



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:  
**15.05.2013 Bulletin 2013/20**

(51) Int Cl.:  
**B65D 75/50** (2006.01) **B65D 33/25** (2006.01)  
**B65B 61/18** (2006.01)

(21) Application number: **12191661.3**

(22) Date of filing: **07.11.2012**

(84) Designated Contracting States:  
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**  
Designated Extension States:  
**BA ME**

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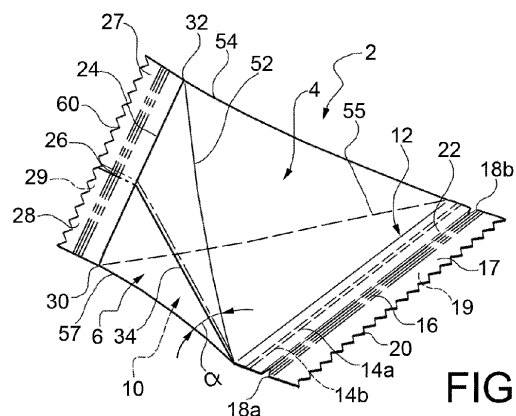
(30) Priority: **08.11.2011 IT TO20111026**

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**AL AT BE BG CH CY CZ DK EE ES FI FR GB GR HR HU IE IS LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**
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(54) **Resealable tetrahedral packaging**

(57) Packaging consisting of a wrapping of flexible material, delimited by generally triangular walls (4, 6, 8, 10), so as to define an essentially tetrahedral containment volume, characterized in that it comprises mutual engagement means (14a, 14b) which are associated with the common sides (12) of a first pair of adjacent walls (4, 10) and which are designed to disengageably interconnect said walls in order to allow opening and closing of the containment volume and in that the common sides (24) of the other pair of adjacent walls (6, 8) are interconnected by a welding region (26) where end overlapped edges (27 and 29) of the walls of said other pair are welded together.



**FIG.6**

## Description

**[0001]** The present invention relates to a packaging formed by a wrapping with a generally tetrahedral form, in particular made using a flexible sheet-like material.

**[0002]** Tetrahedral containers, originally devised and marketed by TetraPak®, are widely used for the sterile packaging of food products; the most common tetrahedral containers are made using a plasticized cardboard suitable for use with food products and able to be opened for dispensing of the product contained therein by means of a cardboard cutting operation. Also known are tetrahedral packages which can be opened by means of manual ripping or tearing of an opening tongue.

**[0003]** The object of the invention is to provide a packaging of the abovementioned kind which is intended in particular for packaging solid products, such as confectionery products and the like, which is suitable for hermetic packaging up to the moment of initial opening and which, following opening thereof by the consumer for removal of part of the articles contained therein, is able to be closed again by the consumer, so as to keep the articles still contained inside the packaging in a sealed containment volume.

**[0004]** Another object of the invention is to provide a packaging of the abovementioned type, which can be easily opened by the consumer and which may also be made by means of simple and low-cost operating steps suitable for industrial packaging.

**[0005]** In view of these objects the invention relates to a packaging having the characteristic features defined in the claims below.

**[0006]** The invention also relates to a method for the production of the abovementioned packaging.

**[0007]** Further characteristic features of the packaging according to the invention and the method for the production thereof will become clear from the detailed description which follows, provided with reference to the accompanying drawings which are provided by way of a non-limiting example and in which:

- Figs. 1 to 4 are plan views which show the articles being made during temporally consecutive steps of a method for the production of the packaging;
- Fig. 5 is a perspective view of an article made during a method step following the step of Fig. 4;
- Fig. 6 is a perspective view of the final packaging obtained following the step of Fig. 5; and
- Fig. 7 is a perspective view of the packaging of Fig. 6, rotated through 180°.

**[0008]** The packaging according to the invention in its currently preferred embodiment shown in Figs. 6 and 7 essentially consists of a wrapping 2 of flexible material, delimited by generally triangular walls which, for the sake of clarity of illustration, are defined in the continuation of the present description as base wall 10 (bottom wall of the packaging in the position shown in Figs. 6 and 7) and

side walls 4, 6 and 8.

