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### (54) **RELEASABLY SEALABLE BAG COMPRISING A COMPOSITE SHEET MATERIAL**

AUS EINEM BAHNFÖRMIGEN VERBUNDMATERIAL HERGESTELLTER LÖSBAR  
VERSCHLIESSBARER BEUTEL

SAC SCELLABLE LIBERABLE COMPRENANT UN MATERIAU EN FEUILLE COMPOSITE

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**Description****FIELD**

5 **[0001]** The present invention relates to a bag for airtight storage, particularly of foods, and for airtight and liquid-tight sealing during cooking. More specifically, it relates to a bag comprised of at least one sheet of a composite film material provided with a pressure sensitive adhesive protected from inadvertent adherence, or a sheet having at least one portion comprised of such a composite film material, the adhesive being releasably sealable to, e.g., another portion of the same film sheet or to a different film sheet when pressed thereagainst, to form an interior of the bag.

**BACKGROUND**

15 **[0002]** Containers for food storage are well-known and have been made available in many forms, e.g., plastic boxes in various shapes with flexible fitted lids such as those sold under the brand name "TUPPERWARE™" from the Tupperware Company, USA, and plastic bags with three sealed sides and a zipper-style reclosable opening such as those sold under the brand name "ZIPLOC™" storage bags from the S. C. Johnson Company in the United States and the Asahi Kasei Company in Japan.

20 **[0003]** Another type of food storage bag that is very commonly used by consumers is the complimentary polyethylene "stock bags" that are provided free of charge by many grocery stores and food markets. Such bags are also commercially available under the name UBE Kitchen Bags from the UBE Film Company of Onoda City, Yamaguchi Prefecture, Japan. This type of bag is usually sealed by tying the free ends of the bag directly to each other, or by using some type of metallic or plastic fastener. However, consumers frequently do not seal such bags at all before placing them in the refrigerator.

25 **[0004]** In addition, various film materials that adhere to the surface of a plate or other container via electrostatic cling have previously been available for food storage uses. These types of film materials are generally provided as a roll, the free edge of which is grasped by the user and unrolled to a desired length, then cut by a blade attached to the package in which the roll is stored; then the cut length of film is placed over the food to be stored and adhered by electrostatic cling to the surface of the plate or container in which the food is placed. Such films can also be directly used to wrap and store food; in such cases, the wrap is intended to self-adhere as opposed to adhering to a plate or other container.

30 Examples of such commercially available films are those sold under the brand names "SARAN WRAP" from the Asahi Kasei Company and "KRE WRAP" from the Kureha Kagaku Company, both of Japan.

35 **[0005]** However, such conventional storage bags and films are not without drawbacks. Airtightness of seal, and corresponding inability to maintain freshness, is frequently problematic. Convenience of use is also an issue for consumers. Rolls of film can be unmanageable to use as they often prematurely stick, and it is often difficult to locate the free edge of the film. With respect to pre-formed storage bags, it can be difficult to firmly and completely seal the zippered end of the bag; it can further be difficult to place the food to be stored inside the bag due to the relatively small size of the opening.

40 **[0006]** It is also known to re-heat various prepared foods using flexible bags or pouches called retortable bags. For example, certain prepared foods that are suitable to be eaten after re-heating can be purchased in hermetically sealed plastic bags. The sealed bag is placed in boiling water, and the heat from the boiling water re-heats the food without penetrating the bag. The user then only has to cut open the bag and remove the contents. A common example of this type of product is curry, available for example, from the House Shokuhin, S&B Shokuhin, and Ajinomoto Companies of Japan.

45 **[0007]** However, the types of food products that can be packaged and re-heated in this manner are limited. In addition, these retortable bags cannot be used to actually cook fresh foods; they can only be used to re-heat foods that have been processed and preserved.

50 **[0008]** Neither are the conventional food storage bags discussed above suitable for re-heating stored foods or for cooking fresh foods in hot water, as there is no practical method available to ensure air and liquid-tightness when sealed or during re-heating or cooking. In addition, such bags may not have material properties that would permit them to sustain the heat of boiling water or the heat generated by a microwave oven without degenerating. Even if it is assumed that such material itself is air and liquid tight, practical methods for sealing/re-sealing of such bags are extremely limited.

**[0009]** Therefore, it can be seen that there remains a desire to provide a convenient and versatile bag-type container for airtight food storage and for airtight/liquid-tight sealing during cooking of fresh foods as well as re-heating of foods. None of the existing art provides all of the advantages and benefits of the present invention.

**SUMMARY**

55 **[0010]** The present invention relates to a bag comprised of at least two superimposed sheets of film material having at least a portion of their superimposed edges being permanently sealed, wherein at least one of the sheets is a composite

film material provided with a pressure sensitive adhesive protected from inadvertent adherence, the adhesive-bearing film sheet being releasably sealable to the other film sheet when pressed thereagainst to create a seal perimeter, wherein an interior of the bag is comprised within the seal perimeter, and the bag has four pairs of superimposed edges, characterised in that two pairs of the superimposed edges are not permanently sealed and at least one pair of the superimposed edges is permanently sealed.

[0011] The present invention additionally relates to a method for storage using the bags of the present invention.

[0012] These and other features, aspects, and advantages of the invention will become evident to those skilled in the art from a reading of the present disclosure.

## BRIEF DESCRIPTION OF THE DRAWINGS

[0013] While the specification concludes with claims particularly pointing out and distinctly claiming the invention, it is believed that the present invention will be better understood from the following description of preferred embodiments taken in conjunction with the accompanying drawings in which:

Figs. 1a-c are perspective views of preferred embodiments of a bag of the present invention;

Illustrative Fig. 2a is a plan view of a sheet of composite film material prior to formation into the bag shown in Fig. 2b; Illustrative Fig. 2b is a perspective view of the bag formed from the sheet shown in Fig. 2a, which is no part of the invention;

Illustrative Fig. 2c is a plan view of the bag shown in Figs. 2a and 2b with a food item placed in an interior of the bag; Fig. 3 is a top plan view of a preferred embodiment of the composite material used in the present invention, showing a piece of flexible film having thermoformed truncated conical protrusions between a grid of pressure sensitive adhesive;

Fig. 4 is a sectioned elevation view of the composite material of Fig. 3, taken along section line 4-4 of Fig. 3, showing the protrusions acting as standoffs from an adhesive layer between protrusions, such that a target surface contacting the outermost ends of the protrusions does not contact the adhesive layer,

Fig. 5 is a sectioned elevation view thereof, similar to Fig. 4, showing the effect of pressing the dimpled composite material against the target surface, such that protrusions collapse and allow the adhesive layer between protrusions to contact the target surface;

Fig. 6 is a plan view of another preferred embodiment of a three-dimensional, nesting resistant composite sheet material used in the present invention;

Fig. 7 is a perspective view of the bag shown in Figs. 1a and 1c with a food item placed in an interior of the bag;

Fig. 8 is a perspective view of the bag shown in Figs. 1a and 1c with food items placed inside interiors of the bag in a compartmentalized fashion; and

Fig. 9 is a graphical representation of the weight deprivation test data of Example 1 comparing a bag of the present invention to a conventional food storage bag.

## DETAILED DESCRIPTION

[0014] Herein, "comprising" means that other steps and other components which do not affect the end result can be added. This term encompasses the terms "consisting of" and "consisting essentially of."

[0015] One preferred embodiment of the bag of the present invention is comprised of at least two superimposed sheets of film material having at least a portion of their superimposed edges being permanently sealed. For example, in the embodiment of the bag 10 that is shown in Figs. 1a-1c, superimposed sheets of film material 20 and 30 are permanently sealed along at least one of their superimposed edges. For example, first sheet 20 has edges 22, 24, 26, 28. Second sheet 30 has edges 32, 34, 36, and 38. In this embodiment, at least one pair of the superimposed edges is permanently sealed, e.g., edge 22 to edge 32, edge 24 to edge 34, edge 26 to edge 36, or edge 28 to edge 38 in the embodiment of Fig. 1a; in the embodiment of Fig. 1b, edge 23 to edge 33, edge 27 to edge 37, or edge 29 to edge 39, may be permanently sealed. For example, the permanent seal may be formed as indicated by the reference numerals 12a and 12b in Figs. 1a and 1c and reference numeral 13 in Fig. 1b.

[0016] It should be understood that the permanently sealed portion of the edges need not extend for the entire length of the superimposed edges, as it does in the preferred embodiment shown in Fig. 1. The permanent seal may be provided at any portion and for any desired length of the superimposed edges.

[0017] As used herein, "permanently sealed" means that these edges are not intended to be opened by the consumer during use of the bag 10; they are not releasably sealable. Any method known to those of skill in the art, e.g., heat sealing, can be used to create the permanently sealed portion of the superimposed edges of the bags herein.

[0018] If the bag is of a square or rectangular shape, as shown in Fig. 1a, it may be desirable for two of the superimposed edges to be permanently sealed, e.g. edge 26 of first sheet 20 is permanently sealed to edge 36 of second sheet 30

along the permanent seal 12a; and edge 28 of first sheet 20 is permanently sealed to edge 38 of second sheet 30 along the permanent seal 12a. Fig. 1c shows the bag of Fig. 1a in its fully opened position, the advantages of which are described in fuller detail below.

