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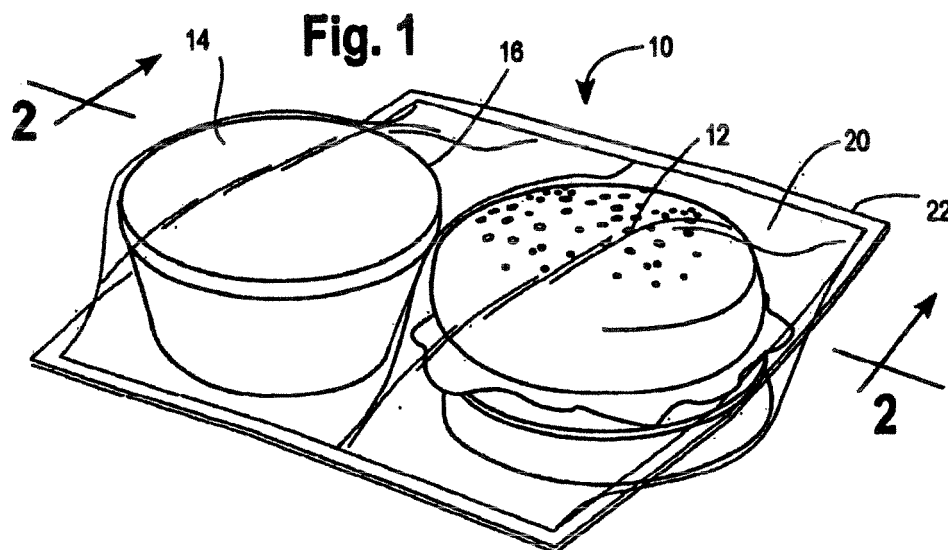
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(54) **Energy-differential microwaveable food package**

(57) A food package (10) is provided having two different food products (12,14) disposed within a common flexible film wrapper (20). A portion of the flexible film wrapper (20) adjacent a first of the food products (12) is

adapted to at least partially shield microwave radiation from the first food product to a greater degree than the second food product (14) when both are heated together in the film wrapper in a microwave oven.



Description

Field

[0001] This disclosure relates generally to an energy-differential microwavable food package, and in particular to a food package for differential energy input to two different food products both contained within the same food package.

Background

[0002] Two or more different food items are often packaged together in the same container and then frozen, refrigerated or shelf-stabilized before use. The frozen food package can then be reheated in a microwave to thaw the food items and bring them to a preferred consumption temperature. Different frozen, refrigerated or shelf-stable foods that are packaged together often require different energies, or differential energy inputs, to reheat the food items in the microwave prior to consumption. However, despite this differential in energy requirements for heating, the foods often are placed in the microwave oven and cooked together for the same amount of time, which can result in one or more food items being overcooked or undercooked.

[0003] Often the first and second food products have different energy requirements when cooking or heating, such that if both food products are placed in a microwave for the same amount of time at least one food product may be overcooked while the other may be undercooked. For example, if stored in a frozen condition, one food product may thaw faster than another food product and once thawed that food product continues to cook and receive more energy, and thus cook faster than the other food product, resulting in nonuniform cooking of the two food products. To solve this problem where two or more different food items are to be simultaneously heated in a microwave and one food item requires more heat than another food item, a shielding and/or susceptor material has been applied to generally rigid packaging, such as paperboard trays, thermoformed containers and the like.

[0004] When a frozen, refrigerated or shelf-stable food product like a sandwich is to be reheated in a microwave where the multiple food items make up the whole of the product, it can be desirable to obtain different temperatures. One such attempt to heat a sandwich product is disclosed in U.S. Patent No. 5,416,305, where a package for a sandwich parates the bread from the non-bread (i.e., the fillings of a sandwich) portion so that upon reheating the frozen sandwich, the non-bread container can be removed to allow only heating of the bread component. This can create two heating steps if the non-bread component is also required to be heated, as well as requiring a further step to reheat the bread component if it has cooled off while heating the non-bread component.

