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(54) METHOD OF FABRICATING CARDBOARD CONTAINERS LINED WITH PLASTIC FILM

(57) Method for manufacturing a laminated food container (100), comprising the steps of: providing a lower shell (2) provided with holes for the passage of air; providing a cardboard blank; folding the blank inside the lower shell to make a container (10) having an opening (11), a bottom (12), side walls (13) surrounding the bottom (12) and ending at the top in a flange (14); providing an upper shell (3) provided with heating elements (4) and having a cavity facing said lower shell (2); providing a plastic film (9); arranging the plastic film (9) between the upper shell (3) and the container (10) arranged in the lower shell (2); heating the plastic film (9) by means of radiation from the heating elements (4); creating a vacuum between the lower shell (2) and the upper shell (3) to make the plastic film (9) adhere to said bottom (12), said side walls (13) and said flange (14).

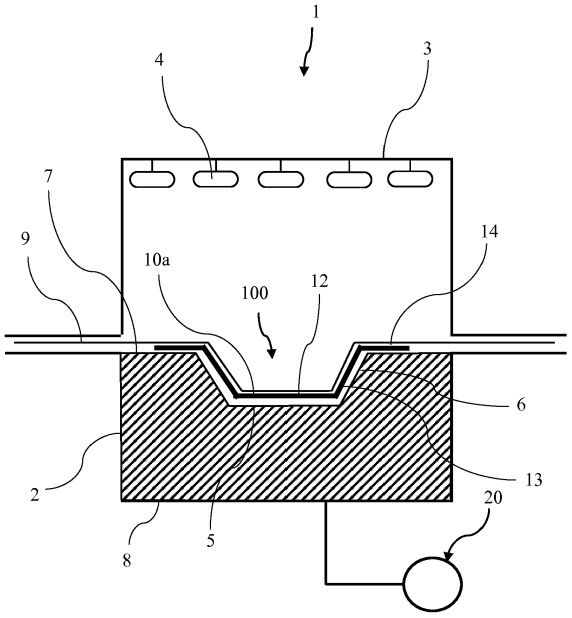

Fig. 2

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to a method of manufacturing food containers for packaging in modified atmosphere.

PRIOR ART

[0002] In the prior art, it is known to use cardboard containers for food storage, in which the inner wall of the package is laminated with a plastic film that seals the cardboard which would otherwise be water permeable and sensitive to edible oils.

[0003] The lamination of the inner wall makes the containers suitable for modified atmosphere packaging, as lamination makes the cardboard sealed to the atmosphere, which is responsible for degradation and rancidity of food over the long term. EP2441697 describes a method for making a laminated cardboard container, suitable for modified atmosphere packaging.

[0004] A blank for a tray is folded inside a lower mould and a plastic film is heated by contact with a heated upper mould.

[0005] The upper mould is essentially flat and on the inner surface thereof, it is provided with air intake openings that keep the plastic film adhered to the heated upper mould. The heat-softened plastic film is laminated on the inner wall of the cardboard container by pressing the upper mould on the lower bell on which the folded tray is arranged. The movement of the upper mould towards the plastic film and thus the cardboard tray is generated by creating a vacuum, by bottom suction of the air between the upper and lower bell.

[0006] For this purpose, the cardboard tray is provided with holes at the lower edges of the container, in such a way as to allow air to escape during vacuum lamination. Alternately, the lamination may be obtained by simultaneously generating a positive pressure above the plastic film by blowing air under pressure ,and low pressure between the film and the container by suctioning the air between the two moulds. The method described in the prior art document EP2441697 requires that the heated plastic film is pressed against the cardboard tray by using the upper mould, regardless of whether the movement of the upper mould is generated by low pressure alone or vacuum and high pressure combination.

[0007] The efficiency of surface lamination is therefore functional to the step of heat sealing under pressure which, in addition to requiring a high power consumption, in the whole process represents the step limiting the production speed.

[0008] This step actually requires that sealing pressure and heating temperatures are ideally balanced, up to reaching a good production speed along with efficient lamination. Heat sealing at too high pressures or temperatures could in fact speed up the softening of the plastic film and the cardboard lamination, but at the same time it could cause melting and/or breakage of the film, resulting in lack of food package sealing.

SUMMARY OF THE INVENTION

[0009] The object of the present invention is to provide a method of manufacturing laminated cardboard containers that have reduced sealing start and thermoforming temperatures, so as to ensure a significant saving of energy during processing compared to traditional solutions for laminating cardboard food containers.

