Jan. 2, 1951 R. B. MELLER 2,536,384

GLUELESS INTERLOCK FOR DOUBLE WALLED FOLDING BOXES

Filed April 17, 1948 3 Sheets-Sheet 1

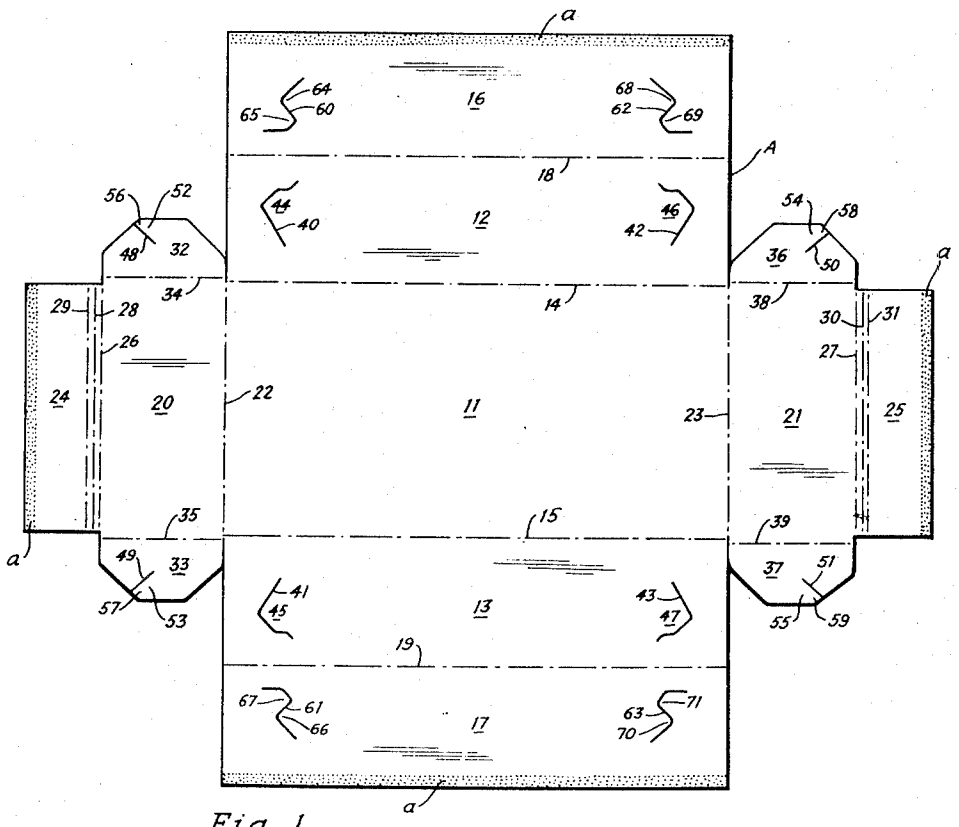



Fig. 1

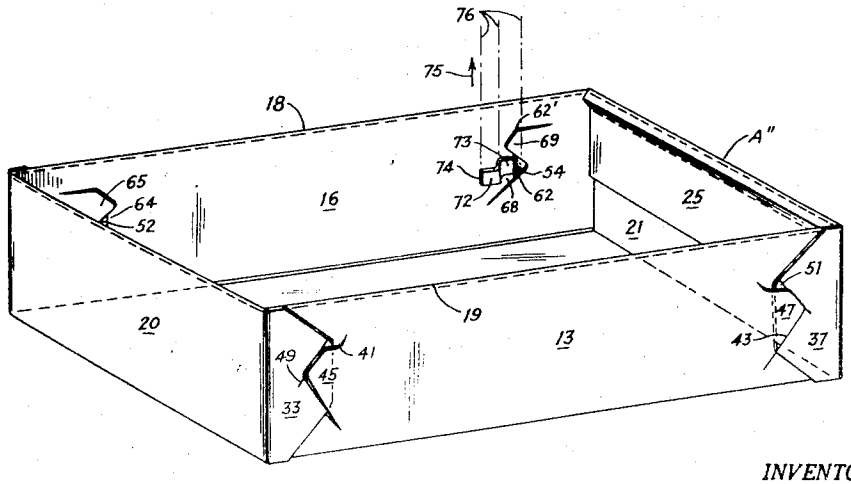



Fig. 6

INVENTOR.
Reginald B. Meller
BY
Austin Wilhelm & Carlson
his ATTORNEY

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Filed April 17, 1948 3 Sheets-Sheet 2

