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(54) **A method for manufacturing a container for pourable products**

(57) Method for making a container (100) in a multi-layer material (1) for pourable products having at least one breakable portion (5) suitable for being removed before pouring said pourable product out of said container (100), comprising the phases of:

a. coupling at least one sheet-like layer in cardboard (3) to at least one sheet-like layer in polyethylene (4) to form said multilayer material (1), and

b. erecting said multilayer material (1) to form said container (100), said at least one cardboard layer (3) being arranged on the outer side of said container (100).

The method contemplates that said phase a) of the method is preceded by the phase of perforation of said at least one sheet-like layer in cardboard (1) in correspondence to said at least one breakable portion (5) and that said phase b) of the method is preceded by the phase of integrally coupling, directly or indirectly, at least part of a removable sheet-like body (8) to said at least one sheet-like layer in polyethylene (4), in correspondence to said at least one breakable portion (5), said at least one removable sheet-like body (8) being placed on the outer side of said multilayer material (1).

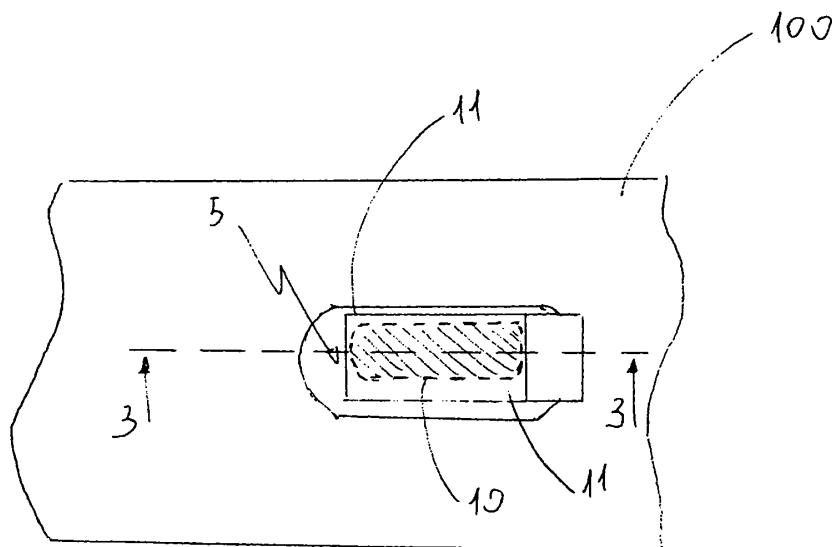


FIG. 1a

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Description

[0001] The present invention concerns a method for making (i.e. manufacturing) a container for pourable products, specifically alimentary ones, of the type including a breakable portion to be removed by hand before being able to pour the product contained therein.

[0002] In particular, the method under discussion finds application in those containers, preferably aseptic, which are made from a multilayer material comprising at least one cardboard layer, able to give rigidity to the container itself, and at least one layer in polyethylene, arranged in contact with the pourable product enclosed inside the container and able to guarantee fluid sealing of the same container, and which has at least one breakable portion added after the lamination of the multilayer material, shaped to be removed thanks to a tab placed on the outside of the container.

[0003] This type of container, the type of opening of which is known by the English name of "pull-tab", is used to avoid the use of means of opening such as straws or tops fitted with teeth able to cut the breakable portion of the container and allow fluid connection between the inside and the outside of the container.

[0004] It should also be added that the multilayer material can have further sheet-like layers in addition to the two described above, such as, for example, a further layer of aluminium arranged between the layer in polyethylene and that in cardboard, and further layers of polyethylene arranged between the various layers of aluminium, cardboard and polyethylene, able to guarantee better preservation of the product inside the container or better coupling between the layers.

[0005] It is known that during the manufacturing process of this type of container with a pull-tab opening, the breakable portion is made inside the packing machine by the complete perforation of the multilayer material and the application, on both the inner and outer sides of the multilayer material, of two tabs, respectively in polyethylene for the tab in contact with the pourable product when the container is closed and in a plastic material, preferably polyethylene, but also in a multilayer material containing aluminium and polyethylene and/or polypropylene or other similar materials, for the tab that is on the outer side when the container is closed.

