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(54) **Food package for use in microwave ovens**

(57) Food package (1) for use in microwave ovens comprising a tray (2) for containing food, the tray (2) having an upstanding side wall (3) with an upper edge (4) to which a plastic film (5) is bonded, the film forming a substantially airtight cover for the tray (2), wherein the bonding between the plastic film (5) and the upper edge

(4) of the tray (2) is in such a way weakened on at least a portion (6) of the upper edge, that the bonding is provided to come loose when the pressure inside the package (1) builds up to predetermined value as a result of heating the food, the predetermined value being reached after a predetermined cooking time.

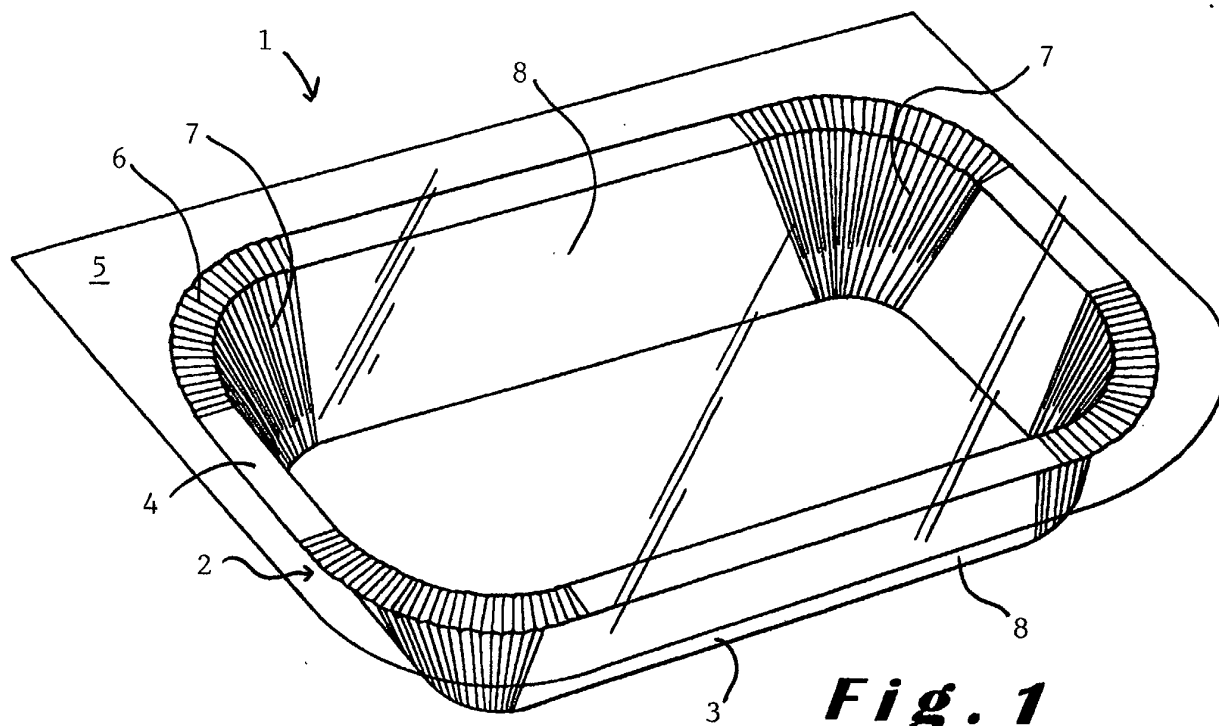


Fig. 1

Description

[0001] The present invention relates to a food package for use in microwave ovens according to the preamble of the first claim.

[0002] Such a food package is for example known from US-A-4210674. The food package described in US-A-4210674 comprises a paperboard tray for containing food. The tray is covered by a plastic film which is bonded to the upper edges of the tray side walls. The film and the tray are transparent to microwave energy for heating the food. A strip of electrically conductive material is provided on the film. This strip is absorptive of microwave energy. During heating in a microwave oven, the strip is heated and melts an opening in the film for venting the food in the tray.

[0003] The food package known from US-A-4210674 however has the disadvantage that its production comprises the step of applying the strip of electrically conductive material to the plastic film. This involves an increase in the cost and the production cost of the package.

[0004] It is an aim of the present invention to provide a cheaper food package for use in microwave ovens.

[0005] This aim is achieved according to the invention with a food package showing the technical characteristics of the characterising part of the first claim.

