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(54) **Improvements in containers.**

(57) This invention relates to containers for use with closures of the type having a plastics sealing compound on its inner surface which is deformable at temperatures above 100°C. A container according to the invention consists of a container (60) having a circular opening (61) for use with a closure of the type including a plastics sealing compound therein, and has an annular sealing surface (62), a cylindrical portion (63) extending from the annular sealing surface, external screw thread means (64) standing proud of the cylindrical portion adjacent the opening and characterised by reclosure inhibiting means (65, 66) having at least one reclosure inhibiting surface facing generally towards the sealing surface, but out of alignment with the screw thread means.

The reclosure inhibiting means may be a combination of circumferential ribs (65) and/or lands (66) on the screw thread means and may include a number of axial beads (69; 69'). Advantages of this arrangement are that reclosure of an opened container is rendered difficult without heating the sealing compound to its plastic transition temperature.

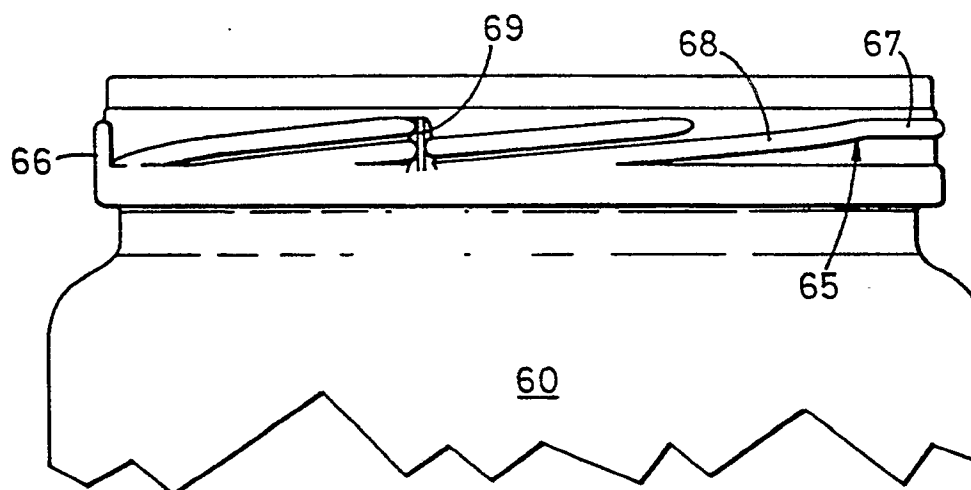


FIG. 6c

EP 0 431 915 A1

IMPROVEMENTS IN CONTAINERS

The present invention relates to containers, and more particularly but not exclusively to food containers.

Containers, such as jars, are often filled with prepared foods and sealed with a closure under vacuum. A seal between the closure and the container is commonly effected using a plastics sealing compound inside the closure which is plastically deformable at temperatures over about 100°C, but which has some resilience but is not significantly deformable plastically below such temperatures. A closure having such a sealing compound inside it will be referred to hereinafter as "a closure of the kind described". Closures of the kind described often have a centre portion movable between two positions relative to the closure rim, a first, depressed position and a second raised position, the second position being the position adopted unless the centre portion is acted on by a depressing force. A vacuum in the container allows external air pressure to push the centre portion into the first position, and the existence of the centre portion in the second position, when the closure is on a container, indicates loss of vacuum and therefore possibilities such as product tampering, or over age products in the container.

Closures of the kind described are generally used on three difference types of container. A first type has a plain rim, and the vacuum is released by levering the closure from the rim with, for example, a coin. A second type has a single helical thread designed to mate with a thread of a teat or other equipment, such that when the closure is removed, the container can be connected to, for example, the teat, and the contents consumed through it. A third type generally has a rim with multi-start, coarse pitch screw threads which enable a user to release the closure by a twisting movement, the sealing compound having been deformed around the screw threads when the vacuum was originally created and thus providing engagement with the container threads to cause relative axial movement between the container and the closure when the closure is twisted relative to the container. It is generally to the third type of container that this invention relates.

According to the invention, there is provided a container having a circular opening for use with a closure of the kind described which container has an annular sealing surface, a cylindrical portion extending from the annular sealing surface, external screw thread means standing proud of the cylindrical portion adjacent the opening and reclosure inhibiting means having at least one reclosure inhibiting surface facing generally towards the sealing surface but out of alignment with the screw thread means.

The screw thread means may be provided with at

least one axial bead also standing proud of the cylindrical portion.

Preferably, the or each axial bead spans at least one space between adjacent threads of the screw thread means, and its external periphery may be flush with those of the threads.

The reclosure inhibiting surface or surfaces preferably lie circumferentially with respect to the cylindrical portion.

There may be two reclosure inhibiting surfaces arranged one on each side of the opening, the screw thread means lying between the two reclosure inhibiting surfaces.