**[0009]** The walls define an essentially tetrahedral containment volume inside which products destined for consumption and generally solid in nature, such as loose confectionery products, may be stored.

**[0010]** The aforementioned wrapping is preferably formed by a sheet of flexible material fed from a reel, such as a flexible plastic film or laminate formed by two or more combined films, for example of plastic, paper and/or aluminium material; the material used may be in particular a material suitable for contact with foodstuffs and may comprise a film with properties suitable for acting as an oxygen barrier.

**[0011]** In general, however, the material consists of a flexible film suitable for heat or ultrasound welding, or a flexible film material which has a heat-sealable lining in at least the regions which, as described below, are intended to be welded together.

**[0012]** The embodiment according to Figs. 6 and 7 shows the generally tetrahedral form of the packaging together with the sharp-edge boundary lines 52, 54, 55 and 57 between the side walls and the base wall; it is understood that this illustration is purely indicative for the purposes of showing more clearly the layout of the walls of the wrapping.

**[0013]** Since in fact the material in question is flexible, the boundary regions between adjacent walls will generally be rounded regions. It is also possible, however, depending on the material used, such as the use of a combined plastic/aluminium material, for there to be sharp edges delimiting the individual walls.

**[0014]** According to the invention the packaging is **characterized in that** it comprises mutual engagement means which are associated with the common sides of a first pair of adjacent walls and are designed to disengageably interconnect said walls in order to allow opening and closing of the containment volume; moreover the common sides of the other pair of adjacent walls, namely the adjacent walls different from those forming the first pair, are connected together by means of a region where overlapped end edges of the walls of the aforementioned other pair are welded together.

**[0015]** In particular, with reference to the illustrations shown in Figs. 6 and 7, the base wall 10 and the side wall 4, which are adjacent to each other along the common side 12, are connected or in any case may be connected together by means of mutual engagement means 14a, 14b associated with the sides of the walls 4 and 10, respectively, directed towards the inside of the containment volume.

**[0016]** The aforementioned engagement means are for example of the type known as pressure closing or "zip lock" means; these engagement means are formed by elongated elements of plastic material which are fixed to the walls 4 and 10 by means of gluing or welding and have matching forms which are preferably continuous, for example a groove and a respective rib, suitable for form-fitting together.

**[0017]** Preferably, overlapped end edges 17 and 19 of the walls 4 and 10 are further connected together in an end welding region 16 situated at a distance from the engagement means 14a and 14b. This welding region may be formed, for example, by a plurality of parallel welding lines which are preferably spaced from each other by non-welded interspaces which may extend as far as the edge 20 of the packaging which, in the example, is shown with a toothed profile, but which obviously could have any other configuration.

**[0018]** Preferably, in order to facilitate opening of the packaging, it is envisaged to form tear invitation means, such as an incision 18a or a pair of incisions 18a and 18b, in the region of the wrapping included between the engagement means and the edge 20. The aforementioned incisions preferably have a V-shaped configuration with the vertex of the incision formed preferably in a non-welded interspace between a preferably continuous welding line, closest to the mutual engagement means 14a and 14b, and a welding line adjacent thereto.

**[0019]** In this way, the region of the walls 4 and 10 included between the mutual engagement means and the tear produced by the incisions is in any case sealed despite the presence of the aforementioned incisions because a narrow continuous welding zone remains between said incisions and the pressure closure.

**[0020]** In other words, said incision (or pair of incisions) is/are situated in an end region of the welding region 16 situated towards the pressure closure such that, after the opening action performed by the user acting on the incision (or pair of incisions) in order to tear the end part 20, the packaging does not lose its tightness and at the same time is easy to open since the wider welded region is removed during opening itself.

**[0021]** In order to complete the opening action, the consumer separates the overlapped edges 17 and 19 so as to act on the pressure closure. This position of the incision (or pair of incisions) is fundamental for ensuring easy opening and for maintaining the tightness of the packaging until the moment of opening.

