

[54] CARTON

[75] Inventor: Jerome Earl Elder, Minneapolis, Minn.

[73] Assignee: International Paper Company, New York, N.Y.

[22] Filed: July 13, 1973

[21] Appl. No.: 379,180

[52] U.S. Cl. 229/31 R; 229/41 B

[51] Int. Cl.² B65D 5/24

[58] Field of Search 242/31 R, 31 FS, 32-36, 242/41 B

[56]

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Primary Examiner—Leonard D. Christian
Attorney, Agent, or Firm—Lawrence W. Flynn

[57]

ABSTRACT

The single piece carton is formed from a blank having a bottom panel, side and end wall panels, corner connector panels intersecting edges of which are attached, respectively, to an end and side wall panel, a locking panel joined to at least one of the connector panels at each end of the carton and, optionally, one or more top panels. The connector panels have a diagonal fold line dividing the panel into a first triangular gusset section attached to an end wall panel and a second triangular gusset section attached to a side wall panel. The locking panel is joined to the second triangular section of the connector panel. In the assembled carton, the triangular sections of each connector panel are folded into face contact and disposed externally of the end wall panel with the first triangular section sandwiched between the end wall panel and the second triangular section. The locking panel extends over the upper edge of the first triangular section and end wall panel into the carton interior where it is secured in face contact with the inner surface of the end wall panel to maintain the carton in an erected position.

21 Claims, 12 Drawing Figures

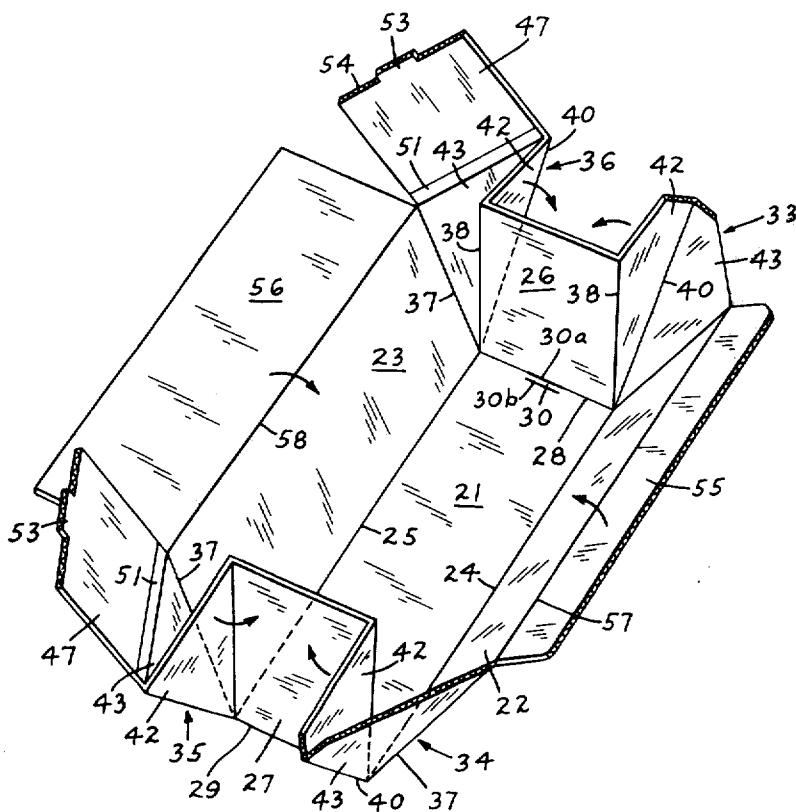


FIG. 1A.

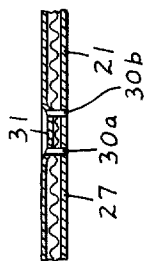


FIG. 2.

