

Dec. 13, 1938.

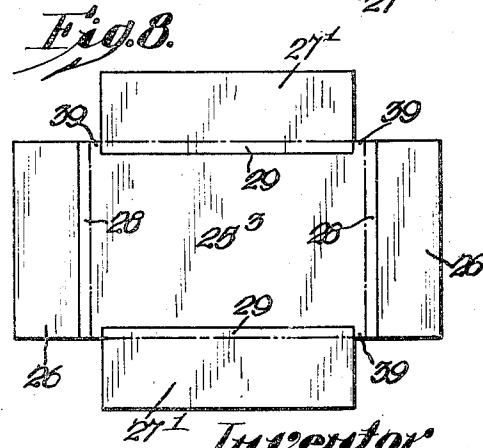
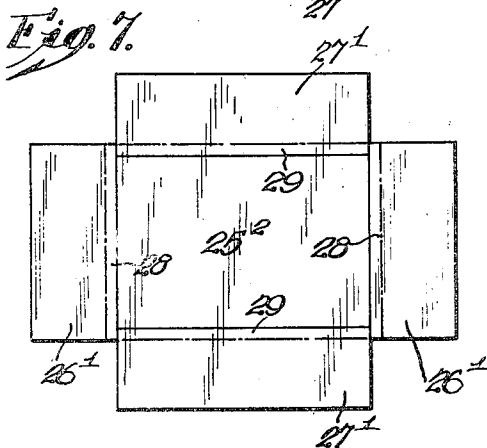
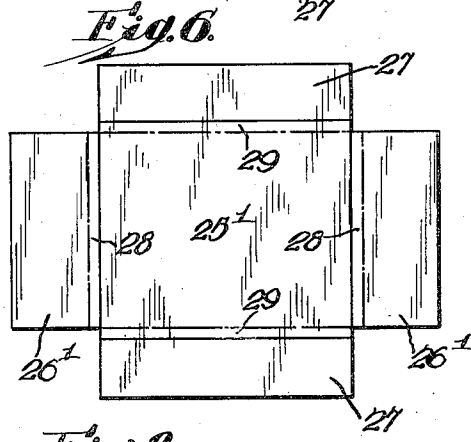
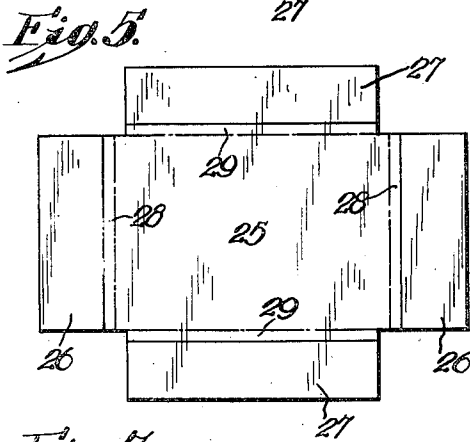
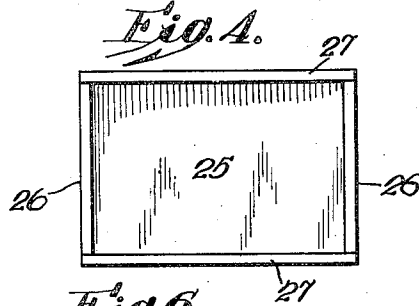
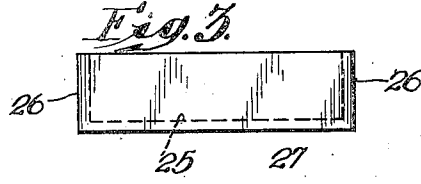
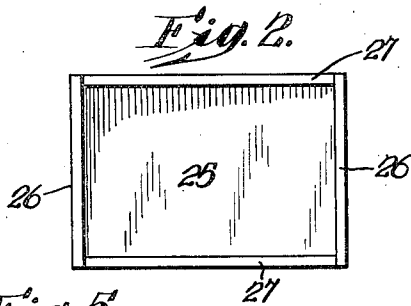
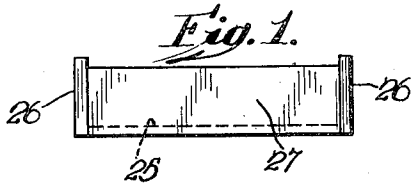
F. R. NEELY

2,139,845

BOX

Filed Aug. 9, 1934

3 Sheets-Sheet 1



Witnesses:

Clarence W. Harker
Walter Chum

Inventor
F. Rodgers Neely
by W. Stuebel and Son
Attorneys.

