June 3, 1969 E. L. BAILEY ETAL 3,447,672

BULGING CARTONS

Filed Sept. 20, 1967 Sheet 1 of 3

FIG. 1

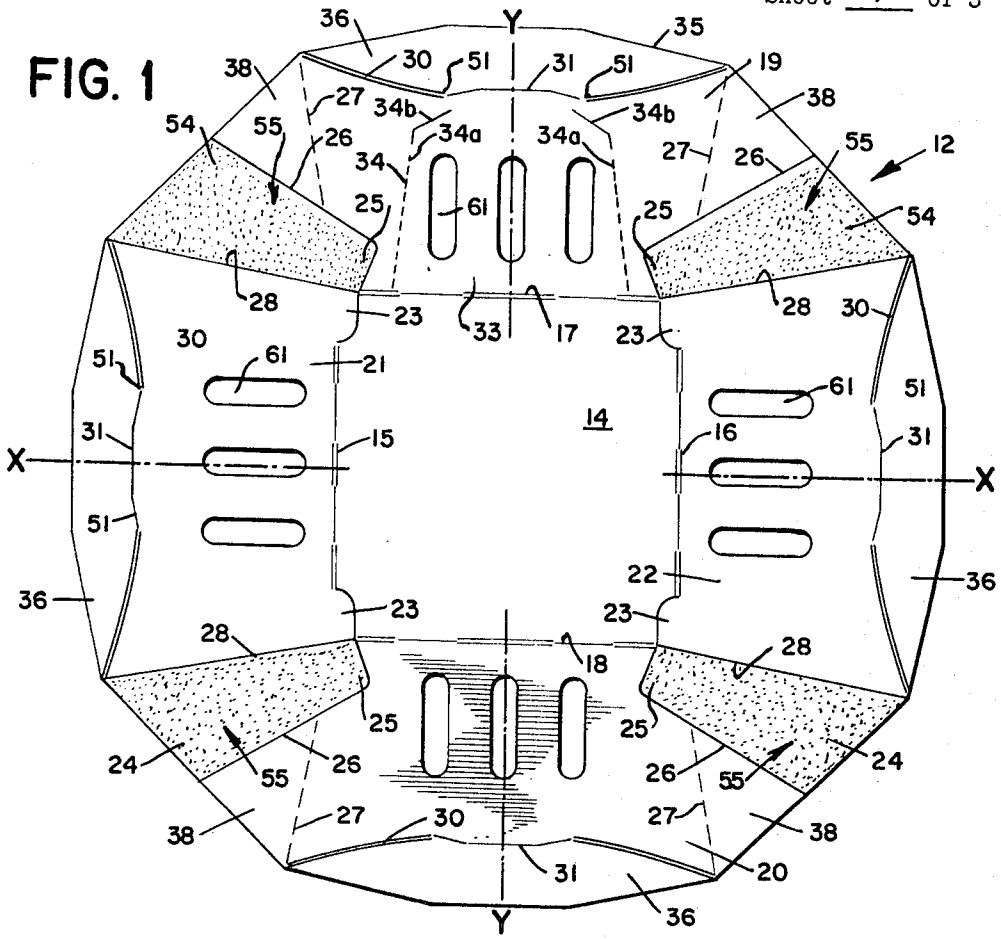

FIG. 2

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