[0005] Multi-component containers are known that

store two or more different food items and allow for sections of the container to be exposed to microwave energy while shielding other sections from the microwave energy, where the different sections correspond to the different food requirements. Various shielding techniques are known that shield or prevent microwave energy from heating one food item, while allowing microwave energy to heat another food item in the same package. In U.S. Patent No. 5,416,304, one such shielding apparatus is used with a frozen pizza, where the shield is in the shape of a ring and is wrapped around the periphery of the pizza to help provide an improved uniformity of cooking, whereas without the shield the crust could possibly overcook, since it thaws before the rest of the pizza and then continues to absorb energy at a higher rate than the rest of the frozen pizza. Another shielding technique is disclosed in U.S. Patent No. 4,874,618, where a shield shaped like a sleeve fits around a cup-like container which contains ice cream and a sauce or other food item to be warmed or heated. The sleeve is fitted such that it only shields the ice cream part of the container during microwave heating, keeping the ice cream frozen while allowing the sauce or other food item to be heated. Another similar ice cream container is disclosed in U.S. Patent No. 4,934,829, where a container with an ice cream and a food item to be heated is wrapped along the outside of the container with a shield, such as aluminum foil. The foil wrapping covers the top and sides, stopping just short of the bottom of the container where the food item to be heated is located, thus allowing the bottom portion to be heated while keeping the ice cream from being heated. In each of these examples, though, the generally rigid packaging can disadvantageously add to the costs, as well as limit the shapes and configurations available for the packaging. Moreover, there can be additional costs associated with attaching the shielding to the rigid packaging, such as when performed using in-mold labeling.

[0006] There are other multi-component containers that can contain a susceptor zone, which is a zone that absorbs microwave energy, or both a susceptor zone and a shielding zone. U.S. Patent No. 6,903,320 discloses a multi-component molded microwaveable container having at least two sections, where at least one section has a susceptor zone. This container can similarly be used for an ice cream food product and a cake or sauce. The container can also include a shielding zone.

[0007] Paperboard or other generally rigid containers or trays have several disadvantages. Such containers or trays can be costly. Also, they can have limitations on the sizes and shapes into which it can be configured. Further, different configurations can require different tooling, and not be readily adjustable to accommodate differently-shaped products.

Summary

[0008] An energy-differential microwaveable food package is provided that addresses the aforementioned

disadvantages of the prior art. Instead of having a shielding layer disposed on a generally rigid compartment or on a generally rigid tray disposed within an outer packaging, shielding for at least one of the two different food products is provided on an outer film wrapper. This advantageously can reduce the costs of packaging by eliminating a requirement for additional outer packaging, as well as a requirement for rigid packaging having shielding thereon. Further, the flexible film can be readily adapted to the desired size of the food products, and can also be adapted, such as by trimming, to accommodate differently-sized products.

[0009] In one aspect, a temperature-differential microwaveable food package is provided that contains at least two different food products, including a first food product and a second food product different from the first food product. A common flexible film wrapper surrounds the first and second food products. The film wrapper has a microwave-influencing segment, such as a microwave shielding material, positioned adjacent the first food product and spaced from the second food product such that there is a temperature differential between the first and second microwave food products following microwave heating in the film wrapper.

[0010] In another aspect, a method is provided for packaging at least two different food products in a temperature-differential microwave package. The method may include providing a first food product and a second food product different from the first food product. The method may further include positioning a microwave-influencing segment of a common flexible film wrapper adjacent the first food product and spaced from the second food product such that the segment results in a temperature differential between the first and second microwave food products following microwave heating. The method may also include sealing the first and second food products in the film wrapper.

[0011] In another aspect, a method is provided for microwave heating a first and second food product. The method may include placing a package having an outer flexible film wrapper containing separate first and second food products in a microwave oven, heating the first and second food products together in the microwave oven while the first and second food products are disposed in the film wrapper, and limiting the microwave heating of the first food product to a different degree than the second food product during heating of the first and second food products together in the microwave oven at least in part using the film wrapper.

[0012] One or both of the first and second food products may optionally be supported by a rigid support disposed in the film wrapper. The rigid support may have feet to elevate the support above the bottom of a microwave oven.

