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3,206,098

END WALL CONSTRUCTION OF FOLDING BOXES

Filed May 26, 1964

3 Sheets-Sheet 1

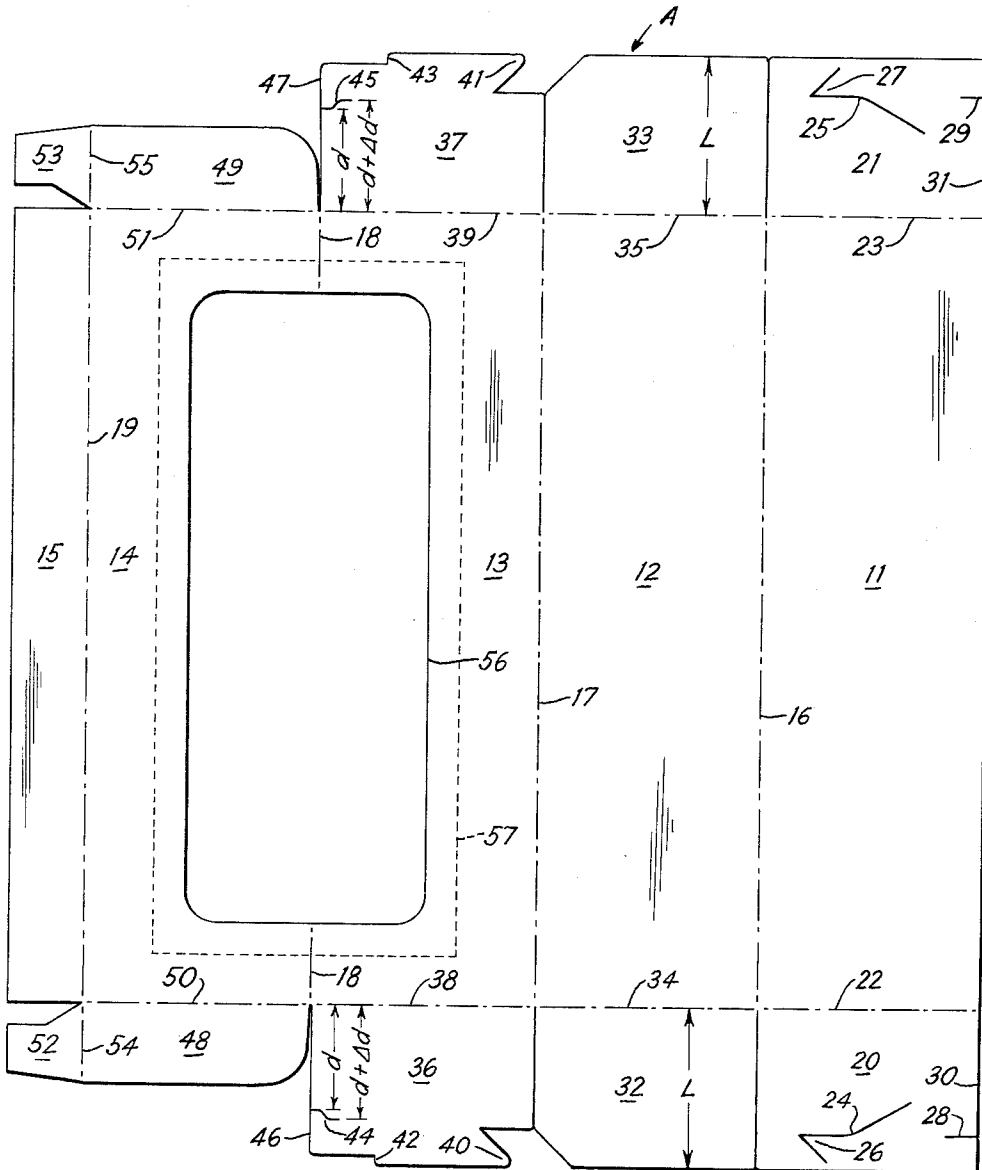


Fig. 1

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3 Sheets-Sheet 2

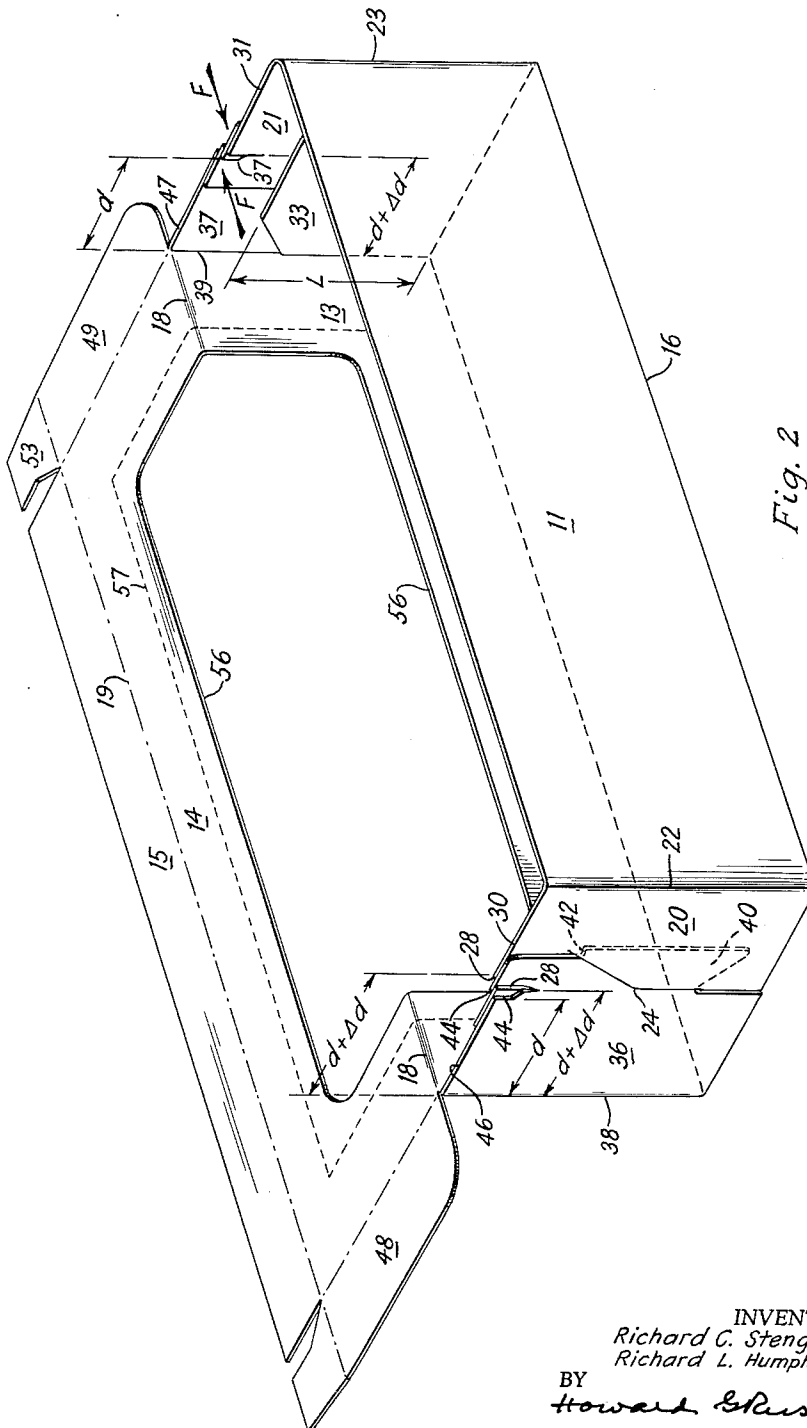


Fig. 2

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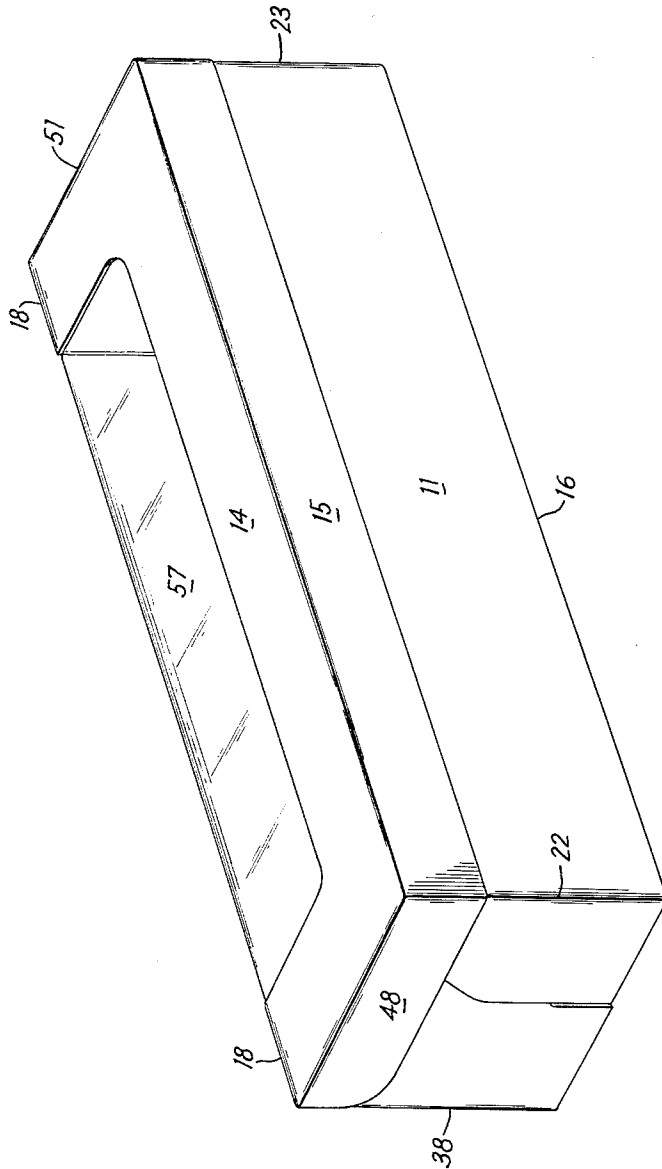


Fig. 3

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1

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END WALL CONSTRUCTION OF FOLDING BOXES
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3 Claims. (Cl. 229—36)

This invention relates to improvements in the construction of gluelessly assembled folding boxes of the style in which end walls of the box body are formed by overlapping end wall panels articulated to the side walls of the box body.

It is well known in this connection to interengage overlapping end panels by means of a hook formation on one end panel which engages a slit in the other panel.