Sheet 2 of 3

FIG. 3

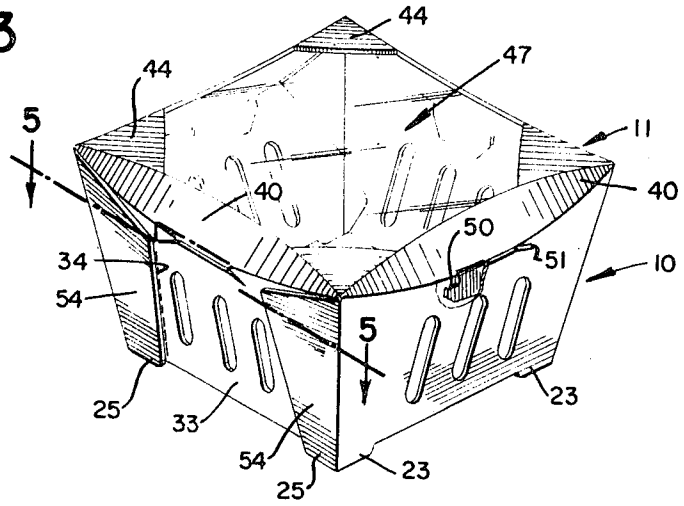


FIG. 4

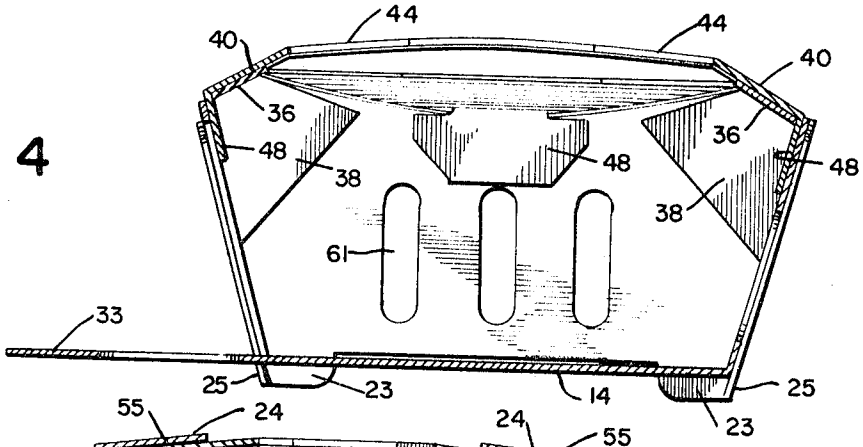
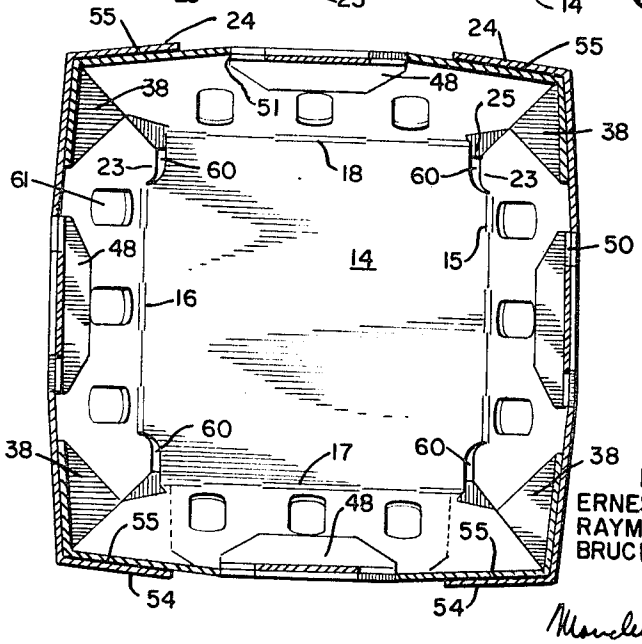