**[0022]** However, if there are no particular requirements in this connection, the scope of the invention is understood as including the case where the end portions or edges of the walls 4 and 10 are formed as one piece, forming a closed end bend; this embodiment is made possible by means of the preferred production method which will be illustrated below with reference to Figs. 1 to 4.

**[0023]** The walls 6 and 8 of the wrapping which are adjacent along a common side 24 are in turn connected together in a welding region 26 where the overlapped end edges 27 and 29 of the walls 6 and 8 are welded together, so as to form a flattened tongue 28 which extends between the vertices 30 and 32 of the substantially triangular walls.

**[0024]** In the configuration shown, the wrapping also has welding lines 34 and 36 which extend substantially along a bisector of the angles at the vertex  $\alpha$  and  $\beta$  of

the walls 6 and 8.

**[0025]** Production of the packaging shown may be performed by means of a method, the operating steps of which are illustrated in Figs. 1 to 5. In this embodiment, the method starts with a thin sheet 40 with a generally quadrangular form, made of flexible material fed from a reel.

**[0026]** In the illustration shown in Fig. 1, the sides 42, 44, 46 and 48 of the sheet are straight, forming a rectangular sheet; however, it is understood that these sides may not be necessarily straight, it being possible to use a sheet fed from a reel and delimited by sides which are for example wavy or toothed or which also have another type of profile.

**[0027]** Matching mutual engagement means 14a and 14b, namely matching elements forming a pressure closure of the "zip lock" type, as described above, are fixed to the sheet 40, before it is cut from the feeder reel, in its central region, generally by ultrasound or heat welding means.

**[0028]** During the operating step shown in Fig. 2, the sheet 40 is cut from the reel and folded onto itself along an intermediate folding line 50 between the engagement means 14a and 14b so as to cause overlapping, in a mutually engaged condition, of the engagement means 14a and 14b.

**[0029]** During the following step shown in Fig. 3 it is envisaged to weld the overlapped longitudinal edges 46 and 48, forming welding regions which, in the illustration shown in Figs. 6 and 7, correspond to the welding lines indicated there by 34 and 36. This results in the formation of a flat bag or wrapping formed by flat walls 64, 66 which are closed along their sides 50, 46 and 48 and with an open end mouth defined by the sides 42 and 44 which are not connected together.

**[0030]** The two flat overlapped walls of the sheet 40 may then be welded together in the region included between the engagement means 14a, 14b and the folding line 50, forming a welding region 16 which extends between the sides 46 and 48 of the bag thus obtained (Fig. 4).

**[0031]** As indicated above, preferably, an incision or a pair of incisions 18a, 18b, is/are created on the sides 46 and 48, whereby said incisions may be connected by a weakening line on the outermost part of the welding region towards the pressure closure, so that the welding zone between said incisions and the pressure closure is still present. This measure allows easy manual opening of the packaging and ensures that the latter retains its tightness.

**[0032]** A possible option consists in the use of a film which is oriented in the direction orthogonal to the direction of feeding of the film from the reel and which is torn along the directrix of its orientation, by gripping with the fingers in the region of the incision, whereby the weakening line between the two incisions is not required in this option.

**[0033]** The products to be packaged may then be in-

troduced inside the bag through the mouth delimited by the sides 42 and 44.

**[0034]** The lines 52 and 54, which are indicated on the sides of the bag as shown in Figs. 4 and 5, are purely ideal lines, which are shown in order to identify the sides of the tetrahedron, and in particular the side 4 which, together with the sides 6, 8, 10, is formed by means of the following welding operation performed in the region adjacent to the mouth for introducing the products. As already mentioned, the lines 52 and 54 are not necessarily to be understood as being folding lines or sharp edges.

