

[54] **FOLDED, ONE-PIECE, LIQUID-TIGHT TRAY AND BLANK FOR FORMING SAME**

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[51] Int. Cl. B65d 5/24
[58] Field of Search 229/31, 32, 35; 99/171

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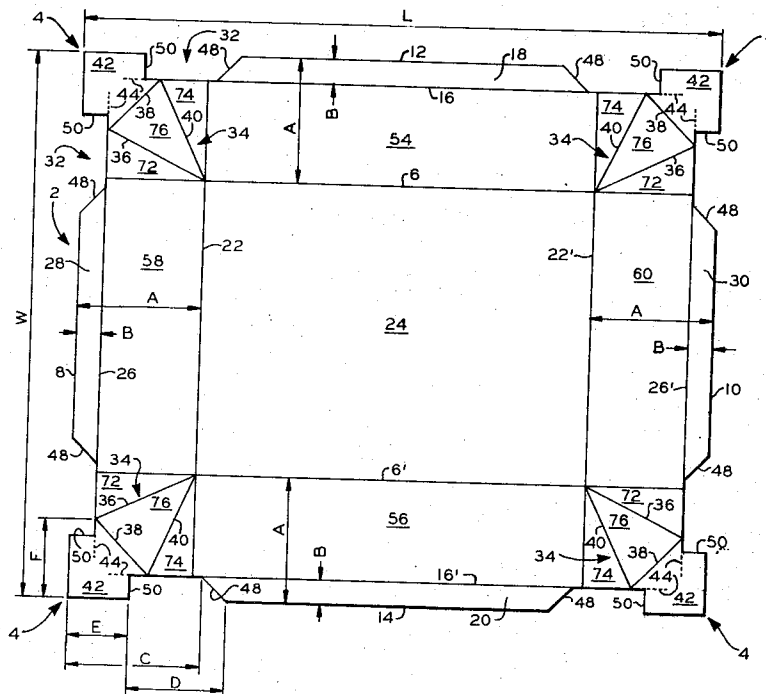
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[57] **ABSTRACT**

A folded, one-piece, liquid-tight tray and blank for forming same. The blank is of rectangular configuration having corners. A plurality of score lines are formed on the blank for forming a tray having a bottom, side and end walls, outwardly extending edge rims, and a corner fold line of triangular configuration in each tray corner for forming a corner supporting column. The corner fold lines define a tab at each corner each of which has two cut lines for inserting associated edge rims therein and maintaining the folded supporting column.