[0006] In this way, while the first tab is able to keep the pourable product held inside the container well preserved, when the container is actually opened, the second tab is used to drag the first tab with it and thus remove it from the container. Once the two tabs are applied, the sheet-like multilayer material is sterilized both on the inner and outer sides and is erected for the subsequent phases of filling with the pourable product and closure of the container.

[0007] In Japanese patent JP-A-2005200065 filed by TETRA PACK JAPAN, a container for pourable products of the type with a "pull-tab" opening is described that, in correspondence to the breakable portion, has two tabs,

a more internal one and a more external one, able to seal the portion removed in the previous phase of perforation of the multilayer material. The two tabs are heat sealed together via a thermal welding device that allows the most suitable temperature to be reached for obtaining a durable coupling between the two tabs. In use, at the moment of opening the container, the user tears off the outer tab, thereby also pulling away the inner one, so that it is possible to pour product held inside the container.

[0008] However, this method of container manufacture, and the phase of perforation and coupling of the two tabs, is not devoid of drawbacks.

[0009] Due the fact that the multilayer material has a discontinuity of material in correspondence to the breakable portion, the subsequent sterilization process, which takes place inside the packing machine, is highly critical. In fact, the first tab, the one that is coupled to the innermost layer of the container, even if it theoretically covers and seals the portion removed during perforation, as it is substantially made of a filler material added to the multilayer material, it has all the problems related to the technological process of welding plastic materials: namely, incomplete adhesion between the parts, the existence of fractures or material gaps in the tab itself, etc. Therefore, if there are welding problems, even minor ones, the container is no longer aseptic and the pourable product it contains runs the risk of deteriorating in a short time.

[0010] Furthermore, the same phase of perforation of the multilayer material, which normally takes place inside the packing machine for reasons of sterility, as well as entailing an extra level of criticality in the production process of the container for pourable products, requires time and high precision.

[0011] The object of the present invention is to increase the level of sterility of containers for pourable products of the type having at least one breakable portion removable via an external tab, of the pull-tab type, and to simplify the sterilization phase of the multilayer material inside the packing machines.

[0012] A further object of the present invention is to accelerate the production process of containers inside the packing machines, eliminating the multilayer material perforation phase for forming the breakable portion to be removed.

[0013] This and other objects are achieved by the present method for making a container in a multilayer material for pourable products having at least one breakable portion suitable for being removed before pouring said pourable product out of said container, said method including the phases of: coupling at least one sheet-like layer in cardboard to at least one sheet-like layer in polyethylene, or a similar material, to form said multilayer material, erecting (i.e. constructing) said multilayer material to form said container, said at least one cardboard layer being arranged on the outer side of the said container, characterized in that the coupling phase of at least one sheet-like layer in cardboard to at least one sheet-like layer in polyethylene, or similar material, is preceded

by the phase of perforation of said at least one sheet-like layer in cardboard in correspondence to said at least one breakable portion and that the phase of erecting said container is preceded by the phase of integrally coupling at least part of a removable sheet-like body to said at least one layer in polyethylene, in correspondence to said at least one breakable portion on the outer side of said multilayer material, as defined above. As a technician in this sector shall easily understand, once said container is formed, this removable sheet-like body, being integral with the innermost layer in polyethylene, is therefore set up to remove at least a portion of this polyethylene layer in correspondence to the aforementioned at least one breakable portion.

[0014] It should be noted that in the following, the term "breakable portion" assumes the meaning of a portion of the multilayer material that it is understood must be broken to allow usage of the container by the end user.

[0015] Similarly, the wording "inner side" and "outer side" refer respectively to the side of the multilayer material that will find itself on the inside or the outside of the container for pourable products, once it has been erected.

[0016] With the method that forms the subject of the present invention, described above in general terms, the multilayer material can be introduced inside the packing machine already fitted with a breakable portion including, in correspondence to this, the inner layer in polyethylene devoid of the relative portion of the outer cardboard layer.

