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(54) **METHOD FOR PRODUCING A SEALED CONTAINER FOR OVEN COOKED PRODUCTS OR SIMILAR**

VERFAHREN ZUR HERSTELLUNG VON ABGEDICHTETEN BEHÄLTERN FÜR IN EINEM OFEN GEKOCHTE PRODUKTE

PROCEDE DE PRODUCTION D'UN CONTENEUR HERMETIQUE DESTINE AUX PRODUITS CUITS AU FOUR OU AUX PRODUITS SIMILAIRES

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Description

[0001] The invention relates to the manufacturing of food products which are packaged in hermetically closed containers. More particularly, the invention concerns chilled food products packaged in sealed cups or similar containers for which a cooking of the product is required after the product has been filled in the cups.

[0002] Chilled sweet foodstuffs such as custard, crème brulée, pudding and the like, need to be cooked to reach a suitable degree of texture and consistency. In particular, the foodstuffs comprise proteins such as egg and lactic proteins which when submitted to a cooking stage gelatinise to form a final product having a satisfactory gel texture. Generally, in industrial production, cooking is performed after the containers have been filled with a liquid non-gelatinised raw preparation. Cooking is performed in ovens where average temperatures are about 90°C. In general, the top of the container is sealed with a flexible sealing peelable foil.

[0003] Difficulties are experienced when the sealed container is passed into the ovens for cooking. The pressure inside the container dramatically increases due to dilatation of the gas within the head-space of the container which tends to have the sealed container deformed to an extent which can ultimately lead to bursting of the packaging or to cause failure of the seal and possibly seepage of the food product.

[0004] One approach to reduce the risks created by internal overpressure during cooking has been to leave apertures during cooking so as to permit the water vapour to escape outside. Then, the container is hermetically closed and the container is cooled. Another approach has been to cook the product without the top foil, and then to have the top foil sealed onto the container afterwards.

[0005] None of these solutions are really satisfactory, as the risks of bacterial contamination have proved to be high before the product is finally hermetically sealed at this later production stage. Indeed, in the case where apertures are made in the foil during cooking for releasing pressure, then after cooking, the temperature gradient creates a slight vacuum inside the container which causes air to enter the head-space of the container. Bacterial contamination is difficult to prevent unless very sophisticated means for controlling the ambient atmosphere are used around the products at each stage of the production line until the containers are imperviously sealed.

[0006] Therefore, there is a need to propose a simple and economical solution which ensures the chilled foodstuff to be properly prepared; i.e., the foodstuffs is properly cooked, and hermetically packaged while preventing any problems of bacterial contamination to occur afterwards.

[0007] The object of the present invention is to meet these needs. In particular, the present invention permits to guarantee an airtight closure and so to improve bacteriological safety. It solves the problem of contamination by providing a packaging which is already hermetically sealed during cooking. For that, the invention alleviates the problem of overpressure during cooking and ensures a resistant closure of the container.

[0008] Therefore, a significant reduction of the defective containers can be obtained and the overall quality of the production can be improved. The production line can be simplified and the labour forces reduced. As a result, significant cost reductions can be made. Simplification of the line of production, for example, includes the possibility of assembling and imperviously sealing a plurality of cups in multi-packs before oven cooking. This was not possible by the conventional methods where the cups were not sealed during cooking. Generally, the final sealing was made after oven cooking and only after that the multi-packs could be prepared. By multi-packs it is meant a group of separate cups maintained together in a plastic (or eventually paper) over-packaging.

[0009] US-A-4 735 339 shows a retortable package wherein the volume of the head-space is reduced during the sealing process so as to limit bulging during the retorting process.

[0010] The present invention includes a method of producing a cooked foodstuff hermetically packaged in a container comprising a recipient and a flexible foil sealed onto the recipient, the method comprising:

filling the recipient with a non-cooked preparation of the foodstuff,

applying the flexible foil on top of the recipient and partly sealing the flexible foil to the recipient while leaving at least one passage for gas to escape,

pressing at least a portion of said flexible foil to provide a portion of concave deformation and consequently, cause air to expel out of the container through said at least one gas passage,

hermetically closing the container so as to form a container having a reduced head-space,

cooking the container to cook the foodstuff.

[0011] It has been found that by reducing the head-space it is permitted to subsequently cook the foodstuff preparation at relatively high temperatures without risking bursting of the container or deteriorating the container seal. The

cooking can be performed while the container is hermetically sealed which has the advantage that no further air can enter the container. The reduction of head-space size limits the volume of gas to be dilated within the container during cooking at a level which remains under a critical volume.

[0012] It also results a simplification of the process and of the production line compared to the state-of-the art methods where the closure operation is carried out before cooking and then completed after cooking. In the present invention, the closure of the lid is only carried out before cooking in two stages, which so permits to greatly simplify the apparatus and production line.

[0013] It must also be noted that initial deformation of the foil or lid before applying the foil on top of the container is not contemplated as being a satisfactory solution for the invention as, in particular due to a very low thickness of the flexible foil, it would cause delicate problems to manipulate the foil without accidentally deforming the intended concave shape of the foil. Therefore, the invention solves this problem by providing the deformation of the foil while the foil has been already partly sealed to the recipient. Therefore, the foil can be applied in a flat configuration and no manipulation of a deformed foil is rendered necessary. The partial seal also provides a firm holding means of the foil onto the recipient while the foil is pressed. There is no need to employ specific support and holding means to maintain the foil sufficiently firmly to the recipient while the pressing operation is carried out. The method is therefore cost effective and greatly reduces production time-cycle and investment in tool equipment.

