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(54) **Fabrication process of flexible adhesive label-valves**

(57) An efficient fabrication process of flexible label-valve minimizes wastes and simplifies the fabrication steps. The flexible adhesive label-valves lend themselves to be individually lifted off a continuous feed carrier

ribbon by automated transfer devices adapted to apply on a precisely defined location the label-valve to seal an opening or incision of the continuous ribbon of flexible film with which a heat sealed flexible air tight package will be formed.

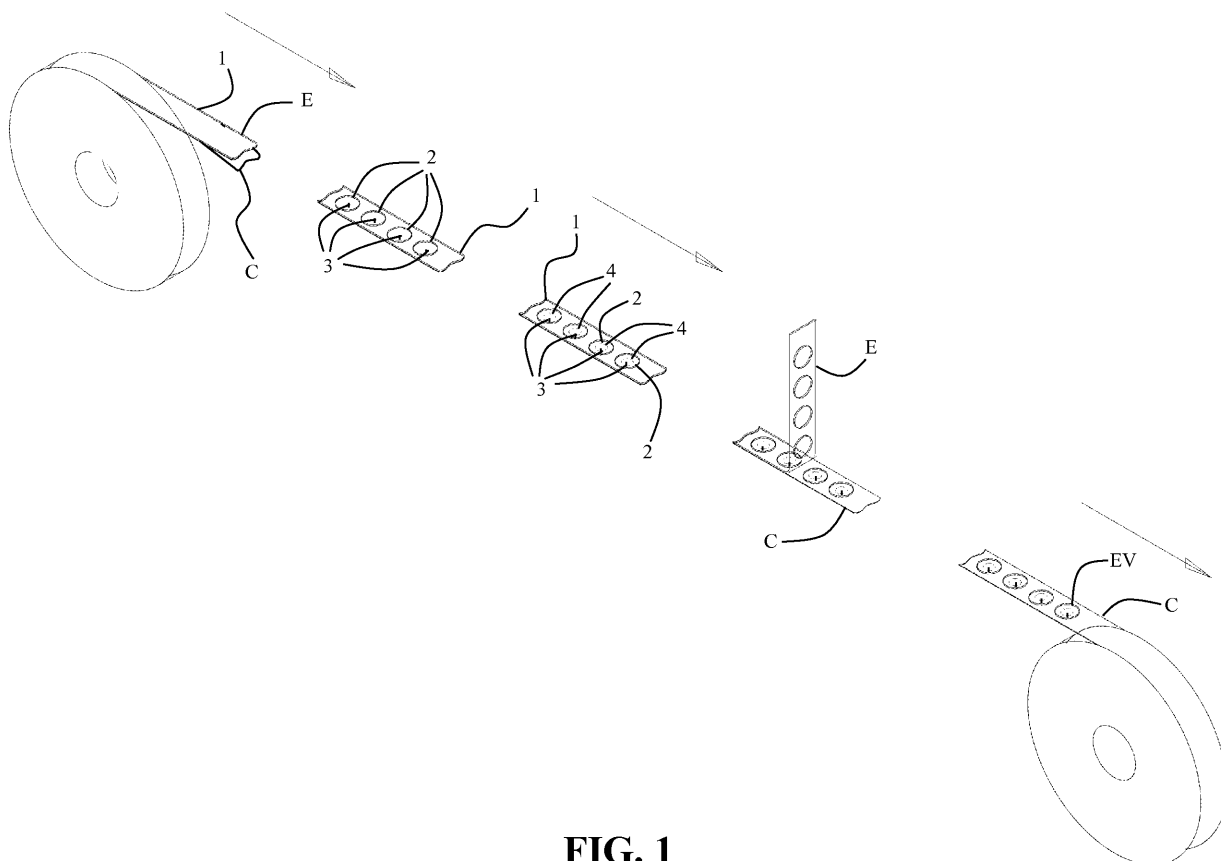


FIG. 1

Description

[0001] The present disclosure concerns in general the packaging techniques of foodstuff in particular inside heat sealed airtight flexible film packages that may eventually be warmed up before heating it.

