(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 775 229 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
18.04.2007 Bulletin 2007/16

(51) Int Cl.:
B65D 30/16 *(2006.01)* ***B65D 81/34*** *(2006.01)*

(21) Application number: **06254349.1**

(22) Date of filing: **18.08.2006**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK YU

(30) Priority: **01.09.2005 US 217581**

(71) Applicant: **Cryovac, Inc.**
Duncan, S.C. 29334-0464 (US)

(72) Inventors:
- **Owensby, Joseph E.**
  Spartanburg
  South Carolina 29301 (US)
- **Cooke, Anthony E.**
  Fairforest
  South Carolina 29336 (US)

(74) Representative: **Jackson, Martin Peter**
J.A. Kemp & Co.,
14 South Square,
Gray's Inn
London WC1R 5JJ (GB)

(54) Flexible package having insulating support member

(57) The invention provides a flexible package comprising a support member having a flexible film attached to the support member to thereby define a continuous sidewall of the package. The package is movable between a collapsed state for storage and an extended state for use. The support member may comprise an insulating material that substantially limits the amount of heat that may be dissipated through the support member and into the outer surface of the support member. As a result, the support member permits a person to handle the support member portion of the flexible package without burning or discomfort. In addition, the insulated support member may be used to help a heated item disposed in the interior of the flexible package retain its heat. The flexible package may also comprise a support member having fold lines that may extend upwardly from the support member to form a tray-like structure.

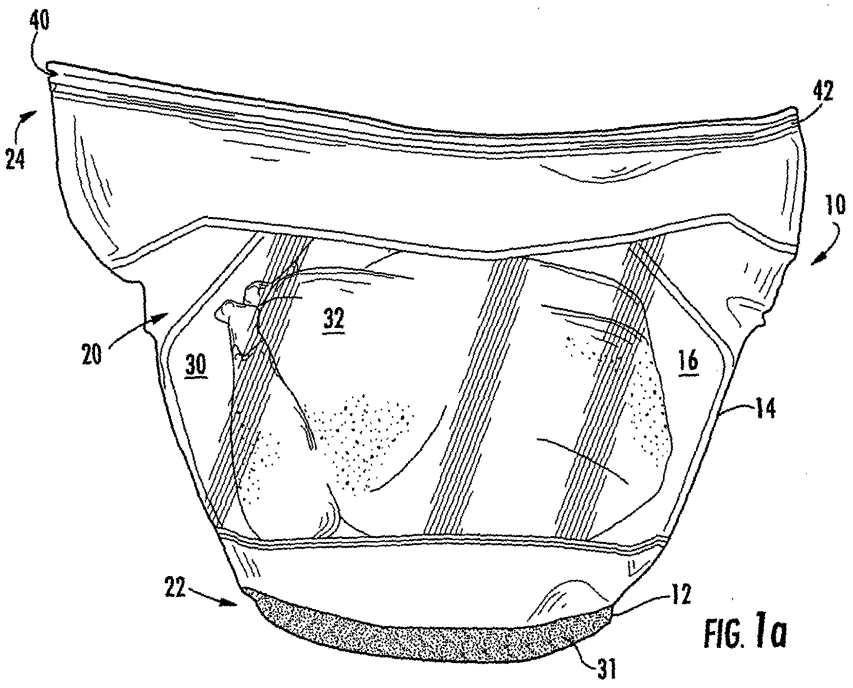

FIG. 1a

EP 1 775 229 A1

(Cont. next page)

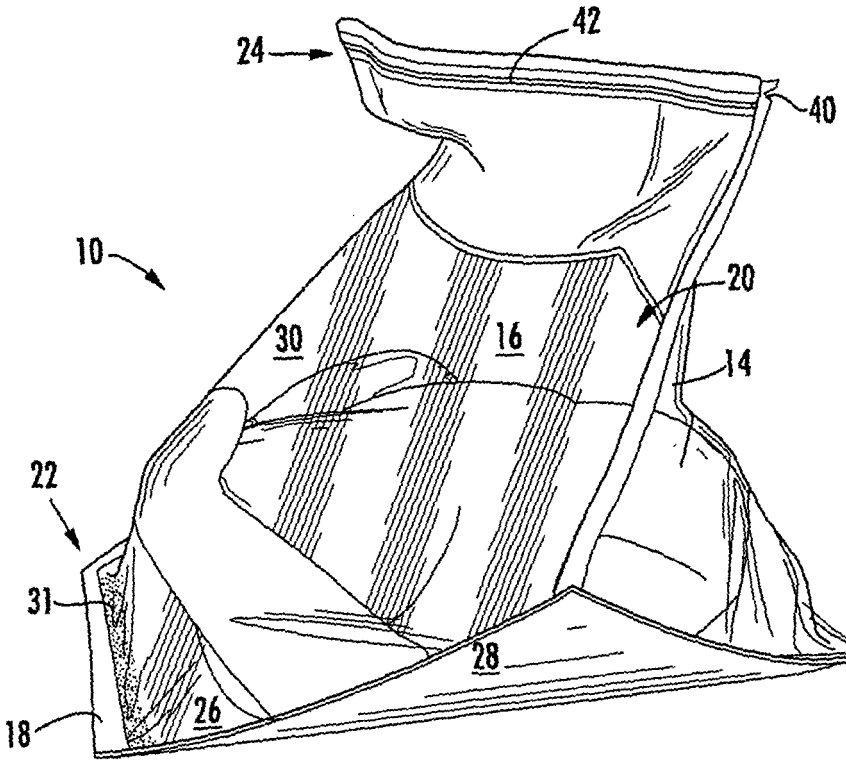

FIG. 1b

Description

BACKGROUND OF THE INVENTION

[0001] The invention relates generally to flexible packaging for enclosing a food product and more particularly to flexible packaging for heating or transporting a heated food product.

[0002] The use of flexible bags for packaging food products has been known for several years. In many cases, the flexible bags may comprise a flexible thermoplastic material, such as a plastic film. When the flexible bags are not filled with materials, they may be compacted into a flattened condition so that they can be stored in a relatively small amount of space. While bags comprised of such materials may be lightweight and compact, they generally have little to no insulation value for maintaining a food product at a desired temperature. As a result, a heated food product disposed in such a bag may quickly lose its heat to the surrounding environment including a consumer who may contact a portion of the bag that is in direct contact with the heated product.

[0003] Some flexible bags may also lack structural support and in some cases may be less sturdy than desired. As a result, the flexible bags may provide relatively less stability than desired and may tend to wobble or be unstable when filled and placed in an upright position. As discussed above, flexible bags are typically made from thin and flexible plastic materials, and thus may not have the same sturdiness as other rigid containers. Many existing flexible bags may tend to wobble and thus can be easily tipped over, leading to unnecessary product spillages and resulting in wasted product and a mess.

[0004] The flexible bags described above may also not be suitable for transporting heated foods, such as roasted chickens that may be found in the local supermarket deli. Rather, the heated foods may be placed in a package having a tray and lid. This type of packaging is commonly referred to as "clam shell packaging." Clam shell packaging generally has better insulating properties than flexible bags so that the heated food product may maintain a desired temperature for a period of time. The tray and lid generally comprise a rigid foam or plastic structure that may be closed by snapping the lid into place. This type of packaging may have several disadvantages. First, the rigid structure of the trays and lids may require significantly more storage than a flexible bag. Second, the lid may be rather loosely secured to the tray. As a result, food products or juices may be able to leak from the interior of the package, which may cause a mess and inconvenience for the consumer.

BRIEF SUMMARY OF THE INVENTION

[0005] The invention provides a flexible package that overcomes may of the aforementioned limitations. In one alternative embodiment, the flexible package comprises a support member having a flexible film attached about the periphery of the support member to thereby define a continuous sidewall of the package. The flexible package is movable between a collapsed state for storage and an extended state for use. The support member may comprise an insulating material such as a foam or air cellular material that inhibits the amount of heat that may be dissipated through the support member and into the outer surface of the support member. As a result, the support member may permit a person to handle the underside of the flexible package without burning or discomfort. In addition, the insulated support member may be used to help a heated item disposed in the interior of the flexible package retain its heat.

[0006] In another embodiment, the flexible package may comprise a support member having a plurality of scoring lines that define fold lines that may extend upwardly from the support member to form a tray-like structure within the interior of the flexible package. The tray-like structure provides added support to the package and may improve the general appearance of the flexible packaging.

[0007] The flexible packaging of the invention may be configured for storing, displaying, and heating an item, such as a food product therein. In some embodiments, the flexible package may be configured to permit an item to be heated in a microwave or conventional oven. In still other embodiments, the flexible packaging presents an appealing package for displaying items for sale, such as at a retail establishment.