DESCRIPTION OF THE FIGURES

[0010] Further features and the advantages of the method according to the present invention will be apparent from the following description of preferred embodiment thereof, provided purely by way of a non limiting example, with reference to the accompanying figures, in which:

- figure 1 shows a schematic view of an apparatus for manufacturing a container by the method of the present invention in a first operating configuration,
- figure 2 shows a schematic view of the apparatus in figure 1 in a second operating configuration.

DETAILED DESCRIPTION OF THE INVENTION

[0011] Figures 1 and 2 schematically show an apparatus 2 for manufacturing a food container by the method of the present invention.

[0012] Apparatus 1 comprises a lower shell 2 and an upper shell 3 provided with heating elements 4.

[0013] The lower shell 2 is intended to receive a cardboard container 10.

[0014] The cardboard container 10 used in the method according to the invention has an inner surface 10a and an opening 11.

[0015] In particular, container 10 comprises a bottom 12, side walls 13 surrounding bottom 12 and ending at the top in a flange 14 which delimits opening 11 of container 10. Bottom 12 and the side walls 13 have inner surfaces 12a and 13a which define the inner surface 10a of container 10.

[0016] Container 10 is preferably obtained starting from a blank (not shown in the figures) that is folded inside the lower shell 2. Even more preferably, said container 10 is obtained starting from a single blank that is folded inside the lower shell 2.

[0017] The lower shell 2 is preferably a solid shell and is provided with a bottom surface 5 and a side surface 6 shaped to receive bottom 12 and the side walls 13, respectively, of container 10. Moreover, the lower shell 2 has an upper surface 7 shaped to receive flange 14 of container 10, as shown in Figure 1.

[0018] The blank folded inside the lower shell 2 is

placed so that bottom 12 and the side walls 13 of container 10 rest on surfaces 5 and 6, flange 14 is folded horizontally on the upper surface 7 and the edges of the side walls 13 are mutually adjacent to form a continuous angular surface.

[0019] The blank is preferably provided with folding grooves in the vicinity of the edges, so as to facilitate the step of deposition of container 10 into the lower shell 2.

[0020] The cardboard used for the purposes of the present invention may consist of any type of cardboard composition among those known to the man skilled in the art for use in food packaging and that meets the requirements of the food industry, as well as those necessary for modified atmosphere packaging.

[0021] Preferably, the cardboard that can be used for the purposes of the present invention is a waterproof cardboard.

[0022] The blank from which the cardboard container 10 is obtained may be printed on both sides, so that one printed side constitutes the inner surface 10a of container 10.

[0023] The lower shell 2 is preferably provided with holes for the passage of air (not shown in the figures) which cross said shell from the bottom surface 5 to a lower surface 8. The holes for air passage are connected to a vacuum pump 20.

[0024] The upper shell 3 of apparatus 1 preferably is a hollow shell, with cavity facing the lower shell 2. In particular, the upper shell 3 comprises at least one side wall and one upper wall arranged transversely to the side wall and facing the lower shell 2 in a distal position therefrom. According to an alternative embodiment, not shown, the upper shell 3 may be defined by a curved cap, in particular hemispherical. In this case, the top of the cap defines the above upper wall, while the peripheral part defines the side wall.

[0025] Note that the above heating elements 4 are placed inside the cavity of the upper shell 3, in particular in a remote position with respect to the plastic film 9. More in detail, the heating elements 4 are arranged on the upper wall of the upper shell 3. Advantageously, in this way the plastic film does not contact the heating elements 4, but they carry out their heating function primarily by irradiation.

[0026] The heating elements 4 with which the upper shell 3 is provided may be selected among those heating elements known to the man skilled in the art for the heat treatment of plastic films for food packaging. More preferably, the heating elements 4 are infrared lamps.

[0027] In particular, the heating elements 4 are fixed to the upper wall of the upper shell 3, in particular in remote position with respect to the lower shell 2.

[0028] A plastic film 9 is arranged between the upper shell 3 and the lower shell 2. In particular, the plastic film 9 is facing container 10 and arranged thereon. Even more preferably, the plastic film 9 is arranged not in contact with container 10.

[0029] Preferably, the plastic film 9 that can be used in the method according to the present invention is a thermoplastic film that withstands heat treatments used in food production or consumption.

[0030] The plastic film 9 according to the purposes of the present invention is preferably adhesive, where by adhesive it is meant a film whose welding properties are functional to the heating temperatures of the film itself, but do not require adhesives for keeping in place or pressure moulds for the adhesion to the surface of interest.

