

United States Patent [19]
Bateman

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[54] DOUBLE STACK INTERLOCKING TRAYS

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[73] Assignee: Plastics, Inc., St. Paul, Minn.

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[52] U.S. Cl.....214/10.5 R, 220/23.4, 220/23.6,
224/48 R

[51] Int. Cl.....B65g 1/14

[58] Field of Search.....224/48 R, 48 A, 48 B,
224/48 C, 48 D, 48 E, 48 F, 48 N; 206/72,
75; 220/23.4 E, 23.6; 214/10.5 R

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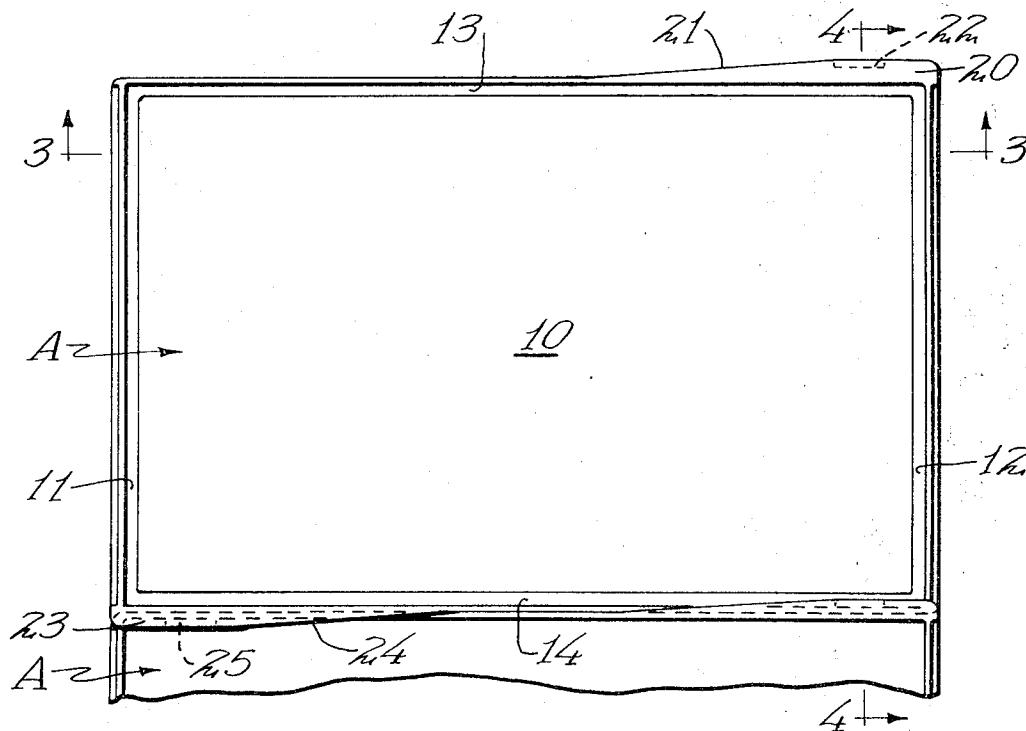
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[57]

ABSTRACT

Serving trays of generally rectangular form are constructed to interlock along adjacent edges as the trays are moved together. The trays also stack and nest together. One corner of each adjacent tray raises over a suitable connecting means on the cooperable tray during the interlocking operation.

