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(54) **A removable lid with vacuum-release button**

(57) A removable lid (1) for use with a food-storage

container (10), the lid having a user-actuable vacuum-release button (12) provided by a curved score line (5).

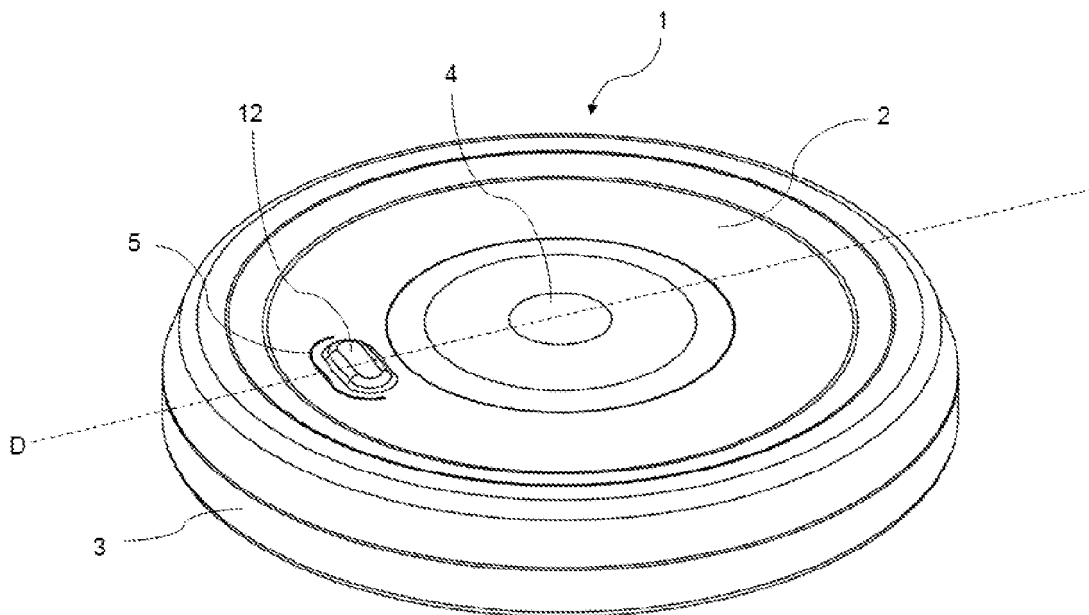


Figure 4

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Description

[0001] The present invention relates to a removable lid of the type that may be applied to and removed from a foodstuff container by a twisting action, and where the container is packed such that a negative pressure exists within the container with respect to the external pressure. More particularly, this invention relates to a removable lid that is easier to remove from the container.

[0002] Twist-off removable lids are often used with containers in order to provide a hermetic seal for holding foodstuffs such as cooking sauces, preserves and the like. Typically such lids are formed of a metallic body, usually steel, with a circular top surface and skirt portion. Threads or lugs are incorporated into the inside of lid to compliment a corresponding helical thread on the outside of the top of the container to be closed. During production the container may be "vacuum sealed" so improve the seal between the lid and the body. The lid may then be removed by a consumer by twisting the lid to unscrew it from the container. A flexible "vacuum button" may be formed in the lid to provide an indication that the vacuum is present.

[0003] Conventional twist-off removable lids have a reputation for being difficult to open for consumers. The reason for this is that in order to remove the lid, the consumer must apply significant grip and torque to overcome the frictional force between the lid and the container which is accentuated by the axial load provided by the vacuum inside the container. This can prove troublesome for some people, particularly those who are elderly, young or suffer from a physical disability or impairment such as arthritis.

[0004] In an attempt to address this, consumers have come up with a large number of methods to more easily remove twist-off lids, including tapping the corner of the lid against a hard surface, striking the corner of the lid with a knife or running hot water over the lid before twisting. These methods are not always successful and can be dangerous if the container is made of glass. In addition to these methods, numerous utensils have been manufactured with the specific intention of aiding in opening twist-off lids. However, most of these utensils work by simply increasing the consumer's grip on the lid, and do not reduce the amount of torque required to overcome the frictional force.

[0005] It is an object of the present invention to overcome or at least mitigate the difficulties experienced by the consumer when removing lids from food-storage containers as described above. This object is achieved by providing an improved removable lid that enables consumers to first release the vacuum within the container before attempting to remove the lid.