Dec. 13, 1938.

F. R. NEELY

2,139,845

BOX

Filed Aug. 9, 1934

3 Sheets-Sheet 2

Fig. 9.

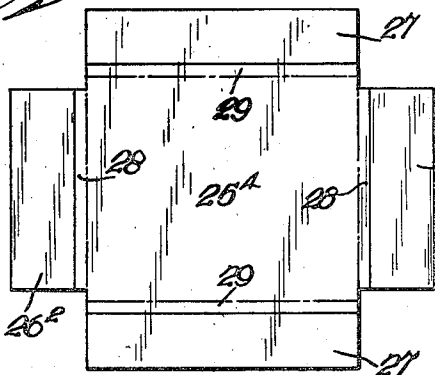


Fig. 10.

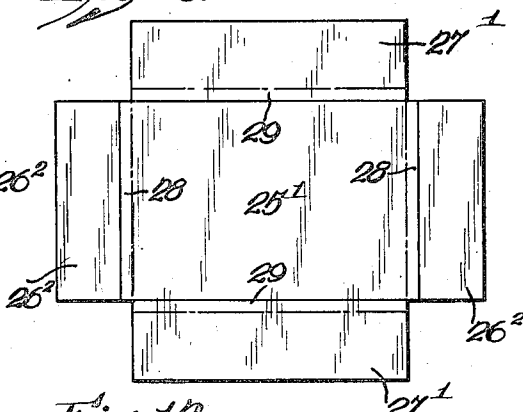


Fig. 11.

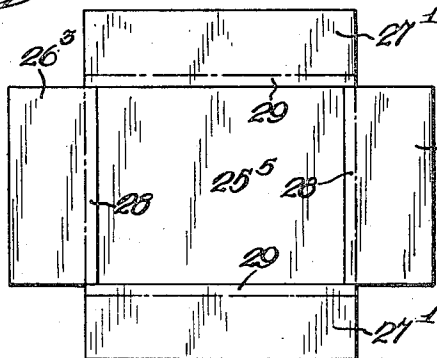


Fig. 12.

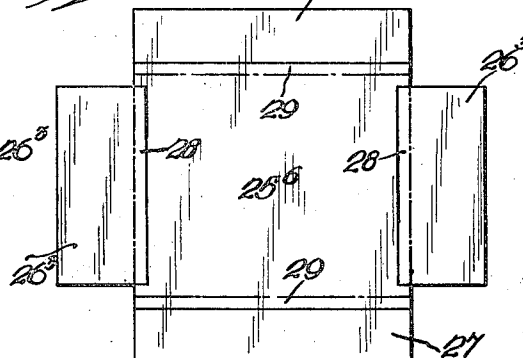


Fig. 13.

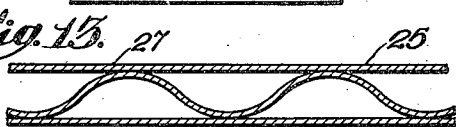


Fig. 14.

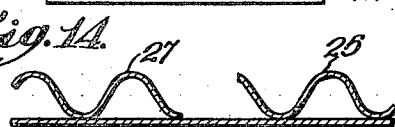


Fig. 15.

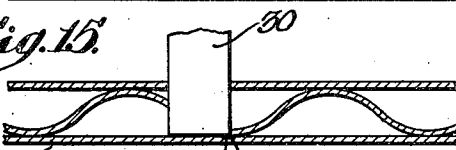


Fig. 16.

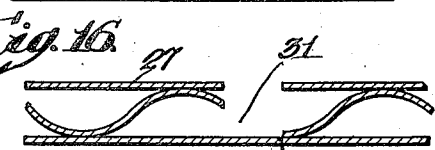


Fig. 17.

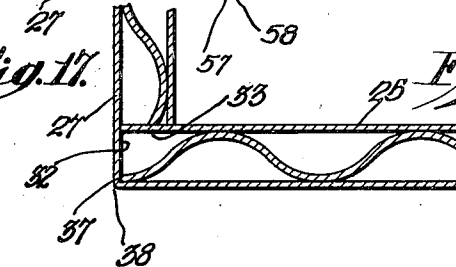
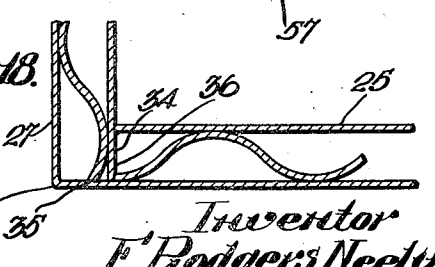


Fig. 18.



