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(54) **Liner**

(57) A liner (10) is provided for a closure (50) which is adapted to seal the opening in a container neck (90). The liner (10) comprises a first layer set (30) adapted to remain on the container neck following first removal of the closure, and a second layer set (20) adapted to re-

main in the closure (50). The first layer set (30) includes one or more dispensing orifices (35, 36) allowing the contents of the container to be dispensed.

A closure (50) incorporating such a liner (10) and a method of forming such a liner (10) are also provided.

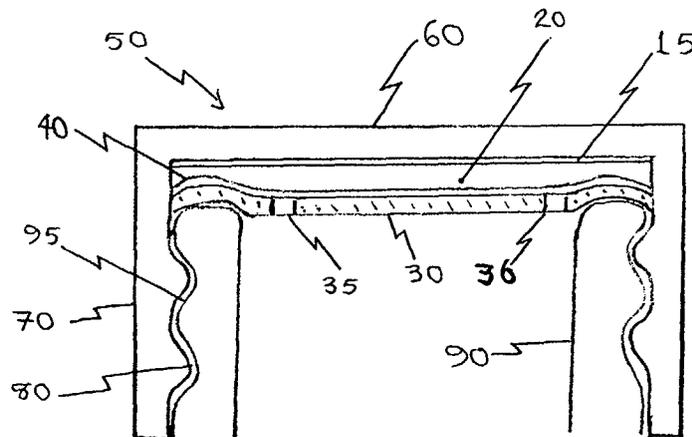


FIG 3

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Description

[0001] The present invention relates to a liner for a closure adapted to seal the opening in a container neck.

[0002] Liners are widely used to perform a variety of functions in association with closures. Primarily liners are used for sealing an associated container neck. However, liners are also used, for example, in gas scavenging and gas barrier applications. In order to provide a plurality of functions, liners often comprise a plurality of layers.

[0003] It is known to use a multi-layer liner in which after first application to a container neck the layers of the liner are or become separable. When the closure is subsequently removed from the container a lower liner layer or set of layers seals the container neck and an upper liner layer or set of layers remains in the closure. Often, the lower liner layer/s must be removed or punctured to allow the contents of the container to be dispensed.

[0004] For many products it is desirable to provide a part on the container which aids dispensing. This is usually provided in the form of a separate component which must be assembled onto the container neck before sealing. In the above example the lower liner layer may seal the dispensing component. The lower liner layer must first be removed or punctured in some way to allow the contents of the container to be dispensed using the separate dispensing component.

[0005] The present invention provides a liner for a closure adapted to seal the opening in a container neck; the liner comprising a first layer set adapted to remain on the container following first removal of the closure, and a second layer set adapted to remain in the closure; the first layer set includes one or more dispensing orifices allowing the contents of the container to be dispensed.

[0006] The principle of the present invention is to use one or more of the layers of a multi-layer liner as a dispensing aid. A separate dispensing component is therefore not required. In addition there is no requirement to remove or puncture the lower layers before dispensing.

[0007] The invention is not limited to the shape or the number of orifices in the liner.

[0008] In one embodiment of the invention a closure with a liner is applied to a container neck and induction welding is used to seal the lowermost liner layer to the container neck. In addition, the induction process weakens or removes the adhesion between a lower layer or set of layers which is intended to remain on the container neck, and an upper layer or set of layers which is intended to remain in the closure.

[0009] The first layer set may comprise or include a layer of aluminium. Aluminium can easily be induction welded onto a plastic container neck and has good gas (e.g. oxygen) barrier properties. The second layer set may comprise or include a layer of polyethylene. Polyethylene, particularly when in foamed form, has good

sealing properties to allow the liner to seal around a container neck. However, it will be appreciated that the present invention is not limited to a particular choice of materials.

[0010] In order that the container neck seal is not compromised, the or each orifice is preferably positioned wholly within the periphery of the sealed area on the neck.

[0011] The present invention also provides a closure incorporating a liner as described herein.

[0012] The present invention also provides a method of forming a liner, comprising the steps of joining the first and second layer sets together and then forming orifices in the second layer set.

[0013] By forming the orifices only after the layers of the liner have been assembled, this allows a closure manufacturer to buy in the liner and then form the orifices as required. In addition, this method allows orifices to be formed in pre-punched liners.