[0014] In a preferred embodiment, partly sealing the foil comprises forming at least one portion of seal along a rim of the recipient while leaving at least one gas passages formed by at least one unsealed portion located along the rim adjacent the at least one portion of seal. Therefore, the foil is ensured to be correctly positioned and firmly maintained during the subsequent step of pressing without any risk of off-centering of the foil with respect to the recipient. The unsealed portions are only of several tenths to several millimetres, i.e., 0.5 to 5 mm. The sealed portions preferably cover a major peripheral length of the rim of the recipient, preferably, at least 80% of the total length.

[0015] By a non-cooked preparation, we mean a raw preparation comprising ingredients which need to be heated in order to modify the texture, taste and/or colour of the final foodstuff. Generally, non-cooked preparations of the invention are those which contain gelatinisable ingredients such as egg and/or milk proteins which require a heating of at least 80°C during about 60 to 90 minutes so as to reach a suitable gel structure. Of course, the operative conditions may vary as a function of the nature of the ingredients, recipes, proportions and specificity of the final foodstuff to be prepared.

[0016] In a preferred embodiment, the flexible foil is pressed by means of mechanical pressure means. Examples of mechanical pressure means are such as a piston or technical equivalents. The use of mechanical pressure means presents the advantage that the degree of deformation can be precisely controlled by the control of geometry and dimensions of the mechanical means.

[0017] In the subsequent step of cooking, the hermetically closed container generally takes place in an oven specifically dedicated for that purpose. Cooking can be carried out in batches of filled containers or, alternatively, in a continuous manner, i.e., while the containers are continuously and linearly conveyed by conveyor means. The cooking temperatures in ovens may vary depending upon the type of foodstuff, recipes or volume to be heated, etc.. However, usual cooking temperatures are considered ranging from 80 to 100 °C during about 1 to 2 hours in the context of the present invention.

[0018] After cooking, a rapid cooling is carried out until the foodstuff reaches temperatures comprised between 0 to 12 °C, preferably, of 4 to 8 °C, corresponding to the temperatures for refrigerated conservation of this type of food product. The conservation of the product is of several days to several weeks, more precisely about 21 days. Cooling is usually performed in a cooling tunnel with blast cooled air.

[0019] The invention also relates to the combination of the cooked foodstuff and container as hermetically closed as defined in claim 8. The container comprises a recipient and a flexible foil sealed onto the recipient wherein the container comprises flexible portions which protrude inwardly, the flexible portions being capable of deforming outwardly upon accumulation of internal gas or vapour pressure resulting from heating of the foodstuff in the closed container.

[0020] The combination of the container and its contents is unique in the sense that the container is specifically designed to withstand the pressure and temperature conditions specific for the oven cooked foodstuff such as those of the invention.

[0021] In a preferred aspect of the invention, the portion of deformation is a portion of the flexible foil. The foil has the capacity to be easily deformed, as it will generally comprise flexible materials such as aluminium or aluminium alloy. The deformed structure of the foil aids in imparting a reduction of the head-space of the container and consequently, in reducing the risks of bursting or failure of the plastic seal. Furthermore, it is given to the foil when deformed inwardly, a higher capacity to deform in the opposite direction; i.e., outwardly, under the overpressure created inside the container during the cooking mode in the oven. Therefore, the volume of head-space is given the capacity to increase compared to a conventional container during the cooking mode.

[0022] The cooked foodstuff of the invention are foodstuffs intended to be proposed as chilled foodstuffs, particularly non-fermented chilled products that require a cooking operation which confers the final texture to the product. The

chilled foodstuffs of the invention may be sweet non-fermented desserts comprising egg, egg yolk or egg proteins such as albumin, milk or milk proteins, sugar or substitutes of sugar, flour such as wheat flour or other flour, artificial or natural aromas, colorants, etc.. For some specialities, fruit or nut pieces, chocolate or caramel can be advantageously added as inclusions and/or toppings. Examples of foodstuffs according to the invention are custard, crème brulée, puddings such as rice pudding, flan such as caramel flan, cream mould, pie, etc. These sweet foodstuffs exhibit a shelf life which is very short and very close to the shelf life of milk, i.e., several days if kept cold and even less if kept at room temperature. Cooking of a custard preparation is necessary to achieve egg albumin coagulation or other various proteins coagulation. However, overcooking must be avoided, as it would cause the syneresis of albumin. Generally, cooking of custard is achieved in ovens at a temperature ranging from 95 to 100°C during 1 to 2 hours. Cooking also participates to pasteurisation of the foodstuff which comprises sensitive bacteriological ingredients such as egg and milk.

[0023] The invention will now be further described with reference to the accompanying drawings illustrating a preferred embodiment of the present invention.

FIG. 1 shows a perspective view of a final product of the invention;

FIG. 2 is a schematic diagram depicting the steps of the method for producing the chilled packaged foodstuff of the invention;

FIG. 3 illustrates a view of the sealing device applying the method of the invention in the first stage;

FIG. 4 is a top view of part of the sealing device of FIG. 1;

FIG. 5 illustrate a view of the sealing process and apparatus in the second stage;

FIG. 6 is a top view of part of the sealing device of FIG. 4;

FIG. 7 is a cross-sectional view of the filled container after sealing before oven cooking;

FIG. 8 is a cross-sectional view of the filled container during oven cooking.

[0024] As illustrated in FIG. 1, the invention refers to a container 10 having the form of a cup or similar items which contains an oven-cooked dessert or similar food product. The container comprises a recipient 11 preferably made of flexible plastic material in which the foodstuff preparation is filled. In general, the plastic recipient is made of polypropylene used for its properties of heat resistance and low off-flavour transmission to the foodstuff. The recipient could be made in other resins such as polyester. The recipient could also comprise aluminium or aluminium alloy. For instance, it could be an aluminium and plastic laminate. The recipient may have a content of several grams to several hundreds grams. The low content recipients are generally assembled in multi-packs whereas the bigger recipients are generally separately sold and are made of aluminium or aluminium alloys. The bigger recipients would have a foodstuff content of about 300 to 600 grams.