10 Claims, 6 Drawing Figures



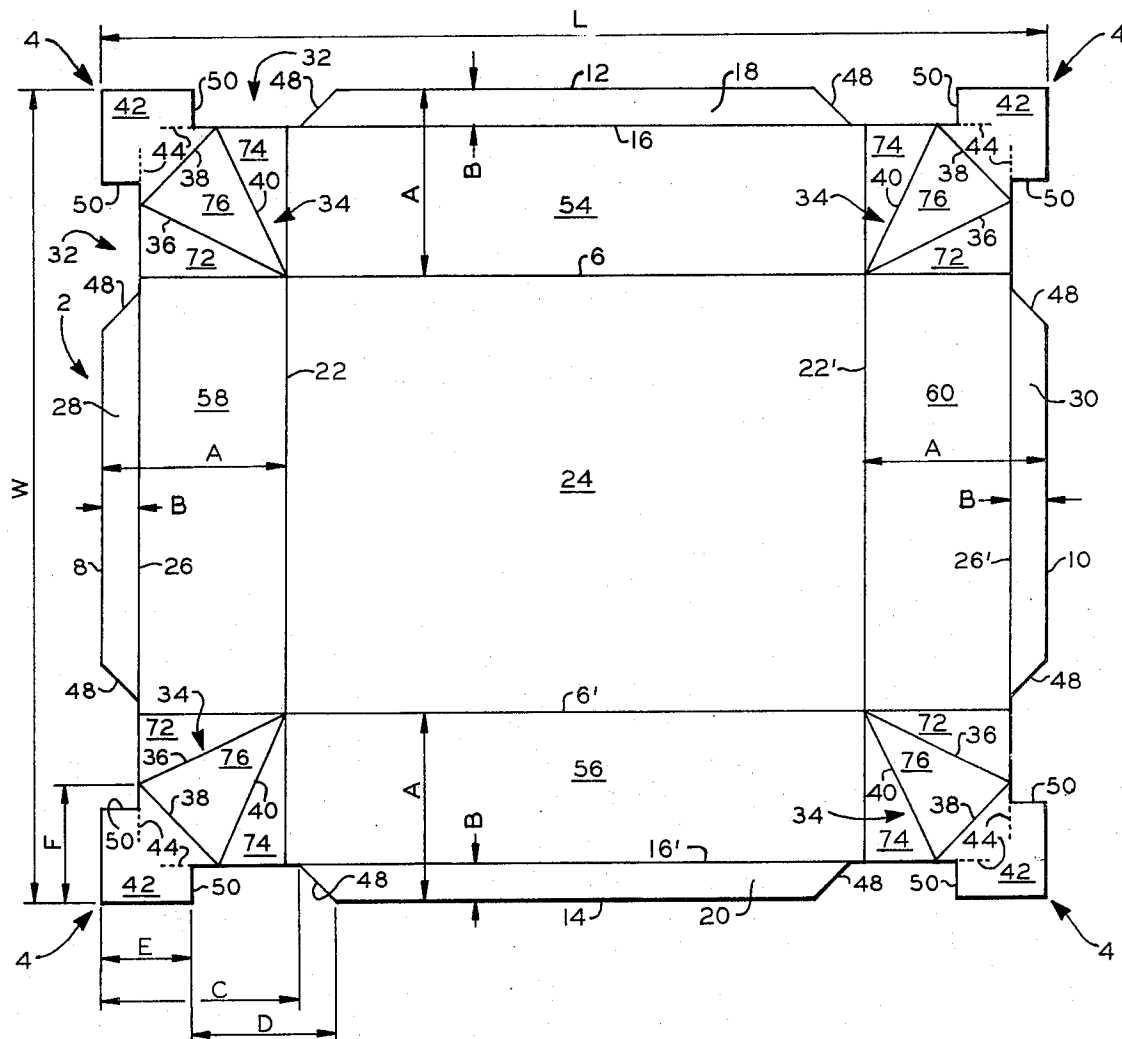


FIG. 1

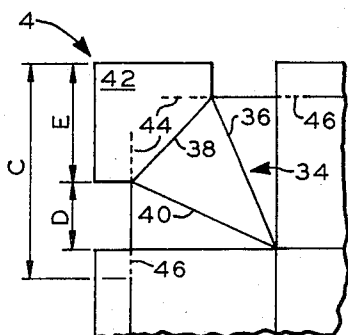


FIG. 2

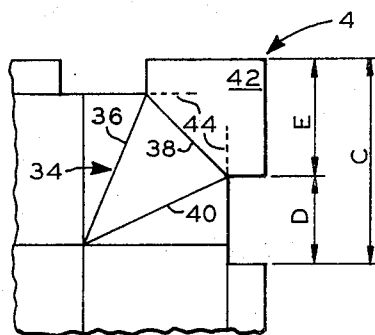


FIG. 3

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ATTORNEYS

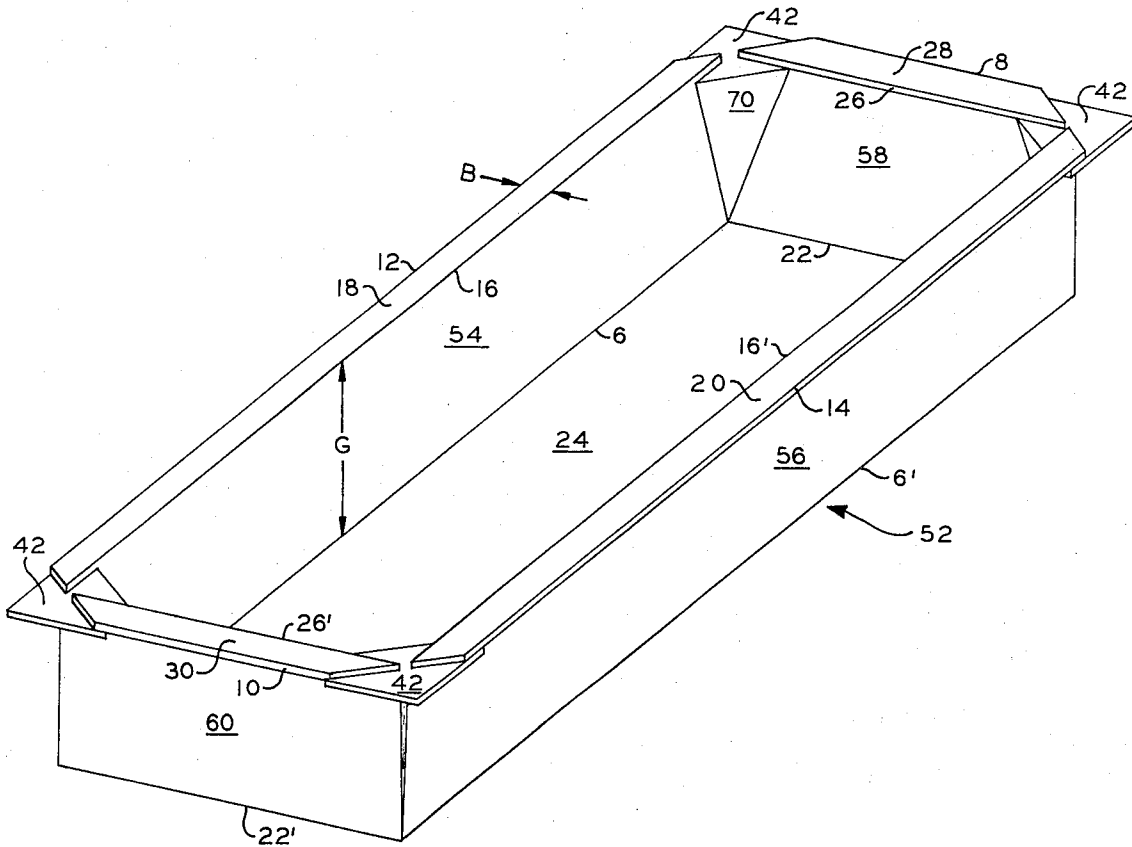


FIG. 6

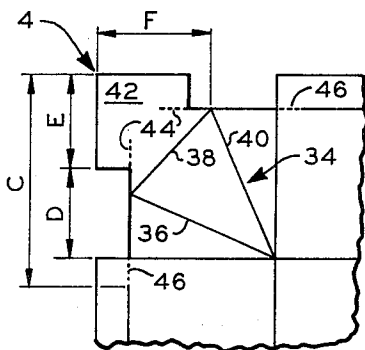


FIG. 4

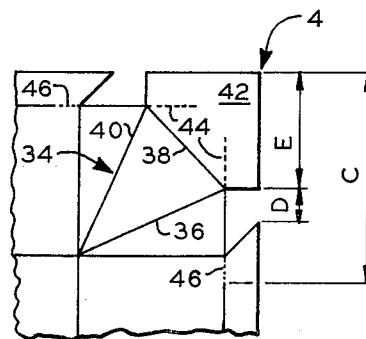


FIG. 5

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FOLDED, ONE-PIECE, LIQUID-TIGHT TRAY AND BLANK FOR FORMING SAME

It is desirable to form a sturdy, folded, one-piece, liquid-tight tray that is formed from a single, foldable rectangular blank and is maintained in the folded tray form without the use of staples, adhesives, or the use of other like securing apparatus or materials.

Heretofore utilized trays of the above-described type generally are formed of a plurality of material pieces and/or require additional securing apparatus or materials for maintaining the tray in the formed condition. The construction of these containers heretofore generally required additional materials, forming machinery, and labor relative to the tray of this invention.