[0008] Thus, the invention provides a collapsible package that may be used to store and heat food products, and that includes an insulating support member that limits the amount of heat dissipated through the support member so that a heated product within the package may be handled without burning or discomfort.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S)

[0009] Having thus described the invention in general terms, reference will now be made to the accompanying drawings, which are not necessarily drawn to scale, and wherein:

FIG. 1a is a front perspective of a flexible package having a heated product disposed therein;
FIG. 1b is a side perspective view of the flexible package of FIG. 1a;

FIG. 2 is a front perspective view of a stack of the flexible packages of FIG. 1a in a substantially compacted state;
FIG. 3a is a perspective view of a cross-sectional view of a flexible package having a support member comprising foam with portions of the package shown in broken lines for clarity of illustration;
Fig. 3b is a perspective view of the package of FIG. 3a depicting a outer portion the support member being folded upwardly to form tray-like sidewalls;
FIG. 4 is a perspective view of a flexible package having a semi-rigid support member comprising an air cellular material;
FIG. 5 is cross-sectional view of the flexible package of FIG. 4 viewed along line 5-5 of FIG. 4;
FIG. 6 is a perspective view of a flexible package having a flexible support member comprising an air cellular material and forming tray-like sidewalls within the flexible package; and
FIG. 7 is cross-sectional view of the flexible package of FIG. 6 viewed along line 7-7 of FIG. 6.

DETAILED DESCRIPTION OF THE INVENTION

[0010] The present invention now will be described more fully hereinafter with reference to the accompanying drawings, in which some, but not all embodiments of the inventions are shown. Indeed, the invention may be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided so that this disclosure will satisfy applicable legal requirements. Like numbers refer to like elements throughout.

[0011] The invention comprises a flexible package having a semi-rigid support member in which an item, such as a food product, may be packaged, stored, displayed for sale, heated and/or cooked. In one embodiment, the support member comprises an insulating material. The insulating support member substantially prevents heat from dissipating through the support member and also helps to maintain the heated item at a desired temperature. In one alternative embodiment, the flexible package provides a packaging in which a food product may be packaged, displayed, and sold. In yet other embodiments, the package provides a package that may be used to heat or cook an item in a microwave or conventional oven while the item is still disposed in the package.

[0012] With reference to FIGS. 1a and 1b, a flexible package according to one embodiment of the invention is illustrated and broadly designated by reference number **10.** The flexible package **10** may comprise a composite package having a support member **12** and a flexible film **14** that is attached to the support member **12** to form a continuous side-wall **16** of the package. The flexible film may be attached to either the inner surface or outer surface of the support member. In one embodiment, the flexible film is attached about the peripheral edge **18** of the support member. The continuous side-wall **16** defines an interior space **20** of the package in which a product may be disposed. The flexible film **14** includes a bottom portion **22,** which is attached to the support member **12,** and a top portion **24** which may define an opening (see briefly FIG. 3 a, reference number **29)** through which one or more items may be inserted or removed from the package. In one alternative embodiment, the support member comprises a semi-rigid structure that permits the flexible continuous side-wall of the package to be moved into a collapsed state. The semi-rigid support member also serves to provide structural support for the flexible package so that an item may be positioned in the package in an upright position. Typically, the support member is stiffer than the flexible film.

[0013] As shown in FIGS. 1a and 1b, the flexible package may be used for carrying an item such as a food product. The flexible package may be used for carrying and/or heating/cooking a wide variety of food products. In one embodiment, the flexible package may be useful for transporting a deli item, such as a rotisserie chicken, from a retail establishment. In still other embodiments, the flexible package may be used to store and heat/cook food products which may include meat products, vegetables, corn on the cob, prepared meals, and the like.

[0014] In one alternative embodiment, the flexible package comprises an insulated package that permits an item to be heated or cooked in the package or permits a heated item to be placed into the package. In one embodiment, the support member **12** comprises an insulating material that substantially limits heat from a heated item disposed on an inner surface **26** of the support member from dissipating through the support member and onto the outer surface **28** of the support member. The insulating material permits the package to be heated to a desired temperature while substantially limiting the amount of heat that is dissipated through the outer surface of the support member. As a result, a heated item may be disposed within the package and a person may be able to handle the bottom-side of the package (i.e., the outer surface **28** of the support member) without burning or experiencing discomfort. In addition, the insulated package **10** may help prevent a heated item disposed therein from dissipating too much heat into the surrounding environment so that the heated product may be maintained at an elevated temperature for extended period of time. The support member also may be configured so that the flexible package is able to be placed in an upright position when it is moved into an extended state. The flexible package may contain an item therein without falling or slumping over.

[0015] In one alternative embodiment, the continuous side-wall **16** of the flexible package **10** is moveable between a substantially collapsed state for storage and an extended state for use. In this regard, FIG. 2 illustrates a plurality of flexible packages **10** stacked one on top of the other that are in a substantially collapsed state. While in a collapsed

state, a plurality of the flexible packages may be stored in a relatively small space in comparison to other forms of insulating packaging, such as so called clam-shell packaging. This may be particularly useful in delis where available space for packaging may be limited.

[0016] In some embodiments, the flexible package **10** may comprise a package having a flexible sidewall and a support member that is configured to form a tray-like structure. In some embodiments, the support member forms the tray-like structure when an item has been disposed on the inner surface of the support member. In one alternative embodiment, a portion of the support member is moveable from a relatively flat state for storage and into an upwardly extended state to form tray-like sidewalls. In one embodiment of the invention, the support member **12** may include at least two lines of scoring that are each disposed proximal to opposing peripheral edges of the support member. The lines of scoring each define fold-lines on the support member so that portions of the support member can fold upwardly to define side-walls extending upwardly from the inner surface of the support member. As a result, when an item is placed into the package and onto the support member and the continuous side-wall is moved into an extended state, the opposing lines of scoring cause the fold-lines to extend upwardly to define one or more tray sidewalls. In the context of the invention, the term "line of scoring" includes any structure or configuration adapted to facilitate folding a portion the support member upwardly to thereby form a tray sidewall. Lines of scoring may include creases, perforations, slices, depressions, and the like that may be formed on the inner surface of the support member.

[0017] With reference to FIGS. 3a and 3b, a flexible packaging **10** having a support member **12** that is configured to form tray-like side-walls **36** is illustrated. The upper portion of the flexible film has been removed for clarity. In this embodiment, the support member **12** is configured to form a plurality of sidewalls **36** that extend upwardly about the periphery **18** of the support member. The support member includes multiples lines of scoring **38** that are disposed on the inner surface **26** of the support member adjacent to the support member's outer edges **34.** In the illustrated embodiment, the support member is depicted as having eight sides and also includes one or more lines of scoring **39** that are disposed between each adjacent side. Lines of scoring **38** and **39** together define a portion of the support member that is upwardly foldable to form one or more tray sidewalls **36.** It should be recognized that the support member may comprise a wide variety of shapes and structures and is not limited to any particular shape or geometric configuration. In one particularly useful embodiment, the dimensions of the support member and flexible film may be configured to produce a package that forms a relatively tight fit about an item placed into the package.

[0018] As can be seen in FIG. 3b, placing an item **32** onto the surface of the support member may cause the continuous side-wall **16** to fit tightly about the item and to pull the outer edges of the support member upwardly to thereby form sidewalls 36 on the support member. Alternatively, sidewalls **36** may be formed when a top portion of the continuous side-wall is gripped and lifted upwardly. The force of this action may result in the continuous side-wall exerting an upward force on the support member to thereby form sidewalls on the support member.

[0019] With reference to FIGS. 4 and 5, an embodiment of the package **10** is illustrated wherein the continuous side-wall of the package **10** is formed from two sheets that are adhered to each other along opposing edges. FIG. 5 is a cross-sectional view of the flexible package viewed along line 5-5 of FIG. 4. In this embodiment, a front sheet **46** and a rear sheet **48** are oriented face-to-face and affixed to each other at side edges **50, 52** and are each adhered to the support member **12** along bottom edges **54.** In some embodiments, each of the side edges and bottom edge are permanently sealed. In some embodiments the front and rear sheets may comprise two separate sheets, or alternatively, a single sheet that has been center-folded along one of the side edges. Together the sheets and the support member define flexible package **10** having an interior space for receiving an item and an opening (see briefly FIG. 3a, reference number **29)** through which the item can be placed into the interior **20** of the flexible package.

[0020] The side edges **50, 52** may be attached to each other and the inner surface **26** of the support member **12** with an adhesive, thermal, ultrasonic fusion, or other suitable bonding method. In the illustrated embodiment, the bottom edge **54** of the continuous side-wall **16** has been attached to the inner surface **26** of the support member. Alternatively, the bottom edge **54** of the continuous side-wall may be attached to the outer surface **28** of the support member. In this illustrated embodiment, the support member **12** comprises an air cellular material having a plurality of air cavities **56** disposed within the support member. As discussed above, the air cavities serve as a heat insulation that substantially limits heat from flowing to the outer surface of the support member. The air cellular material in this embodiment may comprise at least one sheet of a semi-rigid film or laminate.

