

Microwaveable package

FIELD OF INVENTION .

5 This invention relates to a package. In particular, the invention relates to a package for containing food which is intended to be heated by microwave.

10 BACKGROUND OF INVENTION

 Ready prepared meals that are intended to be reheated using microwave oven are becoming increasingly popular. The food is initially prepared by the manufacturer, and is then placed in a package, which is then wrapped frozen or packaged
15 for freshness and handled for distribution and sale.

 During the heating of the food, the moisture content of the food is rapidly heated and transformed into steam. As the temperature of the package increases during heating, the
20 pressure within the package increases due to the expansion of the water molecule. This will sometimes cause the package to explode, spattering the food in the microwave oven, or explode when the package is opened.

25 To avoid this from happening, consumers usually pierce holes on the package to allow the steam to escape from the container during heating. However, sometimes the punctured holes may be exceedingly large in size, or numerous, and hence too much steam may escape through the holes during heating
30 thus causing the food to be dry after heating. On the other hand, the punctured holes may be exceedingly small or too few in amount, and hence, much of the steam is still trapped and the spattering of food may still occur when the package is

opened or when the package explodes. Either way it is likely to result in the food packaging becoming unpallatable.

Thus, the object of the present invention is to provide a package which will enable the food to be heated without the need of puncturing the package prior to heating which may dry the food during heating and or spattering of food to occur.

Prior inventions to overcome this problem are sighted.

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US 4,461,420 to Horvath Laszlo S. discloses a ventable package cover for packages, consisting of a valve film welded to the inner surface of the capping film of the package. The valve can only be exposed when the capping film is torn off along a predetermined rupture line. The valve film may be permeable to water vapour but impermeable to water.

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WO 9959897 to Read M. Peter and Smith B. John discloses a food container and also relates to a film for sealing foods and food containers and to a method of manufacturing a food container. The seal or film for sealing the food containers of this invention consists of 2 layers, a continuous layer and an apertured layer. These two layers are placed in close proximity, wherein they are joined together by means of adhesive or heat bonding. The apertured layer consists of 2% to 50% of apertures with the size of 1-10 mm in diameter, spaced 1-10 mm apart. When the food is to be cooked, the continuous layer is peeled off from the apertured layer, exposing the apertured layer.

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GB 2213689 to Griffin C. John discloses a microwave container that has a splashguard or cover which allows the escape of steam from the food contained during cooking or reheating. The cover of this particular invention has holes

that are spread over a large area of the cover, thus enabling venting of the steam to occur.

PCT/NZ98/00195 to Tang, Luen and Sing discloses bags,
5 packages or packaging material for containing food or
beverages which can be easily torn, without the need for
scissors. The bag is multi layered, wherein the inner layer
contains at least one line of weakness with the outer layer
being substantially intact along the line of weakness and
10 tearable along the line of weakness and the line of weakness
extends from the first edge of the bag to the other edge. The
line of weakness may be a perforated line, or a dot-dash
perforation, or any interruption in the inner layer which
substantially disconnects the two portions either side of the
15 weakness. Alternatively, the line of weakness may be a zone
which is thinner and/or weaker than the rest of the inner
layer. To facilitate the initiation of tear, small opening,
break, nick, notch or the like is located along the first edge
of the bag.

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PCT/NZ00/00180 to Tang, Luen and Sing discloses a
packaging and/or openable sealing means for packaging. The
openable sealing means for this invention consists of
preferably 3 layers, whereby the first layer is a continuous
25 layer with lines of weakness (i.e. lines of perforations or
lines of reduced gauge or a cut), second layer consisting of
apertures, and an optional third layer covering the first
layer also consisting the lines of weakness. The first and
third layer is removed along the line of weakness prior to the
30 heating of the food to expose the apertures that will allow
the escape of steam from the food.

SUMMARY OF INVENTION

For the purpose of this patent application, the term "package" used throughout at the specification includes all
5 kind of the food containers which fall within the scope of the
of the claims, i.e. pouch, packaging, and any other relevant
containers. It is to be understood that the use of the term is
not limiting the scope of the claims to certain designs and/or
embodiments of the package according to the invention.

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Accordingly, the current invention relates to a package
with flexible or diffusible films to form an openable sealing
means. In particular, the invention relates to a package with
flexible or diffusible films to form an openable sealing means
15 for containing food which are intended to be heated by
microwave ovens. The current invention is a simpler and a
more convenient solution to contain the food by packaging that
will enable the prepared food to be heated without the need of
puncturing the packaging prior to heating.