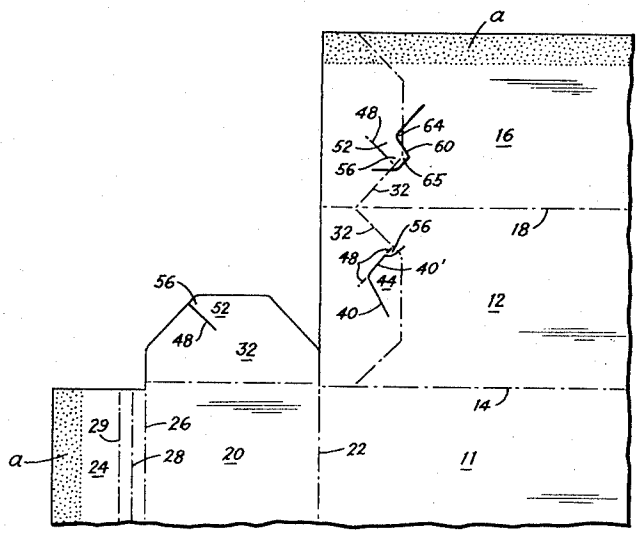



Fig. 2

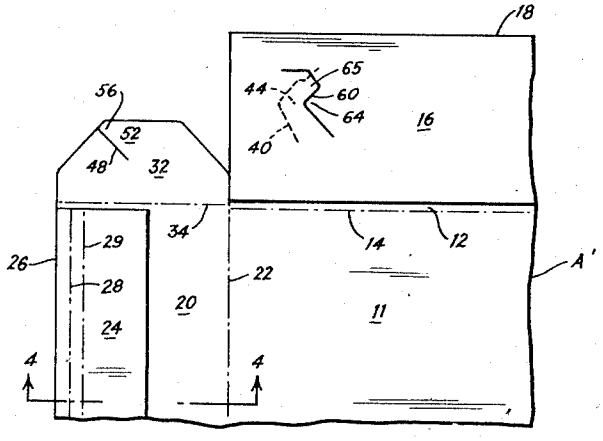



Fig. 3

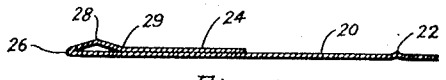



Fig. 4




Fig. 5

INVENTOR.
Reginald B. Meller
BY
Austin Wilhelm & Carlson
his ATTORNEYS

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GLUELESS INTERLOCK FOR DOUBLE WALLED FOLDING BOXES

Filed April 17, 1948 3 Sheets-Sheet 3

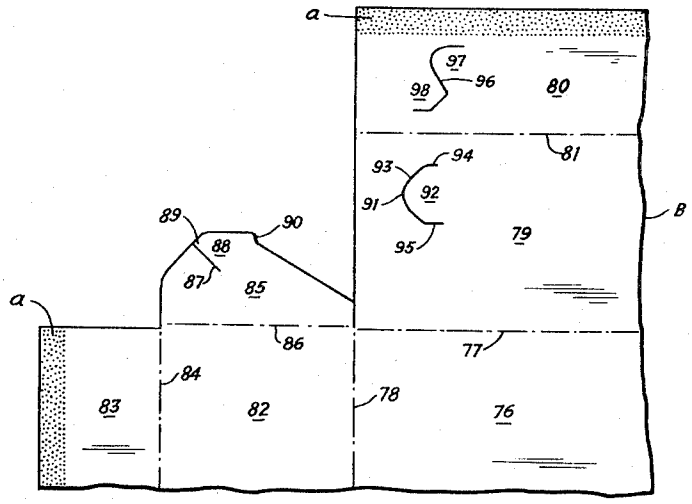



Fig. 7

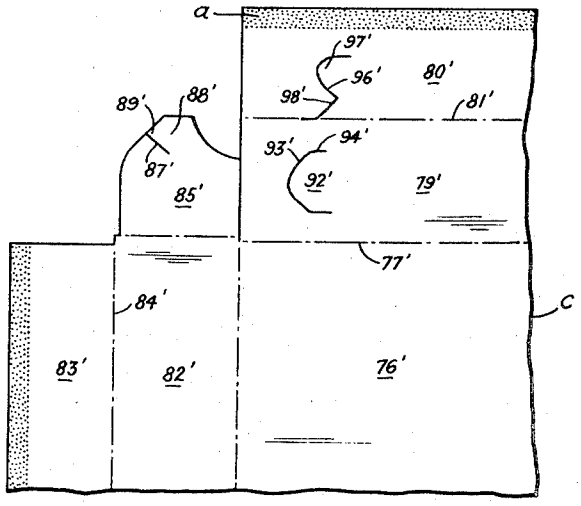



Fig. 8

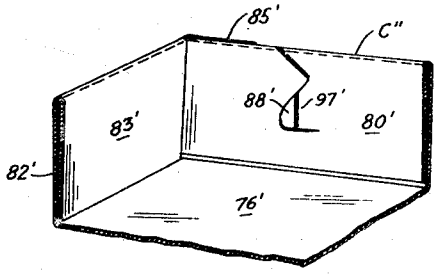



Fig. 9

INVENTOR.
Reginald B. Meller
BY
Austin Wilhelm & Carlson
his ATTORNEYS

Patented Jan. 2, 1951

2,536,384

# UNITED STATES PATENT OFFICE

2,536,384

## GLUELESS INTERLOCK FOR DOUBLE WALLED FOLDING BOXES

Reginald B. Meller, Oakland, Calif., assignor to Bemiss-Jason Company, San Francisco, Calif., a corporation of California

Application April 17, 1948, Serial No. 21,638

21 Claims. (Cl. 229—35)

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

The invention is particularly directed to folding boxes which, either partially or entirely, are composed of walls of multiple thickness.

