

[54] **KNOCKDOWN FOAMED PLASTIC SHIPPING CONTAINER**

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[51] Int. Cl. **B65d 7/30**

[58] Field of Search.....220/6, 7, 9 F, 97 R, DIG. 9, 220/DIG. 12; 229/30

[56] **References Cited**

UNITED STATES PATENTS

3,156,371	11/1964	Harrison.....	220/6
3,448,914	6/1969	Scholz.....	220/97 X
3,432,061	3/1969	Anderson	220/7
3,473,690	10/1969	Cazenove.....	220/97 X
3,497,127	2/1970	Box.....	220/6 X
3,506,154	4/1970	Barnes.....	220/97 X

FOREIGN PATENTS OR APPLICATIONS

1,467,411	12/1966	France.....	220/6
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[57] **ABSTRACT**

A unitary knockdown foamed polystyrene shipping container blank molded in a single operation for fruits, comestibles and other articles has a flat rectangular bottom wall with the four sidewalls hinged thereto by integral thin flexible hinge portions. Two of the sidewalls have slots therein adjacent their side edges and two of the other sidewalls have ears projecting from their respective side edges for insertion into the slots to lock the adjoining sidewalls together. Two of the side walls have lugs on each of their upper corners which project beyond the plane of the side walls and the top edges of the sidewalls. The lugs are adapted to interlock with recesses formed in the bottom corners of the side walls having the lugs thereon of an adjacent shipping container. A recess in two of the side walls allows air to circulate freely around the containers when stacked in side-by-side relation.

7 Claims, 8 Drawing Figures

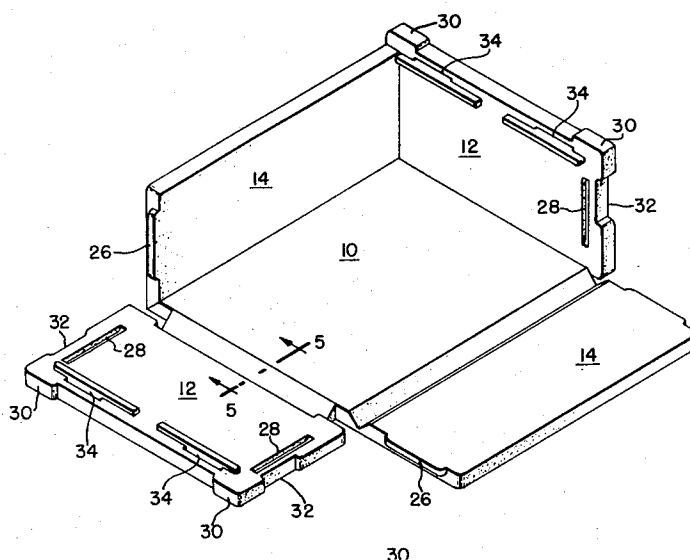


FIG-3

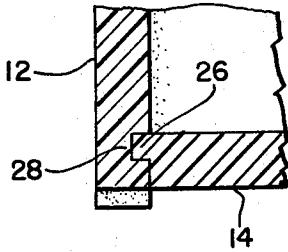


FIG-4

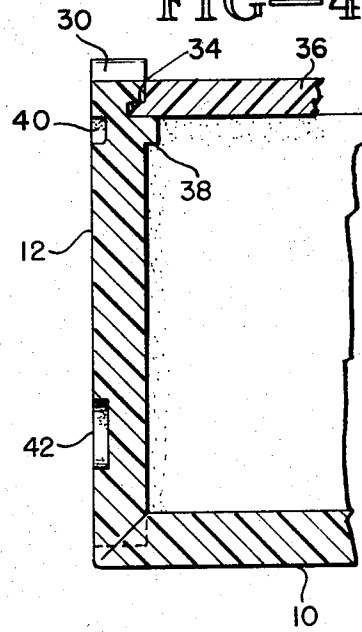
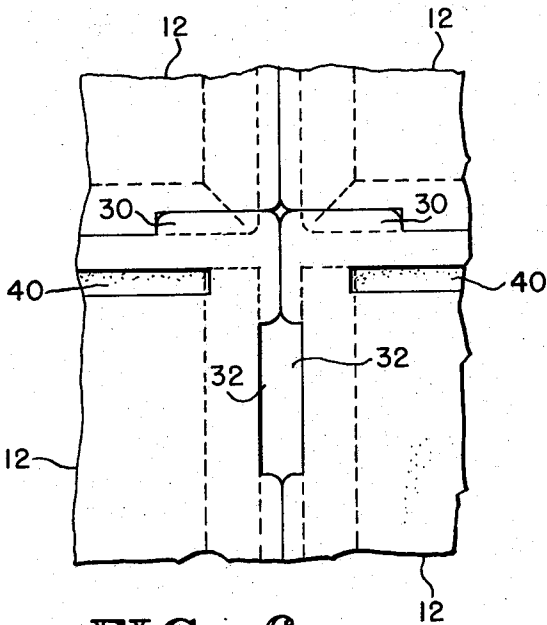