**[0019]** Referring again to Fig. 1a, in a preferred embodiment having two permanently sealed edges, the two permanently sealed edges are preferably adjacent, e.g., two of the intersecting edges of a rectangular or square shaped bag that are perpendicular to each other, e.g. edges 26, 36 and 28, 38. However, two opposing, non-intersecting edges such as 22, 32 and 26, 36; or 24, 34 and 28, 38 may be selected as the permanently sealed edges.

**[0020]** Fig. 1b shows an alternative embodiment in which the bag 10 is provided in a triangular shape, with one pair of superimposed edges 23, 33 being permanently sealed along permanent seal 13. Again, it should be understood that the permanently sealed portion of the edges need not extend for the entire length of the superimposed edges, and may be provided at any portion and for any desired length of the superimposed edges.

**[0021]** It should also be understood that the present invention is not limited to any particular shape or configuration for the bag 10 or for the sheets 20, 30. In addition, it is not necessary that the sheets be of identical or similar size, or of identical shape. Furthermore, the preferred embodiments herein are not limited to bags comprised of one sheet or two sheets of film material. Bags comprised of more than two sheets are also within the scope of the present invention.

**[0022]** Referring again to Figs. 1a-c, at least one of the sheets 20, 30 is a composite film provided with a pressure sensitive adhesive protected from inadvertent adherence. By the phrase "inadvertent adherence" it is meant that the adhesive bearing sheet does not prematurely stick to a target surface, e.g., to the other sheet, to another portion of the same sheet, or to any other surface, until the user of the bag activates the adhesive by pressing the sheet. The adhesive-bearing film sheet is releasably sealable to the other film sheet, or to another portion of itself, when pressed thereagainst, to create a seal perimeter (not shown in Fig. 1, see Figs. 2c and 7). The composite film material itself will be described in greater detail below.

**[0023]** Thus, the seal perimeter will be created at the location chosen by the consumer when the consumer presses the sheet. Any location can be chosen and it should be noted that the seal perimeter need not coincide with the edges of the sheet material.

**[0024]** If the sheet 70 is of square or rectangular shape, the releasably sealable portion of the seal perimeter may be created at or approximately at the juxtaposed free edges (e.g., 82 and 92, 84 and 94, and 86 and 96, as shown in Fig. 2b) to give the largest interior area for the bag. However, as noted above, the seal perimeter may be formed at any desired location.

**[0025]** The bag 10 may additionally be provided with an opening indication means 21 to facilitate opening of the sheets prior to inserting an item to be stored or cooked. The opening indication means 21 may equally well facilitate reopening of the bag when it is desired to remove items from the bag after the bag has been sealed. Opening indication means 21 may be separate from sheets 20, 30, e.g., a tab made from material different from that of either of both of the sheets 20, 30. Or, opening indication means 21 may be integral with either or both of sheets 20, 30, e.g., it may be made from a color or printing indication in the film that signals an appropriate opening location to the user. Preferably, the opening indication means visually contrasts with the other surface that it contacts.

**[0026]** Yet another embodiment of the bag which is not claimed but described for a better understanding of the claimed invention is shown in Figs. 2a-b. In this embodiment, the bag 10 is comprised of a single sheet 70 as described in detail below. The sheet 70 has a first portion 80, a second portion 90, and a juncture area 75 located generally between the first and second portions 80, 90. The juncture area 75 is shown in dashed lines in Fig. 2a to indicate that it does not have an exactly defined area or location. In addition, it can divide the first portion 80 and the second portion 90 into areas of any respective sizes or shapes; these portions need not necessarily be of equal or approximately equal size or shape.

**[0027]** It should be noted that the rectangular shaped sheet 70 that is shown in Fig. 2a is not intended to be a limiting shape. Like the invention shown in Fig. 1, any shape for the sheet 70 can be used, e.g., circular, oval, triangular, amorphous, decorative.

**[0028]** The first portion is bounded by at least one first portion free edge. In the embodiment shown in Fig. 2a, the first portion free edges are indicated by the reference numerals 82, 84, and 86. The second portion is bounded by at least one second portion free edge. The second portion free edges are indicated by the reference numerals 92, 94, and 96. Again, it should be noted that this embodiment is not limited to having a specified number of free edges. For example, if the sheet 70 were oval, there would be one continuous first portion free edge that would not be shown in three segments as shown in Fig. 2a.

**[0029]** In one embodiment, at least one of the first portion 80 or the second portion 90 is comprised of a composite material provided with a pressure sensitive adhesive protected from inadvertent adherence. In another preferred embodiment, both of the first portion 80 and the second portion 90 is comprised of a composite material provided with a pressure sensitive adhesive protected from inadvertent adherence. In yet another preferred embodiment, the juncture area 75 is further comprised of a composite material provided with a pressure sensitive adhesive protected from inadvertent adherence.

**[0030]** In another embodiment, the sheet is a unitary sheet of a composite material provided with a pressure sensitive adhesive protected from inadvertent adherence; in other words, the first portion 80, the second portion 90, and the juncture area 75 exist as locations on the same unitary sheet from which the bag is formed.

**[0031]** The bag 10 is formed from the sheet 70 as follows, see Fig. 2b. First portion 80 is folded generally at or around the juncture area 75 so that it is overlaid onto the second portion 90. A seal perimeter 85 may be created by pressing one of the first or second portions against the other portion at a desired location. Thus, an interior of the bag 10 is formed within the seal perimeter 85. The seal perimeter may be created totally independent of the juncture area 75 if desired by the consumer, for example as shown on Fig. 7. Or, the interior may further be comprised within the juncture area as well as within the seal perimeter 85 as shown on Fig. 2c.

**[0032]** In another embodiment of a bag of the type shown in Fig. 2, it is desirable to provide at least one of the first or second portion free edges with an opening indication means, as described hereinbefore and in a manner similar to that shown in Fig. 1a. Preferably, such an opening indication means visually contrasts with the other first or second portion free edges that are not provided with the opening indication means.

**[0033]** In each of the above-described embodiments, at least one of the sheets 20 or 30, or the sheet 70, in the invention described in connection with Fig. 1, or at least one of the first portion 80 or the second portion 90 in the embodiments described in connection with Fig. 2, is comprised of a composite material such as that described in Hamilton et al. US patent no. 5,662,758, "Composite Material Releasably Sealable to A Target Surface When Pressed Thereagainst and Method of Making," issued on September 2, 1997; Hamilton et al. US patent no. 5,871,607, "Material Having A Substance Protected By Deformable Standoffs And Method of Making," issued on February 16, 1999; McGuire et al. U.S. patent 5,965,235, "Three-Dimensional, Amorphous-Patterned, Nesting-Resistant Sheet Materials and Method and Apparatus for Making Same," issued October 12, 1999; and Hamilton et al. US patent no. 5,968,633, "Selectively-Activatable Sheet Material For Dispensing And Dispersing a Substance Onto A Target Surface," issued on October 19, 1999.

**[0034]** Such a composite material is a flexible film coated with a pressure sensitive adhesive for releasably sealing to a target surface and for preventing premature sticking to a target surface. More particularly, the composite material is a flexible film that has protrusions formed on an adhesive side which act to space a pressure sensitive adhesive from a target surface until the film is pressed thereagainst. According to the present invention, the "target surface" herein is the other of the film sheets 20 or 30 in the embodiments shown in Fig. 1, or another portion of the same sheet 70 as shown in the Fig. 2 embodiments.

**[0035]** Although a full disclosure of the composite materials herein is given in the above-referenced patents, a concise description will be repeated herein. One embodiment of the composite film is shown in Fig. 3 and is generally indicated as 100. The composite film 100 generally includes a piece of flexible film 120 having protrusions 140 and a layer of pressure sensitive adhesive 160 located between protrusions 140. In the embodiment of the film 100 that is shown in Fig. 3, the protrusions 140 are conical in shape with truncated or domed outermost ends 180. The protrusions 140 are equally spaced in an equilateral triangular pattern, all facing the same direction. They are spaced center to center a distance approximately two protrusion diameters. Protrusions 140 have heights which are preferably less than their diameters, so that when they collapse, they collapse along an axis which is substantially perpendicular to a plane of film 120. This mode of collapse avoids protrusions 140 folding over and blocking adhesive from contact with a target surface.

**[0036]** Fig. 4 shows a target surface 200, which according to the present invention is either another film sheet that comprises the bag 10 or another portion of the same film sheet from which the bag is formed, being spaced away from the layer of pressure sensitive adhesive 160 by outermost ends 180 of protrusions 140. Fig. 5 shows the target surface 200 contacting a layer of pressure sensitive adhesive 160 after protrusions 140 have partially inverted on themselves under pressure applied to the non-adhesive side of flexible film 120, as indicated by force F.