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The diffusible strip on the packaging is sealed or welded
to the packaging in such a way that during the heating of the
prepared packaged food, the point of welding will
automatically rupture, thus allowing the expanded steam to
25 escape without the food spattering. This simplified approach
would ensure that the intended moisture contained therein
would be retained and hence, the packaged food will not be
dried or rendered unpalatable. Hence and unlike previous
patents, there is no necessity for the consumer to peel off
30 any layer from the packaging, nor to puncture the packaging at
any stage. Another major advantage in the manufacturing of
the laminated films for such packaging is the simplicity of
not having to contend with the required amount of

perforation/aperture for perfect reheating so that the prepared food is palatable.

Embodiments of the invention will appear more clearly in the following description with reference to the accompanying drawings.

BRIEF DESCRIPTION OF DRAWINGS

10 Figure 1 is the top view a centre-sealed flexible pouch of the current invention according to the preferred embodiment of the invention, showing the diffusible strip on the pouch.

15 Figure 2 shows the cross-section of the centre-sealed pouch of the current invention according to the preferred embodiment of the invention, illustrating the layers in the main body and the diffusible strip.

20 Figure 3 is the perspective view of the centre-sealed flexible pouch of the current invention according to the preferred embodiment of the invention showing the diffusible strip and the area of weakness on the pouch.

25 Figure 4 is the perspective view of the centre-sealed flexible pouch of the current invention according to the preferred embodiment of the invention showing the diffusible strip and ruptured area on the pouch.

30 Figure 5 shows perspective view of a 3-side sealed pouch, illustrating the sealing of the sheets to form a 3-side sealed pouch and also illustrating the absence of the third layer of the current invention according to the preferred embodiment of the invention.

Figure 6 is the perspective view of the 3 side-sealed pouch of the current invention according to the preferred embodiment of the invention.

5 Figure 7 is the cross section of the pouch at the sealed edges, illustrating the area of weakness in the pouch of the current invention according to the preferred embodiment of the invention.

10 Figure 8 is cross section of the pouch at the sealed edges, illustrating the area of weakness in the pouch without the third layer of the current invention according to the preferred embodiment of the invention.

15 Figure 9 is the perspective view of a gusset pouch with the diffusible strip of the current invention according to the preferred embodiment of the invention.

20 Figure 10 is the perspective view of a standing pouch of the current invention according to the preferred embodiment of the invention with the diffusible strip.

25 Figure 11 is the perspective view of a top-sealed container of the current invention according to the preferred embodiment of the invention.

30 Figure 12 is the perspective view of a centre-sealed pouch with more than one sheet of the diffusible strip of the current invention according to the preferred embodiment of the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT OF THE INVENTION

Figure 1 shows the top view of a centre-sealed pouch
5 (100) which is one form of the preferred embodiment of the current invention. The other embodiment of the current invention is shown in figure 11, which shows a perspective view of a top-sealed container (200). Both form of the current invention consists of the multi-layered main body
10 (120) and the multi-layered diffusible strip (130).

With reference to figure 1 of the current invention, the pouch (100) is made by sealing the diffusible strip (130) in between two sheets of the main body (120) to form one
15 continuous sheet, which is then sealed at the parallel edges or sides to produce the sealing ends (150) in order to contain the prepared food within. The sealing of the edges is now described in detail.

Figure 2 figuratively shows how the sealing is done at the parallel edges or sides to give sealing ends (150). The parallel edges or sides, which are pointed by the arrows, are to be sealed together in the direction of the arrows to give the sealing ends (150). Figure 5 shows another method of
25 sealing the sheets together to form a three-side sealed pouch (see figure 6). In this figure, it can be clearly seen that there are two separate sheets; one top consisting of the multi-layered main body (120) and multi-layered diffusible strip (130), and one bottom consisting of only the main body
30 (120), and these two sheets are to be sealed at the parallel edges or sides which are pointed by the arrows so that the prepared food is contained. The edges are sealed in the direction of the arrows to produce the sealing ends (150). Note that the lower main body (120) in this diagram is

inverted when compared to the upper main body (120). Sealing of the edges to produce sealing ends (150) is done by means of heat sealing or RF or ultrasonic or similar welding.

5 Figure 2 also shows the cross section of the food pouch (100). Both the main body (120) and the diffusible strip (130) of the present invention consist of first layer (121; 131), a second layer (122; 132), and possibly a third layer (123; 133). However in a broad sense, the main body (120) and
10 the diffusible strip (130) may consists of only first layer (121; 131) and second layer (122; 132) wherein the third layer (123; 133) is absent (see figure 5) or may consists of more than three layers. In this configuration, substantially all of the features that have been described herein and are made
15 with reference to the first layer (121; 131) and second layer (122; 132) with the presence of the third layer (123; 133).

