A package has inner and outer layers of formed web material. The outer layer has a bottom wall portion, and has a side wall portion projecting upward from the bottom wall portion. A flange portion of the outer layer projects outward from an upper end of the side wall portion. The inner layer has bottom and side wall portions defining a cavity for containing a product. The inner layer further has a flange portion that is sealed to the flange portion of the outer layer fully around the upper end of the cavity. The bottom and side wall portions of the inner layer are nested within the bottom and side wall portions of the outer layer, and are unattached to the bottom and side wall portions of the outer layer.
DAMAGE RESISTANT PACKAGE

RELATED APPLICATIONS


TECHNICAL FIELD

[0002] This technology includes packages for containing products with parts that could damage the package.

BACKGROUND

[0003] Packaging items with sharp edges or containing hard protruding parts to protect them during handling at manufacturing, shipping, handling onto store shelves and at home has long been a challenge to the packaging industry. Particularly damaging is the abrasion caused by these sharp edges or hard protruding parts during shipment over long distances.

[0004] To prevent the sharp edges or hard protruding parts from puncturing the package and thus compromising the package integrity, it is typical for the industry to either use very thick and puncture resistant materials, or to add separators between the object containing the sharp edges and the package, such as foamed plastics, loose expanded Styrofoam, additional layers of cardboard or so-called pads of various constitutions.

[0005] However, such practice can prove either impracticable in certain situations or cost prohibitive. Such a case is constituted by the packaging of so-called bone-in meat in formed, vacuumed, plastic containers whereby the abrasion caused by protruding bones from meat parts during handling and shipping in vacuum packs causes significant amounts of leakers, i.e., bones puncturing their way during handling and shipping through the packaging material. Initial attempts in adding bulk to the package material to theoretically increase the force or abrasion required to puncture the thicker material have proven ineffective in reducing the amount of leakers, thus only increasing cost and environmental burden.

[0006] Adding padding in form of foamed pads into the formed package to prevent damage to the walls of the package is cost prohibitive, adds significant complexity to the packing process, reducing product visibility, not to mention its unappealing appearance to consumers. The current practice adds so-called pads or reinforcement parts to packages in order to prevent sharp edges or protruding parts from puncturing the outside wall of the packages. Such packages are typically pouches into which pads are added and fixed through various means to the walls or parts of said pouches. Another type of pouch using the addition of pads is a so-called heat-shrinkable pouch.

[0007] Furthermore, in order to overcome the puncturing of the pads and/or the outer pouch, various multilayered structures use various tough resins such as polyamide, metalloocene catalyzed polyethylene etc. in order to improve the toughness of the materials used.

[0008] When used in a heat-shrink application or when used in a vacuum or modified atmosphere package applications, the added protection in the pack has to be designed and added in such a manner as to allow vacuum to be drawn between the added protective material and the outer package material, thus the added protection can’t necessarily cover the entire surface of the package, but has to be precisely placed in a strategic location where most of the sharp objects are located.

[0009] In the absence of additional padding material, when using a thermoformed container in order to vacuum pack products, such thermoformed part is either a single layer material (if no particular requirements to gas barrier, mechanical performance etc. are required) or made out of multilayered materials in order to engineer barrier protection for instance against oxygen and moisture loss, potentially adding UV-light protection and offering a heat sealable layer for a permanently fused or peelable lid to close the package after applying vacuum on it. State of the art in such packages is to ascertain that all the layers properly adhere firmly to each other, such as to prevent the pack from so-called delamination and maintaining product protection. Such packages have limited puncture and abrasion resistance to sharp objects or to hard protruding parts such as bones in a piece of meat.

SUMMARY OF THE INVENTION

[0010] A package has inner and outer layers of formed web material. The outer layer has a bottom wall portion, and has a side wall portion projecting upward from the bottom wall portion. A flange portion of the outer layer projects outward from an upper end of the side wall portion.