**[0037]** In the embodiment of the film 100 that is shown in Figs. 3-5, the conical protrusions 140 have a base diameter of about 0.015 inches (0.381 mm) to about 0.03 inches (0.762 mm). They also have a center to center spacing of from about 0.03 inches (0.762 mm) to about 0.06 inches (1.524 mm), and a protrusion height of about 0.004 inches (0.102 mm) to about 0.012 inches (0.305 mm). The film material may be made from homogenous resins or blends thereof. Single or multiple layers within the film structure are contemplated whether co-extruded, extrusion-coated, laminate or combined by other known means. The key attribute of the film material is that it be formable to product protrusions and valleys. Useful resins include polyethylene, polypropylene, PET, PVC, PVDC, latex structures, nylon, etc. The preferred film material is from about 0.01 to about 0.02 mm, more preferably from about 0.012 to about 0.015 mm, nominal thickness polyethylene. A preferred film material is 100% HDPE film, about 0.012 mm, available from the Tredegar Co., USA. Such films are also available from the Exxon Co., USA.

**[0038]** The layer of pressure sensitive adhesive 160 is preferably a hot melt adhesive about 0.025 mm thick. Such hot melt adhesives, for example those available from the Findley Co., USA, e.g., specification nos. ATO Findley 2630.07, 2630.08, and 2630.09, and those available from the H.B. Fuller Co. of Minnesota, USA, e.g., specification nos. HB Fuller HL-2115X, HB Fuller HL 1711-XZP, and HB Fuller HL 1717-X, are suitable for use herein. Alternatively, other adhesives including latex can also be used for the adhesive layer 160.

**[0039]** The size and spacing of protrusions is optimized to provide a continuous adhesive path for fluid tight seals, but without generating a film that is easily stretched. Stretched film result in residual forces parallel to the plane of adhesive contact, which may cause the weak adhesive bond to break.

**[0040]** Even more preferably, the composite sheet herein is a three-dimensional composite sheet material that resists nesting of superimposed layers into one another as described in the aforementioned McGuire et al. US patent 5,965,235.

**[0041]** To provide such nesting resistant advantages, the protrusions form an amorphous pattern of a plurality of different two-dimensional geometrical shapes on one side of the composite sheet material; on the opposite side are provided a plurality of spaced, three-dimensional hollow depressions corresponding to the protrusions, such that the protrusions are hollow. The term "amorphous" as used herein is generally in accordance with the ordinary meaning of the term, i.e., a pattern which exhibits no readily perceptible organization, regularity, or orientation of constituent elements. In such a pattern, the orientation and arrangement of one element with regard to a neighboring element bear no predictable relationship to that of the next succeeding element(s) beyond.

**[0042]** Within the preferred amorphous pattern, protrusions will preferably be non-uniform with regard to their size, shape, orientation with respect to the web, and spacing between adjacent protrusion centers. Fig. 6 is a plan view of a representative three-dimensional, nesting-resistant sheet material 200 in accordance with the present invention. The protrusions are indicated by the reference numeral 240 and the spaces by reference numeral 220. Also indicated on Fig. 6 is the dimension A, which represents the width of spaces 220, measured as the substantially perpendicular distance between adjacent substantially parallel walls at the base of the protrusions. In a preferred embodiment, the width of the spaces 220 is preferably substantially constant throughout the pattern of protrusions.

**[0043]** Protrusions 240 are generated with non-uniform size and shape so that one sheet or piece of the material 200 may be placed in face to face contact with another sheet or piece of material 200 without nesting occurring between the two sheets. The nesting-resistant feature is achieved because the amorphous pattern of the protrusions as discussed above limits the ability of the face of one sheet to align with the back of another sheet whereby the protrusions of one layer enter the depressions formed behind each protrusion in an adjacent layer. The benefit of narrow constant width spaces between protrusions is that protrusions cannot also enter spaces 220 when layers of material 200 are placed face to face.

**[0044]** The use of polygons having a finite number of sides in the amorphous pattern arranged in an interlocking relationship provides an advantage over structures employing circular or near circular shapes. Patterns such as arrays of circles are limited in terms of the amount of area the circles can occupy relative to the non-circled area between adjacent circles. More specifically, even in a pattern where adjacent circles touch at their point of tangency there will still be a given amount of space "trapped" at the "comers" between consecutive tangency. Accordingly, even amorphous patterns of circular shapes are limited in terms of how little non-circle area can be designed into the structure. Conversely, interlocking polygonal shapes with finite numbers of sides (i.e., no curvilinear sides) can be designed so as to pack closely together and in the limiting sense can be packed such that adjacent sides of adjacent polygons can be in contact along their entire length such that there is no "trapped" free space between corners, see Fig. 6. Preferably, the amorphous pattern herein has a statistically controlled degree of randomness, as described in detail in U.S. patent 5,965,235.

**[0045]** The three-dimensional shape of the individual protrusions is believed to play a role in determining both the physical properties of individual protrusions as well as overall web properties. The use of an interlocking polygonal base pattern for the protrusions is believed to be highly advantageous herein. Such a polygonal pattern is preferably comprised of interlocking convex polygons each having a finite number of substantially linear sides with facing sides of adjacent polygons being substantially parallel. However, it should be understood that the protrusions may be formed from virtually any three dimensional shape.

**[0046]** Protrusions 240 are preferably spaced center to center an average distance of approximately two protrusion base diameters or closer, in order to minimize the volume of valleys between protrusions and hence the amount of adhesive located between them. Preferably, the protrusions have heights that are less than their diameters, so that when they deform, they deform by substantially inverting and/or crushing along an axis that is substantially perpendicular to a plane of the material. This protrusion shape and mode of deforming discourages protrusions from folding over in a direction parallel to a plane of the material so that the protrusions cannot block the adhesive in the valley between them from contact with a target surface.

**[0047]** A preferred adhesive herein is a hot melt pressure sensitive adhesive about 0.025 mm thick. Such hot melt adhesives, for example those available from the Findley Co., USA, e.g., specification nos. ATO Findley 2630.07, 2630.08, and 2630.09, and those available from the H.B. Fuller Co. of Minnesota, USA, e.g., specification nos. HB Fuller HL-2115X, HB Fuller HL 1711-XZP, and HB Fuller HL 1717-X, are suitable for use herein. Alternatively, other adhesives including latex can also be used for the adhesive layer 160.

**[0048]** The film material may be made from homogenous resins or blends thereof. Single or multiple layers within the film structure are contemplated, whether co-extruded, extrusion-coated, laminated or combined by other known means. The key attribute of the film material is that it be formable to produce protrusions and valleys. Useful resins herein include polyethylene, polypropylene, PET, PVC, PVDC, latex structures, nylon, etc. Preferred material gauges are about 0.0025

mm to about 0.25 mm. A preferred film material is 100% HDPE film, about 0.012 mm, available from the Tredegar Co., USA. Such films are also available from the Exxon Co., USA. Forming may be done by mechanical embossing, vacuum thermoforming, hydroforming, or combinations thereof, as well as by other forming methods known to those of skill in the art.

**[0049]** It should be noted that while the entire surface of a sheet preferably exhibits such an amorphous pattern, under some circumstances it may be desirable for less than the entire surface of such a sheet to exhibit such a pattern. For example, a portion of the sheet may exhibit some regular pattern of protrusions or may in fact be free of protrusions so as to present a generally planar surface.

**[0050]** In addition, the designer may separate the amorphous regions with a regular, non-amorphous pattern or a "blank" region with no protrusions at all, or any combination thereof. The shape and dimensions of the non-amorphous regions can further be customized.

**[0051]** As noted previously, in the embodiment shown in Fig. 1, at least one of the sheets 20 or 30 comprising the bag 10, or a portion of the sheet for embodiments made from a single sheet, is a composite sheet material as described above. The other sheet material or portion thereof may be the same or a similar composite material; or, the other sheet or portion thereof may be a non-composite sheet material may be any conventional film material known to those of skill in the art, e.g., high density polyethylene or low density polyethylene. In the embodiment shown in Fig. 2, at least a portion of the sheet 70 forming the bag 10 is a composite sheet material as described above. As a result, a user of the bag 10 can releasably seal the bag as desired by simply pressing at any other desired location to activate the adhesive of the composite sheet to tightly seal it at a seal perimeter to a target sheet or target portion.

**[0052]** It may also be desirable to provide the sheet materials herein or any portion or portions thereof with some type of decorative printing for aesthetic appeal. Such printing may be done in any pattern, color, style, design, etc.

**[0053]** For example, Fig. 7 shows a food item 40 contained in the preferred embodiment of the bag 10 in which a seal perimeter 45 has been created by pressing forces exerted by the user generally in the directions of the arrows labeled "S1" and "S2" around the periphery of the food item. Such a bag 10 could be comprised of any of the embodiments described herein.

**[0054]** Another example of a use of the bag 10 is illustrated in Fig. 8. Namely, it is possible to individually compartmentalize several items for storage, whether they are the same type of item or different items, within one bag. Separate airtight and liquid tight seal perimeters 45a-d can be formed around individual items 50 by pressing the film in the desired areas. Within each seal perimeter 45a-d is an individual bag interior. Alternatively, the bag can simply be pressed as indicated by the arrows S1-S4 to create four sealed compartments for sealing. Such a bag 10 could be comprised of any of the embodiments described herein.

**[0055]** Of course, it should be understood that the examples shown in Figs. 7 and 8 are not intended to be limiting, as many different ways to use the various embodiments of the bags of the present invention are possible and are within the scope of the present invention as claimed.