[0021] With reference to FIGS. 6 and 7 an alternate embodiment of a flexible package is illustrated. FIG. 7 is a cross-sectional view of the package viewed along line 7-7 of FIG. 6. In this embodiment, the support member **12** comprises an air cellular material that is relatively more flexible than air cellular material of FIGS. 4 and 5. In this embodiment, the flexible film **14** defining the continuous side-wall wraps underneath the support member **12** and is attached to the outer surface **28** of the support member. The flexibility of the support member permits a portion of the support member to bend upwardly and form tray-like sidewalls **36** that extend upwardly about the periphery **18** of the support member **12.** The sidewalls **36** help improve the item support provided by the flexible package and may generally improve the overall appearance of the flexible package.

[0022] In one alternative embodiment, the flexible package may also provide a convenient medium in which a food

product may be heated. In one embodiment, the flexible package comprises a microwave oven safe package that permits an item to be heated via a microwave oven while disposed in the interior of the package. In yet another embodiment, the flexible package may be configured to withstand temperatures in excess of 200° F, 225° F, 250° F, 275° F, 350° F and 400° F, such as those that may be encountered when cooking/heating a food product in a microwave or conventional oven. In some embodiments, the flexible package may be capable of withstanding temperatures in excess of about 450° F. In elevated temperature applications, such as microwave and conventional oven applications, the insulated support member provides a surface that may permit a person to handle the flexible package having heated contents disposed in its interior without burning or discomfort. In some embodiments, the flexible package may also include one or vents that may be used to exhaust steam from the package during cooking. In one embodiment, the vents remains closed tightly until pressure from gas in the pouch reaches approximately 3 mbar during microwaving or oven cooking. The vent may then remain open to vent gas from the package. Many suitable vents including gas holes covered by tape or a pressure relief device may be used to vent hot air/steam from within the package. The vents may also be operable to respire gas formed in the package prior to heating from decaying food or during freezing.

[0023] In some embodiments, the flexible package may also be used as a convenient means for displaying and/or storing a packaged item. For example, a food product may be placed into the package at a point of processing and then the package and its contents may be stored or shipped to a retailer. Upon reaching the retailer, the flexible package and its contents may be displayed and sold. As can be more clearly seen in FIGS. 1a and 1b, the continuous side-wall may comprise a translucent film having a transparent window **30** through which the item **32** may be viewed by the consumer. The window **30** may permit a consumer to visualize and judge the quality of the item before making a purchasing decision. In addition, the flexible film **14** may be printable so that the supplier or manufacturer may include printed indicia on the package. Such indicia may include brand labeling, expiration dates, cooking instructions, colors, graphics, and the like. In addition, the flexible package may also include a zone **31** of the package that is substantially printed or opaque. This zone **31** may be used to mask the accumulation of unsightly liquids that may have pooled on or about the support member. Such liquids may result from cooking/heating the item in the package.

[0024] In some embodiments, the item is placed into the flexible package and then the package and its contents are subsequently shipped to a retailer. The packaged contents may be maintained in the package until it may be desirable to heat the package and its contents. In such embodiments, it may be desirable to seal the package at the point of packaging after the item has been inserted into the flexible package. The opening of the flexible package may be sealed by bonding opposing surfaces of the film to each other with an adhesive, thermal, ultrasonic fusion, or other suitable bonding method. In one embodiment, the package may comprise a hermetic seal that maintains the packaged item in a substantially closed state so that fluids cannot ingress into, or egress out of the flexible packaging.

[0025] In some embodiments, the flexible package may include a tear notch **40,** line of weakening, or combination thereof, or other means that may help assist in the easy opening of the sealed package. The notch may comprise a slit or cut that is formed into a side of the continuous side-wall. In some embodiments, the tear notch may be oriented in the side wall so that it is substantially parallel to the film's orientation. Pulling along a top edge of the flexible package, which includes the heat seal, and is above the tear notch **40** causes a top portion of the flexible film to be separated and detached from the remaining portion of the flexible package. As a result, the flexible package is opened so that its contents may be removed.

[0026] The term "line of weakening" includes any structure or configuration adapted to facilitate the selective removal of one portion on one side of the line of weakening from another portion on the opposite side of the line of weakening. In some embodiments, a line of weakening may extend laterally across a top portion of the film **14.** Typically, the line of weakening may be disposed adjacent and parallel to the opening (see briefly FIG. 3a, reference number **29)** of the package. The line of weakening defines a portion of the package that may be removable. The line of weakening may be provided by a plurality of openings or perforations that extend across the surface of the film **14.** The perforations should be spaced sufficiently close to one another along the line so that the removable portion can be easily separated from the package.

[0027] In some embodiments, the package may also include a zipper **42** or other resealable closure device that may permit the package to be opened and re-closed. This may be particularly advantageous in embodiments where the package is used to transport heated items. For instance, in a grocers market or deli, the flexible package may be used by a consumer to transport a heated food product, e.g., a rotisserie chicken or the like, from the deli to the consumer's home. In one alternative embodiment, the flexible package may also include a handle that may permit easy carrying of the flexible package. As can be seen in FIG. 4, the flexible package may include an opening in the continuous sidewall that defines a handle **60.** Alternatively, the handle may extend outwardly above the top edge of the continuous side-wall. Typically, the handle is disposed above any heat seal or closure device that may be present in the flexible package.

[0028] In one alternative embodiment, the support member comprises a semi-rigid structural member that provides support for an item disposed in the package and may permit the package to be placed in an upright position. As discussed above, the support member may also be configured to form sidewalls that extend upwardly from the inner surface of the support member. In some embodiments, the support member may also comprise a heat insulating material so that the

amount of heat transferred to the outer surface of the support member is limited. In this alternative embodiment, the support member comprises a material that provides insulating capabilities and is capable of withstanding the elevated temperatures to which the package may be exposed. The insulating properties of the support member help prevent the flow of heat from a heated item disposed on the support member to the outer surface of the support member.

[0029] In one alternative embodiment, the support member may comprise a semi-rigid foam having the desired insulating properties. In this regard, FIG. 1b illustrates a support member **12** comprising a semi-rigid foam. Suitable foams include those having a high temperature melting range and having sufficient insulating properties to substantially limit the amount of heat that is dissipated through the outer surface of the support member. In one alternative embodiment, the support member may include a foam having a melt temperature in excess of at least 200° F. In some embodiments, the foam support member may have a melting temperature of at least 275° F. Such foams may be particularly useful in applications that are intender for transporting heated items or for heating items in a microwave oven. Suitable foams having a melting range in excess of 200° F may include, but are not limited to, polypropylene, high and low density polyethylenes, polyamides, polyesters, copolymers thereof, and the like. Additional foams that may be used include styrenic and acrylic copolymers both of which are available from Novachem under the tradenames Dylark and Zylar, respectively.

[0030] The thickness and density of the foam may also be selected to further adjust or enhance the insulating properties of the support member. In one alternative embodiment, the support member has a thickness of at least 1 mm. In some embodiments the thickness of the support member is at least 4 mm. In one alternative embodiment, the support member comprises polypropylene foam having a density of 0.4 g/cm^3 and a thickness of about 1.5 mm.

[0031] In another embodiment, the support member may comprise an insulating material that can withstand elevated temperatures that may be encountered in heating/cooking application that may be used in conjunction with a conventional oven. Suitable insulating materials for conventional oven applications may have a melting temperature in excess of at least 350° F, with a melting temperature in excess of 400° F and 450° F being more typical. Suitable materials for the conventional oven applications may include nylons, crystallized polyethylene terephthalate, and other high melt temperature polymers. In one alternative embodiment, the support member comprises a layer of air cellular material. Air cellular material comprises two sheets of film or laminate that are adhered to each and include a plurality of air-filled cavities or "bubbles" that are formed between the sheets. Suitable air cellular material may be available from Sealed Air Corporation under the trademark Bubblewrap®. In one embodiment, the air cellular material may be formed from two sheets of film, such as nylon that have been sealed together to enclose a plurality of air cavities between the sheets. The air cavities within the air cellular material provide insulating properties that may effectively limit the amount of heat that is transferred to the outer surface of the support member. The size and quantity of air cavities may be selected so that a desired level of heat insulation is achieved. The rigidity of the support member and the air cellular material may also be selected to provide flexible packages having a desired degree of rigidity.

[0032] Support member may be formed from any material useful for the expected end use conditions, including polyvinyl chloride, polyethylene terephthalate, polystyrene, polyolefins (e.g., high density polyethylene or polypropylene), nylon, and polyurethane. The support member may be foamed or non-foamed as desired. Support member may have oxygen transmission barrier attributes. In some embodiments, where it may be desirable to expose the product to a high oxygen atmosphere, the support member may have an OTR of at least 4,000 cc at STP/m^2/24 hr/atm. In other embodiments, the support member may have an oxygen transmission rate less than about 4,000 cc at STP/m^2/24 hr/atm.