FIG. 5



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Sheet 3 of 3

FIG. 6

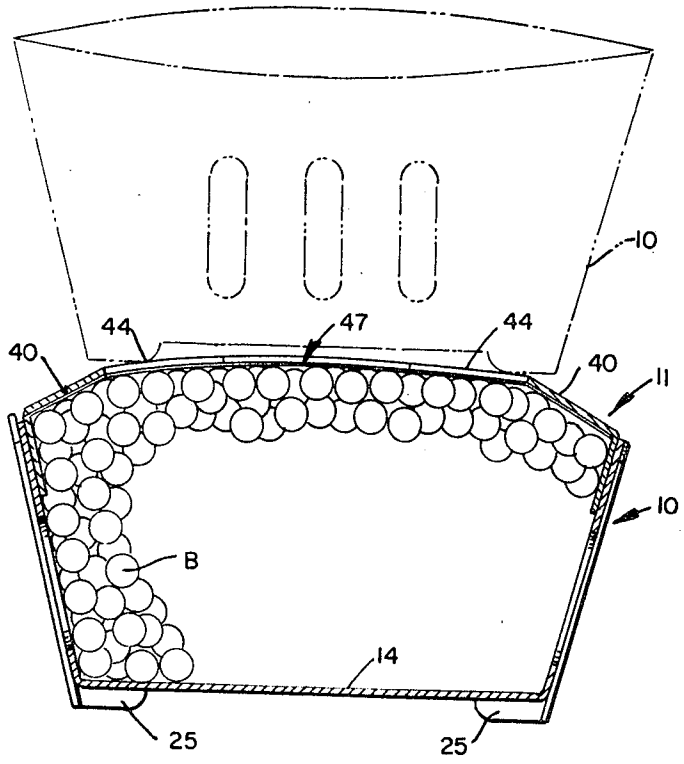
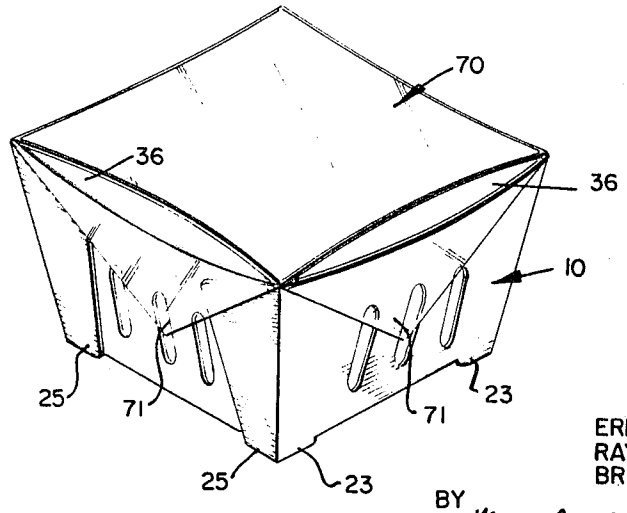


FIG. 7



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3,447,672

BULGING CARTONS

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U.S. Cl. 206—45.31
15 Claims

ABSTRACT OF THE DISCLOSURE

The invention is directed to improved, two piece covered bulging cartons for commodities such as berries and the like, the trays of which are erected from novel polygonal or generally circular blanks and the covers of which cartons have varying degrees of bulge. The two piece carton is of a unique rigidified construction which includes legs for rigidifying the carton and for facilitating the stacking of a plurality of boxes one upon the other without crushing the packaged contents; tear opening arrangements for providing access to the interior of the carton through a side wall; and bottom ventilating ports formed automatically by the erection of the rigidifying legs.

Relation to copending applications

The present invention is closely related to and represents an improvement in the invention disclosed in copending application Ser. No. 520,684, filed Jan. 14, 1966, now United States Patent No. 3,343,660, for "Box Closure."

Summary of invention

In the packaging of perishable and fragile commodities such as berries, for example, it has been the practice to use simple baskets and trays of various configurations and to fill and cover the same manually. The present invention is directed to an improved, covered bulging carton which provides unusually great protection to the packaged commodity, lends itself to rapid filling and assembly in automated packaging machinery.

Specifically, the carton of the invention includes a bulging tray of the general type disclosed in said application 520,684 which is formed from a new and improved, generally circular blank and which is rigidified at its corners by glue flap legs. More specifically, the erection of the glue flap legs forms a plurality of ventilating ports in the tray bottom. Additionally, base or foot portons of the glue flap legs are arranged to be supported on web portions of bulging covers of the general type disclosed in said application 520,684 without crushing the contents of the cartons. Thus, the new cartons may be freely stacked one upon the other.

As an important aspect of the invention, a uniformly sized bulging tray may have its capacity varied by using new and improved bulging covers having varying degrees of bulge. Specifically, the covers are formed from blanks having uniform outer dimensions and configurations but having varying inner dimensions and configurations.

Another important aspect of the invention is the provision of a new and improved tear opening tongue in one of the tray walls. This novel arrangement allows the cover and tray to be locked in a tamperproof manner while providing ready access to the contents of the carton.