[0006] According to a first embodiment of the present invention there is provided a removable lid for use with a food-storage container, the lid having a user-actuable vacuum-release button provided by a curved score line.

[0007] A range of curved profiles have been tested and

it was found that one curved generally around the finger actuation point gives the lowest opening force for a given score residual and is therefore the easiest to open closure with minimal chance of accidental opening.

[0008] Embodiments of the present invention provide an easy-to-use, integrated solution that, when in use, allows consumers to more easily remove lids from containers, without the need for separate utensils or for carrying out potentially unsafe methods.

[0009] The curved score line may be such that the user-actuable vacuum-release button can be actuated to fracture along the score line by finger pressure. The length of curved score line may be less than 2cm.

[0010] The lid may further comprise a centrally located pop-up button to indicate whether or not a vacuum is present, and said curved score line is located radially outward of the button.

[0011] The surface of the lid proximate to the curved score line may be decorated and contain an embossed pattern, which may comprise ridges formed in the material of the lid. Also, the surface of the lid within the curved score line may be raised to form a button.

[0012] The force required to actuate the vacuum-release button may be between 10N and 40N, and it may be 20N. Too small a force may lead to accidental opening in transit or capping and too great a force will make the button difficult to open.

[0013] The lid may further comprise one or more formations or lugs for engaging screw threads on the food-storage container.

[0014] The curved score line may be formed by laser scoring, or by mechanical scoring, and the depth of the curved score line may extend between 50% and 100% through the thickness of the lid.

[0015] The thickness of the lid may be substantially 0.16mm, and the curved score line may cut the thickness to substantially 0.02mm.

[0016] The depth of the curved score line may extend 100% through the thickness of the lid.

[0017] A sealing compound may be provided on the underside of the removable lid underneath the user-actuable vacuum-release button. The sealing compound may peel away from part of the lid during actuation of the vacuum-release button to expose an opening.

[0018] The removable lid may be substantially metal, for example it may be substantially steel.

[0019] According to a second embodiment of the invention there is provided a product comprising a food-storage container and a removable lid as described in any of the previous statements.

[0020] The interior of the container may be at a negative pressure with respect to the atmosphere such that the removable lid is removably sealed to the food-storage container by a pressure differential.

[0021] For a better understanding of the present invention and in order to show how the same may be carried into effect reference will now be made, by way of example, to the accompanying drawings in which:

Figure 1 shows a perspective view of a removable lid according to an embodiment of the invention; Figure 2 shows an enlarged cross-sectional detail of the score line in the removable lid of Figure 1; Figure 3 shows a perspective view of the removable lid of Figure 1 attached to a container; Figure 4 shows a perspective view of a removable lid according to another embodiment of the invention; Figure 5 shows an enlarged cross-sectional detail of the embodiment of Figure 4; Figures 6a and 6b show a perspective view of a removable lid according to a further embodiment of the invention from above and below respectively; Figure 7 shows an enlarged cross-sectional detail of the user-actuated vacuum-release button of the embodiment of Figures 6a and b; and Figures 8a and 8b show enlarged cross-sectional details of the user-actuated vacuum-release button of Figure 7 before and after a force is applied.

[0022] As discussed above, conventional removable lids can be difficult to remove from foodstuff containers due to the need to overcome the frictional force between the lid and container which is accentuated by the vacuum inside the container.

[0023] A removable lid will now be described with reference to the figures that can overcome this difficulty by allowing the consumer to first easily release the vacuum within the container before attempting to twist off the lid. This is facilitated by providing a weakened score line on the top surface of the lid. The score line is generally curved, e.g. arcuate, in shape to match the shape of a finger tip, and can take the form of an arc segment. Figure 1 shows a perspective view from above of a removable lid 1 comprising a top surface 2 that is circular in shape, and a "skirt" 3 that extends down from the edges of the top surface 2. The top surface 2 and the skirt 3 together form an interior recess underneath the lid, and the inside walls of the skirt 3 comprise a helical thread that engages with a corresponding helical thread on a container. Alternatively, instead of a full helical thread being formed into the lid, there may be a number of formations or lugs that engage with helical threads on the container.

