April 11, 1961 R. F. FRISOSKY ET AL 2,979,251

FOLDING BOXES OF THE TRAY TYPE

Filed Feb. 11, 1960 4 Sheets-Sheet 1

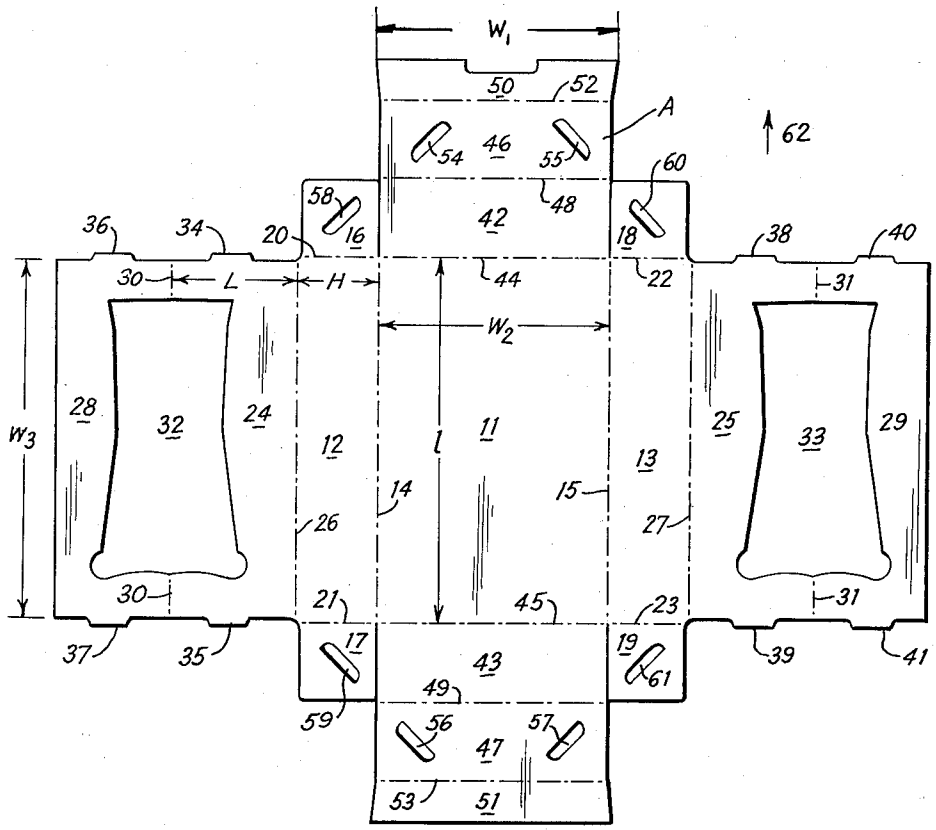


Fig. 1

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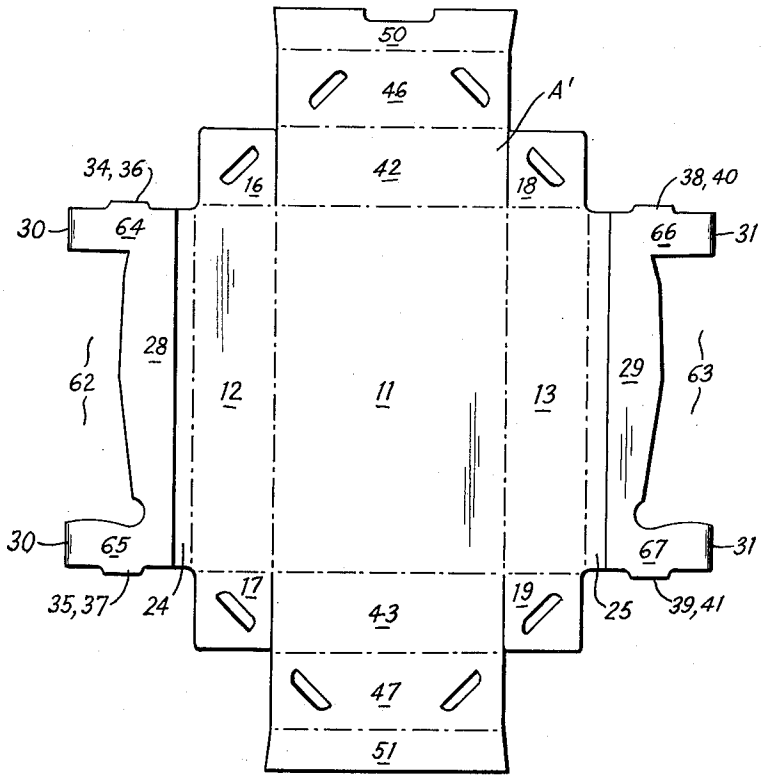