[0017] In this way, during the making of the container for pourable products having a pull-tab type of opening, according to the present invention, the multilayer material does not undergo any process of perforation and, in consequence, any process of further addition of filler material, with relative welding, to cover and seal the portion of material removed during perforation.

[0018] According to the invention, the inner surface of the multilayer material, composed of the polyethylene layer, is in fact continuous, thereby permitting complete protection of the inner side of the multilayer material with respect to the outer one.

[0019] Furthermore, due to the continuity of the material of the inner side of the multilayer material, also the subsequent sterilization of this multilayer material does not take place on both sides, but only on the inner side, i.e. that which will be finally in contact with the pourable product after the container has been erected.

[0020] As already described, to ensure the opening of the breakable portion while avoiding the use of means of cutting, such as, for example, straws or toothed tops, the aforementioned removable sheet-like body is applied to the polyethylene layer, this body preferably consisting of an additional layer, or a tab, in a plastic material, arranged in correspondence to the breakable portion, on the outer side of the multilayer material, namely the side in which the cardboard layer is present.

[0021] In this way, when the container is made, it is possible to open it by simply pulling the tab, which, in

turn, removes at least a portion of said at least one layer in polyethylene in correspondence to the aforesaid breakable portion.

[0022] Preferable, this plastic tab is heat sealed to said polyethylene layer at a temperature between 200 and 400 °C, which is maintained for a period of time ranging from 0.1 to 0.5 s.

[0023] In practice, this heat-sealing must bring the two heat sealed layers, namely that in polyethylene and that of the tab in a plastic material, such as, for example, polyethylene, or in a multilayer aluminium/plastic material, to their work-hardening state, in order to weaken the breakable portion and facilitate the subsequent opening of the container via the simultaneous removal of the tab and the portion of the polyethylene layer that is coupled with it.

[0024] It should also be added that the multilayer material can have further sheet-like layers in addition to the two described above, such as, for example, an extra aluminium layer placed between the layer in polyethylene and that in cardboard, and extra polyethylene layers placed between the various aluminium, cardboard and polyethylene layers, able to guarantee better preservation of the product inside the container or better coupling between the various layers. In practice, before entering the packing machine, the multilayer material could include a cardboard layer, perforated in correspondence to the breakable portion and a series of layers in polyethylene, aluminium or another similar material, but suitable for containing pourable products, especially alimentary ones, which are applied to the cardboard layer without being perforated. In this case, the subsequent application of the plastic tab no longer takes place directly on the polyethylene layer, but with the insertion of further films in a printable material and/or polyethylene, which nevertheless guarantee the integral constraint between the tab and the lower layer of polyethylene.

[0025] Some special embodiments of the present invention shall now be described, purely by way of non-limitative example, with reference to the attached figures, where:

Figure 1 is a perspective view of a container according to the invention,

Figure 1a is a top view of the container in Figure 1. Figure 2 is a cross-sectional view of the breakable portion of the container of known art having a "pull-tab" type of opening,

Figure 3 is a cross-sectional view of the breakable portion of the container according to the present invention, before it is opened,

Figure 3a is a cross-sectional view of the breakable portion of the container in Figure 3, after it is opened, Figure 4 is a cross-sectional view of the breakable portion of the container according to a second embodiment, and

Figure 4a is a cross-sectional view of the breakable portion of the container in Figure 4, after it has been

opened.

With particular reference to these figures, the generic multilayer material according to the invention is indicated by reference numeral 1.

[0026] According to a first embodiment of the present invention, the multilayer material 1 for making a container 100 is composed of a sheet-like layer in cardboard 3 and a sheet-like layer in polyethylene 4, which are firmly coupled to each other to form the multilayer material 1, subsequently destined to be processed inside a normal packing machine (not shown here).

[0027] According to the invention, the cardboard layer 3 is perforated in correspondence to a breakable portion 5, before this layer 3 is coupled to the polyethylene layer 4.

