March 19, 1957 R. C. STENGER 2,785,845

LINED FROZEN FOOD BOXES

Filed Dec. 4, 1953 4 Sheets-Sheet 1

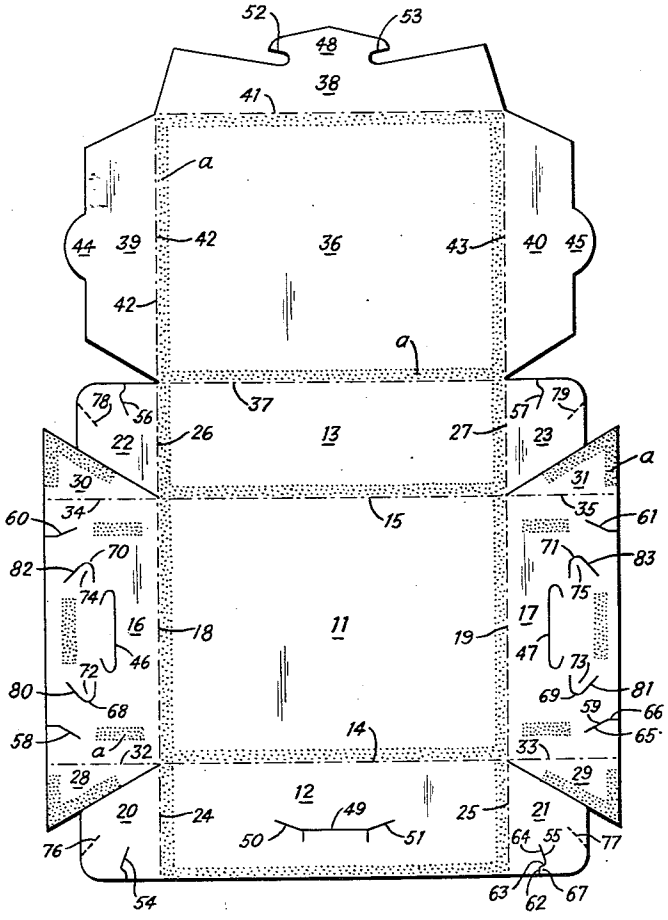


Fig. 1

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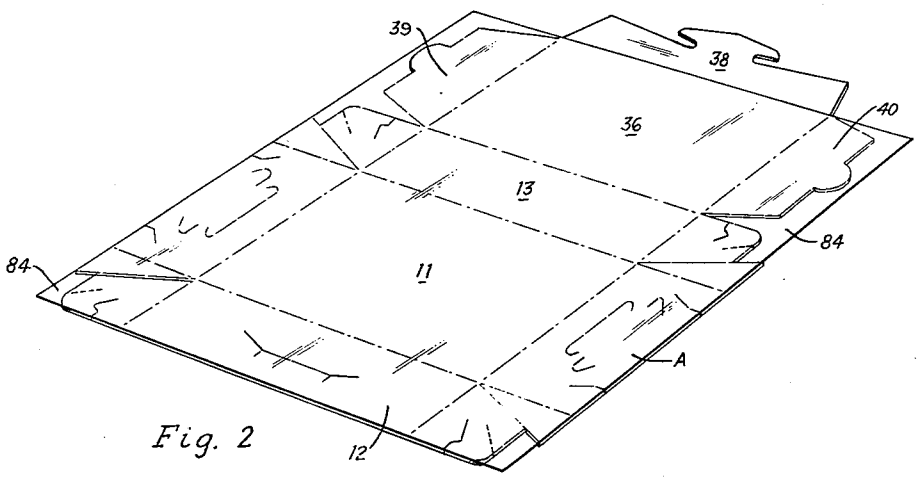