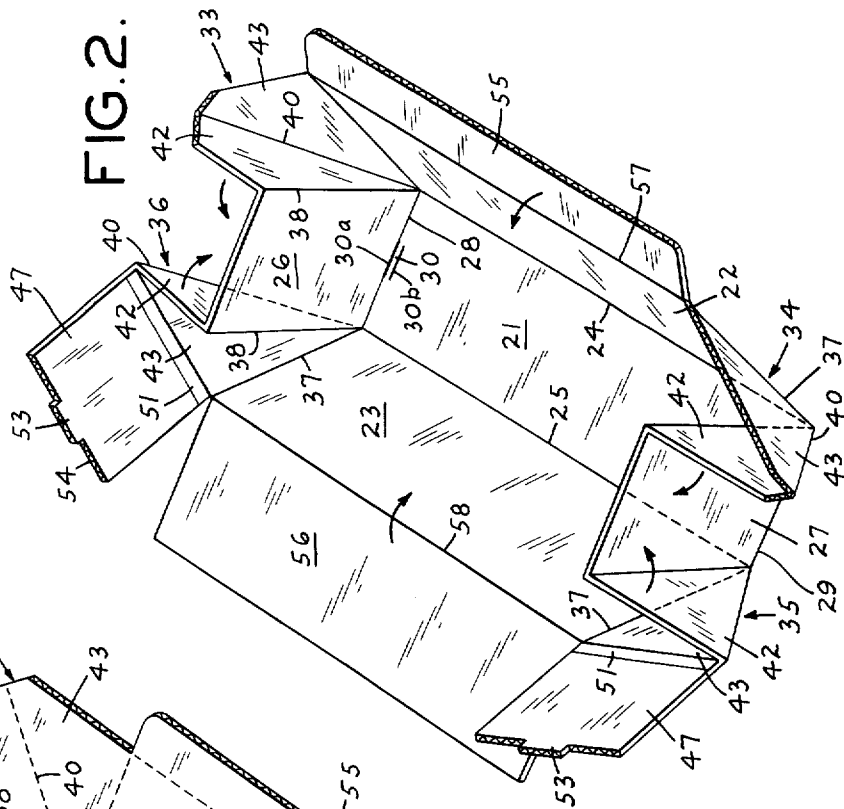
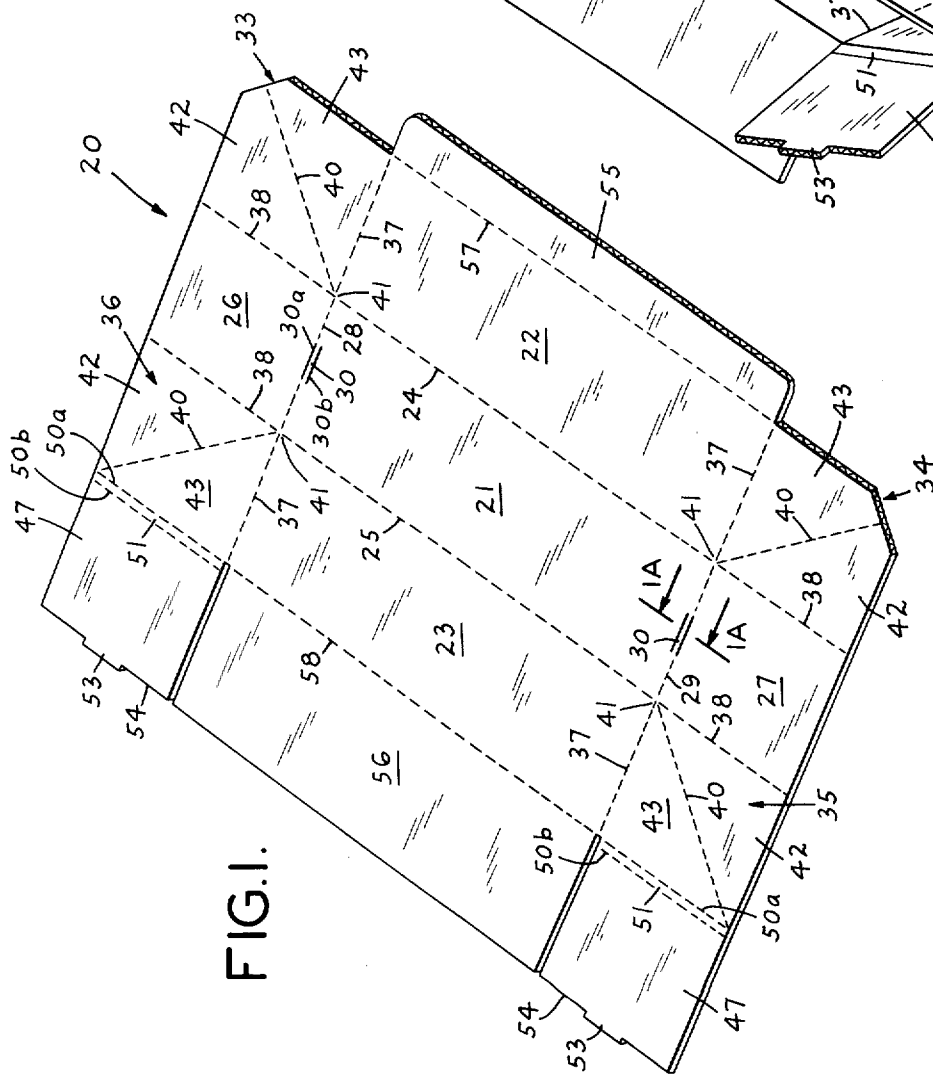
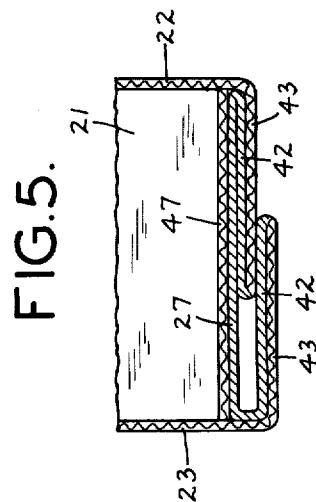