FIG-5

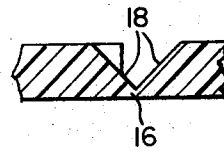


FIG-6

FIG-8

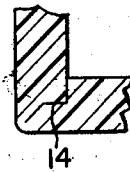
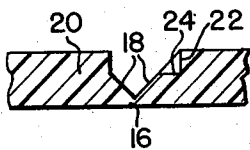


FIG-7

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KNOCKDOWN FOAMED PLASTIC SHIPPING CONTAINER

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a one-piece knockdown shipping container of foamed bead polystyrene formed in a single pressing operation.

2. Prior Art Relating to the Disclosure

Fruits, particularly peaches, pears, cherries, apples and other comestibles are generally packed in containers and the containers stacked in refrigerated locations for storage or shipment. During storage and/or shipment the articles are refrigerated under relatively high humidity conditions to preserve their quality as best possible. Generally wooden boxes have been used to ship fruit. Wooden boxes, however, must be assembled and stored in advance of packing of the fruit. This creates a problem in that large numbers of the boxes must be stored prior to the beginning of picking. It is difficult to predict the number of boxes needed and an excess is generally kept readily available. Attempts have been made to use reinforced paperboard shipping containers for fruit and other comestibles but these have not been entirely successful because of the breakdown of the containers under the relatively high humidity conditions encountered during shipment and/or storage of the fruit.

Shipping containers formed from plastic materials are described in U.S. Pat. Nos. 3,497,127 and 3,156,371. The shipping containers described, however, lack many desirable features when shipping and/or storing fruit and other comestibles.

SUMMARY OF THE INVENTION

This invention relates to a unitary knockdown container blank of foamed plastic forming, when erected, a rigid shipping container. The container comprises a bottom wall and sidewalls lying in the same plane connected to the respective edges of the bottom wall by thin flexible integral hinges formed during the pressing operation, the hinges allowing folding of the side walls from a flat position in the same plane as the bottom wall to an erect position at substantially right angles to the bottom wall. Two opposite walls of the container have ears projecting from their opposite side edges and two other opposite walls have complimentary slots therein for receiving the projecting ears so as to interlock the sidewalls together. Integral lugs are provided on each of the upper corners of two opposite walls, the lugs extending above top edges of the sidewalls. The lugs are adapted to interlock with recesses formed in the bottom corners of the same sidewalls which carry the lugs of an adjacent container, thereby allowing the erected shipping containers to be stacked on top of one another without danger of slippage.

It is a primary object of this invention to provide a lightweight foamed plastic shipping container having sidewalls hinged to the bottom edges of the bottom wall by integral hinge portions formed during the molding operation.

It is a further object of this invention to provide a unitary foamed plastic shipping container molded in a single press operation which can be shipped in knockdown form and easily assembled for use in a minimum of time without the necessity of expensive equipment.

It is a further object of this invention to provide a foamed plastic container having interlocking lugs so that the containers can be readily stacked.

It is a further object of this invention to provide a foamed plastic container allowing free flow of air therearound during storage and/or shipment of fruit and other comestibles.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the shipping container of this invention with two of the sidewalls shown in assembled position and the other two walls in collapsed or knockdown condition;

FIG. 2 is a perspective view of the shipping container of this invention in assembled form with a top fitted thereon;

FIG. 3 is a partial cross-sectional view along line 3—3 of FIG. 2 illustrating the interlocking sidewalls;

FIG. 4 is a cross-sectional view along line 4—4 of FIG. 2;

FIG. 5 is a cross-sectional view along line 5—5 of FIG. 1 showing the configuration of the integral hinge portions connecting each of the sidewalls to the bottom wall;

FIG. 6 is a partial end view of a group of stacked containers illustrating the manner in which the shipping containers of this invention can be stacked, the configuration of the container allowing free flow of air around the containers;

FIG. 7 is a partial cross-sectional view of a modified integral hinge between the bottom wall and sidewall of the container, the sidewall in the same plane as the bottom wall; and