Fig. 2

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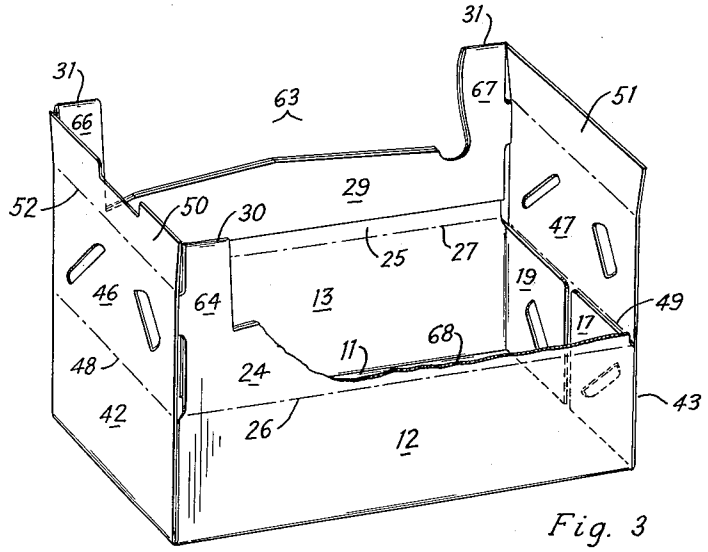


Fig. 3

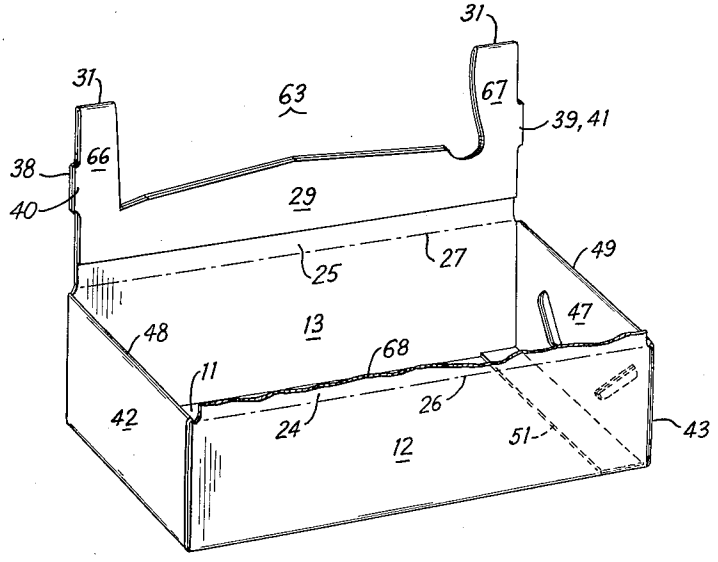


Fig. 4

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Filed Feb. 11, 1960 4 Sheets-Sheet 4