[0025] The recipient 11 of the cup is covered by a lid 12 comprising a flexible foil hermetically sealed on the peripheral flat edge or rim 14 of the recipient. The foil is generally a flat laminate comprising an outer layer made of aluminium foil having a thickness ranging from 10 to 100 micrometers, an intermediate primer layer, an extruded fusible plastic inner layer such as polypropylene and optionally an external printing layer. The function of the primer is mainly to promote adhesion of the extruded PP layer to the external aluminium layer. Examples of flexible foils or laminates are those commercialised by "Lawson Mardon Morin" under the reference "FLEXALPEEL". The fact that the flexible foil and the recipient have the same material in contact promotes the capacity of heat sealing together. However, the materials along the sealing line 13 could also be different provided they can melt together to form a solid seal. The cup, for instance, could comprise a polyester material for at least the sealing line.

[0026] FIG. 2 illustrates the process of the invention. The recipient is first filled with a metered amount of a cold raw preparation of the foodstuff before gelatinisation of the gelatinisable ingredients. The foodstuff can be, for instance, a preparation for a typical custard comprising the following ingredients: egg, sugar, condensed milk, emulsifier such as xanthan gum and caramel sauce or other flavoured sauce.

[0027] The filling is made at cold or chilled temperature by a filling machine such as a "HAMBA" filling machine for preformed cups.

[0028] In a subsequent stage of the method, the recipient as filled with the raw preparation is transferred in a sealing unit where the sealing is performed in two separate steps. Firstly, as illustrated by FIG. 3 and 4, the recipient that includes the raw preparation 20 is placed in position to receive the flexible foil 12. The foil is applied adjacent the planar

edge or rim 14 of the recipient while an upper hot die 30 is moved downwardly to partially heat seal the foil to the recipient. The die comprises a pair of discrete protruding arcuate portions 31 corresponding to the shape of the seal to be obtained between the edge 14 and the periphery of the foil. In general, the horizontally arcuated portions 31 are resistance elements for which the temperature is between about 120 to 180 °C. The foil 12 remains substantially flat while partial welding is carried out. Therefore, an initial provisional head-space 50a is provided which can be defined as the volume between the upper surface 21 of the food product and the lower surface 120 of the foil or lid 12 when resting flat on the top of the container.

[0029] The weld seal resulting from the sealing operation is shown in FIG. 4. Two separate arcuate seal portions 40, 41 are formed along the side edge 14 of the recipient which are separated by two short non-sealed portions or free portions 42, 43 forming two gas passages of several millimetres. It should be understood that the present invention might also encompass variants where more than two portions of sealed are provided along the edge 14 of the recipient. However, it is preferred in order to guarantee a strong connection of the lid to the recipient during the subsequent operations that the seal covers at least 80%, preferably 90% of to total length of the edge 14.

[0030] The cup is held in place in a carrier 33 during all the sealing operations. The carrier comprises openings or cells 34 having a shape complementary to at least outside portions of the recipient so that the recipient can fit properly in.

[0031] FIG. 5 and 6 show the pressing and subsequent sealing phases. After, the cup has incrementally moved in horizontal direction of one or more steps and stopped, a second upper die 35 is moved downwardly at the vertical of the container. The device 35 comprises means 36 for expelling air of the internal volume of the recipient. These means are conveniently mechanical pressure means which force the foil to deform inwardly to an extent which creates a reduction of the initial head-space. During compression, the air inside the head-space is forced to expel through the two non-sealed portions 42, 43, leaving so a reduced head-space 50b. The seal portions 40, 41 provide a firm and precisely positioned holding means of the periphery of the foil while the centre of the foil is pressed. Such a firm holding means could not be obtained by simply squeezing the edges of the foil without risking an off-centring of the foil with respect to the rim of the recipient. Off-centring would further cause defective seal of the foil and risks of failure of the seal due to variations of the seal width during sealing.

[0032] In the mechanical assembly for pressing the foil, the die 35 more particularly comprises a central protruding piston member 360 which acts in deforming a portion of the foil 12 while the die moves downwardly. The dimensions of the piston member mainly depend upon the volume of the final head-space 50b to be obtained and upon the overall dimensions of the container. Generally, it has been found that, for an initial head-space of about 15 to 30 cubic centimetres, a reduction of at least 10 %, preferably 15% in volume of the head-space is required. Preferably, the volume of head-space is reduced as much as possible but while applying the compression forces below the strength limit of the foil 12 and the strength limit of the partial sealed portions. Attention is also required to avoid contact with the foodstuff and prevent the foil from deforming the surface of foodstuff. The inwardly concave portion of the foil can be a portion of sphere or may take other various possible shapes like pyramidal, polygonal or elliptical shapes.

[0033] It must be noted that the mechanical pressure means could be replaced by pneumatic pressure means. For instance, the inwardly oriented deformation of the foil could be also performed by compressed air or gas (not illustrated).

[0034] The piston member of the mechanical pressure means may be coupled with additional sealing means 37 attached to the die 35. Sealing can be so carried out immediately after the foil 12 has been deformed by the piston member 360. The sealing means 37 are present in the form of a pair of hot bars 38, 39, preferably discrete resistance elements, which contact the edge of the container in the region of the free portions 42, 43. The hot bars are of a temperature sufficient to cause the thermoplastic of the foil and of the recipient to melt together and provide a seal after solidifying.

[0035] The arrangement of the sealing means 37 is such that completion of the sealing is carried out after deformation of the foil has occurred by the piston member so as to properly evacuate the excess of air in the head-space, as it is required. The piston member 360 may be, for instance, part of the same bloc as the sealing means 37 as illustrated in FIG. 5 and the sealing can be carried out while the piston is still in a lower compressive position. In an alternative (not shown), the piston member and the sealing means can be mounted on a distinct carrier or die so that deformation and sealing are applied in two separate cycles.