The invention provides a novel interlock for connecting together, without the use of adhesives, staples, or other special securing means, walls of a box in rigid corner forming relationship where all of the walls, or at least part of them, are of multi-ply thickness. The invention thus extends to boxes requiring heavier than single thickness walls for strength, a form of interlock which, in a somewhat simpler modification, has found wide adoption throughout the industry for the setting up of boxes having single thickness walls.

According to the invention, two multi-ply walls, or a single ply and a multi-ply wall, meeting at a corner are mechanically interlocked by a peculiar inter-engagement of cut edges formed on or in the stock. The resulting box corner has the strength and rigidity of a glued or stapled construction. The novel interlock is permanent and cannot, except by the use of special tools, be separated or disengaged and is secure against accidental disengagement by forces acting on the box from the inside or the outside.

The present invention offers the advantage of eliminating gluing or stapling operations in the setting up of a hollow box from a flat blank, leading to production rates far in excess of those attainable for glued boxes. The invention further leads to simplification of the mechanical equipment for setting up the boxes and reduces its cost. Moreover, the invention permits economical setting up of double walled boxes of certain relatively small sizes which heretofore could not be produced economically by gluing because of disproportionately high cost due to intricacy of the gluing machines and the relatively low production rates of such machines.

These and various other features, objects and advantages of the invention will appear more fully from a consideration of the detailed description which follows accompanied by drawings showing, for the purpose of illustration, preferred embodiments and applications of the invention.

The invention also consists in certain new and improved details of construction as 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, its objects and advantages, and the manner in which it may be carried out may be better understood by referring to the

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following description taken in connection with the accompanying drawings forming a part of it in which

Figure 1 is a plan view of a flat box blank embodying the invention, the inside surface of the blank facing the observer;

Figure 2 is a fragmentary plan view of a corner portion of the blank shown in Figure 1, in which certain dash dotted lines indicate the relative position which certain elements assume after forming of the blank into hollow box form;

Figure 3 is a plan view of the corner portion of the blank shown in Figure 2 after a gluing and folding operation for forming walls of double thickness;

Figure 4 is a sectional side view of an end wall, a section being taken on line 4—4 of Figure 3;

Figure 5 illustrates an alternative form of construction of the end wall in a view corresponding to that of Figure 4;

Figure 6 is a perspective view of a box set up from the blank shown in Figures 1, 2 and 3;

Figure 7 is a fragmentary plan view of a corner portion of a modified blank, the inside surface of the blank facing the observer;

Figure 8 is a fragmentary plan view of a corner portion of a form of blank for making shallow boxes; and

Figure 9 is a perspective view of a corner portion of a box set up from the blank of Figure 8.

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 as generic in their application as the art will permit. 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 ones shown.

The blank A shown in Figure 1 is subdivided by several scored fold lines to provide a bottom panel 11 to which outer side wall panels 12 and 13 are hinged along side fold lines 14 and 15. Inner side wall panels 16 and 17 are hingedly connected to the outer side wall panels along fold lines 18 and 19, respectively.

Outer end panels 20 and 21 are hingedly connected to the bottom panel 11 along end fold lines 22 and 23, respectively, and inner end panels 24 and 25, slightly narrower than the outer end panels, are hingedly connected to the outer end panels 20 and 21 along fold lines 26 and 27, respectively. Additional folding scores

28, 29, 30 and 31 extend across the inner end panels 24 and 25 adjacent the fold lines 26 and 27. The purpose of these additional folding scores will become apparent hereinafter.

Flaps 32 and 33 are hingedly connected to the outer end panel 20 along fold lines 34 and 35, respectively. These fold lines are either aligned with, or parallel and slightly offset with respect to, the side fold lines 14 and 15 to compensate for wall thickness in the succeeding folding operations, as is customary in the art. Flaps 36 and 37 are hingedly connected to the outer end panel 21 along fold lines 38 and 39 in a similar manner as described in connection with the flaps 32 and 33.

Internal cuts 40, 41, 42 and 43 separate the outer side wall panels 12 and 13 into portions which may be resiliently flexed with respect to each other for the purpose of opening the cuts and inserting portions of the flaps 32, 33, 36 and 37 into them. The internal cuts 40, 41, 42 and 43 are preferably of bent outline to form internal tongues 44, 45, 46 and 47 in the panels 12 and 13.

Cut edges are formed on the flaps 32, 33, 36 and 37 by external cuts 48, 49, 50 and 51 extending into the body of the flaps from outer edges. The orientation and shape of the cuts 48, 49, 50 and 51 is such that portions of the cut edges formed by the cuts in the flaps 32, 33, 36 and 37 upon assembly of the blank into box form move into substantial coincidence with portions of the internal cuts 40, 41, 42 and 43 so that an edge-to-edge engagement results between cut edges of the flaps and cut edges of the outer side wall panels, as will hereinafter be apparent.

