July 23, 1968 D. GIUMMO 3,393,859

FOLDING BOX

Filed July 20, 1966 2 Sheets-Sheet 1

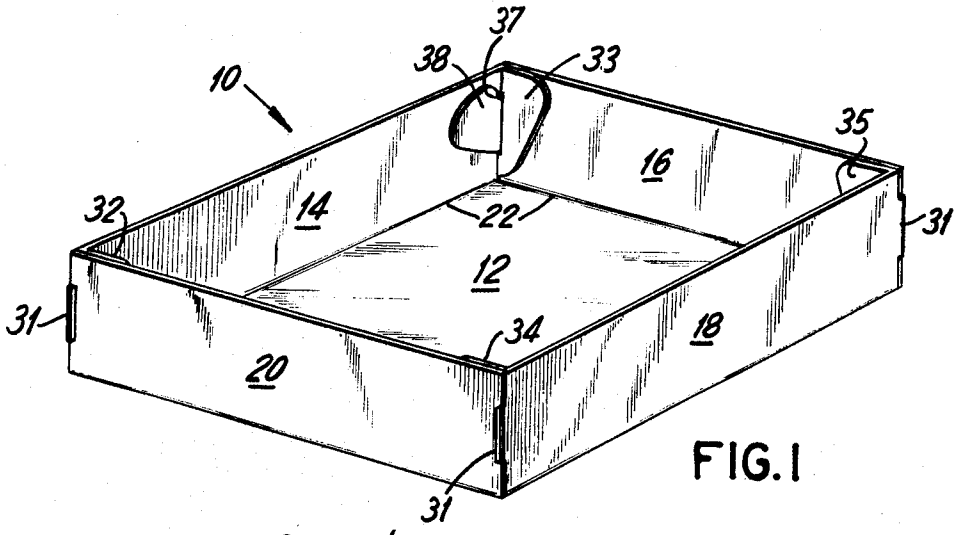


FIG. 1

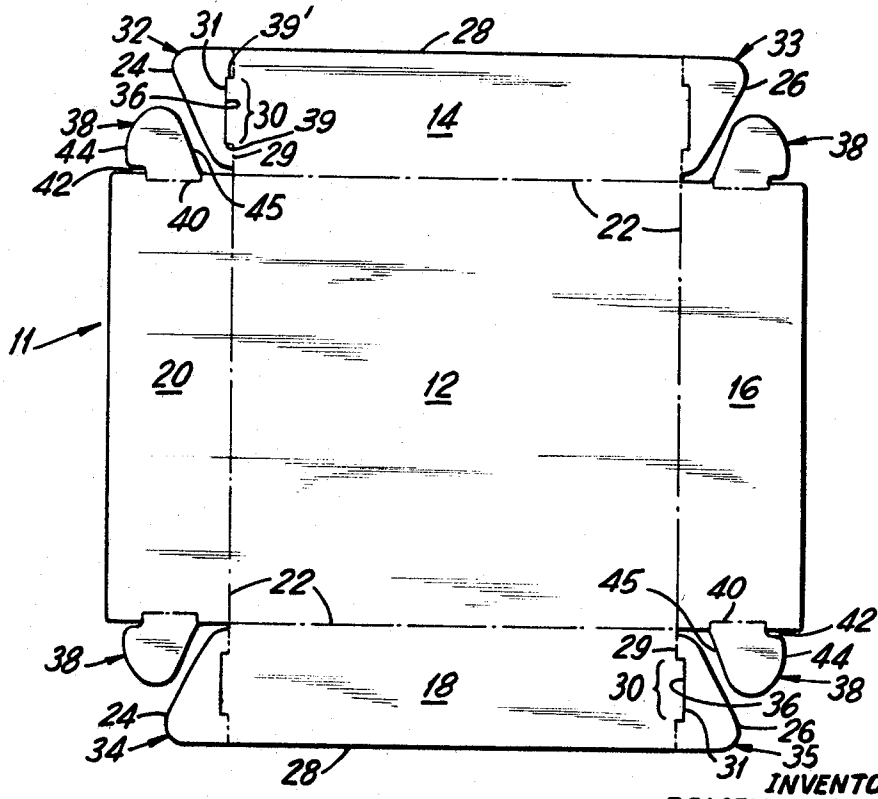


FIG. 2

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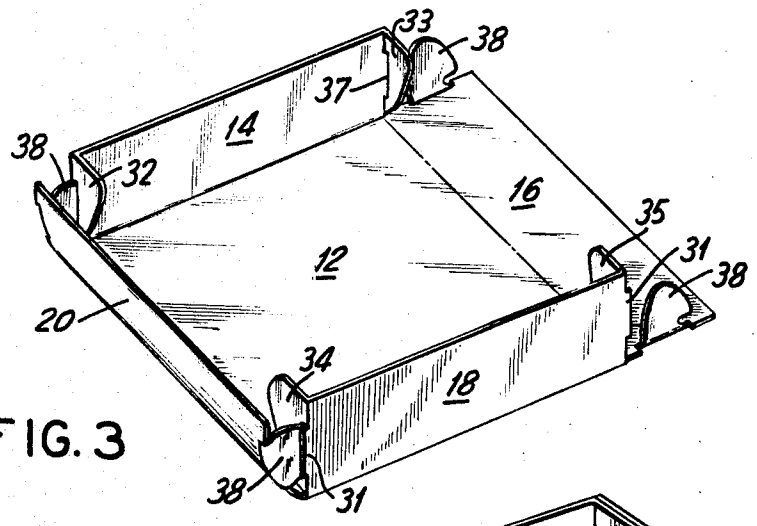


FIG. 3

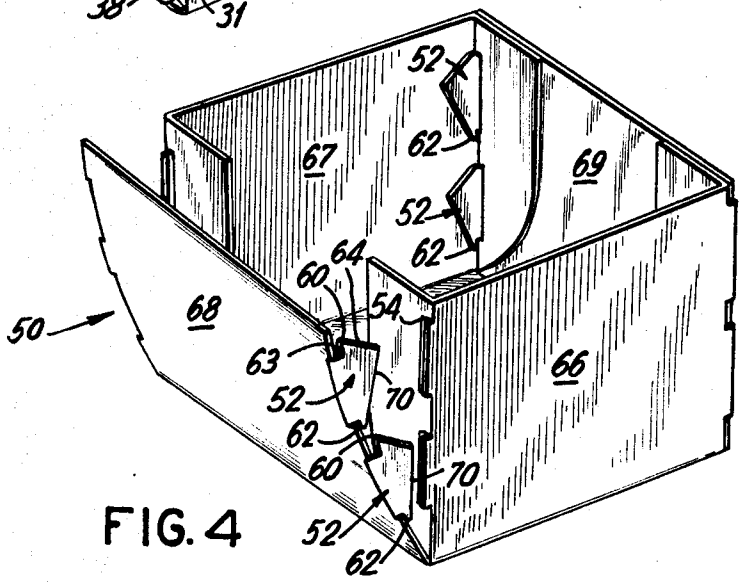


FIG. 4

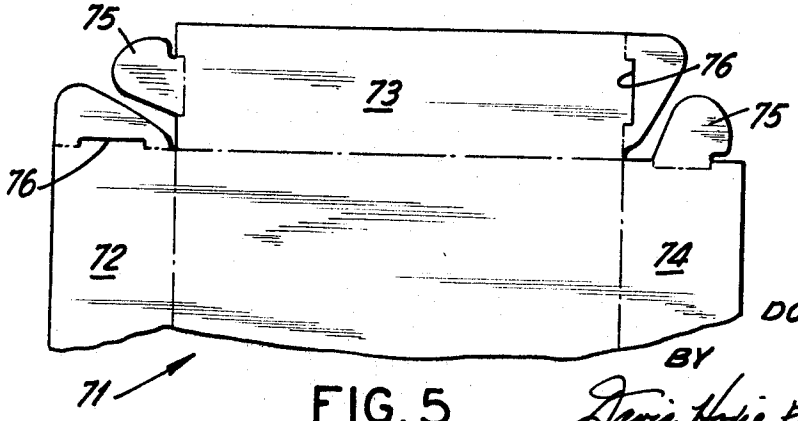


FIG. 5

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FOLDING BOX

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6 Claims. (Cl. 229—35)

ABSTRACT OF THE DISCLOSURE

A folding box having an improved locking means, the box including flaps attached to side wall panels having self-clearing slits through the flaps and tabs, attached to adjacent side wall panels, having an upper edge higher than the top of the slits. The tabs coact with the slits to cam the tabs into the slits by arching the side wall panels on which the tabs are mounted so that after the tabs are inserted through the slits the side panels straighten out causing the tabs to abut against a solid wall portion of the adjacent wall panel providing a simple and effective locking means.