[0002] The practice of packaging foodstuff in airtight packages for preventing contaminations and favor conservation of the preparation is common practice. This type of packaging used in the commerce, delivery or distribution of meals may also be adapted to allow heating/cooking the foodstuff in a hot or microwave oven prior to deliver or serve the heated food still contained in the package. Such a practice is very common in snack-bar, fast-food, restaurants, mess-rooms, automatic food dispensers and alike.

[0003] When heating the content of these airtight packages, an inner overpressure is produced because of the development of vapors (typically water vapor) which inflates the flexible film airtight package to the point of causing its tearing open and/or partial detachment of welded seams or welded edges, unless the flexible film is preventively perforated. In any case the package to be delivered or served after having heated its contents would assume a non integer aspect besides complicating an orderly opening of a flexible sac-like package or the removal of an already pierced or partly detached sealing film of flexible plastic film of a relatively rigid tub or plate like container.

[0004] For preventing these effects of heating the contents of an airtight package, special pressure release valves for the pressurized gaseous substances have been devised, often intended to be pre-applied onto the plastic film with which will be formed the heat sealed flexible sac package or sealed a plate-container of relatively rigid plastic in order to release over pressurized vapors upon exceeding a certain maximum limit pressure thus avoiding uncontrolled tearing or detachment of the hot welded flexible film of the package.

[0005] The document JP-2006-298410 (A) describes a vapor release valve that may be fabricated replicating it over a support ribbon. The fabrication machine separates a portion or segment of the ribbon carrying on it a single valve, removes from it the portion of the supporting ribbon, and apply the adhesive valve in a predetermined area over the inner surface of the flexible film with which the airtight package will be made.

[0006] Various structures of adhesive label-valve applicable over the outer surface of hot weldable films used for packaging foodstuff, for sealing a release opening of inner over pressurized gaseous substances from the airtight package, are described in the documents: U.S. Patent No. 5,989,608, AU2006219770(A1), WO2006107974(A1), WO2004108557(A2), EP1157942 (A1).

[0007] The composite structures of known adhesive label valves comprising a layer of adhesive and a central shielding membrane adherent to the layer of pressure

activated adhesive of the label-valve such to overlay the opening formed through the hot weldable flexible film of the package to prevent contact of the aliment with the adhesive, are relatively costly from the point of view of the efficient use of materials and ease of application over an aperture made through the flexible film with which the hot sealed packages will be made.

[0008] Has been found and is the object of the present application, a novel and efficient fabrication process of flexible adhesive label-valves that provides for a substantial minimization of wasted materials (chisel) together with a simplification of the processes. Moreover, flexible the adhesive label-valves may be picked-up singularly from a continuous feed carrier ribbon to an automated handling device that eventually apply a picked-up label-valve onto the outer surface of a flexible plastic film ribbon having holes at regular intervals, with which the hot sealed package will be formed.

[0009] Basically, the process of the present disclosure comprises the steps of:

- a) coupling a carrier sheet or ribbon of a foodstuff compatible polymeric packaging material having an antiadherent coupling surface, to a sheet or ribbon of a polymeric material suitable for packaging foodstuff (foodstuff compatible) having onto its coupling surface a layer of a pressure activated adhesive;
- b) incising only the carrier sheet or ribbon of said laminated article once for producing a cut that defines the perimeter of an island portion of the carrier ribbon of size adapted to occlude, superimposing on it, the pressure release hole or cut in the flexible plastic film of formation of the package and a second time in order to produce cut only in the sheet or ribbon with adhesive layer, that defines the perimeter of a valve label strippable off said antiadherent surface of the underlying carrier sheet or ribbon, around the area of the defined island portion, and at least a cut secant the geometric projection of the perimeter of the island portion of carrier sheet or ribbon.