[0011] The inner layer has bottom and side wall portions defining a cavity for containing a product. The inner layer further has a flange portion that is sealed to the flange portion of the outer layer fully around the upper end of the cavity. The bottom and side wall portions of the inner layer are nested within the bottom and side wall portions of the outer layer, and are unattached to the bottom and side wall portions of the outer layer.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] FIG. 1 is perspective view of a damage resistant package.

[0013] FIG. 2 is a sectional view of the package of FIG. 1.

[0014] FIG. 3 is a sectional view taken on line 3-3 of FIG. 2.

[0015] FIG. 4 is a view similar to FIG. 2, showing an alternative package.

[0016] FIG. 5 is a schematic view of an apparatus for constructing a damage resistant package.

DETAILED DESCRIPTION

[0017] The apparatus shown in the drawings has parts that are examples of the elements recited in the claims. The illustrated apparatus thus includes examples of how a person of ordinary skill in the art can make and use the claimed invention. It is described here to meet the enablement and best mode requirements of the patent statute without imposing limitations that are not recited in the claims.

[0018] In the embodiment shown in FIG. 1, a package 10 includes a container 12 and a sealed lid 14. The container 12 defines a cavity 17 for containing one or more products, and is constructed to resist abrasion, puncturing, and other damage that could be caused by the products pressing or moving against the container 12. Accordingly, the container 12 is especially well suited to securely contain a food product having hard, sharp or protruding parts such as, for example, a bone-in meat product 20 (shown schematically).
As best shown in FIGS. 2 and 3, the container 12 is constructed with multiple layers of formed plastic web material. These include an outer layer 30 and an inner layer 32. The lid 14 reaches over the cavity 17, and is sealed to both layers 30 and 32 of the container 12 at the top of the package 10. The thickness of the layers 30, 32 and the lid 14 is exaggerated in the drawings for clarity of illustration.

The outer layer 30 of the container 12 has a flat bottom wall portion 36 defining the bottom of the container 12. A side wall portion 38 of the outer layer 30 has four sections 40 projecting upward from the bottom wall portion 36 to provide the container 12 with the shape of a rectangular tray. A flange portion 42 of the outer layer 30 projects outward from the upper end of the side wall portion 38.

The inner layer 32 of the container 12 also has flat bottom wall portion 46 and an upwardly projecting side wall portion 48. The bottom wall portion 46 of the inner layer 32 defines the bottom of the cavity 17. The side wall portion 48 has four sections 50 defining the sides of the cavity 17 in a rectangular peripheral shape substantially the same as the outer peripheral shape of the container 12. A flange portion 52 of the inner layer 32 projects outward from the upper end of the side wall portion 48, and reaches over the flange portion 42 of the outer layer 30 in overlying contact. An outer edge portion 54 of the lid 14 likewise overlies the flange portion 52 of the inner layer 32. A thermal weld 56 seals the edge portion 54 of the lid 14 and the flange portions 42 and 52 of the two layers 30 and 32 together to close the cavity 17 fully around the top of the package 10.

As further shown in FIGS. 2 and 3, the bottom and side wall portions 46 and 48 of the inner layer 32 are nested within the bottom and side wall 36 and 38 portions of the outer layer 30 in overlying contact. However, the bottom and side wall portions 46 and 48 of the inner layer 32 are not attached to the bottom and side wall 36 and 38 portions of the outer layer 30. More specifically, the layers 30 and 32 are closely fitted together to adjoin in the nested arrangement fully about the bottom and sides of the cavity 17. The close fit can accommodate movement of the inner layer 32 relative to the outer layer 30 when the food product 20 presses or moves against the inner layer 32 or, alternatively, can resist or block such movement even though the layers 30 and 32 are not bonded, adhered, welded, or otherwise fastened together at the bottom or sides of the cavity 17. This adjoining but unattached arrangement is found to provide the container 12 with superior resistance to being abraded or punctured by sharp or protruding portions of the food product 20 in the cavity 17.