[0028] In this way, while on the inner side 6 of the multilayer material 1 only the continuous layer in polyethylene 4 is visible, on the outer side 7 of the multilayer material it is possible to verify, at substantially regular intervals, the presence of a breakable portion 5, which pinpoints the innermost layer in polyethylene 4.

[0029] In this way, once introduced inside the packing machine, the multilayer material 1 is no longer perforated to make the breakable portion, as in the production of containers of known art (Figure 2), and is not sterilized on both sides, but only undergoes sterilization of the inner side 6, namely that which will be in contact with the pourable product after the container 100 is formed.

[0030] Figure 2 shows a cross section of the breakable portion 5' of a container 100' for pourable products of known art. In this container, the breakable portion 5' is completely perforated and on the inner side 6' of multilayer material 1' a further filler layer in polyethylene 4" is applied to the polyethylene layer 4', previously coupled to the cardboard layer 3'.

[0031] Furthermore, the multilayer material 1 includes a removable sheet-like body 8, preferably in a plastic material such as, for example, polyethylene and/or polyethylene coupled with aluminium, and/or similar materials, integrally coupled in a direct or indirect manner to said polyethylene layer 4, in correspondence to the breakable portion 5, but from the outer side 7 of the multilayer material, namely from the side where the cardboard layer 3 is present. This body 8 is preferably composed of a tab 11 welded, at least in a portion thereof, to the polyethylene layer 4.

[0032] In this way, it is possible to open the container 100 in an extremely simple manner by removing the tab 8 and so pull, together with the tab 8 itself, also that portion 10 of the polyethylene layer 4 placed in correspondence to the breakable portion 5 and coupled to said tab 8.

[0033] In Figure 3, the sheet-like body 8 is a tab 11 coupled to the polyethylene layer 4 via heat-sealing (e.g. welding). The purpose of this heat-sealing, unlike that foreseen by known art, is not only that of coupling the various layers, but also that of bringing the inner layer in polyethylene 4 and the tab 11, or in any case the sheet-

like body 8, in a plastic material, or in an aluminium and plastic material, to their work hardening state, so as to weaken their resistance to the mechanical stress that occurs in correspondence to the said breakable portion 5 when the tab 11 is removed by the user of the container.

[0034] Preferable, the temperature reached during heat-sealing between the polyethylene layer 4 and the tab 11 can be between 200° and 400 °C, and applied for a time interval between 0.1 and 0.5 s.

[0035] In containers of known art 100' (Figure 2), unlike that described above, the tab 11' is coupled to the polyethylene layer 4", which, in turn, is coupled to the innermost layer of the multilayer material 1', namely the polyethylene layer 4'.

[0036] In addition, the heat-sealing is carried out via two opposing dies (not shown) that exert their heating function in correspondence to the portion 10, thereby bringing the two materials to the work hardening condition. In this way, during the opening of the container 100, or rather when the tab 11 is pulled away, the portion 10 of the polyethylene layer 4 is also removed.

[0037] According to another embodiment of the invention, in addition to the two layers in polyethylene 4 and cardboard 3, the multilayer material 1 can include an aluminium layer 25, placed between the layer in polyethylene 4 and that in cardboard 3, and two further polyethylene layers 26, placed between the layer in aluminium 25 and that in cardboard 3 and the layer in aluminium 25 and that in polyethylene 4, able to guarantee better preservation of the product inside the container and better coupling between the various layers.

[0038] In practice, before entering inside the packing machine, the multilayer material can also include a cardboard layer 3, perforated in correspondence to the breakable portion, and a series of layers in polyethylene 4 and 26, in aluminium 25 or another similar material, but suitable for containing pourable products, particularly alimentary ones, which are applied to the cardboard layer 3 without being perforated.

[0039] Furthermore, additional films in a printable material 50 and in polyethylene 51 can be coupled on outer side 7 of the multilayer material such that when the tab 11 is heat sealed to the polyethylene layer 4, they will become inserted between the tab 11 and the polyethylene layer 4 itself.

