

April 4, 1944.

R. J. GRUENBERG ET AL

2,345,810

FOLDING BOX

Filed April 11, 1941

2 Sheets-Sheet 1

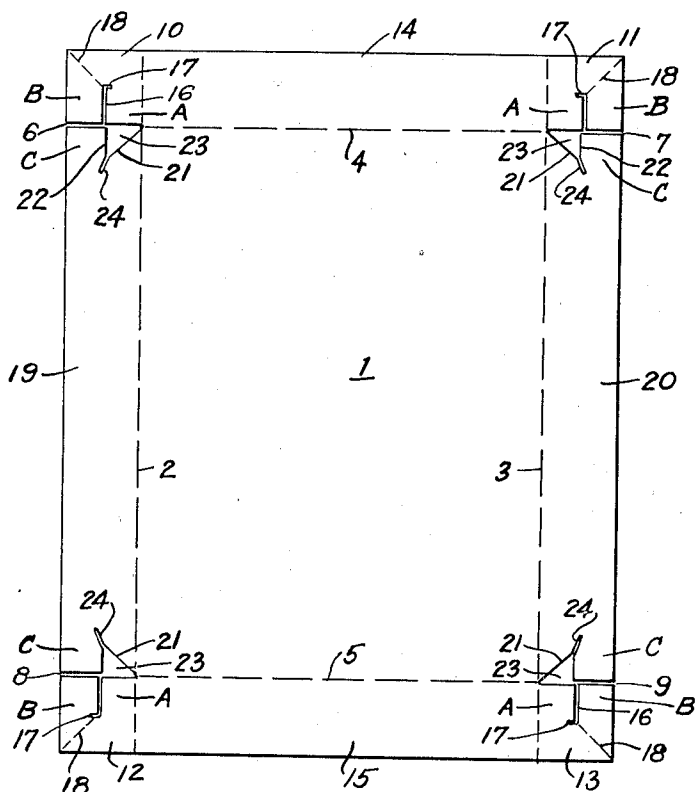


Fig. 1.

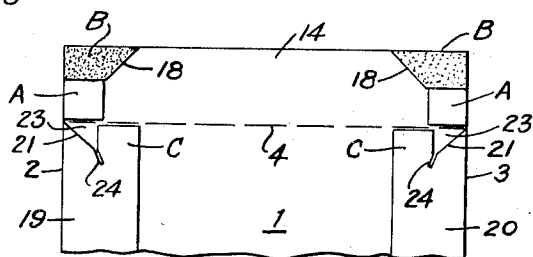


Fig. 2.

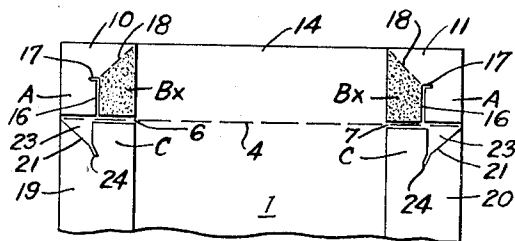


Fig. 3.

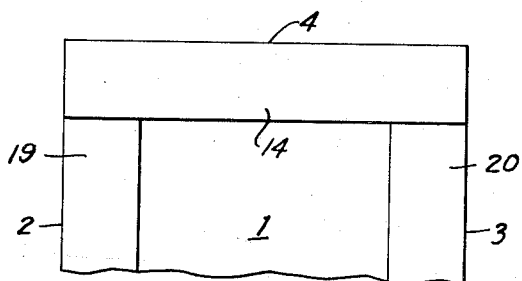


Fig. 4.

INVENTOR.
RAOUL J. GRUENBERG
EDGAR L. STERN
BY

Bredon Yale
ATTORNEY.

April 4, 1944.

R. J. GRUENBERG ET AL

2,345,810

FOLDING BOX

Filed April 11, 1941

2 Sheets-Sheet 2

FIG. 5.