[0014] The present invention will now be more particularly described, by way of example, with reference to the accompanying drawings, in which:

Fig.1a is a sectional view of a liner according to the present invention;

Fig.1b is an underplan view of the liner of Fig.1a;

Fig.2 is a sectional view of the liner of Fig.1 fitted into a closure, prior to application to a container neck;

Fig.3 is a sectional view of the closure of Fig.2 following application to a container neck;

Fig.4 is a sectional view of the closure and container neck of Fig.3 following first removal of the closure;

Figs. 5a to 5c are diagrammatic representations of the stages involved in the method of forming a liner according to the present invention;

Fig.6 is a sectional view of a liner formed according to an alternative embodiment; and

Fig.7 is a sectional view of a liner formed according to an alternative embodiment.

[0015] Referring first to Fig.1a there is shown a disc-shape liner generally indicated (10). The liner (10) comprises a layer of foamed polyethylene (20) and a layer of aluminium (30) joined by a layer of adhesive (40). Referring also to Fig.1b, the aluminium layer (30) includes two oval orifices (35, 36).

[0016] Referring now to Fig.2, the liner (10) is shown secured into the top of a closure generally indicated (50). The closure (50) comprises a disc-shape top plate (60) with a cylindrical skirt (70) depending from the periphery thereof. The skirt (70) includes screw thread formations (80). The liner (10) is glued to the underside of the top plate (60) by an adhesive layer (15) on the polyethylene layer (20).

[0017] In Fig.3 the closure (50) is shown applied to a container neck (90). The closure is applied using screw thread formations (95) on the neck corresponding to the

formations (80) on the closure.

[0018] With the closure fully applied the liner, in particular the foamed polyethylene layer (20), is compressed and forms a seal around the container neck (90). The aluminium layer (30) is welded to the container neck (90) by an induction process. The induction process also weakens/removes the adhesion between the layers (20, 30) by at least partly melting the adhesive layer (40).

[0019] Fig.4 shows the closure and container neck following first removal of the closure. Because the adhesion between the layers (20, 30) is weakened/removed, when the closure (50) is unscrewed the aluminium layer (30) remains on the container neck (90) and the polypropylene layer (20) remains on the top plate (60) because of the adhesive layer (15). The aluminium layer (30) constitutes a first layer set which remains on the container neck following first removal of the closure. The polyethylene layer (20) constitutes a second layer set which remains in the closure following first removal.

[0020] The orifices (35, 36) in the layer (30) now allow the contents of the container to be dispensed, with no need for a separate dispensing component in order to control product flow.

[0021] When the closure (50) is re-applied the layer (20) still serves to seal the container.

[0022] Referring now to Figs. 5a to 5c there is illustrated a method of forming the liner of Figs. 1 to 4 according to the present invention. Fig.5a shows the two layers (20, 30) separate to each other. The layers (20, 30) are then joined by the layer of adhesive (40) to form a multi-layer liner as shown in Fig.5b. Only once the layers are joined together, orifices (35, 36) are formed solely in the aluminium layer (30). The depth of cutting/drilling must therefore be determined precisely. It is of course likely that in practice the cutting/drilling may extend slightly into the polypropylene layer (20). Because the orifices are entirely within the area (A) of the layer (20) which seals around the container neck (see Fig.4), even if the orifices extend into the layer (20) this will not affect the sealing performance.

[0023] Referring to Fig.6 there is shown an alternative embodiment. In this embodiment the liner (110) comprises a layer of foamed polyethylene (120), an oxygen-scavenging layer (121), a further layer of foamed polyethylene (131) and a layer of aluminium (130).

[0024] Orifices (135, 136) are formed in the aluminium layer and the polyethylene layer (131). The layers are joined together by adhesion. The polyethylene layer (131) and the oxygen-scavenging layer (121) are joined using an adhesive layer (140) which acts in the same way as the layer (40) of Figs. 1 to 4. Accordingly, after the liner (110) has been secured into a closure and added to a container neck the layers (121, 131) separate on removal of the closure.

[0025] The layers (130, 131) constitute a first layer set which remains on the container neck following first removal of the closure. The layers (120, 121) constitute a

second layer set which remains in the closure. The contents of the container can be dispensed through the orifices (135, 136).