External tongues 52, 53, 54 and 55 are formed by the external cuts 48, 49, 50 and 51, respectively. These external tongues are resiliently deflectable with respect to the remainder of the flaps 32, 33, 36 and 37 in the same manner as the internal tongues 44, 45, 46 and 47 may be flexed with regard to the remainder of the outer side wall panels 12 and 13.

The external tongues 52, 53, 54 and 55 include tab portions 56, 57, 58 and 59 extending partially beyond the confines of the external tongues 44, 45, 46 and 47 as is particularly apparent from Figure 2 in which the flap 32 is shown in dash-double-dot-lines superimposed upon the panel 12 in the position which the flap assumes in the set up box. The purpose of these tab portions will become apparent from a consideration of the assembly procedure of the blank which will be described hereinafter.

Internal cuts 60, 61, 62 and 63 are formed in the inner side wall panels 16 and 17. These internal cuts are preferably of reversely curved outline and form oppositely directed tongues 64, 65, 66, 67, 68, 69, 70 and 71 in the inner end wall panels 16 and 17, respectively. The tongues formed by the internal cuts 60, 61, 62 and 63 are so located and shaped as to make more effective and secure the interlock formed between cut edges of the external cuts 48, 49, 50 and 51 and edges formed by the internal cuts 40, 41, 42 and 43.

Referring specifically to Figure 2, in which the elements are shown on an enlarged scale, it will be seen that the tongue 64 overlaps the external tongue 52 in the position in which the blank is folded into hollow box form. The overlap causes the flap 64 to deflect the external tongue 52 with respect to the remainder of the flap 32 into edge-to-edge engaging position with the internal cut 40 as will also become apparent from an inspection of Figure 6 hereinafter described in greater detail.

The oppositely pointed tongue 65 overlies the tab portion 56 of the external tongue 52. This tab portion, as will later become apparent, secures the interlock against accidental disengagement. The tongue 65 which bears down upon the tab portion 56 maintains the tab portion in locking position and protects it against contact with the box contents.

The internal cuts 61, 62, and 63 and the tongues formed thereby are identical in outline and function with the internal cut 60 just described. A detailed description of the tongues 66, 67, 68, 69, 70 and 71 may therefore be dispensed with.

The assembly of the blank A into hollow box form may proceed as follows:

Adhesive *a* is first applied to marginal portions of the inner side wall panels 16 and 17 and to marginal portions of the inner end wall panels 24 and 25 as indicated in Figure 1. The panels are then folded about fold lines 18, 19 and 26, 27, respectively, to bring the inner side wall panels and the inner end wall panels face-to-face with the outer side wall panels and the outer end wall panels, respectively, and pressure is applied to the glued portions to produce a secure bond. During the folding the inner end wall panels 24 and 25 are preferably slightly flexed at the fold lines 28 and 29 to form ridges near the upper edge of the end walls as is apparent from Figure 4.

The resulting blank A', of which a corner portion is shown in Figure 3, has double thickness side walls 12, 16 and double thickness end walls 20, 24. The blanks A' are flat except for the slight ridge at the fold lines 28 and 30. They may be shipped and stored in flat collapsed condition and are available for immediate setting up into hollow box form at the plant of the user of the boxes.

The setting up of the blanks A' into hollow box form may be carried out on manually operated machinery of simple construction, where relatively small volumes are involved, or may be set up on automatic high speed machinery where the volume demand is large.

The setting up of the blank A' into hollow box form and the interlocking of the blank at the corners involves the following operations:

The side panels 12, 16 and 13, 17 are first folded along the side fold lines 14 and 15 to bring the side walls into substantially upright position with respect to the bottom panel 11. In this position the stock of the side walls is flexed at the internal cuts in order to open the cuts in the outer wall panels. This may be accomplished by pressing with suitable finger shaped tools against the inner side wall panels as indicated in Figure 6 where a finger 72 is shown as flexing the internal tongue 68 outwardly. Flexing of the internal tongue 68 causes flexing of the internal tongue 46 in the outer side wall panel which overlies it. During the flexing of the internal tongues the remainder of the side wall is supported, preferably adjacent the tongues to be flexed so that apertures are formed in the side wall into which the corresponding flaps 32, 33, 36 and 37 may be inserted.

The four internal tongues in the side walls are preferably flexed simultaneously so that all four cuts 40, 41, 42 and 43 are opened for insertion of portions of the flaps 32, 33, 36 and 37 therein.

The end walls 20, 24 and 21, 25 are then folded with respect to the bottom panel 11 about the

end fold lines 22 and 23, and substantially simultaneously the flaps 32, 33, 36 and 37 are folded with respect to the end walls about their respective fold lines 34, 35, 38 and 39. The flaps are brought into face-to-face position with respect to the upright side walls 12, 16 and 13, 17 before the end walls 20, 24 and 21, 25 are fully erect with respect to the bottom panel 11 and the erection of the end walls is then continued while simultaneously the portions 52, 53, 54 and 55 of the flaps are guided into the opened slits 40, 41, 42 and 43.