**[0035]** The final operation consists in sealing the open mouth by means of an ultrasound or heat welding operation. In order to obtain the desired tetrahedral form, welding is performed after bringing the end edges 27 and 29 of the walls of the bag into the overlapped position, in a plane substantially orthogonal to the plane in which the flat overlapped walls 64 and 66 shown in Figs. 1 and 3 lie; this operation is performed by folding over the sides 42 and 44 onto each other about the middle points 56 and 58 of these sides.

**[0036]** The edges 60 and 20 of the wrapping may be cut with a desired cutting profile, for example with a toothed profile as shown; this operation may be preferably performed at the same time as the respective welding operation which forms the welding regions 16 and 26.

**[0037]** It is intended that the method described here is to be understood as being purely exemplary and not binding. For example, a configuration similar to that of Fig. 3 and 4 may also be obtained from two separate sheets, to each of which the mutual engagement means forming the pressure closure are fixed, followed by an operation for welding together the perimetral sides which in these figures are identified by 46, 48 and 50.

**[0038]** The execution of a weld such as that indicated by 16, included in the region between the mutual engagement means and the end 20 of the wrapping, is an operation which may also be considered optional in the case where the packaging is obtained by means of the method shown in Figs. 1 to 3 described above.

**[0039]** In this case, opening of the packaging could be performed by means of a cutting operation, for example using a shearing implement, parallel to the extension of the mutual engagement means.

**[0040]** The packaging shown in Figs. 6 and 7 and the method described above are in any case to be regarded as preferred for the purposes of providing a packaging which can be easily opened, also by a child, and which, prior to initial opening, is able to keep the packaged products in a hermetic environment.

**[0041]** It is also understood that, without affecting the principle of the invention, the embodiments and the constructional details may be greatly modified with respect to that described and illustrated purely by way of a non-limiting example, without thereby departing from the scope of the claims which follow.

## Claims

1. Packaging consisting of a wrapping (2) of flexible material, delimited by generally triangular walls (4, 6, 8, 10), so as to define an essentially tetrahedral containment volume, **characterized in that** it comprises mutual engagement means (14a, 14b) which are associated with the common sides (12) of a first pair of adjacent walls (4, 10) and are designed to disengageably interconnect said walls in order to allow opening and closing of the containment volume and **in that** the common sides (24) of the other pair of adjacent walls (6, 8) are interconnected by a region (26) where overlapped end edges (27, 29) of the walls of said other pair are welded together.
2. Packaging according to Claim 1, **characterized in that**, adjacent to said mutual engagement means (14a, 14b), it has a region (16) where the overlapped end edges (17, 19) of the walls of said first pair (4, 10) are welded together.
3. Packaging according to Claim 1 or 2, **characterized in that** it comprises tear invitation means (18a, 18b) in the region of the wrapping included between said mutual engagement means (14a, 14b) and the end edges (20) of the walls (4, 10) of said first pair.
4. Packaging according to Claim 3, **characterized in that** said tear invitation means (18a, 18b) are formed in an intermediate zone of the region (16) where welding is performed between the overlapped edges (17, 19) of the walls (4, 10) of said first pair of walls, so as to maintain a continuous welding zone between said tear invitation means and said mutual engagement means, in order to ensure the tightness of the packaging even after tearing.
5. Packaging according to Claim 4, **characterized in that** said welding region (16) where the overlapped edges (17, 19) of the walls of said first pair are welded together comprises a plurality of welding lines mutually spaced by non-welded interspaces and wherein said tear invitation means (18a, 18b) are formed in one of said interspaces.
6. Packaging according to any one of the preceding claims, **characterized in that** on the walls of said other pair (6, 8) it has a respective welding line (34, 36) connecting portions of the sheet material forming the packaging.
7. Packaging according to any one of the preceding claims, **characterized in that** said mutual engagement means comprise pressure closing means (14a, 14b) of the form-fitting or snap-engagement type.
8. Packaging according to any one of the preceding

claims, **characterized in that** it is composed of a flexible sheet material suitable for heat-sealing.