11 Claims, 23 Drawing Figures



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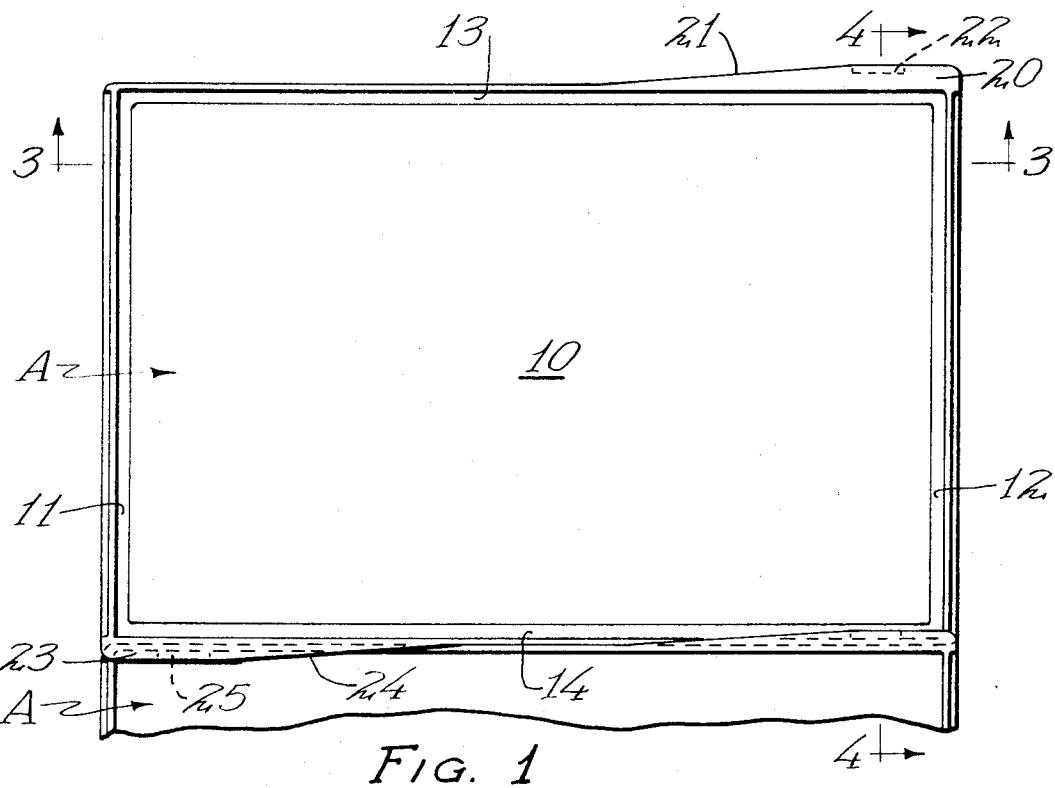