This operation brings the edges of the external tongues 52, 53, 54 and 55 into substantial coincidence with portions of the internal cuts 40, 41, 42 and 43 as is quite apparent from Figure 2 where the coincidence of the cut edge 48 with a portion 40' of the cut 40 is shown.

The position of the finger shaped tools with respect to the various portions of the blank during the locking operation is apparent from Figure 6 where it is seen that the finger shaped tool 72 bears against the side wall 16, 12 with its outer surface 73, opening the cut in the side wall, while permitting the external tongue 74 in the respective flap to move underneath its inner surface 74.

After insertion of the flap portions 52, 53, 54 and 55 underneath the respective finger shaped tools, the tools are drawn or moved towards the inside of the box until the tab portions 56, 57, 58 and 59 which previously lay on the outside of the outer side wall panels are drawn to the inside of the outer side wall panels.

In this position, the edges of the external tongues 52, 53, 54 and 55 which were in coincidence with edge portions of the internal cut 40, 41, 42 and 43 move into edge-to-edge engagement therewith and are maintained in this position by the tab portions on the respective external tongues which now lie on between the outer and the inner side wall panels 12, 16 and 13, 17, respectively.

The set up box A'' is then removed from the folding mechanism. As shown in Figure 6 the finger shaped tools which opened the cuts in the side walls and which pulled the tab portions from the outside of the outer wall panels to the inside can easily disengage themselves from the box by movement in the direction of the arrow 75, it being understood that the arrow is used to indicate relative motion since it may be preferred to remove the folded box from its forming mechanism rather than move the forming mechanism away from the set up box. It may therefore be preferred to move the finished box A'' in a downward direction in which event, however, the finger 72 moves along the dash dot lines 76. In either case the finger shaped tool is free to disengage itself from the blank by reason of the peculiar shape of the internal cut in the inner side wall panel which permits the finger to move freely out of the cut 62 at 62'.

After the box is disengaged from its forming and locking mechanism, the internal tongues 65, 67, 69 and 71 bear against the respective lock tabs which lie between these tongues and the outer side wall panels and securely hold these lock tabs in place and protect them from contact with the box contents.

The set up box is very strong and rigid and its walls resist forces acting on the walls from the outside and from the inside.

The side edges of the inner end wall panels 24 and 25 bear against the side wall panels 13 and 16 in edge-to-surface relationship and prevent



folding of the side walls towards the inside of the box. The side walls are protected against outward folding by the flaps 32, 33, 36 and 37 overlying the side walls.

The end wall panels 20 and 21 bear against the side edges of the side walls and prevent inward folding of the end panels. Outfolding of the end panels is prevented by the edge-to-edge engagement between the external tongues 52, 53, 54 and 55 and the internal cuts 40, 41, 42 and 43. This edge-to-edge interlock is very strong and resists a considerable amount of force which may be exerted against the end panels from the inside of the box. Such force subjects the board to compression at the edge-to-edge engagement and constitutes the most favorable form of load for paperboard and box board since board offers relatively great resistance to compression as compared to tear-resistance which is comparatively low. The compression force exerted against the board at the points of edge-to-edge contact lies in the plane of the board and the board offers its greatest resistance to deformation if subjected to force in this direction. The threading of the external tongues 52, 53, 54 and 55 through the two plies of the side walls furthermore locks the two plies together and imparts additional rigidity to the side walls against bulging out if, for example, force is exerted against the upper edges of the side walls at fold lines 18 and 19.

Instead of forming a ridge in the surface of the inner end panels as shown in Figure 4, the end panels may be folded along a single fold line 26' as shown in Figure 5 to provide sufficient abutment along its side edges for the side walls 12, 16 and 13, 17. A relatively wide score may be impressed into the board at 26' to prevent the board from forming a sharp crease so that the inner end panel forms an inward bulge 24' as shown in Figure 5.

The blank B of which a corner portion is shown in Figure 7 comprises a bottom panel 76 to which side walls and end walls are hingedly connected along fold lines 77 and 78. The side wall comprises an outer side wall panel 79 and an inner side wall panel 80 hinged to the outer panel along a fold line 81. The end wall comprises an outer end panel 82 and an inner end panel 83 hinged to the outer end panel along a fold line 84. A flap 85 is hingedly connected to the outer end panel 82 along a fold line 86. An external cut 87 extends into the flap 85 and forms an external tongue 88 therein having a tab portion 89. The outer edge of the flap includes a portion 90 whose purpose will presently become apparent.

An internal cut 91 forms an internal tongue 92 in the outer side wall panel 89. This internal cut comprises a portion 93 adapted to enter into edge-to-edge engagement with a cut edge formed by the external cut 87. It further includes a portion 94 forming an edge past which a tab portion 89 is forced in assembling the blank into corner forming position. Lastly, the internal cut comprises a portion 95 adapted to engage the edge portion 90 of the flap 85 to provide an edge-to-edge interlock effective in a direction opposite with respect to the interlock formed between edges of the cuts 93 and 87.

The interlock furnished by the blank B is a double interlock effective in two opposite directions and is not dependent on an engagement between the side edge of the side walls and the surface of the outer end wall panel for preven-

tion of the end walls from folding towards the inside of the box.

