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(54) METHOD FOR PRODUCING A PACKAGING ITEM
VERFAHREN ZUR HERSTELLUNG EINER VERPACKUNG
PROCEDE DE PRODUCTION D'UN ARTICLE D'EMBALLAGE

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Description

[0001] The invention is in the field of the packing industry and relates to a method for producing packaging items according to the generic part of the first independent claim. The method according to the method packaging item is applicable in particular for packaging goods from which liquid tends to ooze, which liquid for different reasons is not wanted inside the package.

[0002] An example for such a liquid is the meat juice oozing out of packed fresh meat. If the meat is packed in a liquid proof packaging item and remains so for some time, the meat juice accumulates inside the package round the meat. This does not look nice and furthermore it constitutes a medium in which deterioration of the meat is accelerated. Therefore it is important to keep this meat juice not only out of sight of a potential buyer but it is also important to keep it, as far as possible, separated from the meat. Similar problems arise with any goods to be packed which goods produce a liquid whilst packed.

[0003] According to the state of the art the problem of unwanted liquid inside a liquid proof package is solved, in the case of packages made from polymeric which do not absorb any liquid at all, by introducing an absorbing agent into the package, which absorbing agent absorbs the unwanted liquid. The absorbing agent mainly used in the case of packaged meat is a piece of absorbing paper. This piece of absorbing paper is usually positioned between the not transparent bottom part of the packaging item and the meat and it is smaller than the meat. Such, the absorbing paper cannot be seen as long as the package is closed. Furthermore the piece of absorbing paper reduces the meat surface which is in direct contact with the absorbed juice, i.e. the absorbing paper solves the problem of the unwanted liquid in a satisfactory way.

[0004] However, the absorbing paper or any absorbing agent introduced in the package keeps the liquid meat juice out of sight of the customer only as long as he does not open the package. Then, this customer is confronted with the wet and not very appetizing absorbing paper which he has to separate from the meat and which he has to dispose of. Furthermore the absorbing paper or any other sort of absorbing agent constitutes a further piece of material adding to the weight and to the cost of the package.

[0005] A further known means for removing unwanted liquid in a packaging item: from the view of a potential buyer and from the packed goods are grooves or holes in the bottom-part of the packaging item which grooves or holes act as capillaries taking up the liquid and not releasing it any more. Such packaging items and methods for producing them are described in the publications US-3974722 and FR-2717452.

[0006] It is the object of the invention to create a further method for producing a packaging item applicable in particular for packing goods out of which unwanted squid oozes, which packaging item differs from known such items in that, without introduction of a separate absorbing agent, the unwanted liquid is kept substantially separated from the packed good and is prevented from causing an esthetic drawback. The inventively produced packaging item is to be substantially producible with the same production means from the same amount of the same sort of material or materials as are packaging items already known and applicable for the same packing purposes.

[0007] This object is achieved by the method for producing packaging items as they are defined in the claims.

[0008] The inventively produced packaging item which is e.g. a tray to be closed with a lidding film, has in at least the one part of its wall which is to constitute the bottom of the package, grooves which are, over their whole length, open towards the inside of the packaging item, whereby the opening of the grooves is narrower than the inside of the grooves. These grooves may have any length. They may also be so short, that their length is about equal to their width such that they are not grooves in the proper sense of the word any more but holes, e.g. with a round opening.

[0009] In these grooves the unwanted liquid is trapped, if the width of the groove opening is chosen such that the liquid is driven into the opening by a capillary effect and kept inside the groove by the same effect. The maximum width possible for the groove openings is dependent on the surface tension between the package material and the liquid concerned. It is best determined by corresponding experiments.

[0010] The inventively produced packaging item is made from a thermoplastic polymer material and is produced by a thermoforming process which includes a vacuum expansion step for expanding a foam layer in the material of which the packaging item is fabricated. For forming at least its bottom a forming tool (thermoforming die or mould for injection moulding) with protrusions according to the desired grooves is used. These protrusions are such formed that the material is formed or molded around them to form between the protrusion and the main surface of the tool, lips on both sides of groove openings which openings are narrower than the inside of the groove. After thermoforming or moulding, the tool is separated from the formed item whereby the protrusions are pulled out of the grooves. For this operation, in particular when working with a material which is not easily elastically deformable when cold, the temperature management is such that the protrusions can be removed from the grooves without damaging nor irreversibly deforming the lips, such that these lips return to their original form, at least as far as it is defined by the main surface of the tool whereby the groove openings may be widened to a limited degree by the removing of the protrusions from the grooves.