For a more complete understanding of the present invention, reference should be made to the following detailed description taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a plan view of a blank for a tray embodying the principles of the invention;

FIG. 2 is a plan view of a blank for a cover embodying the principles of the invention;

FIG. 3 is a perspective view of an erected two piece carton embodying the inventive principles and formed from the blanks of FIGS. 1 and 2;

FIG. 4 is a cross-sectional view showing details of construction of the carton of FIG. 3 and illustrating the manner in which the new carton is opened;

FIG. 5 is a transverse cross-sectional view of the carton of FIG. 3 taken along line 5—5 thereof;

FIG. 6 is a cross-sectional view of the carton of the invention showing the manner in which it may be stacked; and

FIG. 7 is an alternate embodiment of the invention.

Referring now to FIG. 3, the preferred embodiment of the new carton includes a bulging tray **10** and a mating bulging cover **11** which are formed from blanks of paperboard sheet material **12**, **13**, respectively, shown in FIGS. 1 and 2.

In accordance with the invention the tray blank **12** is symmetrical about its two major axes XX and YY and has a base panel **14** disposed at its center. As shown the perimeter **35** of the blank is polygonal and has a sufficient number of straight edges (typically sixteen) in relation to its overall size to be characterized as being generally circular. For reasons of economy of paperboard (optimized nesting of multiple blanks on a press sheet) and for easier alignment of the blank in carton forming operations, the polygonal configuration or a blank having at least one straight edge at its perimeter is preferred.

Specifically, the base panel **14**, which is generally square shaped, is articulated to minor side wall panels **19**, **20**, respectively, along hinge lines **17**, **18** formed by alternate score lines and cut lines, and is articulated along similar hinge lines **15**, **16** to major side wall panels **21** and **22**. In accordance with the principles of the invention, the major side wall panels **21**, **22** include foot portions **23** which extend inwardly of the base panel edges defined by the hinge lines **15–18**.

As a further important aspect of the invention, the major side wall panels **21**, **22** on both sides thereof include full depth glue flap legs **24** and **54** which extend for the entire depth of the carton and include foot portions **25** which are derived from the minor side wall panels **19**, **20** and are contiguous with the foot portions **23**. More specifically, and as shown, the glue flap legs carry an adhesive coating **55**; however, the marginal edges of the glue flap legs **54** are free of adhesive for reasons to be explained hereinafter. As shown in FIG. 1, the foot portions **25** extend into the general wall forming portions of the minor panels **19** and **20** and are separated therefrom and from the base panel **14** by continuous cuts **26** which extend from the outer perimeter of the blank **12** in a more or less J-shaped course to the hinge lines **15**, **16**. In accordance with the invention, the J-shaped cut lines include chevron-shaped portions which define the bottom edges of the foot portions **23** and **25** in such a manner that they will lie in a common horizontal plane when the blank is erected into a tray with sloped walls.

The side edges of each of the minor wall panels **19**, **20** and the major wall panels **21**, **22** are defined by crease lines **27**, **28** respectively. As shown, the crease lines **27** extend from the periphery of the blank convergently toward intersections of the extensions of the hinge lines **15–18** while the crease lines **28** extend convergently from the periphery and terminate at the opposite ends of the hinge lines **17**, **18**. More specifically, the crease lines **27** also cooperate with the perimeter of the blank and the cuts **26** to define a generally triangular assembly flap **38** on the opposite side edges of the minor wall panels **19**, **20**.

As shown in FIG. 1, and in accordance with the teachings of the aforementioned application number 520,684, the upper edges of each of the wall panels **19–22** is defined by a generally arcuate score line **30** which is interrupted at its centermost portion by a locking slit **31** having an orientation generally opposite that of the score line **30**. Thus, the circular or substantially circular outer edges **35** of the blank **12** will cooperate with the score lines **30** to define a series of substantially elliptical bulge panels **36** adjacent and articulated to the upper edges of each of the side wall panels **19–22**.