**[0056]** Fig. 1c shows the bag of Fig. 1a in its fully opened state, illustrating one of the advantages of the present invention. As shown in Fig. 1c, the bag 10 is provided with a large insertion and removal area that exists as a result of the fact that the bag has two superimposed edges that are not permanently sealed. For example, representative dimensions for a bag according to the present invention are about 29.2-30.0 cm by about 30.0 cm. For a bag such dimensions, the insertion/removal open area is about 1040 cm<sup>2</sup>, calculated by defining the open area as a complete circle.

**[0057]** Other non-limiting dimensions generally convenient for household use include about 15.0 cm by about 15.0 cm, and about 60.0 cm by about 60.0 cm.

**[0058]** In contrast, conventional bags having only one side usable for insertion and removal, e.g., zipper-type bags or stock bags, cannot provide such advantages. In the commercially available zipper-type bags, the opening may actually be narrower than the actual bag dimensions due to the area necessary for incorporation of the zipper materials and closure. Such zipper-type bags can therefore be inconvenient or impossible to use for large or irregularly shaped items. For example, a commercially available ZIPLOC™ vegetable storage bag, Large Size, has dimensions of about 26.8 cm by 27.9 cm. Yet its insertion/removal open area is only about 223 cm<sup>2</sup>, calculated by defining the open area as a complete circle.

**[0059]** Therefore, it can be seen the open area mouth size of the embodiment of the bag shown in Figs. 1a and 1c of the present invention, when in its fully opened state, is at least about 50% greater than that of other commercially available storage bags; e.g., stock bags and zipper bags.

**[0060]** While it will be appreciated that a square or rectangular shape gives a large interior area available for use and may provide two non-permanently sealed edges for convenient insertion and removal, other shapes can be provided and are within the scope of the present invention, for example an oval or circular bag comprised of at least one sheet of the composite material described here, with a releasably sealable open area for insertion and removal of food items.

**[0061]** In addition, bags having no permanently sealed edges are equally and sometimes more convenient to use than those having permanently sealed edges. The type of bag that is most suitable for the intended use depends on the desired use, the size and shape of the item to be placed in the interior of the bag, and the preference of the user.

[0062] Therefore, it can be seen that the insertion and removal of food items to be stored or cooked into and out of the preferred embodiments of the bags 10 of the present invention can be accomplished with ease, as the bag can accommodate many different sizes and shapes of food items.

[0063] In addition to its advantages in terms of ease of use, the bags of the present invention also provide improved freshness benefits for stored foods. It is believed that this benefit is derived from the superior airtightness properties of the bag of the present invention. This benefit is described in greater detail in the Examples herein.

[0064] Finally, it should be understood that the bags of the present invention are not limited to food uses and may be used with equal advantage for storing or protecting any other items, especially where air tightness and/or liquid tightness of seal is desired. For example, the bags can be used to store cosmetics, art supplies, sundries, and may be conveniently used to store many different types of articles during travel.

## EXAMPLES

[0065] In order to illustrate the storage freshness benefits of the preferred embodiments of the present invention, the bags according to the present invention are compared to other commercially available bags as follows.

### EXAMPLE 1: Weight Deprivation Test I (Spinach)

[0066]

Table 1: Weight Deprivation Test I Data

Bag of Present Invention Stored Spinach Weight (g)				Ziploc™ Vegetable Bag Stored Spinach Weight (g)			
ID	Day 0 (a)	Day 8 (b)	Deprivation (%) (= (1-b/a) x100)	ID	Day 0 (a)	Day 8 (b)	Deprivation (%) (= (1-b/a) x100)
1	29.61	28.24	4.63	21	29.34	26.11	11.01
2	39.40	38.74	1.68	22	56.78	50.73	10.66
3	49.80	49.11	1.39	23	49.50	43.92	11.27
4	49.73	49.09	1.29	24	39.10	34.60	11.51
5	47.35	46.96	0.82	25	37.50	33.39	10.96
6	81.16	80.00	1.43	26	49.84	44.25	11.22
7	67.57	66.45	1.66	27	49.14	43.93	10.60
8	28.19	27.61	2.06	28	88.11	79.36	9.93
9	43.93	43.35	1.32	29	33.82	30.28	10.47
10	35.74	35.09	1.82	30	30.40	26.48	12.89
11	44.59	43.87	1.61	31	31.34	27.79	11.33
12	34.74	34.12	1.78	32	48.38	44.12	8.81
SUM	551.81	542.63	NA	SUM	543.25	484.96	NA
Avg.	<b>45.98</b>	<b>45.22</b>	<b>1.79</b>	Avg.	<b>45.27</b>	<b>40.41</b>	<b>10.89</b>

[0067] These data are graphically represented in Fig. 9, with the diamond shaped data points representing the weight loss for the bags of the present invention, and the square shaped data points representing the weight loss for the commercially available ZIPLOC™ bags. The shaded bars represent the weight loss data for the bags of the present invention, and the un-shaded bars represent the weight loss data for the commercially available ZIPLOC™ bags.

Table 2: Weight Deprivation Test I Results

	Bag of the Present Invention n=12	ZIPLOC™ Vegetable Bag n=12
Weight Loss (Ave. % loss on 8 day storage)	1.79%	10.89%
20 Base Consumer Vote for Freshness	20	0

[0068] The weight deprivation test is carried out as follows. An equivalent average weight amount of a vegetable, for example spinach, is divided into two groups according to root. One group is individually placed, i.e., one per bag, into



(1) a bag according to the present invention; and the other group is individually placed into (2) a ZIPLOC™ brand vegetable storage bag, large size, available from S.C. Johnson Co./Asahi Kasei Co.

[0069] Bag (1) of the present invention is 29.2 cm in width, 30.0 cm in length, and 12.5  $\mu$ m in thickness (excluding the adhesive layer and the protrusions). The material is HDPE.

[0070] ZIPLOC™ Bag (2) is 26.8 cm in width, 27.9 cm in length, and 40.0  $\mu$ m in thickness. The material is LDPE.

[0071] In bag (1) of the present invention, air is pushed out to limit the amount of air packed inside the bag, and the bag is sealed in the shape of the spinach by pressing the sheet as described hereinbefore. In ZIPLOC™ bag (2), air is pushed out to limit the amount of air packed inside the bag, and the bag is sealed in the shape of the spinach by closing the zipper.

[0072] All bags are stored in the vegetable drawer of a household model refrigerator. All bags are placed in one refrigerator at the same start time on Day 0. Bags are not stacked up on each other. The temperature and humidity of the refrigerator are measured as a reference at the start date, Day 0, although actual conditions will vary throughout the period of the test. In addition, actual conditions vary from refrigerator to refrigerator; in general it can be expected that normal household refrigeration conditions are about 4-5°C and from 25-55% relative humidity. Weight is calculated as 100% at start time, Day 0, at 4°C and 26% relative humidity.

[0073] The bags are mixed once per day during the refrigeration cycle to mimic household refrigerator usage. The bags are left in the refrigerator for 8 days.

[0074] At the end of the test, each piece of spinach is removed from its bag and weighed. In addition, each group is presented to a group of 20 consumers, preferably aged at least about 20 years. The consumers are asked which group is fresher, and are permitted to look and to touch the spinach before making a decision.

[0075] The result of this test is given in Table 2 above. Without being limited by theory, it is believed that freshness is linked to water loss, i.e., as vegetables lose water (which can be quantitatively measured as weight loss) they become less fresh. Thus, it can be seen from Table 2 that less water was lost by the spinach stored in the bag according to the present invention. The freshness result is confirmed by consumers who compared the two groups of spinach.

#### EXAMPLE 2: Weight Deprivation Test II (Spinach)

[0076]

Table 3: Weight Deprivation Test II Result

Day	Bag of the Present Invention Deprivation (%)	ZIPLOC™ Vegetable Bag Deprivation (%)
0	100.0	100.00
13	95.2	58.0
$\Delta$ Deprivation (%)	4.8	42.0

[0077] The weight deprivation test is carried out a second time as described above, starting with a different batch of spinach on a different start day (i.e., a different Day 0).

[0078] Due to the fact that an different batch of spinach is used at the outset, the percent deprivation shown in Table 3 is different from that shown in Table 2. This is to be expected because the condition of spinach or of any other vegetable at the time of purchase on a particular day can never truly be duplicated at the time of purchase on a different day. In other words, each time that a consumer purchases a vegetable, the condition of that particular vegetable at the time of that particular purchase is highly variable.

[0079] A comparison of the results given in Tables 2 and 3 shows better storage freshness during storage over conventional ZIPLOC Vegetable Storage Bags can be expected when bags of the present invention are used to store the vegetable. The initial condition of the vegetable is irrelevant to this result.

#### EXAMPLE 3: Weight Content Deprivation Test III (Broccoli)

[0080]

Table 4: Weight Deprivation Test II Result

Day	Bag of the Present Invention Deprivation (%)	ZIPLOC™ Vegetable Bag Deprivation (%)
0	100.0	100.0
13	98.48	82.30

Table continued

Day	Bag of the Present Invention Deprivation (%)	ZIPLOC™ Vegetable Bag Deprivation (%)
Δ Deprivation (%)	1.52	17.7

**[0081]** The test is carried out as described above, using equivalent amounts of broccoli. Weight is calculated as 100% at start time, Day 0, at 4°C and 38% relative humidity.