Fig. 2

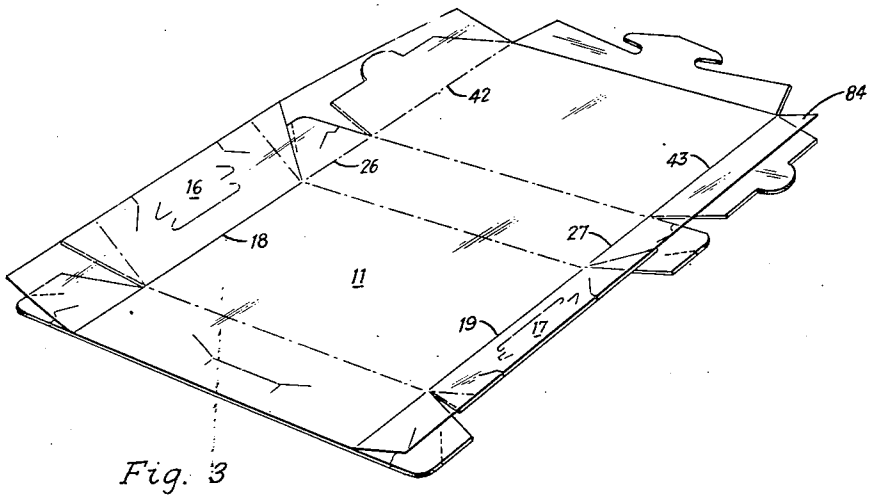


Fig. 3

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LINED FROZEN FOOD BOXES

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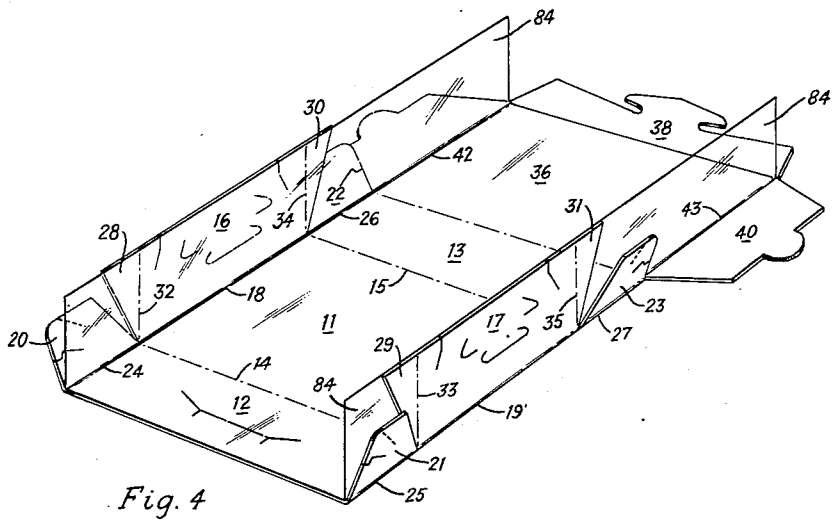


Fig. 4

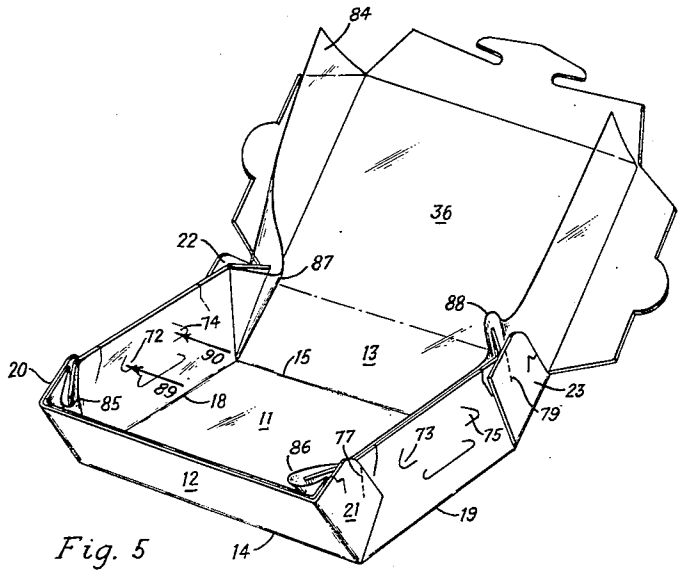


Fig. 5

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LINED FROZEN FOOD BOXES

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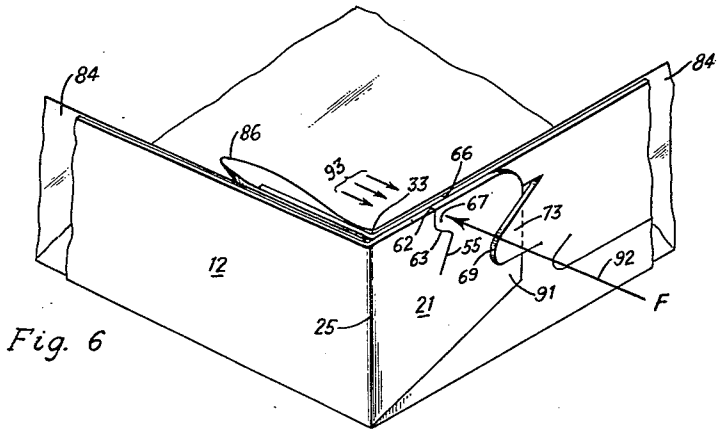