[0026] In practice the liner (110) will be formed in a large sheet, and disc-shaped liners will be punched out. The orifices (135, 136) could be formed before or after the punching operation.

[0027] Referring to Fig.7 there is shown an alternative embodiment. In this embodiment the liner (210) comprises a layer of foamed polyethylene (220), a layer of wax (225), a layer of adhesive (240) joining the layer of wax (225) to another layer of wax (226), a layer of aluminium (230), a layer of polyethylene terephthalate (227) and a layer of polyethylene (228). Orifices (230, 231, 232) are formed in the layers (226, 230, 227, 225). The layers (226, 230, 227, 228) constitute a first layer set which remains on the container neck following first removal of the closure. The layers (220, 225) constitute a second layer set which remains in the closure.

[0028] In this embodiment because of the inclusion of the wax layers, the level of adhesion provided by the adhesive layer (240) is very low and is sufficient merely to hold the wax layers (225, 226) together.

[0029] In this embodiment when the liner is added to a closure and welded to a container neck, the level of adhesion provided by the adhesive layer (240) is not reduced. However, the lower polyethylene layer (228) is welded to the container neck, and the upper polyethylene layer (220) is glued into the closure. As long as the strength of these bonds with the polyethylene layers (228, 220) is stronger than the strength of the bond between the adhesive layer (240) and the adjacent wax layers (225, 226), the liner will split between the wax layers (225, 226) when the closure is removed for the first time.

[0030] The principle that the liner will split along the line of lowest adhesion can be applied when deciding which layers to include in a liner, and what levels of adhesion are required between the layers.

Claims

1. A liner (10) for a closure (50) adapted to seal the opening in a container neck (90), the liner comprising a first layer set (30) adapted to remain on the container neck following first removal of the closure, and a second layer set (20) adapted to remain in the closure, the first layer set includes one or more dispensing orifices (35, 36) allowing the contents of the container to be dispensed.
2. A liner (10) according to claim 1, wherein the first layer set (30) comprises or includes a layer of polyethylene.
3. A liner (10) according to claim 1 or claim 2, wherein the second layer set (20) comprises or includes a

layer of aluminium.

4. A liner (10) according to any of claims 1 to 3, wherein the or each orifice (35, 36) is positioned wholly within the periphery of the sealed area (A) on the container neck. 5
5. A closure (50) incorporating a liner (10) according to any preceding claim. 10
6. A method of forming a liner (10) according to any of claims 1 to 4, comprising the steps of joining the first (30) and second layer (20) sets together and then forming orifices (35, 36) in the second layer set (20). 15

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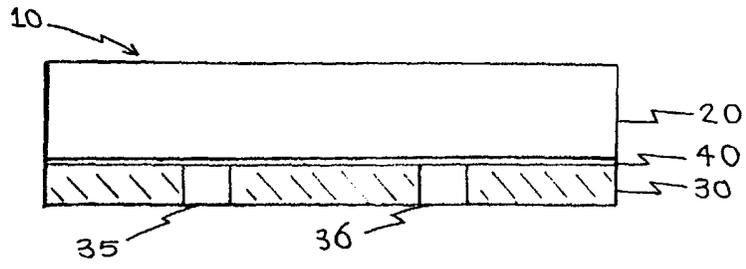


