BOTTLE SHIPPING SYSTEM WITH TOP AND BOTTOM INSERTS

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ABSTRACT

Disclosed are systems and methods for an improved bottle packaging system and shipping container, and more particularly to a container wherein top and bottom inserts are employed to stabilize the bottle(s) and to provide impact resistant cushioning during shipment of liquids and the like. For a 4-bottle (quad) pack embodiment the improved insert design includes a fiber-molded bottom insert placed on the bottom of the carton for receiving the bottoms of a plurality of bottles and top insert fitting over the caps, necks and shoulders of bottles placed into the carton.
This application claims priority from U.S. Provisional Patent Application No. 62/207,952 for a BOTTLE SHIPPING SYSTEM WITH TOP AND BOTTOM INSERTS, by M. Gray et al., filed Aug. 21, 2015, which is hereby incorporated by reference in its entirety.

The disclosed packaging system is directed to an improved bottle shipping container, and more particularly to a container wherein a pair of inserts are employed to stabilize the bottle(s) and to provide impact resistant cushioning during shipment of liquids and the like. The improved packaging includes, in one embodiment, at least one of a pair of inserts, a first to receive and secure a bottle bottom, and a second to receive and restrain a bottle shoulder and neck region (bottle top). In one embodiment, the inserts and packaging system may be used for shipping chemicals and the like.

BACKGROUND AND SUMMARY

Glass bottles and similar containers are used for shipment of liquid products that may, for one reason or another, not be storable or shippable in plastic containers (e.g., made from polystyrene, polypropylene or polyvinyl chloride). For example, chemical products that must retain a high level of purity, are shipped in glass bottles because of the adverse reactions with plastic containers. However, glass bottles are brittle and shatter on impact. Therefore, it is necessary to cushion glass bottles containing chemical products to prevent breakage during shipping and storage. This is necessary, not only to protect the product itself, but also because these products are frequently solvents or other chemicals that present an environmental hazard if leaked or spilled.

Disposing of packaging material is an additional burden on those who receive bottles and who are already burdened with disposing of not only chemical waste but also of the bottles and packaging materials themselves. Any arrangement that can reduce the disposal burden on an end user of chemical products shipped and stored in bottles is of substantial importance. Moreover, it is desirable that such packaging materials be recyclable and made from recycled, or at a minimum, biodegradable materials.

Currently, it is generally known to package bottles of chemicals in expanded foam polystyrene (EPS) packing material, which is placed around the bottles within a corrugated paperboard container. A drawback of using EPS is that solvents in or on the bottles can dissolve the EPS, thus reducing or eliminating its cushioning purpose. Moreover, once the package is opened there are two discreet material groups which must be disposed of—the corrugated paperboard as well as the expanded polystyrene. Polystyrene foam also has environmental impacts itself, both because the gases that it releases as it decomposes and because of its exaggerated physical presence resulting from its rigid expanded cell structure that consumes a great deal of volume in landfills. Restricting the use of foamed polystyrene packaging is a priority of many solid waste and environmental organizations as well as governments. For example, a number of US cities have banned polystyrene food packaging.

In view of these considerations, there is a need for an economical replacement of polystyrene with a packing system that eliminates the dual waste streams and that uses a biodegradable packing material for which there are established, environment-friendly waste management processes in place.

In light of the above-noted problem, the disclosed packaging system provides an improved package with molded inserts. More specifically, the system provides both impact protection or cushioning for the bottle(s) and also assures the ease of use, and potential re-use, of such a system by employing an insert design that protects the bottles.

Disclosed in embodiments herein are systems and methods for bottle packaging system and shipping container, and more particularly to a container wherein top and bottom inserts are employed to stabilize the bottle(s) and to provide impact resistant cushioning during shipment of liquids and the like. For a 4-bottle (quad) pack embodiment the improved insert design includes a fiber-molded bottom insert placed on the bottom of the carton for receiving the bottoms of a plurality of bottles and top insert fitting over the caps, necks and shoulders of bottles placed into the carton.