Fig. 6

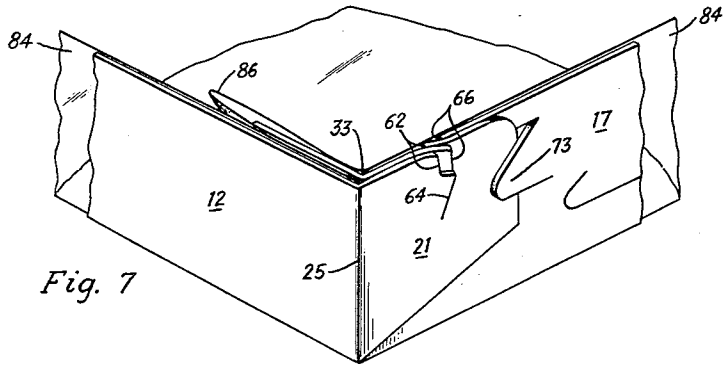


Fig. 7

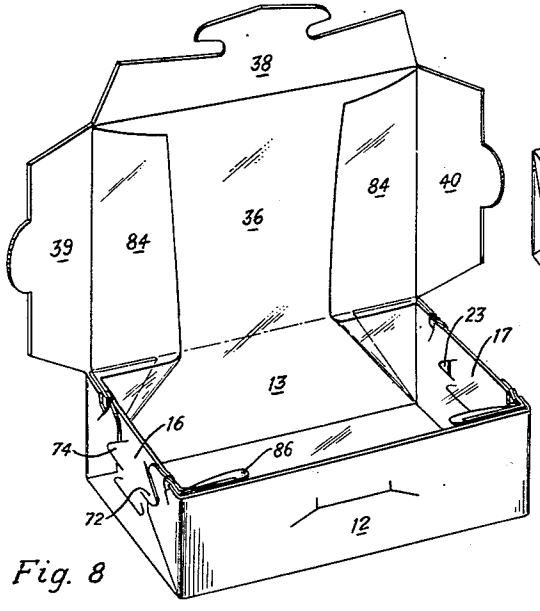


Fig. 8

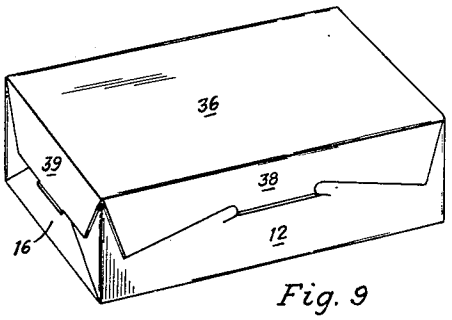


Fig. 9

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United States Patent Office 2,785,845 Patented Mar. 19, 1957

2,785,845

LINED FROZEN FOOD BOXES

Richard C. Stenger, San Carlos, Calif., assignor to Baljak Corporation, Wilmington, Del., a corporation of Delaware

Application December 4, 1953, Serial No. 396,123

5 Claims. (Cl. 229—36)

This invention relates to improvements in cartons, trays, or other structures made from blanks of cardboard, paperboard, or other suitable foldable sheet material, hereinafter collectively referred to as "boxes" or "folding boxes."

More particularly, the invention applies to gluelessly assembled folding boxes in which the box corners are locked by means of a flap. The flap is articulated to one wall panel, and is inserted into a cut in another wall panel which meets the one wall panel at the box corner.

Box corner constructions of the glueless type are favored because of the relative smallness and simplicity of the box machinery required for setting up the boxes and because of the rapidity with which flat box blanks can be assembled into box form ready for filling.

The assembly of glueless box corners which are designed to be mechanically "tight" in the sense that they form a rigid corner equally resistant to forces acting from the inside of the box outwardly and from the outside of the box inwardly, generally requires an assembly mechanism including a plunger on which movable elements are mounted. These elements press against the inside of the box walls which comprise the locking cuts for the purpose of opening the cuts sufficiently to permit the lock flaps to enter freely. Thereafter the movable elements grasp a portion of the lock flaps and positively pull them into engaging position whereby failure of locking is eliminated.