Brief Description of the Drawings

[0013] FIGURE 1 is a perspective view of an outer film

wrapper containing two different food products;

[0014] FIGURE 2 is a section view taken along line 2-2 of FIGURE 1 and showing both a shielded region of the outer film wrapper adjacent one of the food products and a non-shielded region of the outer film wrapper adjacent the other of the food products;

[0015] FIGURE 3 is a perspective view of an outer film wrapper containing a tray which is supporting two different food products;

[0016] FIGURE 4 is a section view taken along line 4-4 of FIGURE 3 and showing both a shielded region of the outer film wrapper adjacent one of the food products and a non-shielded region of the outer film wrapper adjacent the other of the food products, as well as the tray supporting the two food products;

[0017] FIGURE 5 is a detailed section view of region V of FIGURE 4, showing details of the construction of the shielded region of the outer film wrapper; and

[0018] FIGURE 6 is a detailed section view similar to that illustrated in FIGURE 5, but showing an alternative construction of the shielded region of the outer film wrapper.

Detailed Description of the Drawings

[0019] The food package illustrated in FIGURES 1-6 and described herein includes two different food products disposed within a common flexible film wrapper. A portion of the flexible film wrapper adjacent a first of the food products is adapted to at least partially shield microwave radiation from heating the first food product to the same degree as the second food product is heated when both are heated together in the film wrapper in a microwave oven. This advantageously permits the film wrapper and the first and second food products to be placed in a microwave oven for the same time period, but can reduce the microwave energy input to one of the food products to a different degree than the other of the food products. The use of the flexible film wrapper eliminates the need for additional outer packaging, as well as reduces the costs associated with providing generally rigid packaging having the shielding thereon. Also, it can be more cost-effective to adjust the size of the film, such as by trimming excess film, to accommodate different product shapes than having to create tooling for differently-shaped rigid packaging. Although such outer packaging and rigid packaging are not necessary, they may nonetheless be used with the food package described herein.

[0020] The food package 10 of the first exemplary embodiment has a flexible film wrapper 20 which encloses a first food product 12 and a second food product 14, as illustrated in FIGURES 1 and 2. The film wrapper 20 includes a microwave shielding layer 28 adjacent the first food product 12 but not adjacent the second food product 14, as illustrated in FIGURE 2. During microwave heating of the food products 12 and 14 together in the film wrapper 20, the shielding adjacent the first food product 12 will at least partially restrict microwave radiation from heating

the first food product 12 to the same degree as the second food product 14. Thus, both food products 12 and 14 may be heated together in the film wrapper 20 in a microwave oven for the same period of time, with the first food product 12 receiving a different microwave energy input than the second food product 14.

[0021] The food package 110 of the second exemplary embodiment has a first food product 12 and a second food product 14 which are supported by a generally rigid tray 140, as illustrated in FIGURE 3. The film wrapper 120 includes a microwave shielding layer 128 adjacent the first food product but not adjacent the second food product 14, as illustrated in FIGURE 4. As in the first embodiment, the shielding adjacent the first food product 12 will at least partially restrict microwave radiation from reaching the first food product 12 to the same degree as the second food product. This can permit both food products 12 and 14 to be heated together in the film wrapper 120 in a microwave oven for the same period of time, with the first food product 12 having received a different energy input following microwave heating as compared to the second food product 14.