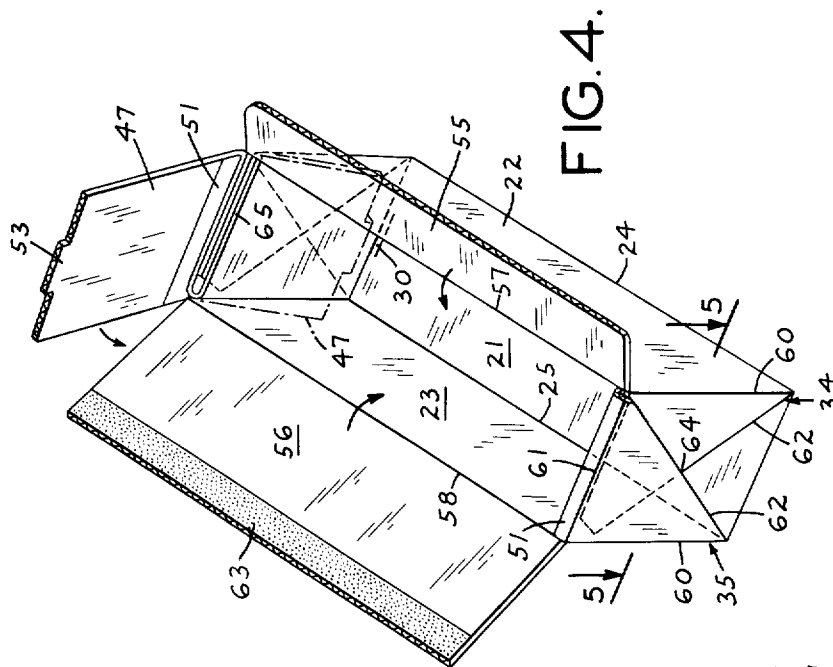
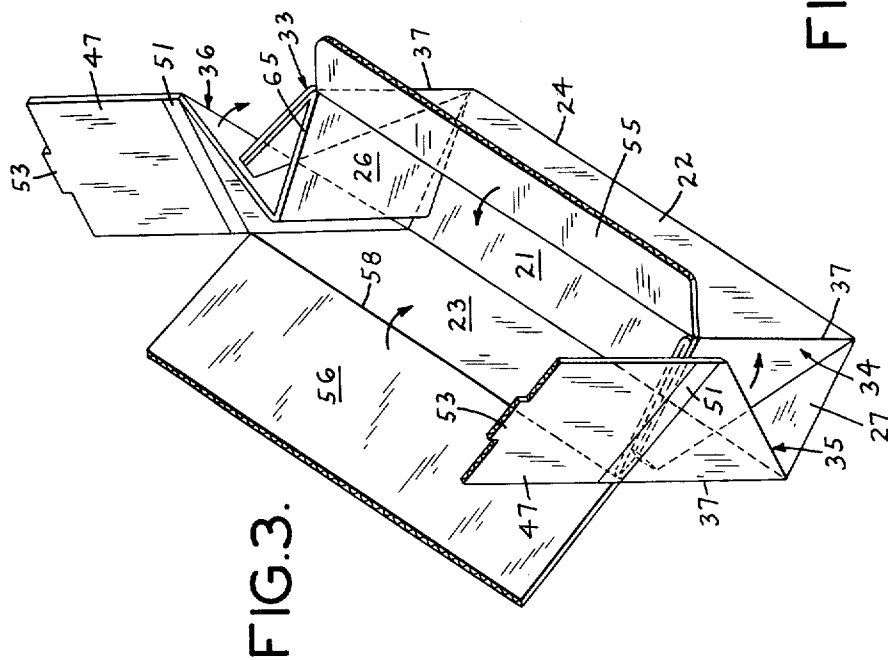
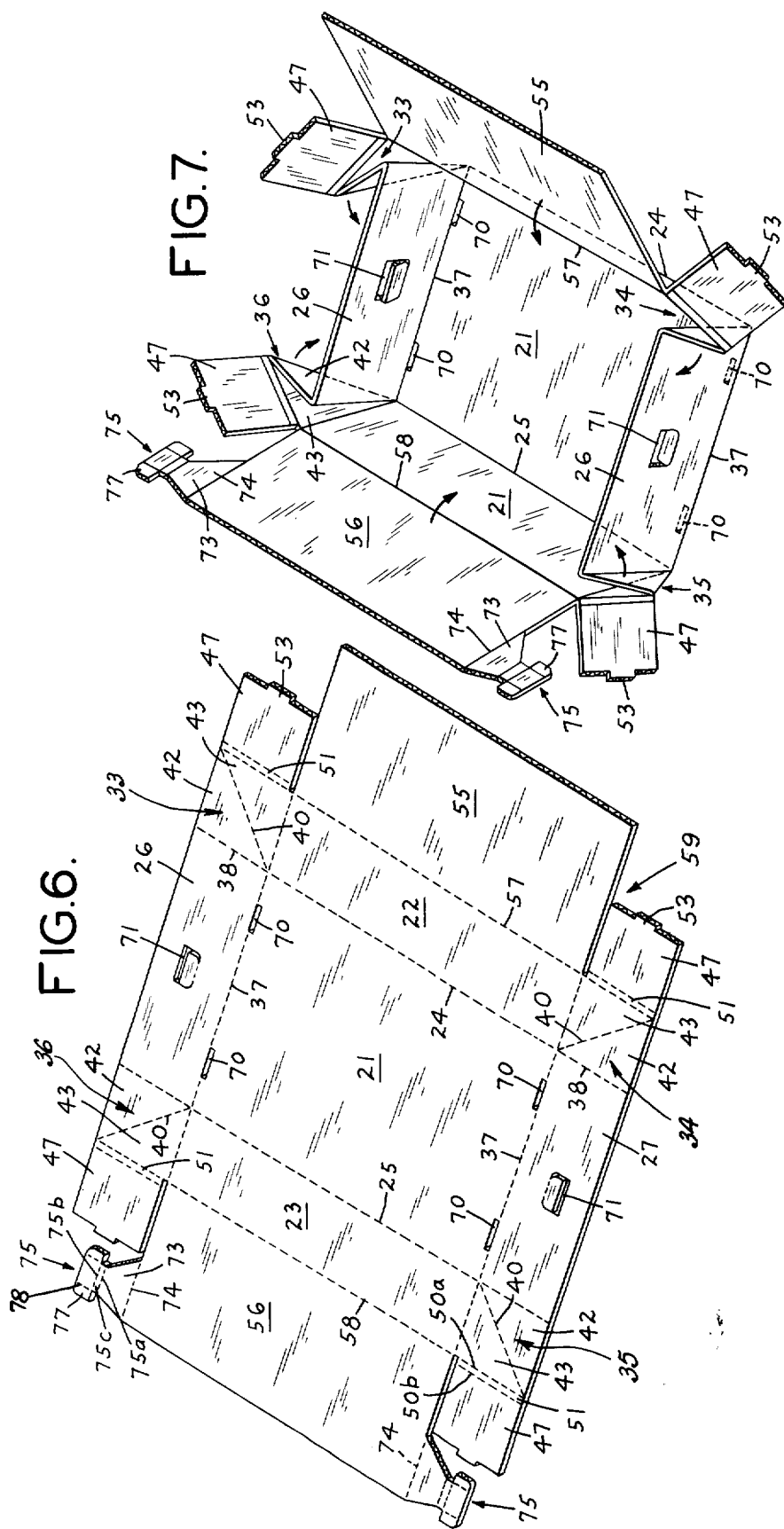