**[0082]** As above, this result indicates that superior storage benefit can be obtained by using the bags of the present invention.

**[0083]** As illustrated by the Examples above, the preferred embodiments disclosed herein provide the advantages of superior airtightness and greater duration of fresh condition as compared to conventional vegetable storage bags.

**[0084]** Improved ease of use, convenience, and versatility for storage and cooking uses are also provided, as described herein. The preferred embodiments herein are also cost effective, easy to manufacture, and offer versatility in usage.

## METHODS OF USE

**[0085]** The present invention also relates to methods of using the bags described herein.

### Storage

**[0086]** A method of storing an item herein comprises placing the item in any embodiment of a bag according to the present invention, releasably sealing the bag by pressing the surface of the composite film in the desired locations to activate the adhesive and create the seal perimeter, and placing the sealed bag in a storage location. More specifically, a method for storing food herein comprises placing cooked or uncooked food in any embodiment of a bag according to the present invention, sealing the releasably sealable edges of the bag at a desired location to create the seal perimeter, placing the sealed bag in a storage location such as a refrigerator, and removing the food from bag after a period of time, preferably not exceeding about two weeks for best freshness benefits.

### Cooking By Boiling

**[0087]** A preferred method for cooking food herein comprises the use of boiling water. This method comprises placing uncooked food, along with desired seasonings or spices, into in any embodiment of a bag according to the present invention, releasably sealing the bag by pressing the surface of the composite film in the desired locations to activate the adhesive and create the seal perimeter, placing the sealed bag in a quantity of boiling water sufficient such that the bag is partially submerged in the hot water but remains buoyant (preferably not touching the bottom of the pan in which the water is to be heated) for a time sufficient to cook the food that is placed therein, removing the bag from the water after that time has elapsed, and opening the bag to remove the contents. Preferably the pan in which the hot water is contained is covered during cooking so that the contents in the bag are cooked both from the heat of the water itself and also from the steam that collects inside the covered pan.

### Cooking by Microwave

**[0088]** Another method of cooking herein comprises placing uncooked food into in any embodiment of a bag according to the present invention, releasably sealing the bag such that the food is located in the interior of the bag, placing the sealed bag in a microwave oven for a time sufficient to cook the food that has been placed therein, and removing the bag from the microwave oven after that time has elapsed. The bag may then be opened to remove and serve the contents. It is believed that this method is especially useful for steam cooking of raw vegetables such as asparagus, pumpkin, or broccoli. According to such a method, the fresh color and appearance of the vegetable are believed to be well-maintained and superior to conventional methods of cooking by boiling in direct contact with water.

**[0089]** In the methods of cooking by microwave, care should be taken not to introduce oils or oily seasonings into the bag. If such oils are introduced, it is believed that the temperature within the bag may exceed 125°C, thereby compromising the structural integrity of the film material, which may cause the bag to melt.

### Preparation of Marinated or Pickled Foods

**[0090]** Yet another method of food preparation herein comprises preparation of marinated or pickled food items. This method comprises placing at least one uncooked food item, e.g., raw vegetables, fish, or meat, and any desired flavorant,

e.g., oil, salt, herbs, soy sauce, vinegar, miso, koji (a type of malt), or sakekasu (a rice-based sediment derived from the sake brewing process), into in any embodiment of a bag according to the present invention, releasably sealing the bag at the desired seal perimeter location, placing the sealed bag in the refrigerator and leaving the bag in the refrigerator for a time sufficient to flavor the food. In most cases 1-2 nights is believed to be sufficient. The bag may then be opened to remove and serve the contents.

**[0091]** In the case of uncooked vegetables, the flavored vegetables may be eaten as is after removal from the bag. Such vegetables may be referred to by their Japanese name, "tsukemono." In the case of marinated fish or meat, the marinated fish or meat must be subsequently be cooked, e.g., by grilling or boiling as described above.

#### Reheating

**[0092]** In addition to the methods of preparation for uncooked foods above, any embodiment of a bag according to the present invention may be used to reheat foods that have already been cooked. The boiling methods described above are preferred for reheating, as foods containing oils may cause the bag to become too hot if placed in a microwave oven.

**[0093]** In the reheating methods herein, water temperatures of less than 100°C (boiling) may be used, as the higher level of heat generated by boiling water may not be needed in cases where the food is not raw or uncooked and there is no danger of eating undercooked foods. Depending on the type of food item to be reheated and the user's preference as to how warm this food item should be, temperatures of from about 50°C to about 100°C are suitable. As a non-limiting example, it may be desired to warm a dessert cake that has been stored in the refrigerator prior to eating.

**[0094]** However, it bears repeating that for raw or uncooked foods, boiling at 100°C is preferred to avoid any problems or sickness that could arise as a result of eating undercooked foods.

**[0095]** It is understood that the examples and embodiments described herein are for illustrative purposes only and that various modifications or changes in light thereof will be suggested to one of skill in the art without departing from the scope of the present invention as claimed.

#### Claims

1. A bag comprised of at least two superimposed sheets of film material having at least a portion of their superimposed edges being permanently sealed, wherein at least one of the sheets is a composite film material provided with a pressure sensitive adhesive protected from inadvertent adherence, the adhesive-bearing film sheet being releasably sealable to the other film sheet when pressed thereagainst to create a seal perimeter, wherein an interior of the bag is comprised within the seal perimeter and the bag has four pairs of superimposed edges, **characterised in that** two pairs of the superimposed edges are not permanently sealed and at least one pair of the superimposed edges is permanently sealed.
2. The bag according to Claim 1 wherein the interior is further comprised within the permanently sealed portion of the superimposed edges.
3. The bag of Claim 1 wherein the composite film material is a three-dimensional composite sheet material having a first side and a second side, wherein the first side comprises at least one region having a plurality of spaced three-dimensional protrusions extending outwardly from the first side, the protrusions being separated by an interconnected network of three-dimensional spaces between adjacent protrusions, and the spaces being partially filled with an adhesive.
4. The bag according to Claim 3 wherein the plurality of protrusions form an amorphous pattern of interlocking convex polygons each having a finite number of substantially linear sides with facing sides of adjacent polygons being substantially parallel.
5. The bag according to Claim 1, wherein the interior is divided into a plurality of interiors by releasably sealing the adhesive-bearing film sheet to create a plurality of seal perimeters.
6. The bag according to Claims 1, further comprising an opening indication means.
7. The bag according to Claim 6 wherein the opening indication means is comprised of a color indication means.
8. The bag according to Claim 6 wherein the opening indication means is comprised of a printing indication means.

9. The bag according to Claim 1, wherein the sheet is provided with decorative printing.
10. A method of storing an item comprising placing the item in the bag according to Claim 1, releasably sealing the bag by creating a seal perimeter, and placing the sealed bag in a storage location.
11. The method according to Claim 10, wherein the item is a vegetable and the storage location is a refrigerator.