The reclosure inhibiting means may comprise a rib extending partly around the cylindrical portion, and may include two such ribs, the or each rib providing a reclosure inhibiting surface.

The or each rib may consist of an isolated circumferential rib length.

One or more ribs may include a circumferential portion and a thread portion aligned with the screw thread means.

The reclosure inhibiting means may comprise one of more lands having part cylindrical surfaces corresponding substantially in diameter to the external diameter of the screw thread means, the or each land providing a reclosure inhibiting surface but no surface facing axially away from the sealing surface engageable, in use, with closure sealing compound.

Preferably, the reclosure inhibiting means comprise one said rib having a circumferential portion and a thread portion aligned with the screw thread means, and one said land having a part cylindrical surface.

The rib and the land may be diametrically opposed, with screw thread means extending between them, but the rib and the land may, for example, be offset by 10° or so from being diametrically opposed.

In such a case, there are preferably two axial beads provided on the screw thread means separating the rib from the land, which beads may be diametrically opposed, or may, for example, be offset from being diametrically opposed by about 10°.

The threads and rib preferably offer a steeper profile towards the rim than away from the rim.

By way of example, embodiments of containers according to the invention will now be described with reference to the accompanying drawings, in which :-

Figure 1 is a side view of a conventional container for use with a closure of the kind described ;

Figure 2 is a side view of a first embodiment of a container according to the invention ;

Figure 3 is a side view of a second embodiment of a container ;

Figure 4 is a side view of a third embodiment of a

container according to the invention ;

Figures 5a, and 5b are respectively, a view showing one side of a fourth embodiment of a container and the opposite side of the same container ;

Figures 6a, b and c are respectively, a view showing one side of a fifth and preferred embodiment of a container, the opposite side of the same container and a view in the direction of arrow C (Figs. 6a and b) of the same container ;

Figure 7 is a detailed view of a reclosure inhibiting rib ;

Figure 8 is a detailed view of a development of a blocked thread to produce a reclosure inhibiting land ; and

Figure 9 is an enlarged external profile illustrating a container thread profile.

The containers shown in the drawings are intended for use with closures in the form of a lid having a rim, a flowed-in plastics compound being provided on the inner surface of the closure in the region of the rim to seal against both an end cylindrical portion of the container and against an annular end face of the container. The plastics compound has resilience when cool but when heated to a temperature of about 100°C or higher becomes plastically deformable. In use, when a seal is to be made, the plastics compound is heated and pressed on to the end of the container, thereby deforming into and round the material of the container.

A conventional container 10 is shown in Figure 1. The container 10 has an opening 11 defined by an annular rim 12 from which a substantially cylindrical portion 13 extends. The portion 13 carries multi-start screw threads 14 arranged at regular intervals and with consistent pitch around the cylindrical portion 13. In use, when a closure is fitted and sealed to the container 10, the plastics compound is heated and the closure pressed on to the threads 14 thereby deforming into and round the material of the container 10 to form both a vacuum seal and a means by which the closure can be removed. The latter is achieved since, upon cooling, the plastics compound retains an internal screw thread from the impression made by the threads 14 of the container 10 such that twisting of the closure relative to the container 10 causes relative axial movement of the closure away from the container 10 to release the vacuum.

Two points of seal occur. A first, and primary, seal is formed between the rim 12 and the plastics compound. A second seal is formed between the plastics compound and the cylindrical portion 13. The containers 10 are generally of glass but it will be appreciated that other materials may be used.

It will be appreciated that with the thread arrangement of the container 10 of Figure 1, it is an easy matter for a closure, once removed, to be screwed on again. Evidence that vacuum has been lost may be provided by the closure having a movable central por-

tion which, in its unstressed state, is raised but when stressed, for example, by a vacuum in the container, is pulled towards the container. Such closures are widely used to indicate that a container has been opened or that vacuum has been lost for some reason. It is possible, however, for a vacuum to be recreated by heating the contents of the container, screwing the closure back onto the container 10 and allowing the contents to cool and steam in the container to condense to create a vacuum. If this were done, it would be impossible to detect that the container had been opened and the contents perhaps tampered with.

Figure 2 shows a first embodiment of a container 20 according to the invention. The container 20 is again of glass, or of other suitable material, and again has an opening 21, an annular rim 22, a cylindrical portion 23 extending from the rim 22 and a series of threads 24 spaced around the portion 23. Additionally, however, the cylindrical portion 23 carries a pair of circumferentially extending ribs 25, the ribs 25 being diametrically opposed. One rib 25 may be sufficient to achieve its purpose.