FIG. 1

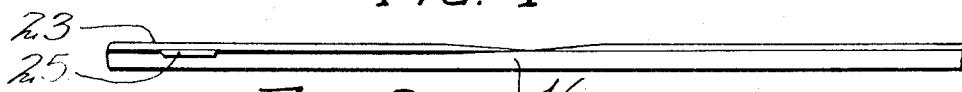


FIG. 2

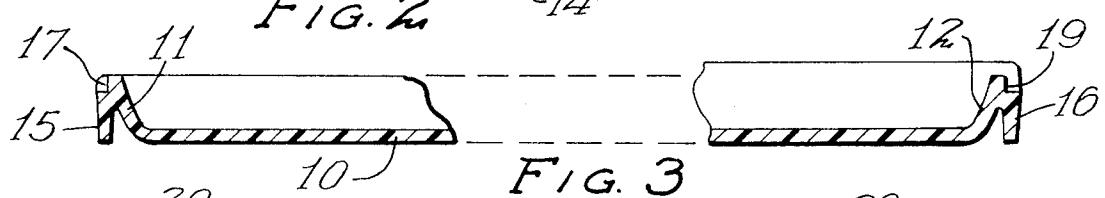


FIG. 3

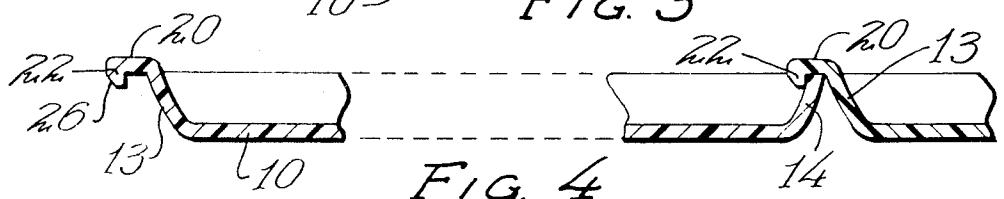


FIG. 4

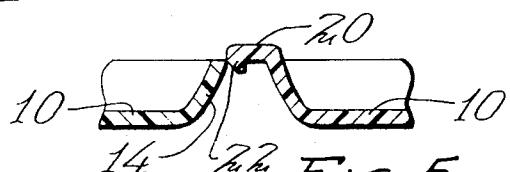


FIG. 5

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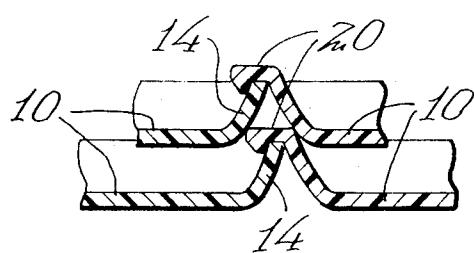
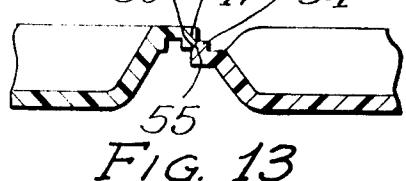
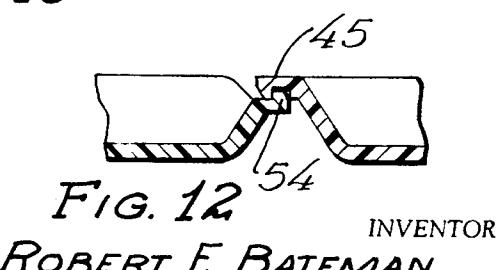
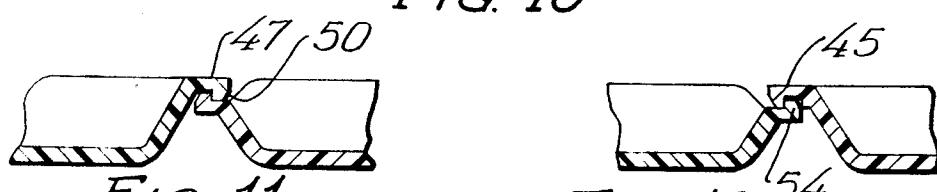
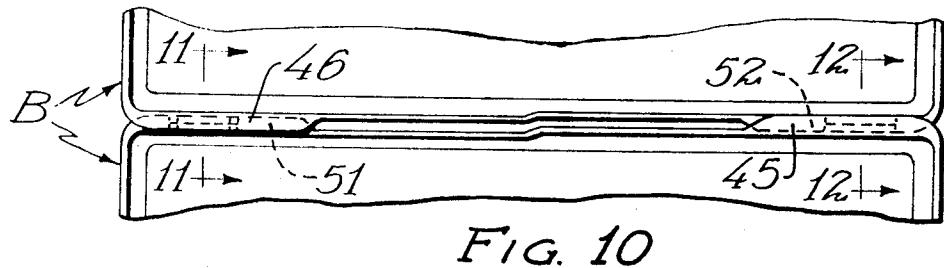
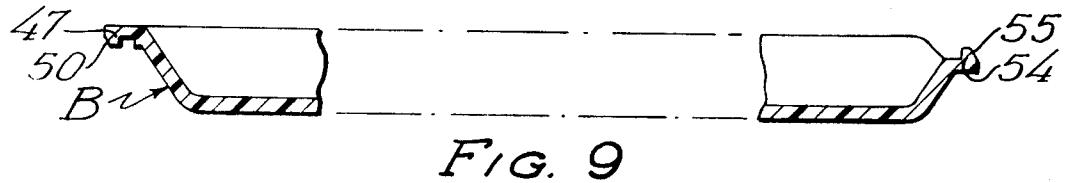
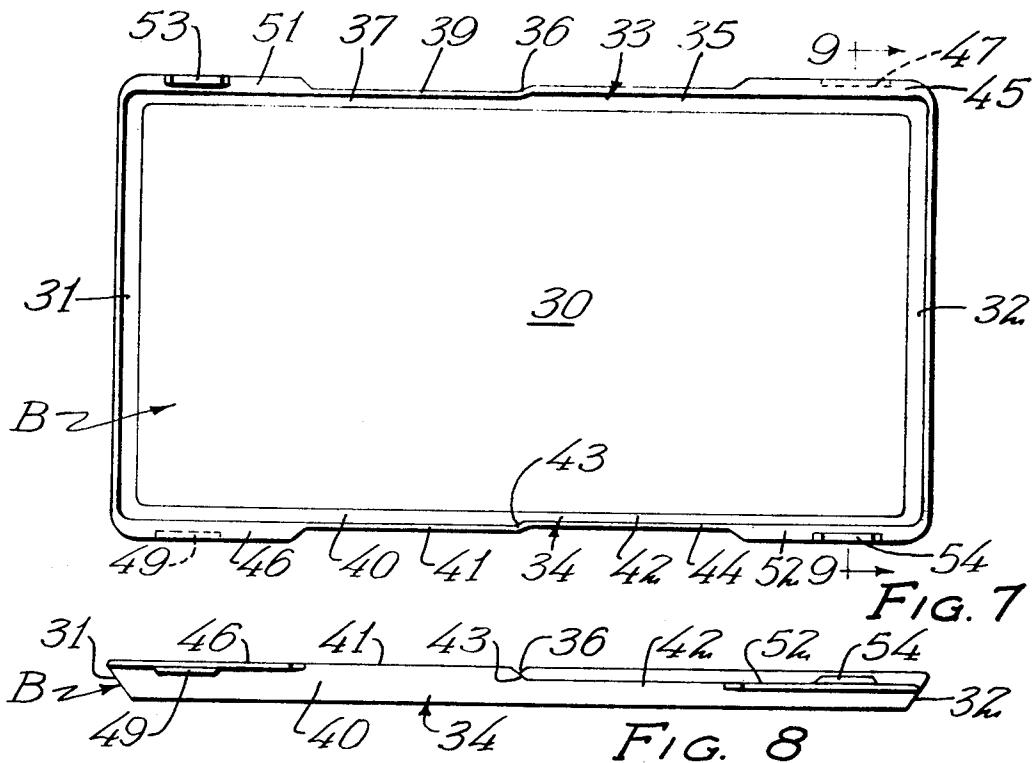


