparations in liquid form also present a hazard. An inquisitive child who comes upon a bottle containing a liquid is likely to taste the contents of the bottle, especially if the liquid is coloured. Since it is common practice to use a pleasant flavouring to render sour or bitter tasting medicines more palatable, the child in question could easily exceed greatly a safe dose. Also, the removal by a child of a cap from a container carrying a caustic substance or a highly volatile liquid which gives off a toxic gas, for example, would be a potentially very dangerous action.

According to the invention, there is provided a container and closure arrangement including a closure member comprising a skirted cap containing a sealing member, and a neck of the container defining an open mouth, said closure member and said container neck cooperating to hold the sealing member over the container mouth, compressible means within the cap to bias the same axially away from said mouth when the closure member is in position on the container, at least one projection on either the closure member or the container neck, and at least the same number of grooves formed in the remaining container neck or closure member, the or each groove comprising an upper downwardly inclined lead-in section for a projection, a sealing lock section having at least one indent within which the projection is located when the container is sealed, said sealing lock section being substantially at or beneath the level of the lower end of the lead-in section so that sealing of the container is effected at substantially the same or a greater degree of compression of the biasing means as, or than, occurs at any position during closing

[Price 25p]

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of the seal on the container, and a safety-locking section between the lead-in section and the sealing lock section and which includes an indent extending above the level of the lower end of the lead-in section.

Some preferred embodiments of the invention will now be described with reference to the accompanying drawings, in which:

Figure 1 is a side elevation of the top part of a container closed by an arrangement in accordance with the present invention;

Figure 2 is a front view, partly in section, of the closure arrangement of Figure 1, illustrating safety provisions in a groove in the container neck;

Figure 3 is a front view, partly in section, of a different embodiment of the invention, showing a combination of safety and simple cap locking arrangements;

Figure 4 is a section through the cap of Figure 3;

Figure 5 is a partly sectional view of a modified arrangement where pins are included on the container and grooves are formed in the cap, and

Figure 6 depicts the groove configuration of yet another embodiment of the invention.

Although a variety of cap and neck combinations are possible within the scope of the present invention, the following description relates specifically to the case where the projections in the form of diametrically spaced pins and two grooves are used. It is, however, possible to use one pin and one groove in the closure arrangement, but this is not regarded as the most practical closure arrangement. It should be noted that where a plurality of pins (or other suitable projections) and grooves is involved, it is not necessary for the pins and grooves to be uniformly spaced around the container mouth, although this will generally be the case, and it is possible for there to be more grooves than pins in an arrangement.

In addition, in this specification, the directional terms, such as "downwardly", "upward", "above", "below" and the like, relate to the container and cap in a location corresponding to that of the containers and caps illustrated in the drawings. It is realised that this is not necessarily the case in practice.

Referring now to the drawings, a container 11 is closed as its mouth by a cap 7 having diametrically spaced locating pins 8 which engage with a groove or track 9 formed on or in opposite sides of the surface of the container (a bottle in the drawings) adjacent the mouth thereof. Each groove or track 9 is cut out of the wall of the neck of the bottle or formed therein. The groove does not extend completely through the neck material. Each groove has a generally downward lead-in section 10

which terminates in a sealing lock portion having indents for use in holding the cap on the container when the latter is closed by the former. The lower end of the lead-in section is assumed to terminate at the point where a pin 8 changes its downward direction to enter the sealing lock portion.

To ensure a good seal when the cap is used, and to assist in the locking of the cap on the container, a means to provide a biasing force away from the container on sealing the same is provided. This means is typically a compressible and resilient pad 12 mounted within the cap behind a sealing pad 13, rubber or a rubber substitute or an air bag being examples of pad 12. Alternatively, a spring or the like may be fitted in the cap 7 behind the pad 13.

Sealing with the cap is effected by running the pins 8 into the lead-in sections 10 of grooves or tracks 9 until the pad 13 meets the rim around the mouth of the container 11. At this point it should be noted that at the upper end of the neck the lead-in sections of the grooves may be considerably wider than is necessary to accommodate the pins. When, for example, the container is intended for use by persons of limited manipulative ability — the lead-in section may be quarter-circular in shape or an expanded form of that shape extending over almost half of the outer circumference of the neck at the top thereof. Normally, however, the grooves will be enlarged at their entrances to about two or three times the width of the pins to be inserted so that locating the pins within the grooves is not a difficult task. Manual pressure on the cap to compress pad 12 or its alternative spring enables the pins to complete their travel to the bottom of lead-in sections 10 and enter the sealing lock portions of the grooves. Here, if the pins have been moved into a position under the indent or one of the indents formed in the upper edge of the sealing lock portions of the grooves, release of the cap permits it to move under the biasing force so that the pins enter into the indents having dimensions similar to those of the indent reference 14 in Figure 2. A plurality of such indents may be provided in the sealing lock portion of a single groove to provide a number of sealing positions of the cap. If the plurality of indents are so arranged that they are at different heights on the neck (for example, by inclining the locking portions of the grooves), a variety of sealing pressures of pad 13 is possible. As shown by the drawings, generally all sealing indents such as 14 are at or beneath the level of the lower end of the lead-in section 10.