Witnesses:

Oliver W. Backer
Walter Chism

Inventor
F. Rodgers Neely

by *W. Stall John and Son*
Attorneys.

Dec. 13, 1938.

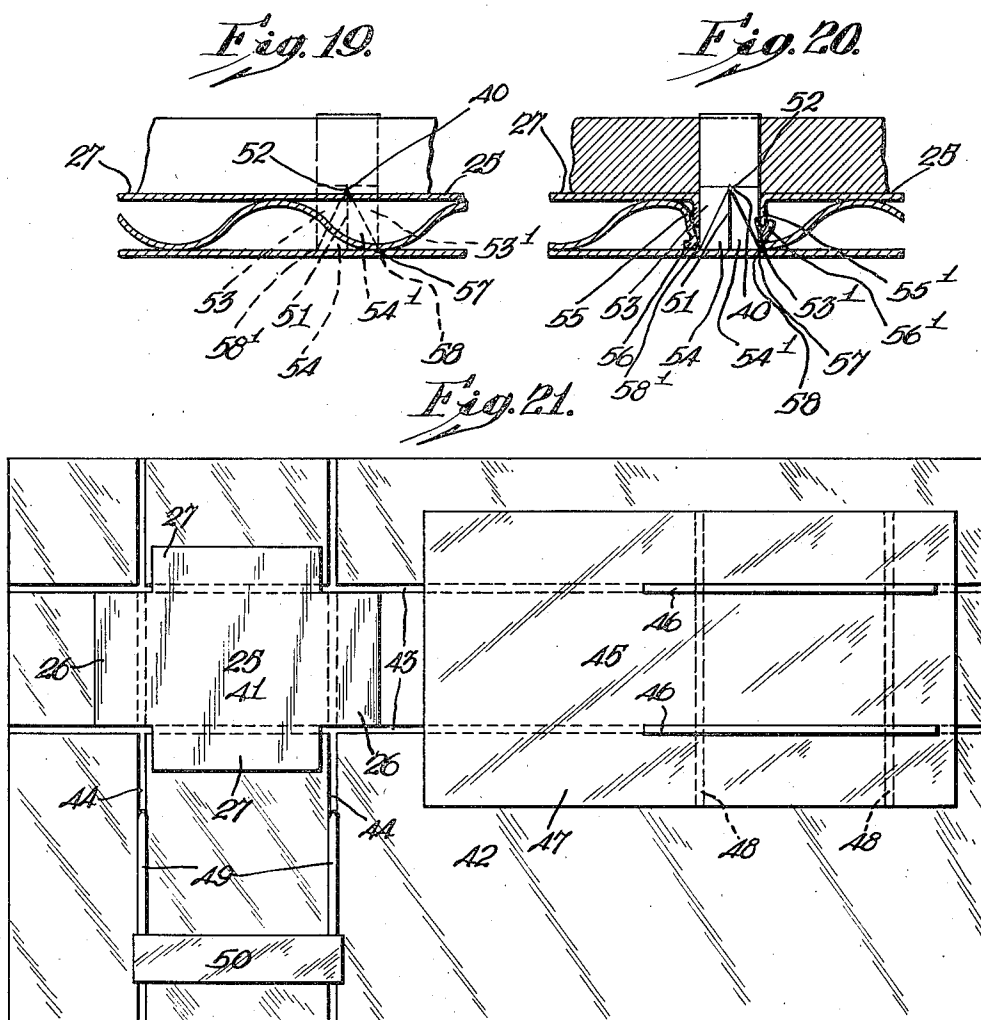
F. R. NEELY

2,139,845

BOX

Filed Aug. 9, 1934

3 Sheets-Sheet 3



Witnesses:

Chas. W. Hacker
Walter Chism

Inventor
F. Rodgers Neely
by *W. Steel Jackson and Son*
Attorneys.

UNITED STATES PATENT OFFICE

2,139,845

BOX

Frank Rodgers Neely, Allentown, Pa.