The frozen food industry requires boxes which must be capable of holding a certain amount of fluid contents without leakage from the time of filling to the time of freezing. Fluid tightness is a primary consideration and is generally achieved by the use of a liner. Since the liner overlies the interior surface of the blank, it does not permit of the use of projecting and retracting elements on the plunger which bear against the inside of the box walls and flex wall portions outwardly for the purpose of opening cuts and then pulling the locking portion of the flaps into engaging position.

In order to overcome the assembly limitations imposed by the liner, it has been suggested to modify the box structure and its assembly by moving the box walls not only into upright position with respect to the box bottom, but farther towards the inside of the box through an angle of more than 90 degrees. This initial motion is then followed by a locking motion in the reverse direction until certain hook-type locks are engaged which make the corners' movement tight only in the sense that the corners resist pressure directed from the inside to the outside. In order to permit the aforementioned first movement, the edges of the side walls adjacent box corners must be trimmed back to an angle less than 90 degrees. Thus shaped, the walls are not available as reinforcing structures to prevent movement of the adjacent erected box walls towards the inside in response to a force acting from the outside.

It is most desirable to provide for an end-to-panel engagement between the walls containing the locking cut and the wall to which the lock flap is articulated, since this

engagement stiffens the box corner against forces acting from the outside to the inside, and it is further desirable to provide for movable locking elements on assembly mechanism for positively pulling the locking edges into positive engagement.

The present invention provides a box corner construction and a box blank for forming not only a liquid-tight box corner, but also a corner construction which is movement-tight in the sense that it resists forces acting from the outside of the box towards the inside as well as forces acting from the inside of the box towards the outside.

The box corner construction according to the invention also includes corner flaps which engage and guide the liner during assembly to form neat gusset folds at the box corners.

The assembly of the box blank incorporating the invention requires a minimum of time, since the box walls need only be folded into upright position, by one controlled motion, in distinction from assembly procedure requiring two controlled motions, namely, one in which the box walls are moved through an angle of more than 90 degrees and a second controlled motion returning the box walls to the upright position.

These and various other features, objects and advantages of the invention will appear more fully from the detailed description which follows, accompanied by drawings showing, for the purpose of illustration, a preferred embodiment of the invention. The invention also consists in new and improved details of construction hereinafter set forth and claimed.

Although the characteristic features of the invention which are believed to be novel will be particularly pointed out in the claims appended hereto, the invention itself and the manner in which it may be carried out, may be better understood by referring to the following description taken in connection with the accompanying drawings forming a part of it in which:

Fig. 1 is a plan view of a flat lined box blank embodying the invention, the inside surface of the blank, and the liner facing the observer;

Fig. 2 is a perspective view of the blank of Fig. 1 at the first stage of assembly;

Figs. 3, 4 and 5 illustrate, in perspective views, successive stages of the assembly;

Fig. 6 is a perspective view, on an enlarged scale, of a folded box corner prior to completion of the lock;

Fig. 7 is a perspective view of the box corner of Fig. 6 after completion of the lock;

Fig. 8 is a perspective view of the erected box ready for filling; and

Fig. 9 is a perspective view of the filled and closed box.

In the following description and in the claims, various structural details will be identified by specific names for convenience. The names, however, are intended to be generic in their application. Corresponding reference characters refer to corresponding parts in the several figures of the drawings.

In the drawings accompanying, and forming part of, this specification, certain specific disclosure of the invention is made for the purpose of explanation of broader aspects of the invention, but it is understood that the details may be modified in various respects without departure from the principles of the invention and that the invention may be applied to other structures than the one shown.

The blank A may be cut and scored, in multiple, from a large sheet or roll of paperboard or other suitable foldable material on an automatic cutting and creasing machine.

The blank A is traversed by several scored fold lines to provide a main or bottom panel 11 to which a front panel 12 and a back panel 13 are articulated along a front

fold line 14, and a back fold line 15, respectively. Side panels 16 and 17 are articulated to the bottom panel 11 along side fold lines 18 and 19, respectively.

Lock flaps 20, 21, 22 and 23 are articulated to the front and back panels along corner fold lines 24, 25, 26, and 27, respectively. These corner fold lines are either aligned with, or slightly offset with respect to, the side fold lines 18 and 19 to compensate for the thickness of the board and of the liner in a conventional manner. Corner flaps 28, 29, 30 and 31 may be articulated to the side panels 16 and 17 along corner flap fold lines 32, 33, 34 and 35, respectively.

A top panel 36 is articulated to the back panel 15 along a cover fold line 37. A front tuck flap 38 and side tuck flaps 39 and 40 are articulated to the top panel 36 along tuck flap fold lines 41, 42 and 43, respectively.