9. Method for the production of a packaging consisting of a wrapping of flexible material, delimited by substantially triangular walls (4, 6, 8, 10), so as to define an essentially tetrahedral containment volume, according to any one of Claims 1 to 8, **characterized in that** it comprises the steps of:

- preparing a flattened wrapping of flexible material, formed by two overlapped flat walls (64, 66) interconnected along the perimetral edges (46, 48, 50) and having an open mouth (42, 44), provided in the vicinity of the perimetral side (50) opposite the mouth side (42, 44) with mutual engagement means (14a, 14b) associated with the inner surfaces of the wrapping and designed to disengageably interconnect said walls;
- introducing through the open mouth one or more items to be packaged;
- positioning, in an overlapped relationship, the end edges (27, 29) of said walls (64, 66), adjacent to the mouth, in a plane substantially orthogonal to the plane in which, in the flattened configuration of the wrapping, said overlapped walls (64, 66) lie; and
- performing welding (26) of said overlapped edges (27, 29), thus defining a closed wrapping, having said essentially tetrahedral containment volume.

10. Method according to Claim 9, **characterized in that** said flat wrapping is obtained by the steps of:

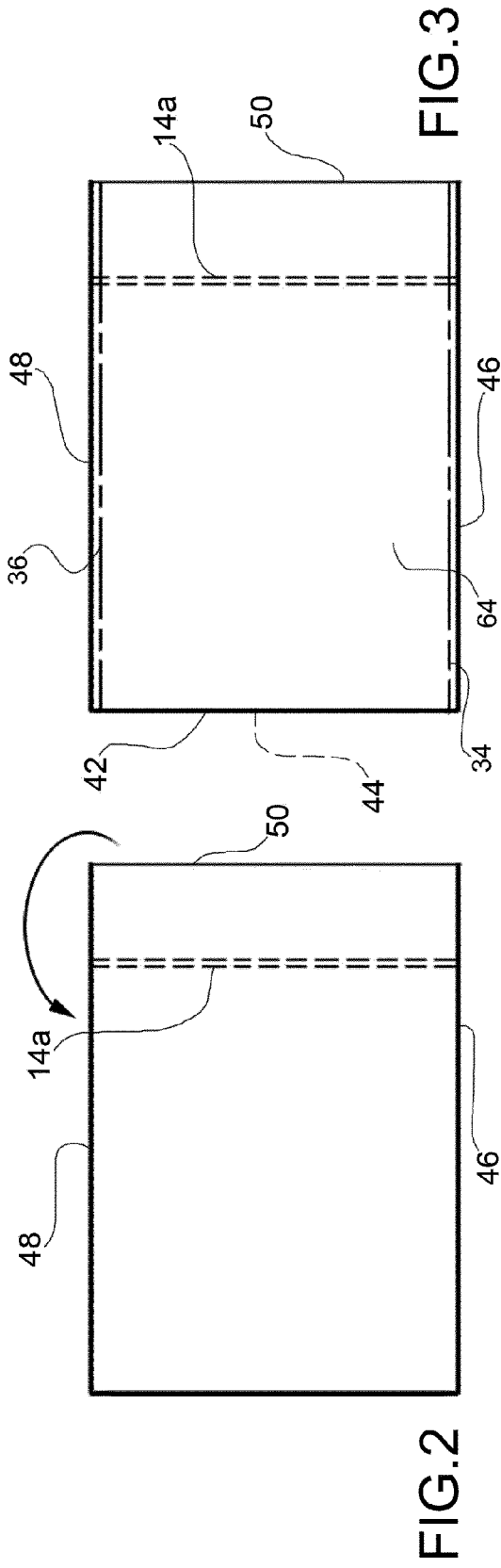
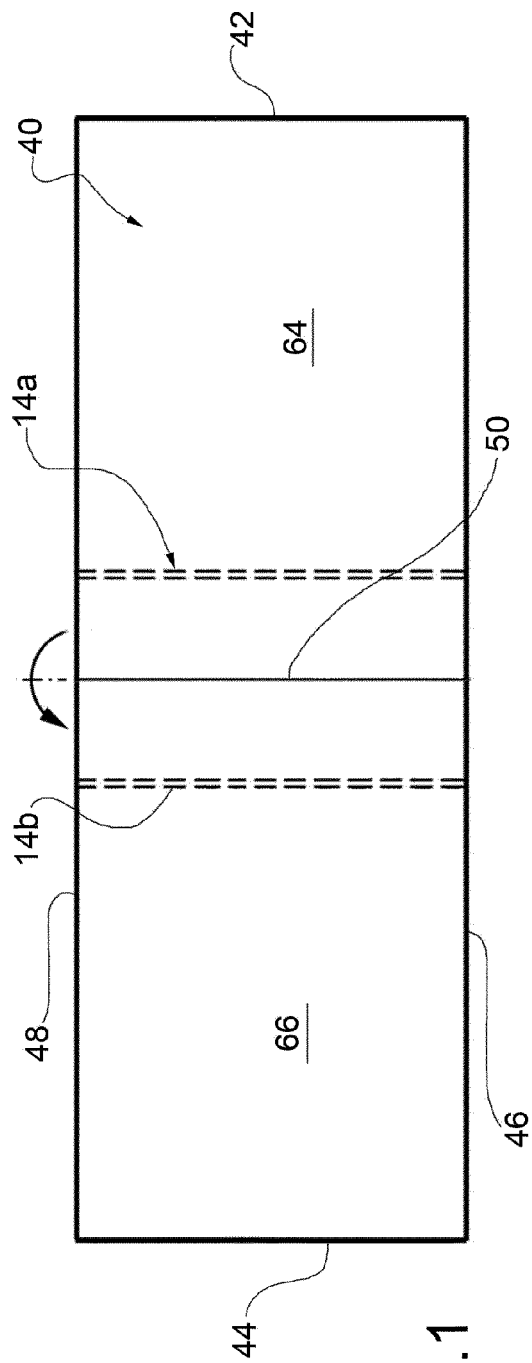
- preparing a sheet (40), provided in its central region with mutual engagement means (14a, 14b) spaced and parallel to each other;
- folding the sheet onto itself about an intermediate folding line (50) between said mutual engagement means, so as to bring said mutual engagement means into an engaged position, and
- welding the sheet (40) folded onto itself along the perimetral sides (48, 46) to form a flattened wrapping having said mouth.