The advantage of the interlock shown in Figure 7 is its freedom from play or lost motion. The abutting or interlocking edges may be cut with great accuracy and close tolerances are easier to maintain in cutting interlocking edges than in providing equally close tolerances for the surface-to-edge abutment between the outer end panel and the edge of the side wall.

An internal cut 96 of reverse curvature is formed in the inner side panel 80. It forms two internal tongue 97 and 98 in the panel, the tongue 97 serving to flex the external tongue 88 into edge-to-edge engagement and the tongue 98 serving to bear down upon, and protect, the tab portion 89 as hereinbefore described in connection with blank A.

The assembly of the blank B into box form proceeds in the same manner as hereinbefore described in connection with the blank A and the resultant box differs from the box A'' of Figure 6 only in that two pairs of edges at each corner flap provide an interlock effective in two opposite directions whereby the resulting interlock is completely free from play or lost motion.

The blank C shown in Figure 8 corresponds in most particulars to the blank shown in Figure 7 and primed reference numerals are employed to designate corresponding parts. A detailed description of the blank may therefore be dispensed because of the similarity.

The blank C is particularly designed for shallow boxes. Its interlock corresponds to that of the blank B except for the absence of a cut edge corresponding to edge 90 on the flap. Correspondingly, no edge portion corresponding to cut edge 95 is present. The only point of difference between the blanks B and C, except the absence of edges 90 and 95 is the location of the internal cut 96' which extends to the fold line 81'. This arrangement permits reduction of the height of a side wall and permits very shallow double walled boxes to be formed economically which heretofore were not economical to make by gluing.

A corner portion of a box set up from the blank C is shown in Figure 9.

The invention thus provides an improved construction for boxes having double side and end walls permitting assembly of the blanks into hollow box forms on relatively simple machinery at high production rates. The boxes embodying the invention are comparable in strength to glued boxes, but are generally superior to glued boxes from a point of economy since complicated box forming and gluing machine may be dispensed with. In its place a relatively simple forming mechanism is used which may be operated at high or slow speeds depending on production requirements. This folding and locking mechanism costs only a fraction of the cost of an ordinary forming and gluing machine and has the added advantage of being operable at the wide range of speeds since no critical glue setting time need be observed.

Boxes embodying the present invention are not only extremely strong but also are relatively tight permitting relatively finely divided material to be packaged. This advantage is attained by providing the cuts in the side wall panels in offset relationship. Comparable tightness is not normally found in gluelessly assembled boxes.

Obviously the present invention is not restricted to the particular embodiments herein shown and described, but may be applied with equal benefit to other forms of boxes. Numerous additions, omissions and substitutions may be made in adapting the invention to specific needs without departure from the spirit and essence of the present invention.



What is claimed is:

1. In a box blank of foldable sheet material including a main panel; a first side wall hingedly connected to the main panel along a first fold line, said first side wall being composed of an outer panel and an inner panel foldable into overlapping face-to-face relationship with the outer panel; a second side wall hingedly connected to the main panel along a second fold line extending at an angle with respect to said first fold line; and a flap hingedly connected to said second side wall along a third fold line extending at an angle with respect to said second fold line, said flap being foldable into face-to-face overlapping position with respect to the first side wall, the improvement permitting formation, without the use of adhesives, of said panel, walls, and flap into a rigid box corner, the improvement comprising, an internal cut in said outer panel severing the stock of said outer panel to form two panel portions deflectable with respect to each other for opening said cut; an external cut edge on said flap forming an edge of a deflectable external tongue of said flap, said internal cut and said external cut edge being so located with respect to each other that portions of said cut and said cut edge are in substantial coincidence when said first and second side wall are in corner forming position permitting an edge portion of the cut edge to engage an edge portion formed by said internal cut when said external tongue is inserted into said opened cut; and an internal cut of bent outline in said inner panel forming an internal tongue in said inner panel adapted to engage the outside surface of said external tongue, thereby maintaining said external tongue in flexed position in which the external tongue engages an edge of the internal cut in the outer panel.

2. A folding box set up from a blank as defined in claim 1.

3. The box blank structure as set forth in claim 1 in which, in addition, the second side wall is composed of an outer panel and an inner panel, the inner panel being foldable against the inside surface of the outer panel in overlapping face-to-face relationship, the inner panel being narrower than the outer panel and furnishing with its side edges an abutment against which the first side wall panel rests when the two side walls are in corner forming position, the abutment preventing folding of the first side wall towards the inside of the corner.