[0036] The final plastic sealable and peelable seal 45 is the result of a continuous substantially circular seal. The seal is a peelable seal while it is sufficiently resistant to withstand the subsequent cooking step. This is a reason the invention proposes by reducing the head-space to lower the pressure accordingly during the cooking. In general, strength values of the seal are between 1200 to 2150 gf/15 mm.

[0037] As shown in FIG. 7, the top of the sealed container experiences a concave deformation in a significant portion 15 of the lid 12. This deformation leaves less free gas volume inside the container when hermetically closed. As intended by the invention, the less gas volume the less gas and vapour dilation will occur during the later cooking stage.

[0038] In another feature of the invention, the recipient comprises a bottom comprising at least a portion 16 of a convex shape. The convex portion 16 has to be flexible enough to deform outwardly when the internal pressure progressively increases during cooking. Therefore, the specific shape of the portion 16 also participates to the reduction

of the risks of bursting or sealing breakage during cooking. The bottom of the recipient is further designed to confer a stable position when the recipient rests on a planar surface. For that, the side walls of the recipient may extend downwardly to form a lower raising edge 17 at the periphery of the bottom. The lower raising edge can be either a continuous peripheral portion of the recipient or alternatively formed of discrete portions distributed along the periphery of the bottom.

[0039] As shown in FIG. 8, during cooking, as the container has been made impermeable to gas and vapour by heat sealing, the flexible lid and flexible bottom can absorb the excess of pressure by deforming outwardly or "ballooning". Preferably, the raising edge 17 protrudes substantially beyond the lowermost point of the flexible portion 16 when the flexible portion bends down during cooking. As previously explained, the impressed deformation to the foil 12 tends to increase the amplitude of deformation of the foil 12 in both vertical direction. Therefore, the foil is made capable to deform a higher amplitude outwardly as shown in FIG. 8. It results from both the reduction of gas volume and increase of deformation that the pressure inside the cup is significantly minimised. The delamination forces exerted on the seal can so be reduced to a magnitude below the rupture strength of the seal. Of course, the rupture strength will vary depending upon the material used in forming the seal and the width of the seal. Therefore, the reduction of the head-space will take into account the strength values of the seal as well as the strength values of the walls and lid of the container. It must be noted that any mismatching of the lid with respect to the recipient would cause a weak seal and consequently a higher risk of failure of the seal. The pre-sealing of the lid along a significant peripheral length of the rim of the recipient greatly reduces the risk of mismatching of the lid. The calculations and experimentation in determining the suitable reduction of head-space according to the relevant strength values are well within the abilities of one skilled in the art.

[0040] The subsequent cooking operation can be carried out in an oven or any suitable cooking means. Good results have been obtained in a static oven with forced hot air. Cooking can be carried out in batches in a static oven or, alternatively in a continuously conveying manner under a forced hot air tunnel, for instance. The cooking temperature highly depends upon the nature of the food product to be produced. Normal cooking temperatures in the product range from 80 to 95 °C during at least 1 hour.

[0041] The inwardly deformed lid or foil preferably combined with a convex bottom has proved to give an appropriate solution to the conditions of build-up of pressure and elevated temperatures. The method eliminates the second sealing operation formerly carried out in traditional methods after oven cooking. The containers can also be assembled at an earlier stage as multi-packs, i.e., before sealing and cooking.

[0042] Cooling is carried out which causes the lid to slightly bend down due to a return to a slight vacuum.

EXAMPLE:

[0043] A series of small polypropylene cups of about 90 grams with a lid diameter of 68 mm, bottom diameter of 48 mm and height of 50 mm have been filled with a custard having the following recipe:

Egg	13,5% by weight
Milk	51,5% by weight
Sugar	1% by weight
Sugared condensed milk	34% by weight

[0044] The cups were partly sealed with a lid having the following characteristics:

Printing	3 g/m^2
Al foil (50 microns)	135 g/m^2
Coextruded polypropylene	25 g/m^2
Primer	1,4% by weight of the lid.

[0045] Then, the cups were pressed by the method of the invention while leaving a head-space 50b of about 18 cm^3 and final sealing was completed. The cups were then cooked in static air-forced oven at air temperature of 93-95 °C during 2 to 2:30 hours to reach the desired texture in an air forced static oven commercialised by "Bernauer".

[0046] Every 20 minutes, a visual detection was carried out after oven cooking which revealed no leak of flan.

[0047] After cooking, a small percentage (about 10 %) of the cups had not expanded the bottom, but all the cups were hermetically sealed.

[0048] Cooling was carried out by decreasing temperature to 8°C using a cooling blast tunnel. After cooling, about 90% of the cups had the bottom bent down. Lids were more deformed due to a higher internal vacuum on the top of

the foodstuff.

Claims

1. A method of producing a cooked foodstuff hermetically packaged in a container (10) comprising a recipient (11) and a flexible foil (12) sealed onto the recipient, the method comprising
filling the recipient (11) with a non-cooked preparation of the foodstuff (20),
applying the flexible foil (12) on top of the recipient (11) and partly sealing the flexible foil to the recipient (11) while leaving at least one passage for gas to escape,
pressing at least a portion of said flexible foil (12) to provide a portion of concave deformation (15) and consequently, cause air to expel out of the container through said at least one gas passage,
hermetically closing the container so as to form a container having a reduced head-space (50b),
cooking the container to cook the foodstuff.

2. A method of claim 1, wherein partly sealing the foil (12) comprises forming at least one portion of seal along a rim (14) of the recipient while leaving at least one gas passage formed by at least one unsealed portion located along the rim adjacent the at least one portion of seal.

3. A method of claim 1 or 2, wherein pressing the flexible foil (12) comprises pressing the foil by means of mechanical pressure means.