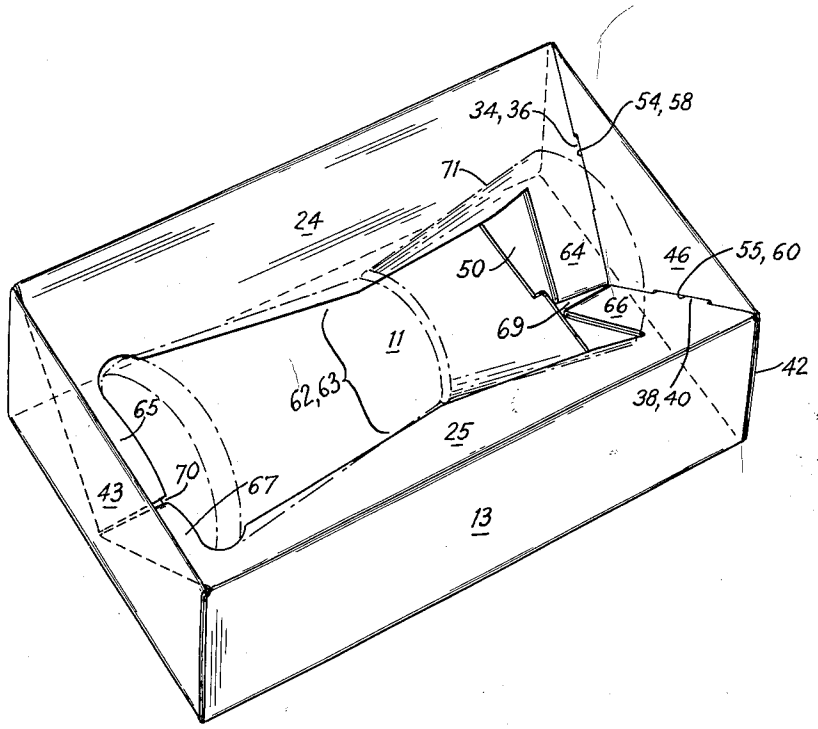


Fig. 5

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FOLDING BOXES OF THE TRAY TYPE

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6 Claims. (Cl. 229—34)

This invention relates to improvements in the construction of folding boxes of the tray type and has particular application to trays which serve not only to protect the packaged article, but to display it in a sales promoting manner.

The invention provides an improved tray which may be assembled at a rapid production rate without any gluing operations during the assembly on a compact automatic assembly machine of the plunger and die type. Such machines are preferred in the industry as they require only a fraction of the floor space of a conventional folding and gluing machine.

The tray is so constructed that it cradles the merchandise in a position spaced from the side walls and creates a frame effect about the merchandise which rests in the visual center of the tray. The tray may be constructed from board which is finished on one side only, for example by a lamination of foil, or by finishing the board in other manners, and the various panels of the tray are so arranged that no portion of the unfinished side of the board is visible, not even through gaps between panels, so as not to mar the appearance of the displayed article of merchandise.

Forming of the tray by the aforementioned type of machinery dictates a predetermined sequence of assembly operations to be performed on the various portions of the tray blank. This sequence must be adhered to if the advantages of assembly by a plunger and die machine are to be gained.

The finished tray comprises inwardly inclined inner side panels constructed to support the load of the packaged article without sagging or deformation during transport. The inner side panels are held in place securely after forming of the box, so that the box may be handled between the box forming and filling stations without danger of displacement of panels and to permit the article to be packaged to be dropped into the tray or to be forced into it to provide frictional engagement between the article and cut edges of a cutout in the inner side panels. The inner side panels may serve as anchoring means for the merchandise forcibly inserted between them, so that certain portions of the edges of the cutout bear down upon the article and prevent accidental removal. Other portions of the cutout panels may support the article in the opposite sense. This feature arises from the slanted disposition of the panels which in part lie below and in part lie above the center plane of the article inserted therebetween.

The tray construction further includes structural features which facilitate handling of the blank by the aforementioned type of assembly machine, for example by temporarily locking certain flaps or panels so as not to interfere with subsequent assembly operations performed on other flaps or panels which then serve to lock the first mentioned flaps or panels in place permanently.

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

Although the characteristic features of this 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 following description taken in connection with the accompanying drawings forming a part of it in which:

Fig. 1 shows a typical flat blank from which a tray embodying the invention may be formed;

Fig. 2 shows the blank of Fig. 1 after a preliminary folding and gluing operation while the blank is still in its flat stage;

Fig. 3 is a perspective view of the tray during an initial phase of the assembly operation, a portion of the blank being shown broken away;

Fig. 4 is a perspective view showing a further advanced stage of the assembly in which the tray ends are completed; and

Fig. 5 is a perspective view of the finished tray.

In the following description and in the claims various details will be identified by specific names for convenience. The names, however, are intended to be generic in their application. Corresponding reference characters refer to corresponding parts in the several figures of the drawings.