FIG. 1.







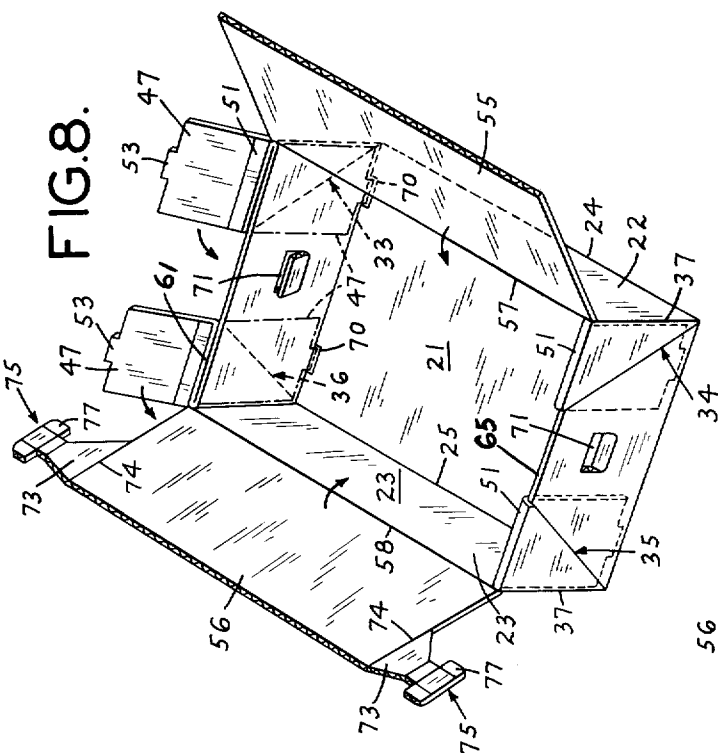


FIG. 8.

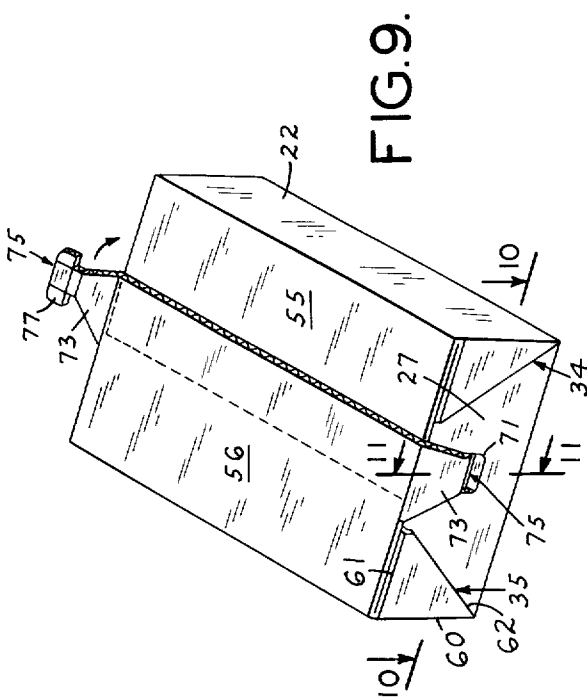


FIG. 9.

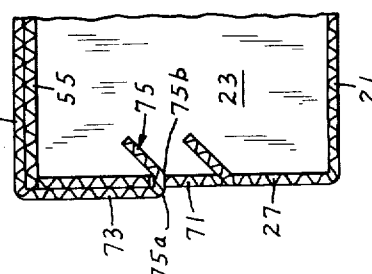


FIG. 10.

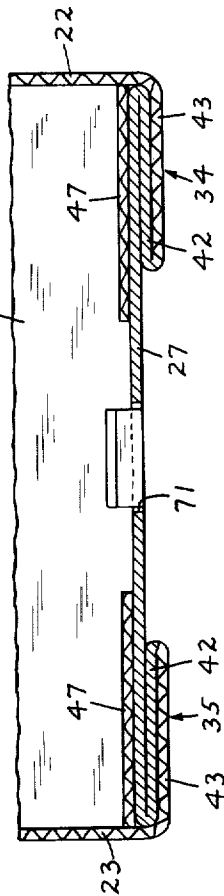


FIG. 11.