## Patentansprüche

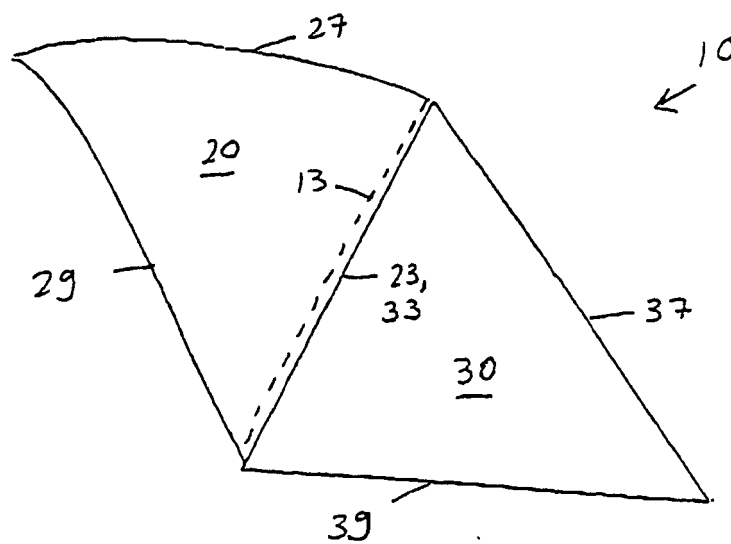
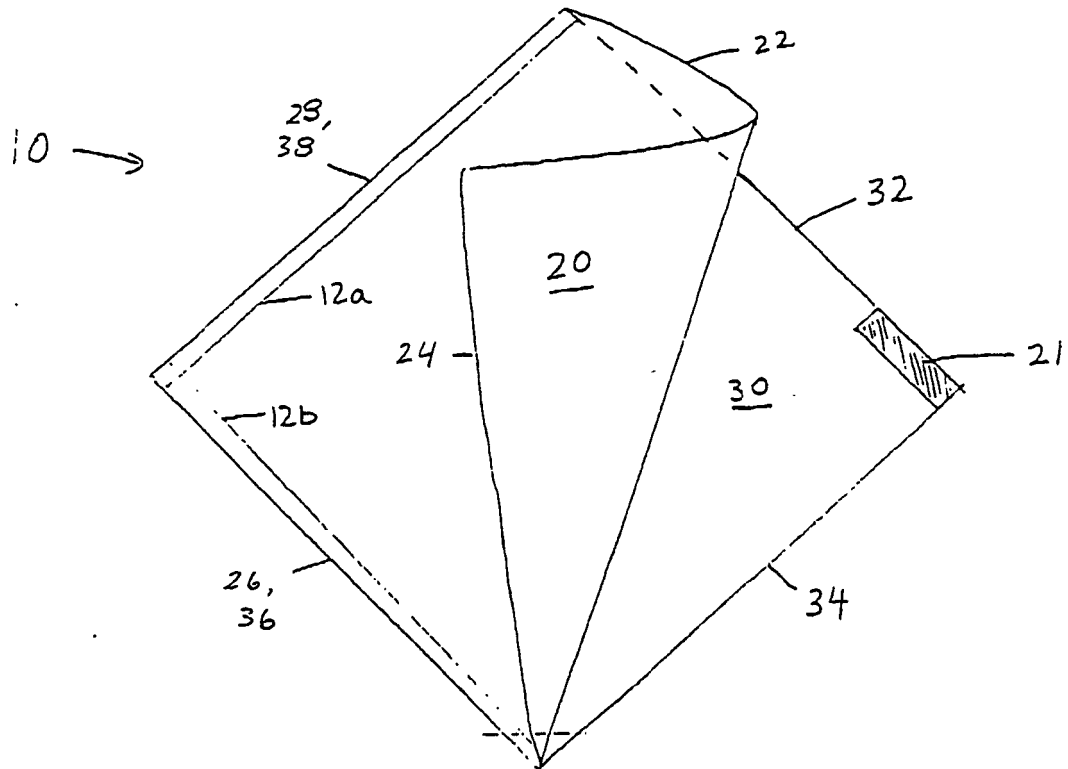
1. Beutel, bestehend aus mindestens zwei übereinander angeordneten Lagen aus Folienmaterial, wobei mindestens ein Abschnitt ihrer übereinander angeordneten Ränder permanent versiegelt ist, wobei mindestens eine der Lagen ein Verbundfolienmaterial ist, das mit einem Haftkleber, der vor unbeabsichtigtem Kleben geschützt ist, ausgestattet ist, wobei die Folienlage, die den Klebstoff trägt, lösbar auf die andere Folienlage geklebt werden kann, wenn sie dagegen gedrückt wird, um eine Umfangsversiegelung zu erzeugen, wobei ein Innenraum des Beutels innerhalb der Umfangsversiegelung eingeschlossen ist und der Beutel vier Paar übereinander angeordneter Ränder aufweist, **dadurch gekennzeichnet, dass** zwei Paare der übereinander angeordneten Ränder nicht permanent versiegelt sind und mindestens ein Paar der übereinander angeordneten Ränder permanent versiegelt ist.
2. Beutel nach Anspruch 1, wobei der Innenraum ferner innerhalb des permanent versiegelten Abschnitts der übereinander angeordneten Ränder eingeschlossen ist.
3. Beutel nach Anspruch 1, wobei das Verbundfolienmaterial ein dreidimensionales flächenförmiges Verbundmaterial mit einer ersten Seite und einer zweiten Seite ist, wobei die erste Seite mindestens einen Bereich umfasst, der mehrere auf Abstand zueinander befindliche dreidimensionale Vorsprünge aufweist, die sich von der ersten Seite nach außen erstrecken, wobei die Vorsprünge durch ein miteinander verbundenes Netzwerk dreidimensionaler Zwischenräume zwischen benachbarten Vorsprüngen getrennt sind und die Zwischenräume teilweise mit einem Klebstoff gefüllt sind.
4. Beutel nach Anspruch 3, wobei die mehreren Vorsprünge ein amorphes Muster ineinander greifender konvexer Vielecke bilden, von denen jedes eine begrenzte Anzahl im Wesentlichen linearer Seiten aufweist, wobei einander zugewandte Seiten benachbarter Vielecke im Wesentlichen parallel sind.
5. Beutel nach Anspruch 1, wobei der Innenraum durch lösbares Versiegeln der Klebstoff tragenden Folienlage in mehrere Innenräume unterteilt ist, um mehrere Umfangsversiegelungen zu erzeugen.
6. Beutel nach Anspruch 1, der ferner ein Öffnungsanzeigemittel umfasst.
7. Beutel nach Anspruch 6, wobei das Öffnungsanzeigemittel aus einem farbigen Anzeigemittel besteht.
8. Beutel nach Anspruch 6, wobei das Öffnungsanzeigemittel aus einem gedruckten Anzeigemittel besteht.
9. Beutel nach Anspruch 1, wobei die Folie mit einem dekorativen Druck versehen ist.
10. Verfahren zum Aufbewahren eines Gegenstands, das das Platzieren des Gegenstands in dem Beutel nach Anspruch 1, das lösbare Versiegeln des Beutels durch Erzeugen einer Umfangsversiegelung und das Platzieren des versiegelten Beutels an einem Aufbewahrungsort umfasst.
11. Verfahren nach Anspruch 10, wobei der Gegenstand Gemüse ist und der Aufbewahrungsort ein Kühlschrank ist.

## Revendications

1. Sac comprenant au moins deux feuilles superposées de pellicule de conditionnement ayant au moins une partie de leurs bords superposés étant scellée de manière permanente, dans lequel au moins une des feuilles est une pellicule de conditionnement composite pourvue d'un adhésif sensible à la pression protégé d'une adhérence involontaire, la feuille à pellicule portant l'adhésif étant scellable de façon libérable à l'autre feuille à pellicule lorsqu'elle est pressée contre celle-ci de façon à créer un périmètre de joint, où un intérieur du sac est compris au sein du

périmètre de joint et le sac a quatre paires de bords superposés **caractérisées en ce que** deux paires des bords superposés ne sont pas scellées de manière permanente et au moins une paire des bords superposés est scellée de manière permanente.

- 5     **2.** Sac selon la revendication 1, dans lequel l'intérieur est, en outre, compris au sein de la partie scellée de manière permanente des bords superposés.
- 10    **3.** Sac selon la revendication 1, dans lequel la pellicule de conditionnement composite est un matériau en feuille composite tridimensionnel ayant un premier côté et un deuxième côté, où le premier côté comprend au moins une région ayant une pluralité de parties saillantes tridimensionnelles espacées s'étendant vers l'extérieur à partir du premier côté, les parties saillantes étant séparées par un réseau consolidé d'espaces tridimensionnels entre des parties saillantes adjacentes, et les espaces étant partiellement remplis avec un adhésif.
- 15    **4.** Sac selon la revendication 3, dans lequel la pluralité de parties saillantes forme un motif amorphe de polygones convexes à enclenchement réciproque, chacun ayant un nombre fini de côtés sensiblement linéaires avec les côtés faisant face de polygones adjacents étant sensiblement parallèles.
- 20    **5.** Sac selon la revendication 1, dans lequel l'intérieur est divisé en une pluralité d'intérieurs en scellant de façon libérable la feuille à pellicule portant l'adhésif pour créer une pluralité de périmètres de joint.
- 25    **6.** Sac selon la revendication 1, comprenant en outre un moyen d'indication d'ouverture.
- 7.** Sac selon la revendication 6, dans lequel le moyen d'indication d'ouverture comprend un moyen d'indication en couleur.
- 30    **8.** Sac selon la revendication 6, dans lequel le moyen d'indication d'ouverture comprend un moyen d'indication à impression.
- 9.** Sac selon la revendication 1, dans lequel la feuille est pourvue d'une impression décorative.
- 35    **10.** Procédé de stockage d'un article comprenant le placement de l'article dans le sac selon la revendication 1, le scellage de façon libérable du sac en créant un périmètre de joint, et le placement du sac scellé dans un emplacement de stockage.
- 40    **11.** Procédé selon la revendication 10, dans lequel l'article est un légume et l'emplacement de stockage est un réfrigérateur.
- 45
- 50
- 55