Application August 9, 1934, Serial No. 739,085

1 Claim. (Cl. 229—30)

The present invention relates to boxes having bottom and side walls of relatively heavy open board—as corrugated board—and also relates to blanks for setting up boxes of the character indicated.

The “open” board referred to here comprises board having one or both of its faces of flat sheet material, as of paper or the like, with a more or less open structure body taking up a major portion of the board thickness. A particularly suitable open board appears in the commercial corrugated board.

A purpose of the invention is to groove the open board blank for a box, for example, a cigar box, along the lines of corner folding, and on the surface to be presented inside the box, as distinguished from the present practice of scoring or grooving the blank on the surface thereof that is to be presented to the outside of the box.

A further purpose is to provide a groove of width corresponding nearly to the thickness of the board used and located upon the side of the board which is to form the inside of the box and to fold the flap of the blank in a direction to close the groove and upon that edge of the groove nearer or farther from the bottom portion of the box as preferred, covering both raw edges of the board at the groove, one by the inside of the outer facing sheet and the other by the outside of the inner facing sheet and the ungrooved board of which it forms a part.

Further purposes will appear in the specification and in the claim.

I have elected to illustrate a few only of the different forms of my invention, selecting forms however that are practical and efficient in operation but which have been selected primarily because they well illustrate the principles involved.

Figures 1 and 2 are side elevation and top plan views of a drop-lid-end box adapted to be made as an embodiment of the present invention.

Figures 3 and 4 are side elevation and top plan views of a box without drop lid ends and which is also adapted to embody the present invention.

Figures 5, 6, 7 and 8 are top plan views of somewhat different forms of blank each of which is adapted to be set up into a drop-lid-end box of Figures 1 and 2, or with suitable dimensional changes in the extension of the end flaps, to be set up into a box without drop lid ends, as illustrated in Figures 3 and 4.

Figures 9, 10, 11 and 12 are top plan views of still somewhat different forms of blank, each of which is adapted to be set up into a box without drop lid ends, as illustrated in Figures 3 and 4

but not so well suited to setting up into drop lid end boxes illustrated in Figures 1 and 2.

Figures 13 and 14 illustrate in section to enlarged scale different “open” board, of which Figure 13 is intended to represent commercial corrugated board, usually having a corrugated intermediate strip and faced by flat sheets that are usually glued to the corrugated strip at the successive corrugations and Figure 14 (shown as skived) is intended to represent any open board having an open structure body faced by flat sheet on one side only.

Figure 15 is a fragmentary view to illustrate skiving, showing a cutting tool skiving the open board of Figure 13.

Figures 16, 17 and 18 are views generally similar to Figure 15 but after completion of the skiving operation and, in the case of Figures 17 and 18, with the board in set-up position. In Figure 17 the fold takes place about the inner (nearer to the bottom) edge of the skived groove and against a box form, and in Figure 18 the fold takes place about the outer edge. The views are intended to be conventional illustrations of a grooved blank in the stated position, whatever the method of grooving.

Figures 19 to 21 illustrate a different method of grooving from that shown in Figures 15 and 16 respectively, material cut away in Figures 15 and 16 being retained though pressed downwardly and laterally out of the way in the method of Figures 19 to 21.

Figures 19 and 20 may be considered as enlarged fragmentary sections taken upon the line 19—19 of Figure 21 at different stages of operation.

Figure 21 is a top plan diagrammatic illustration showing conventional grooving mechanism. Like numerals refer to like parts in all the figures.

Describing in illustration and not in limitation and referring to the drawings:—

Boxes made from blanks of relatively thick open board structure have hitherto been set up by turning flaps up about score lines or grooves on the sides of the blanks that will be presented outwardly of the finished box, as distinguished from score lines or grooves to be presented inwardly of the finished box.

As a result of locating the score lines or grooves on the side of the blanks to be presented on the outside of the finished box, the bending of the flaps at the score lines or grooves has left unprotected open raw edges along the scorings or grooves and has also made it difficult or im-

possible to secure square outer corners along the bends.

From the standpoints of wear and of commercial appearance both of these disadvantages are serious.

Where the set-up box is subsequently to be subjected to wrapping on a box-wrapping machine, the lack of firm outwardly square corners around the bottom is particularly objectionable, as the wrapping will conform to the roundness of the bottom corners.

It is thought wide application of the invention will be found in the manufacture of "open" board cigar boxes, or other open board boxes with or without drop lid ends, such as are conventionally shown in Figures 1 to 4, and that where corrugated board is used, at least, the board will be faced on both sides.