[0033] Although the drawings show support member in a few configurations, support member may have any desired configuration or shape, such as rectangular, round, or oval. The support member may be substantially rigid, semi-rigid, or flexible. For example, the support member may have a 1% secant flex modulus of at least about any of the following values: 120,000, 140,000, 160,000, 180,000, 200,000, and 225,000 pounds/square inch.

[0034] The flexible film forming the continuous side-wall may also be selected to withstand elevated temperatures and to have varying degrees of insulating properties. In one alternative embodiment, the flexible film comprises a sheet of film or laminate having a melt temperature of at least 200° F. For microwave oven applications, the flexible film should have a melt temperature in excess of at least 300° F. Suitable materials include polyethylenes, polypropylenes, polyesters and copolymers thereof having a melt temperature in excess of 200° F225° F, 250° F, 275° F, 350° F and 400° F,. In yet another embodiment, the flexible film may comprise a sheet of film or laminate having a melt temperature of at least 450° F. For conventional oven applications, the flexible film should have a melt temperature in excess of at least 400° F and for some applications in excess of 450° F. Suitable materials may include nylons and polyesters, such as poly (ethylene terephthalate).

[0035] The continuous side-wall of the flexible package may be formed from a wide variety of films or laminates. In one alternative embodiment, the continuous side-wall may comprise two opposing sheets that have been adhered together along their side edges to form a tube like structure having a bottom edge which is attached to a surface of the support member. In another embodiment, the continuous side-wall may comprise a blown film having a tubular structure. In yet another embodiment, the continuous side-wall may comprise single sheet of film or laminate that has been c-folded to define a common side edge.

[0036] The flexible film **14** may have any total thickness as long as it provides the desired properties (e.g., OTR, flexibility, stiffness, optics, strength) for the given packaging application of expected use. The film may have a thickness of less than about any of the following: 10 mils, 5 mils, 4 mils, 3 mils, 2 mils, 1.5 mils, 1.4 mils, 1.3 mils, 1.2 mils, 1.1 mils, and 1 mil. (A "mil" is equal to 0.001 inch.). The sealant film may also have a thickness of at least about any of the following: 0.3 mils, 0.4 mils, 0.5 mils, 0.6 mils, 0.7 mils, 0.75 mils, 0.8 mils, 0.9 mils, 1 mil, 1.2 mils, 1.4 mils, and 1.5 mils. In some embodiments the sealant film has a thickness from about 0.45 to 1.2 mils.

[0037] The flexible film **14** may comprise one or more layers of sealant and/or print films that form a laminate. In one alternative embodiment, the flexible film comprises an inner sealant layer that may be sealable to itself and/or the support member. In other embodiments, the flexible film may include an outer print layer that may be printable or include a trap printed image. The flexible film may include one or more thermoplastic polymers including polyolefins, polystyrenes, polyurethanes, polyvinyl chlorides, nylons, polyesters such as poly(ethylene terephthalate), and ionomers provided that the desired flexibility and meting temperature of the film may be maintained.

[0038] Useful polyolefins may include ethylene homo- and co-polymers and propylene homo- and co-polymers. Ethylene homopolymers include high density polyethylene ("HDPE") and low density polyethylene ("LDPE"). Ethylene copolymers include ethylene/alpha-olefin copolymers ("EAOs"), ethylene/unsaturated ester copolymers, and ethylene/(meth)acrylic acid. ("Copolymer" as used in this application means a polymer derived from two or more types of monomers, and includes terpolymers, etc.).

[0039] EAOs are copolymers of ethylene and one or more alpha-olefins, the copolymer having ethylene as the majority mole-percentage content. In some embodiments, the comonomer includes one or more C_3-C_{20} alpha-olefins, more preferably one or more C_4-C_{12} alpha-olefins, and most preferably one or more C_4-C_8 alpha-olefins. Particularly useful alpha-olefins include 1-butene, 1-hexene, 1-octene, and mixtures thereof.

[0040] EAOs include one or more of the following: 1) medium density polyethylene ("MDPE"), for example having a density of from 0.93 to 0.94 g/cm^3; 2) linear medium density polyethylene ("LMDPE"), for example having a density of from 0.926 to 0.94 g/cm^3; 3) linear low density polyethylene ("LLDPE"), for example having a density of from 0.915 to 0.930 g/cm3; 4) very-low or ultra-low density polyethylene ("VLDPE" and "ULDPE"), for example having density below 0.91 g/cm^3; and 5) homogeneous EAOs. Useful EAOs include those having a density of less than about any of the following: 0.925, 0.922, 0.92, 0.917, 0.915, 0.912, 0.91, 0.907, 0.905, 0.903, 0.9, and 0.898 grams/cubic centimeter. Unless otherwise indicated, all densities herein are measured according to ASTM D 1505.

[0041] The polyethylene polymers may be either heterogeneous or homogeneous. As is known in the art, heterogeneous polymers have a relatively wide variation in molecular weight and composition distribution. Heterogeneous polymers may be prepared with, for example, conventional Ziegler Natta catalysts.

[0042] On the other hand, homogeneous polymers are typically prepared using metallocene or other single site-type catalysts. Such single-site catalysts typically have only one type of catalytic site, which is believed to be the basis for the homogeneity of the polymers resulting from the polymerization. Homogeneous polymers are structurally different from heterogeneous polymers in that homogeneous polymers exhibit a relatively even sequencing of comonomers within a chain, a mirroring of sequence distribution in all chains, and a similarity of length of all chains. As a result, homogeneous polymers have relatively narrow molecular weight and composition distributions. Examples of homogeneous polymers include the metallocene-catalyzed linear homogeneous ethylene/alpha-olefin copolymer resins available from the Exxon Chemical Company (Baytown, Tex.) under the EXACT trademark, linear homogeneous ethylene/alpha-olefin copolymer resins available from the Mitsui Petrochemical Corporation under the TAFMER trademark, and long-chain branched, metallocene-catalyzed homogeneous ethylene/alpha-olefin copolymer resins available from the Dow Chemical Company under the AFFINITY trademark.

[0043] Another useful ethylene copolymer is ethylene/unsaturated ester copolymer, which is the copolymer of ethylene and one or more unsaturated ester monomers. Useful unsaturated esters include: 1) vinyl esters of aliphatic carboxylic acids, where the esters have from 4 to 12 carbon atoms, and 2) alkyl esters of acrylic or methacrylic acid (collectively, "alkyl (meth)acrylate"), where the esters have from 4 to 12 carbon atoms.

[0044] Representative examples of the first ("vinyl ester") group of monomers include vinyl acetate, vinyl propionate, vinyl hexanoate, and vinyl 2-ethylhexanoate. The vinyl ester monomer may have from 4 to 8 carbon atoms, from 4 to 6 carbon atoms, from 4 to 5 carbon atoms, and preferably 4 carbon atoms.

[0045] Representative examples of the second ("alkyl (meth)acrylate") group of monomers include methyl acrylate, ethyl acrylate, isobutyl acrylate, n-butyl acrylate, hexyl acrylate, and 2-ethylhexyl acrylate, methyl methacrylate, ethyl methacrylate, isobutyl methacrylate, n-butyl methacrylate, hexyl methacrylate, and 2-ethylhexyl methacrylate. The alkyl (meth)acrylate monomer may have from 4 to 8 carbon atoms, from 4 to 6 carbon atoms, and preferably from 4 to 5 carbon atoms.

[0046] The unsaturated ester (i.e., vinyl ester or alkyl (meth)acrylate) comonomer content of the ethylene/unsaturated ester copolymer may range from about 3 to about 18 weight %, and from about 8 to about 12 weight %, based on the weight of the copolymer. Useful ethylene contents of the ethylene/unsaturated ester copolymer include the following amounts: at least about 82 weight %, at least about 85 weight %, at least about 88 weight %, no greater than about 97

weight %, no greater than about 93 weight %, and no greater than about 92 weight %, based on the weight of the copolymer.

[0047] Representative examples of ethylene/unsaturated ester copolymers include ethylene/methyl acrylate, ethylene/methyl methacrylate, ethylene/ethyl acrylate, ethylene/ethyl methacrylate, ethylene/butyl acrylate, ethylene/2-ethylhexyl methacrylate, and ethylene/vinyl acetate. Another useful ethylene copolymer is ethylene/(meth)acrylic acid, which is the copolymer of ethylene and acrylic acid, methacrylic acid, or both.

[0048] Useful propylene copolymers may include propylene/ethylene copolymers ("EPC"), which are copolymers of propylene and ethylene having a majority weight % content of propylene, such as those having an ethylene comonomer content of less than 10%, preferably less than 6%, and more preferably from about 2% to 6% by weight.