Other aspects, objects, and advantages of the present invention will become apparent from a study of the disclosure, the appended claims, and the drawing.

The drawings are diagrammatic views of a blank and portions of blanks used for forming the tray of this invention and an isometric view in partial section of a tray of this invention.

FIG. 1 shows a blank of this invention,

FIGS. 2-5 show a portion of the blank of FIG. 1 with said portion having score lines of different embodiments, and FIG. 6 shows an example tray of the invention.

Referring to FIG. 1, the blank 2 for forming the tray of this invention has a length (L), a width (W) and four corners 4.

A first pair of spaced, substantially parallel fold lines 6,6' extend along a portion of the length (L) of the blank 2 and terminate at a location spaced from the lateral edges 8,10 of the blank 2. Each of the fold lines 6,6' is positioned a common distance A from an associated longitudinal edge 12 or 14 of the blank 2.

A second pair of spaced, substantially parallel fold lines 16,16' extend along a portion of the length of the blank 2. The second pair of fold lines 16,16' are each substantially parallel to the first pair of fold lines 6,6' and each are positioned between one of the first pair of fold lines 6 or 6' and the associated longitudinal edge 12 or 14 a common spaced distance B from said longitudinal edge. Each of the second pair of fold lines 16,16' terminate at locations spaced a common preselected distance C from associated lateral edges 8,10 of the blank 2 thereby forming first and second edge rims 18,20 that are defined by their respective fold lines 16 or 16' and their respective longitudinal edge 12 or 14.

A third pair of spaced, substantially parallel fold lines 22,22' extend along a portion of the width (W) of the blank 2 and terminate at a location spaced from the longitudinal edges 12,14 of the blank 2. Each of the fold lines 22,22' is spaced a common distance A from an associated lateral edge 8 or 10 of the blank 2 with portions of the first and third pairs of fold lines 6,6' and 22,22' defining the bottom 24 of the tray in the formed condition.

A fourth pair of spaced, substantially parallel fold lines 26,26' extend through a portion of the width of the blank 2. The fourth pair of fold lines 26,26' are each substantially parallel to the third pair of fold lines 22,22', and are each positioned between one of the third pair of fold lines 22 or 22' and the associated lateral edge 8 or 10 a common spaced distance B from said lateral edge 8 or 10. Each of the fourth pair of fold lines 26,26' terminate at locations spaced a common preselected distance C from associated longitudinal edges 12 or 14 of the blank thereby forming third and fourth edge rims 28,30 that are defined by their respective fold lines 26,26' and their respective lateral edge 8 or 10.

Eight slots 32 are formed on the blank with a slot pair positioned on opposed sides of each corner 4 of the blank 2. Each slot 32 has a depth substantially equal to the length of said distance B and extends from a location near one of the intersections of the second and third pairs of fold lines 16,16' and 22,22' a common distance D toward the associated corner 4 and terminates at a location spaced a common distance E from said associated corner 4.

Corner fold lines 34 are positioned adjacent each corner 4 of the blank 2. Each corner fold line 34 is formed of first,

second, and third portions 36,38,40 forming a triangular configuration. The first and third portions 36,40 of each corner fold line 34 extends from one of the junctures of the first and third fold line pairs 6,6' and 22,22' to a location on a separate one of the adjacent slots 32 spaced a common distance F from the respective corner 4 of the blank 2. The second portion 38 of each corner fold line 34 joins the first and third fold line portions 36,40 and extends between the slot pair of the associated corner 4 forming a tab 42 between each corner 4 of the blank 2 and each second fold line portion 38 of the corner fold lines 34.

A cut line 44 extends from each slot 32 a distance through the associated tab 42. Each cut line 44 is substantially parallel to and spaced a distance B from an associated, adjacent edge 8,10,12 or 14 of the blank 2 for locking the tab 42 to the edge rims 18 and 28, or 18 and 30, or 20 and 28, or 20 and 30 in the formed condition of the blank.

