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(54) **VEGETABLE AND FRUIT PACKAGING BOX**

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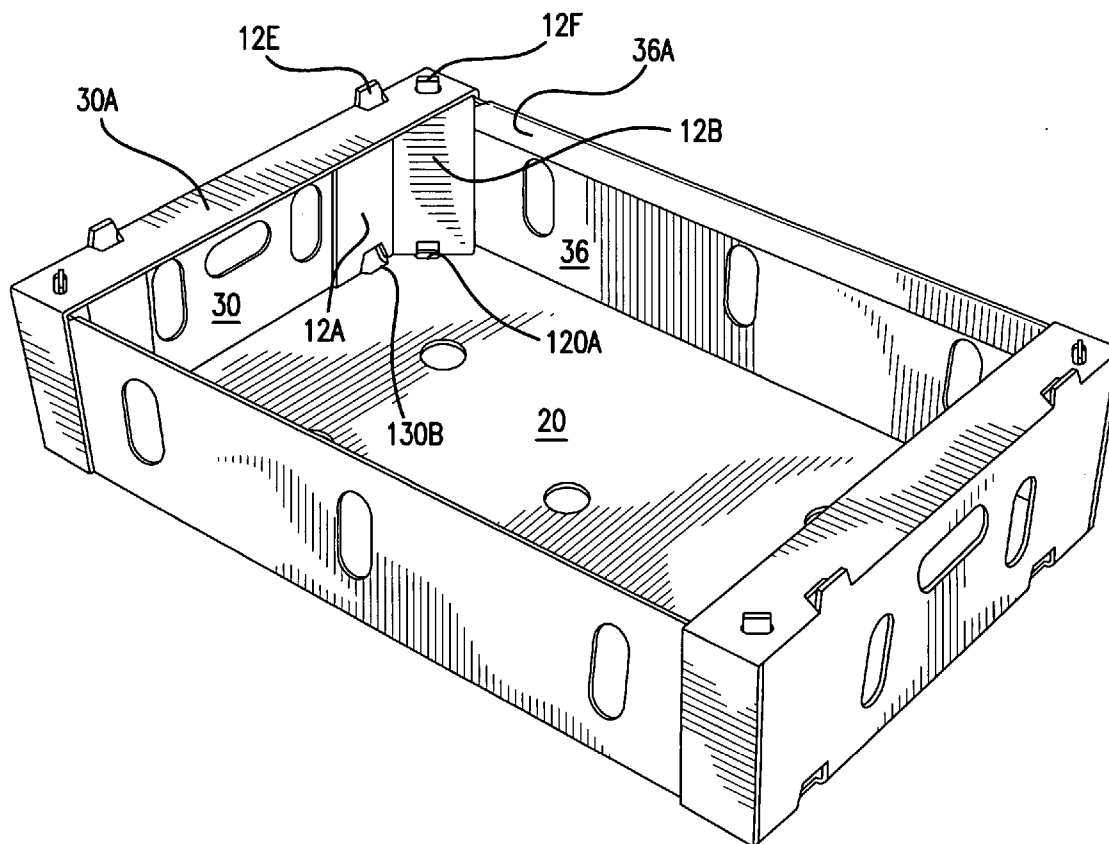
(57) **ABSTRACT**

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Related U.S. Application Data

(60) Provisional application No. 60/730,062, filed on Oct. 25, 2005.

A one-piece container for packing, shipping, and displaying produce is provided. The container is constructed of materials to enhance recyclability of the container while providing improvement in strength, durability, and aesthetics.



