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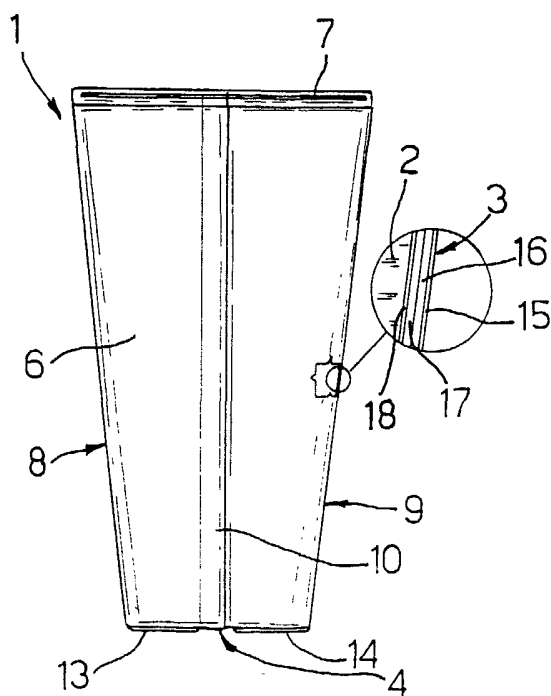
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(54) Title: MICROWAVE-HEATABLE FOOD PRODUCT PACKAGE



(57) Abstract: A microwave-heatable package (1) containing a food product (2) to be consumed hot; the package (1) is made from a packaging sheet material (3) having a barrier layer (17) pervious to microwave radiations and is substantially wedge-shaped with a base wall (4), a front wall (5) and a back wall (6) extending from opposite sides of the base wall (4) and joining together at a top transversal seal (7); the top transversal seal (7) is adapted to open upon exposure of the package (1) to microwave radiations.

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MICROWAVE-HEATABLE FOOD PRODUCT PACKAGE

TECHNICAL FIELD

10 The present invention relates to a microwave heatable food product package.

BACKGROUND ART

As is known, many food products, in particular pourable food products such as fruit juice, UHT (ultra-
15 high-temperature processed) milk, wine, tomato sauce, etc., are sold in packages made of sterilized packaging material.

The packaging material has a multilayer structure comprising a layer of fibrous material, e.g. paper,
20 covered on both sides with layers of heat-seal plastic material, e.g. polyethylene, and, in the case of aseptic packages for long-storage products, such as UHT milk, also comprises a layer of oxygen-barrier material defined, for example, by an aluminium film which is
25 superimposed on a layer of heat-seal plastic material and is in turn covered with another layer of heat-seal plastic material eventually defining the inner face of the package contacting the food product.

A typical example of such a package is the parallelepiped-shaped package for liquid or pourable food products known as Tetra Brik Aseptic (registered trademark), which is formed from a continuous tube of packaging material obtained by bending and longitudinally sealing a web packaging material; the web of packaging material is sterilized on the packaging machine itself, e.g. by applying a chemical sterilizing agent, such as a hydrogen peroxide solution, which, after sterilization, is removed, e.g. vaporized by heating, from the surfaces of the packaging material; and the web of packaging material so sterilized is maintained in a closed sterile environment, and is folded and sealed longitudinally to form a vertical tube.

The tube is filled with the sterilized or sterile-processed food product, and is sealed and cut at equally spaced cross sections to form pillow packs, whose ends are then folded mechanically to form a pair of bottom triangular flaps folded and heat-sealed against the bottom surface of the package and a pair of upper flaps folded and heat-sealed against respective lateral walls of the package.

A similar process may be used to produce wedge-shaped packages, such as the packages commercially available under the trade name Tetra Wedge Aseptic (registered trademark). A wedge-shaped package is obtained from a pillow pack by mechanically folding only the two bottom flaps, and leaving the top transversal

seal of the pack linear and flat, so as to define the edge of the wedge shape.

The wedge-shaped packages are relatively inexpensive, have excellent stand-up capability and may be provided with a prelaminated hole (i.e. made in the paper layer but not in the barrier layer of the packaging material) or with a hole internally protected by a breakable patch of oxygen barrier material, in the upper part near the top transversal seal, so as to allow the use of a drinking straw.

Parallelepiped packages are generally used for different food products, including drinks and relatively dense or viscous products such as sauces, e.g. cooking cream or tomato sauce, in a wide variety of dimensions (e.g. from 125 to 2000 ml). Known wedge-shaped packages are generally used for single portions of liquid food products, in particular drinks, ranging from 50 to 400 ml.

In conclusion, packages of the above-described types, obtained from laminated web packaging materials, have been widely used in connection with food products to be consumed cold.

In case the food product is adapted to be heated or cooked, e.g. by means of microwaves, it must be removed from the package and heated in a suitable container.