[0024] The lid 2 is intended to be used with vacuum-sealed foodstuff containers, for example glass mason jars used to contain cooking sauces, preserves or similar. The lid will typically be made of steel. During the production process in which the foodstuff is introduced into the jar, the lid hermetically seals the jar with a negative pressure ("vacuum") inside to strengthen the seal and possibly aid in the preservation of the food. The top surface 2 comprises a "pop-up" button 4 formed as part of the top surface. If there is a vacuum inside the jar then the pop-up button 4 remains depressed. If there is no longer a vacuum in the jar, then the pop-up button will be released and the consumer can press it down to feel and hear a "click" or "pop" which acts as an indication to the consumer that the jar has been opened.

[0025] Figure 1 also shows a curved score 5 on the top surface 2 of the lid. This score provides a weakened line in the steel of the lid that can be broken when a force is applied to it. The score is made in the top surface during manufacture of the lid, and is made off-centre such that it doesn't overlap with the pop-up button 4. In this way, pressing the pop-up button 4 will not fracture the curved score line 5. There are numerous ways in which the score can be formed, examples of which are laser scoring, machining, or mechanical scoring (e.g. using a press and anvil). By fracturing the top surface of the lid at the curved score line, air is allowed to enter the jar through the newly made opening, therefore releasing the vacuum inside.

[0026] Also shown formed on the top surface in Figure 1 is an embossment pattern that comprises ridges formed into the top surface of the lid. This embossment pattern acts as an indicator to the consumer where best to place a finger in order to apply pressure to the score line and fracture it.

[0027] Figure 2 shows an enlarged section of the top surface 2 containing the score line 5 in cross-section, taken perpendicular to the score line. Typically the thickness of the steel, as indicated by the distance α , is around 0.16mm. At the score line 5, the thickness of the steel, indicated by the distance β , will be reduced to about 0.02mm. However, α can be a thickness in the range 0.10 to 0.3mm, and β can be between 0.005 and 0.1 mm.

[0028] Figure 3 shows the lid 1 as shown in Figure 1 attached to a jar 10. Arrows A to C indicate the events that take place when a consumer first opens the jar. Initially the jar is unopened, therefore the vacuum within is intact and the pop-up button 4 has not been released. The consumer first applies a force A to the area indicated by the embossed pattern 6 in the top surface 2. This causes the top surface to fracture at the score line 5, and air enters the jar through the resulting opening. As a result, the vacuum within the jar is released, and the pop-up button 4 is released as indicated by arrow B. The release of the pop-up button 4 is often accompanied by a "pop" or "click" type sound which acts as an audible indication to the consumer that the vacuum has been released. Now the consumer can proceed with twisting off the lid 1 from the top of the jar 10 in the normal fashion, as indicated by arrow C. As there is no longer a vacuum seal to overcome at the twisting off stage, the force required is significantly reduced.

[0029] The resulting opening that is formed in the top surface when the score line is fractured may be sharp and so, to avoid consumers injuring themselves, the area of the top surface that contains the score line may be slightly lower compared to the rest of the top surface. The resulting opening does not need to be large as it only requires that air is able to enter the jar to equalise the pressure difference, and so the part of the top surface that is displaced by the force applied by the consumer does not need to be displaced by very much. Typically the maximum displacement will be less than 1 mm, and once the force is removed the resilience of the material

will return that part of the top surface substantially to its previous position. Thus the consumer will not see a hole in the closure after opening.

[0030] An alternative embodiment is shown in Figure 4. Instead of the embossed pattern of the first embodiment, a raised button 12 is provided adjacent to the score line 5, and the shape of the button compliments the shape of the score line, i.e. the score line extends partially around the button. The raised button may be formed from extra material added to the top surface. However, the embodiment shown is formed by shaping the steel top surface to incorporate the raised button at the desired location. Figure 5 shows a cross section of the lid of Figure 4 along the dotted line D.

[0031] The score line can, in a further alternative, reduce the thickness of the lid down to 0mm, i.e. the score line breaks through the lid. Figures 6a and 6b show the top and underneath respectively of such a lid. From the top, the lid looks the same as previous embodiments. There is a generally arcuate score line 5, with a raised button 12 formed in the top surface 2, along with a pop-up button 4. Underneath, however, there is an area of compound 14 underneath the button and score line. This compound 14 seals the lid, maintaining the vacuum and protecting the cut edge provided by the score line 5. Figure 7 shows a cross section through the score line 5 and raised button 12, and includes the compound 14 on the underside of the top surface. This compound can be made from a plastic, foil patch, hot melt or rubber-type material. Figures 8a and 8b show how the seal provided by the compound 14 is peeled away from the top surface when a force F is applied to the top of the raised button, and an opening 15 is created through which air can enter the container to release the vacuum.