FIG 1a

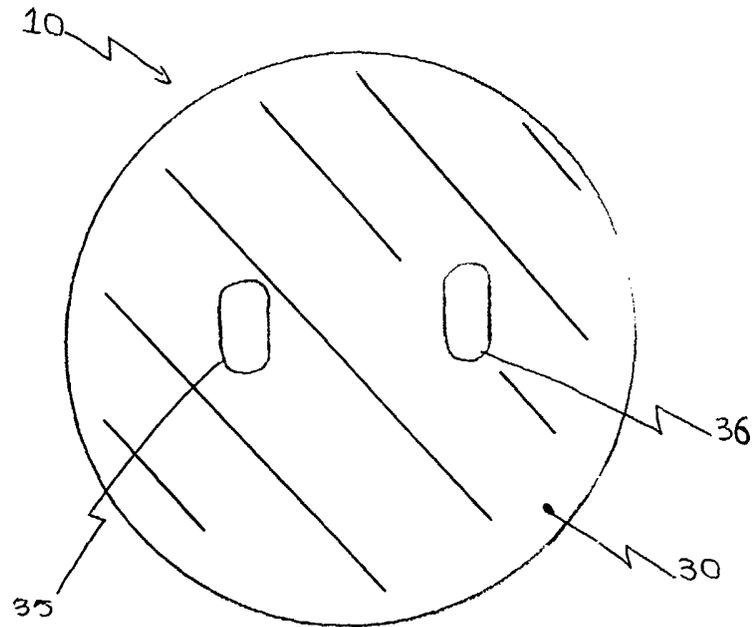


FIG 1b

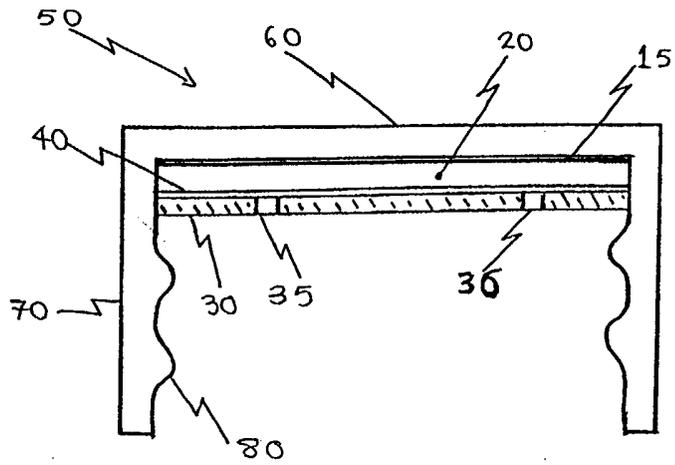


FIG 2

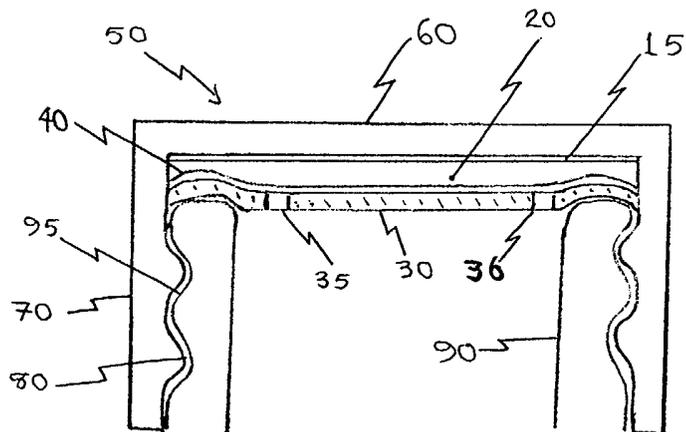


FIG 3

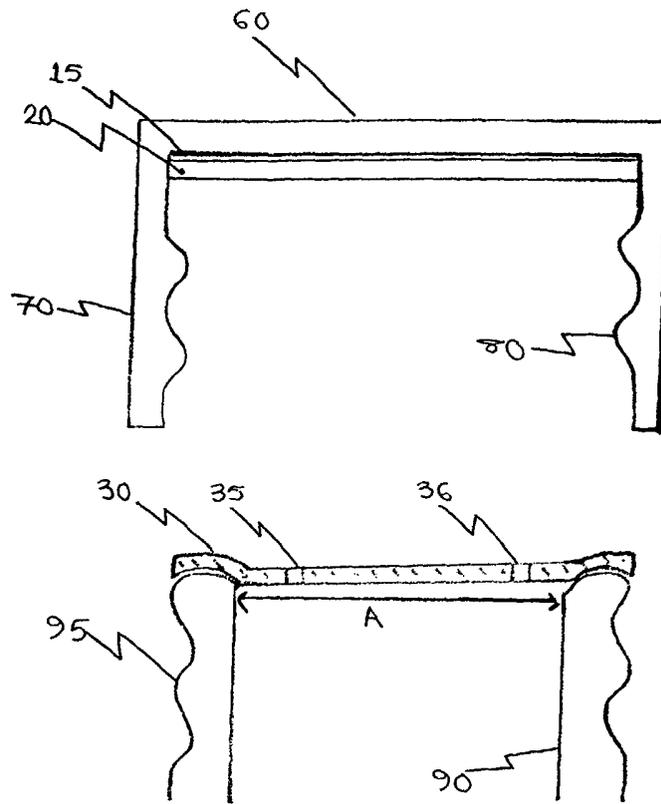


FIG 4

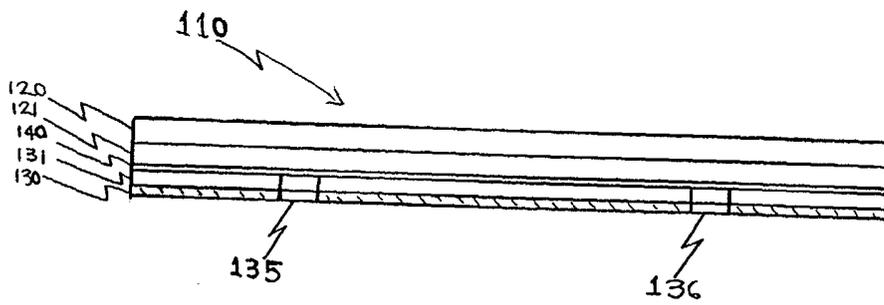


FIG 6

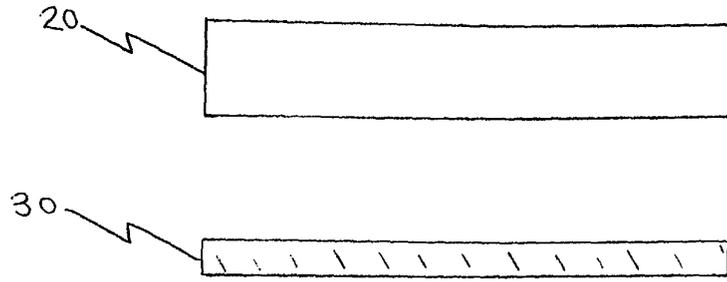


FIG 5a

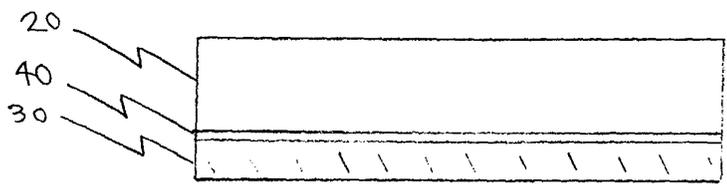


FIG 5b

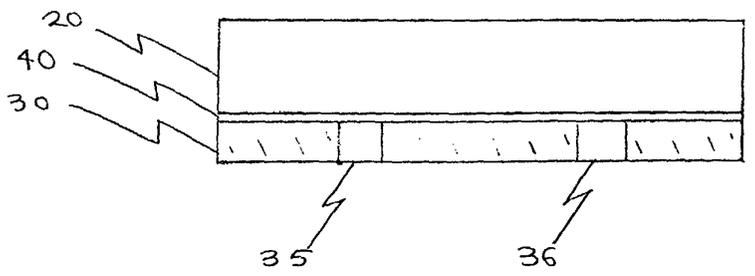


FIG 5c

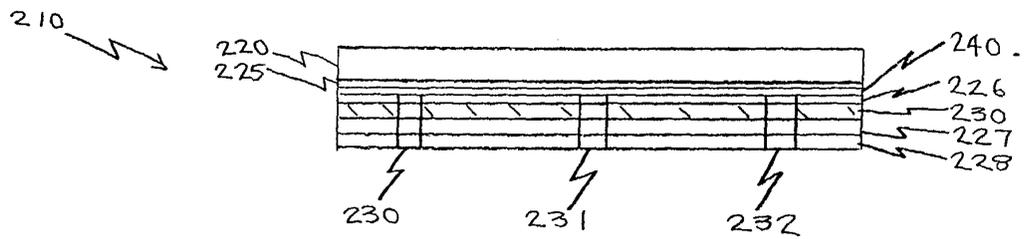


FIG 7



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The present search report has been drawn up for all claims			
Place of search MUNICH		Date of completion of the search 13 August 2003	Examiner Lendfers, P
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ANNEX TO THE EUROPEAN SEARCH REPORT
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