The lid 14 and each layer 30 and 32 of the container 12 may be formed of any suitable material or combination of materials known in the art. Preferred examples of materials for the outer layer 30 include Surlyn, polyamide, polyolefin, and polyester materials and copolymers thereof. Examples of preferred materials for the inner layer 32 include urethane, resilient polyolefin materials such as low density polyethylene, ultra-low density polyethylene, and ethylene vinylacetate type materials, and polyamides and copolymers thereof. Either or both of the layers 30 and 32 may further comprise a barrier layer to block oxygen from easily migrating through the container 12. Examples of preferred barrier layer materials include ethylene vinyl alcohol (EVOH), polyvinylalcohol (PVOH), and derivatives thereof, as well as cycloolefinco-polymer (COC) as a moisture barrier or stiffness agent. The lid 14 preferably has a so-called peelable weld to facilitate the user's access to the food product 20 in the package 10.

A package 100 comprising a second embodiment of the invention is shown in FIG. 4. This package 100 has a container 112 that differs from the container 12 in the package 10 described above. Specifically, the container 112 in the second embodiment has an intermediate layer 120 of formed plastic web material interposed between the inner and outer layers 30 and 32.

The intermediate layer 120 has bottom and side wall portions 122 and 124 nested between the bottom and side wall portions of the inner and outer layers 30 and 32. The intermediate layer 120 further has a flange portion 126 projecting outward between the flange portions of the inner and outer layers 30 and 32. A thermal weld 128 seals the flange portion 126 of the intermediate layer 120 to the flange portions of the inner and outer layers 30 and 32 fully about the upper end of the cavity 17.

The bottom and side wall portions 122 and 124 of the intermediate layer 120 are fitted closely to adjoin the corresponding portions of the inner and outer layers 30 and 32 at the bottom and sides of the cavity 17, but are unattached to the inner and outer layers 30 and 32 at the bottom and sides of the cavity 17. Like the inner and outer layers 30 and 32, the intermediate layer 120 can be formed of any suitable material or combination of materials known in the art, and other embodiments can include multiple intermediate layers in the same configuration and closely fitted, unattached arrangement. In each case, this provides the container 112 with more greatly enhanced resistance to abrasion and puncturing under contact with the food product 20.

An example of an apparatus 200 for constructing the package 10, the package 100, or another alternative embodiment as described above, is shown schematically in FIG. 5. The apparatus 200 includes a wound roll 202 of plastic material in the form of a web 204. The web 204 has layers to provide the outer layer 30, the inner layer 32, and any intermediate layers 120 of the container 12, 112, etc. to be constructed. Alternatively, layers of web material can be withdrawn from multiple rolls and fed through one or more roller nips to provide a complete web 204 that includes all of the desired container layers.

The web 204 is advanced past a preheating station 206 at which it is preheated for vacuum forming at a thermoforming station 208. The thermoforming station 208 includes a mold cavity 211 in which successive sections 212 of the heated web 204 are vacuum formed into the shape of the container. The food products 20 are placed in the cavities 17 in the succession of formed container sections 212 as the web 204 is advanced through a loading area 214. Another web 216 is withdrawn from a wound roll 220 of lid material, and is fed to a sealing station 222 at which successive sections 224 of the lid web 216 are thermally welded onto the formed sections 212 of the container web 204. An optional printing station 226 follows the sealing station 222, and the individual packages 10, 100, etc. are severed from the welded webs 204 and 216 at a cutting station 228.

This written description sets forth the best mode of carrying out the invention, and describes the invention as to enable a person skilled in the art to make and use the invention, by presenting examples of the elements recited in the claims. The patentable scope of the invention is defined by the claims, and may include other examples that occur to those
skilled in the art. For example, a container and/or package constructed in accordance with the invention can have a circular or other nonrectangular peripheral shape. Other examples of suitable forming processes include cold vacuum forming, impact forming, and plug-assisted vacuum forming. Such other examples, which may be available either before or after the application filing date, are intended to be within the scope of the claims if they have structural elements that do not differ from the literal language of the claims, or if they have equivalent structural elements with insubstantial difference from the literal language of the claims.

