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(54) **Multilayer structure for reclosable container closure**

(57) A multilayer structure for closing containers, adapted to produce containers which can be re-closed several times after their initial opening. The multilayer structure comprises at least two layers, namely, a first layer (2) which can be subjected to thermal bonding along the perimeter of the opening (3) of a container (4) and a second layer (5) which is coupled to the first layer (2). A third layer (6) of permanent adhesive is interposed between the first layer (2) and the second layer (5), at at least a part of the region of the first layer (2) designed to be coupled to the container (4) by thermal bonding. The tearing resistance of the first layer (2) is

weaker than the bonding force between the first layer (2) and the second layer (5), where the third layer (6) is not present, and is weaker than the resistance to separation of the thermal bonding (10) to be provided between the first layer (2) and the container (4). The resistance to separation of the thermal bonding (10) is greater than the bonding and/or cohesion force of the permanent adhesive, so that the first layer (2) tears during the first opening of the container (4), exposing the third layer (6), which can be used to re-close the container (4).

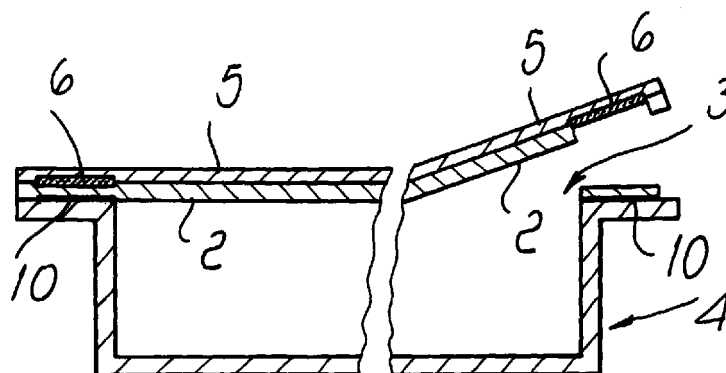


Fig. 4

Description

[0001] The present invention relates to a multilayer structure for closing containers, suitable for providing containers which can be re-closed several times after their initial opening.

[0002] It is known that many food and non-food products are packaged in containers, for example trays, pouches or similar containers, which are sealed.

[0003] Tray-like containers are constituted by a lower thermoformed portion, designed to contain the product, and by an upper portion, designed to close the container. The lower portion and the upper portion designed for closure can both be flexible or rigid and be of the single-layer or multilayer type. In some cases, the lower portion is produced on-line by the packaging machine by thermoforming a film made of flat synthetic material. In other cases, the lower portion is already preformed when it is introduced in the packaging machine. In many cases, the container is closed by thermal bonding performed along the perimeter of the tray where the two portions overlap.

[0004] In the case of pouch-type containers, the production and packaging method is similar, except that the lower portion is not subjected to thermoformation.

[0005] Due to economic and environmental requirements, products are packaged in a plurality of doses in said containers. The consumer must therefore be able to easily and effectively re-close the container in order to preserve the part of the product that has not been consumed. Especially in the case of food products, after the initial opening of the container it would be convenient to be able to re-close it in order to avoid spreading odors into the surrounding environment, avoid dehydration of the packaged product or its alteration, and avoid other drawbacks arising from poor preservation of the product.

[0006] In order to meet this requirement, various mechanical and chemical-physical re-closure systems have been devised for these containers.

[0007] One of the re-closure systems currently in use is based on using, in order to close tray-like containers, a multilayer structure comprising at least three layers: a first layer, constituted by a film of material which allows thermal bonding and is designed to be subjected to thermal bonding at the rim of the opening of the container; a second outer layer; and a third layer of permanent adhesive interposed between the first layer and the second layer.

[0008] In this multilayer structure, the bonding force between the adhesive layer and the first layer is weaker than the resistance to separation of the thermal bonding performed in order to apply the multilayer structure to the tray-like container.

[0009] In this way, during the first opening of the container the first layer tears at the thermal bonding region and this tearing exposes the layer of permanent adhesive, which can be used to re-close the container

by pressing.

[0010] This multilayer structure requires a large amount of permanent adhesive, since the layer of permanent adhesive that is used, besides allowing to re-close the container, also mutually couples the first layer and the second layer.

[0011] Moreover, in the above-described multilayer structure it is necessary to use a permanent adhesive having a strong bonding force, necessarily greater than the force required to tear the first layer, in order to prevent the first layer and the second layer from uncoupling during the initial opening of the container, when it is necessary to apply to the multilayer structure a force sufficient to tear the first layer at the thermal bonding region.