[0011] Examples of the inventively produced packaging item and of the inventive method for producing the
packaging items as well as tools for this method are described in detail in connection with the following Figures, wherein

**Figure 2** shows a section through a exemplified embodiment of the inventively produced packaging item;

**Figures 3 to 8** show exemplified layouts of grooves in bottoms of inventively produced packaging items;

**Figures 9 to 11** show tools for producing the inventively produced packaging item and

**Figure 13** shows arrangement for producing the inventively produced packaging item in a thermoforming process combined with vacuum expansion (Figure 13).

**[0017]** It is obvious that from combining and altering the groove patterns according to Figures 3 to 8, a multitude of further patterns results. It is also obvious that the bottom of the packaging item in which the grooves are positioned does not have to be oblong as shown in the Figures 3 to 8, it can e.g. be round square, triangular a.s.o.

**[0018]** Only grooves in the bottom part of a packaging item can serve as a trap for unwanted liquid, but of course other parts of the packaging item may carry grooves also, may this be for decorative reasons or for reasons dictated by the manufacturing process.

**[0019]** Figures 9 to 11 show different tools for forming the grooves of the inventive packaging item.

**[0020]** Figure 9 shows a tool applicable for a thermoforming process. The tool 20 is shown in section whereby the section is parallel to a straight, oblong protrusion 21 for forming a straight groove (as e.g. shown in Figure 3). The protrusion consists of a bar 22 with e.g. a round cross section which bar 22 is positioned within a distance of the main surface 23 of the tool and parallel to this surface by means of at least two fittings 24 which preferably are thinner than the bar 22. As will be shown further on, such a tool is in particular applicable in a thermoforming process.

**[0021]** Figure 10 shows a tool cut perpendicular to two straight, oblong protrusions 25 which run parallel to each other. The protrusions 25 consist of a wider, bar-like headpiece 25.1 and a narrower headpiece 25.2 which headpiece runs along the whole length of the protrusion 25 and is fixed to the main surface 23 of the tool.

**[0022]** Figure 11 shows a tool for producing a packaging item as illustrated in Figure 8. The protrusions 26 of this tool are not oblong as the protrusions of the tools according to Figures 9 and 10 but extend to about the same amount in all directions parallel to the main surface 23 of the tool. The protrusions consist of a headpiece 26.1 which is e.g. spherical and of a headpiece 26.2, which is e.g. cylindrical.

**[0023]** As will be shown furtheron, the tools according to Figures 9, 10 and 11 may be used together with a counter tool having an even counter surface or together with a counter tool having grooves positioned according to the position of the protrusions.

**[0024]** Figure 13 shows a process for manufacturing packaging items, e.g. trays, with a thermoforming process combined with vacuum expansion. This process starts with a sheet material which contains at least one layer of a foamed thermoplastic material. It can be shown, that by applying vacuum to at least one side of
such a material, the foam layer or foam layers can be made to expand such that the thickness of the sheet increases in the treated area. To achieve this, the foamed material needs to have a temperature which is high enough for the material to be plastically deformable, when the vacuum is applied.

[0025] The inventive packaging item is again made by thermoforming a sheet 80 of packaging material, which packaging material contains at least one foam layer. The sheet is thermoformed between two tools 81 and 82, wherein the male tool 81 again carries protrusions according to one of Figures 9 to 11 and the female tool may again have an even counter surface facing the protrusions (as illustrated) or may have a grooved counter surface. Both tools 81 and 82 have channels 73 which are connected to some sort of underpressure source and the tools 81 and 82 together with the sheet 80 dose at least the area of the bottom of the item to be made, e.g. by a tight fit in the area 83. The arrangement just after the thermoforming step is shown on the left hand side of Figure 13.

[0026] In this phase the cavity between the two tools is evacuated from both sides of the sheet 80, which causes the foam layer to expand and the sheet to fill the cavity, in particular to expand around the protrusions to form the grooves. This phase is illustrated on the right hand side of Figure 13.

[0027] For separating the thermoformed item from the tool, e.g. vacuum is applied between the counter tool (female tool) and the packaging item, then the male tool is removed from the item whereby the protrusions are pulled Out of the grooves and then the packaging item is ejected by pressurized air or by an ejection tool incorporated in the female tool. If the finished item is still part of a sheet of packaging material, it might be possible to remove it from the male tool and the female tool without the help of a pressure difference and/or an ejection tool.