Folding boxes of the aforementioned style are suited for the packaging of a wide variety of merchandise and are particularly favored for the packaging of bakery goods, such as cookies and doughnuts. For the latter uses the boxes are generally fitted with a hinge cover which may comprise a transparent window portion.

If a box is of substantial length, as are cookie and doughnut boxes, there exists a potential danger of unlocking of the end walls. This danger results from a variety of causes.

Starting with the box in its empty state, there is the tendency of racking or twisting of the box body about a longitudinal axis extending through the centers of the end panels. Such twisting or racking may be caused by a tendency of the board to warp slightly as a result of humidity conditions. Twisting may also be caused by uneven creasing of the longitudinal scores having a residual "fight" in the board at the scores which may be uneven from one box end to another. Next, there is the handling of the box from the moment it leaves the box forming machine until it arrives at the loading stations via conveyor mechanisms.

After loading of the box it undergoes further handling, such as closing, forming and gluing of the cover and, prior to such closing, the box generally undergoes a turning operation to change the attitude of the box from an end-leading position to a cover-leading position which is more advantageous for closing. The weight of the contents is considerable in relation to the physical strength of the still open box which is therefore weak until the moment the cover is closed and sealed after which the box possesses considerable strength.

Accidental unlocking of the box end structure interferes greatly with the loading and closing operation of the automatic machinery which handles the boxes and involves generally spoilage of the contents of the box involved and occasionally also of the contents of other boxes with which the failing box jams.