[0006] In the food package of the invention, the bonding between the plastic film and the upper edge of the tray is weakened on at least a portion of the upper edge. As the plastic film forms a substantially airtight cover, pressure builds up inside the package when the food is heated in a microwave oven. The bonding is weakened in such a way on at least a portion of the upper edge, that the bonding is provided to come loose when the pressure inside the package reaches a predetermined value. This predetermined value is chosen such that the bonding only comes loose after a predetermined cooking time, which is the time needed for preparing the food to the desired extent. Preferably, the predetermined cooking time is chosen to be the time needed for fully preparing the food so that it is ready for consumption.

[0007] As a portion of the covering film comes loose after the predetermined cooking time, the consumer can see when the food is ready. Furthermore, as at least a portion of the film comes loose from the tray when the food is ready, the removal of the film by the user is facilitated.

[0008] It is understood that, in normal conditions, the pressure outside the package will be in the vicinity of the atmospheric pressure. The predetermined cooking time depends on the power of the microwave oven in which the food package is heated. The higher the power, the shorter the cooking time. This results from the fact that the pressure builds up faster at higher microwave power.

[0009] With the food package of the invention, the application of a conductive strip for melting the film during

heating can be omitted. As a result, the cost of the package itself and the production costs of the food package can be reduced. Omitting the strip also has the advantage that the melting of plastic during heating and consequently the mixing of molten plastic into the food can be avoided.

[0010] As during heating of the food package, pressure builds up inside the package, the food is heated under a pressure above atmospheric pressure. So with the food package of the invention, food can be heated in a microwave oven in a way similar to cooking food in a pressure cooker. This has the advantage that the time required for preparing the food can be reduced. The pressure build-up is not present in prior art food packages for use in microwave ovens, where a consumer is requested to prick holes in the cover or, as is the case in the prior art package cited above, means are provided to create a venting hole in the cover.

[0011] Preferably, the bonding between the plastic film and the upper edge of the package is provided to weaken when temperature inside the food package increases. In this way, the moment at which the weaker portion of the bonding comes loose can be defined more accurately. For example, when the bonding is provided to come loose at a temperature of about 150° C, it can be assured that the food inside the package is sufficiently heated before the film is released. Furthermore, as the bonding weakens, the removal of the film by the consumer after heating is facilitated and can easily be peeled off. The bonding may however also be provided to come loose at temperatures above or below 150° C.

[0012] Preferably, the upper edge of the tray has at least one creased portion. As this creased portion provides a less smooth surface for bonding the plastic film to the tray, it forms a weakened portion of the bonding. Such a creased portion can easily be achieved during production of the food package, for example by manufacturing the tray by deforming a cardboard sheet in a mould. This way of manufacturing involves at least a portion of the side wall and as a result also the upper edge of the tray being bent and creased, as the side wall naturally is circumferential to the tray. For example in a tray having a substantially rectangular shape with rounded corners, the portions of the side wall on the corners will be creased.

[0013] The tray is preferably constructed in cardboard which is provided with a plastic coating, for enabling the bonding of the plastic film to the upper edges of the tray. The plastic used for the coating is preferably polyester, but also any other plastic may be used. The coating is preferably provided on the inside of the tray, including the upper edges, but may also be provided on the outside. The tray may however also be constructed in any other material known to the person skilled in the art, such as for example a plastic material. However, coated cardboard has the advantage that it has good transparency to microwaves, so that the microwaves are passed by the cardboard to the inside of the tray. This

enables a homogeneous heating of the food inside the tray, so that the cooking time can be further reduced. Cardboard is also preferred over plastic as it seems to enhance the flavour of the food.

[0014] The invention will be further elucidated by means of the following description and the appended figures.

[0015] Figure 1 shows a three-dimensional view of a food package according to the invention.

[0016] Figure 2 shows a cross-sectional view of the food package of figure 1.

[0017] The food package 1 shown in figures 1-2 comprises a tray 2 for containing food (not shown). The tray 2 has an upstanding side wall 3 with an upper edge 4 to which a plastic film 5 is bonded. The film 5 forms a substantially airtight cover for the tray 2. The bonding between the plastic film 5 and the upper edge 4 of the tray 2 is weakened on at least a portion 6 of the upper edge. Due to this weaker portion of the bonding, the film 5 is provided to come loose from the upper edge 4 when the pressure inside the package 1 builds up to a predetermined value. The predetermined value of the pressure results from heating the food and is reached after a predetermined cooking time.

[0018] The predetermined cooking time is preferably chosen such that it is the time required for preparing the food. The cooking time depends on the power of the microwave oven, i.e. the higher the power, the shorter the cooking time. At higher power, more microwave energy is emitted towards the food, which results in a faster heating and in turn in a faster pressure build-up. This means that at higher power, the shorter period of time. The predetermined cooking time is also dependent on the amount of food inside the package, as more food will release more water vapour, and the nature of the food contained in the package, i.e. the amount of water held by the food and whether the food releases the water vapour more quickly or more slowly.