The closure (not shown) is applied to the container with the plastics compound heated in exactly the same way as described with reference to Figure 1. Upon cooling, the plastics compound retains a profile caused by the threads 24 and rib or ribs 25. When it is desired to open the container 20, the closure is twisted as before and the plastics compound engaged with the threads 24 causes the closure to lift off and break the vacuum seal. However, the rib or ribs 25 seriously inhibit replacement of the closure by screwing down, as was possible with the Figure 1 container, since it is not easy for the plastics material to pass over the circumferential rib or ribs 25. In trials, it was found difficult to replace the closure and subsequently form a vacuum, even when the contents and the closure were reheated. This embodiment is, however, not totally without disadvantages in that there was evidence of some tearing of side wall compound at the rib or ribs 25 and release torques were high for the closure. Nevertheless, this embodiment is significantly advantageous where these concerns are not important.

A second embodiment of a container 30 according to the invention is shown in Figure 3. In a similar way to earlier embodiments, the container 30 is of glass or other suitable material and has an opening 31, an annular rim 32, a substantially cylindrical portion 33 extending from the rim and a series of regularly spaced screw threads 34 on the portion 33.

As an improvement to the Figure 2 embodiment, the ribs 25 are replaced by elongate ribs 35, there being a pair of diametrically opposed ribs 35 in the Figure 3 embodiment. The long ribs 35 have a circumferential portion 36 and a helical portion 37, the purpose of this profile being that the long ribs 35 would

be less likely to dig into or plough through the plastics compound on the inside of the closure than were the ribs 25 of the Figure 2 embodiment. Additionally, in order to lower release torques, profiles of the threads 34 were altered as compared to the profiles of the threads 14 of the conventional container 10 (this will be described in more detail with reference to Figure 8) and the helix angle was changed relative to the container 10. This embodiment provides a container on which closures cannot be replaced with any apparent security when the closure is cold. Release torques are low for initial release of the closure and this embodiment thus deals satisfactorily with, for example, someone who wishes to tamper with a product instantly in a store. However, this embodiment is less successful when the plastics compound is heated.

A third embodiment 40 of a container according to the invention is shown in Figure 4. Again, the container 40 is of glass or possibly of other suitable material having an opening 41 surrounded by an annular rim 42 from which extends a substantially cylindrical portion 43 carrying a series of regularly spaced threads 44. In the Figure 4 embodiment, the means for inhibiting reclosure is a circumferentially extending land 45 which is effectively the long rib 35 of the Figure 3 embodiment filled axially with material in a direction away from the opening 41. Two diametrically opposed part cylindrical lands 45 are provided in the Figure 4 embodiment. The lands 45 present a closure blocking surface 46 which, as with the previously described ribs, inhibits pressing of the closure onto the container when the closure is cold.

The Figure 3 and Figure 4 embodiments may be modified by having a single long rib 35 in the case of the Figure 3 embodiment or a single land 45 in the case of the Figure 4 embodiment to encourage hand applied reclosures to tilt due to the asymmetric resistance to reapplication. Tilting of a reapplied closure makes it very clear to a potential purchaser or a store attendant that the container is not in its original closed state.

Figures 5a and b show a fourth embodiment of a container 50 according to the invention. The container 50 has an opening 51, an annular rim 52 surrounding the opening, a substantially cylindrical portion 53 extending from the rim 52 and a series of threads 54 on the portion 53. The portion 53 also carries reclosure inhibiting means of two different forms. On one side of the container is a long rib 55 substantially the same as the long rib 36 described in the Figure 3 embodiment. Diametrically opposed to the long rib 55 is a part cylindrical land 56 having an external diameter corresponding essentially to the external diameter of the thread 54. The land 56 thus constitutes a filled-in portion.

With the Figure 5 embodiment, the closure for the container is applied in the same way as with all the previous embodiments, namely the way described

with reference to the conventional Figure 1 container. The closure is heated to a temperature where the plastics compound is plastically deformable and the closure is then pressed on to the threaded portion of the container. Primary sealing is, as before, on the rim 52 of the glass (or other suitable material) container 50 and the secondary seal is on the cylindrical portion 53 carrying the threads 54, long rib 55 and land 56. With this embodiment of a container, an attempt to reapply the closure with its plastics compound carrying a profile from the threads 54, long rib 55 and land 56 results not only in tilting of the closure but also rendering reproduction of a vacuum extremely difficult. This effect is partly caused by the tendency of the closure to tilt but also because any steam pressure generated in the container, and steam pressure would be needed to create the vacuum, would tend to force the closure away from the container and in the region of the land 56, there is no surface lying substantially parallel to but facing away from the rim 52 to prevent such movement. The steam would tend to force the closure away in the region of the land 56 thus making a vacuum very difficult to obtain. Clearly, the old closure, or a new closure, could be applied by using a full closure operation involving heating of the plastics compound and the contents as was the case in the original closure application in, for example, the original factory but with less sophisticated equipment, reapplication of the closure and creation of a vacuum is unlikely to be successful.