The invention provides an improved glueless end wall construction of the basic hook style which after its initial engagement in the box former which sets up the flat bank into hollow box shape is highly resistant to accidental unlocking or disengagement and which reduces box failure to a negligible proportion.

The various objects, features and advantages of this invention will appear more fully from the detailed description which follows accompanied by drawings showing, for the purpose of illustration, a preferred manner in which the invention may be carried out. The invention also resides in certain new and original features of construction and combination of elements as hereinafter set forth and claimed.

Although the characteristic features of this invention which are believed to be novel will be particularly pointed

2

out in the claims appended hereto, the invention itself, its objects and advantages, and the manner in which it may be carried out will be better understood by referring to the following description in connection with the accompanying drawings forming a part of it in which:

FIG. 1 is a plan view of a folding box blank incorporating the invention;

FIG. 2 is a perspective view of a box formed from the blank of FIG. 1; and

FIG. 3 is a perspective view of the box of FIG. 2 after completion and closure of the box cover.

In the following description and in the claims various 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 elements in the several figures of the drawings.

The drawings accompanying and forming part of this specification disclose certain specific details for the purpose of explanation of broader aspects of the invention, but it should be understood that details may be modified in various respects without departure from the principles of the invention and that the invention may be incorporated in other structural forms than shown.

The blank A shown in FIG. 1 may be formed from appropriate foldable sheet material, such as paperboard, by conventional cutting and creasing equipment. The flat blanks A may be stacked and stored in flat condition until the time they are to be converted into box form either by hand or by an automatic box forming machine.

The blank A comprises a front side wall panel 11, a bottom panel 12, a rear side wall panel 13, a top or cover panel 14 and a front flap 15 articulated one to another along a front bottom fold line 16, a rear bottom fold line 17, a cover hinge line 18 and a front flap fold line 19.

Outer end panels 20 and 21 are articulated to the front side wall panel 11 along corner fold lines 22 and 23. Each of the outer end wall panels comprises an internal slit 24, 25, which are conveniently of angular outline to form a readily deflectable tongue 26, 27 in the end panel.

External locking cuts 28 and 29 extend into the edge 30, 31 of the panel which in the finished box becomes the top edge.

Inner end panels 32, 33 are articulated to the bottom panel 12 along bottom end fold lines 34, 35, and have a length L from the bottom end fold lines 34, 35 whose significance will appear later.

Outer end panels 36, 37 are articulated to the rear side wall panel 13 along corner fold lines 38, 39, respectively. The outer end panels 36, 37 are shaped to comprise downwardly pointing hook formations or tabs 40, 41 and, above the latter, substantially horizontal or transverse shoulders 42, 43.

External locking cuts 44, 45 extend into the outer end panels 36, 37 from their top edges 46, 47, respectively. These cuts are preferably of angular outline, such that the upper portion of the cut which extends into the board at a distance "d" from the corner fold line 38 or 39, respectively, is offset with respect to the lower or inner portion of the cut which has a distance " $d + \Delta d$ " from the corner fold line.

As will be seen later, the function of the lower cut portion is to form an interlock, whereas the function of the upper cut portion is to form a safety catch for the interlock.

Cover end flaps 48, 49, commonly called "charlottes" in the trade, are articulated to the cover panel 14 along cover end fold lines 50, 51, respectively. Glue flaps 52, 53 are articulated to the cover end flaps 48, 49 along fold lines 54, 55, respectively.

A window aperture 56 may be cut into the body of the rear side wall panel 13 and the cover panel 14 over

which a sheet 57 of transparent window material may then be applied in a conventional manner.

The blank A may be folded into box form by hand or by automatic machinery. The side panels 11, 13 and the inner end panels 32, 33 are folded upright with respect to the bottom panel 12. The outer end panels 20, 36 and 21, 37 are folded into right angular position with respect to the side panels 11 and 13 and are hooked together by inserting the hook formations 40, 41 into the respective slits 24, 25. By this operation the shoulders 42, 43 move under the upper ends of the slits 24, 25 and prevent withdrawal of the hooks from the slits in a vertical direction.