The configuration of the tuck flaps 38, 39 and 40 is optional.

The illustrated configuration of the flaps is conventional in frozen food boxes and comprises tab projections 44 and 45 fitting into cuts 46 and 47 in the side panels 16 and 17, respectively. Similarly, the front tuck flap 38 has a locking tab 48 fitting into a cut 49 in the front panel 12 and engages edge portions 50 and 51 of the cut with correspondingly oriented edge portions 52 and 53 of the tab 48. These cover locking details are in common use and do not form a part of the present invention.

The improved corner locks of the box blank comprise external cuts in the side wall panels and in the associated lock flaps. These cuts are moved into interlocking engagement after erection of the front, back and side panels of the box into upright position in regard to the bottom panel.

In the illustrated embodiment the construction of all four box corners is alike, and it will therefore be sufficient to describe one of the four external cuts 54, 55, 56 and 57 in the lock flaps 20, 21, 22 and 23, which are brought into engagement with other external cuts 58, 59, 60 and 61 in the side panels 16 and 17, respectively.

The external cut 55 is preferably of bent outline and comprises an exterior portion 62, an intermediate portion 63 extending at an angle to exterior portion 62, and an interior portion 64 extending at an angle to the intermediate portion 63. The interior portion 64 runs preferably in a substantially radial direction towards the box corner marked by the intersection of the fold lines 14 and 19.

The corresponding external cut 59 in the side panel 17 comprises an interior portion 65 and an exterior portion 66. When the panels and flaps are in corner-forming position, as is also shown in Figure 6, the interior portion 65 of the cut 59 is in register with the interior portion 64 of the cut 55. This permits edges of the two cuts to be brought into edge-to-edge engagement, as will later be described. As is best seen in Figure 6, the exterior portions of the two cuts are not in register, but are offset. The amount of the offset is roughly equal to the extent of the intermediate portion 63 of cut 55.

The offset is selected in accordance with the flexibility of the board. In the type of board more commonly used for frozen food packages, the offset may be of the order of 3/32 of an inch, or roughly 2½ mm.

For the purpose of locking, the corner assembly is flexed adjacent to the external portions 62 and 66 into the position shown in Figure 7. This will be described in greater detail further below. At this point it will suffice to say that the amount of offset should be such that the engagement shown in Figure 7 can be formed without permanently creasing the board at the base of the tongue or projection 67 formed by the angularly disposed cuts 62 and 63.

Internal cuts 68, 69, 70 and 71 of bent outline form internal tongues 72, 73, 74 and 75 in the side panels 16 and 17. The internal tongues are directed toward the respective box corners and serve to anchor the lock flaps in flat side panel overlying position when the box is set up. This will become apparent as the description proceeds.

Additional external cuts 76, 77, 78 and 79 may optionally be provided in the lock flaps 20, 21, 22 and 23. In the drawings, these cuts are shown by broken lines to indicate that the cuts are optional. If provided, they are arranged in such a position that they are in coincidence with the upper portions 80, 81, 82 and 83 of the internal cuts 68, 69, 70 and 71 when the corner is formed. In this position the cuts form a secondary or supplemental lock between the lock flaps and the side panels. This lock engages by reason of the inherent stiffness of the board. It is supplemental in that it assists, but is not depended on, for maintaining the box corners locked. The primary lock is the one formed by the cuts 54, 55, 56 and 57 together with the cuts 58, 59, 60 and 61. This lock is not brought into engagement by resiliency of the board but is positively formed by a mechanical locking action, as will later appear.

The optional cuts 76, 77, 78 and 79 are also preferably radially disposed with respect to the box corners and, for the same reason, the upper portions 80, 81, 82 and 83 are likewise substantially radially disposed with respect to the box corners.

A sheet 84 of liquid impermeable liner material, for example, cellulose acetate, is adhesively secured to the blank A along glue areas marked "*a*" in Figure 1.

The glue areas are so selected that the liner follows the folding motion of certain panels and flaps to which it is attached, and does not follow other flaps or blank portions to which it is not attached. The liner is substantially rectangular in outline and corresponds roughly to the size of the box blank A, not including the front tuck flap 38.