In accordance with a very important aspect of the invention, at least one of the wall panels is provided with the unique tear opening tongue **33** which extends, as shown in FIG. 1, for the full depth of the minor side wall panel **20**. The tear opening tongue **33** has side edges **34** which are divergently tapered from the ends of the slit **31** toward the base panel **14**. More specifically, the slit **31** defines the upper edge of the tongue **33** while the side edges **34** of the tear opening tongue **33** are formed by gradually tapering lines of perforation **34***a* extending from the hinge line **18** score line **30** and by abruptly and sharply tapering cuts **34***b* which extend beneath the ends of the locking slit **31**. As will be appreciated, the tear opening tongue **33** may be simply separated from the side wall panel **20** by grasping its upper margin and severing the portions of the blank between the slit **31** and the cuts **34***b* and the lines of perforation **34***a*.

As shown in FIG. 2 a blank **13** for the bulging lid or cover **11** includes four substantially elliptical cover bulge panels **40** arrayed with their major axes generally definitive of the shape of the base panel, i.e., a square. In accordance with the teachings of the aforementioned application Serial No. 520,684, the cover bulge panels **40** are interconnected along the score lines **42** by relatively broad, tapered web portions **44**, as shown, and the outer edges **41** of the cover bulge panels **40** have substantially the same curvature as the edges **30** of the tray bulge panels **36**. The inner edges of the bulge panels **40** and the tapered web portions define a central opening or window **46** which, as shown may be closed off with a transparent plastic sheet **47**.

As an important aspect of the present invention, uniformly sized cover blanks may be used with uniformly sized trays to form cartons having different capacities. Specifically, the precise degree of the bulge of a cover having predetermined and fixed outer dimensions is controlled by the shape of the score lines **42** which define the inner edges of the cover bulge panels **40** and the edges of the web portions. For example, the score lines **42** may be provided with the same curvature as the outer edges **41** to provide substantially symmetrical cover bulge panels and a "normal" degree of bulge. However, the inner score lines **42** may be given a greater curvature as shown in phantom in FIG. 2 by broken lines **43**, thus providing more budge of the cover, and thus increasing the volume of the erected two-piece carton. When the inner edges of the bulge panels have the greater curvature defined by the lines **43**, the tapered web portions **44** will be comparatively more narrow and may be extended further inwardly toward the center of the cover as shown in phantom by broken lines **45**.

Web shaped locking tabs **48** of conventional configuration are hinged to each of the cover bulge panels along score lines **49**. The locking tabs are, of course, adapted to be inserted into the locking slits **31** of the tray and to be securely held therein when the covers and trays are automatically assembled in the manner set forth in greater detail in the copending application Serial No. 566,014, of William H. Bennert et al., for "Berry Boxer.' More specifically, the undercut edges **50** of the locking tabs are adapted to be securely engaged under locking portions **51** formed in the wall panels **19–22** adjacent the slits **31**. This well-known type of locking of the two elements of the carton is so effective that it is virtually impossible to separate the cover from the tray without mutilating one or the other. In other words the new carton is effectively tamperproof and cannot be opened without detection. Of course, the provision of the tear opening tongue **33** in the side wall **20** greatly enhances the use of the new tamperproof carton for ordinary packaging applications.

The tray **10** of the present invention, as shown in FIG. 3, may be simply erected from the blank **12** by folding each of the side wall panels **19–22** upwardly about the hinge lines **14–18** and thereafter securing each of the glue leg flaps **24**, **54** to the outer surface portions of the minor wall panels **19**, **20**. As will be appreciated, the glue leg flaps **24**, **54** cover the portions of the minor wall panels from which the foot portions **25** are derived and provide the tray with four similarly shaped, complete walls. The assembly flaps **38**, as shown best in FIG. 5, underlie the major wall panels **21**, **22** and with the glue leg flaps **24**, **54** contribute to the rigidification of the tray corners.