This invention relates to improvements in cartons, boxes, trays and other like structures hereinafter collectively referred to as "boxes" or "folding boxes," made by folding, from blanks of cardboard, paper board, or other like suitable foldable sheet material. More particularly, this invention relates to folding boxes having an improved corner construction which locks the walls in container-forming relation upon positioning the walls in their erected position.

Folding boxes have been in use for many years and there exists a myriad of designs for blanks. Most prior art designs utilize flaps on side walls which are inserted in slits or cuts through the central portion of the adjoining side walls; however, these designs lack locking power and are asthetically unattractive. Furthermore, it is very difficult to print on those sides containing the slits and through which the flaps are inserted. To overcome these deficiencies, there has developed a style of folding box wherein the locking is achieved at the corners of the box, thereby providing a box with clean, uninterrupted sides. In addition to being asthetically more pleasing, it is possible to print or affix printed matter on all sides of the box. Prior art corner locking boxes, however, have been found to be either difficult to assemble or deficient in locking power.

Major users of folding boxes are retail stores which are widely distributed throughout the world. The assembler of these boxes in such stores is usually a clerk who has little time to spend assembling the boxes and, furthermore, is untrained in such assembling procedures. To avoid the need for training such clerks in the assembling of folding boxes, it is extremely desirable that the assembly be simple and obvious and require a minimum of time and effort. It is also desirable that the locking step for fixing the sides of the box in their erect position be automatically performed as an integral part of assembling the box. If an additional step is required to lock the sides in place, it has been the experience of the industry that either the step is performed incompletely, thereby insufficiently locking the sides in place, or the step is neglected altogether. Either deficiency results in a box which will come apart in use.

Accordingly, it is one object of this invention to provide an asthetically appealing folding box which is easily and quickly assembled.

It is another object of this invention to provide a folding box which has sufficient locking power to prevent the box from opening when in use.

It is a further object of this invention to provide a folding box which automatically locks in its assembled position as an integral part of the assembly step of erecting the sides with respect to the bottom.

It is a still further object of this invention to provide a folding box having an interior free from projections extending into the central portion thereof in order to permit use of the box form as a cover which telescopes over the box bottom.

Other objects and attendant advantages will become apparent from the below specification and accompanying drawings in which:

FIGURE 1 is a perspective view of a box formed in accordance with this invention;

FIGURE 2 is a plan view of a blank that, when folded, forms the box of FIGURE 1;

FIGURE 3 is a perspective view of the blank of FIGURE 2 in a partially folded position;

FIGURE 4 is a perspective view of a partially folded blank form in accordance with a second embodiment of this invention; and

FIGURE 5 is a partial plan view of a blank formed in accordance with a third embodiment of this invention.

This invention, in one form, comprises a folding box having an improved corner construction which serves as the locking means for the box when the sides are erected. The assembled box is asthetically appealing since the corner construction is essentially completely concealed and, furthermore, the interlocking portions lie flat along the sides of the box thus permitting the use of telescoping covers made with the same design as the base of the box.

Adverting now to the drawings, and more particularly FIGURES 1 and 2, there is illustrated an assembled box **10** (FIG. 1) formed from the blank **11** illustrated in FIGURE 2. The blank **11**, cut from sheet material such as cardboard, solid fiber, paper board, or other suitable foldable sheet material, includes a base panel **12** and four side wall panels **14, 16, 18, 20**, referred to as first, second, third and fourth panels, respectively, for ease of description. The wall panels are joined to the edges of the base panel **12** along fold lines **22** which form the base edges of the wall panels **14, 16, 18, 20**. The fold lines **22** provide for easy erection of the wall panels along a definite line thus simplifying the assembly procedure.