4. A method of claims 1, 2 or 3, wherein the head-space is reduced of at least 10% in volume.

5. A method of any of claims 1 to 4, wherein hermetically closing includes completing hermetic sealing of the foil to the recipient by sealing the at least one gas passage.

6. A method of any of claims 1 to 5, wherein cooking comprises cooking in an oven at temperature comprised between 80 to 100°C.

7. A method of any of claims 1 to 6, wherein it comprises subsequent cooling and keeping the foostuff container at chilled temperature comprised between 0 to 12°C.

8. A combination of a cooked foodstuff hermetically packaged in a container (10) comprising a recipient (11) and a flexible foil (12) sealed onto the recipient wherein the flexible foil (12) comprises at least one flexible portion (15) which protudes inwardly, the flexible portion being capable of deforming outwardly upon accumulation of internal gas or vapour pressure resulting from heating of the foodstuff in the closed container and **characterised in that** the bottom of the recipient (11) comprises a flexible portion (16) which protudes inwardly, adapted to deform outwardly upon accumulation of internal gas pressure and **in that** the recipient (11) has further downwardly extending edges (17) to confer a stable position when the recipient rests on a planar surface regardless the flexible portion of the bottom protrudes inwardly or outwardly.

9. The combination of claim 8, wherein the foil (12) is an aluminium foil comprising a thermoplastic extruded inner layer.

10. The combination of claim 9, wherein the aluminium foil has a thickness comprised between 10 and 100 micrometers.

11. The combination of claim 9 or 10, wherein the thermoplastic layer is made of polypropylene.

12. The combination of any of claims 9 to 11, wherein the container is a plastic cup comprising a material fusible to the thermoplastic layer of the foil (12).

13. The combination of claim 12, wherein the plastic cup comprises polypropylene.

14. The combination of claim 12, wherein the cup comprises polyester.

15. The combination of claim 16, wherein the cup is a laminate of aluminium and plastic.

16. The combination of any of claims 8 to 15, wherein the foodstuff is chosen among custard, crème brulée, pudding, flan, cream mould and pie.

Patentansprüche

1. Verfahren zum Herstellen eines gekochten Lebensmittels, das hermetisch in einem Behälter (10) verpackt ist, der einen Aufnahmebehälter (11) und eine flexible Folie (12) aufweist, die auf den Aufnahmebehälter verschweißt ist, wobei das Verfahren die folgenden Schritte umfaßt:

   Füllen des Aufnahmebehälters (11) mit einer ungekochten Zubereitung des Lebensmittels (20),

   Anbringen der flexiblen Folie (12) an dem Oberteil des Aufnahmebehälters (11) und teilweises Verschweißen der flexiblem Folie auf den Aufnahmebehälter (11) während zumindest ein Durchgang zum Entweichen von Gas freigelassen wird,

   Drücken zumindest eines Abschnitts der flexiblen Folie (12), um einen Abschnitt einer konkaven Verformung (15) zu schaffen, und um folglich Luft aus dem Behälter durch den zumindest einen Gasdurchgang hinauszudrängen, hermetisches Verschließen des Behälters, um einen Behälter mit einem reduzierten Kopfraum (50b) zu bilden, und

   Kochen des Behälters, um das Lebensmittel zu Kochen.

2. Verfahren nach Anspruch 1, bei dem das teilweise Verschweißen der Folie (12) das Bilden zumindest eines Abschnitts einer Verschweißung entlang eines Randes (14) des Aufnahmebehälters umfaßt, während zumindest ein Gasdurchgang freigelassen wird, der durch zumindest einen unverschweißten Abschnitt gebildet wird, der entlang des Rands neben dem zumindest einen Abschnitt der Verschweißung angeordnet ist.

3. Verfahren nach Anspruch 1 oder 2, bei dem das Drücken der flexiblen Folie (12) das Drücken der Folie durch eine mechanische Preßvorrichtung umfaßt.

4. Verfahren nach Anspruch 1, 2 oder 3, bei dem der Kopfraum zumindest 10 % im Volumen reduziert wird.

5. Verfahren nach einem der Ansprüche 1 bis 4, bei dem das hermetische Verschließen das Vervollständigen der hermetischen Verschweißung der Folie auf dem Aufnahmebehälter umfaßt, indem der zumindest eine Gasdurchgang verschweißt wird.

6. Verfahren nach einem der Ansprüche 1 bis 5, bei dem das Kochen das Kochen in einem Ofen bei einer Temperatur zwischen 80 bis 100°C umfaßt.

7. Verfahren nach einem der Ansprüche 1 bis 6, bei dem es ein anschließendes Kühlen und Aufbewahren des Lebensmittelbehälters bei gekühlten Temperaturen zwischen 0 bis 12°C umfaßt.

8. Kombination aus einem gekochten Lebensmittel, das hermetisch in einem Behälter (10) mit einem Aufnahmebehälter (11) und einer flexiblen Folie 12 verpackt ist, die auf den Aufnahmebehälter geschweißt ist, bei der die flexible Folie (12) zumindest einen flexiblen Abschnitt (15) umfaßt, der nach innen vorsteht, wobei der flexible Abschnitt fähig ist, sich beim Anstieg des inneren Gas- oder Dampfdrucks als Folge des Erwärmens des Lebensmittels in dem geschlossenen Behälter nach außen zu verformen, und **dadurch gekennzeichnet ist, daß** der Boden des Aufnahmebehälters (11) einen flexiblen Abschnitt (16) umfaßt, der nach innen vorsteht, und der geeignet ist, sich beim Aufbau des inneren Gasdrucks nach außen zu verformen, und darin, daß der Aufnahmebehälter (11) des weiteren nach unten vorstehende Kanten (17) aufweist, um eine stabile Position einzunehmen, wenn der Aufnahmebehälter auf einer ebenen Fläche steht, egal ob der flexible Abschnitt des Bodens nach innen oder nach außen vorsteht.