[0049] Ionomer is a copolymer of ethylene and an ethylenically unsaturated monocarboxylic acid having the carboxylic acid groups partially neutralized by a metal ion, such as sodium or zinc, preferably zinc. Useful ionomers include those in which sufficient metal ion is present to neutralize from about 15% to about 60% of the acid groups in the ionomer. The carboxylic acid is preferably "(meth)acrylic acid"--which means acrylic acid and/or methacrylic acid. Useful ionomers include those having at least 50 weight % and preferably at least 80 weight % ethylene units. Useful ionomers may also include those having from 1 to 20 weight percent acid units. Useful ionomers are available, for example, from Dupont Corporation (Wilmington, Del.) under the SURLYN trademark.

[0050] In some embodiments, the flexible film may also include one or more additives useful in packaging films, such as, antiblocking agents, slip agents, antifog agents, colorants, pigments, dyes, flavorants, antimicrobial agents, meat preservatives, antioxidants, fillers, radiation stabilizers, and antistatic agents. Such additives, and their effective amounts, are known in the art. An antifog agent may advantageously be incorporated into or coated onto the flexible film. Suitable antifog agents may fall into classes such as esters of aliphatic alcohols, esters of polyglycol, polyethers, polyhydric alcohols, esters of polyhydric aliphatic alcohols, polyethoxylated aromatic alcohols, nonionic ethoxylates, and hydrophilic fatty acid esters. Useful antifog agents include polyoxyethylene, sorbitan monostearate, polyoxyethylene sorbitan monolaurate, polyoxyethylene monopalmitate, polyoxyethylene sorbitan tristearate, polyoxyethylene sorbitan trioleate, poly (oxypropylene), polyethoxylated fatty alcohols, polyoxyethylated 4-nonylphenol, polyhydric alcohol, propylene diol, propylene triol, and ethylene diol, monoglyceride esters of vegetable oil or animal fat, mono- and/or diglycerides such as glycerol mono- and dioleate, glyceryl stearate, monophenyl polyethoxylate, and sorbitan monolaurate. The antifog agent is incorporated in an amount effective to enhance the antifog performance of the film **14.**

[0051] In some embodiments, the flexible package may comprise a modified atmosphere packaging (MAP). In MAP the surrounding atmosphere in the package is evacuated and replaced with an atmosphere having attributes that may prolong the shelf-life or appearance of a packaged food product. In some packaging applications it may be desirable to enclose the food product in a high oxygen atmosphere. For example, in packaging meat, the atmosphere in the sealed package may comprise about 80% by volume oxygen and about 20% by volume carbon dioxide in order to inhibit the growth of harmful microorganisms and extend the time period in which the meat retains its attractive red ("bloom") coloration. Oxygen and carbon dioxide barrier attributes may also be imparted to a film by incorporating, for example as a film layer, one or more resins having low permeability to oxygen. Such films are generally referred to as "barrier films" and may be designed to prevent oxygen from entering or escaping from the interior of the sealed package. The barrier film helps to maintain a high oxygen atmosphere within the sealed package during any subsequent storage, shipment, or display at the point of sale. In other applications, it may be desirable to package the food product in a low oxygen atmosphere.

[0052] In some embodiments, the flexible package may also include a cooking temperature indicator such as a strip of temperature-sensitive material which changes color upon reaching a certain temperature. The cooking temperature indicator may be placed on a label so as to give an indication of when the food is properly heated or within the package so that it is visible through the transparent window.

[0053] As should be evident from the foregoing discussion, the flexible package of the invention may be particularly suited for a wide variety of packaging applications. In one embodiment, the package may be particularly useful in deli or grocers market. For example, the flexible package of the invention may be to transport a heated item, such as a rotisserie chicken, from the retailer to the consumer's home. In other embodiments, the flexible package may be used to store and display a packaged item. In some embodiments, the flexible package may also be used to heat and/or cook the packaged item in a microwave or conventional oven.

[0054] The following examples are provided for the purpose of illustration only and should not be considered limiting in any way.

Example 1:

[0055] In this example, the insulating properties and hot handling properties of the support member were compared to the insulating properties of a small paperboard box, such as the type commonly used in deli applications for packaging and carrying home a heated food product. Two samples of simmering water having a temperature of approximately 201° F were placed in a flexible package of the invention comprising polypropylene foam and having a density of 0.45 g/cc,

and the paperboard box. The paperboard box and the polypropylene foam both had a thickness of 0.018 inches.

[0056] After the water samples were placed in their respective test containers, the two containers were handled to determine the relative insulating capabilities of each container. The paperboard container could only be handled briefly before the container was too hot for further handling. The flexible package of the invention could be handled on the order of 30 seconds before the package was considered too hot for continued handling. From this experiment, it can be seen that a support member comprising an insulating foam material may be used to permit handling of the heated item. It should also be seen that the insulating capabilities of the foam support member may be improved by adjusting the density and/or thickness of the foam.

[0057] To further demonstrate the insulating properties of the foam, the temperature of the water was measured at 10 minute intervals. From the Table below it can be seen that the flexible package having a polypropylene support member provides superior heat retention in comparison to the conventional paperboard box.

Table 1

Measurement	Elapsed Time (minutes)	Temperature Paperboard (°F)	Temperature Polypropylene Package
1	0	201.6	200.8
2	10	159.6	189.8
3	20	142.4	173.2
4	30	127	155
5	60	113.2	136.4
6	75	101.8	120.2

Example 2:

[0058] In another experiment, the hot handling capabilities of a flexible pouch having a support member comprising a layer of air cellular material that included 1 inch sidewalls extending upwardly on the continuous sidewalls of the flexible package. Simmering water having a temperature of about 180° F was introduced into the pouch. Thereafter, the bottom of the flexible package was held to determine the insulating capacity of the flexible pouch. The flexible pouch was able to be continuously handled without becoming too hot to handle.

[0059] Many modifications and other embodiments of the inventions set forth herein will come to mind to one skilled in the art to which these inventions pertain having the benefit of the teachings presented in the foregoing descriptions and the associated drawings. Therefore, it is to be understood that the inventions are not to be limited to the specific embodiments disclosed and that modifications and other embodiments are intended to be included within the scope of the appended claims. Although specific terms are employed herein, they are used in a generic and descriptive sense only and not for purposes of limitation.

Claims

1. A flexible package for enclosing a heated product comprising:

   a support member having an inner and outer surface and a peripheral edge, the inner surface being configured for supporting a product thereon, the support member comprising an insulating material that inhibits heat from a heated product disposed on the inner surface from dissipating through the outer surface of the support member; and

   a flexible film having a top portion and a bottom portion, the bottom portion being attached about the peripheral edge of the support member so that the flexible film forms a continuous side-wall of the package and defines an interior space of the package, and the top portion defining an opening into the interior space of the package, and wherein the continuous side-wall is movable between a substantially collapsed state for storage and an extended state for use.

2. The flexible package according to Claim 1, wherein the support member includes at least two lines of scoring that are each disposed proximal to opposing peripheral edges of the support member so that when the continuous side-wall is moved into an extended state, the opposing lines of scoring each define fold-lines so that portions of the support member can fold upwardly to define side-walls extending upwardly from the inner surface of the support member.

3. The flexible package according to Claim 1 or 2, wherein the top portion of the flexible film is bonded to itself to close said opening and form a sealed package, and wherein bonding is by thermal bond, adhesive, ultrasonic fusion bond, or a combination thereof.

4. The flexible package according to Claim 1, 2 or 3, wherein the support member comprises two thermoplastic sheets that are adhered together and include a plurality of air-filled cavities that are disposed between the thermoplastic sheets.

5. The flexible package according to Claim 4, wherein the support member comprises nylon having a melting temperature that is 400° F or greater.

6. The flexible package according to any one of the preceding claims, wherein the support member comprises a foam selected from the group consisting of polyvinyl chloride, polyethylene terephthalate, polystyrene, polypropylene, low density polyethylene, high density polyethylene, nylon, polyurethane, acrylics, and copolymers and combinations thereof.

7. The flexible package according to any one of the preceding claims, wherein the flexible film is attached to the support member with an adhesive, thermal bond, or ultrasonic fusion bond.

8. The flexible package according to any one of claims 1 to 6, wherein the flexible film includes a bottom edge that extends below an outer surface of the support member and is attached thereto with a thermal bond, adhesive, or ultrasonic fusion bond.

9. The flexible package according to any one of claims 1 to 7, wherein the flexible film includes a bottom edge having a generally tubular shape that is attached to the inner surface of the support member.

10. The flexible package according to any one of the preceding claims, wherein the flexible film comprises a first and second sheet affixed to each other along a pair of seams with an adhesive, thermal bond, or ultrasonic fusion bond.