FIG. 6

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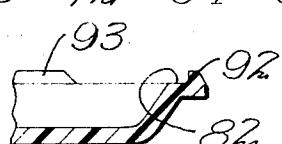
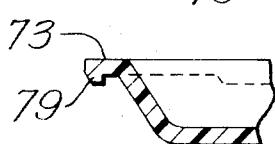
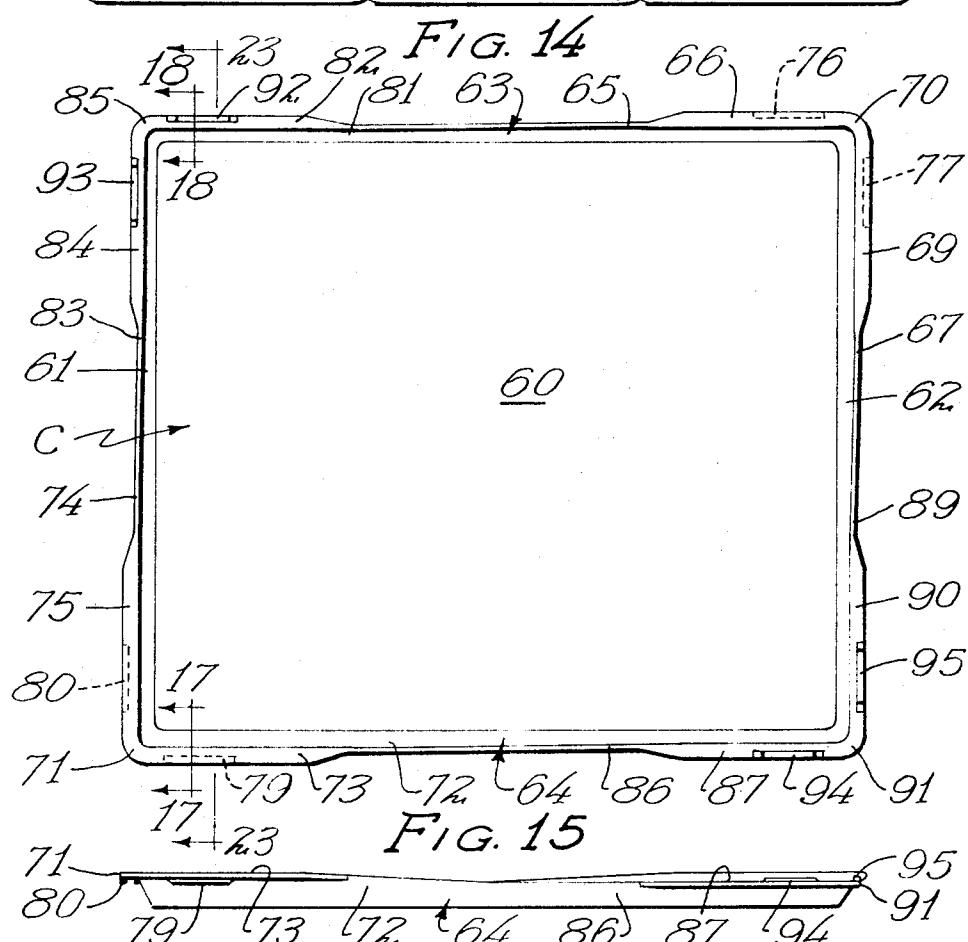
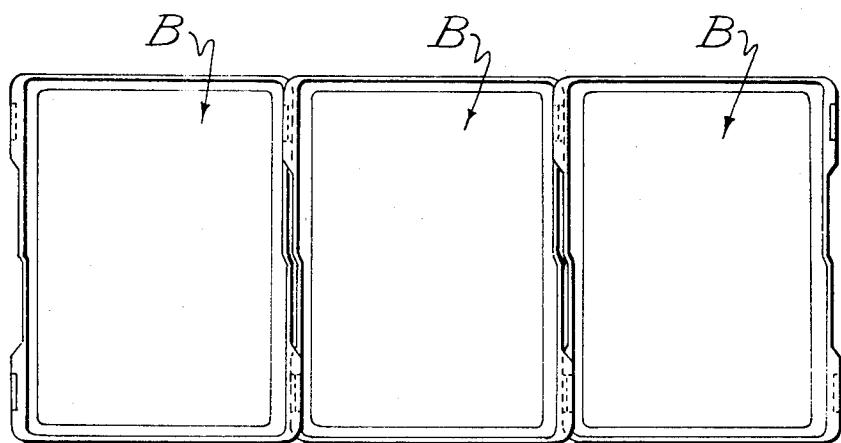