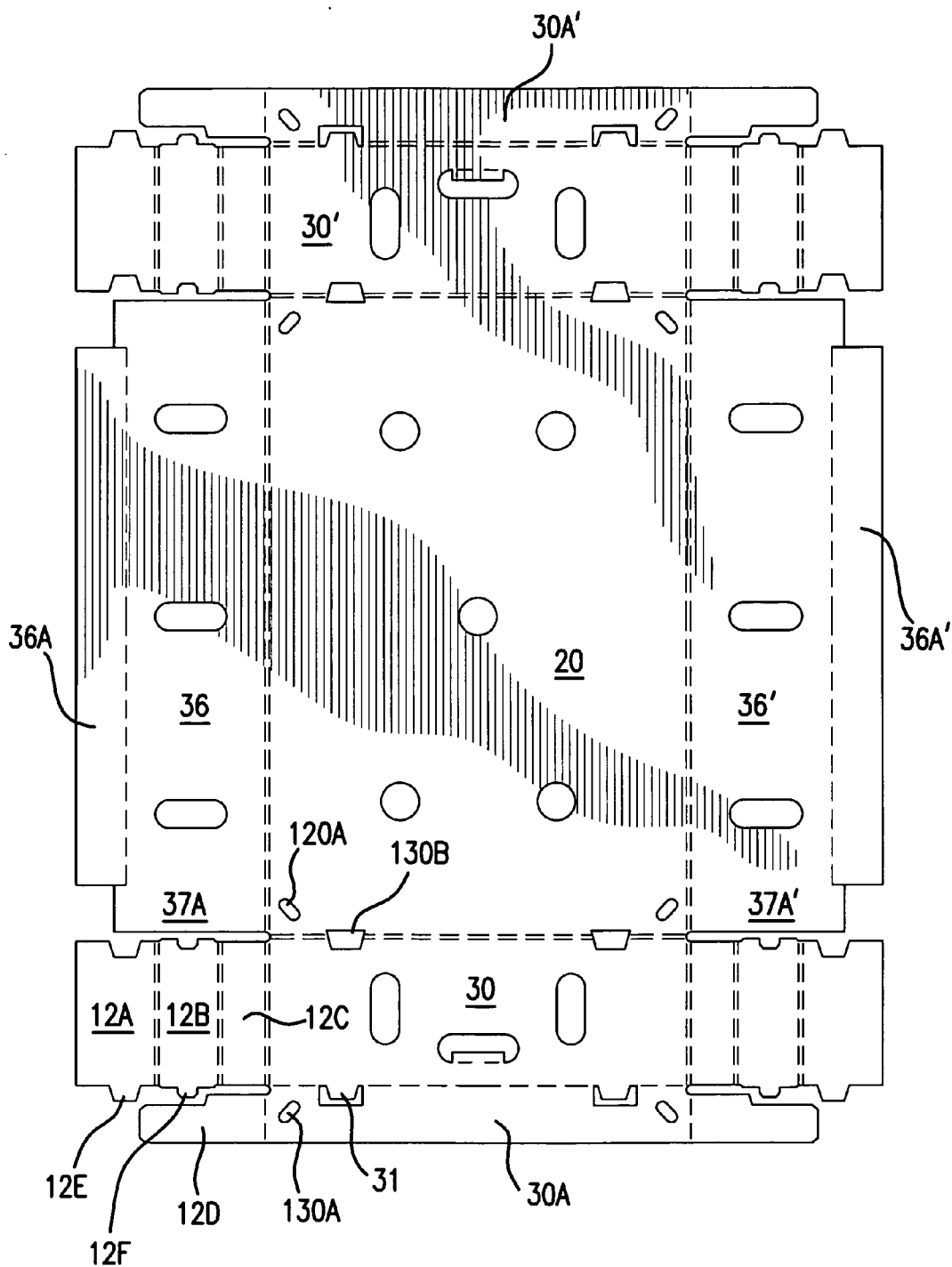


FIG. 1

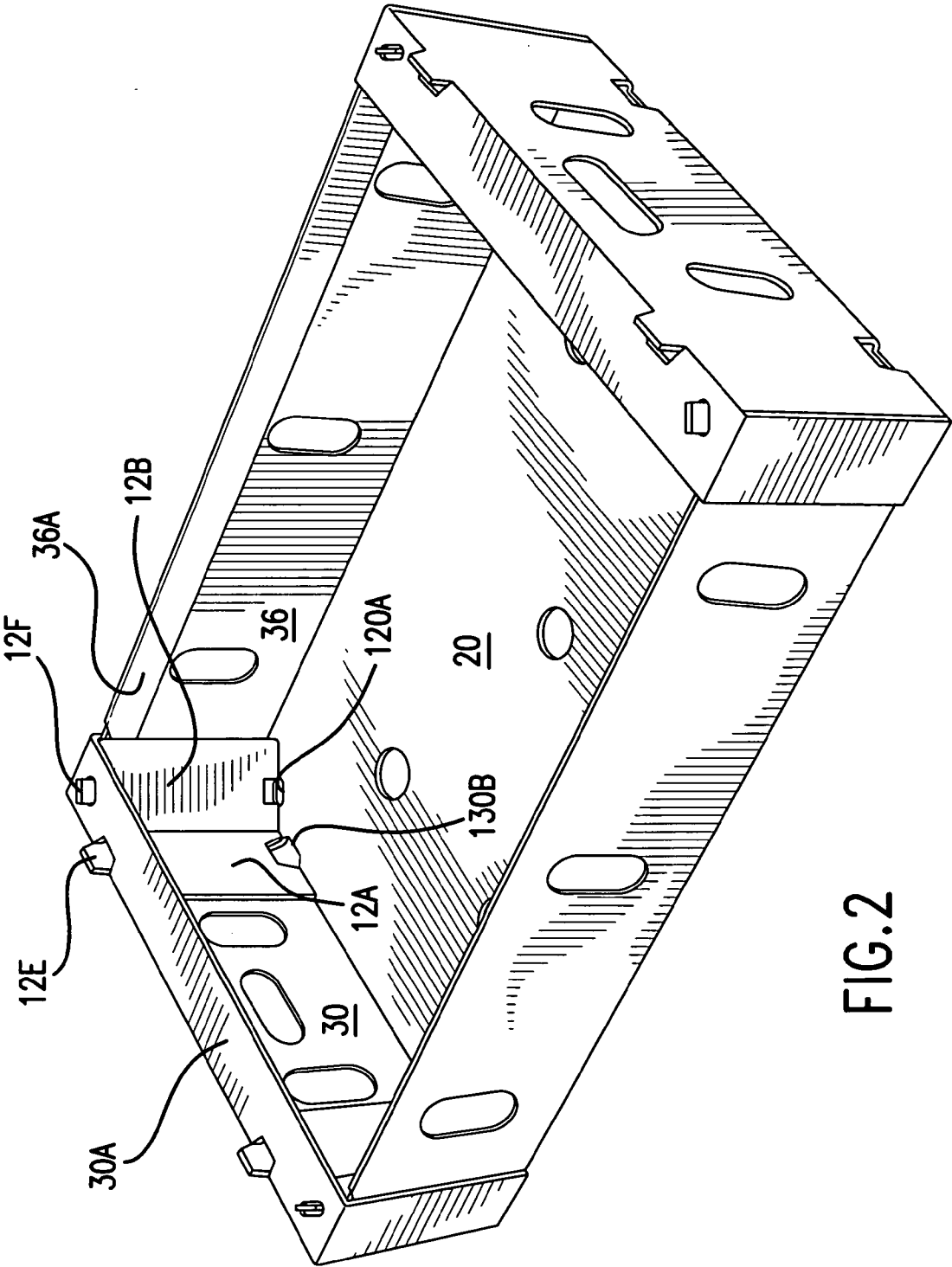