[0010] Exemplary, a continuous laminated ribbon, unwound from a feed roll, is simply subjected to a first incision with a sharp tool of only a carrier ribbon of a polymeric material adapt for packaging foodstuff and having its coupling surface treated in a manner such to make it antiadherent, defining a close perimeter of a shielding membrane island of size adapted to overlie an area exceeding the area of a release hole formed in the hot weldable flexible plastic film, with which will be formed the airtight package of the foodstuff.

[0011] The process of fabrication further comprises a second incision of the ribbon of flexible foodstuff compatible plastic film having a layer of adhesive on its coupling surface, around the geometrical projection of the incision made on the carrier ribbon, for defining the closed perimeter of the adhesive label-valve strippable off the antiadherent carrier ribbon, and at least a cut secant to

the geometrical projection of the definition perimeter of the central island portion of the underlying antiadherent carrier ribbon. Of course, the order of execution of the incisions in one and in other plastic ribbons may also be inverted.

[0012] The laminated article so prepared, whether in the form of a ribbon or of a continuous sheet that would be successively sliced to form several distinct feed ribbons is rewound in a roll.

[0013] A continuous ribbon of adhesive label-valves, one after the other, may be commonly unwound in an automated station of application of the adhesive label-valve onto a continuous sheet of hot weldable plastic film with which the airtight packages will be formed. Commonly, a suction cup comes to bear over the back of an adhesive label-valve, holding it during its lift-off the carrier ribbon. This determines the lifting off of label-valve from the carrier ribbon, carrying with it, onto the surface covered with a layer of pressure activated adhesive, the island portion incised in the carrier ribbon. The pick-up arm aligns the label-valve precisely above one of the holes formed in the flexible film of hot weldable material, and finally presses the adhesive label-valve thereon such that the central island portion of carrier ribbon carried with it overlies the hole amply exceeding its perimeter.

[0014] Should, inside the hot sealed package develop an overpressure exceeding a given threshold, the cut secant the projection of the perimeter of the central shielding island of foodstuff compatible flexible plastic carrier sheet that covets the hole in the flexible film of the package provide a preferential failure path of adhesive of the cut edges (part of which extend over the antiadherent central membrane) which causes the release of pressurized gas and vapors relieving the pressure inside the package.

[0015] The threshold of inner overpressure beyond which release of pressurized vapors occurs is set by the adhesive property of the pressure activated adhesive used and characteristics of adhesion of the interested surfaces, by absolute or relative sizing of the different parts that composed the adhesive label-valve (perimeters of definition of the anti adhesive central island portion of carrier ribbon and of the adhesive label-valve dimensions and position and length of the cut secant to the projected perimeter of the central island piece and of the adhesive label-valve, number of secant cuts if more than one) that is applied on the surface of the flexible plastic film used for forming the hot sealed package.

[0016] Preferably the incision of the flexible adhesive label-valve and of the secant cut or cuts of release of the inner overpressure out of then package, may be done using a tool including also arcuated cutters to produce witness incisions for providing an immediate visual check of the integrity of the package, according to common practices in the field.

Fig. 1 shows schematically the basic steps and aspects of the process of the present disclosure.

Fig. 2A, 2B and 2C are layout views from above and from below and a cross section of an exemplary embodiment of the adhesive label-valve of the present disclosure.

Fig. 3A, 3B and 3C are layout views from above, from below and in cross section of an alternative exemplary embodiment of adhesive label-valve of the present disclosure.

Fig. 4 and 5 are layout view from above of other exemplary embodiments of adhesive label valves of the present disclosure.

[0017] The ensuing description of several exemplary embodiment of this invention with reference to the attached drawings, has only illustrative purposes and is not intended to limit the innumerable alternative embodiments of the adhesive label-valves made according to the method of the present invention, as would be evident to an expert reader.