11. The flexible package according to any one of the preceding claims, wherein the flexible film comprises a thermoplastic material having a meltdown temperature that is 400°F or greater.

12. The flexible package according to any one of the preceding claims, wherein the support member includes a plurality of tray-like sidewalls that are configured to fold from a relatively flat state to an upwardly extended state.

13. The flexible package according to claim 12, wherein the support member has a melt temperature of at least 200°F or greater, the support member comprising polyvinyl chloride, polyethylene terephthalate, polystyrene, polypropylene, low density polyethylene, high density polyethylene, nylon, polyurethane, acrylics, or copolymers and combinations thereof.

14. The flexible package according to Claim 13, wherein the support member comprises two or more thermoplastic sheets that are adhered together and include a plurality of air-filled cavities that are disposed between the thermoplastic sheets, the support member having a melt temperature of at least 275° F.

15. The flexible package according to Claim 12, wherein the support member comprises two or more thermoplastic sheets that are adhered together and include a plurality of air-filled cavities that are disposed between the thermoplastic sheets, and wherein an outer portion of the support member comprises the tray-like sidewalls.

16. The flexible package according to any one of claims 12 to 15, wherein the support member includes lines of scoring adjacent to the peripheral edge of the support member defining fold-lines so that peripheral portions of the support member can fold upwardly to define the tray-like sidewalls.

17. The flexible package according to any one of the preceding claims, wherein the support member includes at least two lines of scoring that are each disposed proximal to opposing peripheral edges of the support member, the opposing lines of scoring each defining fold-lines so that peripheral portions of the support member can fold upwardly to define side-walls extending upwardly from the inner surface of the support member.

18. A method of cooking an item in a package comprising:

providing a food product that is disposed in a flexible package, the flexible package having a support member comprising an insulating material having a melt temperature of at least 400° F and a flexible film having a bottom portion attached about a periphery of the support member and a sealed top portion to thereby define a continuous side wall and an interior space of the package in which the food product is disposed;
cooking the food product disposed in the flexible package at an elevated temperature; and
removing the flexible package including the food product from the oven, wherein the insulating material inhibits heat from the heated product from dissipating into the surrounding environment.

19. The method according to Claim 18, further comprising the step of venting fluids from the interior space of the package.

20. The method according to Claim 18 or 19, further comprising the step of opening the flexible package by tearing along a line of weakening that is disposed proximal to the top portion of the flexible film.

21. The method according to Claim 18, 19 or 20, wherein the step of cooking further comprises inserting the flexible package into a conventional oven that is at temperature of at least 400° F.

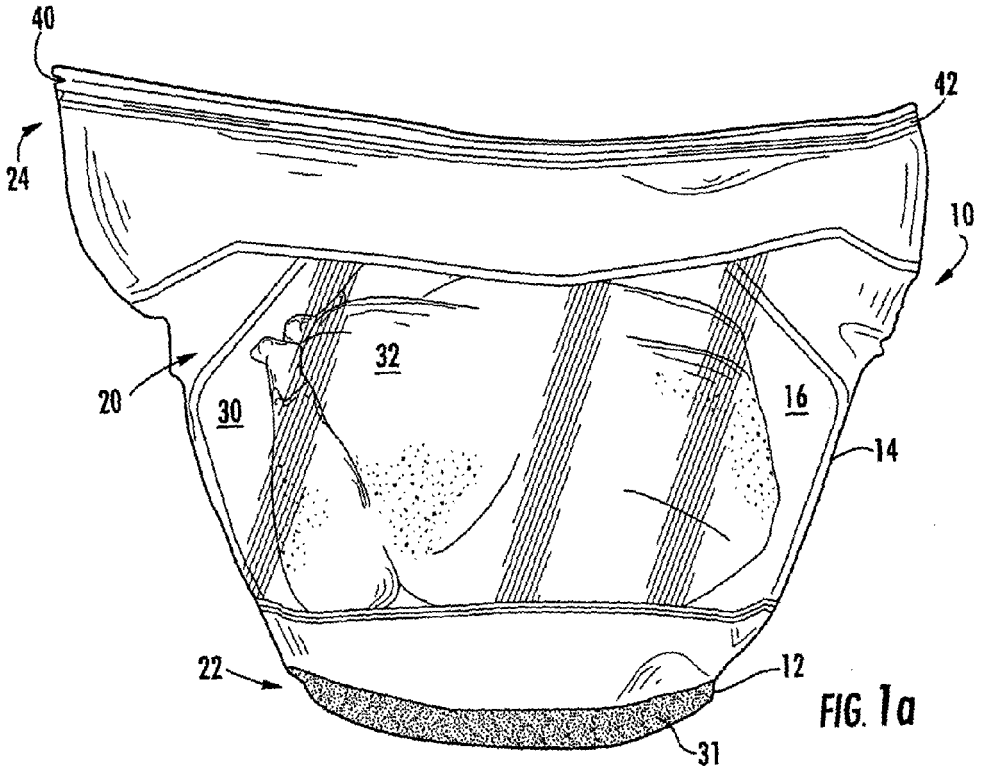
40
42
24
10
20
32
30
16
14
22
12
31

FIG. 1a

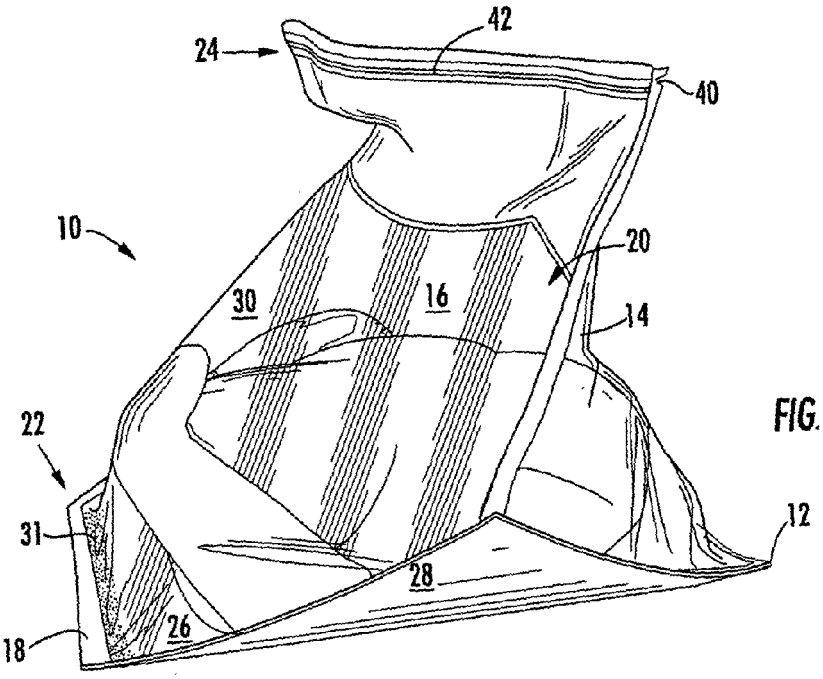
42
24
40
10
20
30
16
14
22
31
12
28
26
18