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

The blank A shown in Fig. 1 may be cut and scored in multiple from sheets or rolls of foldable board on conventional cutting and creasing machines. The blank comprises a bottom panel **11** to which side walls **12** and **13** are articulated along bottom side fold lines **14** and **15**. Side flaps **16**, **17**, **18** and **19** are laterally articulated to the side walls **12** and **13** along flap fold lines **20**, **21**, **22** and **23**. Inner side panels **24** and **25** are articulated to the side walls **12** and **13** along top side fold lines **26** and **27**. Lower side panels **28** and **29** are articulated to the main inner side panels **24**, **25** along base fold lines **30** and **31**.

Panel portions **32** and **33** are blanked from the stock of the inner side panels and the lower side panels, the shape of the blanked panel portions being preferably, although not necessarily, symmetrical with respect to the base fold lines **30** and **31** as shown. Lock tabs **34**, **35**, **36** and **37** are provided on panels **24** and **28** and similar lock tabs **38**, **39**, **40** and **41** are provided on the lateral edges of the panels **25** and **29**.

End panels **42** and **43** are articulated to the ends of the bottom panel **11** along bottom end fold lines **44** and **45**. End liner panels **46** and **47** are articulated to the end panels **42** and **43** along top end fold lines **48** and **49**. Base flaps **50** and **51** hingedly extend from the liner panels **46** and **47** along flap fold lines **52** and **53**.

Slanted slots **54**, **55**, **56** and **57** are cut in the liner panels **46** and **47**. Similar slots **58**, **59**, **60** and **61** are provided in the side flaps **16**, **17**, **18** and **19** for purposes which later become apparent.

The blank A represents a blank for a tray having reinforced inner side panels. The blank is first subjected to a gluing and folding operation in order to produce double-ply inner side panels. This may be done on a conventional gluing and folding machine through which the blank

moves in the direction of the arrow 62. During its passage through the machine adhesive is applied to the lower side panels 28 and 29 and the panels are then folded over and brought into adhesive engagement with the main inner side panels 24 and 25.

The resulting blank A' is shown in Fig. 2. The folding operation transforms the blanked portions 32 and 33 (Fig. 1) into substantially C-shaped recesses 62 and 63 extending into the side panels 24, 28 and 25, 29 from the terminal edges 30 and 31, respectively. The recesses are laterally flanked by leg portions 64, 65 and 66, 67, respectively, each leg portion being provided with an equally reinforced lock tab 34, 36; 35, 37; 38, 40; and 39, 41.

The assembly of the blank A' of Fig. 2 into tray form preferably proceeds as follows. The side walls 12 and 13 are folded upright with respect to the bottom panel 11 and simultaneously the side flaps 17, 19 on one end and 16, 18 at the opposite end are folded substantially at right angles with respect to the side walls 12 and 13. The end panels 42 and 43 are folded upright with respect to the bottom panel 11, in which position they overlie the side flaps on the outside. The partially folded condition of the tray is shown in Fig. 3 in which a portion of the inner side panel 24, 28 is broken away at 68 in order to show the interior more clearly.

The assembly operation may be performed by a rectangular plunger (not shown) fitting the bottom panel, which plunger forces the blank into the throat of a folding die. While the structure of Fig. 3 is being held in the die, the plunger may retract, whereafter the liner panels 46 and 47 are folded over the side flaps towards the inside of the tray, thereby producing multi-ply end walls. It is readily apparent that the folding of the liner panels brings their slanted slots into a position in which they register with the slots in the side flaps.

The folding operation also brings the base flaps 50 and 51 into a position over the bottom panel 11 as shown in broken lines in Fig. 4 at 51. The purpose of the base flaps 50 and 51 is to provide a temporary, yet dependable, frictional lock for the liner panels to prevent the liner panels from swinging up due to the fold resistance of the stock at the fold lines 48 and 49. The temporary lock is of the frictional edge-to-panel engagement type and is provided in the illustrated form by a slightly flared shape of the base flaps to make the dimension W_1 slightly larger than the width W_2 of the base panel, as measured between the bottom side fold lines 14 and 15 (Fig. 1). At this stage of the assembly operations the tray has the appearance shown in Fig. 4.