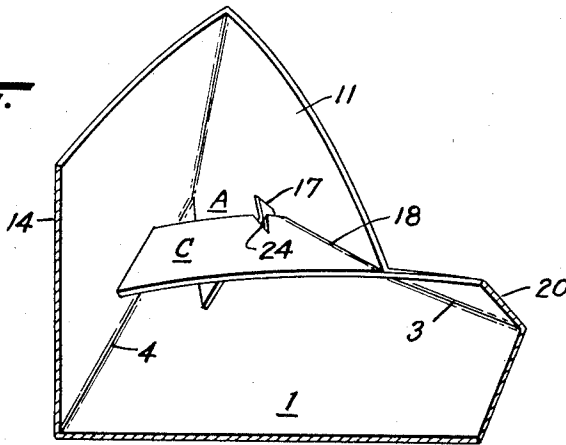


FIG. 6.

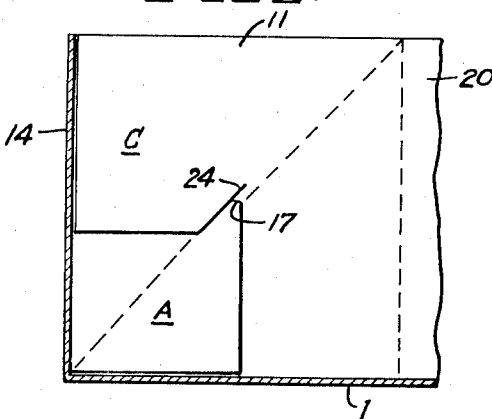


FIG. 7.

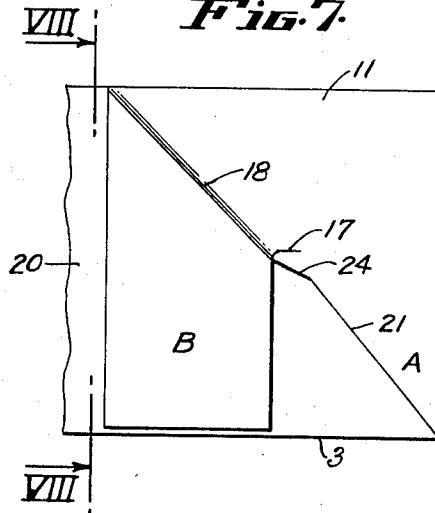


FIG. 8.

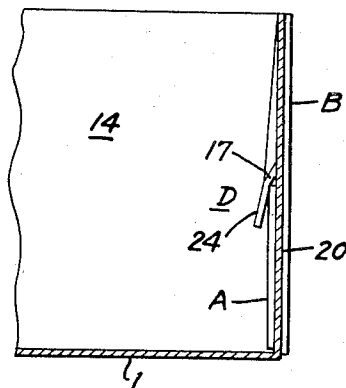
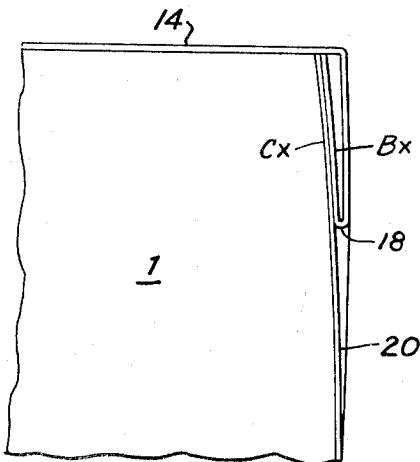


FIG. 9.



INVENTOR.
RAOUL J. GRUENBERG
EDGAR L. STERN
BY

Bredwin Yale

ATTORNEY.

UNITED STATES PATENT OFFICE

2,345,810

FOLDING BOX

Raoul J. Gruenberg, San Francisco, and Edgar
L. Stern, Pasadena, Calif.