[0031] According to a preferred embodiment, the plastic film (9) is a rigid film.

[0032] Even more preferably, the plastic film 9 is a peelable film.

[0033] The plastic film 9 that can be used in the method according to the invention preferably comprises metallocene, an organo-metal compound consisting of two cyclopentadienyl anions bound to an atom of a transition metal.

[0034] The presence of metallocene imparts adhesive properties and good mechanical properties of resistance to piercing to the plastic film 9.

[0035] In a preferred embodiment, the plastic film 9 that can be used in the purposes of the present invention is a multilayer plastic film.

[0036] Said multilayer plastic film comprises at least one upper layer and one lower layer. During lamination, said lower layer is facing the inner surface 10a of container 10. Preferably, said lower layer comprises metallocene and said upper layer comprises combinations of one or more polymers that are known to the man skilled in the art to impart oxygen barrier and impermeability properties to the plastic film 9, such as EVOH/PE (ethylene vinyl alcohol/poly ethylene), EVOH/PP (ethylene vinyl alcohol/polypropylene), PET/PE (polyethylene terephthalate/polyethylene), PE/PA (polyethylene/polyamide).

[0037] Preferably, the plastic film 9 is heated by convection/irradiation.

[0038] Thereafter, a step of lamination of container 10 with the plastic film 9 is carried out. Preferably, the lamination step according to the present invention takes place in vacuum, by generation of low pressure between the plastic film 9 and the inner surface 10a of the cardboard container 10 arranged in the lower shell 2.

[0039] Figure 2 shows the vacuum lamination step according to the purposes of the present invention.

[0040] The activation of the vacuum pump 20 allows suctioning the air between upper shell 3 and lower shell 2 through the air passage holes, thus allowing the adhesion of the plastic film 9 to container 10.

[0041] The vacuum generation makes bottom 12 and the side walls 13 of the cardboard container 10 adhere to the bottom 5 and side 6 surfaces of the lower shell 2, while flange 14 horizontally adheres to the upper surface 7 of the lower shell 2 so as to create a laminated container 100.

[0042] At the same time, vacuum generation allows the plastic film 9 arranged between the upper shell 3 and

the lower shell 2 to be returned towards the inner surface 10a of container 10, to which it adheres naturally, without the need for heat sealing. Bottom 12, the side walls 13 and flange 14 are advantageously kept in the shape of container 10 by the lamination of the plastic film 9 on the inner surface 10a of container 10.

[0043] In a preferred embodiment, the method of manufacture provides that during vacuum generation, the upper shell 3 and the lower shell 2 are sealed, pressure-tight.

[0044] The folding grooves in the vicinity of the edges, in addition to facilitating the folding of the blank, facilitate the lamination step, allowing air to escape through the cardboard container 10.

[0045] Due to the low heating temperatures and to the elimination of the pressure heat sealing step, the method according to the present invention has the advantage of reducing the consumption of energy, offering reliable lamination without heat sealing.

[0046] Such features allow speeding up the packaging operations compared to other known prior art sealing systems.

[0047] The blank from which container 10 is obtained may be printed on the inner surface 10a.

[0048] The lamination of the printed inner surface 10a of container 10 prevents contact of the ink with the food contents that will be placed inside the laminated container 100. After filling, the laminated container 100 can be sealed with a closing plastic film, preferably peelable, that allows food packaging thereof in modified atmosphere.

[0049] The composition of said closing plastic film depends on the composition of the plastic film 9 laminated on container 10.

Claims

1. Method for manufacturing a laminated food container (100), comprising the steps of:

   - providing a cardboard container (10) having an opening (11), a bottom (12), side walls (13) surrounding the bottom (12) and ending at the top in a flange (14) which delimits the opening (11) of the container,
   - providing a lower shell (2) shaped to accommodate the container (10) and provided with holes for the passage of air,
   - providing an upper shell (3) provided with heating elements (4),
   - providing a plastic film (9),
   - arranging the plastic film (9) between the upper shell (3) and the container (10) arranged in the lower shell (2),
   - heating the plastic film (9) by means of the heating elements (4) of the upper shell (3),
   - creating a vacuum between the lower shell (2) and the upper shell (3) to make the plastic film (9) adhere to the bottom (12), to the side walls (13) and to the flange (14) of the container (10),

   characterized in that said upper shell (3) has a cavity facing said lower shell (2); said step of providing the cardboard container comprising the steps of providing a blank; folding the blank inside the bottom shell (2) to make the container (10) inside the lower shell (2); said step of heating said plastic film (9) being carried out by irradiation.