In the preferred embodiment shown in FIG. 1, the summation of the distances D and E are greater than the distance C, the second portion 38 of the corner fold line 34 intersects the respective first and third portions 36,40 at locations spaced a distance greater than E from the respective corner 4 of the blank 2 and the distance from a location spaced a distance B from an edge of the blank 2 to the intersection of the second fold line portion 38 with the slot 32 being substantially equal to the distance from the intersection of the second fold line portion 38 with the slot 32 to a location spaced a distance B from the associated corner. In this preferred construction, the side and end walls of the tray meet in the formed condition and the corner portions of the tray are of sturdy construction.

Referring to other embodiments of the corner portion of the blank 2, as shown in FIGS. 2 and 4, the summation of the distances D and E are less than the distance C. This embodiment also includes a second cut line 46 that is substantially parallel to and spaced a distance B from an associated adjacent edge 8,10,12 or 14 of the blank 2 and abutting an end of one of the fold lines that are spaced a distance B from the associated edge of the blank, i.e., 16,16', 26 or 26'. Referring to FIG. 2, the second portion 38 of the corner fold line 34 can also intersect the respective first and third portions 36,40 of the corner fold lines 34 at locations spaced a common distance E from the respective corner 4 of the blank.

Referring to FIG. 3, a corner portion of the blank 2 is constructed with the summation of the distances D and E being substantially equal to the distance C and with the second portion 38 of the corner fold lines 34 intersecting the respective first and third portions 36,40 of the corner fold lines 34 at locations spaced a distance E from the respective corner 4 of the blank 2.

Referring to FIGS. 1 and 4, the second portion 38 of the corner fold line 34 can intersect the respective first and third portions 36,40 of the corner fold lines 34 at locations spaced a common distance F greater than E from the respective corner 4 of the blank 2.

As shown in FIG. 5, the length of each slot 32 in a plane passed through a location a distance B from and parallel to the respective edges 8,10,12 or 14 of the blank 2 can be about one-half of the difference between the distance A minus the distance B. The length of each slot 32 in a plane passed through the respective edge 8,10,12 or 14 of the blank 2 can be smaller than the length of each slot 32 in a plane passed through a location a distance B from and parallel to the respective edge of the blank 2 and with a first edge 48 of the slot 32 being angularly disposed relative to the respective edge of the blank 2 and a second edge 50 of the slot 32 positioned between the first slot edge 48 and the respective corner 4 of the blank being substantially perpendicularly disposed relative to the respective edge of the blank 2.

By varying the distances and positioning of the second portion 38 of the corner fold line 34 and other associated fold lines as indicated above, the operator can change the construction of the corner portion of the tray to vary the resultant configurations to more nearly meet his needs yet maintain a

construction that is liquid-tight, of one-piece construction and foldable.

Suitable example materials from which the blank and tray of this invention can be formed are: paperboard, thin metal sheet, metal foil, plastic sheet and/or laminates of these materials with one another or with other materials.

Referring to FIG. 6, a tray 52 of this invention is formed of the blank of this invention. The tray 52 has a bottom 24 defined by the first and third pairs of spaced fold lines 6,6' and 22,22'. The first pair of fold lines 6,6' are substantially parallel to the longitudinal edges 12,14 of the blank 2 and the third pair of fold lines are substantially parallel to the lateral edges 8,10 of the blank with each fold line of the first and third pair of fold lines 6,6' and 22,22' being a common distance A from the respective edges 8,10,12 or 14 of the blank 2.

First and second side walls 54,56 extend upwardly from the tray bottom 24 a distance G. The side walls 54,56 are each defined by one of the first pair of fold lines 6 or 6' and one of the second pair of fold lines 16 or 16' that are substantially parallel to a longitudinal edge 12 or 14 of the blank 2. Each of the first and second side walls 54,56 is spaced a common distance B from its respective longitudinal blank edge 12 or 14.

First and second end walls 58,60 extend upwardly from the tray bottom 24 a distance G. The end walls 58,60 are each defined by one of the third pair of fold lines 22,22' and one of a fourth pair of fold lines 26,26' that are substantially parallel to the lateral edges 8 or 10 of the blank 2. Each of the first and second end walls 58,60 are spaced a common distance B from its respective lateral blank edge 8 or 10.