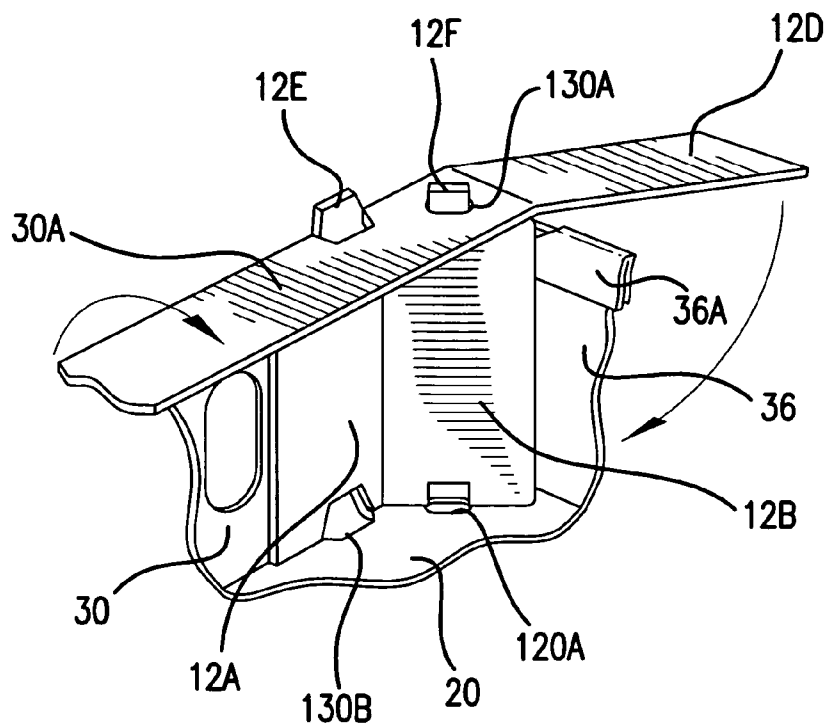
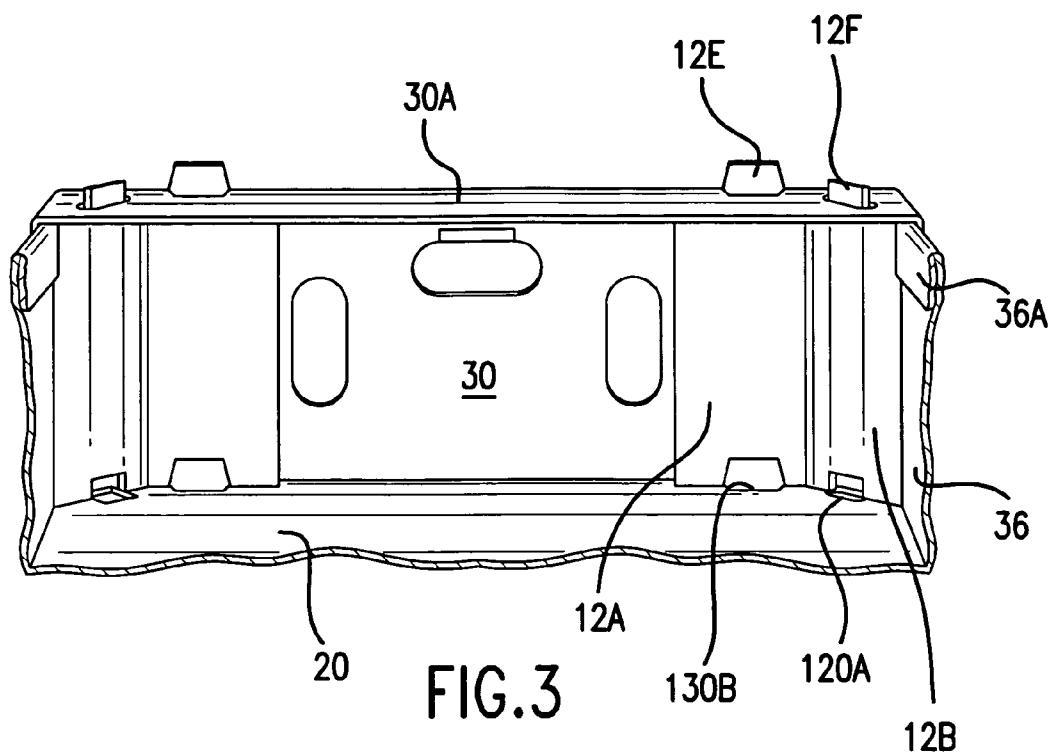