As a final operation, the inner side of panels 24 and 25 are swung into the interior of the tray about their fold lines 26 and 27. This causes the lock tabs 38, 40 and 39, 41, as well as the corresponding lock tabs on the opposite side, to enter the respective slanted slots in the liner panels 46 and 47.

Due to the matching of the slots in the liner panels 46, 47 with those in the side flaps 16, 17, 18 and 19, the lock tabs may enter the slots to a depth equal to two thicknesses of the board. It is obviously not necessary to make the slots in the side flaps of the same size as those in the end liner panel, but the side flaps may be cut away in other ways to provide the necessary clearance for the lock tabs.

The fit of the inner side panels between the end liner panels 46 and 47 is substantially a friction fit. For this purpose the width of the inner side panel W_3 may be made only slightly smaller than the length l of the base panel, the difference being of the order of two to four thicknesses of the board. The finished tray is shown in Fig. 5.

Inasmuch as the length L of the inner side panels exceeds the height H of the side walls, the inner side panels 24 and 25 assume a slanted position and form a V in vertical cross section, as is clearly visible at the far end in Fig. 5. The leg portions 64, 65, 66 and 67 rest on the bottom of the tray.

The unfinished surface of the bottom panel 11 is not exposed to view when the packaged article is inserted into the central tray recess 62, 63. A gap, however, may exist between the ends of the legs 64, 66 and 65, 67 at 69 and 70, respectively. At this portion the respective base flaps 50 and 51 form a liner lying with the finished side up so that no unfinished portion of the box appears at the points 69 and 70. The base flaps therefore serve a double purpose as locking devices and as liners.

The legs 64, 66, and 65, 67 support the upper portions of the inner side panels in their proper slanted position. In instances where the merchandise is heavy and tends to depress the inner side panels 24 and 25, the lock tabs on the lateral edges of the inner side panels perform the additional function of transferring the load resting on the inner end panels 24 and 25 to the liner panels 46 and 47. Thus the lock tabs not only serve the purpose of permanently locking the assembled tray, but the additional purpose of transferring a portion of the load.

Furthermore, the lock tabs lock the inner side panels against upward displacement. This is of importance where an article of merchandise 71 is forcibly inserted into the cutout deep enough to permit a portion of the edge bordering the cutout to snap into a position above the article, thus holding it down. At the same time, other portions of the inner side wall panels may support the article in the opposite sense. This locking action is rendered possible by the slanted disposition of the inner side panels whose article-engaging edges lie partially above and partially below the center plane of articles inserted therebetween, the plane referred to being the plane parallel to the bottom panel passing through the center of the article.

The finished tray has great structural strength and has considerable resistance to twisting. It presents an attractive package which may be overwrapped with a sheet of transparent material or be provided with a telescoping cover, as desired.

What is claimed is:

1. A tray of foldable sheet material comprising, in combination, a bottom panel; a pair of side walls articulated to opposite sides of the bottom panel; a pair of end panels articulated to opposite ends of the bottom panel; an end liner panel articulated to the top of each of the end panels and folded back flat over the end panel on the inside of the tray; a pair of side flaps laterally articulated to said side walls and folded with respect thereto and inserted between the respective end panel and its liner panel; an inner side panel articulated to the top of each of the side walls, said inner side panels being of a length greater than the height of the side walls and being disposed at a slant to the side walls and to the bottom panel to enclose a space of substantially triangular cross section between the inner side panels, the side walls, and the bottom panel, the inner side panels having a cutout therein extending into the respective panels centrally from its bottom edge so as to leave two full-length portions adjacent the liner panels forming legs, the cutouts of opposite side panels forming a central article supporting recess in the tray; lateral lock tabs on said legs, said liner panels having slanted slots therein into which said lock tabs extend.