FIG. 8 is the same hinge shown in FIG. 7 with the side wall in erect position.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The container illustrated in FIG. 1 has a bottom wall and side walls connected thereto by thin flexible integral hinge portions formed during the molding operation by a process described in applicant's co-pending application Ser. No. 27,704, filed Apr. 13, 1970, entitled "Liners and/or Containers of Expanded Polystyrene Having Integral Hinge Portions and the Method of Their Manufacture." The shipping container of this invention can be shipped in knockdown or flat form with the sidewalls in the same plane as the bottom wall. To assemble the container the sidewalls are folded along the flexible hinge portion at right angles to the bottom wall. The adjoining sidewalls are connected by insertion of the ears projecting from the edges of two of the opposite side walls into the complimentary slots formed in the other two sidewalls. Adhesive tape, adhesive alone or other suitable means are used to hold the adjoining sidewalls together.

The shipping container of this invention is preferably made of a foamed plastic such as bead polystyrene. The containers are molded in a single press operation by introducing prefoamed polystyrene beads into a molding cavity of the design FIG. 1 would assume with the two erected sidewalls in collapsed position. The cavity with the prefoamed beads therein is heated to a temperature sufficient to cause the beads to further expand and fill the mold cavity and fuse with one another into a rigid integral container. One of the inner mold surfaces has V-shaped projections therein defining the fold lines for the container. The flexible hinge portions are formed by momentarily moving one of the mold surfaces, generally the one having the V-shaped projections, away from the opposed mold surface, thereby expanding the area of the mold cavity. The drawback of the mold is only momentary, followed by immediate reduction of the mold cavity to substantially the original area. Generally a time period of 0.25 to 3 seconds and preferably 1 to 1½ seconds occurs during expansion and reduction of the mold cavity. On reduction of the mold cavity the expanded polystyrene beads beneath the V-shaped projections are partially collapsed, resulting in a zone of greater density in the area of the base of the V-shaped projections. The distance between the base of the Vee and the opposite mold surface is from one sixty-fourth to one-sixteenth inches and preferably one thirty-second inch. Heat concentration is greater in the area of the V-shaped projections because of the close distance separating the opposed mold surfaces. The increased heat aids in formation of greater density at the base of the Vee projections and results in a flexible hinge. If desired additional heat input may be employed in the vicinity of the Vee projections. This may be provided by steam or other suitable means.

As shown in FIG. 1 the container includes a flat rectangular bottom wall 10, end walls 12 and sidewalls 14. The end walls and side walls are joined to the respective edges of the bottom wall by integral hinge portions shown in cross-section in FIG. 5. The integral hinge portions are formed during the pressing

operation as described and include a relatively thin flexible portion 16 at the base of a V-groove. The sides of the V-groove 18 slope upwardly at about a 45° angle. A preferred hinge is shown in FIGS. 7 and 8 wherein one side of the V-groove is provided with a shoulder 20 running the length of the groove. The opposite side of the V-groove is provided with an indentation 22 adapted to mate with the shoulder when the sidewall is erected. When the containers are stacked one on top of the other the horizontal surface 24 bears a portion of the downward force exerted by the weight of the stacked containers on the integral hinges of the containers.

The thickness of the end, side and bottom walls can be varied as desired depending on the rigidity and strength needed for the particular product to be shipped.

The sidewalls 14 include integrally molded ears 26 projecting from each of the side edges of the sidewalls. Complementary slots 28 molded into the inner surface of the adjoining end walls adjacent the side edges thereof are adapted to receive the projecting ears of the sidewalls so that the side and end walls are interlocked together when the container is erected. Once erected the side and end walls are held together by a strip of adhesive tape secured around the outer surfaces of the end and side walls. Other suitable means may also be used to hold the side and end walls together.

Integral lugs 30 are molded on each of the upper corners of the end walls for stacking of the containers. The lower corners of the end walls, when erected, do not extend downwardly as far as the outer surface of the bottom wall, thereby providing recesses at each of the four corners of the containers of a size to receive and interlock with lugs 30 of another container when the containers are stacked.

The side edges of the end walls project beyond the outer surface of the sidewalls. Channels 32 having a bottom surface coincident with the outer surface of the sidewalls are preferably provided in the end walls to permit air circulation around the containers when stacked in rows side-by-side. Interlocking of the containers and the air channels are shown in FIG. 6 which is a partial representation of two rows of two stacks of containers. In a carton having a bottom length and width of about 14½ inches and 12½ inches respectively, and sidewalls about 7 inches high the lugs 30 project above the plane of the top edge of the end walls about three-sixteenths inch.