Spaced inwardly from opposed first and second edges **24, 26** respectively and extending from the base edge or fold line **22** outwardly toward the top edge **28** are fold lines **29**. The fold lines are interrupted for a predetermined length, illustrated at **30**, to provide a guide **31** when the first and third panels **14, 18** are erected, for reasons described below. The side edge, base edge, top edge, and a line or axis through the fold line **29** define flaps **32, 33** on first panel **14** and flaps **34, 35** on third panel **18**. An elongated slit **36**, commencing at a first point **39** and terminating at a second point **39'** extends through the flaps **32–35**, one such slit being provided on each flap. The slits **36** are parallel to the fold lines **29** and are coextensive with the guide **31** which borders one side thereof. The guides **31** and slits **36** are formed concurrently by providing a U-shaped cut in the flaps with the legs of the U normal to and intersecting with the fold line **29**, the base of the U forming the projecting end of the guides **31**. When the flaps **32–35** are folded along their fold lines **29** the interrupted portion **30** will remain coplanar with its respective wall panel (**14** or **18**) and, due to the U-shaped cut, project therefrom and serve as a guide **31** (see FIG. 1). Furthermore, the area of the flaps **32–35** which formed the guides **31** will now be vacant, thus forming the openings **37**. The slits **36**, therefore, are self-clearing.

The remaining two side wall panels, i.e., second wall panel **16** and fourth wall panel **20**, are each provided

along their side edges with a projection or locking tab **38**. The line of juncture of the tabs **38** and their respective panels is a fold line **40** to permit easy folding of the tabs, the fold line being either adjacent to or directly on the side edge of the wall panels. Preferably the fold lines **40** are slightly spaced from the side edges of the wall panels **16, 20**, as can be seen clearly in FIGURE 2, since the spacing will permit the edge of the wall panels **16, 20** to be coplanar with the outer surface of the adjacent panels **14, 18**. Each tab **38** is joined to its wall panel throughout most of the length of the tab and, for the remaining portion of the length of the tab, is spaced from the side edge of the wall panel so as to provide a slot **42** which effects formation at the tab **38** into a hook. The tab **38** is positioned on its wall panel such that when the wall panels **14, 16, 18, 20** are erect with reference to the base panel **12** the portion of the tab **38** above the bottom of the slot **42** coincides with the portion of the wall panel (either **14** or **18**) adjacent thereto above its respective opening **37**. This provides a locking relationship between the adjacent side panels when the tabs **38** are inserted through the openings **37** as described below.

To form or assembly the box **10** the first and third side wall panels **14, 18** are folded along their fold lines **22** into an erect position and the flaps **24, 26** are similarly folded along their respective fold lines **29** thereby forming the guides **31** and the openings **37** at the inner ends of the flaps (see FIG. 3). The guides serve to direct the tabs **38** into the openings thereby simplifying assembling of the box **10**. The tabs **38** are folded along their fold lines **40** and the second and fourth side wall panels **16, 20** are then folded erect along their respective fold lines **22**. This latter step will place the tabs in position to be inserted into their respective openings **37**. Because the hooked end of the tabs **38** extend above the upper end of the openings **37** it is necessary to gently arch the wall panels **16, 20** on which the tabs are mounted, thereby lowering the tabs with respect to the openings and permitting insertion of the tabs therethrough. The arching of the panels **16, 20** can be performed by the assembler by pressing downwardly on the top of the panels **16, 20**. However, it is undesirable to make such a requirement of the assembler because it would then be necessary to instruct each assembler in the method of assembling the box. Furthermore, if arching is performed in this manner unless care is taken in the arching its wall panel will bend and crease thus rendering the blank unuseable.

In order to eliminate the need for manually arching the wall panels **16, 20** the upper edge **44** of the tabs **38** contingous to the hooked end are shaped particularly to effect a caming action which automatically arches the wall panel the proper amount allowing entry of the tabs **38** into the openings **37**. One particularly effective shape, illustrated in FIGURE 2, is a convex curvature which places that portion of the tab **38** which first sees the opening **37** at the upper extremity of the opening **37**, the remaining upper edge **44** being above the opening. A slight force on the wall panels **16, 20** to insert the tabs **38** into the openings **37** cause the tab edge **44** to ride along and press against the wall panel defining the upper edge of the openings. The exchange of forces between the cantilevered tabs **38** and the adjacent wall panels **14, 18** effects a gentle arching of the wall panels **16, 20** to which the tabs are attached thus permitting the tabs to be completely inserted into the openings **36**. FIGURE 3 illustrates the tab-insertion step, and the arching of wall panel **20**.