First and second edge rims 18,20 extend outwardly from a respective one of the first and second side walls 54 or 56. The edge rims 18,20 each are defined by one of the second pair of fold lines 16 or 16' and its respective longitudinal blank edge 12 or 14 and each have a width B.

Third and fourth edge rims 28,30 extend outwardly from a respective one of the first and second end walls 58,60. The third and fourth edge rims 28,30 each are defined by one of the fourth pair of fold lines 26,26' and its respective lateral blank edge 8 or 10 and each have a width B.

The plurality of slots are formed on the edges 8,10,12,14 of the blank 2. Each slot has a depth substantially equal to the width of the associated edge rim 18,20,28 or 30 and extends from a location near one of the intersections of the second and third pairs of fold lines 16,16' and 22,22' and the intersections of the first and fourth pairs of fold lines 6,6' and 26,26' a common distance D toward one associated corner 4 of the blank 2 and terminate at a location spaced a common distance E from said associated corner 4. Each corner 4 thus has a pair of slots 32 associated therewith.

A supporting column 70 of triangular configuration is formed at the intersection of each side wall 54,56 and each end wall 58,60 within the tray. Each supporting column 70 has first and second enfolded panels 72,74 and a face panel 76 of triangular configuration. The face panels 76 are each defined by the corner fold line 34 which has first, second, and third portions 36,38,40 as described above. The first and third corner fold line portions 36,40 each extend from a corner of the tray bottom 24 to a location on a separate one of the adjacent slots 32 spaced a common distance F from the respective corner 4 of the blank 2. The second portion 38 of each corner fold line 34 joins the first and third fold line portions 36,40 and extends between the adjacent associated slots 32. Each first enfolded panel 72 is defined by the first corner fold line portion 36, the associated slot 32, and one of the end walls 58 or 60. The first enfolded panel 72 is hingedly connected to the associated end wall 58 or 60 and face panels 76 and is folded in overlapping and facing relationship with the associated end wall 58 or 60. Each of the second enfolded panels is defined by the third corner fold line portion 40, the associated slot 32 and one of the side walls 54,56. The second enfolded panel 74 is hingedly connected to the associated side wall 54,56 and face panels 76 and folded in overlapping and facing relationship with the associated side wall 54 or 56.

Four tabs 42 extend outwardly from their respective corner fold line second portion 38. Each tab has first and second cut lines 44 receiving a portion of the adjacently positioned edge rims 18,28, or 18,30, or 20,28, or 20,30 for locking the panels 72,74,76 of the supporting column 70 in the enfolded position. Each tab 42 is defined by its respective second fold line portion 38, associated slot 32 and blank corner 4.

As described above with reference to the blank 2, the edge rims 18,20,28 and 30 can have a cut line 46 extending along the fold line 16,16', 26 or 26' of said edge rim. The cut line 46 extends from a respective slot 32 a distance along said fold line and terminates at a location spaced a distance C from the respective blank corner 4 in the enfolded condition of the blank 2.

The tray 52 of this invention can be provided with a snap-on cover, wrapped with plastic film, or other means and sealed to cover articles or materials supported by the tray bottom 24 within the tray 52. One example of a use of this tray would be for the packaging of meats for retail sales.

In forming the tray 52 of this invention from a blank 2 of this invention, the side walls 54,56 and end walls 58,60 are moved, for example, upwardly relative to the bottom 24 to position the side walls 54,56 and end walls 58,60 at an angular location about 90° relative to the bottom. The blank is folded along fold lines 6,6' and 22,22' during this operation. The edge rims 18,20,28,30 are folded outwardly from their respective end walls 58,60 and side walls 54,56 at angles of about 90° relative thereto. During movement of the edge rims 18,20,28, and 30, the blank 2 is folded along fold lines 16,16' and 26,26'. The corner fold lines 34 are folded to move the first and second unfolded panels 72,74 into facing relationship with their respective side walls 54,56 and end walls 58,60 and the tabs 42 are moved outwardly from the tray 52 folding the second corner fold line portion 38 for positioning the tab 42 in a position substantially parallel to the tray bottom 24 and the edge rims 18,20,28 and 30. Portions of the tabs 42 are then moved to a location at a lower elevation than the edge rims 18,20,28,30 with portions of each edge rim inserted within the cut line 44 of the tab 42 for maintaining the tray 52 in the folded formed condition.