[0018] Generally, the carrier film may be of material safe to come in contact with food belonging to the group composed of polypropylene (for example of thickness comprised between about 35 μm and about 60 μm), polyester (for example of thickness comprised between about 25 μm and about 45 μm or of material having equivalent characteristics), the coupling surface of which may be commonly treated with a silicone to make it non adherent or limitately so.

[0019] Also the film used for making the adhesive label may be of material belonging to the group composed of polypropylene (for example of thickness comprised between about 35 μm and about 60 μm), polyester (for example of thickness comprised between about 25 μm and about 45 μm) or of any other material having equivalent characteristics, multilayer laminates of the same materials or singularly coupled with a film of a polyamide (for example of thickness comprised between about 10 μm and about 20 μm).

[0020] The adhesive applied onto the bonding surface of the plastic film of the adhesive label may be a common aqueous base acrylic adhesive or UV reticulating acrylic adhesive mix or an acrylic resin mix in an organic solvent.

[0021] Referring to **Fig. 1**, a multilayer laminated ribbon 1 composed of a carrier film/adhesive layer/label film unwound from a feed roll E, is subjected to a first incision of only the label film such to define the perimeter of the adhesive label 2 to be eventually lifted off the non adherent carrier film C, and to produce at least a cut 3 within the area defined by the perimetral incision of the label 2. Optionally, more than one arcuated cuts 5 may also be incised, relatively short and spaced from one another and generally distributed uniformly along an inner circumference or perimeter in respect to the outer circumference or perimeter of definition of the adhesive label 2. These optional arcuated cuts (incisions) constitute effective witnesses of integrity (becoming irremediably distorted in

case of malicious attempts to remove the adhesive label from the surface on which it will be eventually be applied).

[0022] In a second operating station of the fabrication line, (of course the order of the two incision steps may be inverted), the continuous laminated ribbon 1 is subjected to a second incision on the opposite surface to that of the first incision step, of only the carrier film such to define a island 4 more or less centered in respect to the incised perimeter of the label 2 and such that the definition perimeter of such a incised central island 4 of the carrier film projectively intersecates the cut (or cuts) 3 formed through the thickness of the film of definition of the label 2, remaining contained within the circumference or perimeter along which may be present arcuated integrity witness cuts 5.

[0023] In the shown example, the process may contemplates detachment and disposal of the waste portion of the film with adhesive layer of definition of the labels 2, which may be lifted off the non adherent carrier ribbon C carrying the adhesive label-valves so formed, which may than be rewound in a roll EV. As may be observed, the wasted material is effectively minimized by purposely sizing the width of the carrier film C.

[0024] The EV roll will than be used as feed roll in a common automated station of application of the adhesive label-valves singularly lifted-off the carrier ribbon C, precisely over holes formed in the continuous ribbon of hot weldable flexible plastic film with which will be formed the airtight packages.

[0025] In **Fig. 2A, 2B** and **2C** is illustrated by a layout view from above, a layout view from below and a cross sectional view, an exemplary embodiment of the structure of adhesive label-valve as defined with the novel fabrication process of the present invention.

[0026] A possible alternative embodiment of adhesive label-valve fabricated with the fabrication process of the present invention is illustrated in **Fig. 3A, 3B** and **3C**. According to this alternative embodiment, beside a different geometry of the central island portion 4 of the non adherent carrier film C, the view from below shows that in the two zones of incision of the cuts 3 of favored opening of the relief valve device upon exceeding the maximum limit of inner overpressure, the "breaking open" of the label-valve device may be facilitated by freeing from adhesive the two zones 6.

[0027] **Fig. 4** and **5** are layouts views from above of other exemplary embodiments of adhesive label-valves made according to the present invention, which may obviously be made in innumerable other geometrical shapes and sizes.