At this stage in its erection, the tray **10** has four generally flat walls which are sloped upwardly and outwardly from the bottom panel **14**, which itself is elevated by feet formed in each of the corners of the carton by the contiguous foot portions **23** and **25**. Thereafter, each of the tray bulge panels **36** is inwardly folded to give an arcuate curvature or bulge to the side wall panels **19–22** and simultaneously to open the locking slits **31** to receive the wedge shaped locking tabs **48** of the cover. After the tray has been filled, with a commodity such as berries B, for example, the cover **11** is formed and attached thereto by infolding each of the cover bulge panels **40** along its inner arcuate score line and thereafter folding and inserting the wedge shaped locking tabs into the open slits **31** to form the package shown in FIG. 3. Details of new and improved machinery for assembling the cover **11** to the tray **10** may be had from the copending application Serial No. 566,014, aforementioned.

As an important aspect of the invention, and as shown in FIG. 6, the completed cartons may be stacked one upon the other safely and without crushing the contents of the cartons. The foot portions **23** and **25** of the erected trays **10** are arranged to be supported on each of the web portions **44** of the covers **11** of an underlying carton. Furthermore, and as an important aspect of the invention, bottom vent openings **60** (FIG. 5) are formed automatically at the lower corners of the carton tray when it is erected from a blank. To provide additional ventilation of packaged commodities each of the side walls may be provided with air vents **61** as shown in the drawings.

In use, the new carton may be opened very simply by merely severing the tear opening tongue **33**, as described hereinabove, and pivoting it along the hinge line **17** away from the plane of wall **19**. Advantageously and as a further aspect of the invention, the carton may be reclosed by returning the tongue **33** to its initial position in the plane of the wall **19** where it is held by the marginal edges of the glue panels **54** which slightly overlap its edges, as shown in FIG. 5.

In some packaging applications, it may be desirable in the interest of economy or for greater display of the contents to employ a draped, rectangular cellophane sheet in lieu of the cover **11** shown in FIG. 3. Thus, as shown in FIG. 7, a square, transparent sheet of plastic **70** may be draped in a catercornered manner across the top of the tray with each of its corners **71** disposed centrally of a side wall and then adhered thereto. In this manner the tray bulge panels **36** will impart a bulging configuration to the tray and may additionally serve as indicia bearing surfaces which will be visible through the cellophane sheet.

From the foregoing, it will be apparent that the new cartons provide a construction which may be produced economically in large quantities and which may be readily filled and completed on automatic packaging equipment of the type disclosed in more detail in copending appli-

cation of William H. Bennert et al., Serial No. 566,014, for "Berry Boxer." Furthermore, the new construction provides a rigid carton which may be safely stacked in vertical columns. Additionally, the new carton may be provided with varying degrees of bulge by using different cover blanks having identical outer dimensions but having bulge panels and interconnecting tapered webs of varying configurations. Still further, the new carton provides a virtually tamperproof closure while also providing easy access to the contents through an improved tear opening tongue.

We claim:

1. A substantially circular blank of sheet material for a tray or the like, including
(a) a base panel having a polygonal configuration disposed with its center coincident with the center of said blank;
(b) wall panels articulated to each of said edges of said base panel;
(c) the side edges of said wall panels extending radially outwardly to the perimeter of said blank from the corners of said base panel;
(d) arcuate score lines extending inwardly between the intercepts of said side edges and said perimeter to define the upper edges of each of said side walls and with said perimeter to define elliptical panels contiguous therewith;
(e) flap means articulated to side edges of said wall panels and being derived from substantially all the sheet material disposed between the edges of adjacent wall panels.

2. A blank in accordance with claim 1, in which
(a) the perimeter of said blank includes at least one straight edge.

3. A blank in accordance with claim 1, in which
(a) said arcuate score lines are interrupted by centrally disposed locking slit means.

4. A blank in accordance with claim 3, in which
(a) said slit means are substantially arcuate cuts of curvature opposite to that of said arcuate scores.

5. A blank in accordance with claim 1, in which
(a) said flap means include individual flaps articulated to each edge of each of said wall panels;
(b) continuous cuts separate adjacent ones of said flaps;
(c) the outer edges of adjacent ones of said flaps are defined by a single straight line.

6. A blank in accordance with claim 1, in which
(a) lower portions of selected ones of said flap means includes foot-forming portions.

7. A blank in accordance with claim 6, in which
(a) said base panel is generally four sided; and
(b) said foot-forming portions are derived from corners of said base panel.