For figure 2, the outermost or first (121), second (122) and the innermost or third layer (123) of the main body (120)
20 can be made of either polyethylene and its derivatives, polyester and its derivatives, polypropylene and its derivatives, nylon and its derivatives or any material suitable for heating by microwave oven. All three layers are sealed or laminated to one another or together by means of
25 adhesion using a suitable adhesive or by extrusion with organic additives.

For the same figure, the bottommost or first layer (131) of the diffusible strip (130) is made of the same material
30 selected for the outermost or first layer (121) of the main body (120). The uppermost or third layer (133) of the diffusible strip (130) is also made of the same material selected for the innermost or third layer (123) of the main body (120). The second layer (132) of the diffusible strip

(130) can be made of any of the mentioned materials; i.e. polyethylene and its derivatives or polyester and its derivatives or polypropylene and its derivatives or nylon and its derivatives or any material suitable for heating by microwave oven and is not necessarily made of the same material selected for the second layer (122) of the main body (120). All three layers are sealed or laminated to one another or together by means of adhesion using a suitable adhesive or by extrusion with organic additives.

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For figure 5 which shows the cross-section of the pouch (100) of the present invention with the absence of the third layer (123 & 133), the first (121) and second (122) layer of the main body (120) can be made of either polyethylene and its derivatives, polyester and its derivatives, polypropylene and its derivatives, nylon and its derivatives or any material suitable for heating by microwave oven. All layers are sealed or laminated to one another or together by means of adhesion using a suitable adhesive or by extrusion with organic additives.

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Similarly, with reference to the same figure, the bottommost or first layer (131) of the diffusible strip (130) is made of the same material selected for the outermost or first layer (121) of the main body (120). The uppermost or second layer (132) of diffusible strip (130) is also made of the same material selected for the innermost or second layer (122) of the main body (120). All layers are sealed or laminated to one another or together by means of adhesion using a suitable adhesive or by extrusion with organic additives.

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From figures 2 and 5, it can be seen that the diffusible strip (130) is underlaying the main body (120). For figure 2,

the uppermost or third layer (133) of diffusible strip (130) is sealed to the innermost or third layer (123) of the main body (120) and for figure 5, the uppermost or second layer (132) of diffusible strip (130) is sealed to the innermost or second layer (122) of the main body (120). Sealing is done by adhesion using suitable adhesive or extrusion with organic additives or heat sealing or RF or ultrasonic or the like welding. The pouch is then sealed at the edges by means of heat sealing or RF or ultrasonic or similar welding to produce the sealing ends (150) so that the prepared food can be contained within.

Figures 7 and 8 shows the cross section of the sealing ends (150). The bottommost or first layer (131) of the diffusible strip (130) is now overlaying and sealed by means of heat sealing to the innermost or third layer (123) of the main body (120) for figure 7, or the innermost or second layer (122) of the main body (120) for figure 8. This heat sealing is done between two different materials, i.e. the bottommost or first layer (131) of the diffusible strip (130) with the innermost or third layer (123) of the main body (120) for figure 7, or with the innermost or second layer of the main body (120) for figure 8. Both the figures are simplified only to show the heat sealing of the bottommost or first layer (131) of the diffusible strip (130) with the innermost layer of the main body. Although it is shown in both figures 7 and 8 that the innermost layers of both the main bodies (120) are separated, the innermost layers of both the main body (120) are actually sealed together.

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Sealing by means of adhesion using a suitable adhesive or by extrusion with organic additives is stronger than the sealing done by means of heat sealing or RF or ultrasonic or the like welding. Heat sealing two layers of the same

material together creates a stronger bond between the two layers when compared to the heat sealing between two layers of different material. Due to the weak bond that is created during heat sealing, the area of sealing between two different material creates an area of weakness (140) and it is this area of weakness that enables the steam to escape and how the steam escapes will be described later.

The packaging is not only limited to centre-sealed flexible pouch. Other forms of packaging can also be used with the current invention as shown in figures 4 and 5 which is a 3-side sealed flexible pouch. The invention is not only limited to flexible pouch. It can also be used for gusset pouch (figure 9) and standing pouch (figures 10) and also top-sealed food containers (figures 11).