Claims

1. A fabrication process of flexible adhesive valve-labels (EV), alignedly applicable onto the outer surface of a flexible film of an air tight package for sealing a release opening through the flexible package film of

inner overpressure, comprising the steps of:

a) coupling a carrier sheet or ribbon (C) of a food-stuff packaging compatible polymeric material having an antiadherent coupling surface to a sheet or ribbon (E) of a polymeric material suitable for packaging foodstuff having onto it coupling surface a layer of pressure activated adhesive to form an adhesive bonded laminated article (C+E);

b) producing on said laminated article (C+E) a first cut of only the carrier sheet or ribbon (C) defining the perimeter of an island portion (4) of size adapted to occlude said release opening through the package film, and a second cut of only said sheet or ribbon (E) with said adhesive layer, defining the perimeter (2) of a valve label (EV) strippable off said antiadherent surface of the carrier sheet or ribbon (C) around said cut island (4) and at least a third cut (3) secant of the geometric projection of the perimeter of said cut island portion (4) of the underlying carrier sheet or ribbon (C);

c) said valve (EV) stripped off the carrier sheet or ribbon (C) carrying along said cut island portion (4) of the carrier sheet or ribbon (C) and applied with the outer surface of the packaging flexible film, occluding as a nonadhesive membrane said release opening also preventing contact of said adhesive with the content of the package.

2. The process according to claim 1, wherein the perimeter of the cut defining said island position of carrier sheet or ribbon surrounds the perimeter of said pressure release opening through the package film.

3. The process according to claim 1, further including the formation of tightness violation witnesses cuts (5) through said sheet or ribbon with adhesive layer (E) in an area geometrically confined by said perimeter (2) of the valve-label and the projection of the perimeter of the underlying membrane-island (4) of carrier sheet or ribbon (C).

4. The process of claim 1, wherein said cut or cuts (3) secant of the geometric projection of the perimeter of the underlying island (4) or carrier sheet or ribbon (C) carried along onto the adhesion side of the lifted off valve-label (EV), partially extends in an adhesive-free zone of the valve label (EV).

5. The process of claim 1, wherein said carrier sheet or ribbon (C) is of a material belonging to the group composed of polypropylene of thickness comprised between 35 and 60 μm and polyester of thickness comprised between 25 and 45 μm , and the coupling surface of the sheet is made antiadherent by appli-

cation of a silicon material.

6. The process of claim 1, wherein said second sheet or ribbon (E) of polymeric material suitable for packaging foodstuff, having on the coupling surface a layer of pressure activate adhesive, is of a material belonging to the group composed of polypropylene of thickness comprised between 35 and 60 μm , polyester of thickness comprised between 25 and 45 μm and laminates of the same materials together and/or singularly with a polyamide film of thickness comprised between 10 and 20 μm .
7. The process of claim 1, wherein said pressure activated adhesive is an acrylic adhesive in aqueous or organic solvent.