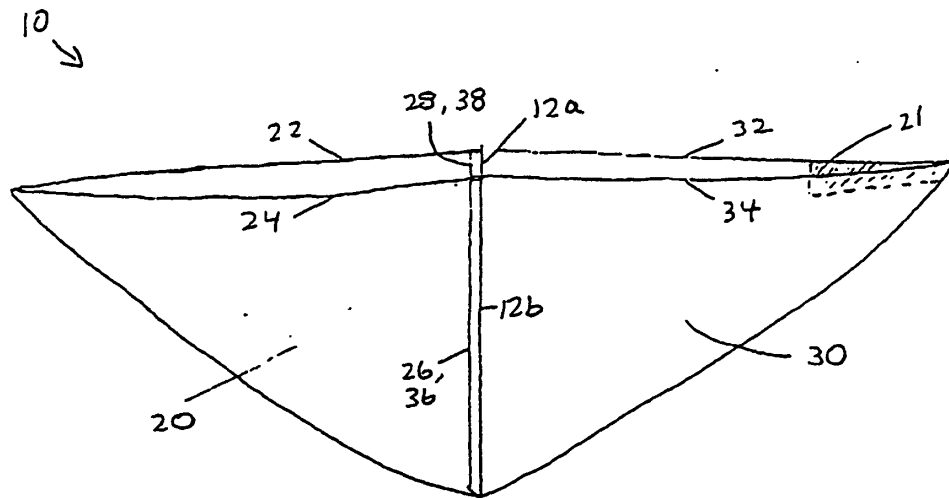


Fig. 1c

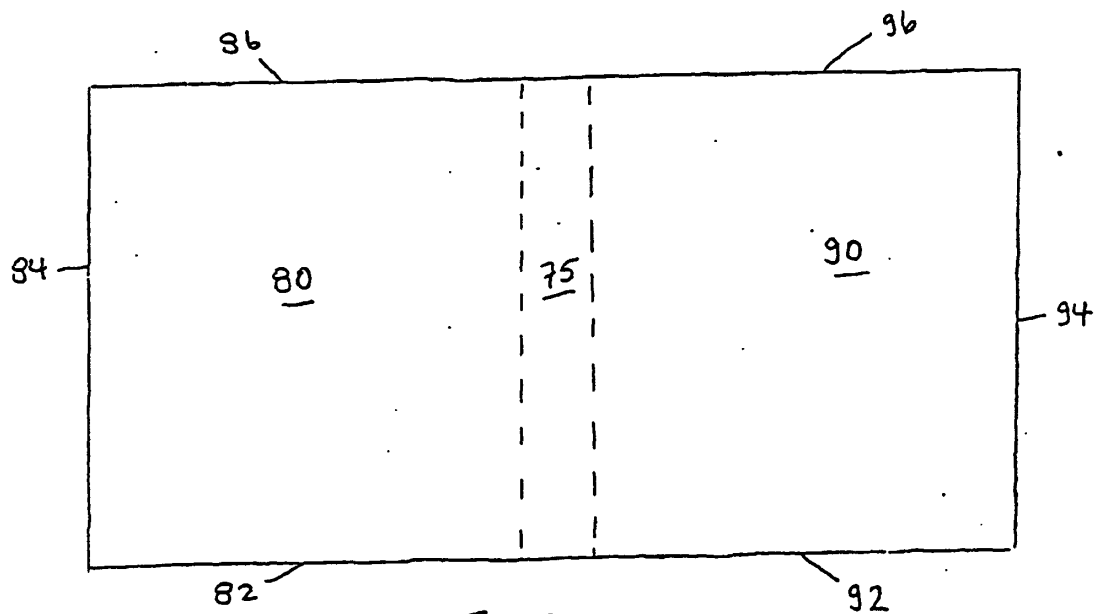


Fig 2a

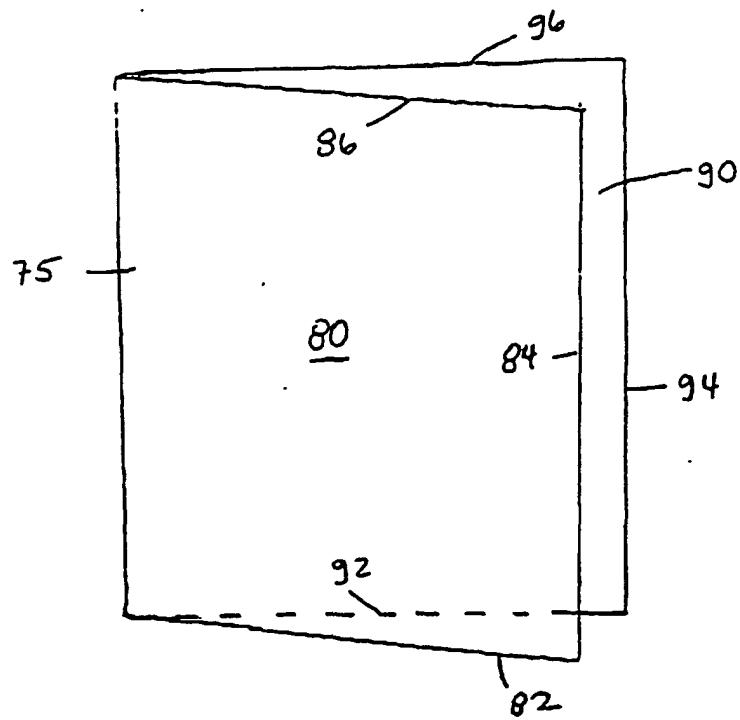


Fig. 2b

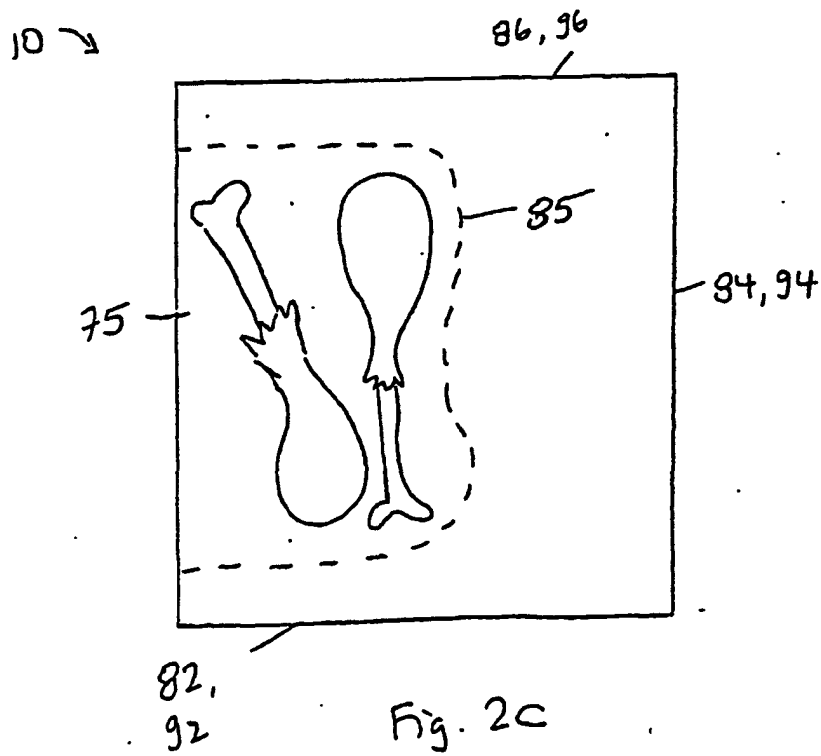


Fig. 2c



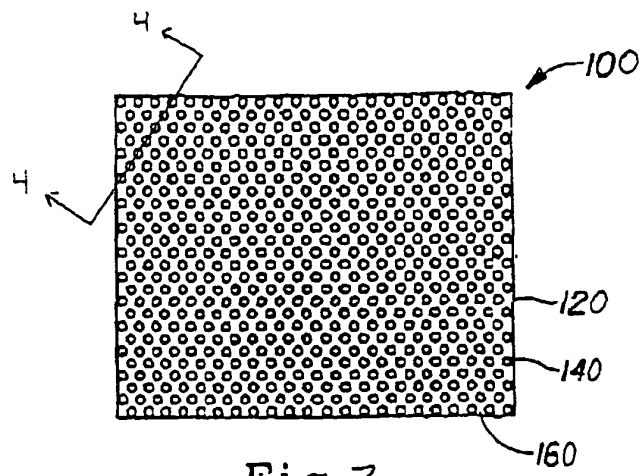


Fig. 3

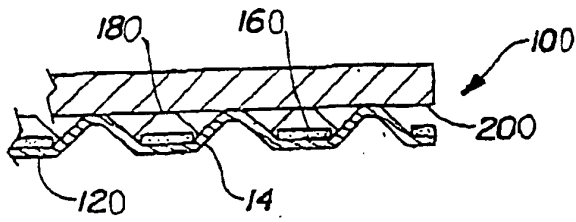