When sealed in this manner, which for convenience will be termed "simple sealing" the cap cannot be accidentally removed from the bottle. However, reverse rotation



In the case of containers made of non-resilient material, the tip 28 will be positioned so that the pin is a snug fit in the channel 26. This is a sufficient restriction to the path of a pin to make it difficult for the pin to re-enter channel 26 at tip 28 especially if the back edge of the pin is flat or inclined.

Figure 5 illustrates the arrangement of pins and grooves when the pins are incorporated with the bottle while the grooves — having any of the configuration already described — are formed in the inner face of the skirt of the cap.

It will be noted that in the drawings, all the pins in the caps have buttons projecting beyond the outer surface of the cap. This is not necessary but can be useful for location of the pins by a person (for example, a blind or infirm person) wishing to seal a container or as a holding point for the machine filling the containers. They may, therefore, be added to or formed integrally with the exterior of the skirt of the caps.

It should also be realised that while the invention is particularly applicable to containers made of glass or plastics materials and caps made of plastics material, other materials, including metals, can be used for caps or containers where circumstances so require.

WHAT I CLAIM IS:—

1. A container and closure arrangement including a closure member comprising a skirted cap containing a sealing member, and a neck of the container defining an open mouth, said closure member and said container neck cooperating to hold the sealing member over the container mouth, compressible means within the cap to bias the same axially away from said mouth when the closure member is in position on the container, at least one projection on either the closure member or the container neck, and at least the same number of grooves formed in the remaining container neck or closure member, the or each groove comprising an upper downwardly inclined lead-in section for a projection, a sealing lock section having at least one indent within which the projection is located when the container is sealed, said sealing lock section being substantially at or beneath the level of the lower end of the lead-in section so that sealing of the container is effected at substantially the same or a greater degree of compression of the biasing means as, or than, occurs at any position during closing of the seal on the container, and a safety-locking section between the lead-in section and the sealing lock section and which includes an indent extending above the level of the lower end of the lead-in section.

2. A container and closure arrangement

according to claim 1, wherein said projections are pins and the number of said pins is at least two.

3. A container and closure arrangement in accordance with claim 1 or claim 2, in which the or each sealing lock section extends from said lead-in section at a downward inclination, a plurality of indents being formed in the or each sealing lock section whereby the pins may be located at different distances from said sealing member when said container is sealed by the closure arrangement.

4. A container and closure arrangement in accordance with claim 3, in which the indent of the safety-locking section is deeper than the indents of the sealing lock section, said biasing means being effective to bias the cooperating projection into the deeper indent when said closure members are rotated relative to each other to open a sealed container unless a force is applied to the closure members to overcome the effect of the biasing means until the cooperating projection has reached the lead-in section of the groove.

5. A container and closure arrangement according to any preceding claim, wherein a second sealing lock section is provided above the first-mentioned sealing lock section and is connected to an intermediate point of the lead-in section.

6. A container and closure arrangement according to claim 5, in which two sets of projections are provided, one set of projections moving in the upper sealing lock sections and the other set of projections moving in the lower sealing lock sections.

7. A container and closure arrangement according to claim 5, in which each sealing lock section extends in a different direction away from said lead-in section.

8. A container and closure arrangement according to any preceding claim, in which said projections are provided in the cap and said grooves in the neck of the container.

9. A container and closure arrangement according to any preceding claim, in which said projections are provided in the neck of the container and said grooves are formed in the cap.

10. A container and closure arrangement according to claim 8, in which projections are provided on the outer surface of the skirt of the cap, the positions of these projections being respectively aligned with the positions of the first-mentioned projections.

11. A container and closure arrangement according to any one of claims 1 to 4, in which, in the sealing lock section, each groove is divided into two channels separated by an island, the end of said island remote from the lead-in section forming a restriction in the channel through which the cooperating projection must pass to reach

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the indents, the opposite end of the island defining a side of a narrow passage connecting the channels, the restriction being effective to prevent the return of the projection into that channel in the reverse direction, whereby, to separate said closure member and container, the projection has to travel in the other channel until it reaches a stop preventing further relative rotation of said closure members, a force now being required to cause the projection to pass through the narrow passage, following which the projection can be moved into the lead-in section of the groove and the closure member removed.

12. A container and closure arrangement according to claim 11, in which the grooves

are formed in the container neck and the projections are located in the cap, said projections being blunt on the surfaces thereof closest to the meeting point of the lead-in section and the sealing lock section of the groove when the container is sealed.

13. A container and closure arrangement substantially as hereinbefore described with reference to Figures 1 and 2, Figures 3 and 4, Figure 5 or Figure 6 of the accompanying drawings.

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