The blank A together with its liner 84 may be transformed into hollow box form either by hand, or preferably, by automatic box machinery as disclosed in the co-pending application of Chester J. Pierce, Jr. and Thomas F. Burke, Serial No. 487,632, filed February 11, 1955. The machine operations, which may also be carried out by hand, are substantially as follows:

The side panels 16 and 17 are first folded towards upright position with respect to the bottom panel 11 along the side fold lines 18 and 19. The marginal portions of the liner 84 which are adhesively secured to the side panel take part in this folding operation and cause a more or less indefinite crease to be formed in line with the fold lines 26, 42 and 27, 43 of the box blank. This is illustrated in Figure 3.

Figure 4 illustrates the side panel 16 and 17 in substantially upright position. At about this point, the front panel 12 and the back panel 13 are folded about their respective fold lines 14 and 15, and substantially simultaneously the lock flaps 20, 21, 22 and 23 are folded along their fold lines 24, 25, 26 and 27 to assume an angular position with respect to the front panel 12 and the back panel 13.

Also, the corner flaps 28, 29, 30 and 31 are folded about their respective fold lines 32, 33, 34 and 35 to assume an angular position with respect to the side panels 16 and 17. Since the liner is adhesively secured to the corner flaps, the formation of corner gusset folds 85, 86, 87 and 88 of the liner is thus initiated.

Figure 4 illustrates the blank shortly before folding of the corner flaps 28, 29, 30 and 31 and Figure 5 illustrates the position of the corner-forming flaps and panels at a point where the front panel 12 and the back panel 13 have moved approximately 45 degrees.

The lock flaps 20, 21, 22 and 23 are now guided to enter underneath the internal tongues 72, 73, 74 and 75. For this purpose pressure may be exerted on these tongues from the inside. The deflection of the board at the point of application of the force as indicated by arrows 89 and 90, is slight and does not damage the

liner. The flexing of the internal tongues opens the internal cuts sufficiently for the lock flaps 20, 21, 22 and 23 to slide underneath. The tongue 73 maintains the flap 21 in a position overlying the side panel 17.

If an optional locking cut 77 is provided in the flap 21, the resiliency of the board, tending to return the flap 73 into its original position in the plane of the panel 17, deflects the portion 91 of the flap 21 sufficiently to bring an edge of the cut 77 into engagement with the edge of the cut 69. This engagement constitutes a supplemental lock for maintaining the corner assembly in erected position.

In the condition illustrated in Figure 6, the box corners are ready for engagement of the primary locks as follows:

A force F is exerted in the direction and at the point indicated by the arrow 92 at the tongue or projection 67 formed by the offset of the cut 55. At the same time the side panel 17 is supported on the inside along an area 93 between the corner 25 proper and the end of the cut 62. This causes the tongue 67 to snap in back of the portion of the side panel which lies between the cut 66 and the fold line 33. The completed lock is shown in Figure 7. The lock proper is formed by the interior portion 64 of the cut in the flap 21 and the interior portion 65 of the cut 59 in the side panel. This cut lies in register with the cut portion 64, but is not visible in Figure 7. However, it was previously explained that the two locking cuts, namely the cut 59 in the side panel and cut 55 in the lock flap are so laid out that the lower portions lie in register when the corner is square, so that, by flexing of the board, edges of the registering cuts can be brought into edge-to-edge engagement. This engagement locks the corner against forces directed from the inside of the box outwardly.

The exterior portion of the cuts, namely the portion 62 of the cut 55 and the portion 66 of the cut 59, perform the function of a safety catch which keeps the edges of the lower portions of the cuts in engagement.

The box corner is resistant to forces acting from the outside towards the inside by reason of the edge-to-panel engagement between the side panel 17 and the front panel 12. More particularly, the side edge of the panel 17 represented by the fold line 33 rests against the interior panel surface of the front panel 12 adjacent the corner fold line 25.

This mechanical tightness of the box corner against inwardly directed pressure is important for the packaging of frozen foods, since the filled enclosed cartons are tightly overwrapped. Tight overwrapping naturally tends to push the front and back panels 12 and 13 towards the inside of the box. The corner construction prevents this from happening.

In addition to being mechanically tight, the carton is fluidtight because of the formation of gussets at all four box corners, the gusset 86 being visible in Figures 6 and 7.

The locked carton is shown in Figure 8. It is ready for filling with merchandise and may then be closed in conventional manner by equally conventional closing machines. Figure 9 shows the closed carton in condition for overwrapping.

From the hereinbefore described locking procedure, and more particularly from Figures 6 and 7, it is seen that the application of forces for locking the box corners will not interfere with, nor damage, the liner 34. It is evident that no projectable elements of a plunger or mandrel inside the box are required for performing the locking operation, but that the locking operation can be performed by a force applied from the outside and support from the inside. This makes the box structure ideally suited for handling by high speed automatic machinery of the plunger and die type.