[0022] The microwave shielding layer 28 and 128 may be integrally formed with the wrapper 20, or may be separately applied. As shown in FIGURE 5, the shielding layer 28 may comprise a laminate having an outer and an inner protective sheet 34 and 30 with a shielding sheet 32 disposed therebetween. The outer sheet 34 may be adhered to the inner surface of the wrapper 20. Alternatively, as shown in FIGURE 6, the shielding layer 28 may comprise a laminate having an inner protective sheet 30 and a shielding sheet 32 attached to the inner surface of the wrapper 20. The sheet 30 (Figure 6) or sheets 30 and 34 together (Figure 5) may cover any otherwise exposed edges of the shielding sheet 32. Moreover, the laminate shielding alone may be applied to the outwardly-facing surface of the film instead of the illustrated inwardly-facing surface. The shielding layer can also be applied using deposition techniques, such as printing or spraying. Other permutations can also be used. Types of suitable shielding are disclosed in PCT publications WO2005/068321 and WO2003/043474, the disclosures of which are hereby incorporated by reference in their entireties. The outer wrapper 20 can be in the form of flow wrap, a bag, or a sleeve, although other flexible configurations can be used. Further, the outer wrapper 20 may be formed of a laminate having an inner heat sealing layer to facilitate sealing of the outer wrapper 20 to itself in order to form a sealed package. In one example, the heat sealing layer of the outer wrapper 20 may be the inner protective sheet 30 for at least one of the seals of the outer wrapper 20. That is, the heat sealing layer of the outer wrapper 20 may be sealed, such as an end seal, to the inner protective sheet 30 having heat sealing properties.

[0023] By way of example, the film of the outer wrapper may be formed from polypropylene, polyethylene terephthalate, or other materials suitable for contact with food

and microwaving. The shielding layer may include aluminum or other shielding metals. When a laminate is used, the laminate layers may include the same materials as the film, and could also be ethylene vinyl alcohol polymer or polyethylene.

[0024] The film forming the wrapper 20 and 120 has the microwave shielding layer 28 and 128 positioned adjacent the first food product 12. Although depicted as being only adjacent the first food product 12 in FIGURES 1-4, the shielding layer may be adjacent both food products 12 and 14, with a lesser degree of shielding adjacent one of the food products as compared to adjacent the other. For example, the shielding layer may have perforations or other patterns and/or decreased thickness adjacent the one of the food products requiring less microwave heating as compared to the other of the food products.

[0025] The film wrapper 20 may be the only outer packaging, or other outer packaging may also be provided in addition to the film wrapper 20. The film wrapper 20 has a seal 22 about its periphery to enclose the two food products 12 and 14. An easy-open feature, such as a thinned die line, a score line, or another area of weakness, as well as an aligned starter notch, may be provided to permit the consumer to readily open the film wrapper 20 to gain access to the food products 12 and 14. The film wrapper 20 may be opened prior to microwave heating to permit venting and restrict the build-up of gasses within the sealed wrapper 20, and/or a pressure relieving vent (such as a one-way valve) may be provided to permit venting during and after microwave heating.

[0026] Turning now to details regarding the tray 140 of the second exemplary embodiment, illustrated in FIGURES 3 and 4, the tray 140 includes a food product support surface 142 elevated using multiple legs 146. An opening 144 may optionally be provided for receiving the lidded cup 16 containing the second food product 14. A susceptor surface (not shown) may also be provided on the food product support surface 142 for browning and/or crisping of the adjacent surface of the food product(s). The legs 146 can advantageously elevate the food product 14 to permit microwave radiation to reflect off of the bottom wall of a microwave oven and onto the bottom surface of the food product 14 for additional microwave heating. In one example, the shielding layer 128 may be absent or reduced from beneath the first food product 12 as compared to above the first food product 12. This, in combination with the elevated food product support surface 142, can be used to heat one side of the first food product 12 a greater degree than the other side. The generally rigid tray, which may be formed of paperboard, plastic or the like, can facilitate handling of the food products, particularly following microwave heating.

[0027] The first and second food products are preferably, though not necessarily, different from each other. They may be frozen, shelf-stable or refrigerated. In the illustrated example, the first food product 12 is a sandwich and the second food product 14 is a liquid food product,

such as a soup disposed in a lidded cup 16. The second food product 14 may tend to require a greater amount of energy compared to the first food product 12 to bring each product from its initial state to the desired heated states, for example. Therefore, little or no shielding adjacent the second food product is necessary to provide the desired cooking results of the first food product. The first food product 12 can comprise a non-liquid food product, such as a bread-based food product like a sandwich, that tends to require a lesser amount of energy to bring the bread and its fillings from a frozen state to that of a preferable warm temperature for consumption. As a result, less microwave energy is needed, thus requiring shielding or a greater degree of shielding adjacent the first food product 12 as compared to the second food product 14 to prevent or restrict the same amount of microwave radiation from heating the first food product 12.