2. A tray of foldable sheet material comprising, in combination, a bottom panel; a pair of side walls articulated to opposite sides of the bottom panel; a pair of end panels articulated to opposite ends of the bottom panel; an end liner panel articulated to the top of each of the end panels and folded back flat over the end panel on the inside of the tray; a pair of side flaps laterally articulated to said side walls and folded with respect thereto and inserted between the respective end panel and its liner panel; an inner side panel articulated to each of the side

walls, each inner side panel comprising an upper ply articulated to the top of the side wall and a lower ply articulated to the upper ply along a base fold line, folded back upon, and adhesively secured to, the upper ply, the length of the upper ply being greater than the height of the side wall so that the infolded side panel defines a space of substantially triangular cross section between the bottom panel, the side wall and the side panel when its base fold line is substantially in contact with the bottom panel, the inner side panel having a substantially centrally disposed cutout therein extending into it from said base fold line and having a full-length panel portion adjacent each liner portion forming panel supporting legs, the distance between the lateral edges of opposite legs of the same side panel being sufficient to provide frictional engagement with the end liner panels.

3. A tray of foldable sheet material comprising, in combination, a bottom panel; a pair of side walls articulated to opposite sides of the bottom panel; a pair of end panels articulated to opposite ends of the bottom panel; an end liner panel articulated to the top of each of the end panels and folded back flat over the end panel on the inside of the tray; a base flap articulated to the end of each liner panel, said base flap overlying the bottom panel and being of a width slightly greater than the distance between the side walls for frictional edge-to-panel engagement therewith; a pair of side flaps laterally articulated to said side walls and folded with respect thereto and inserted between the respective end panel and its liner panel; an inner side panel articulated to the top of each of the side walls, said inner side panels being of a length greater than the height of the side walls and being disposed at a slant to the side walls and to the bottom panel to enclose a space of substantially triangular cross section between the inner side panels, the side walls, and the bottom panel, the inner side panels having a cutout therein extending into the respective panels centrally from its bottom edge so as to leave two full-length portions adjacent the liner panels forming legs, the width of the legs not exceeding the length of the base flaps which they overlie, the cutouts of opposite side panels forming a central article supporting recess in the tray; lateral lock tabs on said legs, said liner panels having slanted slots therein into which said lock tabs extend.

4. A tray of foldable sheet material comprising, in combination, a bottom panel; a pair of side walls articulated to opposite sides of the bottom panel; a pair of end panels articulated to opposite ends of the bottom panel; an end liner panel articulated to the top of each of the end panels and folded back flat over the end panel on the inside of the tray, friction means on said liner panel for frictionally locking the liner panel in infolded position, said means comprising an outwardly projecting cut edge adapted frictionally to engage the surface of a tray panel;

a pair of side flaps laterally articulated to said side walls and folded with respect thereto and inserted between the respective end panel and its liner panel; and an inner side panel articulated to the top of each of the side walls, said inner side panels being of a length greater than the height of the side walls and being disposed at a slant to the side walls and to the bottom panel to enclose a space of substantially triangular cross section between the inner side panels, the side walls, and the bottom panel, the inner side panels having a cutout therein extending into the respective panels centrally from its bottom edge so as to leave two full-length portions adjacent the liner panels forming legs, the cutouts of opposite side panels forming a central article supporting recess in the tray, the distance between the outer lateral edges of opposite legs of the same side panel being sufficient to provide frictional edge-to-surface engagement with the end liner panels.

5. A tray of foldable sheet material comprising, in combination, a bottom panel; a pair of side walls articulated to opposite sides of the bottom panel; a pair of end panels articulated to opposite ends of the bottom panel; an end liner panel articulated to the top of each of the end panels and folded back flat over the end panel on the inside of the tray; a pair of side flaps laterally articulated to said side walls and folded with respect thereto and inserted between the respective end panel and its liner panel; an inner side panel articulated to each of the side walls, each inner side panel comprising an upper ply articulated to the top of the side wall and a lower ply articulated to the upper ply along a base fold line, folded back upon, and adhesively secured to, the upper ply, the length of the upper ply being greater than the height of the side wall so that the infolded side panel defines a space of substantially triangular cross section between the bottom panel, the side wall and the side panel when its base fold line is substantially in contact with the bottom panel, the inner side panel having a substantially centrally disposed cutout therein extending into it from said base fold line and having a full-length panel portion adjacent each liner forming legs; and lateral lock tabs on said legs, said liner panels having slots therein into which said lock tabs extend.

6. A tray of the construction set forth in claim 5 in which the side flaps are cut away underneath said slots to permit a depth of entry of said lock tabs equal to two thicknesses of board.

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