FIG. 17

FIG. 18

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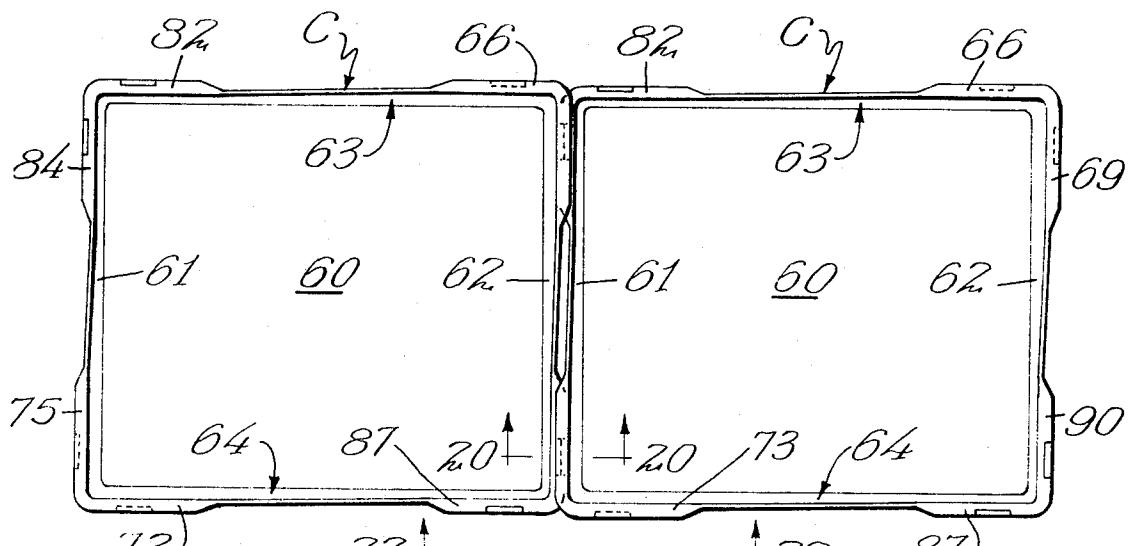