[0028] The food products that can be contained in the package 10 may all initially be in a frozen, refrigerated, or shelf-stable state, but can be heated to any state preferable for consumption. For example, food products can be consumed in a liquid state (i.e., melted or thawed in the container) or can even remain in a relatively frozen state after heating, for consumption. Possible food products may include combinations as crackers and cheese dip, different types of nuts which require different energy inputs, popcorn and soy nuts, a soup and a sandwich, a brownie and a whipped cream, a brownie and ice cream, chili with cheese and sour cream, soup and uncooked bread, sandwich and cottage cheese, vegetables and entrees (such as chicken breast, pasta, etc.), dipping sauce and pizza, macaroni and cheese, cooked bun and hot dog, and foods such as caramel or chocolate in cookies, and a grilled cheese sandwich.

[0029] To heat the two different food products 12 and 14 using a microwave oven, the food package 10 or 110 containing the first and second food products 12 and 14 can be placed in a microwave oven. The food package 10 or 110 can optionally be opened for venting. The microwave oven can then be operated for a preselected time period to heat the first and second food products 12 and 14. Due to the adjacent shielding layer, the first food product 12 will not be exposed to the same amount of microwave radiation as the second food product 14, resulting in a different energy inputs to the first and second food products 12 and 14 during heating in the microwave oven. For instance, the first food product 12 may not be heated the same amount as the second food product 14. In the example where the first food product 12 is a frozen sandwich and the second food product 14 is a frozen soup, following microwave heating the frozen soup can be thawed into a heated liquid, while the frozen sandwich can also be thawed but not heated the same amount as the soup. Following microwave heating, the package 10 or 110 can be removed from the microwave oven, the film wrapper 20 or 120 opened (if not already opened or not fully opened), and the first and second food products 12 and 14 removed therefrom for consumption. If the tray

140 is present, then it can be used to remove the first and second food products 12 and 14 from the film wrapper 120.

[0030] From the foregoing, it will be appreciated a microwaveable food package is provided that allows for temperature differential microwave heating of at least two different food products contained within a common flexible film wrapper. However, the disclosure is not limited to the aspects and embodiments described hereinabove, or to any particular embodiments. Various modifications to the microwaveable food packages described herein can result in substantially the same food package.

15 Claims

1. An energy-differential microwaveable food package containing at least two different food products, the food package comprising:

a first food product;
a second food product different from the first food product; and
a common flexible film wrapper surrounding the first and second food products, the film wrapper having a microwave-influencing segment positioned adjacent the first food product and spaced from the second food product such that there is an energy differential input between the first and second microwave food products during microwave heating in the film wrapper.

2. The food package of Claim 1, wherein the microwave-influencing segment includes a microwave shielding material which is optionally disposed between an inner layer and an outer layer of the film wrapper.
3. The food package of claim 2, wherein the microwave shielding material includes one or both of a plurality of separated portions and non-shielded zones surrounded by shielding material.
4. The food package of any one of Claims 1 to 3, wherein at least one of the first and second food products are supported by a rigid support disposed in the film wrapper, the rigid support optionally having feet to elevate the support.
5. The food package of any one of Claims 1 to 4, wherein the microwave-influencing segment is adjacent a portion of the first food product and spaced from another portion of the first food product.
6. The food package of any one of Claims 1 to 5, wherein the film wrapper includes means for moisture from within the film wrapper during microwave cooking.

7. The food package of any one of Claims 1 to 6, wherein at least one of the first and second food products is disposed in containment means.

8. A method of packaging at least two different food products in an energy-differential microwave package, the method comprising:

providing a first food product and a second food product different from the first food product;
positioning a microwave-influencing segment of a common flexible film wrapper adjacent the first food product and spaced from the second food product such that the segment results in an energy differential input between the first and second microwave food products during microwave heating; and
sealing the first and second food products in the film wrapper.