8. A blank in accordance with claim 1, in which
(a) one of said wall panels includes a tear opening tongue;
(b) the side edges of said tongue are defined by converging lines of severance extending from said base panel toward the arcuate line defining the upper edge of said wall panel;
(c) the upper edge of said tongue is defined by a substantially arcuate locking slit disposed centrally of said arcuate line.

9. A blank in accordance with claim 1, in which
(a) one of said wall panels includes a tear opening tongue;
(b) the side edges of said tongue are defined by converging lines of severance extending from said base panel toward the arcuate line defining the upper edge of said wall panel;
(c) the upper edge of said tongue is defined by a substantially arcuate locking slit disposed centrally of said arcuate line;
(d) said flap means includes glue flaps articulated to the wall panels adjacent said one wall panel;
(e) said glue flaps are of sufficient size to overlap said lines of severance when said blank is formed into a tray.

10. A stackable, rigid, closed polygonal carton comprising
(a) a tray having a plurality of upstanding walls articulated to a common base panel;
(b) the upper edges of said walls are arcuate;
(c) substantially elliptical panels are articulated to said upper edges;
(d) said walls slope outwardly and upwardly from said base panel;
(e) means interconnecting said walls to form the corners of said tray;
(f) contiguous foot means extending in the planes of said side walls at said corners beneath the horizontal plane of said base panel;
(g) said foot means being derived at least in part from said base panel;
(h) a cover for said tray including a plurality of generally horizontal web portions disposed at upper corners of said carton in vertical line with said foot means, whereby said web portions are adapted to support said foot means of another tray similar to said aforementioned tray;
(i) said cover includes a plurality of elliptical panels connected by said web portions;
(j) said elliptical panels slope inwardly and upwardly from said side walls.

11. A carton in accordance with claim 10, which includes
(a) tear opening tongue means formed in at least one of said side walls;
(b) lines of severance extending from said base panel toward said locking slit means defining the side edges of said tongue means;
(c) said locking slit means defining the upper edge of said tongue means.

12. A carton in accordance with claim 11, in which
(a) said foot means are included in adhesively coated glue flap legs which connect the corners of said tray;
(b) marginal portions of at least two of said glue flap legs are free of adhesive and overlap said lines of severance;
(c) whereby said tongue means may be held in a reclosed position by said marginal portions.

13. A carton construction comprising
(a) a tray portion including a bottom and a plurality of interconnected side walls;
(b) each of said walls having an elliptical support flap articulated thereto along arcuate score lines of predetermined curvature;
(c) substantially arcuate locking slit means of opposite curvature to that of said score lines formed at central portions thereof;
(d) whereby the partial inward folding of said elliptical flaps outwardly flexes said bottom walls and opens said locking slit means;
(e) cover means having a shape generally similar to said bottom structure and including a plurality of elliptical bulge panels;
(f) web means interconnecting said bulge panels along arcuate score lines of similar curvature to that of said first-mentioned lines;
(g) wedge shaped locking tab means articulated to the free edges of each of said bulge panels and adapted to be inserted into said locking slit means to lock said cover to said tray portion with said elliptical panels in a predetermined bulged relation; and
(h) tear opening tongue means formed in at least one of said side walls;
(i) lines of severance extending from said base panel toward said locking slit means defining the side edges of said tongue means;
(j) said locking slit means defining the upper edge of said tongue means.

14. A carton construction comprising

(a) a rectangular tray portion formed of paperboard or the like having a plurality of interconnected, normally flat planar side walls;

(b) bulge panels articulated along substantially arcuate score lines to upper edges of said side walls;

(c) said tray bulge panels being infolded toward the center of said tray and out of the normally flat planes of the side walls to impart an outwardly bulging curvature thereto;

(d) transparent plastic sheet means cooperating with and maintaining said bulge panels in said infolded, side wall bulging positions.

15. A carton in accordance with claim 14 in which

(a) said sheet means is rectangular and is disposed in a catercornered relation with said tray.

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U.S. Cl. X.R.

229—8, 16, 32, 45