At this stage the hook and shoulder interengagement of the outer end panels is still vulnerable to disengagement by an arcuate or swinging motion of the rear side wall panel 13 about the rear bottom fold line 17, which would be the reverse of the motion by which the hook locks were previously engaged.

The edge lock 28, 44 and 29, 45 effectively prevents such disengagement once the lock is engaged by an application of forces FF as shown in FIG. 2 causing the offset top portion of the cut 44 for example, which top portion lies at a distance d from the corner fold line 38, to snap behind the cut 28 which lies at a greater distance $d + \Delta d$ from the corner fold line.

In the engaged form of the external cuts, as shown in FIG. 2, the lower portions of the cuts 28, 44 interengage and prevent the aforementioned withdrawal of the hook 40 from the slit 24. The upper portions of the cuts 28, 44, in turn, form a safety catch for the interlocked lower portions.

The resulting end wall construction is secure against separation by the pressure of box contents against the side or end walls, or by racking or twisting of the box. The box may be handled, turned and subjected to all machine operations incidental to filling, closing and gluing.

It will be noted that the inner end panels effectively cover the hook and slit portions of the lock and that they do not interfere with the completion of the top edge locks as the length L of the inner end panels is so limited that the inner end panel does not extend into the area of that portion of the edge lock which is flexed or snapped into engagement by the application of the forces FF.

After filling of the box the cover 14 is folded into closing position, the cover front flap 15 and the side flaps 48, 49 are folded against the box side and ends and the glue flaps 52, 53 are adhered to the underside of the front flap 15 which, in addition, may be adhered to the front side wall 11 by a centrally applied spot of adhesive.

In the closed box shown in FIG. 3 the top edge locks in the box end structures are fully covered by the cover side flaps 48, 49.

What is claimed is:

1. An improved end wall construction for folding boxes comprising a box bottom, oppositely disposed side walls articulated to the box bottom and end panels articulated to the side walls, the end panels being of sufficient length to overlap, at least partially, the end wall construction comprising, a hook formation on one end panel, the hook

extending downwardly towards the bottom; the other panel having a slit in it for engagement by said hook; a shoulder on said one panel above the hook, the shoulder extending substantially transversely to the direction in which the hook is inserted into said slit, said shoulder engaging a portion of the slit to resist vertical displacement of the one panel with respect to the other panel when said hook and shoulder are engaged by said slit; and a top edge interlock between said end panels, said interlock comprising, in each panel, a cut extending into the panel from the top edge thereof, said cuts comprising a lower portion of coincidence at a distance below the top edge, the entrance portion of one cut into the one panel—considering the panels in interengaged position of the coinciding lower cut portion—being at a shorter distance from the line of articulation of the first panel to the respective side wall at the box corner than the entrance portion of the other cut in the other panel from said same last named line of articulation.

2. An improved end wall construction as set forth in the preceding claim 1 in which said shoulder engages the upper end of said slit.

3. An improved end wall construction for folding boxes comprising a box bottom, oppositely disposed side walls articulated to the box bottom and end panels articulated to the side walls, the end panels being of sufficient length to overlap, at least partially, the end wall construction comprising, a hook formation on one end panel, the hook extending downwardly towards the bottom; the other panel having a slit in it for engagement by said hook; a shoulder on said one panel above the hook, the shoulder extending substantially transversely to the direction in which the hook is inserted into said slit, said shoulder engaging a portion of the slit to resist vertical displacement of the one panel with respect to the other panel when said hook and shoulder are engaged by said slit; a top edge interlock between said end panels, said interlock comprising, in each panel, a cut extending into the panel from the top edge thereof, said cuts comprising a lower portion of coincidence at a distance below the top edge, the upper entrance portion of one cut into the one panel—considering the panels in interengaged position of the coinciding lower cut portions—being at a shorter distance from the line of articulation of the first panel to the respective side wall at the box corner than the entrance portion of the other cut in the other panel from said same last named line of articulation; and an inner end panel articulated to said box bottom and overlying said end panels on the inside of the box, said inner end panel being of a length sufficient to cover said hook formation but short enough to terminate below said upper portions of said cuts.

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