FIG.2



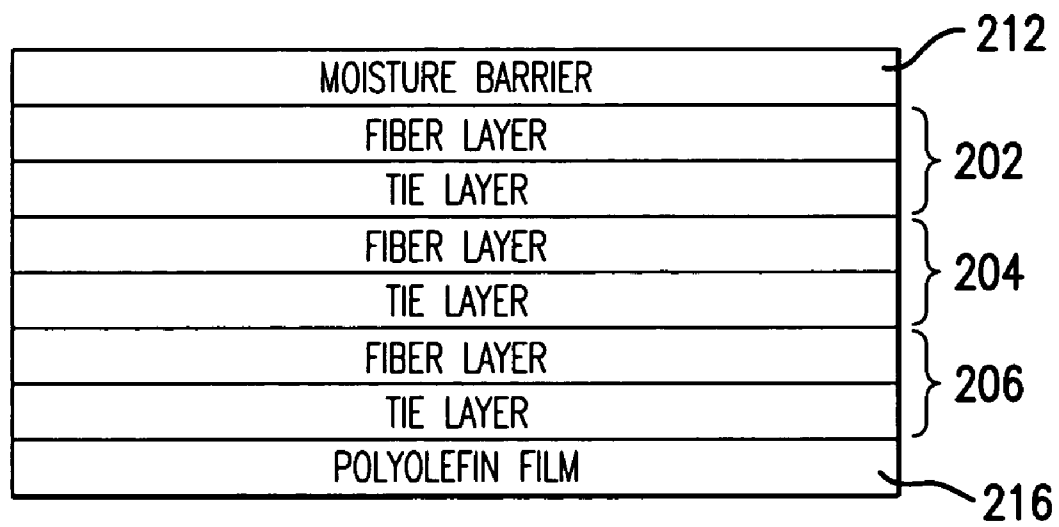


FIG.5

VEGETABLE AND FRUIT PACKAGING BOX

RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Application Ser. No. 60/730,062 filed on Oct. 25, 2005, and which is incorporated herein by reference.