4. A folding box set up from a blank as defined in claim 3.

5. In a box blank of foldable sheet material including a main panel; a first side wall hingedly connected to the main panel along a first fold line, said first side wall being composed of an outer panel and an inner panel foldable into overlapping face-to-face relationship with the outer panel; a second side wall hingedly connected to the main panel along a second fold line extending at an angle with respect to said first fold line; and a flap hingedly connected to said second side wall along a third fold line extending at an angle with respect to said second fold line, said flap being foldable into face-to-face

overlapping position with respect to the first side wall, the improvement permitting formation, without the use of adhesives, of said panel, walls, and flap into a rigid box corner, the improvement comprising, an internal cut of bent outline in said outer panel forming an internal tongue in said outer panel adapted to be resiliently flexed with respect to the remainder of said outer panel for opening said internal cut; an external cut edge on said flap forming an edge of a deflectable external tongue of said flap, said internal cut and said external cut edge being so located with respect to each other that portions of said cut and said cut edge are in substantial coincidence when said first and second side wall are in corner forming position permitting an edge portion of the cut edge to engage an edge portion formed by said internal cut when said external tongue is inserted into said opened cut; and an internal cut of bent outline in said inner panel forming an internal tongue in said inner panel adapted to engage the outside surface of said external tongue, thereby maintaining said external tongue in flexed position in which the external tongue engages an edge of the internal cut in the outer panel.

6. A folding box set up from a blank as defined in claim 5.

7. The box blank structure as set forth in claim 5 in which, in addition, the second side wall is composed of an outer panel and an inner panel, the inner panel being foldable against the inside surface of the outer panel in overlapping face-to-face relationship, the inner panel being narrower than the outer panel and furnishing with its side edges an abutment against which the first side wall panel rests when the two side walls are in corner forming position, the abutment preventing folding of the first side wall towards the inside of the corner.

8. A folding box set up from a blank as defined in claim 7.

9. In a box blank of foldable sheet material including a main panel; a first side wall hingedly connected to the main panel along a first fold line, said first side wall being composed of an outer panel and an inner panel foldable into overlapping face-to-face relationship with the outer panel; a second side wall hingedly connected to the main panel along a second fold line extending at an angle with respect to said first fold line; and a flap hingedly connected to said second side wall along a third fold line extending at an angle with respect to said second fold line, said flap being foldable into face-to-face overlapping position with respect to the first side wall, the improvement permitting formation, without the use of adhesives, of said panel, walls, and flap into a rigid box corner, the improvement comprising, an internal cut of bent outline in said outer panel forming an internal tongue in said outer panel adapted to be resiliently flexed with respect to the remainder of said outer panel for opening said internal cut to permit insertion of said flap therein in assembling the blank; an external cut edge on said flap forming an edge of a deflectable external tongue of said flap, said internal cut and said external cut edge being so located with respect to each other that portions of said cut and said cut edge are in substantial coincidence when said first and second side wall are in corner forming position permitting an edge portion of the cut edge to engage an edge portion formed by said internal cut when said external tongue is inserted into said opened cut; and an internal cut of bent outline in said inner panel forming an internal tongue in said inner panel underlying, when said inner panel is folded against said outer panel, the internal tongue in said outer panel rearwardly of the internal tongue in said outer panel with respect to the adjacent side edge of the inner panel, the internal tongue in said inner panel being adapted to engage the outside surface of said external tongue, thereby maintaining said external tongue in flexed position in which the external tongue engages an edge of the internal cut in the outer panel.

10. A fold ng box set up from a blank as defined in claim 9.

11. The box blank structure as set forth in claim 9 in which, in addition, the second side wall is composed of an outer panel and an inner panel, the inner panel being foldable against the inside surface of the outer panel in overlapping face-to-face relationship, the inner panel being narrower than the outer panel and furnishing with its s de edges an abutment against which the first side wall panel rests when the two side walls are in corner forming position, the abutment preventing folding of the first side wall towards the inside of the corner.

12. A folding box set up from a blank as defined in claim 11.

13. In a box blank of foldable sheet material including a main panel; a first side wall hingedly connected to the main panel along a first fold line, said first side wall being composed of an outer panel and an inner panel foldable into overlapping face-to-face relationship with the outer panel; a second side wall hingedly connected to the main panel along a second fold line extending at an angle with respect to said first fold line; and a flap hingedly connected to said second s de wall along a third fold line extending at an angle with respect to said second fold line, said flap being foldable into face-to-face overlapping position with respect to the first side wall, the improvement permitting formation, without the use of adhesives, of said panel, walls, and flap into a rigid box corner, the improvement comprising, an internal cut of bent outline in said outer panel forming an internal tongue in said outer panel adapted to be resiliently flexed with respect to the remainder of said outer panel for opening said internal cut; an external cut edge on said flap forming an edge of a deflectable external tongue of said flap, portions of said internal cut and said external cut edge being in substantial coincidence when said first and second side wall are in corner forming position permitting an edge portion of the cut edge to engage an edge portion formed by said internal cut when said external tongue is inserted into said opened cut, the external tongue being of such outline relatively to the outline of said external tongue that a tab portion of said external tongue extends beyond the confines of said internal tongue if the first side wall, the second side wall and the flap are in corner forming position in which they are to be interlocked; and an internal cut of reversely bent outline in said inner panel forming two oppositely directed internal tongues in said inner panel, one of said last named tongues being adapted to engage the outside surface of said external tongue, thereby maintaining said external tongue in flexed position in which the external tongue engages an edge of the internal cut in the outer panel, the other of the last

named tongues being adapted to bear against said tab portion to urge said tab portion against the inner surface of the outer panel after assembly of the corner which assembly includes forcing said tab portion from a position overlying the outside surface of the outer panel to a position overlying the inner surface of the outer panel.