DISCLOSURE OF INVENTION

An aim of the present invention is to provide a food product package made from web packaging material, which

can be easily and quickly microwave-heated without opening the package beforehand. Within this aim, an object of the invention is to provide a microwave-heatable package which has a built-in safety function, 5 thereby dispensing with the need to incorporate safety valves or the like.

This aim and object are achieved by a microwave-heatable package containing a food product to be consumed hot, said package being made from a packaging sheet 10 material including at least one layer adapted to provide mechanical strength, a barrier layer pervious to microwave radiations, and at least an outer and an inner heat seal layers, said package being substantially wedge-shaped and including a rectangular base wall, a front 15 wall and a back wall extending from opposite sides of the base wall and joining together at a top transversal seal, said top transversal seal being adapted to open upon exposure of said package to microwave radiations.

It has been surprisingly found that the wedge shape 20 concentrates both mechanical stress due to internal pressure and temperature increase on the top seal, which opens when the food product is hot.

Consequently, the seal opens up and releases the internal pressure without significant product spills, and 25 with no need to provide a steam valve or similar safety device.

BRIEF DESCRIPTION OF THE DRAWINGS

A preferred, non-limiting embodiment of the present

invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 is a back view of a package according to the present invention;

5 Figure 2 is a side elevational view of the package of Figure 1;

Figure 3 is a perspective view of the package of figure 1 subjected to a microwave heating process; and

10 Figure 4 is a perspective view of the package of figure 1 after the microwave heating process.

BEST MODE FOR CARRYING OUT THE INVENTION

With reference to figures 1 to 4, numeral 1 references a package products according to the present invention containing a food product 2 to be consumed hot, 15 for example a hot drink or a baby food product or a pediatric nutritional product, or a dense or viscous fluid such as a sauce containing oils or fats or a soup.

Package 1 is made from a web packaging material 3 (figure 5) - hereinafter "material 3" - and is 20 substantially wedge-shaped. More particularly, package 1 includes a rectangular base wall (not shown) 4, a front wall 5 and a back wall 6 of substantially isosceles trapezoidal shape with their respective shorter bases adjacent to base wall 4 and their respective longer bases 25 sealed together by a top transversal seal 7, and a pair of lateral walls 8, 9 of substantially triangular shape.

Package 1 is obtained, in a manner known per se, by longitudinally bending and sealing a web (not shown) of

material 3 to form a continuous tube; the longitudinal seal is referenced 10 in figure 1 and extends along back wall 6. The continuous tube is then filled with the food product 2 and transversally sealed at constant intervals
5 to form pillow packs (not shown).

Material 3 is provided with a crease pattern, not shown as known in itself, which allows the material to be easily folded along inclined lateral corners and along base corners, to form lateral bottom flaps 13, 14 which
10 are folded and sealed against base wall 4 to ensure shape stability of the package.

Material 3 (see enlarged detail of fig. 1) is a multi-layer laminated material basically including a heat seal outer layer 15, preferably made of PE, a paper layer
15 16 adapted to provide some mechanical strength, a barrier layer 17 and a heat seal inner layer 18 preferably made of LDPE (Low Density PE) or Metallocene. Additional mechanical strength is imparted to the packaging material structure by the barrier material which has a high melt
20 temperature, whereby to maintain a high mechanical strength, even at high temperatures (e.g., 120°C). In this way, stresses are transferred to the heat seal inner layer during heating. Adhesive layers of known type (not shown) may be further provided between the paper layer
25 and the barrier layer, as well as between the barrier layer and the inner layer.

According to a feature of the present invention, barrier layer 15 is pervious to microwave radiation, so

as to allow microwave radiation to reach the food product
2; conveniently, barrier layer is made from a polymer or
a mineral coated polymer having a high melting
temperature, e.g. over 130°C. Preferably, the barrier
5 layer is made from a material chosen in the group
including SiOx-coated PET, SiOx-coated PA, SiOx-coated
EVOH; alternatively, if the barrier effect is sufficient,
EVOH alone may be used. Other suitable coatings for the
barrier layer include silicon nitride, aluminium oxide,
10 diamond-like carbon coatings or combinations thereof.

According to the present invention, the package 1
can be microwave-heated without opening the package. The
combination of the shape of the package 1 and the
pressure increase inside the package due to steam
15 evolution consequent to microwave irradiation brings
about the surprising effect that the top transversal seal
7 unseals, i.e. the package opens automatically along the
top transversal seal 7, when the food product is hot
(fig. 4). This happens because the wedge shape of the
20 package concentrates mechanical and thermal stress onto
the top transversal seal 7.

Preferably, the barrier layer has a higher melt
strength than the heat-seal inner layer, and the wedge
shape transfers stresses exerted on the package, during
25 heating, to the top transversal seal.