By so constructing the tray and blank of this invention, the tray can be formed without using adhesive, staples or other like locking apparatus or material. The tray is sturdy, compact, requires small amounts of labor to form and assemble and can be shipped flat to the location of use. The various embodiments of the corner portion of the tray of this invention permits an operator to choose a tray type that is adapted to his desired usage of the tray.

Other modifications and alterations of this invention will become apparent to those skilled in the art from the foregoing discussion and accompanying drawing, and it should be understood that this invention is not to be unduly limited thereto.

WHAT IS CLAIMED IS:

1. A generally rectangular blank having a length, a width, and corners for forming a folded, one-piece, liquid-tight tray comprising:

a first pair of spaced, substantially parallel fold lines extending along a portion of the length of the blank, each being spaced a common distance A from an associated longitudinal edge of the blank;

a second pair of spaced, substantially parallel fold lines extending along a portion of the length of the blank, said second pair of fold lines each being substantially parallel to the first pair of fold lines, positioned between one of the first pair of fold lines and the associated longitudinal edge a common spaced distance B from said longitudinal edge, and each terminating at locations spaced a common preselected distance C from associated lateral edges of the blank for forming an edge rim defined by the second pair of fold lines and their respective longitudinal edge;

a third pair of spaced, substantially parallel fold lines extending along a portion of the width of the blank, each spaced a common distance A from an associated lateral edge of the blank with portions of said first and third pairs

of fold lines defining the bottom of the tray in the formed condition;

a fourth pair of spaced, substantially parallel fold lines extending along a portion of the width of the blank, said fourth pair of fold lines each being substantially parallel to the third pair of fold lines, positioned between one of the third pair of fold lines and the associated lateral edge a common spaced distance B from said lateral edge, and each terminating at locations spaced a common preselected distance C from associated longitudinal edges of the blank for forming an edge rim defined by the fourth pair of fold lines and their respective lateral edge;

eight slots formed on the blank, said slots having a depth substantially equal to the length of said distance B and extending from a location near one of the intersections of the second and third pairs of fold lines a common distance D toward the associated corner and terminating at a location spaced a common distance E from said associated corner;

corner fold lines positioned adjacent each corner of the blank, each corner fold line having first, second, and third portions defining a triangle, said first and third portions of each corner fold line extending from one of the junctures of the first and third fold line pairs to a location on a separate one of the adjacent slots spaced a common distance F from the respective corner of the blank and said second portion of each corner fold line joining the first and third fold line portions and extending between the slots of the associated corner forming a tab between each corner of the blank and each second fold line portion of the corner fold lines; and

a cut line extending from each slot a distance through the tab, each cut line being substantially parallel to and spaced a distance B from an associated edge of the blank for locking the tab to the edge rims in the formed condition of the blank.

2. A blank, as set forth in claim 1, wherein the summation of the distances D and E is greater than the distance C and the second portion of the corner fold lines intersects the respective first and third portions of the corner fold lines at locations spaced a distance greater than E from the respective corner of the blank.

3. A blank, as set forth in claim 1, wherein the summation of the distances D and E are substantially equal to the distance C and wherein the second portion of the corner fold lines intersects the respective first and third portions of the corner fold lines at locations spaced a distance E from the respective corner of the blank.

4. A blank, as set forth in claim 1, wherein the summation of the distances D and E are less than the distance C including a second cut line extending from each slot a distance along the edge rim, each second cut line being substantially parallel to and spaced a distance B from an associated edge of the blank and abutting an end of one of the fold lines spaced a distance B from the associated edge.