[0012] This requirement in practice limits the choice of the permanent adhesive to be used.

[0013] The aim of the present invention is to solve the above-described problems, by providing a multilayer structure for closing containers which is adapted for forming containers which can be re-closed several times after their initial opening and allows to reduce the use of permanent adhesives with respect to conventional multilayer structures.

[0014] Within the scope of this aim, an object of the present invention is to provide a multilayer structure which can be manufactured at a lower cost than conventional multilayer structures.

[0015] A further object of the present invention is to provide a multilayer structure which allows to also use permanent adhesives with reduced bonding force for re-closing the containers after their first opening.

[0016] These and other objects which will become better apparent hereinafter are achieved by a multilayer structure for closing containers provided with an opening, characterized in that it comprises at least two layers, namely, a first layer adapted for thermal bonding along the perimeter of said opening of the container and a second layer which is coupled to said first layer; a third layer of permanent adhesive being interposed between said first layer and said second layer, at at least a part of the region of said first layer designed to be coupled to said container by thermal bonding; the tearing resistance of said first layer being weaker than the bonding force between said first layer and said second layer, where said third layer is not present, and being weaker than the resistance to separation of the thermal bonding to be provided between said first layer and the container; the resistance to separation of said thermal bonding being greater than the bonding and/or cohesion force of said permanent adhesive, so that said first layer tears during the first opening of the container, exposing said third layer, which can be used to re-close the container.

[0017] Further characteristics and advantages of the invention will better appear from the following detailed description of a preferred but not exclusive embodiment of the multilayer structure according to the invention, illustrated only by way of non-limitative exam-

ple in the accompanying drawings, wherein:

Figure 1 is an exploded perspective view of the multilayer structure according to the invention;

Figure 2 is a highly enlarged sectional view of the multilayer structure;

Figure 3 is a sectional view of the multilayer structure according to the invention applied to a tray-type container;

Figure 4 is a sectional view, similar to Figure 3, but showing the behavior of the multilayer structure according to the invention during the first opening of the container.

[0018] With reference to the above figures, the multilayer structure according to the invention, generally designated by the reference numeral 1, comprises at least two layers: a first layer 2, constituted by a film of material which is adapted for thermal bonding, designed to be subjected to thermal bonding along the perimeter of the opening 3 of a container 4, and a second layer 5, which is coupled to the first layer 2 on the face thereof that lies opposite the face designed to be coupled to the container 4 by thermal bonding.

[0019] A third layer 6 of permanent adhesive is interposed between the first layer 2 and the second layer 5, at at least a part of the region of the first layer 2 designed to be coupled to the container 4 by thermal bonding.

[0020] Substantially, the presence of the third layer 6 is limited to the region of the first layer 2 designed to be coupled to the container 4 by thermal bonding. It should be observed that the third layer 6 can also be omitted at certain portions of the region 10 for the thermal bonding of the first layer 2 on the container 4 if one does not wish to provide opening with the possibility of re-closure at said regions.

[0021] For example, as shown, if the container 4 has a substantially rectangular opening, it is possible to provide the third layer 6 only at three of the four sides along which thermal bonding is performed, so that the container 4 can be opened, so as to allow re-closure, by removing the multilayer structure 1 only along said three sides.

[0022] The tear resistance of the first layer 2 is weaker than the bonding force between the first layer 2 and the second layer 5, where the third layer 6 is not present, and is weaker than the resistance to separation of the thermal bonding 10 to be performed between the first layer 2 and the container 4. The resistance to separation of the thermal bonding 10 is greater than the cohesion and/or bonding force of the permanent adhesive of the third layer 6, so that during the first opening of the container 4 the first layer 2 tears, exposing the third layer 6, which can thus be used to re-close the container 4 several times.

[0023] The first layer 2 can be constituted by a film made of synthetic material suitable for thermal bonding,

such as polyethylene.

[0024] The second layer 5 can be constituted by a flexible or rigid synthetic material, such as an oriented polymer or polyvinyl chloride (PVC) or polyethylene or other synthetic materials.

[0025] The third layer 6 can be constituted, for example, by an acrylic polymer.

[0026] The second layer 5 can be constituted by a barrier film or by a film which bears printing or can be substantially of the same material used for the first layer 2 and can optionally be coupled to one or more additional films with the face that lies opposite the face directed toward the first layer 1.

[0027] Moreover, the second layer 5 can be constituted by a rigid thermoformable film or can be coupled to a thermoformable rigid film with its side that faces away from the first layer 2.

[0028] The first layer 2 and the second layer 5 can be mutually coupled by heat calendering, or each one of the two layers 2 and 5 can be provided, according to the method known as extrusion coating, on the other layer.