For example, tests performed have shown that a
package containing 200 g of a fatty sauce will open after
a microwave treatment at 900 W power for about 1-5

minutes, with a sauce average temperature of about 70-80°C.

It has been observed that the wedge shaped geometry produces temperature gradients in the food product; in particular, the product in the central zone near the base wall 4 of the package has the lowest temperature (40-50°C), whilst the product in the central zone near the top surface reaches the highest temperature (up to 120° in case of fatty sauces); the product in the vicinity of lateral walls 8, 9 ranges from about 60°C near the base wall to about 80°C near the top surface.

It has been observed that the product gently boils at its top surface, when the package opens; the self-opening at the top transversal seal 7 releases the pressure inside the package (fig. 4) without any spill of the product since the opening is above the product level.

According to the present invention, the combination of the wedge shape and a microwave-pervious barrier layer allows the food product to be safely heated without any risk of explosion or spill, and without any need to open the package before heating. No safety device such as a pressure release valve is necessary, which would be very difficult to provide in an aseptic package.

After heating, the package is open and ready for use, and can be safely handled both because of its excellent stability, due to its geometry, and because of the good heat insulating properties of the packaging material, which remains relatively fresh at its outer

surface.

Finally, it should be noted that the package described may be modified without departing from the scope of the present invention as defined by the claims.

5 In particular, the layer of the packaging material adapted to provide mechanical strength may be made from a polymeric material, e.g. expanded polypropylene, rather than from paper material. Another example of packaging sheet material according to the present invention would
10 thus include the following layers (from inside to outside): PE, PET/SiOx, PE, expanded polypropylene, PE.

Furthermore, the package could be made from a sheet packaging material cut into blanks, rather than from a continuous packaging material tube.

CLAIMS

1.- A microwave-heatable package (1) containing a food product (2) to be consumed hot, said package (1) being made from a packaging sheet material (3) including at least one layer (16) adapted to provide mechanical strength, a barrier layer (17) pervious to microwave radiations, and at least an outer and an inner heat seal layers (15, 18), said package (1) being substantially wedge-shaped and including a rectangular base wall (4), a front wall (5) and a back wall (6) extending from opposite sides of the base wall (4) and joining together at a top transversal seal (7), said top transversal seal (7) being adapted to open upon exposure of said package (1) to microwave radiations.

2.- A package as claimed in claim 1, characterised in that said barrier layer (17) pervious to microwave radiations has a melt strength higher than said inner heat seal layer (18).

3.- A package as claimed in claim 1 or 2, characterised in that said barrier layer (17) pervious to microwave radiations includes a material chosen in the group including SiOx-coated PET, SiOx-coated PA, EVOH, SiOx-coated EVOH.

4.- A package as claimed in any of the preceding claims, characterised in that said layer (16) adapted to provide mechanical strength includes a paper material.

5.- A package as claimed in any of Claims from 1 to 3, characterised in that said layer (16) adapted to

provide mechanical strength includes a polymeric material.

6.- A package as claimed in Claim 5, characterised in that said polymeric material includes expanded
5 polypropylene.

7.- A package as claimed in any of the preceding claims, characterised in that said food product (2) is a dense or viscous fluid.

8.- A package as claimed in any of the preceding
10 claims, characterised in that said food product (2) includes oils or fats.

9.- A package as claimed in any of the preceding claims, characterised in that said food product (2) is a sauce.

15 10.- A package as claimed in any of claims from 1 to 6, characterised in that said food product (2) is a soup.

11.- A package as claimed in any of claims from 1 to 6, characterised in that said food product (2) is a drink.

20 12.- A package as claimed in any of claims from 1 to 6, characterised in that said food product (2) is a pediatric nutritional product.

13.- A method of heating a package (1) as claimed in any of the preceding claims, characterised by including
25 the step of exposing said package (1) to a microwave radiation until said transversal top seal (7) opens.

14.- The use of a package as claimed in any of claims 1 to 12 for packaging a microwave-heatable food

product (2) to be consumed hot.