Fig. 4

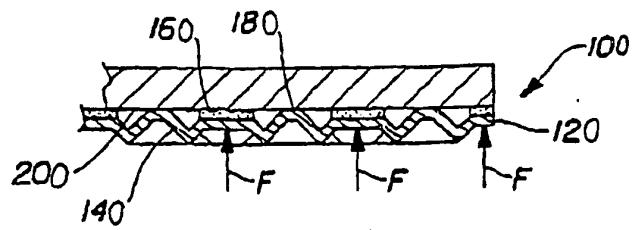


Fig. 5

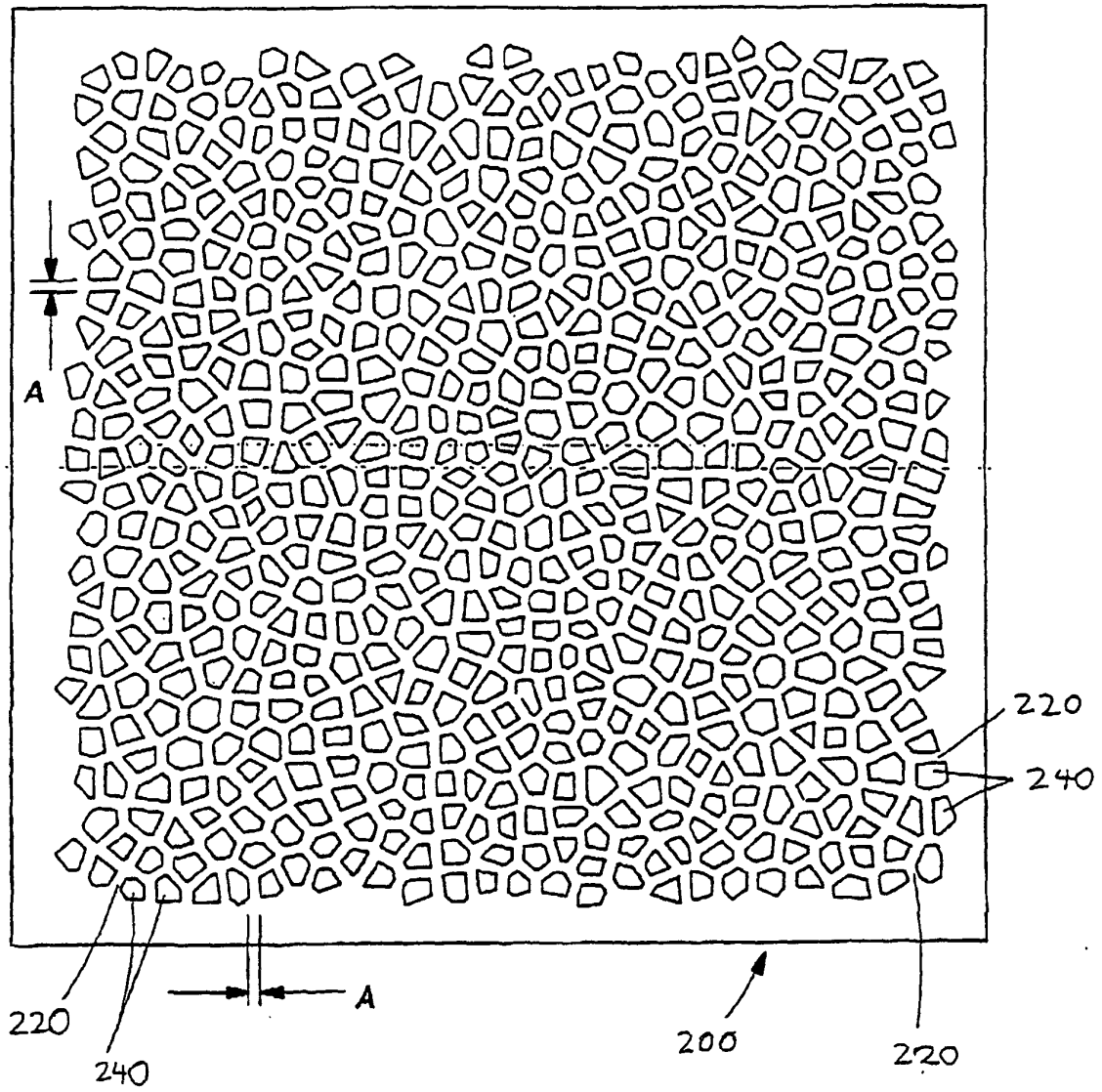


Fig. 6

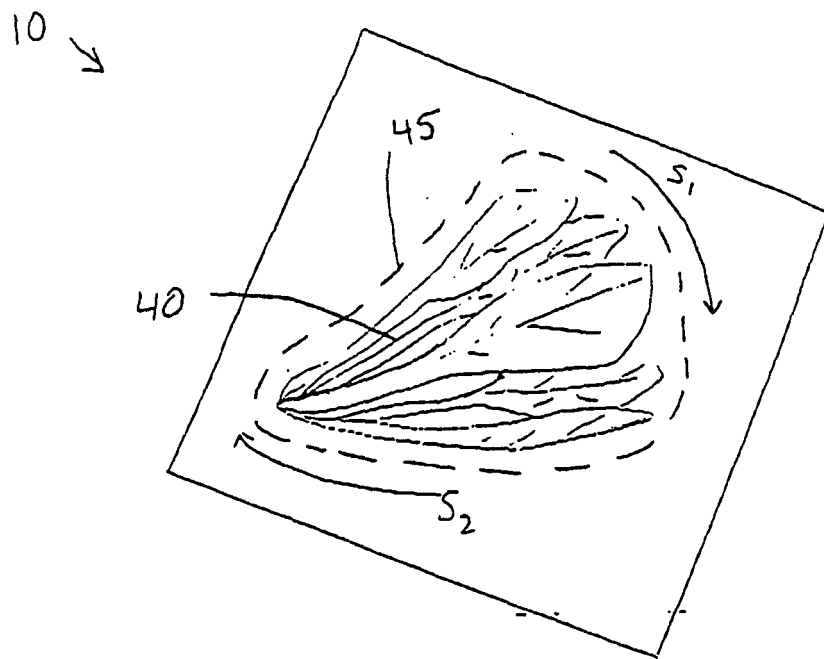


Fig. 7

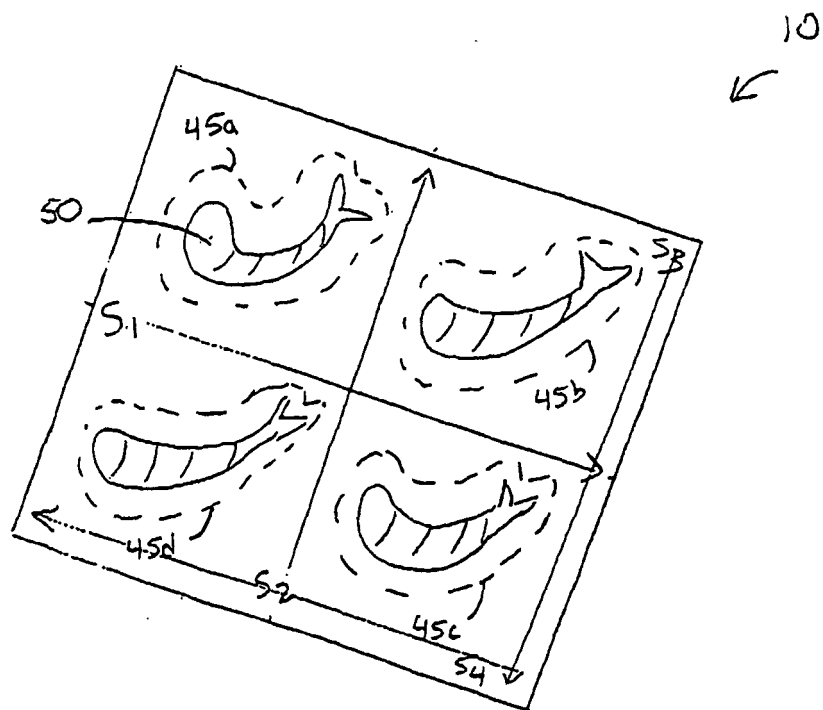


Fig. 8

# Spinach Weight Deprivation

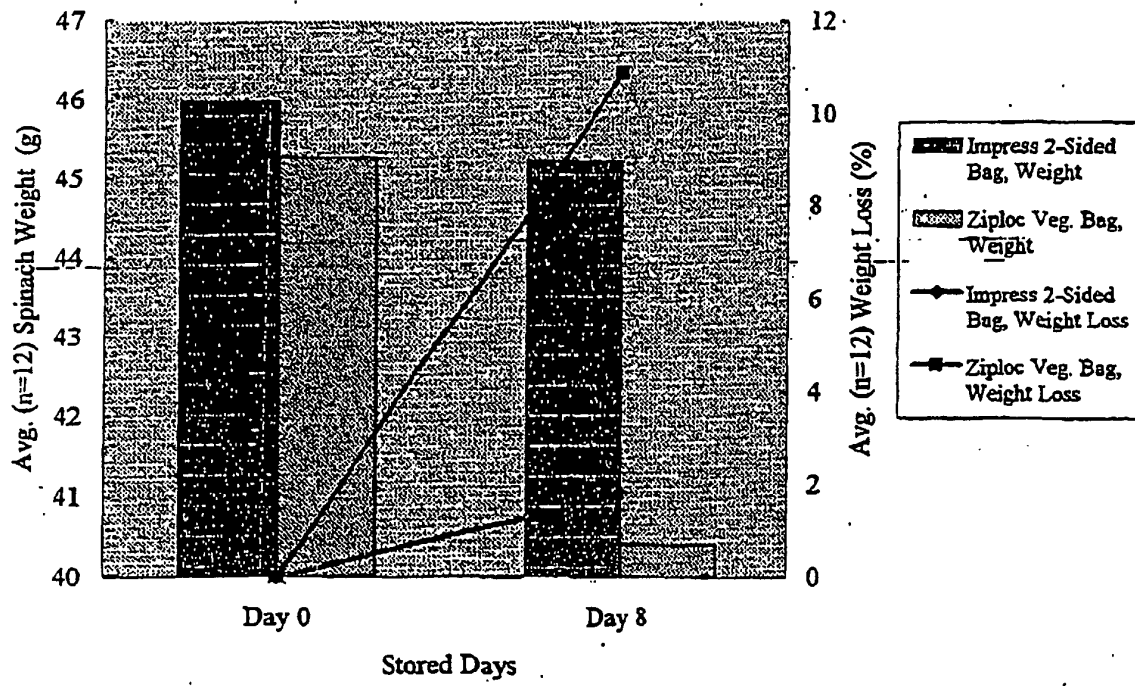


Fig. 9