9. The method of claim 8, wherein the step of providing the first and second food products further includes the step of positioning at least one of the first and second food products on a rigid support the rigid support optionally including elevating means.

10. The method of Claim 8 or 9, wherein the step of positioning a microwave-influencing segment of a common flexible film wrapper adjacent the first food product and spaced from the second food product further includes the step of surrounding the first and second food products with the film wrapper.

11. The method of any one of Claims 8 to 10, wherein the step of providing a first food product and a second food product further includes the step of providing at least one of the first and second food products in containment means.

12. The method of any one of Claims 8 to 11, wherein the step of providing a first food product and a second food product further includes the step of providing each of the first and second food products in separate containment means.

13. A method of microwave heating a first and second food product, the method comprising:

placing a package having an outer flexible film wrapper at least partially surrounding separate first and second food products in a microwave oven;
heating the first and second food products together in the microwave oven while the first and second food products are disposed in the film wrapper; and
limiting the microwave energy input to the first food product to a different degree than the sec-

ond food product during heating of the first and second food products together in the microwave oven at least in part using the film wrapper.

14. The method of claim 13 wherein the outer flexible film wrapper has a microwave-influencing segment adjacent the first food product and spaced from the second food product such that microwave radiation is at least partially blocked from the first food product.

15. The method of claim 14 wherein the step of placing a package in a microwave oven further includes placing a package in a microwave oven where the package includes a rigid support for both the first and second food products disposed in the film wrapper.

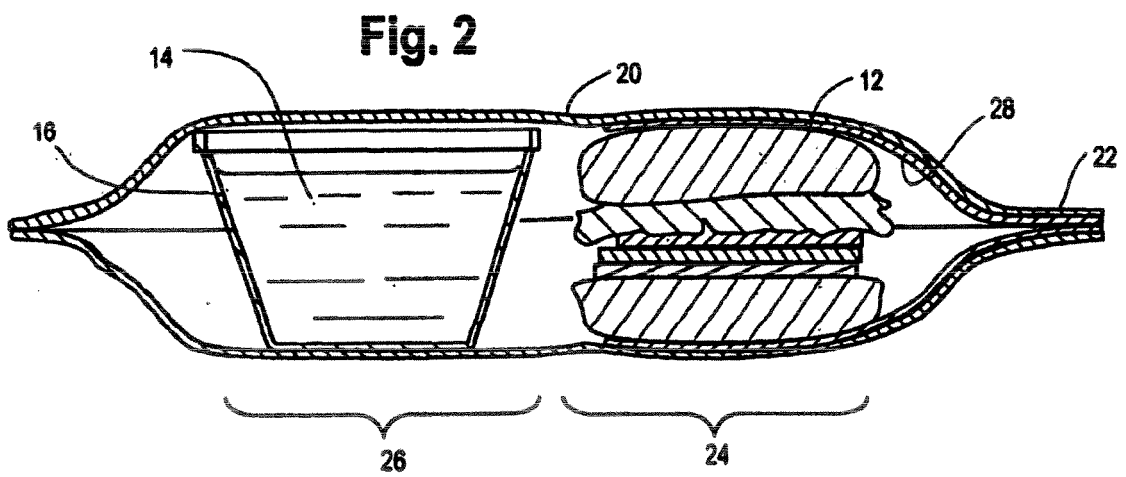
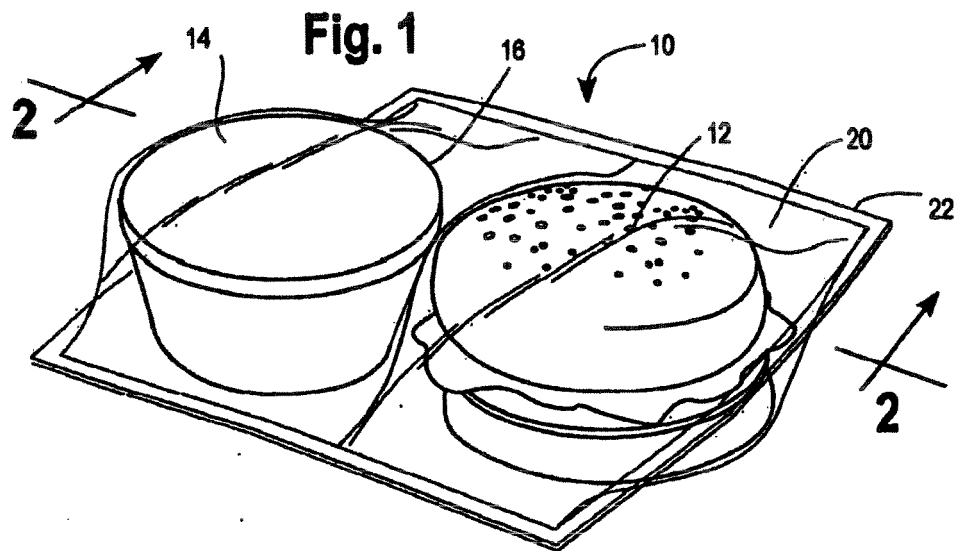