[0032] It will be appreciated by the person of skill in the art that various modifications may be made to the above described embodiments without departing from the scope of the present invention.

Claims

1. A removable lid for use with a food-storage container, the lid having a user-actuable vacuum-release button provided by a curved score line.
2. A removable lid as claimed in claim 1, wherein the curved score line is such that the user-actuable vacuum-release button can be actuated to fracture along the score line by finger pressure.
3. A removable lid as claimed in any one of the preceding claims, wherein the lid further comprises a centrally located pop-up button to indicate whether or not a vacuum is present, and said curved score line is located radially outward of the button.
4. A removable lid as claimed in any one of the preced-

ing claims, wherein the surface of the lid within the curved score line is raised to form a button.

5. A removable lid as claimed in any one of the preceding claims, wherein the force required to actuate the vacuum-release button is between 10N and 40N.
6. A removable lid as claimed in any one of the preceding claims, wherein the lid further comprises one or more formations or lugs for engaging screw threads on the food-storage container.
7. A removable lid as claimed in any one of the preceding claims, wherein the curved score line is formed by laser scoring.
8. A removable lid as claimed in any one of the preceding claims, wherein a sealing compound is provided on the underside of the removable lid underneath the user-actuable vacuum-release button.
9. A product comprising a food-storage container and a removable lid as described in any one of the preceding claims attached to the container.
10. A product as claimed in claim 9, wherein the interior of the container is at a negative pressure with respect to the atmosphere such that the removable lid is removably sealed to the food-storage container by a pressure differential.