CARTON

BACKGROUND OF THE INVENTION

This invention relates to a single piece, self-locking carton of improved corner and stacking strength. In the carton, the corners are reinforced by a double corrugated layer which connects the end and side wall panels to provide a stronger corner structure and improved stacking strength. Stacking strength is further improved by a locking panel which reinforces each end panel of the carton and which is held against the inner surface of these end panels to maintain the carton in its assembled position.

Although the cartons have numerous uses, they have been found particularly useful as "loin and beef boxes" which are normally used to ship hog loins and various cuts of beef from the slaughter house to wholesale or retail butchers in a refrigerated condition. The carton offers several advantages over presently used loin and beef boxes such as one piece construction, ease of assembly, elimination of stitching because of the self-locking feature, more economical usage of the corrugated board from which the carton is made, reduced inventory problems, and improved ability to hold its shape under compression. These and other advantages of the carton will be apparent to those skilled in the art upon consideration of this entire disclosure.

SUMMARY OF THE INVENTION

The assembled carton is formed from a single piece blank comprising a conventional bottom panel with foldably attached side and end wall panels, corner connector panels intersecting edges of which are foldably attached, respectively, to an end and side wall panel and a locking panel joined to at least one of the connector panels at each end of the carton. Each connector panel has a diagonal fold line which passes through the intersection of the two intersecting edges to divide the panel into a first triangular gusset section which is foldably attached to an end wall panel and a second triangular gusset section which is foldably attached to a side wall panel. In the assembled position, these triangular sections are folded along the diagonal fold line into face contact and are disposed externally of the end wall panels with the first triangular section between the end wall panel and the second triangular section. The triangular section of each connector panel is disposed so that it has a vertical edge aligned with the intersection of the side and end wall panel, a horizontal edge aligned with the upper edge of the end wall panel and a third edge connecting the vertical and horizontal edges. The locking panel extends over the upper edge of the first triangular section and end wall panel and into the carton interior where means are provided for maintaining the locking panel in face contact with the inner surface of the end wall panel. In one embodiment, an edge of the locking panel has a tab which is insertable into a slot or recess in the bottom panel.

The carton can optionally be provided with one or more top panels foldably attached to a wall panel. In one embodiment, means are included on the top panel which cooperate with handle apertures in the wall panels of the carton to lock the top panel in a closed position.

The corners of the carton are strengthened by the double corrugated wall structure resulting when the two triangular sections are folded into face contact ex-

ternally of the end wall panel. It is this wall structure which connects the side and end wall panel at the four corners of the carton. When the locking panel is in alignment with an end wall panel, it provides a further double layer of corrugated board across each end of the carton. This feature in connection with the strengthened corners of the carton provides a very strong end structure for the carton and high packing strength.

In cases where only one of the corner panels at each end of the carton has a locking panel joined to it, at least portions of the corner connector panels at each end of the carton overlap to some extent so that the both corners at each end of the carton can be locked in an assembled position by the single locking panel at each end. In cases where each connector panel of the carton has a locking panel attached to it, this overlap is not necessary, since each corner of the carton is maintained in an assembled position independently of every other corner by means of the locking panel associated with the connector panel.

The single piece blank from which the carton is assembled also forms a part of the invention which is further illustrated by the accompanying drawings and the ensuing detailed description of the embodiments shown in these drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the carton blank of one preferred embodiment of the invention involving the use of a single locking panel at each end of the carton.

FIG. 1A is a sectional view taken along the line 1A—1A of FIG. 1 and is intended to show the slit score and crush lock used in conjunction with the locking panel in this embodiment to provide the self-locking feature of the carton.

FIGS. 2 through 4 are perspective views showing the assembly of the blank of FIG. 1 into an erected carton.

FIG. 5 is a partial sectional view taken along line 5—5 of FIG. 4 showing the strengthened end structure of the carton.

FIG. 6 is a perspective view of the carton blank of a second preferred embodiment of the invention involving the use of two locking panels at each end of the carton.

FIGS. 7 through 9 are perspective views showing the assembly of the blank of FIG. 8 into an erected carton.

FIG. 10 is a partial sectional view taken along the line 10—10 of FIG. 9 showing the strengthened end structure of the carton.

FIG. 11 is a partial sectional view taken along the line 11—11 of FIG. 9 with the locking panel omitted for clarity.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIGS. 1–5 represent a first preferred embodiment of the carton of this invention suitable for use as a hog loin box. FIG. 1 shows the single piece blank 20 used to prepare the carton. Blank 20 has a bottom panel 21, two side wall panels 22, 23 foldably attached to opposed sides of panel 21 by fold lines 24, 25, respectively, and two end wall panels 26, 27 foldably attached to opposed sides of bottom panel 21 by fold lines 28 and 29, respectively. Bottom panel 21 contains at each end thereof adjacent the connection to the end wall panels

26, 27 an elongated strip 30 formed by cutting two slits 30a, 30b in panel 21. Portion 30 is then compressed to crush its corrugated core to produce in panel 21 a recess 31 best shown in FIG. 1A. The function of recess 31, as made clearer below, is to receive the locking panel tab in the erected carton to thereby hold the locking panels in place against the inner surface of end wall panels 26, 27. Crushed strip 30 is referred to in the art as a "slit score and crush lock" and is useful when it becomes undesirable to form an aperture through the panel, as occurs, for example, if water or other liquid must be kept out of the carton interior. Slits 30a, 30b will admit less liquid than were strip 30 to be removed to provide a slot into which the locking panel tab could be inserted.