Figures 6a, b and c show a preferred embodiment of a container 60 according to the invention. The container 60 has an opening 61, an annular rim 62 surrounding the opening, a substantially cylindrical portion 63 extending from the rim 62 and a series of threads 64 on the portion 63. The portion 63 also carries reclosure inhibiting means of two different forms. On one side of the container is a long rib 65. Diametrically opposed to the long rib 65 is a part cylindrical land 66 having an external diameter corresponding essentially to the external diameter of the thread 64. The land 66 thus constitutes a filled-in portion. Axially extending beads 69, 69' are provided on the threads 64, one at the front and one at the back of the container. As can be seen from Figure 6a, the axial beads 69, 69' span two of the spaces between adjacent threads, and their external peripheries lie flush with those of the threads.

The long rib 65 has a circumferential portion 67 and a helical portion 68, the purpose of this profile being that the long ribs 65 would be less likely to dig into or plough through the plastics compound on the inside of the closure than would a single circumferential rib.

With the Figure 6 embodiment, the closure for the container is applied in the same way as with the previous embodiments.

One effect of the beads 69, 69' of the Figure 6

embodiment is to increase the release torque of the closure so as to be substantially the same as that of the Figure 1 container and correcting for reduction in release torque caused by the rib 65 and land 66. Conversely, the beads 69, 69' also make it more difficult to re-apply the closure since they then function as anti-rotation devices.

Finally, the beads 69, 69' lift the plastics compound away from the cylindrical portion 63 should an attempt be made to re-apply the closure. This makes it very difficult to obtain an effective seal.

Figure 7 shows a detail of the long rib 55 in the Figure 5 or 6 embodiment. Helical portion 57 of the rib 55 has a 6° helix angle and the long rib occupies a space which would have been taken up by two threads 54.

Figure 8 shows the land 56 of the container 50, the extent of which corresponds essentially to those of the long rib 55 but filled in by container material on the side away from the rim 52.

Figure 9 illustrates a section of thread used in the embodiments of container according to the invention. Instead of a conventional semi-circular section thread, thread 54 in Figure 8 has a shallower profile on the side remote from the rim 52 and a steeper profile on the side adjacent the rim 52 thus allowing for easier initial removal of the closure.

Naturally, the long rib 55, land 56 and thread 54 illustrated in Figures 7-9 are equally applicable to the Figure 6 embodiment.

The embodiments of container according to the invention described with reference to Figures 2 to 9 each offer significant advantages over the conventional container of Figure 1 by making reclosure of the container more difficult. Some embodiments have more advantages than others, the Figure 5 and 6 embodiments in particular having the advantages that cold reclosure results in tilting but also that an attempt to recreate a vacuum will be significantly more difficult than with a conventional container due both to the tendency of the closure to tilt and for steam pressure within the container to tend to push the closure off the land provided. A further advantage of the Figure 6 embodiment is that cold reclosure is further hindered by the axial bars provided on the screw threads preventing an effective seal.

It will be appreciated that the foregoing description is by way of example only and that modifications and alternations may be made within the scope of the invention.

Claims

1. A container (50 ; 60) having a circular opening (51 ; 61) for use with a closure of the kind described, which container has an annular sealing surface (52 ; 62), a cylindrical portion (53 ; 63)

extending from the annular sealing surface, external screw thread means (54 ; 64) standing proud of the cylindrical portion adjacent the opening and characterised by reclosure inhibiting means (55, 56 ; 65, 66) having at least one reclosure inhibiting surface facing generally towards the sealing surface, but out of alignment with the screw thread means.

2. A container according to claim 1, wherein the or each reclosure inhibiting surface lies circumferentially with respect to the cylindrical portion.
3. A container according to claim 1 or claim 2 wherein two such closure inhibiting surfaces are provided, one on each side of the opening, the screw thread means lying between the two reclosure inhibiting surfaces.
4. A container according to any preceding claim wherein the reclosure inhibiting means comprises at least one rib (55 ; 65) extending partly around the cylindrical portion, the or each rib providing a closure inhibiting surface.
5. A container according to any one of claims 1-3 wherein the reclosure inhibiting means comprises at least one land (56 ; 66), the or each land having a part cylindrical surface substantially corresponding in diameter to the external diameter of the screw thread means and providing a reclosure inhibiting surface, but no surface facing axially away from the sealing surface engageable, in use, with closure sealing compound.
6. A container according to claim 4 and claim 5 wherein one such rib (55), having a circumferential portion and a thread portion (57) aligned with the screw thread means, and one such land (56) are provided.
7. A container according to any preceding claim wherein the screw thread means is provided with at least one axial bead (69 ; 69') also standing proud of the cylindrical portion.
8. A container according to claim 7 wherein the or each axial bead spans at least one space between adjacent threads of the screw thread means.
9. A container according to claim 8 and claim 6 having two such axial beads (69 ; 69') separating the rib from the land.
10. A container according to claim 9 wherein the rib and the land, and the two axial beads are respectively offset from being diametrically opposed by

no more than 10°.