A top-sealed food container (200) is shown in figure 11. In this figure, the mouth region defined by a rim of the walls of the container is a flanged rim which present a surface (160) onto which the top-seal can be conveniently sealed. The diffusible strip (130) is sealed to the main body (120) as previously described, wherein the innermost layer of the main body (120) is sealed by adhesive means or extrusion with organic additives or heat sealing or RF or ultrasonic or the like welding to the uppermost layer of the diffusible strip (130) which is of the same material. The third layer (123) of the main body (120) is sealed by heat sealing or RF or ultrasonic or the similar welding to the rim or the container and the third layer (123) of the main body (120) and is made of the same material as the container or the mouth region of the container. Hence, the first layer (131) of the diffusible strip (130) is sealed to the rim of the container which is made of the same material as the third layer (123), and due to the the layers in contact are of different material, an area

of weakness (140) is created. The bond between the first layer (131) of the diffusible strip (130) and the rim of the container [which is made of the same material as the third layer (123) of the main body] that is created during heat sealing is weak.

The function of having the diffusible strip (130) in the main body (120) shall now be further described in detail.

When the package is being heated in a microwave oven, the water contained in the food is heated very rapidly and is transformed into steam. As the temperature within the package increases during heating, the steam will expand and hence the pressure within the package increases. Before the pressure within the package is increased greatly, the pressure of the expanded steam will rupture the designated area of weakness (140) of the package, to create an exit (141) (see figure 4) to allow the steam to escape through without spattering the food. The existence of the area of weakness (140) allows rupturing of the package to occur without having the pressure of the steam within the package being too great, thus preventing the food to spatter. It is the weak bond that is created between two different material when the two are sealed together during heat sealing that creates an area of weakness which is not able to withstand the pressure of the steam that is contained within the package. The bond that is created during heat sealing between two layers of the same material is stronger to withstand the pressure of the steam without rupturing as compared to the designated area of weakness.

The present invention is not only limited to a package having only one sheet of diffusible strip (130). A package can contain more than one sheet of diffusible strip (130). Figure 12 is an example of a package with more than one sheet

of diffusible strip (130) whereby a centre-sealed pouch with 2 sheets of diffusible strip illustrated. The diffusible strip (130) can also be of any shape and size.

5 It will be understood that the present invention has been described above purely by way of example. Equally, the placement of diffusible strip is not limited as thus far described by any of these figures since the principal invention is to provide a weaker bond on the designated
10 sealing area by such construction described above. Modifications of detail can be made within the scope of the invention.

CLAIMS

1. A package for containing food (100) having a sealing means,
wherein said package and said sealing means are made from a
5 material suitable for heating, said sealing means
comprising:
 - a) a sheet of multi-layered diffusible strip sheet (130),
wherein the sheet (130) comprising a designated area of
weakness (140);
 - 10 b) a sheet of multi-layered main body (120) overlaying and
sealed to the said multi-layered diffusible strip sheet
(130); and
 - c) a sheet of multi-layered main body (120) underlaying and
sealed to the said multi-layered diffusible strip (130) and
15 the said multi-layered main body (120) that is overlaying
the said multi-layered diffusible strip (130)
wherein when the package (100) is heated by a heating means,
water contents of the food will be transformed into steam,
thus increasing air pressure in the package (100), the air
20 pressure will then rupture the designated area of weakness
(140) and creates an exit (141) to allow the steam to escape
therethrough.
2. The package (100) as claimed in claim 1, wherein the package
25 (100) is microwaveable and the heating means is a microwave.
3. The package (100) as claimed in any one of the claims 1 to
2, wherein both the said multi-layered diffusible strip
(130) and main body (120) consists of at least two layers.
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4. The package (100) as claimed in any one of the claims 1 to
3, wherein the material of the innermost layer of the said
multi-layered main body (120) that is overlaying and sealed
to the uppermost layer of the said multi-layered diffusible

strip (130) is the same as that of the said uppermost layer of the said multi-layered diffusible strip (130).

5. The package (100) as claimed in any one of the claims 1 to 4, wherein the multi-layered main body (120) underlaying and sealed at its edges to the edges of both the said multi-layered diffusible strip (130) and the said multi-layered main body (120) that is overlaying the said multi-layered diffusible strip (130).

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6. The package (100) as claimed in any one of the claims 1 to 5, wherein, the material of the bottommost layer of the said multi-layered diffusible strip (130) that is in contact and sealed at the edges to the edges of the innermost layer of the said underlaying multi-layered main body (120) is different from the material of the said innermost layer of the underlaying multi-layered main body (120).

7. The package (100) as claimed in any one of the claims 1 to 6, wherein the said package (100) is constructed using a material suitable for heating under a microwave.

8. The package (100) as claimed in any one of the claims 1 to 7, wherein the material is selected from polyethylene and its derivatives, polyester and its derivatives, polypropylene and its derivatives or nylon and its derivatives.