FIELD OF THE INVENTION

[0002] This invention is directed toward containers for retaining, protecting, and displaying produce. In particular, the present invention relates to a produce container having an open top and which has improved qualities in terms of density, strength, recyclability, and durability. In addition, the container has improved graphics to support the use of packaging as a point-of-sale display container, too, as well as cleanable, stain resistant coatings.

BACKGROUND OF THE INVENTION

[0003] Corrugated paperboard has been used for many years as a starting material to produce containers. Typical containers of corrugated paperboard include a single piece tray design having a bottom wall, two side walls, and two end walls, each hinged to the bottom wall. Typically, a single piece of corrugated paperboard will be cut and scored to form a flat blank that will then be erected into a container.

[0004] Fruit and produce containers are often filled for transport and later stacked on site for display and/or storage purposes. As such, there are a variety of container configurations known in the art which facilitate the ability to stack multiple containers. However, typical corrugated containers are prone to damage which occurs during handling, stacking, or impact by equipment or other materials. Further, since many paperboard containers are shipped or stored under refrigerated conditions, ambient moisture absorbed by the container often weakens the container to the point that its utility is compromised.

[0005] Retailers prefer to use the shipping container for direct display for consumer sales. Typical corrugated containers used for this purpose often have minimal aesthetic properties. Further, such containers tend to be rapidly soiled by the container's contents which further reduces the appearance of the packaging and retail display.

[0006] There remains a need to provide a container for transporting produce that has increased durability, greater strength, is more economical to store and ship, and is readily recyclable in conventional re-pulping operations. Accordingly, there remains room for improvement and variation within the art.

SUMMARY OF THE INVENTION

[0007] It is one aspect of at least one of the present embodiments of the invention to provide a produce container having improved moisture resistance and moisture vapor transmission rates (MVTR) and yet retain the ability to be easily recycled in a re-pulping operation.

[0008] It is a further aspect of at least one of the present embodiments of the invention to provide for a produce container having a barrier film applied to an exterior surface of a flat container blank while an interior surface of the flat container blank has a vapor barrier applied to its surface. When assembled into a container, the resulting container has

improved resistance to moisture while the film coating applied to the exterior surface provides for an abuse barrier which is resistant to abrasion and surface damage. In addition, the film coating provides additional moisture control properties to the container blank and assembled container.

[0009] It is yet a further aspect of at least one of the present embodiments of the invention to provide for a fruit and vegetable transport and display container of a non-corrugated fiberboard comprising at least three layers of solid fiber laminates adhered together using a heat releasable adhesive. A first surface of a fiberboard blank used to construct the container is laminated to a polyethylene film having reverse print graphics. A second surface of the fiberboard blank has a vapor barrier layer applied. The resulting blank, when assembled into a container, exhibits improved aesthetics, increased stain resistance, increased moisture resistance, and provides for enhanced graphics while preventing contact between food items and the graphic inks.

[0010] It is yet a further aspect of at least one of the present embodiments of the invention to provide for a fiberboard blank having a first surface having a polyolefin film with reverse printing graphics applied thereto with a heat releasable adhesive, and a second surface of the fiberboard blank having a vapor barrier layer applied thereto. The fiberboard blank, when formed of multiple layers of solid virgin fiber, provides a substrate which, when assembled into a container, offers improvement in container strength, durability, edge crush properties, aesthetics, and recyclability.

[0011] It is a further aspect of at least one of the present embodiments of the invention to provide for a fiberboard fruit and produce container having a polyolefin printed film layer adhered thereto in which the film layer is applied with an adhesive which releases during a re-pulping operation.

[0012] These and other features, aspects, and advantages of the present invention will become better understood with reference to the following description and appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] A fully enabling disclosure of the present invention, including the best mode thereof to one of ordinary skill in the art, is set forth more particularly in the remainder of the specification, including reference to the accompanying drawings.

[0014] FIG. 1 is a plan view of an inner surface of an exemplary carton blank for a stackable container;

[0015] FIG. 2 is a perspective view of a stackable container embodying the present invention;

[0016] FIG. 3 is a perspective view illustrating an end wall of the container seen in FIG. 2;

[0017] FIG. 4 is a perspective view illustrating a corner of the container as seen in FIG. 2 and further indicating a sequence in which portions of the panels of the blank seen in FIG. 1 are folded to form the stackable container seen in FIG. 2; and, FIG. 5 is a cross-sectional view of the fiberboard blank seen in FIG. 1 and setting forth various layers used to construct the blank.