[0019] As the food is cooked under pressure, i.e. at a pressure above the atmospheric pressure, the cooking time can be reduced. This is due to a steamer effect, which is comparable to the effect of cooking food in a pressure cooker.

[0020] The bonding between the plastic film 5 and the tray 2 is preferably provided to weaken with an increase of the temperature inside the package 1. In this way, it can further be ensured that the film comes loose after the desired period of time. The bonding weakens due to indirect heating, i.e. the film 5 and the tray 2 are substantially not heated by the microwave energy but are heated by the increase in temperature of the food inside the package 1. This can be explained in that the film 5 and the tray 2 are substantially not absorptive to microwave energy, but allow the microwave energy to pass through and be absorbed by the food. This is desirable as otherwise the package would be less suitable for use in microwave ovens.

[0021] In the food package 1 shown in figures 1-2, the

bonding between the film 5 and the tray 2 has a weaker portion 6 which is formed by a creased portion of the upper edge 4. The weaker portion 6 of the bonding may however also be achieved in any other way known to the person skilled in the art.

[0022] The food package 1 shown in figures 1-2 has a substantially rectangular shape with rounded corners 7. Each of the corners 7 has a creased upper edge, which results in the bonding between the upper edge 4 and the tray 2 being weaker at the corners 7. The food package 1 may however also have any other shape known to the person skilled in the art, such as for example a circular or oval shape.

[0023] The food package 1 shown in figures 1-2 is constructed as follows (not shown). A plastic coating is applied to one side of a flat cardboard sheet. This sheet is then brought into a mould; in which it is bent to the shape of the tray 2, with the coated side of the cardboard becoming the inside of the tray 2. During the bending of the cardboard sheet, an excess of material exists at the corners of the resulting tray 2, which leads to creasing of the cardboard at the rounded corners 7 and their upper edges. Food is then brought into the tray 2, after which a plastic film 5 is heat-bonded to the upper edge 4 of the tray 2. The plastic coating functions as an adhesive and allows the film 5 to be bonded to the cardboard tray 2. Because of the creasing of the cardboard at the corners 7, the bonding between the film 5 and the tray 2 is weaker at the corners 7 than at the straight portions 8 of the side wall 3.

[0024] When the tray 2 is constructed with a circular or oval shape, the upper edge 4 is entirely creased. As a result, the bonding between the film 5 and the tray 2 will be weakened over the entire circumference of the food package 1. This presents no problem to cooking the food under pressure according to the invention, as the bonding is provided to only come loose after sufficient pressure has built up inside the package.

[0025] The tray 2 of the food package 1 shown in figures 1-2 may also be constructed in any other material than coated cardboard, for example in a plastic material. However, coated cardboard is preferred for its good transparency to microwave energy and for its flavour enhancing characteristics.

[0026] The heating of food with the food package shown in figures 1-2 is described as follows. The food package 1, with the food to be heated inside, is inserted into a microwave oven, which is then started. The oven emits microwave energy towards the food, which is passed through by the tray 2 and the film 5 and absorbed by the food inside the package 1. During heating, water vapour evaporates from the food, which results in an increase of the pressure inside the package. Due to this increase of pressure, the food can be heated to a higher temperature than at atmospheric pressure. Furthermore, due to the higher pressure and temperature, a steamer effect is created inside the package, comparable to the effect of cooking food in a pressure cooker.

As a result, the cooking time of the food can be reduced. When the pressure inside the package reaches a predetermined value, which is chosen as an indication of the food being fully prepared and ready for consumption, the excess pressure inside the package causes the film 5 to come loose from the tray 5 on at least one corner 7, where the bonding is weaker due to the creasing of the cardboard.