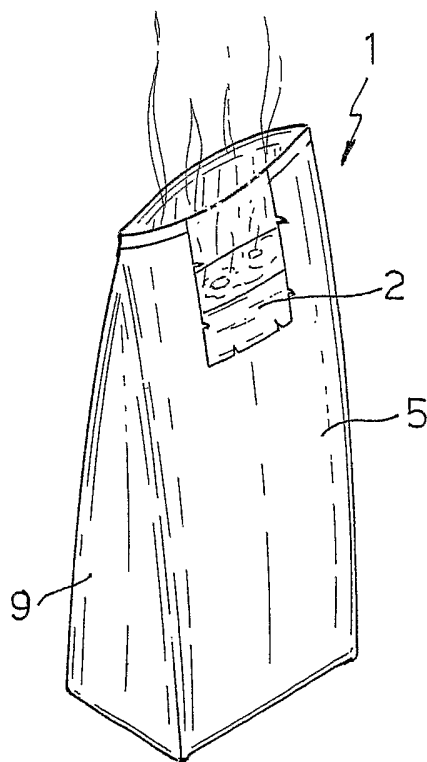
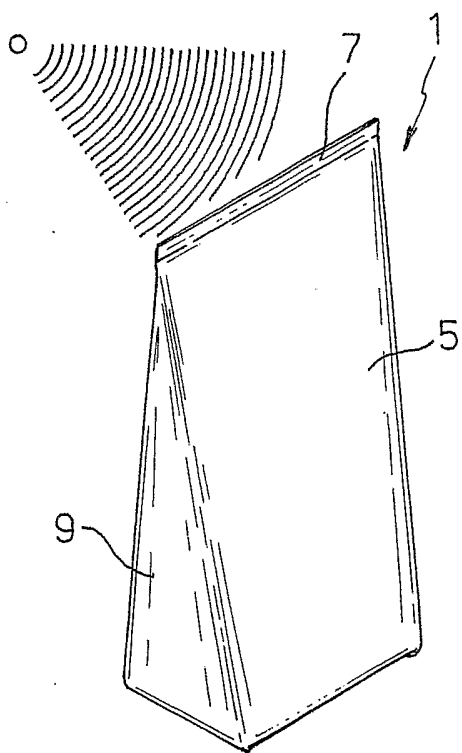
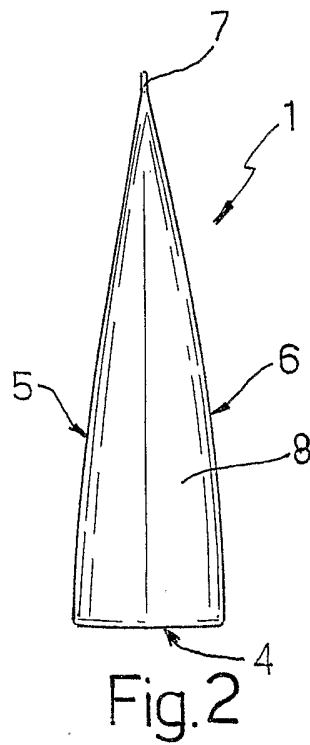
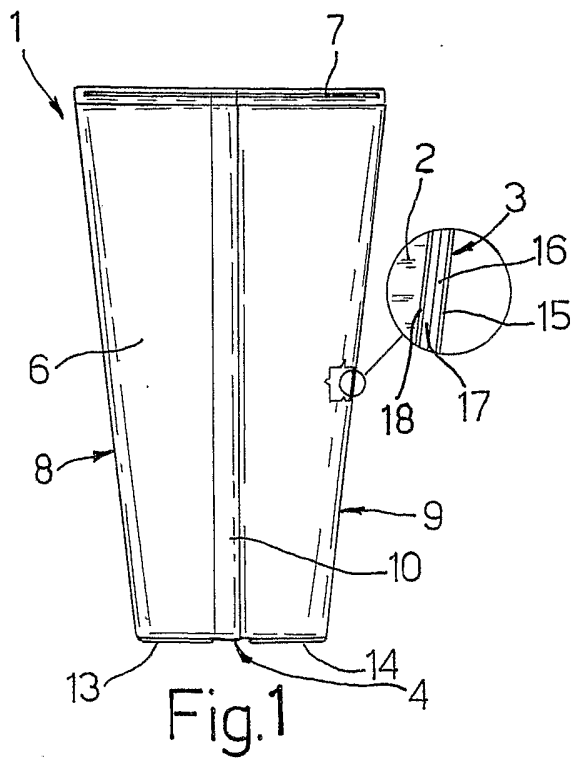


Fig. 3

Fig. 4

INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 01/14332

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B65D81/34 B65D75/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

PAJ, EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Y	FR 2 796 047 A (DANISCO FLEXIBLE FRANCE) 12 January 2001 (2001-01-12) the whole document ----	1-12
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Y	EP 1 099 645 A (WIPAK GRYSPEERT SA) 16 May 2001 (2001-05-16) column 4, line 26 - line 40; figure 1 ----- -/--	5,6

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

° Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
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Date of the actual completion of the international search

18 April 2002

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 01/14332

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	PATENT ABSTRACTS OF JAPAN vol. 016, no. 206 (M-1248), 15 May 1992 (1992-05-15) & JP 04 031273 A (TOYO ALUM KK), 3 February 1992 (1992-02-03) abstract; figures 1-9 -----	1-12
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