9. Kombination nach Anspruch 8, bei der die Folie (12) eine Aluminium-Folie mit einer extrudierten inneren Thermokunststoffschicht ist.

10. Kombination nach Anspruch 9, bei der die Aluminium-Folie eine Dicke zwischen 10 und 100 Mikrometern aufweist.

11. Kombination nach Anspruch 9 oder 10, bei der die Thermokunststoffschicht aus Polypropylen gemacht ist.

12. Kombination nach einem der Ansprüche 9 bis 11, bei der Behälter eine Plastikschale mit einem Material ist, das auf die Thermokunststoffschicht der Folie (12) schweißbar ist.

13. Kombination nach Anspruch 12, bei der die Kunststoffschale Polypropylen aufweist.

14. Kombination nach Anspruch 12, bei der die Schale Polyester aufweist.

15. Kombination nach Anspruch 16, bei der die Schale ein Laminat aus Aluminium und Kunststoff ist.

16. Kombination nach einem der Ansprüche 8 bis 15, bei der das Lebensmittel aus Eierpudding, Creme Brulée, Pudding, Flan, Sahnestücken und Kuchen ausgewählt ist.

Revendications

1. Procédé de réalisation d'un produit alimentaire cuit emballé hermétiquement dans un contenant (10) comportant un récipient (11) et une feuille flexible (12) scellée sur le récipient, le procédé consistant :

à remplir le récipient (11) d'une préparation non cuite du produit alimentaire (20) ;
à appliquer la feuille flexible (12) sur le dessus du récipient (11) et à sceller partiellement la feuille flexible au récipient (11) tout en laissant au moins un passage pour permettre aux gaz de s'échapper ;
à emboutir au moins une portion de ladite feuille flexible (12) pour obtenir une portion de déformation concave (15) et, par conséquent, pour faire chasser de l'air du contenant à travers ledit passage à gaz au nombre d'au moins un ;
à fermer hermétiquement le contenant de façon à former un contenant ayant un espace vide réduit (50b) ;
à cuire le contenant afin de cuire le produit alimentaire.

2. Procédé selon la revendication 1, dans lequel le scellage partiel de la feuille (12) consiste à former au moins une portion de joint le long d'un rebord (14) du récipient tout en laissant au moins un passage à gaz formé par au moins une portion non scellée située le long du rebord et adjacent à la portion de joint au nombre d'au moins un.

3. Procédé selon la revendication 1 ou 2, dans lequel l'emboutissage de la feuille flexible (12) consiste à emboutir la feuille à l'aide de moyens d'application de pression mécanique.

4. Procédé selon les revendications 1, 2 ou 3, dans lequel l'espace vide est réduit d'au moins 10% en volume.

5. Procédé selon l'une quelconque des revendications 1 à 4, dans lequel la fermeture hermétique comprend l'achèvement du scellage hermétique de la feuille sur le récipient en scellant le passage à gaz au nombre d'au moins un.

6. Procédé selon l'une quelconque des revendications 1 à 5, dans lequel la cuisson consiste à cuire dans un four à une température comprise entre 80 et 100°C.

7. Procédé selon l'une quelconque des revendications 1 à 6, consistant à refroidir et à maintenir ensuite le contenant de produit alimentaire à une température de réfrigération comprise entre 0 et 12°C.

8. Combinaison d'un produit alimentaire cuit emballé hermétiquement dans un contenant (10) comportant un récipient (11) et une feuille flexible (12) scellée sur le récipient, dans laquelle la feuille flexible (12) comporte au moins une portion flexible (15) qui fait saillie vers l'intérieur, la portion flexible étant capable de se déformer vers l'extérieur lors d'une accumulation de pression de gaz ou de vapeur interne résultant du chauffage du produit alimentaire dans le récipient fermé et **caractérisé en ce que** le fond du récipient (11) comporte une portion flexible (16) faisant saillie vers l'intérieur adaptée pour se déformer vers l'extérieur lors d'une accumulation de pression de gaz interne et **en ce que** le récipient (11) présente, en outre, des bords (17) s'étendant vers le bas pour assurer une position stable lorsque le récipient repose sur une surface plane, que la portion flexible du fond fasse saillie vers l'intérieur ou vers l'extérieur.

9. Combinaison selon la revendication 8, dans laquelle la feuille (12) est une feuille en aluminium comportant une

couche interne extrudée thermoplastique.

10. Combinaison selon la revendication 9, dans laquelle la feuille d'aluminium a une épaisseur comprise entre 10 et 100 micromètres.

11. Combinaison selon la revendication 9 ou 10, dans laquelle la couche thermoplastique est en polypropylène.

12. Combinaison selon l'une quelconque des revendications 9 à 11, dans laquelle le contenant est un pot en matière plastique comportant une matière apte à fusionner avec la couche thermoplastique de la feuille (12).

13. Combinaison selon la revendication 12, dans laquelle le pot en matière plastique est en polypropylène.

14. Combinaison selon la revendication 12, dans laquelle le pot est en polyester.

15. Combinaison selon la revendication 16, dans laquelle le pot est un stratifié d'aluminium et de matière plastique.

16. Combinaison selon l'une quelconque des revendications 8 à 15, dans laquelle le produit alimentaire est choisi parmi la crème anglaise, la crème brûlée, la crème-dessert, le flan, la crème moulée et la tarte.