Application April 11, 1941, Serial No. 385,132

6 Claims. (Cl. 228—35)

This invention relates to folding boxes and more particularly to pre-folded and glued cardboard boxes.

Among the objects of the invention is the provision of a box in this class adapted to be blanked, glued, folded, and collapsed by machines now available for the purpose of fabricating this class of boxes.

Another object is to design the corners of the box so that it is maintained in both the closed and the open condition by the interrelation of the parts and the tension of the folded blank composing the box.

Another object is to so arrange the interrelation of parts at the corners that the open box will provide the required degree of resistance to crushing stresses.

A further object is the provision of a smooth external corner structure without obstructive projections.

Other objects and advantages will appear as the description progresses.

In this specification and the accompanying drawings the invention is disclosed in its preferred form. But is to be understood, however, that it is not limited to this form, because it may be embodied in modifications within the spirit of the invention as defined in the claims following the description.

In the two sheets of drawings:

Fig. 1 is a plan view of a box blank cut and scored in accordance with this invention.

Fig. 2 is a similar view of one end of the same with the sides and attaching flaps folded inward on the bottom and the end respectively.

Fig. 3 is a similar view of a modification in which the attaching tabs are not folded back on the angular scorelines.

Fig. 4 is a similar view showing the end and associated corner parts folded over the ends of the sides.

Fig. 5 is a fragmentary detail in diagrammatic perspective looking into the corner of the box, intermediate the erecting movement.

Fig. 6 is a fragmentary detail in front elevation of a corner of the open box, viewed from the inside.

Fig. 7 is a similar view, of the same, viewed from the outside.

Fig. 8 is a vertical section of the same taken on the line VIII—VIII, Fig. 7.

Fig. 9 is a top view of the corner of the erected box showing the interrelation of parts when folded in accordance with the modification shown in Fig. 3.

In detail the construction illustrated in the drawings, referring first to Fig. 1, comprises the blank 1 composed of any suitable paper stock cut to the desired rectangular proportions regarding length and width. This blank is provided with the longitudinal creases 2 and 3, preferably extending in line with the grain of the stock from end to end of the blank and spaced inwardly from the long edges a distance equal to the desired depth of the box. The transverse creases 4 and 5 terminate at the longitudinal creases and together they define the bottom area of the box, and the folding lines of the sides and ends.

Collinear with the transverse creases 4, 5, the four margins of the blank are severed by the open cuts 6, 7, 8, 9, leaving the end flaps 10, 11, 12, 13, hinged to the box ends 14, 15 by the marginal extensions of the longitudinal creases 2, 3.

Since all the end flaps are alike in structure only one will be described in detail. Each flap has a longitudinal transverse cut 16 therein terminating with the angular slit 17 directed inward of the body of the flap. The crease 18 extends angularly at about 45 degrees from the juncture of the cuts 16, 17 to the outer corner of the flap, see Fig. 1.

Each of the ends of the sides 19, 20, has a cut such as 21, extending from the juncture of the bottom creases 2, 4, at an angle of about 48 degrees more or less, outward into the body of the sides. Each side also has a cut such as 22, spaced slightly inward from and parallel with the cut 16, and substantially at right angles to the cuts 6, 7, 8, 9, which strips out or removes a triangular notch portion such as 23, from the ends of the sides 19, 20, the hypotenuse being the line of the cut 21. This hypotenuse line 21 terminates with a slit 24 at a slight angles to the line 21.

The product of this invention is adapted to be glue tipped and prefolded in automatic machines now available in the art, such as the patent to Sidebottom issued March 22, 1938, Number 2,212,121 and assigned to Specialty Automatic Machine Company.

In such machines the blanks 1 are stacked and fed singly into the machine. The adhesive areas are indicated by stippling. In passing through the machine the sides 19, 20 are folded inwardly above the bottom and the flaps 10-13 are folded inwardly over the ends 14, 15 respectively on the creases 2, 3. These ends 14, 15 are then folded inwardly so that said ends and flaps overlie the

ends C of said sides 19, 20, and the upper tabs B are attached to the outer sides of the sides 19, 20, and the inner corners A overlie the notches, such as 23.