2. Method according to claim 1, **characterized in that** said upper shell (3) comprises at least one side wall, an upper wall arranged transversely to said side wall and facing the lower shell (2), said heating elements (4) being placed within said cavity, particularly in remote position with respect to said plastic film (9).

3. Method according to claim 2, **characterized in that** said heating elements (4) are arranged on the upper wall of the upper shell (3).

4. Method according to any one of claims 1 to 3, wherein said step of generating a vacuum provides for closing the lower shell (2) and the upper shell (3) pressure-tight.

5. Method according to any one of claims 1 to 4, wherein said step of generating a vacuum provides for suctioning the air comprised between the upper shell (3) and the lower shell (2) through the holes for the passage of air in the lower shell (2).

6. Method according to any one of claims 1 to 5, wherein said cardboard container (10) consists of waterproof cardboard.

7. Method according to claim 6, wherein said cardboard container (10) has edges and is provided with folding grooves edges in the vicinity of said edges.

8. Method according to any one of claims 1 to 7, wherein said plastic film (9) is an adhesive plastic film.

9. Method according to claim 8, wherein said plastic film (9) is peelable.

10. Method according to claim 8 or 9, wherein said plastic film comprises metallocene.

11. Method according to any one of claims 1 to 10, **characterized in that** said container is made starting from a single blank.