FIG. 10 is a top view of a molded 4-pack top insert: FIG. 11 is a bottom view of a molded 4-pack top insert:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top view of a 4-pack bottom insert embodiment; FIG. 2 is a side view of the 4-pack bottom insert; FIG. 3 is a perspective view of the 4-pack bottom insert; FIG. 4 is a top view of a molded 4-pack bottom insert; FIG. 5 is a bottom view of a molded 4-pack bottom insert; FIG. 6 is a perspective view of the tool used to produce the 4-pack bottom insert of FIGS. 4-5; FIG. 7 is an illustration of a 4-pack top insert embodiment from a bottom view; FIG. 8 is a side view of the 4-pack top insert; FIG. 9 is a perspective view of the 4-pack top insert; FIG. 10 is a top view of a molded 4-pack top insert; FIG. 11 is a bottom view of a molded 4-pack top insert;
FIG. 12 is a perspective view of the tool used to produce the 4-pack top insert of FIGS. 10-11;

FIGS. 13-14 are, respectively, perspective illustrations of an outer carton and the manner in which the top and bottom inserts are placed into such a carton in one embodiment;

FIGS. 15A-15B are exploded views of a crush ring in the top insert in both an initial and a crushed state, respectively.

The various embodiments described herein are not intended to limit the disclosure to those embodiments described. On the contrary, the intent is to cover all alternatives, modifications, and equivalents as may be included within the spirit and scope of the various embodiments and equivalents set forth. For a general understanding, reference is made to the drawings. In the drawings, like references have been used throughout to designate identical or similar elements. It is also noted that the drawings may not have been drawn to scale and that certain regions may have been purposely drawn disproportionately so that the features and aspects could be properly depicted. Moreover, any dimensions included in the drawings are there to provide a relative representation of the size of a particular embodiment, but are not intended to limit the disclosed embodiment.

DETAILED DESCRIPTION

As more particularly set forth below, the disclosed system and methods for assembling an improved bottle shipping container, specifically a container wherein molded top and bottom insert designs are employed to stabilize the botle(s) and to provide padding during shipment and handling. As used herein the term bottle is intended to cover both a conventional glass bottle having a base, sides, shoulder, neck and re-sealable top, as well as other types of containers used for the storage and shipment of liquids and the like. The various embodiments described herein disclose configurations for the shipping container, and it is further contemplated that the methods and systems disclosed may be used to ship containers other than traditional bottles. Accordingly, the use of the term bottles is not intended to limit the disclosure or claims to conventional bottles or bottle designs.

The improved insert designs and associated packaging system permit a common insert to provide stabilization to the bottom and upper shoulder of the necked bottle(s) used for shipping chemicals and the like. Although generally described relative to a 4-bottle (quad) pack, it will be appreciated that the features of the disclosed packaging system, and in particular the top and bottom inserts, may be employed in packaging any number of bottles (e.g., single, double, triple, quad and six-pack configurations). Moreover, various sizes and types of bottles may be packaged using the disclosed inserts, and modifications thereof.

Referring to FIG. 1, bottom insert 100 of a 4-pack embodiment is illustrated from a top view. The molded bottom insert 100 includes four packaging cells or wells 110. Each cell comprises a depression defined by a continuous wall 112 that is sized and configured to receive the cylindrical bottom 1410 of a bottle 200 (see FIG. 14). The bottom of the depression, at the base of wall 112, includes intersecting ribs extending in segments 114 across the bottom thereof. The rib segments providing, in addition to the bottom surface 116 of the well, contact points for the lower part or bottom of a bottle partially inserted into the well. In other words, the bottom insert receives the bottom(s) of the bottle(s) and supports the bottle(s) in each well 110 in a spaced-apart and padded relationship with the sides, interior corners and bottom of the carton, as well as with one another. As further illustrated in the figures, the well 110 for each bottle bottom includes a plurality of vertical ribs 120 along at least a portion of a well wall 122. As illustrated, for example, in FIGS. 13-14, the bottom insert 110 is intended to be used in a packaging system inserted into a generally rectangular cross section carton 300. As further illustrated in FIGS. 1-6, each bottom insert well further includes a set of larger, primary ribs or rib segments 114 along the bottom thereof, the rib segments crossing or intersecting at a generally perpendicular angle at a position slightly off-center in the bottom of each well. Furthermore, the ribs or rib segments 114 extend to the walls of each well and transition to a similarly sized vertical rib 118 that extends up at least a portion of the well height (H) of approximately 6.25 in. Although the intersection of ribs 114 is not at the center of the well bottom, it will be appreciated from a review of FIGS. 1 and 4 that at least one rib associated with each well extends along a diagonal (e.g., 150) of the bottom insert.