11. Method according to Claim 9 or 10, **characterized in that** it also comprises the steps of performing welding (16) of said walls in the wrapping region included between said mutual engagement means (14a, 14b) and the side (50) opposite to said mouth (42, 44), said step being performed before or after the introduction of said article/s.

12. Method according to Claim 11, **characterized in that** it comprises the step of providing, in said region of the wrapping included between the engagement means (14a, 14b) and the side (50) opposite to the

mouth (42, 44), tear invitation means (18a, 18b) designed to allow opening of the packaging.

13. Method according to Claim 12, **characterized in that** said tear invitation means (18a, 18b), are formed in an intermediate zone of the region (16) where the overlapped edges (17, 19) of said walls (4, 10) of said first pair are welded together, so as to maintain a continuous welding zone between said tear invitation means (18a, 18b) and said mutual engagement means (14a, 14b) and ensure the tightness of the packaging even after tearing.



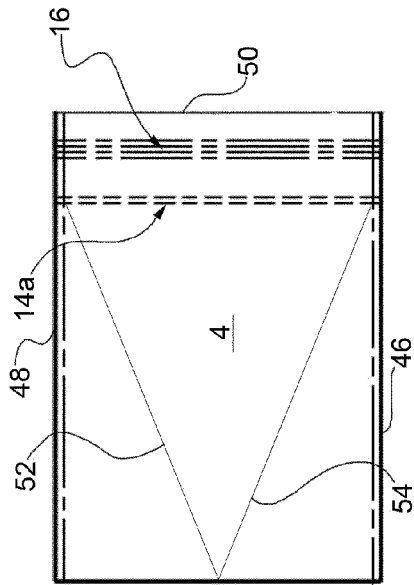


FIG. 4

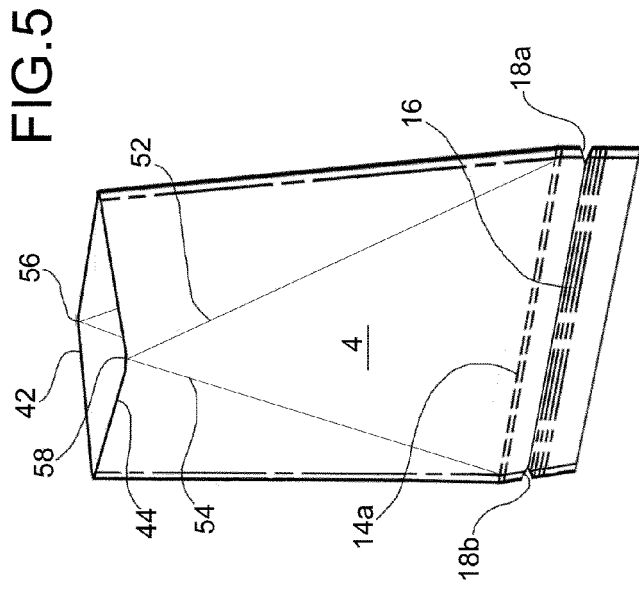


FIG. 5

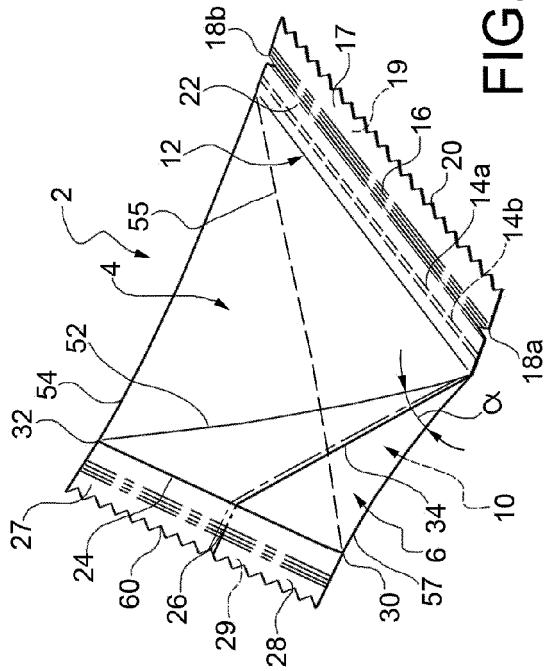


FIG. 6

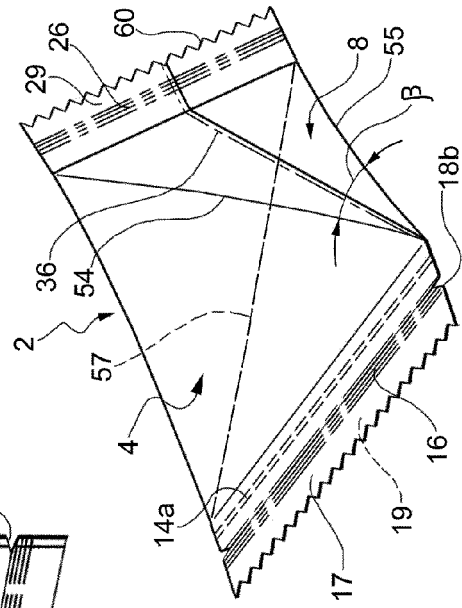


FIG. 7



## EUROPEAN SEARCH REPORT

Application Number  
EP 12 19 1661

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 2002/069615 A1 (GIFFORD LORNE CHARLES [GB] ET AL) 13 June 2002 (2002-06-13) * paragraph [0044] - paragraph [0047]; figures 1-5 *	1,9	INV. B65D75/50 B65D33/25 B65B61/18
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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			B65D B65B
Place of search		Date of completion of the search	Examiner
Munich		21 January 2013	Grondin, David
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**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 12 19 1661

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