[0029] Alternatively, the layer 2 and the layer 5 can be coupled one another with the method known as extrusion lamination.

[0030] The layer 6 of permanent adhesive is interposed on the side of the first layer 2 that faces the second layer 5 or, alternatively, on the side of the second layer 5 that faces the first layer 2, before their coupling, or alternatively before the coating of one of the two layers on the other layer, at the region designed to be affected by the thermal bonding 10 on the perimeter of the opening of the container 4.

[0031] During the subsequent step for coupling the layers 2 and 5, the presence of the layer 6 of permanent adhesive prevents permanent coupling between the layers 2 and 5 only in the regions where said layer 6 has been applied. The layer 6 in any case provides a bonding between the layers 2 and 5 which assuredly seals the package.

[0032] It should be observed that the layers 2 and 5 are mutually coupled also outside the region of the first layer 2 designed to be coupled to the container 4 by thermal bonding and is occupied by the third layer 6.

[0033] Preferably, the cohesion force between the third layer 6 and the second layer 5 is stronger than the cohesion force between the third layer 6 and the first layer 2, so that during the separation of the layer 5 from the layer 2, at the layer 6, the layer 6 remains bonded to the layer 5. This can be achieved by appropriately selecting the materials of the layers 2 and 5 or by means of a different degree of roughness on the faces of the layers 2 and 5 that couple to the layer 6.

[0034] In order to facilitate the opening of the container, in one or more regions along the perimeter of the opening of the container 4 the thermal bonding can affect only partially the region where the multilayer structure according to the invention overlaps the perimeter of the opening 3 of the container.

[0035] It should be observed that the container 4 can be constituted by a tray or even simply by a substantially flat structure constituted by a single film or by a plurality of coupled films, as in the case of pouch-type containers.

[0036] The container closed by means of the multilayer structure according to the invention is opened by lifting a flap of the multilayer structure 1 that lies outside the thermal bonding 10, as shown in Figure 4.

[0037] If the layer 6 does not affect all the region affected by the thermal bonding 10, as described earlier, said free flap, designed to be gripped in order to open the container 4, is provided in a region of the multilayer structure 1 that is adjacent to the region in which the layer 6 of permanent adhesive is present.

[0038] The lifting of said free flap continues without hindrance until it reaches the region affected by the thermal bonding 10. At the beginning of said region, since the coupling force between the first layer 2 and the second layer 5 is greater than the tearing resistance of the first layer 2, the first layer 2 tears and remains bonded to the container 4 due to the thermal bonding 10. As the lifting of the multilayer structure 1 continues, the region where the first layer 2 is coupled to the second layer 5 inside the region affected by the thermal bonding 10 is reached. At said region, owing to the fact that the bonding force between the first layer 2 and the second layer 5 is greater than the tearing resistance of the first layer 2, an additional tearing of the first layer 2 occurs.

[0039] The tearing of the first layer 2 at the region affected by the thermal bonding 10 exposes the layer 6, which can be used to re-close the container, even several times, after its initial opening.

[0040] It should be observed that if the second layer 5 is constituted by a rigid film which is thermoformable or is coupled to a thermoformable rigid film, the multilayer structure according to the invention can be thermoformed and can optionally replace the container without thereby abandoning the scope of the protection of the present invention. In this case, the container constituted by the thermoformed multilayer structure can be closed with a conventional film by thermal bonding.

[0041] In practice it has been observed that the multilayer structure according to the invention fully achieves the intended aim and objects, since it allows to re-close containers after their first opening despite using a reduced amount of permanent adhesive.

[0042] Another advantage of the multilayer structure according to the invention is that it is also possible to use permanent adhesives having a reduced bonding force.

[0043] The multilayer structure thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the inventive concept; all the details may further be replaced with other technically equivalent elements.

[0044] In practice, the materials employed, as well

as the dimensions, may be any according to requirements and the state of the art.

[0045] The disclosures in Italian Patent Application No. MI99A000881 from which this application claims priority are incorporated herein by reference.