FIG. 19

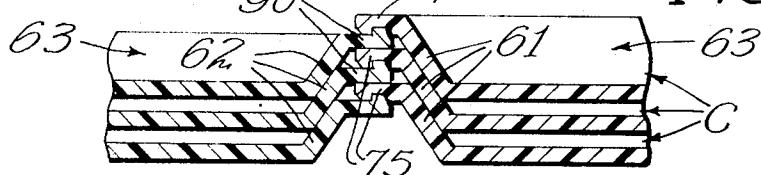


FIG. 20



FIG. 21

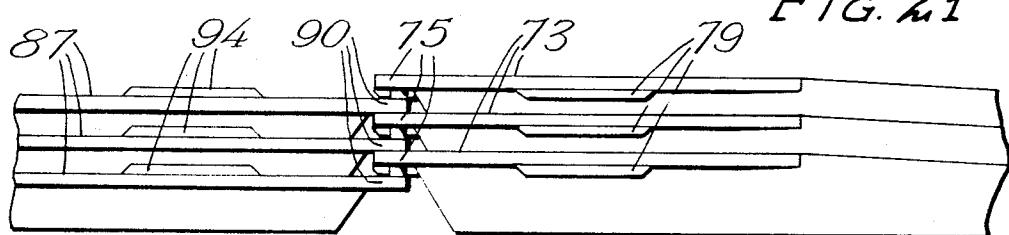


FIG. 22

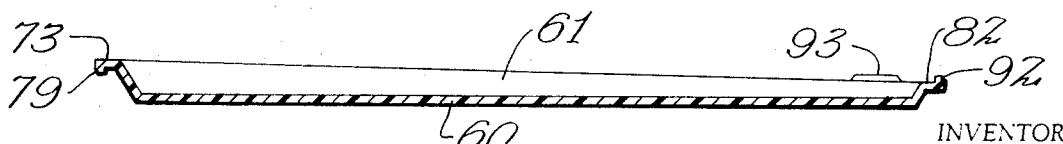


FIG. 23

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DOUBLE STACK INTERLOCKING TRAYS

This invention relates to an improvement in interlocking trays and deals particularly with serving trays designed for airline use and the like and which similar trays are designed to interlock together.

BACKGROUND OF THE INVENTION

Trays used in the serving of food on airliners require substantial storage space even when slideably mounted on tray carriers or stacked together. The difficulty is accentuated by the fact that airplanes are now produced which are capable of carrying several hundred passengers rather than the smaller number previously accommodated. In order to provide the necessary storage space, the tray carriers have been produced capable of holding two or three trays on a common plane. The difficulty with this arrangement lies in the fact that the tray carriers become so deep that it is difficult to remove the rear trays from the carrier.

SUMMARY OF THE INVENTION

It is the object of the present invention to provide trays which are constructed to interlock together to simplify the removal of the trays from a tray carrier, even though the trays are arranged two or three deep. The arrangement is such that the front or most accessible tray is marginally hooked to the rear tray which, in turn, may be hooked to still another tray if the trays are to be stored three deep. As the front or most accessible tray is removed, the tray behind the front tray is moved forwardly into accessible position before being unhooked and removed. If there are three trays in each layer, the removal of the second tray will draw the third tray forwardly into accessible position. As a result, the trays may be readily removed without reaching back into the tray carrier and pulling the rearmost trays forwardly.

A feature of the present invention resides in the provision of a tray having interlocking features in which one tray is marginally hooked to the next, and in which the trays may be automatically hooked together by pushing them against one another. The edges of the tray are so arranged that as the trays are forced toward one another, the tray edges will automatically interlock so that the rear tray will move in unison with the front tray.

A further feature of the present invention resides in the provision of trays of the type described including automatically interlocking tray edges. In preferred form, one end of the tray edge may be provided with a downwardly projecting hook flange which may engage over a portion of the edge of a similar tray, and the other end of the tray edge may be provided with an upwardly extending hook flange which may engage beneath a portion of the edge of the similar tray. The arrangement is such that either of two opposite sides of the tray may interlock with a similar tray.

A feature of a modified form of construction of tray lies in the fact that the trays may be locked either in side-by-side relation or else in end-to-end relation. Thus rectangular trays having longer sides and shorter ends may be stored in tray carriers of more than one size.

These and other objects and novel features of the present invention will be more clearly and fully set forth in the following specification and claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top plan view of one complete tray and an edge portion of a second similar tray.

FIG. 2 is a side elevational view of the tray illustrated in FIG. 1.

FIG. 3 is a transverse enlarged sectional view through the tray, the position of the section being indicated by the line 3-3 of FIG. 1.

10 FIG. 4 is a sectional view through the tray, the position of the section being indicated by the line 4-4 of FIG. 1.

FIG. 5 illustrates in section the edges of two adjoining trays as they are urged together.

15 FIG. 6 is a sectional view through a portion of nested trays.

FIG. 7 is a top plan view of a modified form of tray construction.

20 FIG. 8 is a side elevational view of the tray indicated in FIG. 7.

FIG. 9 is an enlarged sectional view through the tray, the position of the section being indicated by the line 9-9 of FIG. 7.