What is claimed is:

1. A lined folding box, particularly for the packaging of frozen foods, consisting of a box blank and a liner, said box blank comprising, a bottom panel; a front panel and a back panel articulated to the bottom panel along a front fold line and a back fold line, respectively; side panels articulated to the bottom panel along side fold lines; corner flaps articulated to the ends of the side panels along corner flap fold lines; lock flaps articulated to the ends of the front and the back panels along lock flap fold lines which are substantially in coincidence with said corner fold lines, considering the set up box, said side panels having internal cuts in them forming internal tongues in the side panels directed towards the box corners, the tips of the tongues being at a distance from the lock flap fold line less than the length of the respective lock flap so that the tongues overlie said lock flap, considering the box in set up condition, said liner overlying said bottom panel, said front and back panels, said side panels, said lock flaps and said corner flaps, considering the blank and the liner in flat condition, said box being provided with interlocks between said lock flaps and said side panels, each interlock including an external cut extending into the body of the side panel from its top edge and an external cut extending into the body of the lock flap from its top edge, said two external cuts having an interior portion remote from the respective top edge and an exterior portion adjacent the top edge, the interior portions of both cuts being in substantial coincidence when the box is set up, for engagement of edges of the interior portions, the exterior portion of the side wall cut being at a greater distance from the respective flap fold line than the exterior portion of the lock flap cut, the exterior portion of the lock flap cut being in angular relationship to the interior portion of the lock flap cut, thereby forming a hook on the lock flap pointing towards the flap fold line, the hook being sufficiently short to permit flexing of the stock without permanent creasing by pressure applied adjacent the hook and directed toward the inside of the box to snap the hook from a position overlying the end panel into a position underlying the end panel, whereby the far edge of the interior portion of the flap cut is flexed into engagement with the near edge of the interior portion of the side panel cut.

2. A lined folding box, particularly for the packaging of frozen foods, consisting of a box blank and a liner, said box blank comprising, a bottom panel; a front panel and a back panel articulated to the bottom panel along a front fold line and a back fold line, respectively; side panels articulated to the bottom panel along side fold lines; corner flaps articulated to the ends of the side panels along corner flap fold lines; lock flaps articulated to the ends of the front and the back panels along lock flap fold lines which are substantially in line with said corner fold lines, considering the set up box, said side panels having internal cuts in them forming internal tongues in the side panels directed towards the box corners, the tips of the tongues being at a distance from the lock flap fold line less than the length of the respective lock flap so that the tongues overlie said lock flap, considering the box in set up condition, said liner overlying said bottom panel, said front and back panels, said side panels, said lock flaps and said corner flaps, considering the blank and the liner in flat condition, said box being provided with interlocks between said lock flaps and said side panels, each interlock including an external cut extending into the body of the side panel from its top edge and an external cut extending into the body of the lock flap from its top edge, said two external cuts having an interior substantially straight portion remote from the respective top edge, and an exterior portion adjacent the top edge, the interior portions of both cuts being in register when the box is set up, the exterior portion of the side wall cut being at a greater distance from the respective flap fold line than the exterior portion of the lock flap cut, the exterior portion of

the lock flap cut being in angular relationship to the interior portion of the lock flap cut, thereby forming a hook on the lock flap pointing towards the flap fold line, the hook being sufficiently short to permit flexing of the stock without permanent creasing by pressure applied adjacent the hook and directed toward the inside of the box to snap the hook from a position overlying the end panel into a position underlying the end panel, whereby the far edge of the interior portion of the flap cut is flexed into engagement with the near edge of the interior portion of the side panel cut.