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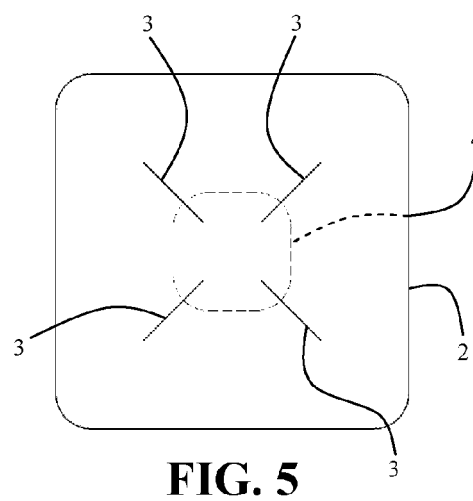
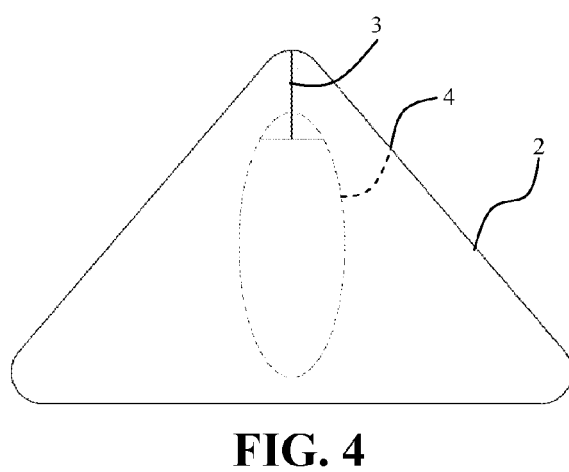
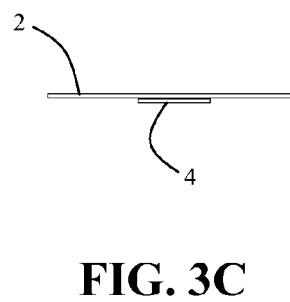
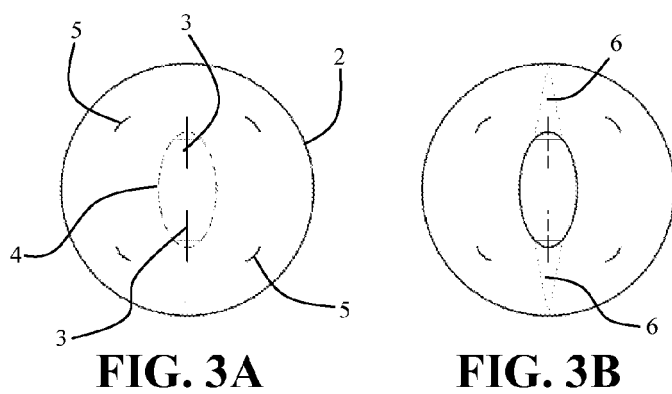
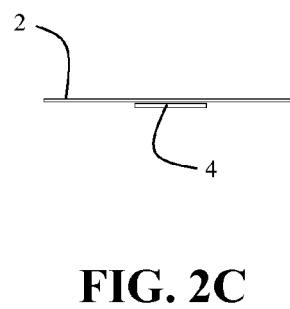
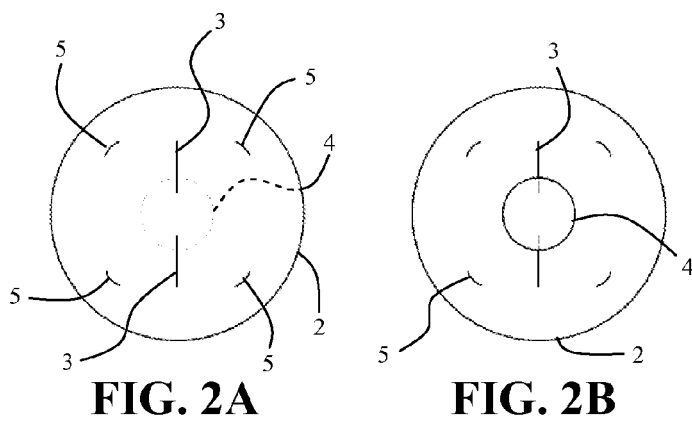
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FIG. 1





EUROPEAN SEARCH REPORT

Application Number
EP 10 16 8393

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 2006/030472 A1 (HARTMAN WILLIAM G [US] ET AL) 9 February 2006 (2006-02-09) * abstract; figures 18-20 * -----	1	INV. B31B19/84 B31D1/02 B65D77/22
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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			B31B B31D B65D
Place of search		Date of completion of the search	Examiner
Munich		25 October 2010	Farizon, Pascal
CATEGORY OF CITED DOCUMENTS		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	
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			

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EPO FORM 1503 03.82 (P04C01)

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

EP 10 16 8393

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The members are as contained in the European Patent Office EDP file on
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25-10-2010

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