The blank 20 further includes four corner connector panels 33, 34, 35 and 36 disposed between adjoining end and side wall panels. Two intersecting edges 37, 38 of each connector panel are foldably attached, respectively, to an end and side wall panel. Each connector panel also has a diagonal fold line 40 which passes through the zone of intersection 41 of edges 37, 38 to divide each corner connector panel into a first triangular section 42 foldably attached to an end wall panel along edge 38 and a second triangular section 43 foldably attached to a side wall panel along edge 37. In this embodiment, the height and width of each corner connector panel 33-36 correspond generally to the height and width of the end wall panels 26, 27.

Joined to the corner connector panels 35, 36 at each end of the blank are locking panels 47. Each locking panel is attached to a connector panel which is disposed on the same side of end wall panels 26, 27. The locking panels 47 are attached to an edge of the connector panel opposite that 38 which is attached to the adjacent end wall panel. The locking panels 47 are joined to the connector panels 35, 36 by a pair of spaced fold lines 50a, 50b, which provide what is known as a "shoulder score." The shoulder is the portion 51 of the locking panel between score lines 50a and 50b. Each locking panel 47 also has a tab 53 adapted for insertion into the recess 31 of the bottom panel 21 upon assembly of the blank. Tabs 53 project from an edge 54 of the locking panels 47 which is opposite that which is attached to the adjoining connector panels 35, 36. The blank also includes two top panels 55, 56 which are foldably attached to side wall panels 22 and 23, respectively, by fold lines 57 and 58.

To assemble the carton, side wall panels 22 and 23 are elevated along fold lines 24 and 25 and end wall panels 26 and 27 are similarly elevated along fold lines 28 and 29 (See FIG. 2). As the side and end wall panels are elevated, the corner connector panels 33-36 are forced outwardly as shown in FIG. 2 causing the panels to bend about their diagonal fold line 40 to form the two triangular sections 42 and 43 which are in approximate face alignment as shown in FIG. 2. The triangular portions 42, 43 of each corner connector panel are then rotated along fold lines 37 and 38 toward the outer surface of the adjoining end wall panel as shown by the arrows in FIGS. 2 and 3. As this rotation begins, it is important that the corner connector panels which have no locking panels attached to them, i.e., panels 33, 34 be first folded inwardly against the outer surface of the end wall panels with the corner connector panels having a locking tab connected to them, i.e., panels 35, 36, following. This is clearly shown in FIG. 3. The over-

lapping triangular sections 42, 43 of each connector panel are then folded against the outer surface of the end wall panels until each triangular section 42, 43 has a vertical edge 60 (See FIG. 4) which is aligned with the intersection of the side and end wall panels, a horizontal edge 61 which is aligned with the upper edge of the end wall panel and a third angled edge 62 which connects the non intersecting ends of edges 60 and 61. The first triangular section 42 of each corner connector panel is disposed between the end wall panel and the second triangular section 43 of the corner connector panel as best seen in FIG. 5.

The locking panels 47 are then folded inwardly into the carton interior over the horizontal edge 61 of the internal triangular section 42 and the upper edge 65 of the end wall panel, as shown in FIG. 4. The locking panels are brought into face contact with the inner surface of the end wall panels 26, 27 and the tabs 53 at the bottom of each locking panel inserted in the recess 31 of the bottom panel to lock the panels 47 in place. For this to occur, the height of the locking panels must be substantially equal to the height of the carton wall panels. Since the triangular sections 42, 43 of the corner connector panel to which the locking panel is attached at least partially overlap the triangular sections 42, 43 of the adjoining connector panel which has no attached locking panel, the integrity of the end of the carton is assured once tabs 53 are inserted in recesses 31. To insure this overlapping feature, the combined width of the two connector panels attached to a given end wall panel must exceed the width of the end wall panel.

The double wall reinforcement of each corner resulting from the overlapping of triangular sections 42, 43 of each connector panel is shown in FIG. 5. The further reinforcement of the end of each carton by the alignment of the locking panels with the end wall panels is also shown in FIG. 5.

Top panels 55, 56 can then be folded inwardly as shown by the direction of the arrows in FIG. 4 to cover the carton. The carton can then be banded about its periphery or maintained in a closed position by any other known manner such as by applying glue 63 to an inner surface of top panel 56 before folding it into place as shown in FIG. 4. The carton can be carried by inserting the fingers into the V-notch 64 (see FIG. 4) so they are placed between the end wall panel and the inner triangular portions 42 of each connector panel.

A second preferred embodiment of the carton of this invention which is useful as a beef box is shown in FIGS. 6-11. FIG. 1 is a single piece blank 59 of this embodiment and is similar in all respects to the blank of FIG. 1 except for (1) variations in the dimensions of the panels, (2) four instead of two locking panels are provided, (3) one top panel has a locking tab structure, (4) the bottom panel has slots instead of recesses for receiving the locking panel tabs, and (5) each end wall panel has a handle cut out to receive the locking tab structure of the top panel. Because of the similarities between the two blanks, the blank of FIG. 6 has been numbered whenever possible to correspond with FIG. 1, it being understood that where common numbering is employed the identification and functioning of the various items is substantially the same in both embodiments.