[0046] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A multilayer structure for closing containers provided with an opening, characterized in that it comprises at least two layers, namely, a first layer (2) adapted for thermal bonding along the perimeter of said opening (3) of the container (4) and a second layer (5) which is coupled to said first layer (2); a third layer (6) of permanent adhesive being interposed between said first layer (2) and said second layer (5), at at least a part of the region of said first layer (2) designed to be coupled to said container (4) by thermal bonding; the tearing resistance of said first layer (2) being weaker than the bonding force between said first layer (2) and said second layer (5), where said third layer (6) is not present, and being weaker than the resistance to separation of the thermal bonding (10) to be provided between said first layer (2) and the container (4); the resistance to separation of said thermal bonding (10) being greater than the bonding and/or cohesion force of said permanent adhesive, so that said first layer (2) tears during the first opening of the container (4), exposing said third layer (6), which can be used to re-close the container (4).
2. The multilayer structure according to claim 1, characterized in that said first layer (2) and said second layer (5) are mutually coupled also outside the region of said first layer (2) designed to be coupled to said container (4) by thermal bonding and is occupied by said third layer (6).
3. The multilayer structure according to claim 1, characterized in that the cohesion force between said third layer (6) and said second layer (5) is greater than the cohesion force between said third layer (6) and said first layer (2).
4. The multilayer structure according to one or more of the preceding claims, characterized in that said second layer (5) is coupled to one or more layers on its side that faces away from said first layer (2).
5. The multilayer structure according to one or more of

the preceding claims, characterized in that said second layer (5) is constituted by a film of oriented polymer.

6. The multilayer structure according to one or more of the preceding claims, characterized in that said second layer (5) is constituted by a barrier film. 5
7. The multilayer structure according to one or more of the preceding claims, characterized in that said second layer (5) is constituted by a thermoformable rigid film. 10
8. The multilayer structure according to one or more of the preceding claims, characterized in that said second layer (5) is coupled to a thermoformable rigid film at its side that faces away from said first layer (2). 15
9. A method for producing a multilayer structure according to one or more of the preceding claims, characterized in that it consists in mutually coupling at least two layers (2,5), one of which is adapted for thermal bonding, and in interposing a layer (6) of permanent adhesive between said two layers (2,5), before their coupling, at at least a part of the region (10) of said layer adapted for thermal bonding designed to be coupled to a container (4) by thermal bonding. 20
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10. The method according to claim 9, characterized in that said two layers (2,5) are mutually coupled by hot calendering. 30
11. The method according to claim 9, characterized in that said two layers (2,5) are mutually coupled by the method known as extrusion lamination. 35
12. The method according to claim 9, characterized in that said two layers (2,5) are mutually coupled by making one of said two layers, with the method known as extrusion coating, on the other one of said two layers (2,5). 40
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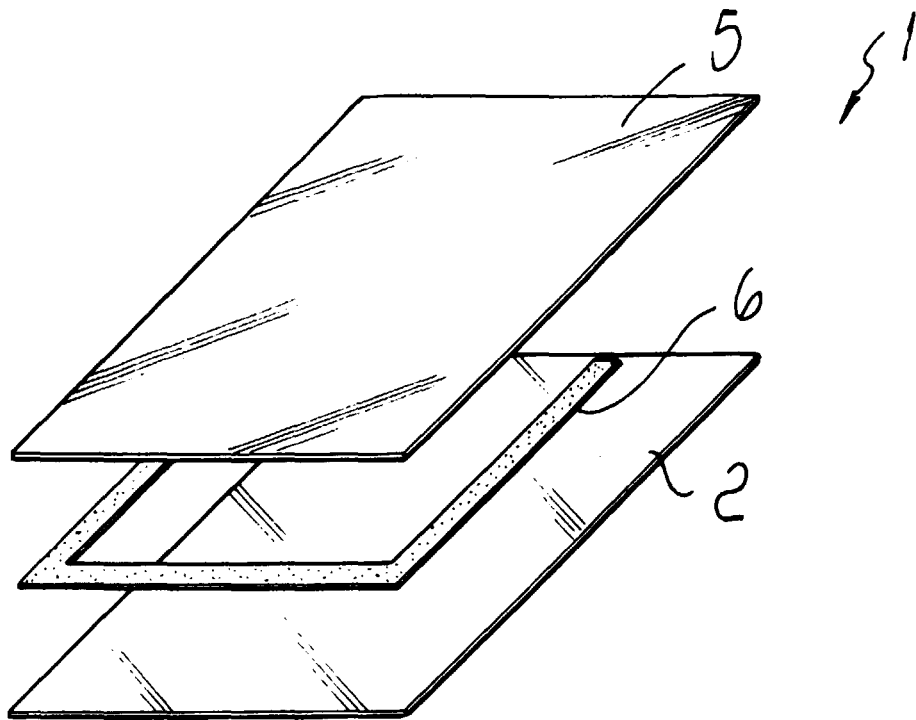