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FIG. 1

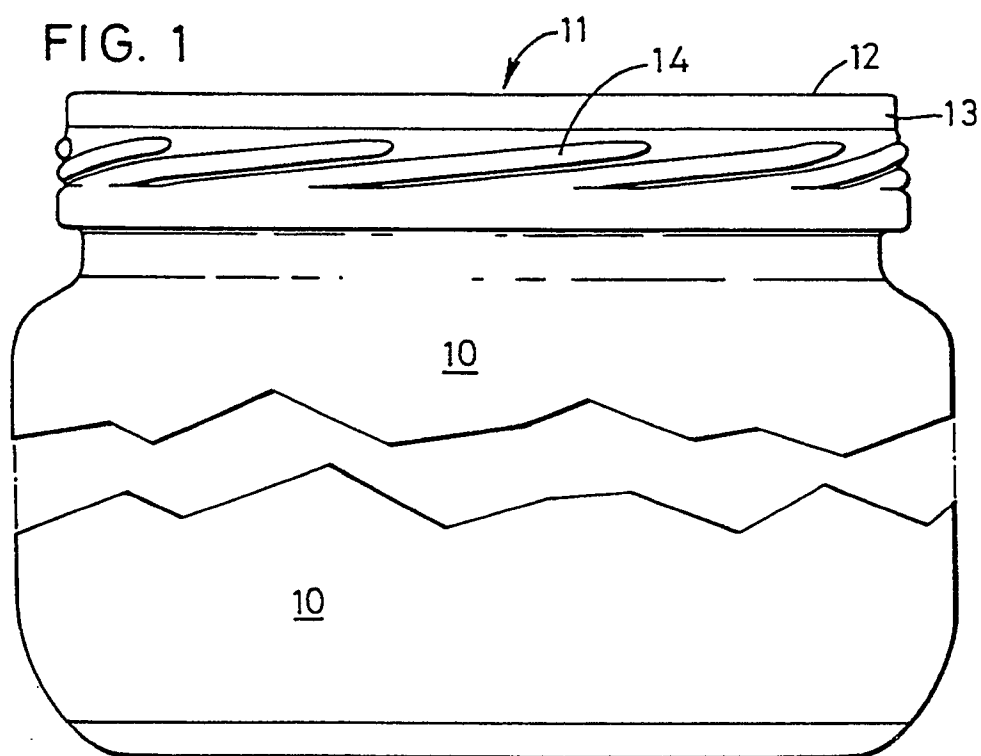


FIG. 2

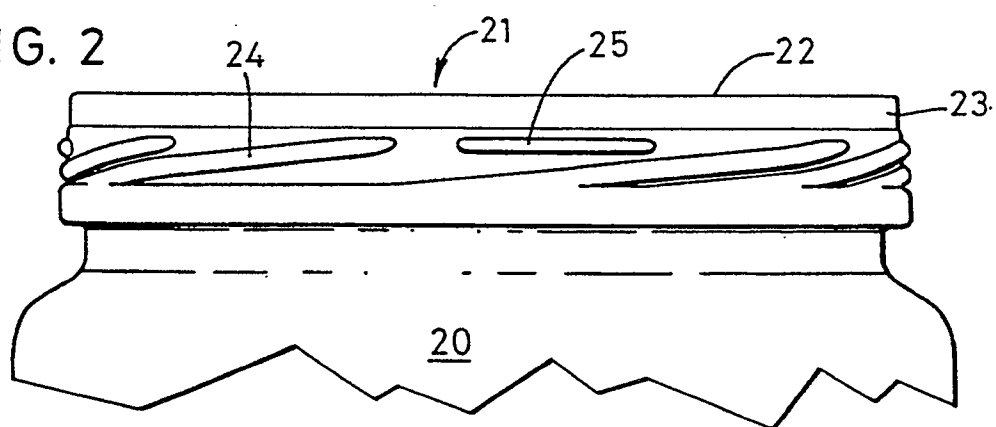
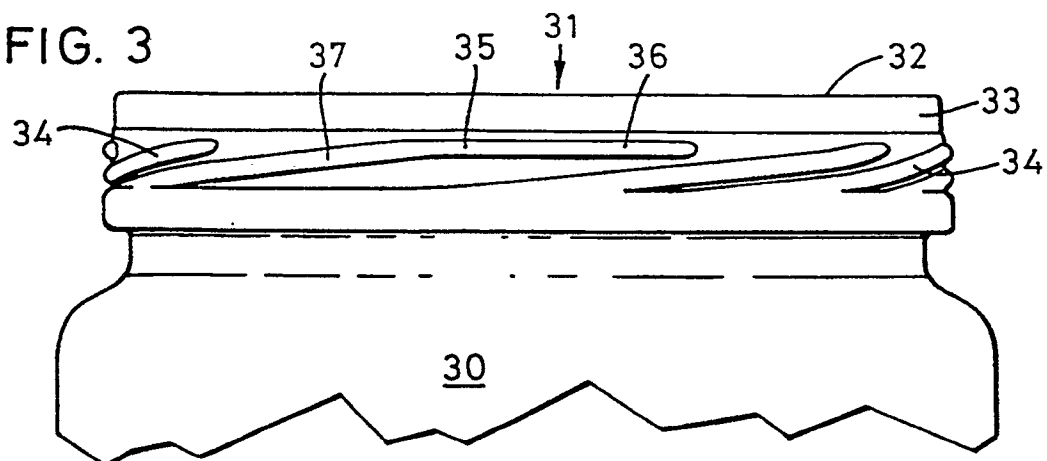