When ready for use the sidewalls of the containers in flat or knockdown form are erected and then the end walls erected. The projecting ears of the sidewalls are inserted into the slots in the end walls. The side and end walls are secured with adhesive tape or other suitable means. The containers are then ready to be filled.

If a top is desired horizontal slots 34 may be formed near the top of the end walls as shown in FIG. 1 to receive tabs of a suitably designed top 36 made of paperboard, foamed polystyrene, plastics such as polyethylene, or other suitable materials. Horizontal projections 38 directly beneath slots 32 are formed in the end walls for support of the weight of the top 36. Recesses 40 directly behind each of the projections 38 receive the projections 38 of an other container when the container blanks are stacked for shipment.

Recesses 42 may also be provided in the end walls as shown in FIGS. 2 and 4 to allow the containers to be picked up easily. It may be desirable to wrap the entire container, when filled, with a heat shrinkable plastic film.

The shipping container of this invention is light in weight, reusable and sufficiently strong to meet shipping standards. If the fruit or other comestibles to be shipped are to be stored, air is able to circulate freely around each of the stacked containers.

The embodiments of the invention in which a particular property or privilege is claimed are defined as follows:

1. A one-piece knockdown container blank of foamed plastic forming, when erected, a shipping container for comestibles and other articles, comprising:

a bottom wall and sidewalls of foamed plastic, the sidewalls connected to the respective edges of the bottom wall by V-shaped grooves, the base of the V of each of the grooves being thin flexible hinge portions of the same foamed plastic material but of reduced thickness with the sidewalls of the V-grooves sloping upwardly from the base of the V at about a 45° angle to allow folding of the sidewalls of the container blank from a flat position to an upright position,

projections protruding from the side edges of two opposite sidewalls,

slots adjacent the side edges of two other sidewalls for receiving the projections in the two opposite walls to interlock the sidewalls together,

integral lugs formed in the upper corners of opposite sidewalls extending above top edges of the sidewalls at each of the four corners of the shipping container when in the erect position,

recesses molded in the lower corners of opposite walls at each of the four corners of the shipping container when in the erect position, the lugs of one shipping container adapted to be received in corresponding recesses of an adjacent shipping container, thereby interlocking the erected containers together when stacked.

2. The container of claim 1 wherein the terminating edges of two opposite sidewalls extend beyond the outer planer surface of the intersecting sidewalls and wherein channels are formed in each of the extensions, the bottom surfaces of the extensions being substantially coincident with the outer planer surface of the intersecting sidewalls to permit air circulation around the erected containers when stacked in side-by-side relation.

3. The container of claim 1 wherein one sidewall of the V-grooves is provided with a shoulder having a substantially horizontal surface running the length of the groove and the other sidewall of the V-grooves is provided with an indentation running the length of the groove, the indentation adapted to mate with the shoulder when the sidewalls of the container are in erect position so that the horizontal surface of the shoulder bears a portion of the downward force exerted on the integral hinge portions of the container when they are stacked one above the other.

4. A shipping container for comestibles of fused together expanded polystyrene beads comprising:

a flat rectangular bottom wall, sidewalls and end walls connected along their lower edges to the respective edges of the bottom walls by V-shaped grooves, the base of the V of the grooves being thin flexible hinge portions of the same expanded polystyrene material but of reduced thickness, the sidewalls of the V-grooves sloping upwardly from the base thereof from at about a 45° angle to allow folding of the side and end walls from a flat position to an upright position,

ears projecting from each of the side edges of the sidewalls of the container,

complementary slots for each of the projecting ears formed adjacent each of the side edges of the end walls for interlocking the side and end walls together when in upright position,

integral lugs formed in the upper corner of each of the end walls extending above the top edges thereof, complementary recesses formed in each of the lower corners of the end walls, the lugs of one shipping container adapted to fit into the complementary recesses of an adjacent shipping container to interlock the containers together when stacked.

5. The container of claim 4 wherein one sidewall of the V-grooves is provided with a shoulder having a substantially horizontal surface running the length of the groove and the other sidewall of the V-grooves is provided with an indentation running the length of the groove, the indentation adapted to mate with the shoulder when the sidewalls of the container are in erect position so that the horizontal surface of the

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shoulder bears a portion of the downward force exerted on the integral hinge portions of the container when they are stacked one above the other.

6. The shipping container of claim 4 including slots running parallel to the top edge of the end walls and adjacent the top edge of the end walls adapted to receive tabs of a top for the container.

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7. The shipping container of claim 4 including projections in each of the end walls extending inwardly when the end walls are in erect position, the projections running parallel to the top edges of the end walls and directly beneath the slots for supporting a top for the container.

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