DESCRIPTION OF THE PREFERRED EMBODIMENT

[0018] Reference will now be made in detail to the embodiments of the invention, one or more examples of

which are set forth below. Each example is provided by way of explanation of the invention, not limitation of the invention. In fact, it will be apparent to those skilled in the art that various modifications and variations can be made in the present invention without departing from the scope or spirit of the invention. For instance, features illustrated or described as part of one embodiment can be used on another embodiment to yield a still further embodiment. Thus, it is intended that the present invention cover such modifications and variations as come within the scope of the appended claims and their equivalents. Other objects, features, and aspects of the present invention are disclosed in the following detailed description. It is to be understood by one of ordinary skill in the art that the present discussion is a description of exemplary embodiments only and is not intended as limiting the broader aspects of the present invention, which broader aspects are embodied in the exemplary constructions.

[0019] In describing the various figures herein, the same reference numbers are used throughout to describe the same material, apparatus, or process pathway. To avoid redundancy, detailed descriptions of much of the apparatus once described in relation to a figure is not repeated in the descriptions of subsequent figures, although such apparatus or process is labeled with the same reference numbers.

[0020] A container construction must meet varying expectations within the marketplace. Heretofore, some functional aspects of containers have been given greater emphasis. However, during the course of the present invention, it has been found that a container can be provided which better meets a wide range of marketplace needs. Containers need to be inexpensive yet easy to assemble mechanically. In addition, a produce container must offer excellent structural integrity to prevent collapsing or weakening of the container. A poorly constructed container can damage the goods or cause personal injury to workers should the integrity of the container fail. Ideally, such containers are stackable when filled with produce and should, therefore, have sufficient strength and stability to permit stacking. Such containers must also have ventilation holes and preformed handles within the container without compromising the strength or integrity of the container.

[0021] A wide variety of containers and container blanks are known in the art which are adequate for general purposes. In accordance with this invention, it has been found that improvements and new attributes of useful properties for such containers are possible by the careful selection of the materials used to construct the containers. The improvements and enhancements of the present invention provide for a structurally sound container while affording additional improvements as reflected in enhanced graphics, durability, and cleanability as well as improvements to the container materials to enhance the reuse, via re-pulping, of the used container.

[0022] One suitable, stackable container **10** is shown in reference to FIG. 2 as a preferred embodiment of the present invention. The container **10** is preferably constructed of non-corrugated fiberboard and comprises three separate layers of virgin fibers which are laminated together by an adhesive. While the use of virgin fibers is preferred in terms of product layers having greater density, strength, and having a compact layer thickness, recycled fibers could also be

used. As illustrated in FIG. 1, container **10** includes a bottom panel **20**, first and second sidewalls, **36** and **36'**, and first and second end walls **30** and **30'** which serve to form the basic structure of the container **10**.

[0023] The container **10** is preferably constructed from a paperboard blank as seen in reference to FIG. 1. The typical blank comprises a three-ply laminated construction of solid virgin fiber having layers **202**, **204**, and **206**, as seen in reference to the cross-sectional view of FIG. 5. In one exemplary embodiment, layers **202** and **206** may be formed from a 56 pound per 1,000 square feet of fiberstock material while layer **204** is comprised of a 69 pound layer.

[0024] The layers **202**, **204**, and **206** are laminated together using a cold water adhesive such as a vinyl acetate adhesive tie layer. It has been found beneficial to use a vinyl acetate adhesive tie layer having excellent cold strength properties which, when subjected to the elevated temperatures and agitation of a re-pulping operation, will release the bound fibers. One such suitable adhesive is marketed by The Reynolds Company (Greenville, S.C.) as Reynco 128-09C.

[0025] As further seen in reference to FIG. 5, a lower surface of the fiberboard stock has applied thereto a polyolefin film layer **216** such as a polyethylene film. The film **216** is adhered to fiber layer **206** using the same heat releasable adhesive identified above used to laminate the fiber layers **202** through **206**.

[0026] Film layer **216** is preferably reverse printed with various graphics, logos, and colors so as to enhance the visible appeal of the container thereafter assembled from the container blank. By using reverse ink printing, the inks used to print the film are sequestered between the inner surface of the film layer and the adjacent fiber layer **206**. In this manner, film layer **216** prevents contact between food items within the assembled container and the printing ink. This arrangement facilitates the use of a wider number and variation of printing inks so as to increase the color and aesthetic appeal of the assembled container. Further, the film layer **216** provides an easily cleanable surface which can be simply wiped clean so as to maintain an attractive display container. In addition, the barrier properties of film layer **216** are such that stains from various fruits and vegetables will not migrate into the paperboard and hence maintains the integrity of the container. Further, the barrier properties prevent the cellulosic substrate of the fiberboard from being colonized by bacterial or fungal growths which could otherwise occur should the paperboard absorb juice or other exudate from the produce.