Each of the illustrated blanks, Figures 5 to 12, includes a body or bottom 25, 25', etc., and flaps 26, 26', etc. and side flaps 27, 27' with side and end grooves 28 and 29 respectively.

All of the grooves are on the face of the blank that is to be presented to the inside of the set-up box. As a result, the setting-up operation closes the grooves and protects the open end or side of the board along the raw edges at the outer and inner limits of the grooves, whether the lines of bending be all along the inner edges of the grooves, all along the outer edges of the grooves or some along the inner and some along the outer edges thereof.

At any interior corner between the bottom and a set-up flap (a side or an end of the set-up box) the thickness of the flap (side or end), that is, the interior and top face sheet thickness, may overlap the adjacent bottom as in Figure 17 or the thickness of the bottom overlap the adjacent flap (side or end), as in Figure 18, depending upon the location of the line of bending.

At the interior corners between the adjacent set-up flaps, either flap may be folded up within the lap of the other for boxes typified in Figures 3 and 4 as these do not have drop lid ends. For drop lid end boxes, however, the side flaps should usually lap inside the end flaps, as best seen in Figure 2.

In the blanks of Figures 5 to 8 inclusive the set-up end flaps are intended each to lap across the set-up ends of the side flaps, the blanks in these figures differing in flap widths according to the edge of the skived groove upon which the flap is to fold and differing with respect to the locations of the side grooves 29 or/and with respect to the locations of the end grooves 28 according to the intended lines of bending at the flap set-ups. The lines of bending are shown dotted in different figures to distinguish them from full lines along the other sides of the grooves, and because these lines of bending may be frequently advantageously scored for more easy bending.

In Figures 5 and 6 the side flaps in their set-up positions will rest upon the edges of the bottom 25 while the end flaps in the two figures differ, in that the end flaps in Figure 6 have their sides against the raw edges of the bottom and have their thicknesses overlapping the bottom while in Figure 5 the reverse is true.

Correspondingly in Figures 7 and 8, the side flaps, in their set-up positions, do not rest upon the inner faces of the bottom but have their sides at the edges across the raw edges of the bottom.

As will be noted, the position of the up-folded

flap, that is whether its raw edge is closed by the flat of the bottom or whether its flat side closes off the raw (open) end of the bottom is determined by which edge of the skived groove acts as the pivot about which the flap bends.

The end flaps differ, with the end thicknesses respectively overlapped by and overlapping the bottom 25.

While broad features of the invention are directed to the blanks having inside groovings along the lines of set-up bending, whatever the kind or method of grooving, yet important detail features of the invention include also the kind of grooving and the method of grooving.

Figures 14 and 15 illustrate grooves made by skiving. In skiving, material is cut away for part or all of the depth of the groove, as by means of a cutting tool, suitably a rotary tool 30, the operation thereof being desirably followed by scoring or crushing along the line of bending, as indicated at 31, Figure 16.

The cutting away of the material by skiving or turning it back, as in other figures, leaves the grooves with raw edged side structure undesirably open, for example as indicated in Figures 15 and 16, and when the flap has been set up these raw edge open sides are protected and closed, one by the bottom 32 of the groove (part of the outside facing sheet) and the other by the inner facing sheet of the bottom at 33 (Figure 17) or one by the bottom of the groove and the other by the inner facing sheet of the flap at 34 and 35 respectively (Figure 18), according to whether the up-setting bend of the flap takes place at the inner edge 36 (that edge adjacent the bottom) or at the outer edge 37 (that edge adjacent the flap) of the outer facing sheet left after the skiving.

In either event it will be seen that both of the raw edges left by skiving are closed and a square joint is made at the corner 38.

From a practical standpoint the chief difference lies in whether the bottom portion of the blank is at this joint to come clear to the outer edge of the box, being separated from that edge (if at all) by the outer facing sheet only, as in Figure 17 or the bottom of the box is at this joint to be separated from the outer surface of the box by the thickness of the side or end flap as in Figure 18.

Viewed from the above standpoint in Figures 5 and 8 the ends of the bottom portions of the blank will come to the outer edges of the box and in Figures 6 and 7 will be spaced from the ends of the completed box by the entire thickness of the upset ends. In Figures 5 and 6 the bottom portion of the blank will extend to the edge of the box (except for the covering by the outer facing sheet); and in Figure 7 the thickness of the sides spaces the bottom portion of the blank from the outer surface of the box. This is true also in Figure 8, except that portions 39 of the bottom at the extreme ends extend out to the sides of the box.