FIG. 3



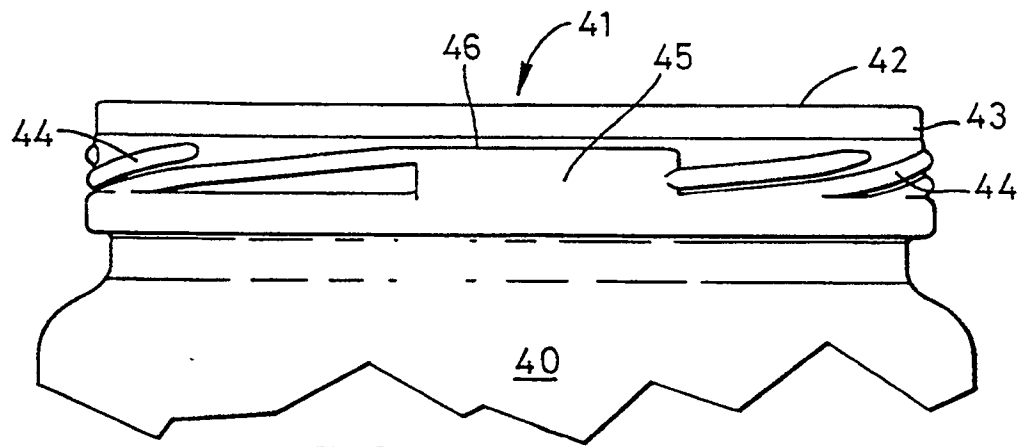


FIG. 4

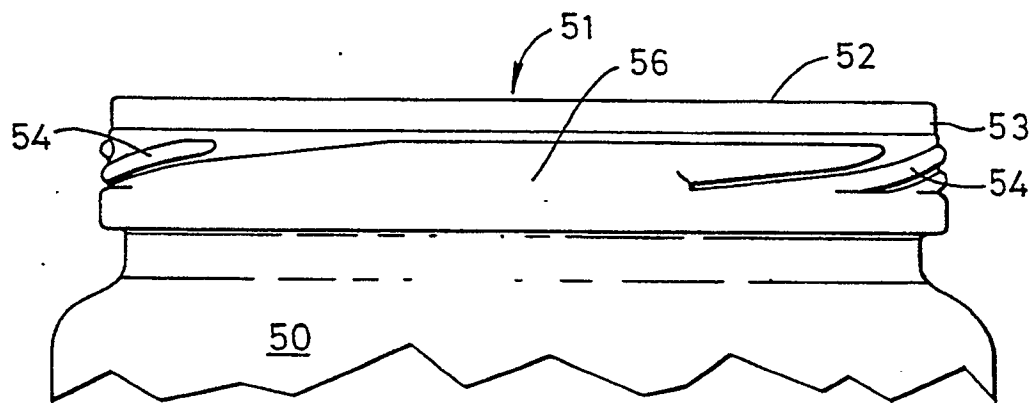


FIG. 5a.

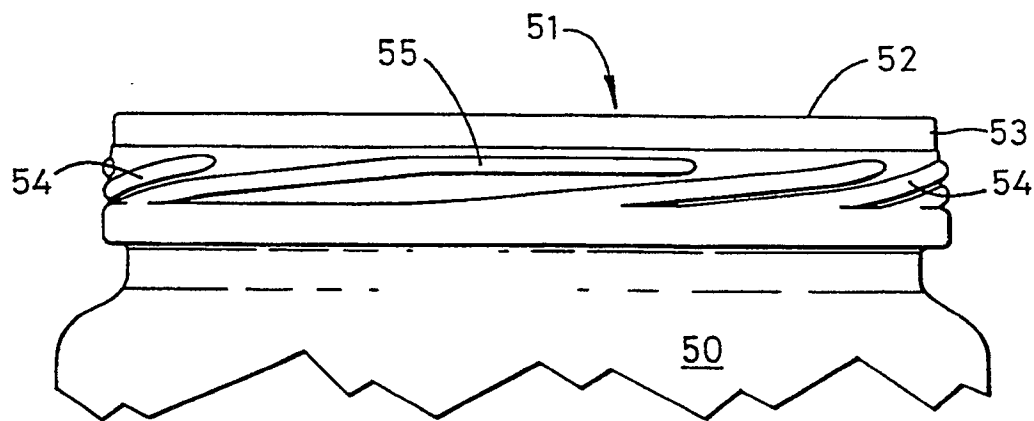


FIG. 5b.