[0040] It should be noted that, although for motives of simplicity only two generic types of multilayer material have been described that differ in the number of layers and material (Figures 3 and 4), the method according to the invention can nevertheless also be applied to the manufacture of containers for pourable products composed of a multilayer material having a different number of layers and different materials without leaving the scope of protection defined by the claims that follow. For example, suitable materials for this type of container could be chosen from polyethylene, aluminium, polypropylene, low-density polyethylene, EVOH and plastic materials similar to those materials known in the field of production

of containers for pourable products, preferably of an aseptic type.

[0041] The container 100, having a breakable portion 5, is therefore made in various distinct phases according to the number of layers that form the multilayer material 1. Initially, the sheet-like layer in cardboard 3, which will then become the outer side 5 of the erected container 100, is perforated in correspondence to the breakable portion 5 and then coupled to the sheet-like layer in polyethylene 4 to form said multilayer material 1. Then, in correspondence to the breakable portion 5, but from the outer side 7 of the multilayer material 1, the sheet-like body 8, preferably composed of a tab 11 in a plastic material, or in a multilayer aluminium/plastic material, is coupled via heat-sealing to the polyethylene layer 4. This heat-sealing is carried out according to technological parameters that preferentially lead to the work hardening of the two materials and can take place, for example, at a temperature between 200° and 400 °C, maintained for a time interval from 0.1 to 0.5 sec, based on the thickness and the number of layers involved.

[0042] Furthermore, according to a unique aspect of the invention, the phase of heat-sealing the polyethylene layer 3 with the tab 11 takes place in two distinct phases so as to allow the two layers subjected to heat-sealing to cool down between a first phase and the other, for then being brought to the definitive work hardening state.

[0043] Subsequently, the multilayer material obtained according to the present invention is sterilized, partially erected, filled with the pourable product, and closed to form the said container 100.

Claims

1. Method for making a container in a multilayer material for pourable products having at least one breakable portion suitable for being removed before pouring said pourable product out of said container, comprising the phases of:

- a. coupling at least one sheet-like layer in cardboard to at least one sheet-like layer in polyethylene, or similar material, to form said multilayer material, and
- b. erecting said multilayer material to form said container, said at least one cardboard layer being arranged on the outer side of said container.

characterized in that said phase a) of the method is preceded by the phase of perforation of said at least one sheet-like layer in cardboard in correspondence to said at least one breakable portion and that said phase b) of the method is preceded by the phase of integrally coupling, directly or indirectly, at least part of a removable sheet-like body to said at least one sheet-like layer in polyethylene in correspondence to said at least one breakable portion,

said at least one removable sheet-like body being placed on the outer side of said multilayer material.

2. Method according to claim 1, **characterized in that** said at least one removable sheet-like body is a tab.
3. Method according to claim 1 or 2, in which said at least one removable sheet-like body is at least partially made of a plastic material.
4. Method according to claim 3, **characterized in that** the phase of coupling said at least one removable sheet-like body to said at least one sheet-like layer in polyethylene includes the phase of heat-sealing said at least one removable sheet-like body to said at least one sheet-like layer in polyethylene.
5. Method according to claim 4, **characterized in that** the phase of heat-sealing said at least one removable sheet-like body to said at least one layer in polyethylene includes the phase of work hardening said at least one removable sheet-like body and said at least one layer in polyethylene.
6. Method according to claim 5, **characterized in that** the temperature at which said heat-sealing is carried out is between 200 and 400 °C
7. Method according to claim 6, in which said temperature at which the heat-sealing is carried out is applied for a time interval of between 0.1 and 0.5 s.
8. Method according to claim 6 or 7, **characterized in that** the said welding temperature is applied in at least two distinct time intervals.
9. Method according to any of the previous claims, **characterized in that** phase a) of the method includes the phase of applying at least one sheet-like layer in aluminium and/or one or more polyethylene films between said at least one cardboard layer and said at least one layer in polyethylene,.
10. Method according to any of the previous claims, **characterized in that** phase a) of the method includes the phase of coupling at least one layer in a printable material and/or one or more polyethylene films on the outer side of said at least one cardboard layer.
11. Method according to any of the previous claims, **characterized in that** said at least one removable sheet-like body is made of a material chosen from polyethylene, polypropylene, and/or low-density polyethylene, and/or EVOH and/or similar materials.
12. Method according to any of the previous claims, **characterized in that** said at least one removable

sheet-like body is made of a multilayer material including at least one layer in a plastic material and at least one layer in aluminium.