FIG. 1b

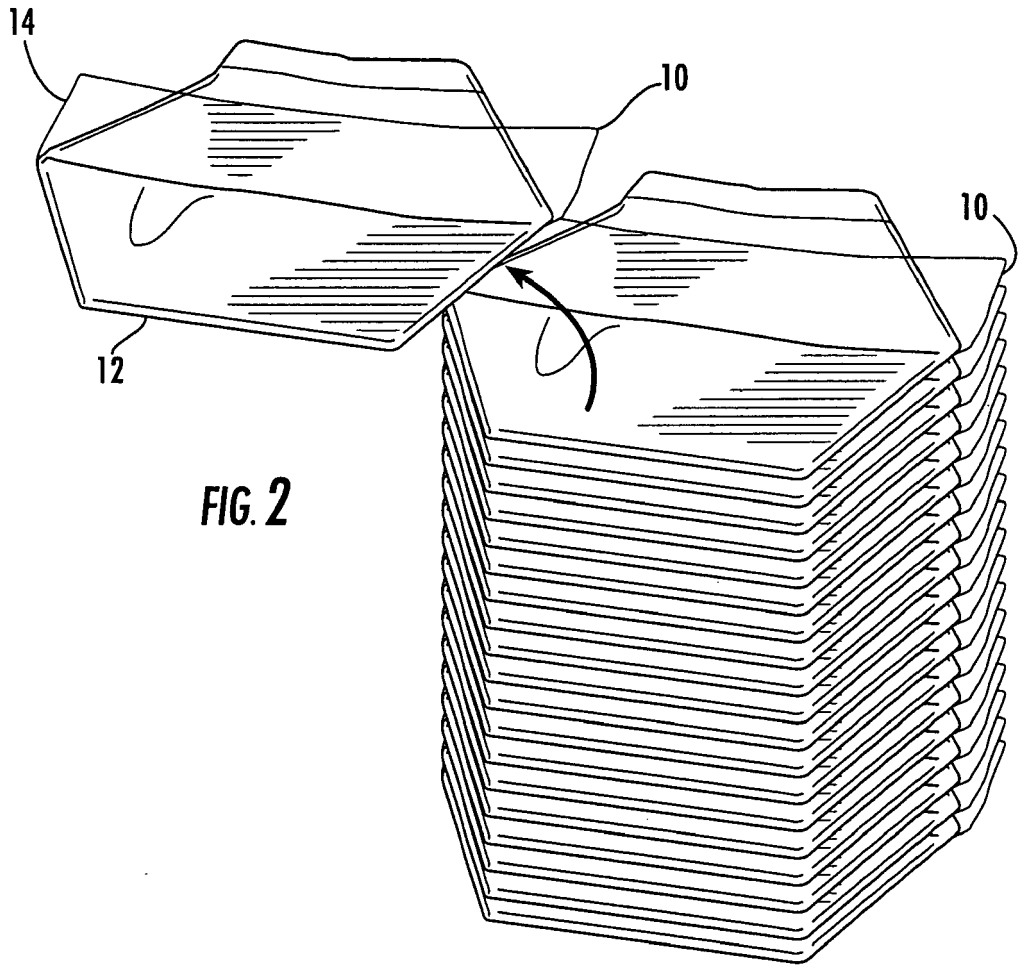

FIG. 2

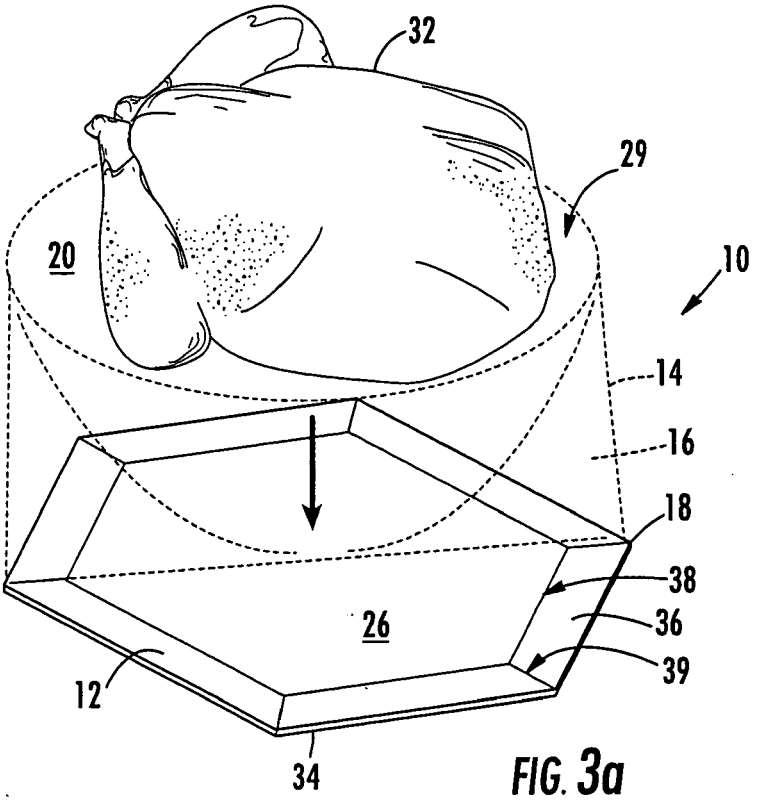
32
29
20
10
14
16
18
38
26
36
39
12
34

FIG. 3a

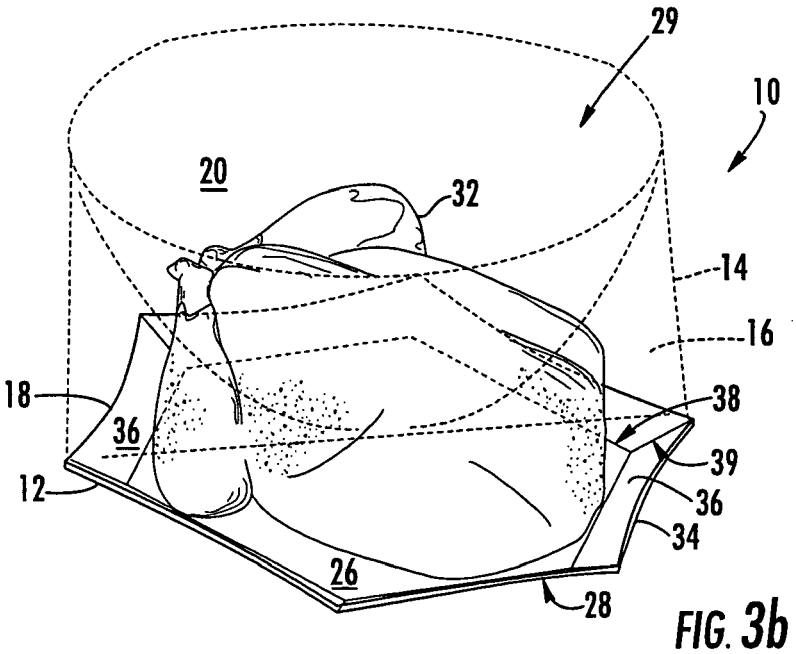
29
10
20
32
14
16
18
38
36
39
12
36
34
26
28