14. A folding box set up from a blank as defined in claim 13.

15. The box blank structure as set forth in claim 13 in which, in addition, the second side wall is composed of an outer panel and an inner panel, the inner panel being foldable against the inside surface of the outer panel in overlapping face-to-face relationship, the inner panel being narrower than the outer panel and furnishing with its side edges an abutment against which the first side wall panel rests when the two side walls are in corner forming position, the abutment preventing folding of the first side wall towards the inside of the corner.

16. A folding box set up from a blank as defined in claim 15.

17. In a box blank of foldable sheet material including a main panel; a first side wall hingedly connected to the main panel along a first fold line, said first side wall being composed of an outer panel and an inner panel foldable into overlapping face-to-face relationship with the outer panel; a second side wall hingedly connected to the main panel along a second fold line extending at an angle with respect to said first fold line; and a flap hingedly connected to said second side wall along a third fold line extending at an angle with respect to said second fold line, said flap being foldable into face-to-face overlapping position with respect to the first side wall, the improvement permitting formation, without the use of adhesives, of said panel, walls, and flap into a rigid box corner, the improvement comprising, an internal cut of bent outline in said outer panel forming an internal tongue in said outer panel adapted to be resiliently flexed with respect to the remainder of said outer panel for opening said internal cut; an external cut edge on said flap forming an edge of a deflectable external tongue of said flap, said internal cut and said external cut edge being so located with respect to each other that portions of said cut and said cut edge are in substantial coincidence when said first and second side wall are in corner forming position permitting, when said external tongue is inserted into said opened cut, an edge portion of said cut edge to engage an edge portion formed by said internal cut thereby preventing movement of said tongue in the direction of withdrawal from said opened cut, the external tongue being further so shaped to engage with another edge portion a further edge portion formed by said internal cut, thereby preventing movement of said tongue in the opposite direction, the external tongue including a tab portion extending beyond the confines of said internal tongue if the first side wall, the second side wall and the flap are in corner forming position in which they are to be interlocked; and an internal cut of reversely bent outline in said inner panel forming two oppositely directed internal tongues in said inner panel, one of said last named tongues being adapted to engage the outside surface of said external tongue, thereby maintaining said external tongue in flexed position in which the external tongue engages an edge of the internal cut in the outer panel, the other of the last named tongues being adapted to bear against said tab portion to urge said tab portion against the inner surface of the outer panel after assembly of the corner which assembly includes forcing said tap portion from a position overlying the inner surface of the outer panel.

18. A folding box set up from a blank as defined in claim 17.

19. The box blank structure as set forth in claim 17 in which, in addition, the second side wall is composed of an outer panel and an inner panel, the inner panel being foldable against the inside surface of the outer panel in overlapping face-to-face relationship, the inner panel being narrower than the outer panel and furnishing with its side edges an abutment against which the first side wall panel rests when the two side walls are in corner forming position, the abutment preventing folding of the first side wall towards the inside of the corner.

20. A folding box set up from a blank as defined in claim 19.

21. In a folding box made from a blank of foldable sheet material and including, a main panel; side walls hingedly connected to the main panel along side fold lines, each of the side walls being composed of an outer panel and an inner panel lying face-to-face with the outer panel; end walls hingedly connected to the main panel along end fold lines extending transversely with respect to the side fold lines; and flaps hingedly connected to the end walls and folded into face-to-face overlapping position with respect to the side walls, the improved corner construction comprising, for each corner, an internal cut in said outer panel severing the stock of said outer panel to form two panel portions deflectable with respect to each other for opening said cut; an external cut edge on the respective flap forming an edge of a deflectable external tongue on said flap, said internal cut and said external cut being in substantial coincidence permitting an edge portion of said cut edge to engage an edge portion formed by said internal cut when said external tongue is inserted into said cut; an internal cut of bent outline in said inner panel forming an internal tongue in said inner panel adapted to engage the outside surface of said external tongue, thereby maintaining said external tongue in flexed position in which the external tongue engages an edge of the internal cut in the outer panel; and means associated with said side walls and end walls for locking said side walls against folding from their upright position towards the inside of the box.

REGINALD B. MELLER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

| Number | Name | Date |
|---|---|---|
| 483,502 | Schmidt | Sept. 27, 1892 |
| 637,838 | Vernon | Nov. 28, 1899 |
| 1,468,696 | Bray | Sept. 25, 1923 |
| 2,228,377 | Wendt, Jr. | Jan. 14, 1941 |
| 2,316,362 | Poe | Apr. 13, 1943 |
| 2,366,419 | Meller | Jan. 2, 1945 |
| 2,450,035 | De Mian | Sept. 28, 1948 |

FOREIGN PATENTS

| Number | Country | Date |
|---|---|---|
| 398,044 | Great Britain | Sept. 7, 1933 |
| 447,136 | Great Britain | May 13, 1936 |