The bottom insert also has an outer skirt 130, extending at a generally horizontal direction at least substantially all the way around the entire periphery of the 4-pack insert. It will also be appreciated that the well walls 112 are not completely cylindrical in shape (only inner portions thereof), but that all of the well wall features may have a slight draft or taper, with the lower portions being slightly smaller in size.

Vertical ribs 120 and 122 maintain the spaced-apart relationship between the respective cells and resist the compaction or compression relative to the cylindrical walls of each well 110. When a bottle is inserted within each cell 110 (see FIG. 13), the bottle is in frictional contact with the walls and rib edges of the cell 110 so that the bottle is held in position during shipping and storage.

FIG. 3 is a perspective view of the bottom insert 100. Ribs 120 are illustrated as providing a solid, continuous bridge between the cylindrical walls and the skirt of the insert and several ribs 122 provide a continuous bridge between adjacent inner well walls in the center of the insert. The skirt 130 also provides a generally continuous lower edge that is intended to provide a firm fit within an enclosure such as a corrugated box or carton 300, as will be described below. A draft angle of about 1-degree, is employed to assure that the skirt wall 130 is in contact with the side panels of the box thereby assuring that the insert does not easily move once inserted within carton 300. As noted above, a similar draft or taper is also provided on the well walls to permit a tight fit or contact with the bottles themselves.

Referring next to FIGS. 4 and 5, depicted therein are top and bottom views of an exemplary bottom insert 100, showing the four wells 110 defined by side walls 112 and ribs 120, 122. The outer edges of flange or skirt 130, as well as the bottom material thickness and bridges of the pulp material (e.g., 550) provide contact with the inner surfaces of carton 300 and provide cushion between the bottles therein.

Referring next to FIG. 6, depicted therein is a perspective view of a “female” mold tool 500 used to manufacture the bottom insert of FIGS. 1-5. It will be appreciated that various mold configurations may be
employed, and that certain mold elements may need to be altered or customized to the method of manufacture and the materials employed. In one embodiment the inserts 100 may be made by FIBERCELL PACKAGING, L.L.C using the mold depicted in FIG. 6, and a fiber material. In one embodiment the fiber material is made from recycled cellulose or other fibrous or pulp materials mixed with water or another carrier, and deposited on the surface of the mold. The fiber is attracted to the screen-like mold surface 510 by selectively pumping water from the reverse or opposite side of the mold.

[0035] Referring next to FIGS. 7-11, depicted therein are figures illustrating the top insert 170 for maintaining the position and cushioning the tops of each of the bottles 200 relative to one another and to a top of the carton, said top insert including a plurality of generally conical recesses 174, one for each bottle top, said recesses each having a series of shoulders 176, 178, 180 corresponding in size to at least the shoulder, neck and top of a bottle. At the “bottom” of each recess, adjacent the smallest shoulder 180, top insert 170 further includes a crush ring 182 suitable for absorbing the impact of the bottle relative to the carton in the event the carton is dropped on its top surface or a top corner. Referring briefly to FIGS. 15A and 15B, respectively, these figures depict the crush ring in an initial state and in a crushed state. The crush ring 182 is formed as a hollowed-out ring or recess positioned at a location that will be over the top of the bottle when the insert is placed in the package. The hollowed nature of the recess facilitates compaction of the fiber material in that region in the event of an impact to the top of the carton.

[0036] The top insert further includes, in each conical recess, a set of primary ribs 184, 186 crossing at a generally perpendicular angle. The primary ribs extend along the walls of each recess for at least a portion of the recess height (T), which may be on the order of 7.25 inches, but is also dependent upon the bottle shape and size. And, at least one primary rib associated with each recess extends along a diagonal 160 of the top insert.