Further progress through the prefolding machine carries the now folded and interlocking ends beneath rollers or other pressure means to press the tabs A against the outer surfaces of the sides 19, 20 of the box to cause a close and permanent adhesion of the tabs with the sides. Obviously the adhesive can be applied either to the tabs, or to the registering portion of the sides. Stapling or any other suitable means of attachment can be substituted for the adhesive.

In the intermediate condition shown in Fig. 5, the parts A and C are under bending stresses until the erecting is completed. In opening the box this intermediate moment of stress must be passed while the edges of the tabs A slide along the inner plane of the bottom 1, and the glued tabs B bend at the creases such as 18. This causes the box to snap to the open position shown in Figs. 6, 7, 8. This opening of the prefolded box is accomplished by manually grasping the edges of the sides 19 and 20 and swinging them upwardly on the hinge creases 2, 3.

In the open position shown in Fig. 6, it will be noted that the lower edges of the tabs A bear against the bottom of the box and the ends of the tabs C bear against the ends 14, 15 respectively. The pressure of the contacts at these points interposes frictional resistance against the return of the box to the prefolded condition and gives vertical stability to the several corners of the open box. The angular slits 17, 24 facilitate the straddling and interlocking of the parts A, C and permit a yielding of the center areas of the flaps and sides to accommodate the overlapping at D, see Fig. 8. While only two thicknesses of the sides and ends 19, 20 and 14, 15 are interlocked, the stabilizing effect of three overlapped thicknesses A, B, C results, as seen above and below the point D in Fig. 8.

Certain of the available automatic folding machines have different modes of operation. For instance it may be desirable not to fold the tab B inwardly as shown in the modification in Figs. 3, 9, so that the adhesion of the glued parts may be accomplished between the outer surface of the upper tabs Bx and Cz, instead of the inside of the tab B against the outside of the sides 19, 20 as previously described in the preferred form. The tabs B can be folded in either direction on the creases 18 without changing the structure of the blank 1, or departing from the spirit of the invention.

The size and shape of the notches 23, and the placement of the cuts and slits such as 16, 17, 24 can be varied by those skilled in the art to meet the requirements of certain folding machines without departing from the spirit of the invention.

Having thus described this invention what is claimed and desired to secure by Letters Patent is:

1. A prefolded box composed of a blank having longitudinal creases extending from end to end thereof and transverse creases extending between said longitudinal creases and defining the bottom, sides and ends of the box; the sides and ends being severed from each other in substantial alignment with said transverse creases and forming flaps on said ends foldable on said longitudinal creases; said flaps and the contiguous sides each having cuts extending thereinto from said lines

of severance between said sides and ends, respectively, said cuts being substantially parallel with said longitudinal creases and forming tabs on said flaps; said cuts in the ends of said sides forming triangular notches therein with the hypotenuses of said triangles extending outwardly from the approximate corners of said bottom toward the inner ends of said cuts in said sides, respectively; said flaps having creases therein directed from the corners of said blank toward the respective corners of said bottom.

2. A prefolded box composed of a blank having longitudinal creases extending from end to end thereof and transverse creases extending between said longitudinal creases and defining the bottom, sides and ends of the box; the sides and ends being severed from each other in substantial alignment with said transverse creases and forming flaps on said ends foldable on said longitudinal creases; said flaps and the contiguous sides each having cuts extending thereinto from said lines of severance between said sides and ends respectively, said cuts being slightly offset with respect to each other and substantially parallel with said longitudinal creases and forming tabs on said flaps; said cuts in the ends of said sides forming triangular notches therein with the hypotenuses of said triangles extending outwardly from the approximate corners of said bottom toward the inner ends of said cuts in said sides, respectively; said flaps having creases therein directed from the corners of said blank toward the respective corners of said bottom.