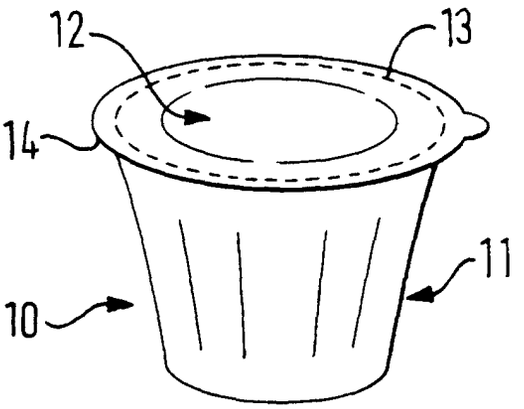
12
13
14
11
10

FIG. 1

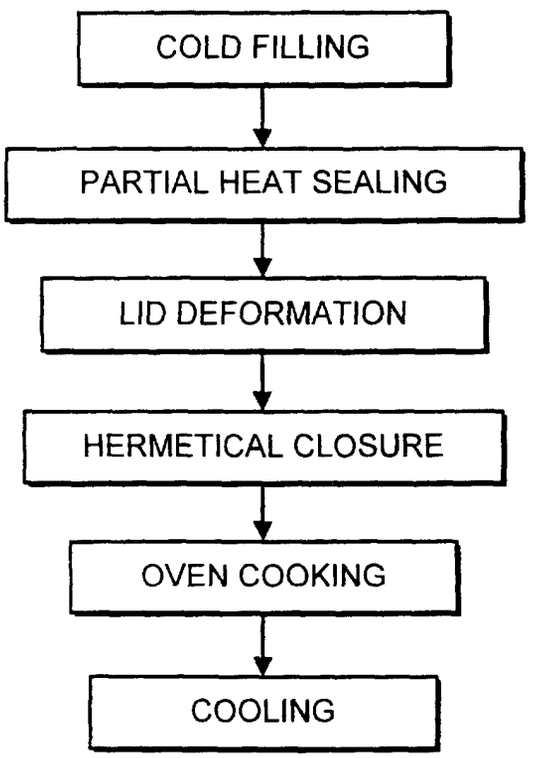
COLD FILLING
PARTIAL HEAT SEALING
LID DEFORMATION
HERMETICAL CLOSURE
OVEN COOKING
COOLING