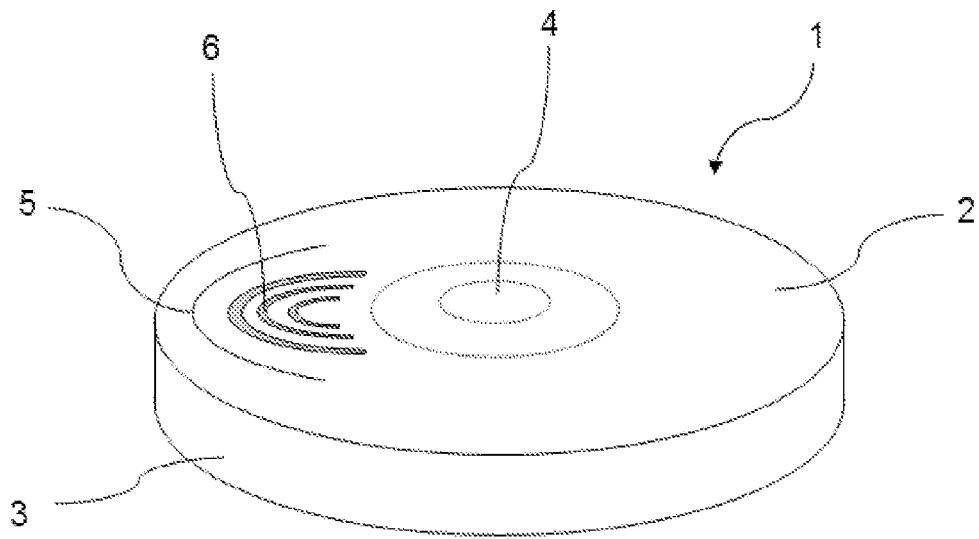


Figure 1

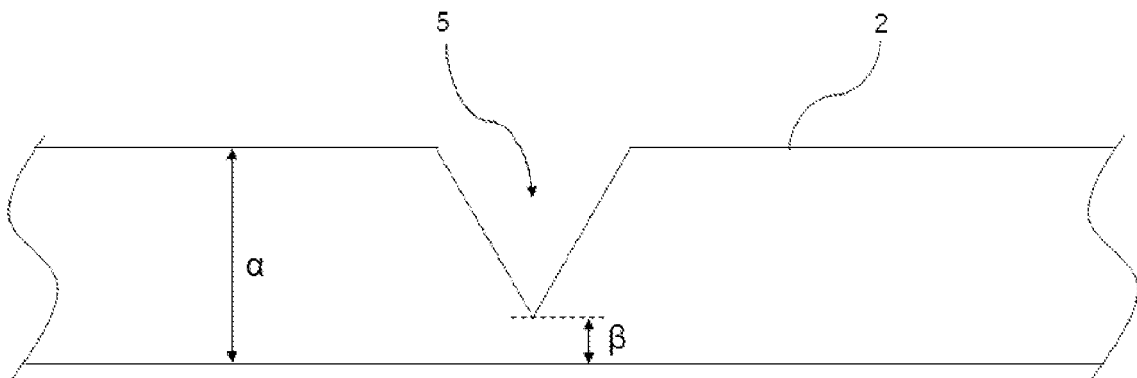


Figure 2

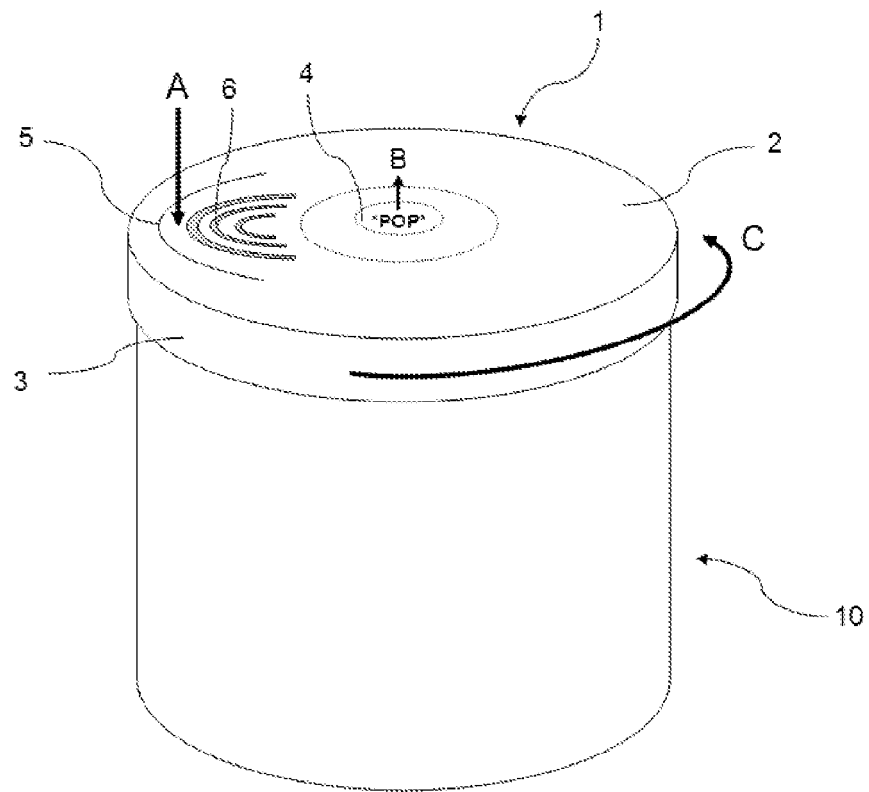


Figure 3

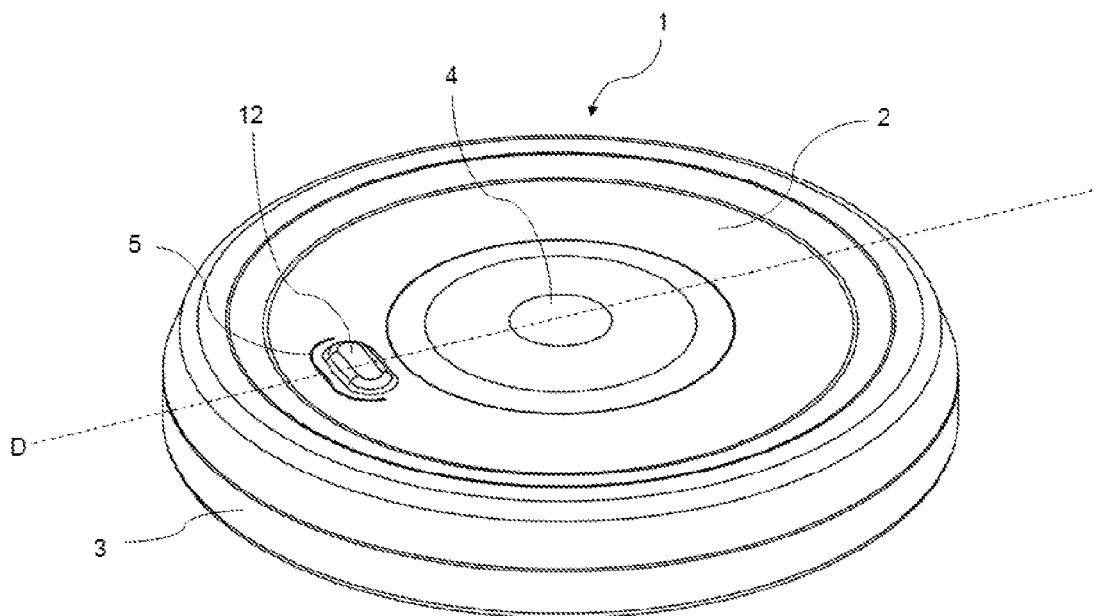


Figure 4

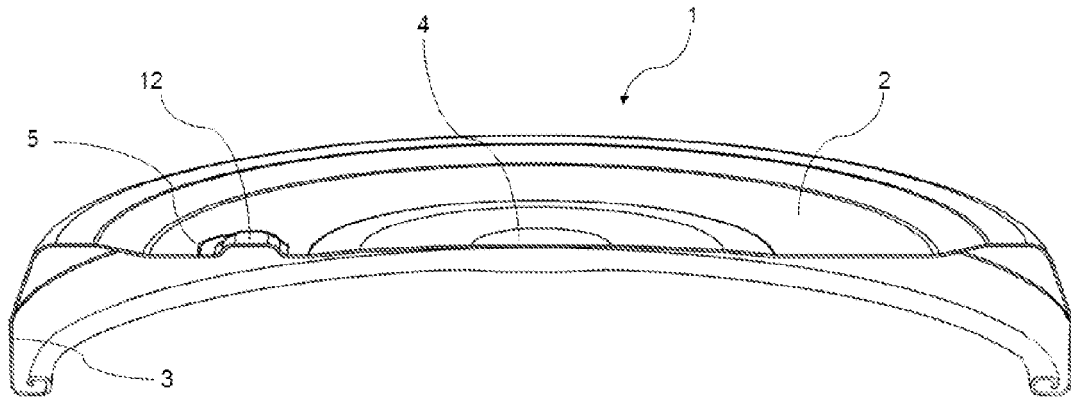


Figure 5

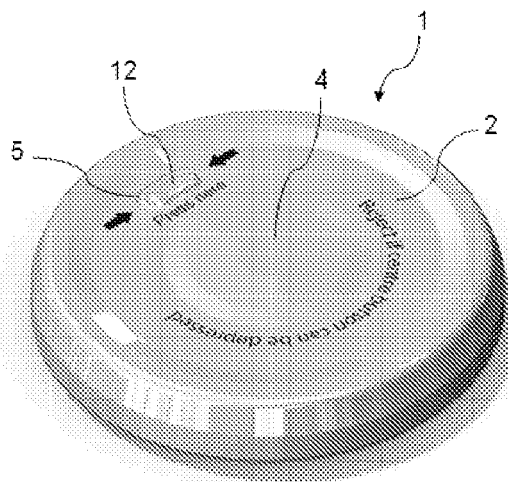


Figure 6a

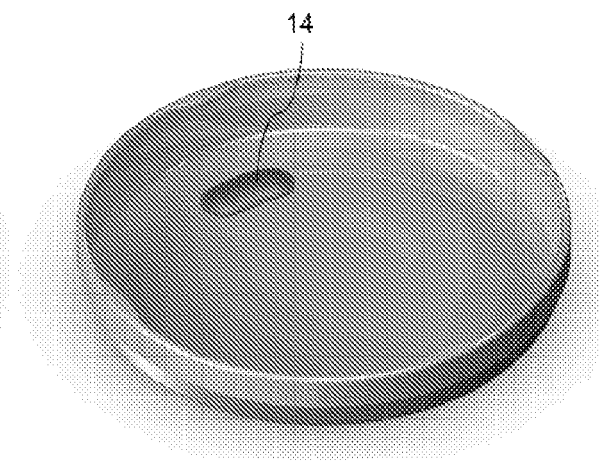


Figure 6b

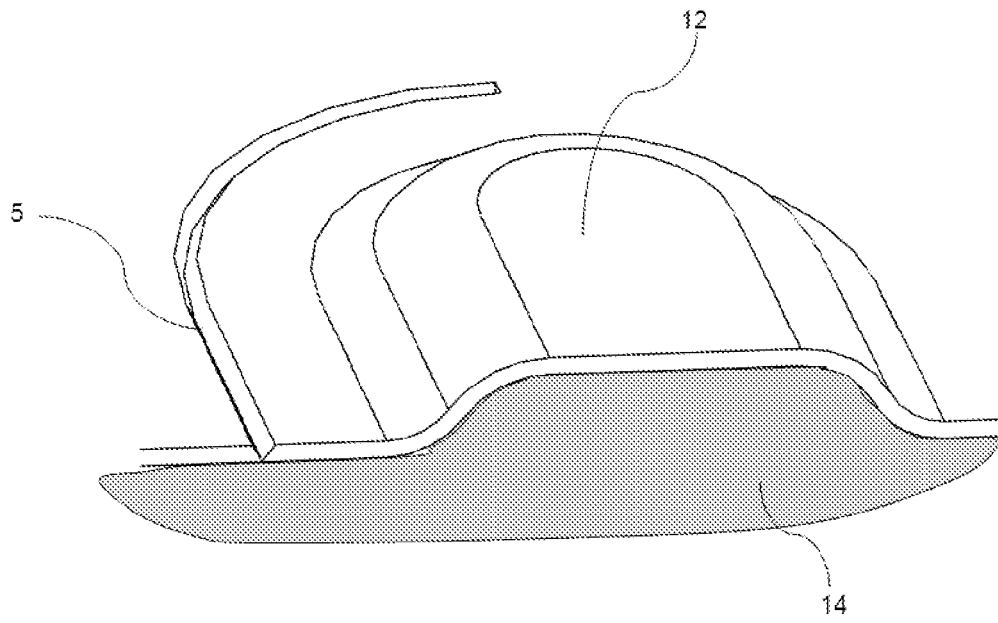