FIG. 3b

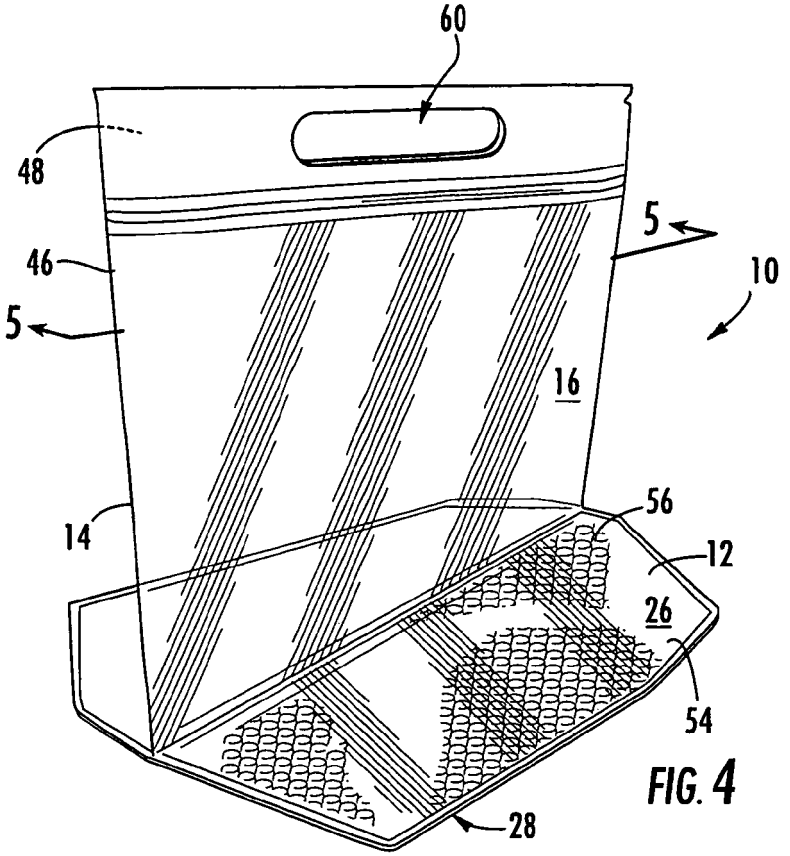
60
48
46
5
5
10
16
14
56
12
26
54
28

FIG. 4

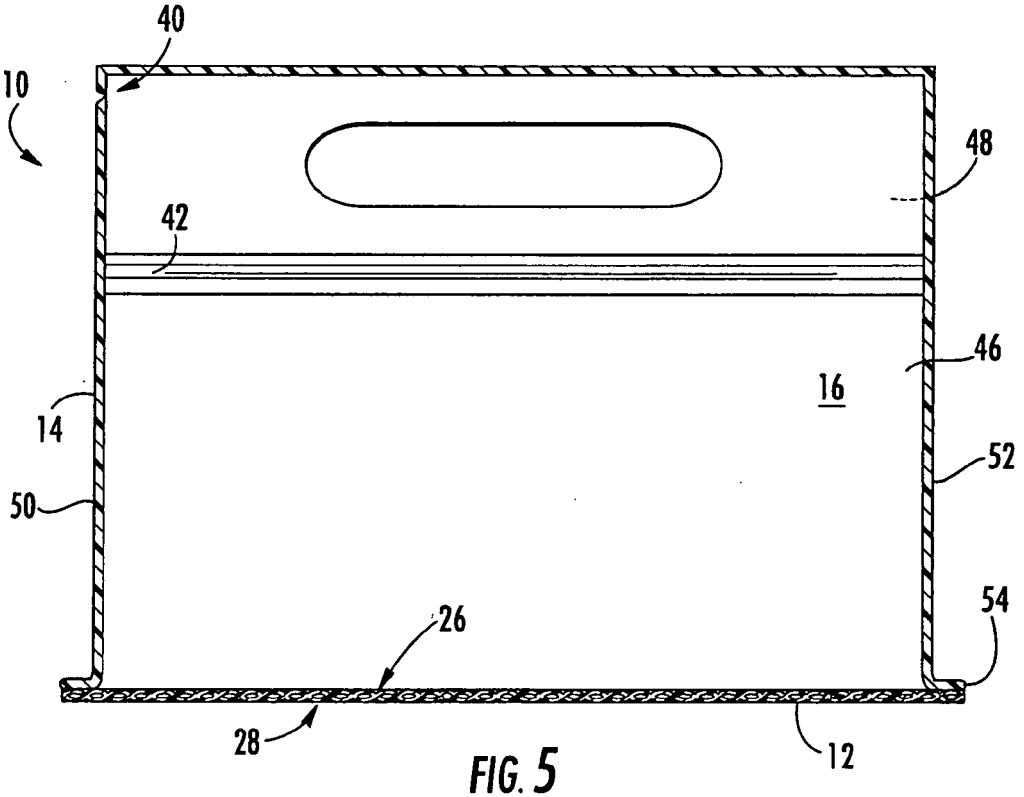
40
10
48
42
46
16
14
52
50
54
26
28
12

FIG. 5

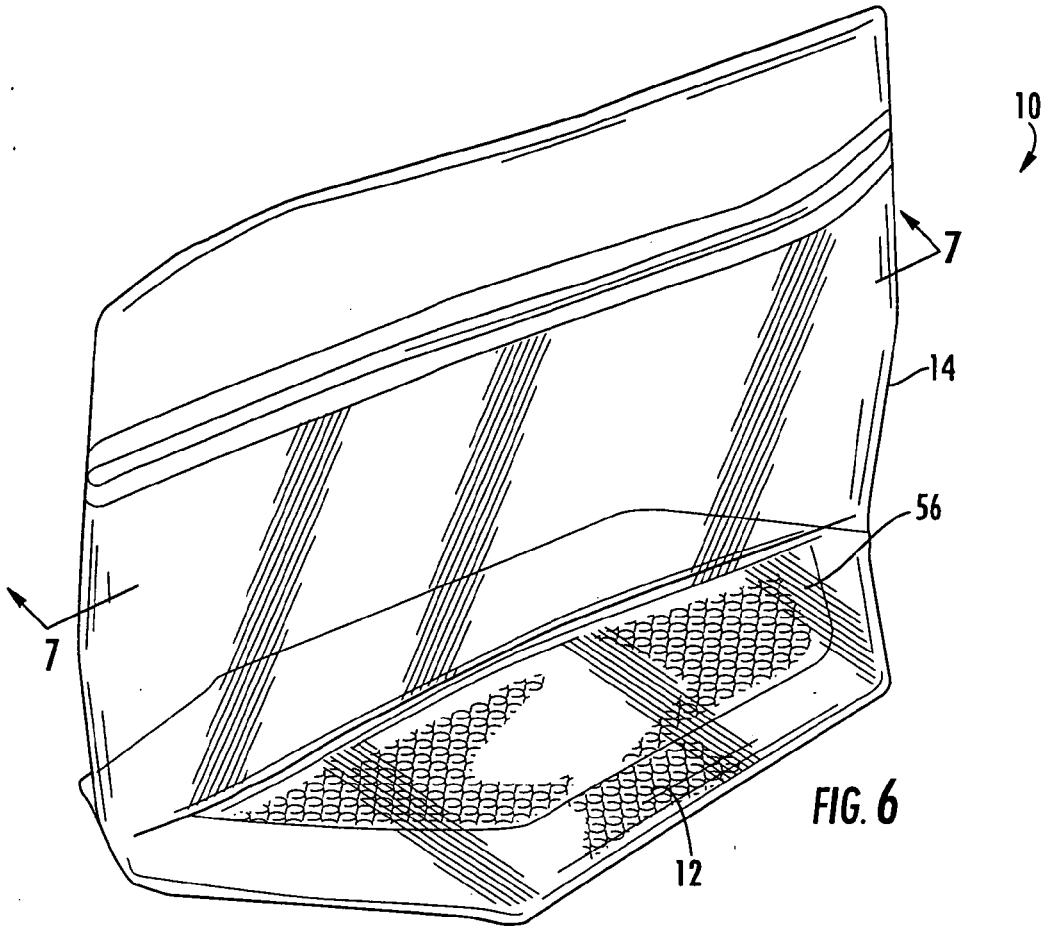

FIG. 6

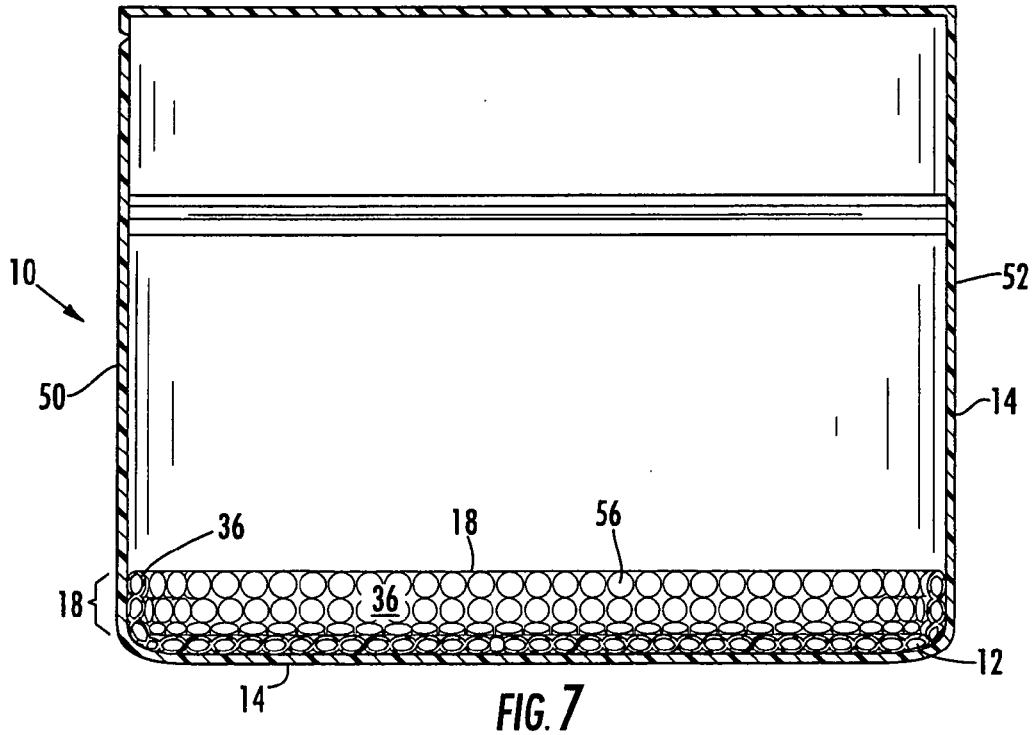

FIG. 7

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 06 25 4349

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2004/226941 A1 (HOPKINS GARY L [US] HOPKINS GARY L SR [US] HOPKINS SR GARY L [US]) 18 November 2004 (2004-11-18) * paragraph [0017] - paragraph [0019] * * paragraph [0028] * * figures 1-4 *	1,3-11, 13,18-21	INV. B65D30/16 B65D81/34
X	US 5 223 288 A (MENDENHALL ABRAHAM H [US] ET AL) 29 June 1993 (1993-06-29) * column 4, line 12 - line 49; figures 6-8 *	1,3,4,7, 9-11,18, 20	
X	US 4 779 998 A (WISCHUSEN III HENRY [US]) 25 October 1988 (1988-10-25) * column 3, line 35 - column 4, line 39; figures 1-7 *	1,2,7, 10-12, 16,17	
A	GB 376 550 A (WILLIAM JOSEPH EVERSHED; LIONEL JOHN WAKEMAN) 14 July 1932 (1932-07-14) * the whole document *	1-17	

TECHNICAL FIELDS SEARCHED (IPC)

B65D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	8 December 2006	Appelt, Lothar

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 06 25 4349

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

08-12-2006

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2004226941 A1	18-11-2004	WO 2004100738 A2	25-11-2004
US 5223288 A	29-06-1993	US 5344661 A	06-09-1994
US 4779998 A	25-10-1988	NONE	
GB 376550 A	14-07-1932	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82