After the tabs **38** are inserted completely through the openings **37** so that the slots **42** between the tabs **38** and their respective wall panels **16, 20** are opposite the portion of the wall panel above the openings **37**, the resilience of the wall panels **16, 20** cause them to straighten out or "rise up" effecting a locking inter-relationship between the adjacent panels. The hooked portion of the tabs **38** is forced upwardly causing the adjacent wall panels **14, 18** to reside in the slots **42**, the tabs abutting against the inside of the wall panels **14, 18** (FIG. 1) thereby locking the four wall panels in place. Experience has shown that it is much easier to insert the tabs **38** into the openings **37** if that portion of the tabs which sees the openings first is near the top of the tab. Accordingly, as can be seen in FIGURES 2 and 3, the tabs **38** are shaped with an inclined lower edge **45** to provide this result.

Furthermore, if the bottom of the flaps **32–35** extend normal to their fold lines **29** there is a tendency for the flap bottoms to interfere with the erection of the adjacent wall panels **16, 20**, especially in deep boxes. To obviate this interference, the bottom of the flaps are cut away or inclined (FIG. 1–3). The top of the flaps, however, are shaped to remain colinear with the main portion of the wall panels **14, 18** in order to strengthen the corner of the box providing a double wall, the flaps **32–35** forming the inner wall. When the box is assembled the flaps prevent the second and fourth wall panels **16, 20** from arching and, consequently, releasing the tab from its locking junction.

As can be seen in FIG. 1 such a construction results in a very clean, aesthetically attractive box **10** securely locked in its assembled position. Furthermore, the tabs **38** and flaps **32–35** fit flush against the inner sides of the box rather than extending outwardly toward the center of the box thus permitting use of this design for both the box bottom and top which fit together in a telescoping fashion without having the tabs or projections interfering with the fit.

FIGURE 4 illustrates a box **50** incorporating several modifications of the above described box **10**. Box **50**, being relatively deep, preferably utilizes a plurality of tabs **52** and corresponding openings **54**. In this manner both the top and bottom of the wall panels are locked in place providing a stronger construction. Obviously, the number and sizes of tabs and openings on each side of the wall panels are chosen to fit the depth of the box.

As in box **10** of FIGURES 1–3, the tabs **52** are formed with a hooked upper end **60**. In addition, to more firmly lock the wall panels together, an auxiliary locking protuberance **62** is provided on the edge **64** of the tab **52** on the end opposite the hooked end **60**, the protuberance **62** being spaced from its wall panel a distance approximately equal to the width of the slot **63** forming the hooked end **60** of the tab **52**. When the tab **52** is inserted into its mating opening **54** the upper end **60** of the tab hooks over the adjacent wall panel, as explained above, locking the upper portion of the tab in place. Furthermore, the protuberance snaps over the wall panel at the lower end of the opening **54** providing a similar lock for the lower end of the tab **52**. This dual lock, in addition to providing greater locking strength, also ensures a flush fit of the side wall panels throughout their length. It should be noted that instead of a proturbance **62** the locking of the lower end of the tab can be effected by forming the lower end to lie below the lower end of the opening and providing the lower end of the tab with a slot.

In place of the convex curvature of the tabs of box **10**, the outer edge of the tabs **52** are provided with a generally triangular contour with the shape of the upper edge **64** designed to provide the proper force exchange with the adjacent wall panels **66, 67** to effect arching of the wall panels **68, 69** on which the tabs are mounted. The lower edge **70** is contoured to avoid any force-exchange contact with the wall panel at the lower end of the openings **54**.

The embodiments illustrated in FIGURES 1–4 have the tabs located on opposite sides of opposed wall panels and the openings on opposite sides of the remaining wall panels. FIGURE 5 illustrates another embodiment wherein the blank **71** has the tabs and openings alternat-

ing such that each wall panel 72, 73, 74 is provided with a tab 75 on one side and an opening 76 on the opposite side.