[0028] According to the packaging material and to the process parameters applied, it is possible to achieve products which he inbetween the products shown on the right hand side of Figures 12 and 13. In other words this means: when thermoforming a sheet material with at least one foamed layer and with vacuum application on one side or on both sides of the material, some expansion of the foamed layer is expected. The amount of the expansion is dependent e.g. on the difference between the pressures on both side of the material, on the thermostability of surface layers on either side of the material and on the temperature difference between the two surfaces of the material.

Claims

1. Method for producing a packaging item made by thermoforming monolayer or multilayer thermoplastic sheet whereby the packaging item for trapping liquid unwanted on the inside of the item comprises at least on its bottom (10) part at least one groove (11) and/or hole (12) open towards the inside of the packaging item the groove and/or hole having an opening on the inside surface of the packaging item narrower than an inner part which extends away from the inner surface, characterized in that the sheet (80) has at least one foam layer, in that the sheet is thermoformed between a tool (81) with protrusions (21, 25, 26) protruding from a main tool surface and substantially corresponding to the at least one groove and/or hole to be formed and a counter tool (82) and that a cavity formed between the two thermoforming tools (81, 82) is evacuated from the sides of both tools, whereby the foam layer of the sheet (80) is vacuum-expanded to fill the cavity and form lips around the protrusions (21, 25, 26) and that the protrusions (21, 25, 26) are removed from the material by elastically deforming the lips.

2. Method according to claim 1, characterised in that the protrusions (21, 25, 26) are arranged at a distance from the main tool surface (23) or have a neckpiece (25.2, 26.2) and a headpiece (25.1, 26.1) wherein the headpiece (25.1, 26.1) is wider than the neckpiece (25.2, 26.2).

3. Method according to one of claims 1 or 2, charac-
erized in that for preventing unwanted irreversible deformation of the lips the protrusions are removed from the grooves when the packaging material is still at an elevated temperature.

4. Method according to one of claims 1 to 3, charac-
erized in that the protrusions are removed from the grooves while a vacuum is applied between the counter tool and the packaging item.

5. Method according to one of claims 1 to 4, charac-
erized, in that the protrusions are such dimensioned that the opening of the at least one groove (11) and/or hole (12) has a width of 1mm or of less than 1mm.

6. Method according to one of claims 1 to 5, charac-
erized, in that the protrusions are such dimensioned that the at least one groove (11) and/or hole (12) forms a regular pattern over the bottom part (10) of the packaging item.

7. Method according to one of claims 1 to 6, charac-
erized, in that the foam layer of the thermoformed sheet consists of low density polyethylene, high density polyethylene, linear low density polyethylene, polypropylene, polyester, polycarbonate, polyethylene naphthalate or polystyrene.

Patentansprüche

1. Verfahren zur Herstellung einer Verpackung durch
thermische Formung einer einschichtigen oder mehrschichtigen thermoplastischen Folie, wobei die Verpackung zum Auffangen unerwünschter Flüssigkeiten in ihrem Inneren, wenigstens in ihrem Boden (10) wenigstens eine Rille (11) und/oder wenigstens ein Loch (12) aufweist, die eine in das Innere der Verpackung gerichtete Öffnung besitzt, die schmaler ist als ein von der inneren Oberfläche weggerichteter innerer Teil, dadurch gekennzeichnet, daß die Folie (80) wenigstens eine Schaufschicht aufweist und daß sie zwischen einem Werkzeug (81) mit Vorwölbungen (21, 25, 26), die aus der Hauptoberfläche des Werkzeuges hervorragen, und einem korrespondierenden Werkzeug (82) thermisch geformt wird und daß ein Hohlraum zwischen den beiden thermisch formenden Werkzeugen (81, 82) von beiden Seiten der Vorrichtung aus evakuiert wird, wobei sich die Schaufschicht des Blattes (80) im Vakuum ausdehnt, den Hohlraum ausfüllt und Lippen um die Vorwölbungen (21, 25, 26) bildet und die Vorwölbungen (21, 25, 26) durch elastische Verformung der Lippen aus dem Material entfernt werden.