The illustrations of Figures 5 to 8 have been restricted somewhat by the fact that in all of these it is preferred to have the end flaps overlap the ends of the side flaps when all of them have been set up in place, which is made desirable on account of the drop lid end construction of the box.

Figures 9 to 12 on the other hand are not controlled by this inasmuch as there is no advantage specially in having the end flaps cover the ends of the side flaps.

Figures 9 to 12 therefore show blanks in which the side flaps are intended to overlap and cover

the ends of the end flaps. Both groups of figures are intended to be illustrative rather than comprehensive and no attempt has been made to show more than a selected few of each group of side and end flap overlappings.

With the understanding therefore that in Figures 9 to 12 the side flaps are to overlap the end flaps and that sides and ends are of equal height Figures 9, 10, 11 and 12 correspond generally with Figures 5, 6, 7 and 8.

In forming the grooves the original material thereof may be slitted longitudinally as at 40 suitably along the middle line of the groove and then pressed laterally out of the way without removal, or, usually less desirably, the open structure material may be grooved by compressing between suitable dies.

For minimum deflection or distortion of board material immediately adjacent the groove the forming dies may move longitudinally of the forming grooves.

For example, as indicated in Figures 19 to 21 an ungrooved blank 41 fits in a suitably recessed stationary die 42 with the upper surfaces of the die and blank substantially flush with each other, and with the die grooved at 43 and 44 in alignment with the intended grooves to be formed in the blank.

A movable die 45 carrying forming tools 46 slidably fits the grooves 43 and carries an apron 47 for supporting the tools 46 and for supporting the upper surface of the blank against any buckling during the forming of the grooves 29. The die is advanced, coming to rest in an advanced position with the tools 46 in the newly formed grooves and with recesses 48 in registry with tools 49 on a die 50.

The die 50 is now advanced and retracted to form the grooves 28, the tools 46 aiding in the support of the blank during the forming of the grooves 28, after which the die 45 is retracted and the finished blank removed in any suitable way.

The cutting and forming tools comprise cutting edges 51 sloping rearwardly and downwardly from forwardly extending points 52 and downwardly and rearwardly extending faces 53, 53' and 54, 54'. These faces engage the cut edges 55, 55' of the inner facing sheet and the cut edges 56, 56' of the corrugated interior wall and turn these cut edges down or up or back so as to leave a channel as in the case where a rotary cutter has been used. The same tools can, of course, be

made to score one edge of the groove at 57, if desired, by extending an edge 58 of the tool below the other edge 58'.

It will be evident that a groove or channel is formed with raw edges on both sides whether the material formerly occupying the space grooved be wholly removed or be turned down and under as in the several views. In each case the raw edge must be covered either by the inner facing sheet of the corrugated or other board where the fold is made about that edge of the groove immediately adjoining the bottom, or by the inner facing sheet of the flap where the fold is made about that edge of the groove farther from the bottom. The words grooving and channelling and like general language are intended to cover both forms whereas skiving in the claim is intended to mean cutting away material and cutting and turning are intended to apply where the material is not removed.

In view of my invention and disclosure variations and modifications to meet individual whim or particular need will doubtless become evident to those skilled in the art, to obtain part or all of the benefits of my invention without copying the structure shown, and I, therefore claim all such in so far as they fall within the reasonable spirit and scope of my invention.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

A box formed of corrugated board having facing sheets and the inside and outside portions of the board grooved about the periphery of the bottom from the inside of the box substantially to the outer facing sheet to a width adjacent the outside sheet as great as the width where the groove passes through the inside sheet exposing the body of the board at opposite sides of the grooves, opposite ends and opposite sides between the ends connected by the outer facing sheets with the bottom at the grooves and comprising two pairs of opposite flaps, one pair of flaps being folded about the inner edges of the grooves whereby the edges of these flaps rest upon the facing sheet of the bottom at the edges of the bottom and the other pair of flaps being folded about the outer edges of the grooves whereby the raw edges of these flaps rest upon the material left by the grooves at the bottom of the grooves and the raw edges of the bottom adjacent these flaps are closed by the inner facing sheets of the flaps.

F. RODGERS NEELY.