[0027] The interior surface of the paperboard blank has a moisture resistant barrier applied onto its surface. One suitable coating is available from Michelman, Inc. (Cincinnati, Ohio) under the trademark Vaporcoat 2200™. It has been found that this barrier layer can be applied to the surface of the paperboard using conventional application techniques and oven dried, thereby imparting the moisture resistant coating **212** to the container stock interior surface. If needed, multiple coatings of about 2 pounds per 1,000 square feet per coating may be applied to the fiberboard. The coated surface **212** provides a great deal of the food contact surface of the resulting container. In addition to providing an improved moisture barrier, the coating layer **212** also provides for a lower coefficient of friction. The lower coefficient of friction minimizes bruising and abrasion between the

produce and the respective food contacting walls of the container. As such, damage to the produce is minimized. Further, the coating reduces the uptake of moisture, including liquids or juice which may be released by the produce. As such, coating **212** provides for a stain resistant barrier which therefore offers improved aesthetics to a retail consumer. Coating **212** also contributes to the improved strength attributes of the container **10**. As the passage of moisture into and through the fiber laminates is reduced, the strength and durability of the container is enhanced.

[**0028**] By sandwiching the fiber layers **202**, **204**, and **206** between a barrier film **216** on a first side of the blank and the moisture barrier layer **212** applied on the opposite surface of the blank, the moisture resistant properties of the blank of the resulting container are significantly improved. These improved properties bring about greater durability of the container, particularly in shipments of produce in which the containers are maintained in a high moisture, refrigerated environment. Frequently, such containers are also used as the product display container which further subjects the container to a variety of temperature and humidity fluctuations. Conventional corrugated paperboard containers exhibit significant weakening during such conditions. The present invention has a significant reduced moisture vapor transmission rate (MVTR) such that assembled containers exhibit greater strength following prolonged or multiple exposure to high humidity conditions.

[**0029**] The use of a solid fiber as opposed to a corrugated paperboard product offers additional advantages. The solid virgin fiber construction has less air and is more dense having a caliper of about 60 to about 80 points and resulting in a more compact container stock blank. As a result, container stock blanks can be shipped more efficiently by including a greater number of container blanks per volume of shipping container. In addition, the container blanks are more resistant to damage during shipping and handling and also have a lower coefficient of friction attributable to the respective film barrier layer **216** and moisture resistant layer **212**. As a result, there is less abrasion of the product during shipping as well as during assembly of the container. The smoother surfaces thus maintain the aesthetic qualities of the graphics component of the container.

[**0030**] Retailers and manufacturers are also under increased pressure from various government regulatory agencies in a number of countries to provide for manufactured products which can be 100% recycled and/or having constituent parts accounted for from "cradle to grave". It is one feature of the present invention that the fiberboard blanks and assembled containers have enhanced recyclability properties to facilitate their use in a fiber re-pulping operation. For instance, the adhesive used to laminate the multiple fiber layers and which is further used to adhere the printed film **216** to an adjacent fiber layer is a cold water adhesive. Such an adhesive maintains its adhesive properties during low temperature and/or damp conditions but has beneficial adhesive release properties when placed in warm water and agitation such as the conditions found in a commercial paper re-pulping operation. As such, the printed films may be easily separated from the fiber content of the fiberboard while enhancing the recyclability of the container. In addition, the use of virgin fibers in the fiberboard construction results in an end product which is desirable for

inclusion in a re-pulping operation since the fibers may be reused in a variety of additional paper and paperboard products.

[**0031**] Attributes of the present invention, including the use of premium virgin fibers, use of a film, and a reverse printed barrier layer for the separation of a recyclable moisture barrier for the interior portions of the container, are applicable to a large number of conventional container structures and container blank design configurations. For instance, there are a number of produce container blanks and container designs such as those seen in reference to U.S. Pat. Nos. 5,361,974; 5,370,303; and 4,056,223; which are incorporated herein by reference. While many of the prior art designs use a corrugated paperboard, such designs may be improved by the adoption of the laminated fiber construction, barrier film, and moisture resistant coating as taught herein.

[**0032**] One suitable container blank which has been modified in accordance with this invention using the materials and techniques referenced above is seen in reference to FIG. 1. As further seen in reference to FIG. 2, the assembled container provides an open area for receiving produce in which the produce makes contact with both an interior surface of the container blank as well as a film covered exterior surface of a container blank.