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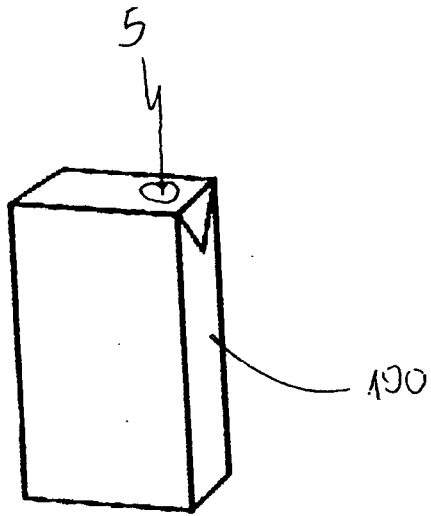


FIG. 1

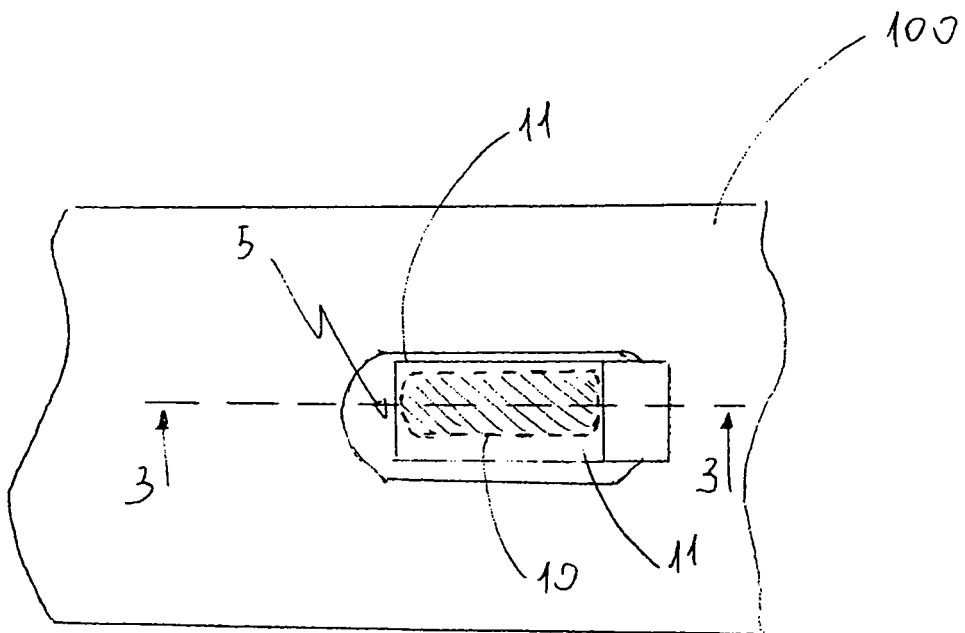


FIG. 1a

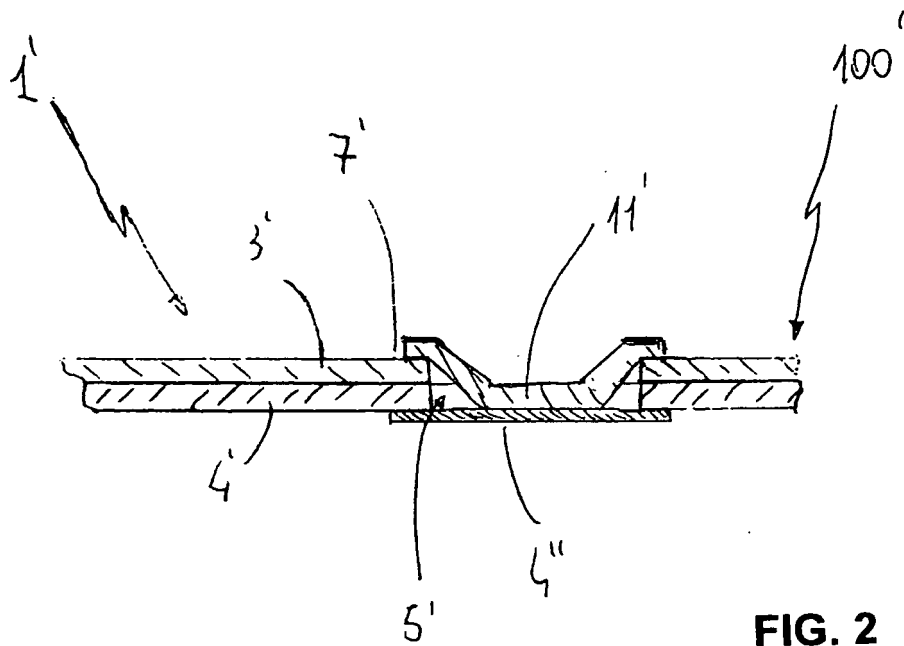


FIG. 2

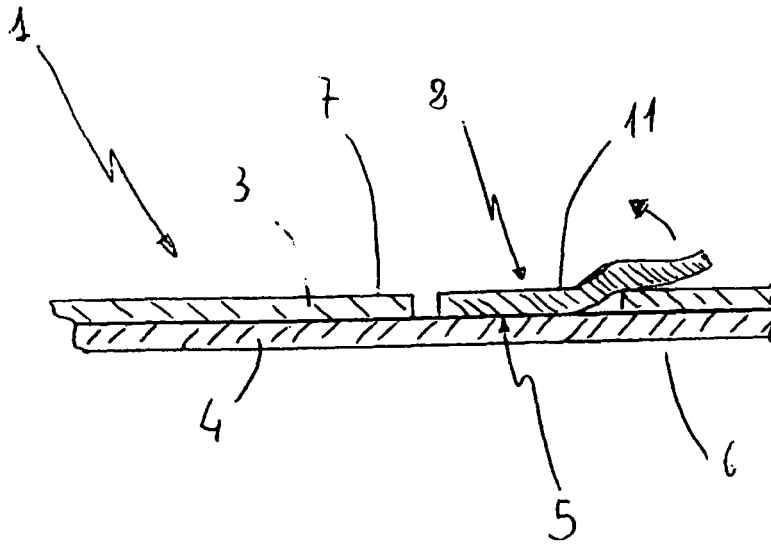


FIG. 3

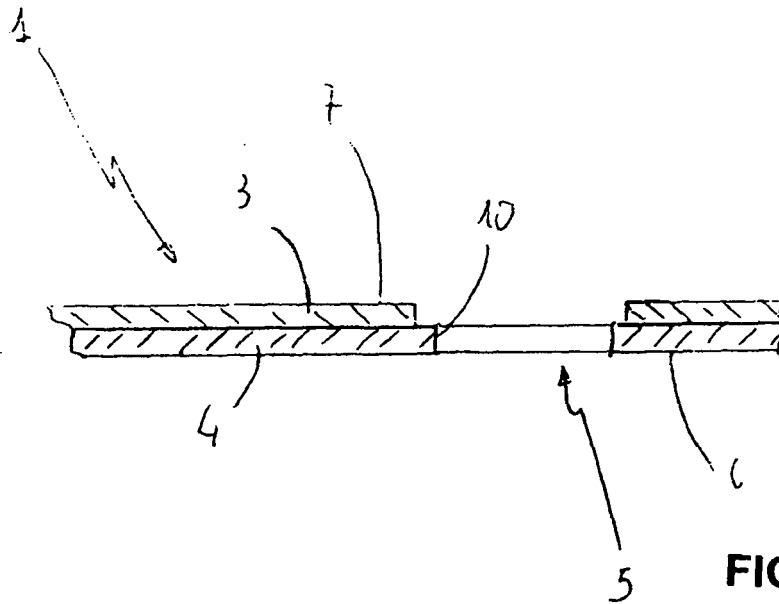