[0037] Referring next to FIGS. 10 and 11, depicted therein are photographic views of the top insert 170, showing the four recesses 174 defined by side walls and ribs 184, 186. The outer edges of flange 190, as well as the bottom material thickness and bridges of the pulp material provide contact with the inner surfaces of carton 300 and provide cushion between the bottles therein.

[0038] Referring, next to FIG. 12, depicted therein is a perspective photographic view of a “female” mold tool 800 used to manufacture the top insert of FIGS. 7-11. It will be appreciated that various mold configurations may be employed, and that certain mold elements may need to be altered or customized to the method of manufacture and the materials employed. In one embodiment the inserts 100 may be made by FIBERCELL PACKAGING, L.L.C using the mold depicted in FIG. 12, and a fiber material. In one embodiment the fiber material is made from recycled cellulose or other fibrous or pulp materials mixed with water or another carrier and deposited on the surface of the mold (fiber is attracted to screen-like mold surface 810 by selectively pumping water from the reverse side of the mold).

[0039] FIG. 13 shows the empty corrugated paper board carton 300, consisting of single-walled conventional construction that may be used in accordance with one embodiment. It will be appreciated that various configurations of the box may be employed, but it would include a bottom panel(s) 310, side panels 320, and top panel(s) 330. The side panels 320 define a generally square or rectangular package cross-section having at least four corners 350. As will be further appreciated, the carton may be further reinforced, and may have alternate shapes and features as may be required by the particular application or types of containers being stored and shipped therein.

[0040] In one embodiment, the fiber used in the formation of the top and bottom inserts may include at least 50% Kraft paper material and less than 50% newsprint, and more particularly, about 60% Kraft paper and about 40% newsprint. It is however, possible to use varying compositions, even compositions that are at or about 100% Kraft paper material, or at or about 100% composite paper, as well as compositions that utilize alternative types of pulp/fiber materials as noted herein. One source of such materials may be recycled paper products such as cardboard, newsprint, etc. One process involves creating a vacuum formed plastic mold 500 representative of the insert shape depicted in the embodiments—described above.

[0041] This mold or “tooling” is mounted on a plate, which is subsequently mounted in pans of pulp molding machines. These machines include a tank that is continuously supplied with a slurry of corrugated Kraft and newsprint pulp. The pans are attached to a rotating wheel and as the wheel revolves, the pans are submerged in the pulp tank. The molds are connected to a vacuum, which draws the pulp solids onto the mold surface 510 and removes water. At the end of a rotation of the wheel, the individual pan reaches the unload station where an air blast blows the semi-solid pulp insert off of the mold 500. The insert is then transferred to a belt of a large multi-zone drying oven (e.g. gas-fired), which removes the remaining moisture. At the end of the oven, the inserts may be packed for shipment.

[0042] It will be further appreciated that various alternative materials may also be used, including various pulps, cellulose, sugar cane waste, palm waste, expanded starches, and foams (EPS). Preferably the materials employed in making the insert are recycled and/or recyclable. It is also contemplated that various handling tools and techniques may be employed to assist in the removal of the molded fiber inserts prior to and/or during a drying process (e.g. before stiffness and dryness of the insert achieves a desired level).

[0043] A packaging system such as depicted in FIGS. 13 and 14 employing the disclosed inserts not only provides for inexpensive packaging, it further provides a solution that is resistant to bottle breakage or damage. The disclosed packaging comprising inserts 100, 170, bottles 200 and container 300, meets the requirements for packaging as tested in accordance with one or more standardized tests, including: ASTM D5276, ASTM D4577, ASTM D999 and ISO 535. Furthermore, use of the common design for the bottom, middle and top inserts in the disclosed packaging system, permits the efficient use, reuse and re-packaging of such materials—thereby reducing the cost of handling and shipping liquids in various bottle configurations. Molded pulp packaging, in accordance with one embodiment of the insert, protects the product and can safely cushion even the most delicate contents such as a bottle(s). A lightweight and cost-effective alternative to most conventional types of packaging, the product is made from 100% recycled materials and is 100% biodegradable.
Although described herein relative to a fiber-based insert, the disclosed system may indeed be suitable for use with alternative packaging materials, including biodegradable or other plastics, starch compounds, etc. Another possible manufacturing process may involve a vacuum-formed plastic having insert shape depicted in the embodiment of FIGS. 1 and 7. It will be appreciated that other techniques such as blow-molding and the like may also be used to manufacture the inserts. It should be further appreciated that various alternative materials may also be used, including various pulps, cellulose, sugar cane waste, palm waste, expanded starches, and foams (EPS). The materials employed in making the insert are preferably recycled, recyclable, or in the alternative biodegradable.