Referring to FIG. 6, it is seen that each corner connector panel 33-36 has a locking panel 47 joined to it. Moreover, the dimensions of the corner connector pan-

els are such that there is no overlap whatever between the corner connector panels attached to the same end wall panel when the carton is assembled. As a result, a separate locking panel must be provided for each corner connector panel in order to maintain the integrity of each corner of the carton in its erected position. The bottom panel 21 is consequently provided with two slots 70 at each end thereof disposed in proximity to the intersection of the bottom panel 21 with each of the end wall panels 26, 27. The tabs 53 on each locking panel 47 are insertable into slots 70 upon erection of the carton.

Each end wall 26, 27 has a handle cut-out 71. The top panel 56 further includes a top locking panel 73 foldably attached to opposed ends of top panel 56 by fold lines 74. Panel 73 has at its extremity a tab 75 which is foldably attached to panel 73 by means of shoulder score lines 75a and 75b. These two score lines define between them a shoulder portion 75c whose function is explained below. Each locking tab 75 further includes extensions 77 foldably attached to opposed edges of tab 75 by fold lines 78.

The assembly of the blank of FIG. 6 proceeds generally along the same lines as for the blank of FIG. 1. This assembly is shown in FIGS. 7-9. As with the embodiment of FIGS. 1-6, the side and end wall panels are first vertically erected along the fold lines connecting them to the bottom panel. The corner connector panels 33-36 then fold along their diagonal score lines 40 moving the connector panels outwardly of the box interior and causing the triangular sections 42, 43 of each connector panel to come into general face alignment. The aligned triangular sections of each connector panel are then rotated toward the outer surface of the adjoining end wall panel until the first triangular section 42 is disposed between the end wall panel and the second triangular section 43 (see FIGS. 8 and 10). In this embodiment, there is no overlap whatever between the folded corner connector panels attached to the same end wall panel. This is shown in FIGS. 8-10. Instead, the folded corner connector panels at each end of the carton are spaced from each other to provide access to the handle cut-outs 71 in each end wall panel.

As soon as the overlapping triangular portions 42, 43 of each connector panel are rotated against the outer surface of the end wall panel, the locking panel is folded into the carton interior over the horizontal edge 61 of the first triangular section 42 and the upper edge 65 of the end wall panel (see FIG. 8). The tabs 53 are then inserted into the slots 70 in panel 21 to lock each locking panel 47 in place and insure the integrity of each corner of the carton in its erected position. The nature of the double layer reinforcement of each corner of the carton provided by overlapping triangular sections 42, 43 and the double layer reinforcement of the end wall of the carton provided by the locking panels are shown in FIG. 10.

To lock the top panels in position, top panel 55 is folded inwardly coming to rest on top of the carton after which top panel 56 is folded onto the top of panel 55 (see FIGS. 8-9). The top locking panels 73 are then folded downwardly along fold line 74 into face contact with the outer surfaces of the end wall panels bringing the locking tabs 75 into close proximity with the handle cut-outs 71. Tabs 75 are then folded inwardly along fold lines 75a and 75b forcing locking tab 75 through cut-outs 71 in the end wall panels (See FIG. 9). Tabs

75 can be forced through the cut-outs 71 because extensions 77 fold outwardly along fold lines 78 as the tab passes through the cut-outs 71. Once the tabs 75 are through cut-outs 71, they are bent upwardly toward the inner surface of the end wall panel as shown in FIG. 11. As soon as the locking tabs are through the cut-outs 71, the extensions 77 return to their normal positions thereby preventing the tab 75 from being withdrawn from cut-out 71. The cooperation between extensions 77 and cut-outs 71 maintains the top panel 56 in its closed position. The shoulder 75c between fold lines 75a, 75b facilitates bending tab 75 upwardly once inside the carton. It also covers the upper edge of cut-out 71 so that when a hand is inserted through cut-out 71, it is in contact with a smooth surface instead of the rather rough upper edge of cut-out 71 (see FIG. 11).

The two embodiments illustrated above are illustrative only and such alterations and modifications thereof as would be apparent to one skilled in the art are deemed to fall within the scope and spirit of the claims appended hereto, bearing in mind, however, that the invention is defined only by these claims.

What is claimed is:

1. A single piece carton comprising:

a bottom panel with foldably attached side and end wall panels;

corner connector panels, intersecting edges of which are foldably attached, respectively, to an end and side wall panel, the connector panel having a diagonal fold line passing through the intersection of the edges to divide the panel into a first triangular section foldably attached to an end wall panel along one of the intersecting edges and a second triangular section foldably attached to a side wall panel along its other intersecting edge;

the triangular sections being folded along the diagonal fold line into face contact and disposed externally of the end wall panel with the first triangular section between the end wall panel and the second triangular section;

a locking panel joined to the second triangular section of at least one of the corner connector panels at each end of the carton and extending over the upper edge of the end wall panel into the carton interior; and

means maintaining the locking panel in face contact with the end wall panel.

2. The carton of claim 1 wherein only one of the corner connector panels at each end of the carton has a locking panel joined to it and wherein at least portions of the corner connector panels attached to the same end wall panel overlap.

3. The carton of claim 1 wherein a locking panel is joined to the second triangular section of each connector panel in the carton.

4. The carton of claim 1 further including at least one top panel foldably attached to a wall panel.

5. The carton of claim 1 wherein the means for maintaining the locking panel in face contact with the end wall panel comprises a tab on an edge of the locking panel and receptacle means carried by the bottom panel into which the tab is insertable.