FIG. 3a

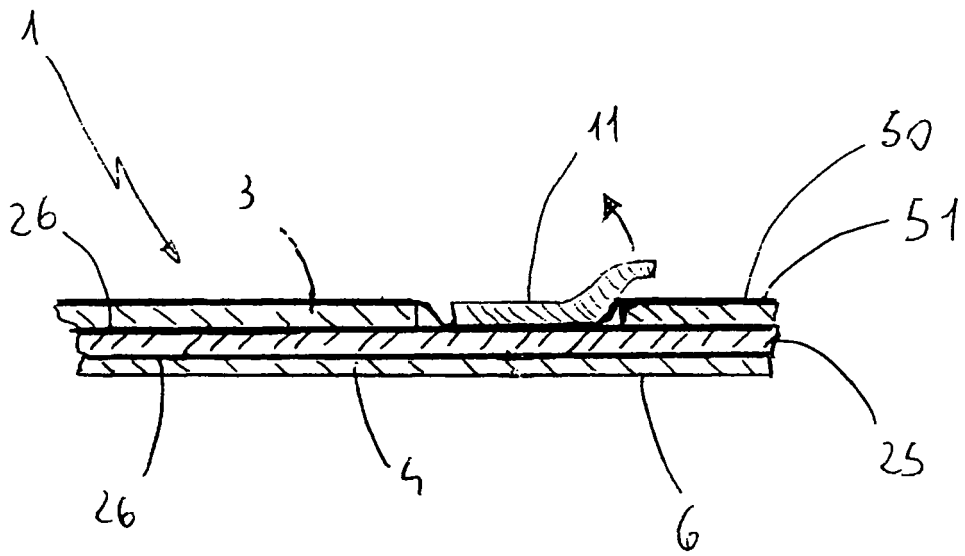


FIG. 4

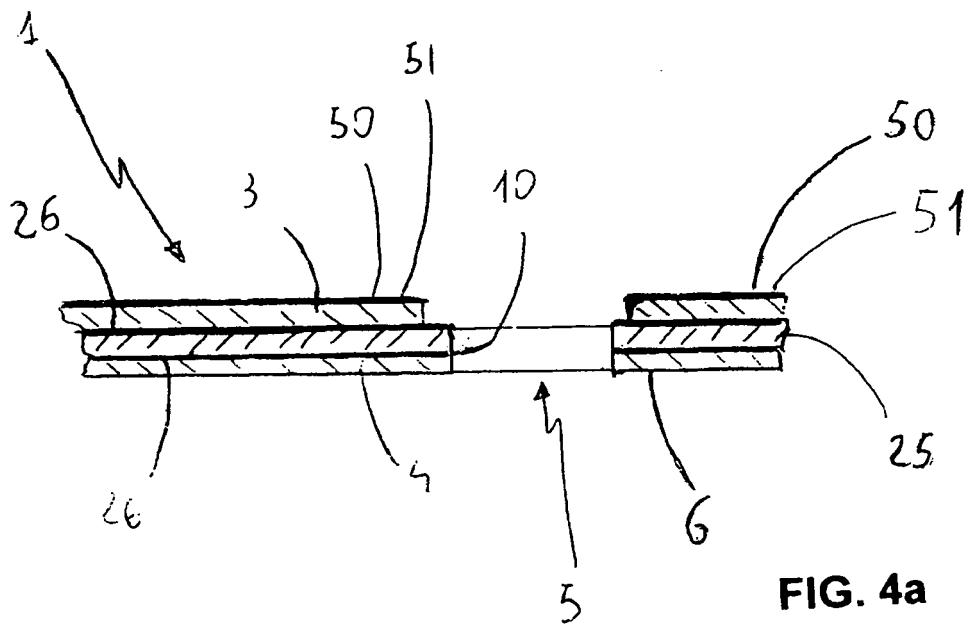


FIG. 4a



DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		14 May 2007	Ungureanu, Mirela
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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**ANNEX TO THE EUROPEAN SEARCH REPORT
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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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14-05-2007

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