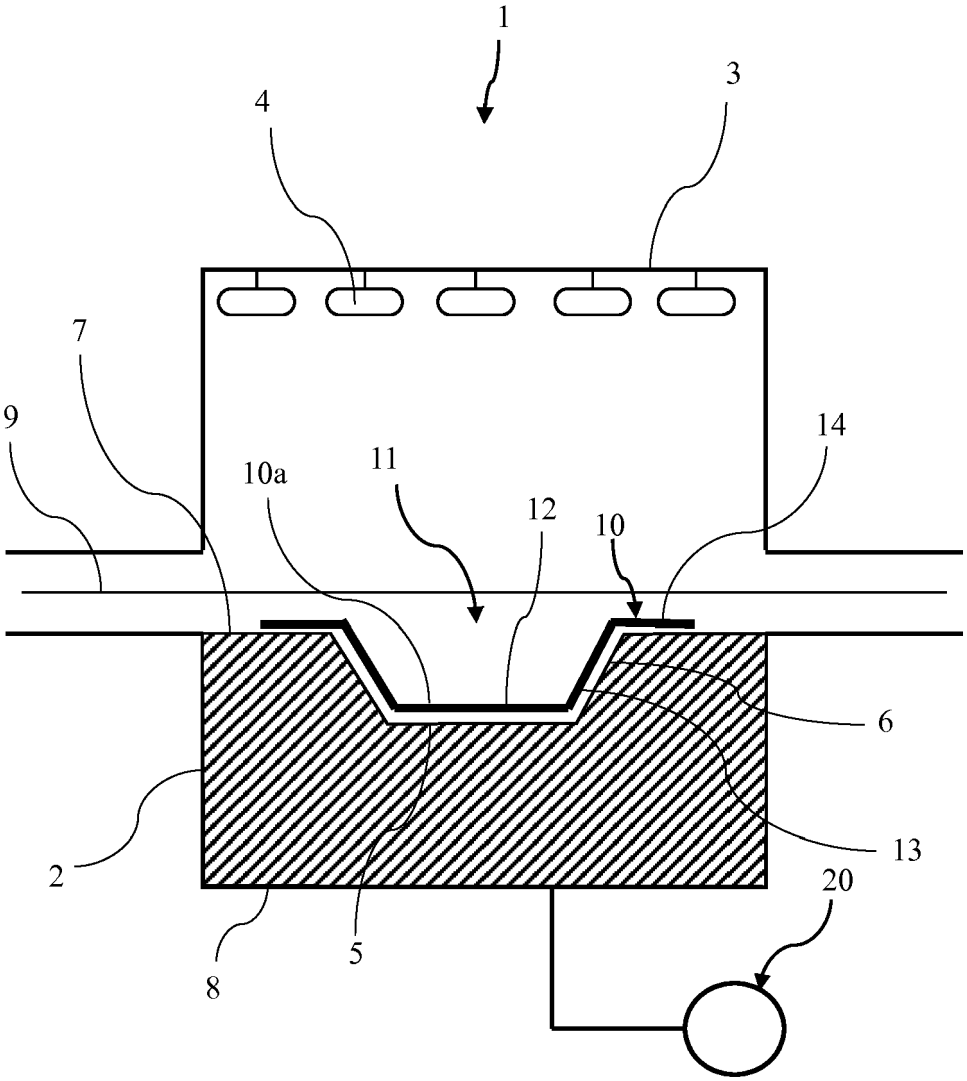

Fig. 1

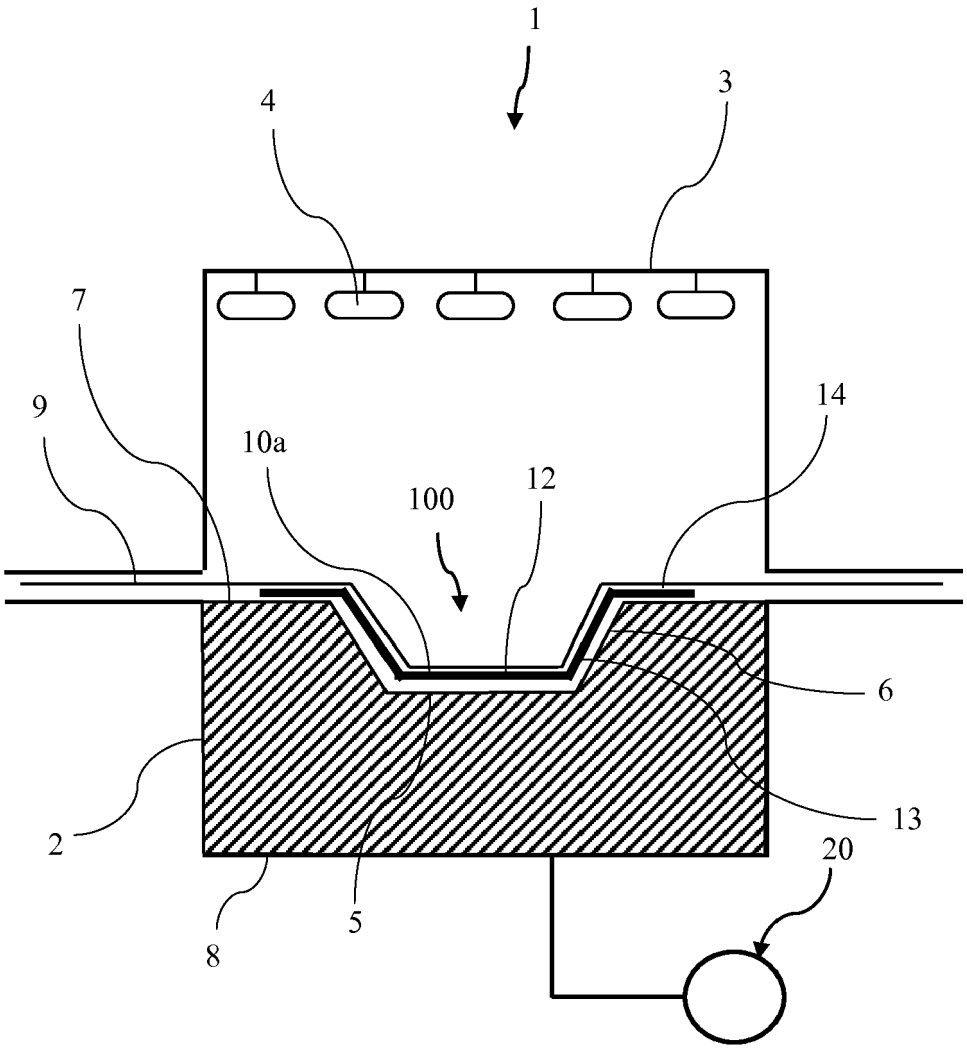

Fig. 2

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EUROPEAN SEARCH REPORT

Application Number
EP 17 16 2347

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	DE 203 06 120 U1 (SIEBERTZ NORBERT [DE]) 14 August 2003 (2003-08-14) * page 13, line 8 - page 14, line 10 * * page 18, line 35 - page 19, line 14 * * page 23, line 17 - line 19; figures 1-3, 5, 6, 11 *	1-11	INV. B31B105/00 B31B120/40 B31B50/59 B31B50/60 ADD. B31B110/10
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TECHNICAL FIELDS SEARCHED (IPC)

B31B
B65B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	13 July 2017	Sundqvist, Stefan

CATEGORY OF CITED DOCUMENTS

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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