9. The package (100) as claimed in any one of the claims 1 to 8, wherein the package (100) can be a centre-sealed flexible package, a three-side sealed flexible package, a gusset package or a standing package.

10. The package (100) as claimed in any one of the claims 1 to 9, wherein the layers of the said multi-layered diffusible strip (130) and said multi-layered main bodies (120) are sealed or laminated together by means of adhesion using a suitable adhesive or by extrusion with organic additives.

11. The package (100) as claimed in any one of the claims 1 to 10, wherein the said sealing of the multi-layered diffusible strip (130) to its overlaying multi-layered main body (120) is by means of adhesion using suitable adhesive or extrusion with organic additives or heat sealing or RF or ultrasonic or similar welding.

12. The package (100) as claimed in any one of the claims 1 to 11, wherein the said sealing of the edges of the said underlaying multi-layered main body (120) to the edges of the said multi-layered diffusible strip (130) and its overlaying multi-layered main body (120) are by means of heat sealing or RF or ultrasonic or similar welding.

13. The package (100) as claimed in any one of the claims 1 to 12, wherein the said diffusible strip (130) can be constructively positioned in any configured package that would ensure a designated area of weakness due to the heat sealing of differing material.

14. The package (100) as claimed in claim 1, substantially as hereinbefore described with reference to the description.

15. The package (100) as claimed in claim 1, substantially as hereinbefore described with reference to the drawings.

16. A package for containing food (200) having a sealing means, wherein said package and said sealing means are made from a material suitable for heating, said sealing means comprising:
- 5 a) a sheet of multi-layered diffusible strip (130); and
b) a sheet of multi-layered main body (120) overlaying and sealed to the said multi-layered diffusible strip (130); wherein the package (100) underlaying and sealed to the said multi-layered diffusible strip (130) and multi-layered main
- 10 body (120) and wherein when the package (100) is heated in a heating means, water contents of the food will be transformed into steam, thus increasing pressure in the package (100), the pressure will rupture the designated area of weakness (140) and creates an exit (141) to allow the
- 15 steam to escape therethrough.
17. The package (200) as claimed in claim 16, wherein the package (200) is microwaveable and the heating means is a microwave.
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18. The package (200) as claimed in any of the claims 16 to 17, wherein both the said multi-layered diffusible strip (130) and main body (120) consists of at least two layers.
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19. The package (200) as claimed in any of the claims 16 to 18, wherein the material of the innermost layer of the said multi-layered main body (120) that is overlaying and sealed to the uppermost layer of the said multi-layered diffusible strip (130) is the same as that of the said uppermost layer
- 30 of the said multi-layered diffusible strip (130).
20. The package (200) as claimed in any of the claims 16 to 19, wherein the multi-layered main body (120) underlaying and sealed at its edges to the edges of both the said multi-

layered diffusible strip (130) and the said multi-layered main body (120) that is overlaying the said multi-layered diffusible strip (130).

5 21. The package (200) as claimed in any of the claims 16 to 20, wherein, the material of the bottommost layer of the said multi-layered diffusible strip (130) that is overlaying and sealed at the edges to the mouth region of the said package (200) is different from the material of the said
10 mouth region of the package (200).

22. The package (200) as claimed in any of the claims 16 to 21, wherein the said package (200) is constructed using a material suitable for heating under a microwave.
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23. The package (200) as claimed in any of the claims 16 to 22, wherein the material is selected from polyethylene and its derivatives, polyester and its derivatives, polypropylene and its derivatives or nylon and its
20 derivatives.

24. The package (200) as claimed in any of the claims 16 to 23, wherein the layers of the said multi-layered diffusible strip (130) and said multi-layered main bodies (120) are sealed or laminated together by means of adhesion using a
25 suitable adhesive or by extrusion with organic additives.

25. The package (200) as claimed in any of the claims 16 to 24, wherein the said sealing of the multi-layered diffusible strip (130) to its overlaying multi-layered main body (120) is by means of adhesion using suitable adhesive or extrusion
30 with organic additives or heat sealing or RF or ultrasonic or similar welding.

26. The package (200) as claimed in any of the claims 16 to 25, wherein the said sealing of the said package (200) to the multi-layered diffusible strip (130) and its overlaying multi-layered main body (120) is by means of heat sealing or RF or ultrasonic or similar welding.

27. The package (200) as claimed in any of the claims 16 to 26, wherein the said diffusible strip (130) can be constructively positioned in any configured package that would ensure a designated area of weakness due to the heat sealing of differing material.

28. The package (200) as claimed in claim 16, substantially as hereinbefore described with reference to the description.

29. The package (200) as claimed in claim 16, substantially as hereinbefore described with reference to the drawings.