A box formed in accordance with this invention is aesthetically attractive, firmly locked in its assembled position and the flaps and tabs lie flat along the inside walls permitting telescoping of a top and bottom. Furthermore, all sides of the box can be easily printed upon when the box is in the form of a blank. The box can be easily and quickly assembled by one who has had no instructions since assemly is obvious. Interlocking of adjacent wall panels is accomplished automatically as an integral part of the normal step of inserting the tabs into the openings, the arching of the wall panels naturally occurring due to the shape and relative location of the tabs and the openings.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. A folding box having an improved corner construction comprising:

(a) a base panel, the perimeter of which is defined by a plurality of edges, and

(b) a plurality of wall panels each of which is at least partially defined by a bottom edge and opposed first and second side edges and each of which is hingedly joined at its respective bottom edge to one of the base panel edges such that the first side edge of a first wall panel is adjacent to the second side edge of a second wall panel,

(i) said first wall panel having a fold line spaced from said first side edge thereof and extending away from said bottom edge thereof, said first side edge and said fold line defining a flap, and a self-clearing slit through said flap spaced from said fold lines, said slit commencing at a first point spaced from said base edge and terminating at a second point spaced from the opposite end of said first wall panel,

(ii) said second wall panel having a tab hingedly connected thereto, said tab having a slot in the upper edge thereof, the distance between the bottom edge of said second wall panel and the upper edge of said tab being greater than the distance between the bottom edge of said first wall panel and said second point, the upper edge of said tab contiguous to said slot being particularly shaped to effect contact between said tab and said first wall panel at the upper end of said slit in a force exerting manner to arch said second wall panel when said tab is partially inserted through said slit, said second wall panel straightening out causing said slot to receive said first wall panel in interlocking relationship when said tab is inserted through said slit a predetermined distance.

2. A folding box as defined in claim 1, wherein said slot is contiguous to the line of juncture of said tab and said second wall panel.

3. A folding box as defined in claim 1, wherein said tab has a convex outer edge which cams the tab into said slit to effect a gentle arching of said second wall panel.

4. A folding box having an improved corner construction comprising:

(a) a base panel, the perimeter of which is defined by four edges,

(b) four side wall panels each of which is defined by a bottom edge, opposed first and second side edges and a top edge, and each of which is hingedly joined at its respective bottom edge to one of the base panel edges,

(i) the first and third wall panels being joined to said base panel at opposite sides thereof, said first and third wall panels having first and second fold lines spaced from said first and second side edges respectively, said fold lines and said side edges defining first and second flaps therebetween, said first and second fold lines extending away from said base edge to the top edge of said first and third wall panels except for a predetermined length intermediate the base and top edges, and a self-clearing slit through each of said flaps spaced from the corresponding fold line coextensive and parallel with said predetermined length and contiguous thereto, said self-clearing slit including a first slit contiguous and parallel to the fold line of the flap through which said slit extends and a pair of second slits substantially normal to said first slit and extending from the top and bottom of said first slit to the flap's fold line whereby said first and third wall panels have an extension projecting sidewardly therefrom and co-planar therewith when the flaps are folded along their respective fold lines.

(ii) the second and fourth wall panels being joined to said base panel at the remaining edges thereof each having a tab joined thereto along a fold line adjacent to but slightly spaced from the first and second edges thereof, each of said tabs being joined to its respective wall panel along a portion of the length of said tabs, the remainder of the tab length being spaced from the said second and fourth wall panels to form a slot, the distance between said base panel and the edge of said tab contiguous to said slot being greater than the distance between said base panel and the top of said slit, the edge of said tabs contiguous to said slot being particularly shaped so as to contact in a force exerting manner said first and third wall panels at the upper end of said slits to effect arching of said second and fourth wall panels when each of said tabs is partially inserted through the slits adjacent thereto, said second and fourth wall panels straightening out causing said slots to receive in an interlocking relationship the wall panels adjacent thereto when said tabs are inserted completely through said slits.

5. A folding box as defined in claim 1 wherein said self-clearing slit includes a first slit contiguous and parallel to said fold line and a pair of second slits substantially normal to said first slit and extending from the top and bottom of said first slit to said fold line whereby said first side wall panel has an extension projecting sidewardly therefrom and co-planar therewith when said flap is folded along said fold line.

6. A folding box as defined in claim 2 wherein said locking means comprises a protuberance extending downwardly from the lower edge of said tab, said protuberance being spaced from the line of juncture of said tab and said second wall panel a distance substantially equal to the width of said slot.

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