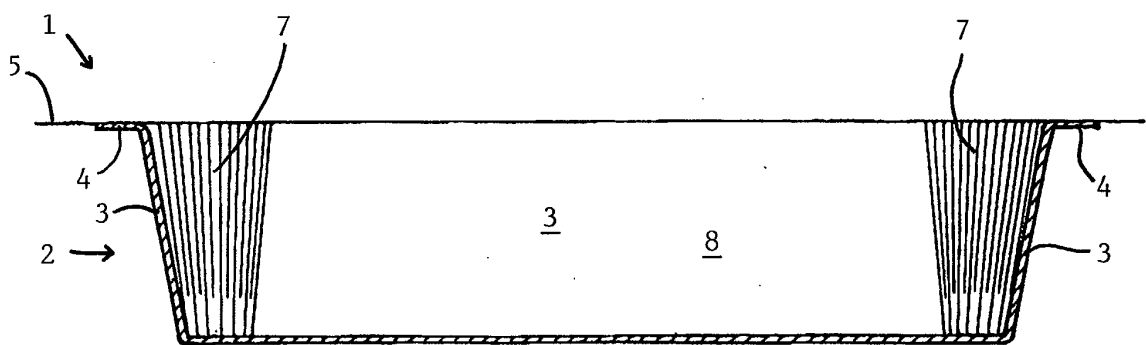
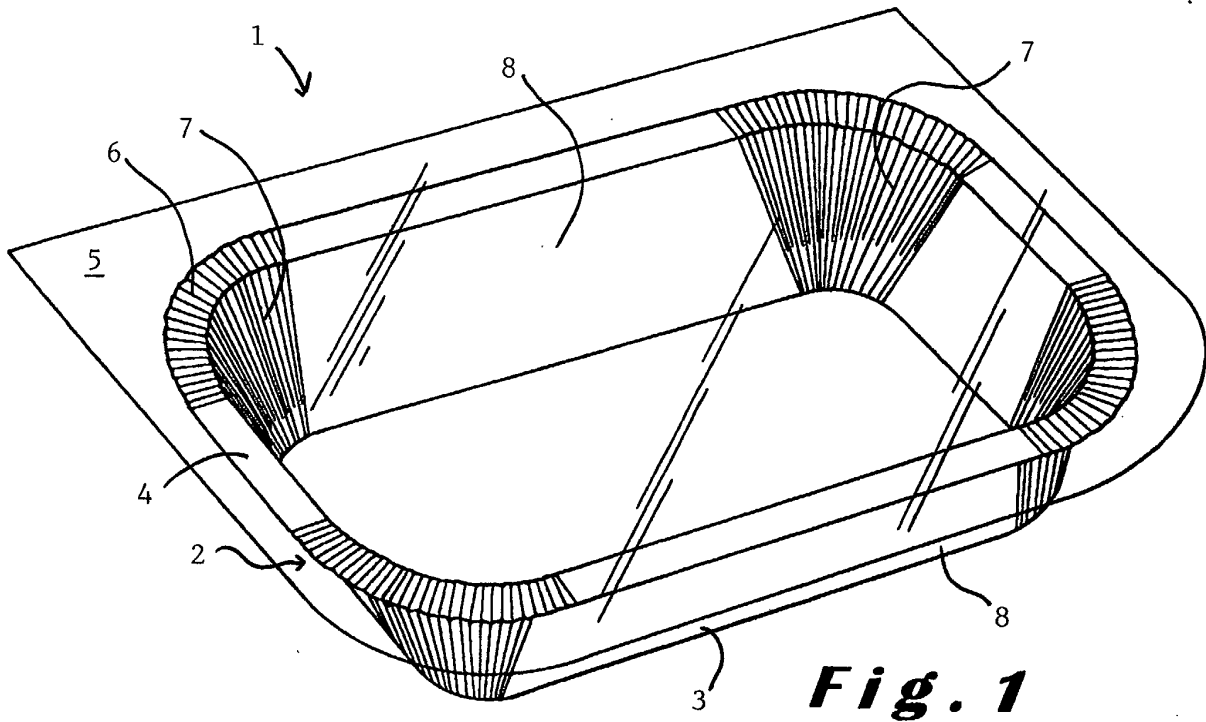
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Claims

1. Food package for use in microwave ovens comprising a tray for containing food, the tray having an up-standing side wall with an upper edge to which a plastic film is bonded, the film forming a substantially airtight cover for the tray, **characterised in that** the bonding between the plastic film and the upper edge of the tray is in such a way weakened on at least a portion of the upper edge, that the bonding is provided to come loose when the pressure inside the package builds up to a predetermined value as a result of heating the food, the predetermined value being reached after a predetermined cooking time. 15 20 25
2. Food package according to claim 1, **characterised in that** the predetermined cooking time is the time required for preparing the food. 30
3. Food package according to claim 1 or 2, **characterised in that** the bonding between the film and the upper edge is provided to weaken when the temperature inside the package rises. 35
4. Food package according to any one of the claims 1-3, **characterised in that** the upper edge has at least one creased portion for providing the weakened portion of the bonding between the film and the upper edge of the tray. 40
5. Food package according to any one of the claim 4, **characterised in that** the package has a substantially rectangular shape with rounded corners, the creased portion of the upper edge being provided on at least one of the rounded corners. 45
6. Food package according to any one of the claims 1-5, **characterised in that** the tray is constructed in cardboard which is provided with a plastic coating. 50

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European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 01 87 0199

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Place of search		Date of completion of the search	Examiner
BERLIN		20 February 2002	Spettel, J
CATEGORY OF CITED DOCUMENTS			
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 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			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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