Fig. 3

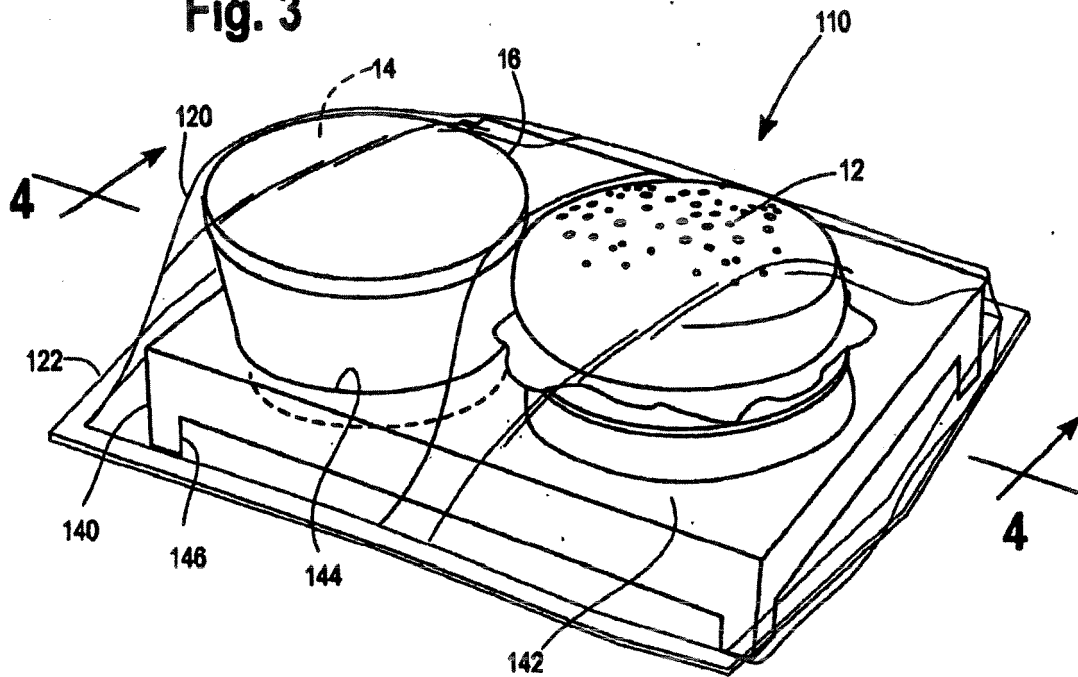


Fig. 4

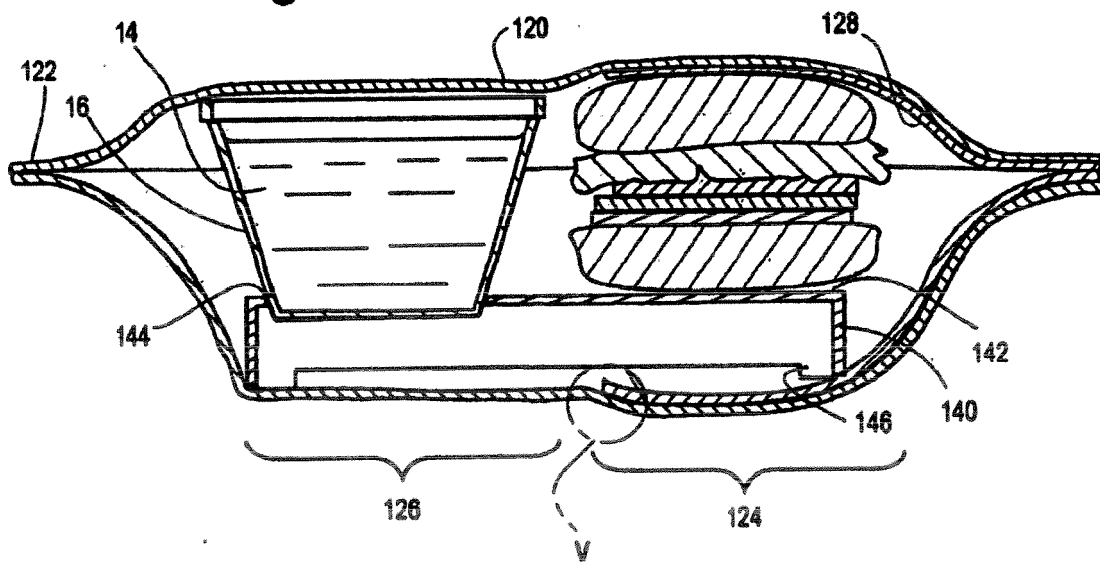


FIG. 5

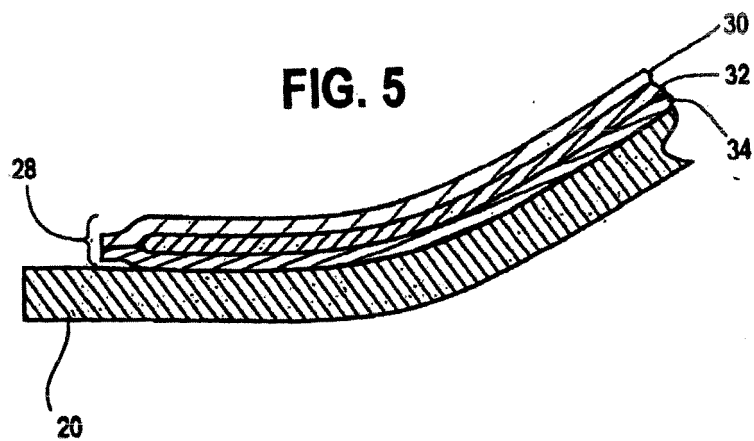
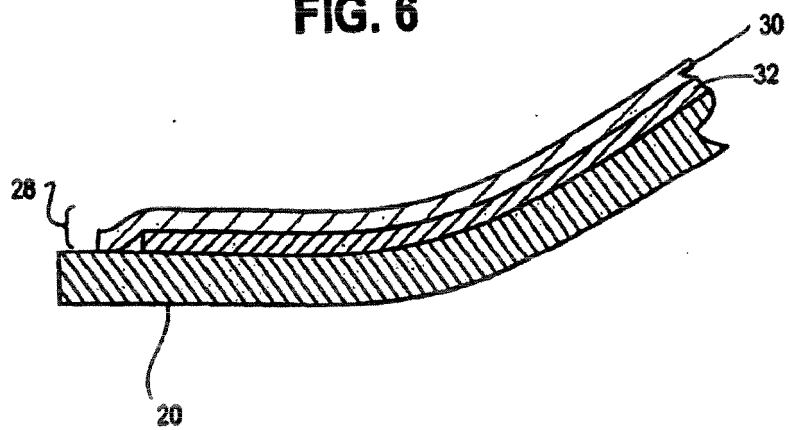


FIG. 6





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Place of search Munich		Date of completion of the search 15 December 2009	Examiner Duc, Emmanuel
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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