It should be understood that various changes and modifications to the embodiments described herein will be apparent to those skilled in the art. Such changes and modifications can be made without departing from the spirit and scope of the present disclosure and without diminishing its intended advantages. It is therefore anticipated that all such changes and modifications be covered by the instant application.

What is claimed is:

1. A packaging system for a plurality of bottles, comprising:
   - a carton having paper board panels defining a space, the panels meeting to define a plurality of interior corners;
   - a bottom insert receiving bottoms of the plurality of bottles and supporting the bottles in a spaced-apart and padded relationship with one another and with the bottom, sides and interior corners of the carton, said bottom insert including a well for each bottle bottom where each of said wells includes a plurality of vertical ribs along at least a portion of a wall; and a top insert maintaining the position and cushioning the tops of each of the bottles relative to one another and to a top of the carton, said top insert including a plurality of generally conical recesses, one for each bottle top, said recesses having a series of shoulders corresponding in size to at least the shoulder, neck and top of a bottle.

2. The packaging system according to claim 1, wherein said carton is of a generally rectangular cross section.

3. The packaging system according to claim 1, wherein said bottom insert further includes a set of primary ribs along the bottom thereof, said ribs crossing at a generally perpendicular angle at a position off-center in the bottom of each well.

4. The packaging system according to claim 3, wherein said primary ribs extend to the walls of each well and transition to a similarly sized vertical rib that extends for at least a portion of the well height.

5. The packaging system according to claim 4, wherein at least one primary rib associated with each well extends along a diagonal of the bottom insert.

6. The packaging system according to claim 1, wherein said top insert further includes a pair of primary ribs, said ribs crossing at a generally perpendicular angle.

7. The packaging system according to claim 6, wherein said pair of primary ribs extend along the walls of each recess for at least a portion of the recess height.

8. The packaging system according to claim 4, wherein at least one said pair of primary ribs associated with each recess extends along a diagonal of the top insert.

9. The packaging system according to claim 1, wherein each conical recess in said top insert further includes a crush ring.

10. A bottom insert for use in a packaging system for a plurality of bottles, the insert supporting the bottles in a spaced-apart and padded relationship with one another and with the bottom, sides and interior corners of a carton, the bottom insert comprising:
    - a well for each bottle bottom, where each of well includes a plurality of vertical ribs along at least a portion of a well wall; and
    - a set of primary ribs along the bottom of each well, said ribs crossing at a generally perpendicular angle at an off-center position along the bottom of each well.

11. The bottom insert according to claim 10, wherein said primary ribs extend to a wall well of each well and transition to a similarly sized vertical rib that extends for at least a portion of the well height.

12. The bottom insert according to claim 11, wherein at least one of said primary ribs in each well extends along a diagonal of the bottom insert.

13. A top insert for use in a packaging system for a plurality of bottles, the insert retaining the bottles in a spaced-apart and padded relationship with one another and with the top, sides and interior corners of a carton, the top insert comprising:
    - a plurality of generally conical recesses, one for each bottle top, said recesses having a series of shoulders corresponding in size to at least the shoulder, neck and top of each bottle, said shoulders maintaining the position and cushioning a top of each bottle relative to one another and to the top of the carton; and
    - a pair of intersecting primary ribs, said ribs crossing at a generally perpendicular angle relative to one another.

14. The top insert according to claim 13, wherein said primary ribs extend along the walls of each recess for at least a portion of the recess height.

15. The packaging system according to claim 14, wherein at least one primary rib associated with each recess extends along a diagonal of the top insert.

16. The packaging system according to claim 13, wherein said top insert further includes a crush ring adjacent the smallest diameter of each recess.