3. A corner construction for a folding box composed of a box blank and a liner blank overlying, and attached to, the inside surface of the box blank, the box corner comprising a main panel; a first wall panel articulated to said main panel along a first panel fold line; a second wall panel articulated to said main panel along a second panel fold line intersecting said first panel fold line at a corner angle; a corner flap articulated to said second panel along a corner flap fold line; a lock flap articulated to said first wall panel along a flap fold line lying substantially in coincidence with said corner flap fold line, considering the corner in set up condition; said second wall panel having an internal cut in it forming an internal tongue in said second panel directed towards, and overlapping, said lock flap, considering the corner in assembled position, the tip of the tongue being closer to said lock flap fold line than the length of the lock flap to provide such overlapping, said first and said second wall panels and said lock flap having a top edge substantially parallel to said main panel, considering the corner in assembled condition, said corner flap underlying said first wall panel with the liner folded around the corner flap to form a gusset, said lock flap having a first external cut extending into it from its top edge, said second wall panel having a second external cut extending into it from its top edge, each of said external cuts comprising an exterior portion adjacent the respective top edge and an interior portion remote from the top edge, the interior portion of both external cuts being in coincidence in the assembled corner, the exterior portion of the said first cut extending at an angle with respect to the interior portion, which interior portion is substantially radial with respect to the point of intersection between said first and said second panel fold lines, the exterior portion of the said first cut meeting the top edge of the lock flap at a point closer to said lock flap fold line than the distance from the corner flap fold line to the point of entry of said second cut into the top edge of the second wall panel measured from the corner flap fold line, the top portion of the lock flap on the far side of the first cut forming a hook tip capable of being resiliently displaced by pressure directed towards the inside of the box from a position overlying said second wall panel into a position underlying the near top portion of the second wall panel in the assembled corner, in which position the interior portions of the two cuts are in edge-to-edge engagement.

4. A corner construction for a folding box composed of a box blank and a liner blank overlying, and attached to, the inside surface of the box blank, the box corner comprising, a main panel; a first wall panel articulated to said main panel along a first panel fold line; a second wall panel articulated to said main panel along a second panel fold line intersecting said first panel fold line at right angles; a corner flap articulated to said second panel along a corner fold line; a lock flap articulated to said first wall panel along a flap fold line lying substantially in coincidence with said corner fold line, considering the set up corner; said second wall panel having an internal cut in it forming an internal tongue in said second panel overlapping said lock flap, considering the corner in assembled condition, said first and said second wall panels and said lock flap having a top edge substantially parallel to said main panel, considering the corner in assembled condition, said corner flap underlying said first wall panel with the liner folded about the corner flap to form a gusset, said lock flap having a first external cut extending into it from its top edge, said second wall panel having a second external cut extending into it from its top edge, each of said external cuts comprising an exterior portion adjacent the respective top edge and an interior portion remote from the top edge, the interior portions of both external cuts being in coincidence in the assembled corner, the exterior portion of said second cut being at a greater distance from the corner fold line than the distance of the exterior portion of the first cut from said flap fold line, the exterior portion of at least one of said external cuts being at an angle to the interior portion of the same cut, whereby a hook is formed by the angled exterior cut portion adjacent the respective top edge, the top portion of the lock flap on the far side of the first cut being flexible by pressure exerted at the top edge from a position overlying said second wall panel into a position underlying the near top portion of the second wall panel in the assembled corner, in which position the interior portions of the two cuts are in edge-to-edge engagement.

5. A corner construction for a folding box, particularly for use with a liner blank overlying, and attached to, the inside surface of the box blank, the box corner comprising a main box panel; a first wall panel articulated to said main panel along a first panel fold line; a second wall panel articulated to said main panel along a second panel fold line intersecting said first panel fold line at a corner angle; a corner flap articulated to said second panel along a corner flap fold line; a lock flap articulated to said first wall panel along a flap fold line lying substantially in coincidence with said corner flap fold line, considering the corner in set-up condition; said second wall panel having an internal cut in it forming an internal tongue in said second panel directed towards, and overlapping, said lock flap, considering the corner in assembled condition, the tip of the tongue being closer to said lock flap fold line than the length of the lock flap to provide such overlapping, said first and said second wall panels and said lock flap having a top edge substantially parallel to said main panel, considering the corner in assembled condition, said corner flap underlying said first wall panel, said lock flap and said second wall panel being provided with an interlock including a first external cut and a second external cut, one of said cuts extending into the lock flap from its top edge, the other external cut extending into said second wall panel from its top edge, each of said external cuts comprising an exterior portion adjacent the respective top edge and an interior portion remote from the top edge, the interior portions of both external cuts being in coincidence in the assembled corner, the exterior portions of said first cut being offset with respect to the interior portion of said first cut, the exterior portion of the external cut meeting the top edge of the lock flap at a point closer to the lock flap fold line than the distance from the corner flap fold line to the point of entry of the cut into the top edge of the second wall panel measured from the corner flap fold line, the top portion of the blank stock adjacent the offset portion forming a hook tip capable of being resiliently displaced by pressure directed against the second wall panel and the overlying lock flap past the exterior portion of the other end into locking position, in which position the interior portions of the two cuts are in locking engagement.

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