1. A package comprising:
   an outer layer of formed web material having a bottom wall portion, a side wall portion projecting upward from the bottom wall portion, and a flange portion projecting outward from an upper end of the side wall portion; and
   an inner layer of formed web material having bottom and side wall portions defining a cavity for containing a product, and having a flange portion projecting outward from an upper end of the cavity, with the flange portion of the inner layer sealed to the flange portion of the outer layer fully around the upper end of the cavity.

2. A package as defined in claim 1 wherein the bottom and side wall portions of the inner layer are nested within the bottom and side wall portions of the outer layer in overlying contact.

3. A package as defined in claim 1 further comprising an intermediate layer of formed web material having bottom and side wall portions nested between the bottom and side wall portions of the inner and outer layers, and having a flange portion projecting outward between the flange portions of the inner and outer layers, with the flange portion of the intermediate layer sealed to the flange portions of the inner and outer layers fully around the upper end of the cavity, and with the bottom and side wall portions of the intermediate layer unattached to the bottom and side wall portions of the inner and outer layers.

4. A package as defined in claim 1 further comprising a plurality of intermediate layers of formed web material, each of which has bottom and side wall portions nested between the bottom and side wall portions of the inner and outer layers, and each of which has a flange portion projecting outward between the flange portions of the inner and outer layers, with the flange portion of each intermediate layer sealed to the flange portions of the inner and outer layers fully around the upper end of the cavity, and with the bottom and side wall portions of each intermediate layer unattached to the bottom and side wall portions of the inner and outer layers.

5. A package as defined in claim 1 wherein the formed web material is vacuum formed web material.

6. A package as defined in claim 1 wherein the outer layer is shaped as a rectangular tray.

7. A package comprising:
   an outer layer of formed web material having a bottom wall portion, a side wall portion projecting upward from the bottom wall portion, and a flange portion projecting outward from an upper end of the side wall portion;
   an inner layer of formed web material having bottom and side wall portions defining a cavity for containing a food product, and having a flange portion projecting outward from an upper end of the cavity;
   a food product in the cavity; and
   a lid layer of web material reaching over the upper end of the cavity, projecting outward over the flange portions of the inner and outer layers, and sealed to the flange portions of the inner and outer layers fully around the upper end of the cavity.

8. A package as defined in claim 7 wherein the food product is movable within the cavity, and the bottom and side wall portions of the inner layer are nested within the bottom and side wall portions of the outer layer in overlying contact that accommodates movement of the inner layer relative to the outer layer under the influence of the food product.

9. A package as defined in claim 7 wherein the food product is movable within the cavity, and the bottom and side wall portions of the inner layer are nested within the bottom and side wall portions of the outer layer in overlying contact that resists movement of the inner layer relative to the outer layer under the influence of the food product.

10. A package as defined in claim 7 wherein the food product is movable within the cavity, and the bottom and side wall portions of the inner layer are nested within the bottom and side wall portions of the outer layer in overlying contact that blocks movement of the inner layer relative to the outer layer under the influence of the food product.

11. A package as defined in claim 7 further comprising an intermediate layer of formed web material having bottom and side wall portions nested between the bottom and side wall portions of the inner and outer layers, and having a flange portion projecting outward between the flange portions of the inner and outer layers, with the flange portion of each intermediate layer sealed to the flange portions of the inner and outer layers fully around the upper end of the cavity, and with the bottom and side wall portions of each intermediate layer unattached to the bottom and side wall portions of the inner and outer layers.

12. A package as defined in claim 7 further comprising a plurality of intermediate layers of formed web material, each of which has bottom and side wall portions nested between the bottom and side wall portions of the inner and outer layers, and each of which has a flange portion projecting outward between the flange portions of the inner and outer layers, with the flange portion of each intermediate layer sealed to the flange portions of the inner and outer layers fully around the upper end of the cavity, and with the bottom and side wall portions of each intermediate layer unattached to the bottom and side wall portions of the inner and outer layers.

13. A package as defined in claim 7 wherein the formed web material is vacuum formed web material.

14. A package as defined in claim 7 wherein the outer layer is shaped as a rectangular tray.

15. A package as defined in claim 7 wherein the food product comprises bone-in meat.