[**0033**] The container blank configuration shown above may be folded as known in the art so as to provide structurally reinforced corners as seen in reference to FIGS. 3 and 4. Further, the container provides a series of projecting tabs which are designed to interengage with corresponding openings along a bottom surface of an assembled container so as to facilitate stacking of the containers.

[**0034**] As seen in reference to FIGS. 3 and 4, a variety of panels defined by respective score lines are folded to provide the assembled container configurations. Reference is made herein to a single corner between a sidewall and an edge wall since the three remaining corners are formed in an analogous manner. The bottom wall **20** has attached thereto a pair of sidewalls **30** and **30'** and a pair of edgewalls **36** and **36'**. Sidewalls **30** and **30'** further define minor panels **12A**, **12B**, and **12C**, all of which are scored along the interior surface of the container blank. Panel **12A** is folded as seen in reference to FIG. 4 such that its interior portion is placed adjacent and opposite to an interior portion of panel **30**. As illustrated, ear **12E**, defined by an edge of panel **12A**, is placed opposite tab **31** and which is defined by cut out **30A**. When so folded, rear portion **12F**, which extends from panel portion **12B**, is placed into aperture **130A** defined within panel **30**. A panel **37A** is then placed against the exterior surface of panel **12C**, such that panel end **33** is thus folded in a substantially 90° angle relative to bottom wall **20**. Further securing of the corner pieces is made by placing the exterior surface of panel **36A** against the corresponding interior surface of panel **12D**. Simultaneously, flap **31** is positioned 90° relative to flap **33** so as to provide a shelf along the opposite edges of the assembled container. Panel **36A** is folded against an interior surface of panel **36**. As seen, the opposite side walls of the assembled container present a reinforced barrier film layer surface as the upper edge portion of the sidewall.

[**0035**] As seen in reference to FIG. 3, apertures **120D** and **130B** defined in the corners of bottom wall **20** and sidewalls

30 and 30' respectively are aligned so as to receive corresponding ears 12F and 12E when two containers are placed in a stacked configuration.

[0036] The above described embodiment has the reinforced corners which are useful in containers of this type of construction. However, there are numerous container shapes known in the art using materials such as corrugated fiberboard. The function and usefulness of such shaped products can be improved by the use of the multi-layer fiber laminate constructions taught herein in conjunction with the reverse printed barrier film layer which applied to an exterior surface of the container stock. Similarly, by applying to the interior surface of the container stock the moisture resistant coating, the resulting strength, durability, aesthetics, and recyclability of the assembled container is significantly enhanced.

[0037] Although preferred embodiments of the invention have been described using specific terms, devices, and methods, such description is for illustrative purposes only. The words used are words of description rather than of limitation. It is to be understood that changes and variations may be made by those of ordinary skill in the art without departing from the spirit or the scope of the present invention which is set forth in the following claims. In addition, it should be understood that aspects of the various embodiments may be interchanged, both in whole, or in part. Therefore, the spirit and scope of the appended claims should not be limited to the description of the preferred versions contained therein.

1. A produce container comprising:

- a bottom wall;
- a pair of opposite side walls and a pair of opposite edge walls each extending upwardly from opposing sides of the bottom wall;

said bottom wall, said edge walls, and said sidewalls, all formed from a single fiberboard blank, said blank comprising a laminate of at least three layers of virgin fibers, said fiberboard blank having a first surface having applied thereto a polyethylene film layer having reverse printed graphics thereon and a second side of said fiberboard surface having a coating of a moisture vapor barrier layer.

2. A paperboard blank used for constructing a produce container comprising:

- a paperboard substrate comprising at least 3 layers of fiber, each fiber layer joined to an adjacent fiber layer by a cold water adhesive tie layer;
- a polyethylene film layer having reverse printed graphics thereon applied to a first surface of said paperboard blank; and,

a tie layer joining said polyethylene film layer to said first surface, said tie layer being a cold water adhesive.

3. The produce container according to claim 1 wherein said at least 3 layers of virgin fibers are bonded together using a cold water adhesive.

4. The produce container according to claim 3 wherein said polyethylene film layer is bonded to said first surface using a cold water adhesive.

5. The paperboard blank according to claim 2 wherein said paperboard blank has a thickness of between about 60 to about 80 point and a basis weight of at least about 180 lbs. per 1,000 sq. ft. of paperboard.

7. The produce container according to claim 1 wherein said single fiberboard blank has a caliper of between about 60 to about 80 point and a basis weight of at least about 180 lbs. per 1,000 sq. ft. of board.

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