5. A blank, as set forth in claim 4, wherein the second portion of the corner fold lines intersects the respective first and third portions of the corner fold lines at locations spaced a common distance E from the respective corner of the blank.

6. A blank, as set forth in claim 4, wherein the second portion of the corner fold lines intersects the respective first and third portions of the corner fold lines at locations spaced a common distance greater than E from the respective corner of the blank.

7. A blank, as set forth in claim 4, wherein the length of each slot in a plane passed through a location a distance B from and parallel to the respective edge of the blank is about one-half of the difference between distance A minus distance B.

8. A blank, as set forth in claim 7, wherein the length of each slot in a plane passed through the respective edge of the blank is smaller than the length of each slot in a plane passed through a location a distance B from and parallel to the

respective edge of the blank with a first edge of the slot being angularly disposed relative to the respective edge of the blank and a second edge of the slot positioned between the first slot edge and the respective corner of the blank being substantially perpendicularly disposed relative to the respective edge of the blank.

9. A folded, liquid-tight, tray constructed from a single blank of rectangular foldable material having edges, a length, a width, and corners, comprising:

a tray bottom defined by first and third pairs of spaced, fold lines, said first pair of fold lines being substantially parallel to the longitudinal edges of the blank and said third pair of fold lines being substantially parallel to the lateral edges of the blank with each fold line of said first and third pair of fold lines being a common distance A from the respective edges of the blank;

first and second sidewalls extending upwardly from the tray bottom a distance G, said sidewalls each being defined by one of the first pair of fold lines and one of a second pair of fold lines being substantially parallel to a longitudinal edge of the blank and each spaced a common distance B from its respective longitudinal blank edge;

first and second end walls extending upwardly from the tray bottom a distance G, said end walls each being defined by one of the third pair of fold lines and one of a fourth pair of fold lines being substantially parallel to the lateral edges of the blank and each spaced a common distance B from its respective lateral blank edge;

first and second edge rims each extending outwardly from a respective one of the first and second sidewalls, said first and second edge rims each being defined by one of the second pair of fold lines and its respective longitudinal blank edge and having a width B;

third and fourth edge rims each extending outwardly from a respective one of the first and second end walls, said third and fourth edge rims each being defined by one of the fourth pair of fold lines and its respective lateral blank edge and having a width B;

a plurality of slots formed on the edge of the blank, each having a depth substantially equal to the width of the edge rim, each of said slots extending from a location near one of the intersections of the second and third pairs of fold lines a common distance D toward one associated corner of the blank and terminating at a location spaced a common distance E from said associated corner with each corner of the blank having a pair of slots associated therewith;

a supporting column of triangular configuration formed at the intersection of each sidewall and end wall within the tray, said supporting column having first and second enfolded panels and a face panel of triangular configuration, each of said face panels being defined by a corner fold line having first, second, and third portions defining a triangle, said first and third corner fold line portions each extending from a corner of the tray bottom to a location on a separate one of the adjacent slots spaced a common distance F from the respective corner of the blank and said second portion of each corner fold line joining the first and third fold line portions and extending between the adjacent, associated slots, each of said first enfolded panels being defined by the first corner fold line portion, the associated slot, and one of the end walls and being hingedly connected to said associated end wall and face panel and folded in overlapping relationship with the associated end wall, and each of said second enfolded panels being defined by the third corner fold line portion, the associated slot, and one of the sidewalls and being hingedly connected to said associated sidewall and face panel and folded in overlapping relationship with the associated sidewall; and

four tabs each extending outwardly from their respective corner fold line second portion, each tab having first and second cut lines receiving a portion of the adjacently

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positioned edge rims for locking the panels of the supporting column in the enfolded position, said tabs each being defined by its respective second corner fold line portion, associated slots, and blank corner.

10. A tray, as set forth in claim 9, wherein the edge rims

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each have a cut line exiting along the fold line of said edge rim from a respective slot a distance along said fold line and terminating at a location spaced a distance C from the respective blank corner in the unfolded condition of the blank.

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