Fig. 1

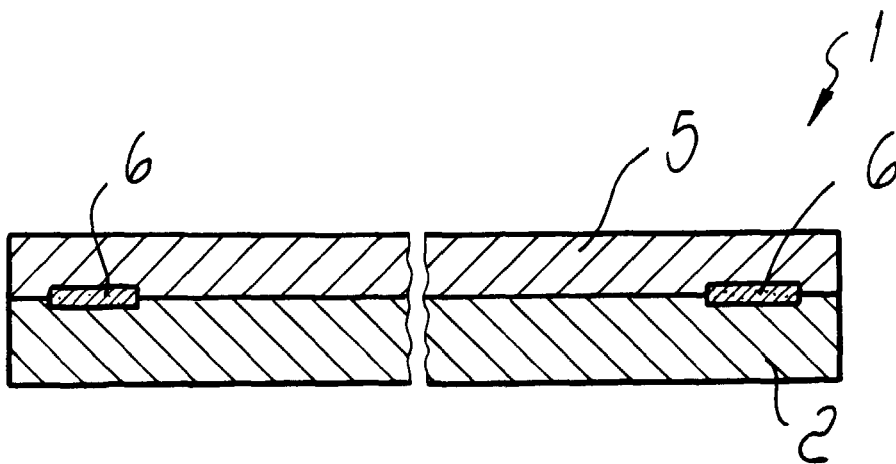


Fig. 2

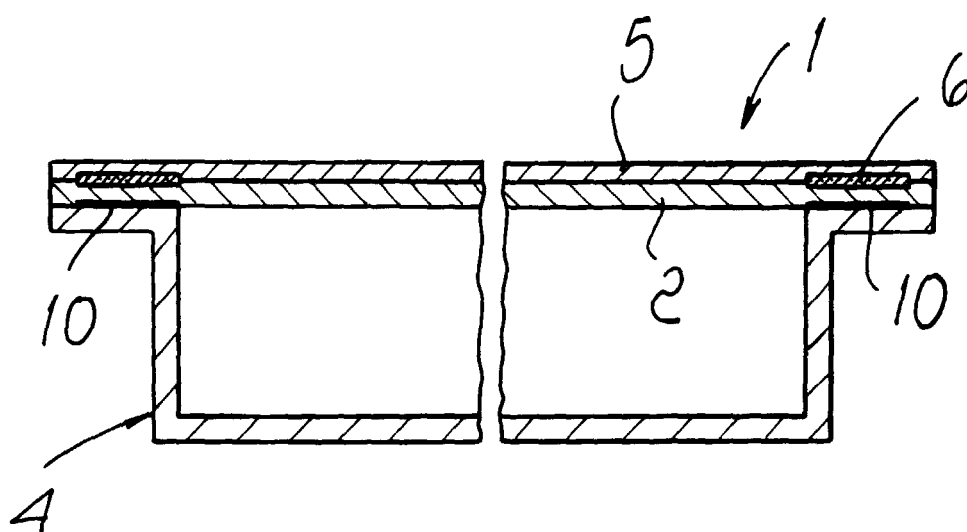


Fig. 3

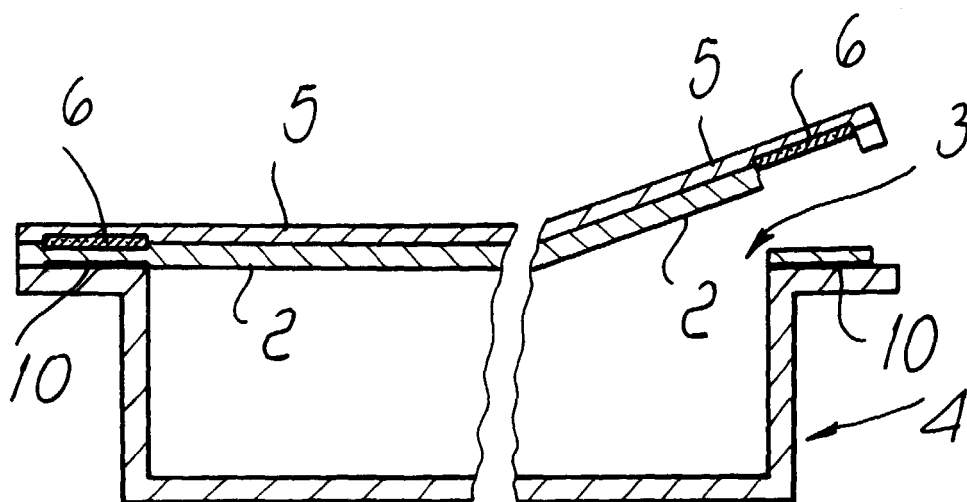


Fig. 4