2. Verfahren nach Anspruch 1, dadurch gekennzeichnet, daß die Vorwölbungen (21, 25, 26) von der Hauptoberfläche der Vorrichtung (23) entfernt angeordnet sind oder ein Halsstück (25.2, 26.2) und ein Kopfstück (25.1, 26.1) aufweisen, wobei das Kopfstück (25.1, 26.1) breiter ist als das Halsstück (25.2, 26.2).

3. Verfahren nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß die Vorwölbungen aus den Rillen entfernt werden während das Verpackungsmaterial noch eine erhöhte Temperatur aufweist, um eine unerwünschte irreversible Verformung der Lippen zu vermeiden.


5. Verfahren nach einem der Ansprüche 1 bis 4, dadurch gekennzeichnet, daß die Vorwölbungen so bemessen sind, daß die Öffnung wenigstens einer Rille (11) und/oder wenigstens ein Loches (12) eine Weite \( \leq 1 \) mm aufweist.

6. Verfahren nach einem der Ansprüche 1 bis 5, dadurch gekennzeichnet, daß die Vorwölbungen so bemessen sind, das sie wenigstens eine Rille (11) und/oder wenigstens ein Loch (12) in einer regelmäßigen Anordnung auf dem Boden der Verpackung (10) formen.

7. Verfahren nach einem der Ansprüche 1 bis 6, dadurch gekennzeichnet, daß die Schaumschicht der thermisch geformten Folie aus Polyethylen niedriger Dichte, Polyethylen hoher Dichte, linearem Polyethylen niedriger Dichte, Polypropylen, Polyester, Polycarbonat, Polyethylennaphthalat oder Polystyrol besteht.

**Revendications**

1. Procédé de production d'un article d'emballage réalisé en thermoformant une feuille thermoplastique monocouche ou multicouche où l'article d'emballage pour arrêter le liquide indésirable à l'intérieur de l'article comprend au moins sur sa partie inférieure (10) une rainure (11) et/ou un trou (12) ouvert vers l'intérieur de l'article d'emballage, la rainure et/ou le trou ayant un ouverture à la surface intérieure de l'article d'emballage plus étroite qu'une partie intérieure partant de la surface intérieure, caractérisé en ce que la feuille (80) a au moins une couche de mousse, en ce que la feuille est thermoformée entre un outil (81) avec des saillies (21, 25, 26) sortant d'une surface d'outil principal et correspondant essentiellement à la rainure et/ou au trou à former et un contre-outil (82), en ce qu'une cavité formée entre les deux outils de thermoformage (81, 82) est mise sous vide par les côtés des deux outils où la couche de mousse de la feuille (80) est dilatée sous vide pour remplir la cavité et former des lèvres autour des saillies (21, 25, 26) et en ce que les saillies (21, 25, 26) sont enlevées du matériau en déformant élastiquement les lèvres.

2. Procédé selon la revendication 1, caractérisé en ce que les saillies (21, 25, 26) sont disposées à certaine distance à partir de la surface principale de l'outil (23) ou ont un collet (25.2, 26.2) et une pièce de tête (25.1, 26.1) où la pièce de tête (25.1, 26.1) est plus large que le collet (25.2, 26.2).

3. Procédé selon l'une des revendications 1 ou 2, caractérisé en ce que, pour empêcher une déformation irréversible et indésirable des lèvres, les saillies sont retirées des rainures quand le matériau d'emballage est encore à haute température.

4. Procédé selon l'une des revendications 1 à 3, caractérisé en ce que les saillies sont retirées des rainures quand le vide est appliqué entre le contre-outil et l'article d'emballage.

5. Procédé selon l'une des revendications 1 à 4, caractérisé en ce que les saillies sont dimensionnées de façon que l'ouverture de la rainure (11) et/ou du trou (12) ait une largeur de 1 mm ou de moins de 1 mm.
6. Procédé selon l’une des revendications 1 à 5, caractérisé en ce que les saillies sont dimensionnées de façon que la rainure (11) et/ou le trou (12) forment un motif régulier sur la partie inférieure (10) de l’article d’emballage.

7. Procédé selon l’une des revendications 1 à 6, caractérisé en ce que la couche de mousse de la feuille thermoformée est constituée de polyéthylène basse densité, de polyéthylène haute densité, de polyéthylène linéaire basse densité, de polypropylène, de polyester, de polycarbonate, de naphtalate de polyéthylène, ou de polystyrène.
FIG. 13