FIG. 2

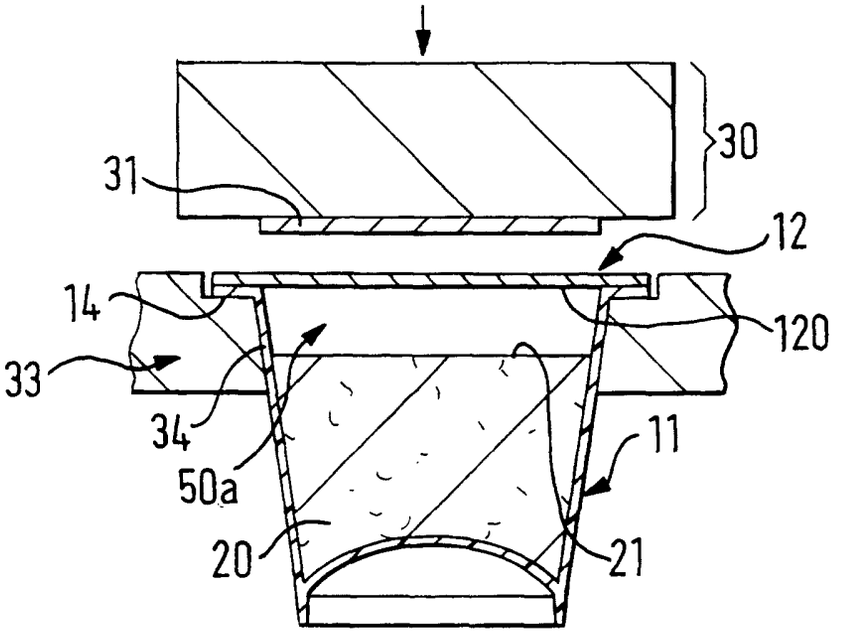

FIG. 3

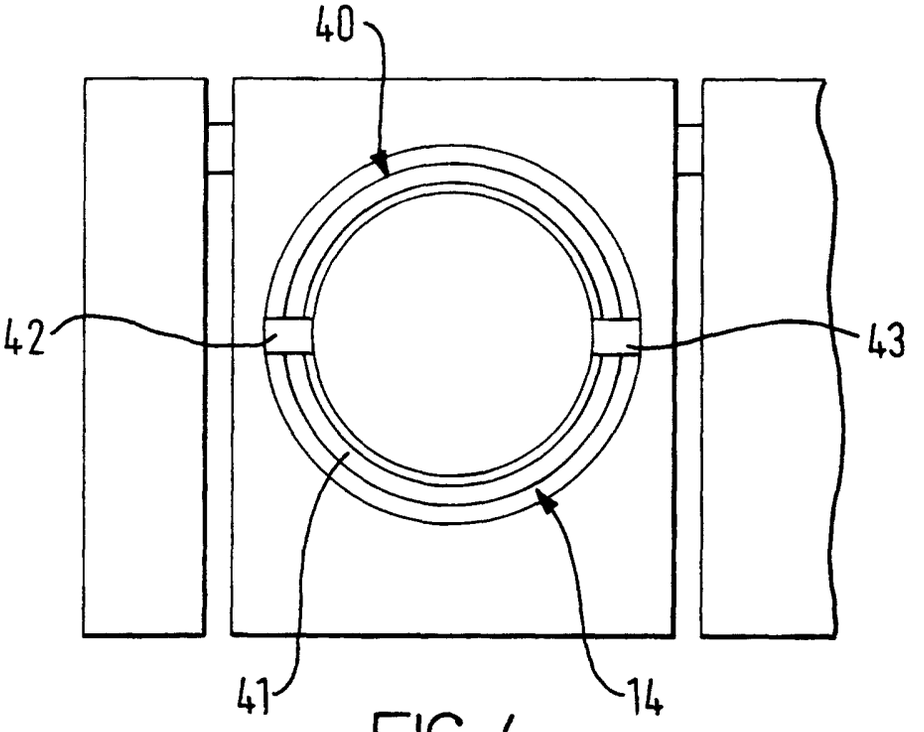

FIG. 4

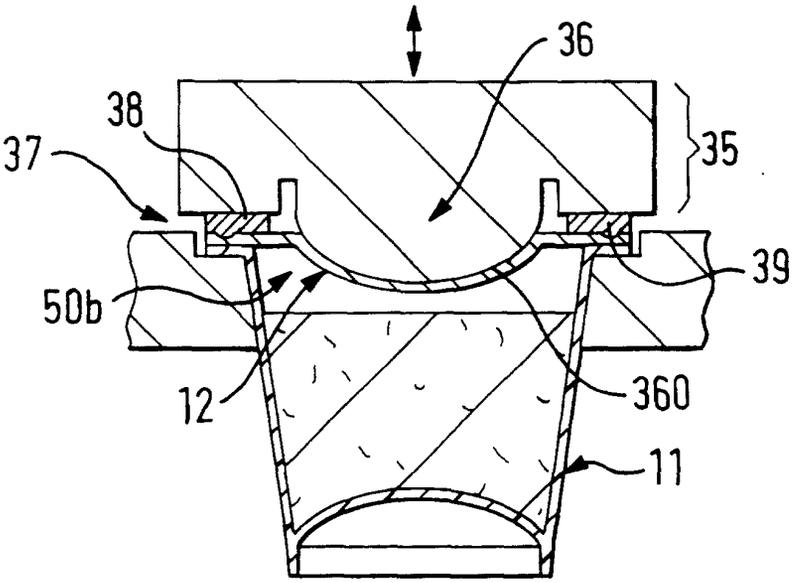

FIG. 5

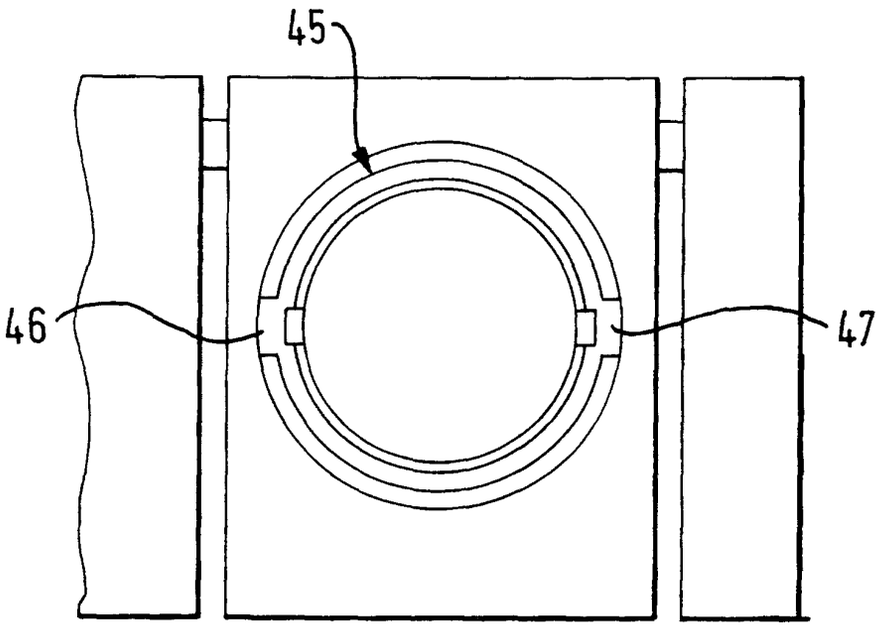

FIG. 6

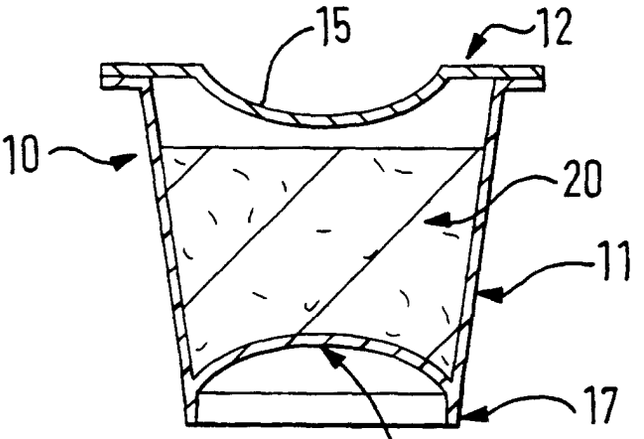

FIG. 7

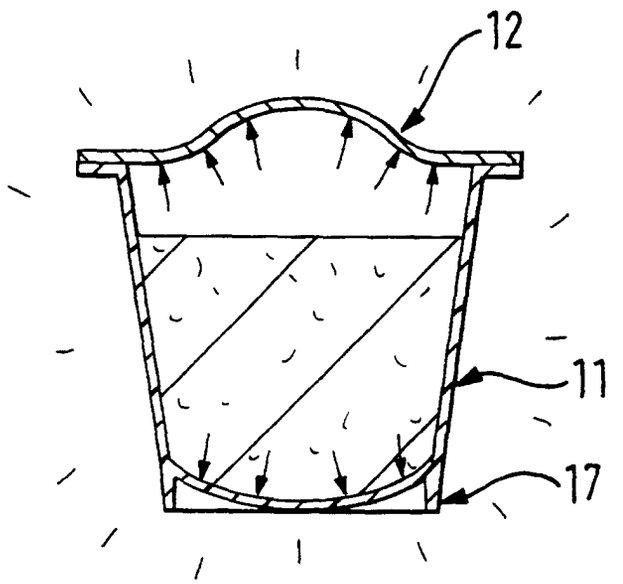

FIG. 8