3. A prefolded box composed of a blank having longitudinal creases extending from end to end thereof and transverse creases extending between said longitudinal creases and defining the bottom, sides and ends of the box; the sides and ends being severed from each other in substantial alignment with said transverse creases and forming flaps on said ends foldable on said longitudinal creases extending beyond the said bottom; said flaps and the ends of the contiguous sides each having cuts extending thereinto from said lines of severance between said sides and ends, respectively, said cuts being substantially parallel with said longitudinal creases and forming tabs on said flaps; said cuts in the ends of said sides forming triangular notches therein with the hypotenuses of said triangles extending outwardly from the approximate corners of said bottom toward the inner ends of the cuts in said sides, respectively; said flaps having creases therein directed from the corners of said blank toward the inner ends of the cuts in said flaps respectively; whereby the inner corner portions of said flaps pass inwardly through said notches and said tabs overlie and engage said sides when said sides and ends are folded inwardly toward said bottom.

4. A prefolded box composed of a blank having longitudinal creases extending from end to end thereof, and transverse creases extending between said longitudinal creases and defining the bottom, sides and ends of the box; the sides and ends being severed from each other in substantial alignment with said transverse creases and forming flaps on said ends foldable on said longitudinal creases extending beyond said bottom; said flaps and the ends of the contiguous sides having cuts extending thereinto from said lines of severance between said sides and ends, respectively, said cuts being substantially parallel with said longitudinal creases and terminating in slits at an angle thereto and forming tabs on said flaps; the cuts in the ends of said sides forming tri-

angular notches therein with the hypotenuses of said triangles extending outwardly from the approximate corners of said bottom toward the inner ends of the cuts in said sides, respectively; said flaps having creases therein directed from the corners of said blank toward the corners of said bottom respectively; whereby the inner corner portions of said flaps pass inwardly through said notches and said tabs overlap and engage said sides when said sides and ends are folded inwardly toward said bottom.

5. A prefolded box composed of a blank having longitudinal creases extending from end to end thereof, and transverse creases extending between said longitudinal creases and defining the bottom, sides and ends of the box; the sides and ends being severed from each other in substantial alignment with said transverse creases and forming flaps on said ends foldable on said longitudinal creases extending beyond said bottom; said flaps and the ends of the contiguous sides each having cuts extending thereinto from said lines of severance between said sides and ends and substantially parallel with said longitudinal creases, each cut terminating in a slit at an angle thereto and forming tabs on said flaps; the cuts in the ends of said sides forming triangular notches therein with the hypotenuses of said triangles extending outwardly from the approximate corners of said bottom toward the inner ends of the cuts in said sides, respectively; whereby the inner corner portions of said flaps extend in-

wardly through said notches and rest upon the bottom, and said tabs overlap and engage said sides and the ends of said sides contact said ends when the box is erected.

6. A prefolded box composed of a blank having longitudinal creases extending from end to end thereof and transverse creases extending between said longitudinal creases and defining the bottom sides and ends of the box; the sides and ends being severed from each other in substantial alignment with said transverse creases and forming flaps on said ends foldable on said longitudinal creases; said flaps and the contiguous sides each having cuts extending thereinto from said lines of severance between said sides and ends, respectively; said cuts being slightly offset with respect to each other and substantially parallel with said longitudinal creases and forming tabs on said flaps; the cuts in the ends of said sides forming triangular notches therein with the hypotenuses of said triangles extending outwardly from the approximate corners of said bottom toward the inner ends of said cuts in said sides, respectively; said flaps having creases therein directed from the corners of said blank toward the respective corners of said bottom; with the inner corner portions of said flaps extending through said notches when the sides and ends are folded inwardly toward said bottom and said tabs are attached to said sides.

RAOUL J. GRUENBERG.
EDGAR L. STERN.