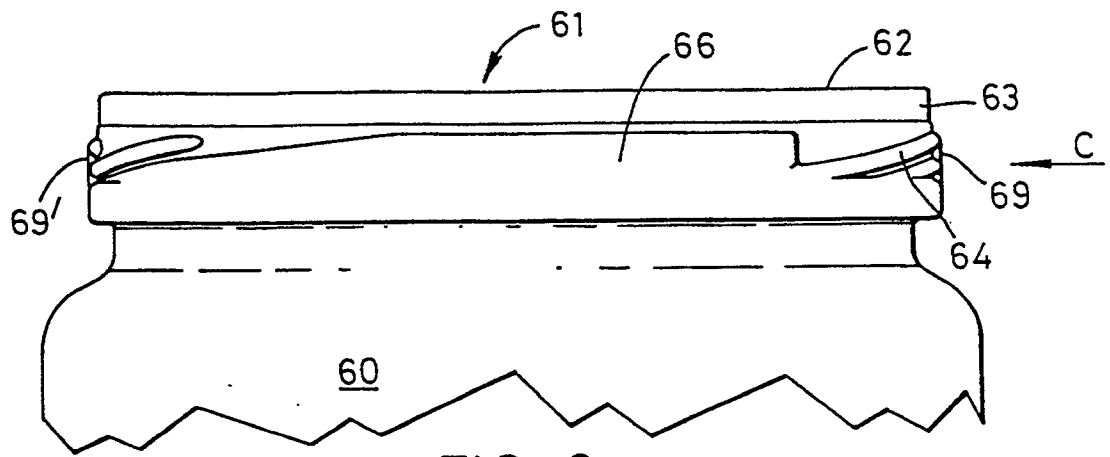


FIG. 6a

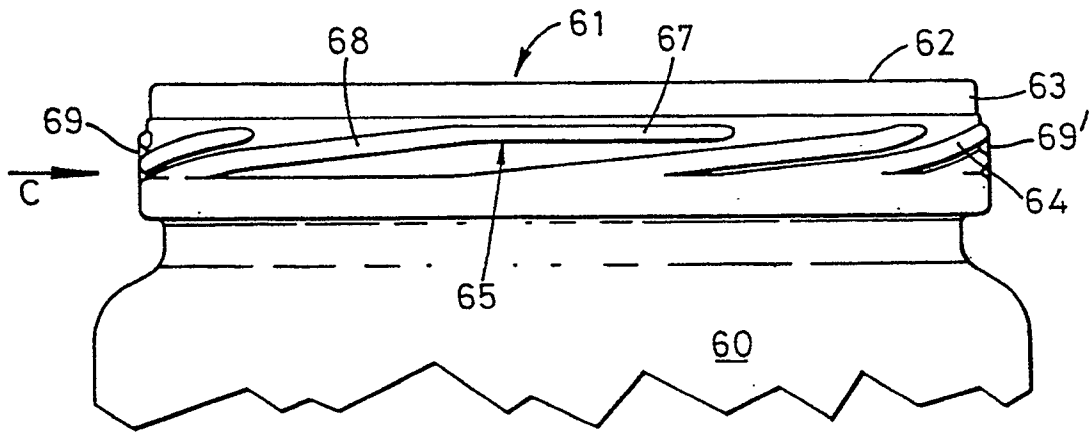


FIG. 6b

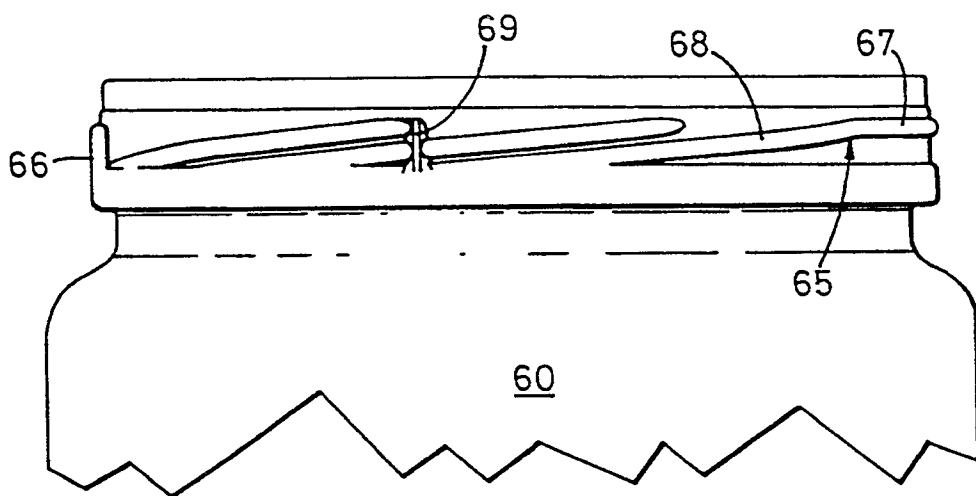


FIG. 6c

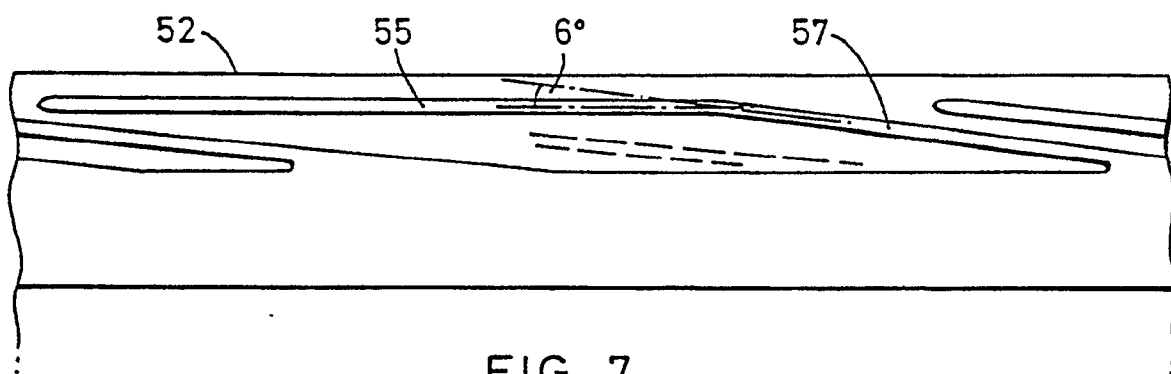


FIG. 7

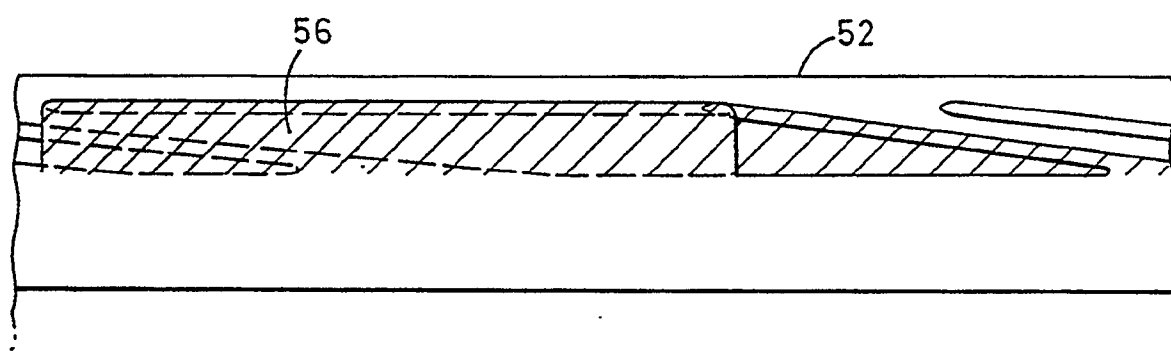


FIG. 8

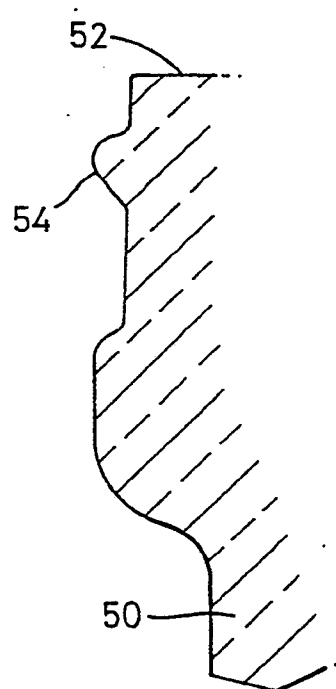


FIG. 9



European Patent
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EUROPEAN SEARCH REPORT

Application Number

EP 90 31 3191

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.5)
A	DE-A-1 900 700 (HART) * Page 6, paragraph 3; claims 1,4,7,8; figures 1-4 *	1-5	B 65 D 41/04
A	DE-A-1 432 137 (FOSTER) * Page 10, paragraphs 2,3; figures 6-7 *	1,2,5	
A	US-A-3 435 978 (WITTWER) * Column 3, lines 61-69; column 4, lines 4-9; figures 6,8; claim 1 *	1-4	
A	US-A-2 589 005 (WELHART) * Claim 1; figures 1-4 *	1-4	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B 65 D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 12-02-1991	Examiner VANTOMME M.A.
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