Figure 7

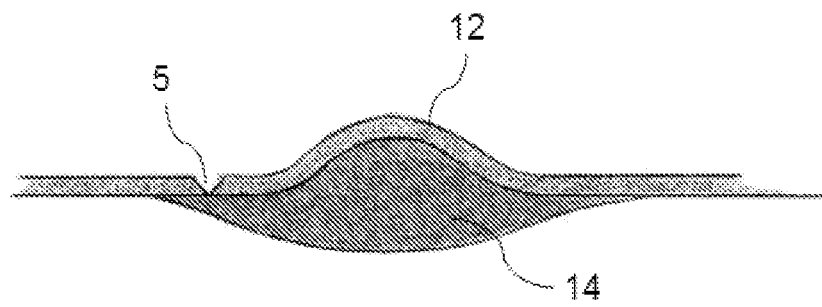


Figure 8a

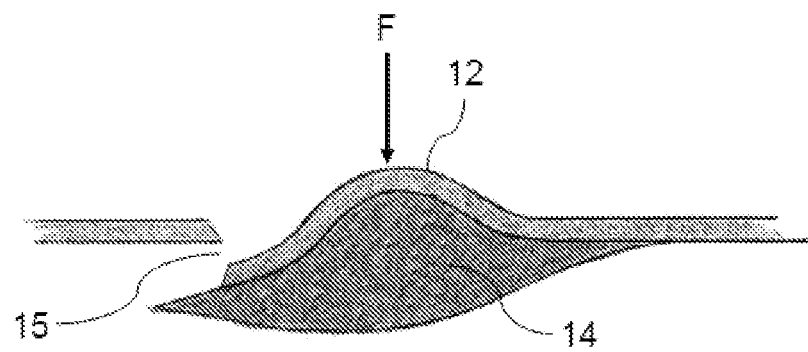


Figure 8b



EUROPEAN SEARCH REPORT

Application Number
EP 11 16 9893

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Y	* the whole document *	3	B65D51/16 B65D79/00

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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			B65D
Place of search		Date of completion of the search	Examiner
The Hague		18 October 2011	Gino, Christophe
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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EPO FORM 1503 03.82 (P04C01)

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

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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