6. A single piece carton blank comprising:

a bottom panel with foldably attached side and end wall panels;

corner connector panels, intersecting edges of which are foldably attached, respectively, to an end and

- side wall panel, the connector panel having a diagonal fold line passing through the intersection of the two edges to divide the panel into a first triangular section foldably attached to the end wall panel along one of its intersecting edges and a second triangular section foldably attached to the side wall panel along its other intersecting edge, the combined width of the two connector panels attached to a given end panel exceeding the width of the end panel; and
- a locking panel foldably joined to the second triangular section of one of the corner connector panels attached to each end wall panel.
7. The blank of claim 6 further including a locking tab on an edge of the locking panel opposite that which joins to the connector panel, and receptacle means on the bottom panel adapted to receive the tab when the blank is assembled.
8. The blank of claim 6 wherein the width of each connector panel and the width of each end wall panel are substantially the same.
9. The blank of claim 6 further including at least one top panel foldably attached to a wall panel.
10. A single piece carton comprising:
- a bottom panel with foldably attached side and end wall panels, at least one of the wall panels containing an aperture;
 - corner connector panels, intersecting edges of which are foldably attached, respectively, to an end and side wall panel, the connector panel having a diagonal fold line passing through the intersection of the edges to divide the panel into a first triangular section foldably attached to an end wall panel along one of the intersecting edges and a second triangular section foldably attached to a side wall panel along its other intersecting edge;
 - the triangular sections being folded along the diagonal fold line into face contact and disposed externally of the end wall panel with the first triangular section between the end wall panel and the second triangular section;
 - a locking panel joined to the second triangular section of at least one of the corner connector panels at each end of the carton and extending over the upper edge of the end wall panel into the carton interior;
 - means maintaining the locking panel in face contact with the end wall panel;
 - at least one top panel foldably attached to a wall panel; and
 - a top locking panel foldably attached to at least one edge of the top panel and in face contact with the outer surface of a wall panel containing an aperture, the top locking panel having means insertable into the aperture which cooperate with the aperture to maintain the top panel in a closed position.
11. The carton of claim 10 wherein a locking panel is joined to each connector panel.
12. The carton of claim 10 wherein only one of the corner connector panels at each end of the carton has a locking panel joined to it and wherein at least portions of the corner connector panels attached to the same end wall panel overlap.
13. The carton of claim 10 wherein opposed wall panels each contain an aperture and wherein a top locking panel is attached to opposed edges of the top panel.

14. The carton of claim 10 wherein opposed end wall panels each contain an aperture and wherein a top panel is attached to each side wall panel, with a top locking panel attached to opposed edges of only one of said top panels, said top panel with the top locking panels attached thereto overlying the other top panel.
15. The carton of claim 1 wherein the corner connector panels attached to the same end wall panel overlap each other.
16. The carton of claim 1 wherein said means maintaining the locking panel in face contact with the end wall panel include receptacle means carried by the bottom panel adapted to receive the insertion of a tab therein, and a tab carried by the locking panel inserted in said receptacle means.
17. The blank of claim 6 further including a tab carried by the locking panel and receptacle means carried by the bottom panel adapted to receive the insertion of said tab therein when the blank is assembled.
18. A single piece carton blank comprising:
- a bottom panel with foldably attached side and end wall panels, at least one of the wall panels containing an aperture;
 - corner connector panels, intersecting edges of which are foldably attached, respectively, to an end and side wall panel, the connector panel having a diagonal fold line passing through the intersection of the edges to divide the panel into a first triangular section foldably attached to an end wall panel along one of its intersecting edges and a second triangular section foldably attached to a side wall panel along its other intersecting edges, and wherein the combined width of the corner connector panels attached to a given end panel exceeds the width of the end panel; and
 - a locking panel foldably joined to the second triangular section of only one of the corner connector panels attached to each end wall panel;
 - at least one top panel foldably attached to a wall panel; and
 - a top locking panel foldably attached to at least one edge of the top panel, the top locking panel having means adapted for insertion into the aperture of said wall panel to maintain the top panel in a closed position upon assembly of the blank.
19. A single piece carton blank comprising:
- a bottom panel with foldably attached side and end wall panels;
 - corner connector panels, intersecting edges of which are foldably attached, respectively, to an end and side wall panel, the connector panel having a diagonal fold line passing through the intersection of the two edges to divide the panel into a first triangular section foldably attached to the end wall panel along one of its intersecting edges and a second triangular section foldably attached to the side wall panel along its other intersecting edge, the combined width of the two connector panels attached to a given end panel exceeding the width of the end panel; and
 - a locking panel foldably joined to the second triangular section of only one of the corner connector panels attached to each end wall panel.
20. A single piece carton blank comprising:
- a bottom panel with foldably attached side and end wall panels wherein two opposed wall panels each contain an aperture;

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corner connector panels, intersecting edges of which are foldably attached, respectively, to an end and side wall panel, the connector panel having a diagonal fold line passing through the intersection of the edges to divide the panel into a first triangular section foldably attached to an end wall panel along one of its intersecting edges and a second triangular section foldably attached to a side wall panel along its other intersecting edge; and a locking panel foldably joined to the second triangular section of at least one of the corner connector panels attached to each end wall panel;

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at least one top panel foldably attached to a wall panel; and
a top locking panel foldably attached to opposed edges of the top panel, the top locking panel having means adapted for insertion into the apertures of said wall panels to maintain the top panel in a closed position upon assembly of the blank.
21. The blank of claim 20 wherein a top panel is attached to each side wall panel with a top locking panel attached to opposed edges of only one of said top panels.

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