25 FIG. 10 is a plan view of the adjoining edges of a pair of interlocked trays.

FIG. 11 is a section view of the line 11-11 of FIG. 10.

FIG. 12 is a sectional view on the line 12-12 of FIG. 10.

30 FIG. 13 is a view similar to FIG. 11 but before the trays are interlocked together.

FIG. 14 is a top plan view of a plurality of trays in interlocked position.

35 FIG. 15 is a plan view of a modified form of tray.

FIG. 16 is a side elevational view of the tray shown in FIG. 15.

FIG. 17 is an enlarged sectional view through a portion of the tray, the position of the section being indicated by the line 17-17 of FIG. 15.

40 FIG. 18 is a sectional view through another modified portion of the tray, the position of the section being indicated by the line 18-18 of FIG. 15.

FIG. 19 is a plan view showing a pair of trays with the ends thereof interlocked in end-to-end relation.

45 FIG. 20 is a sectional detail through a series of stacked trays, the position of the section being indicated by the line 20-20 of FIG. 19.

FIG. 21 is a side elevational view of portions of a series of stacked trays.

50 FIG. 22 is an elevational detail showing stacked trays in interlocked relationship.

FIG. 23 is a sectional view on the line 23-23 of FIG. 15.

55 The trays A illustrated in FIGS. 1 through 6 inclusive of the drawings include a flat bottom panel 10 which is curved upwardly at opposite ends to form end walls 11 and 12, and which is curved upwardly along its side edges to form curved side walls 13 and 14. As indicated in FIG. 3 of the drawings, the upwardly curved end walls 11 and 12 support down-turned flanges 15 and 16 respectively, the lower edges of which are substantially flush with the undersurface of the bottom panel 10. As indicated, the upper and outer edges of the juncture between the end walls 11 and 12 and the flanges 15 and 16 respectively are transversely notched as indicated at 17 and 19 respectively. These notches 17 and 19 are designed to provide a means of stacking similar trays,

60

65

with the down-turned flanges 15 and 16 extending into the notches 17 and 19 respectively to hold the trays in superimposed relation.

The longitudinal edge 13 of the tray is provided with an elongated laterally projecting flange 20 having a tapered edge 21 which extends to a point near the longitudinal center of the tray, and which is of greater width at its junction with the end wall 12. A downwardly projecting hook-shaped flange 22 is provided on the undersurface of the flange 20 in spaced relation to the longitudinal wall 13. A similar, but opposed flange 23 is provided on the longitudinal wall 14, the flange 23 also having a tapered edge 24 which extends somewhat less than one-half the length of the longitudinal edge 14. The flange 23 also supports a downwardly projecting hooked shaped flange 25.

The flanges 20 and 23 are slightly above the plane of the upper edges of the end walls 11 and 12 and the unflanged portions of the side walls 13 and 14. The lower surfaces of the flanges 20 and 23 are substantially flush with this plane so that the flanges may extend over, and rest upon, the unflanged portions of the side walls 13 and 14 while the trays rest upon a common supporting surface.

As will be noted in FIG. 4 and 6 of the drawings, the hook-shaped flanges 22 are bevelled to provide upwardly and outwardly inclined cam surfaces 26 which guide two similar trays into interlocking relationship as they are moved together. The flange 23 and its hook-shaped downwardly extending flange 25 is identical to the flange 20 and its downwardly projecting hook-shaped flange 22. As will be seen from FIG. 5 of the drawings, as two similar trays are urged together, the hook shaped flange 22 will engage over the edge 14 of the adjoining tray, lifting the flange 20 until it passes over the tray wall 14 and interlocks therewith. At the same time, the hook-shaped flange 25 on the flange 23 rides over the wall 13 of the adjoining tray, causing the two trays to interlock together as shown in FIG. 4.

The interlocked trays may nest together in the manner shown in FIG. 6 of the drawings if it is so desired. The flanges 15 and 16 on the ends of the tray engage in the grooves 17 and 19 of a lower tray, and the flanges 20 and 23 extend beneath the connected edges of a pair of interlocked trays as shown in FIG. 6.

A modified form of tray construction is indicated in FIGS. 7 through 14 of the drawings. The trays B include a bottom panel 30 which include upwardly and outwardly inclined end walls 31 and 32, and upwardly and outwardly inclined side walls 33 and 34 connected at their ends to the end walls 31 and 32 to form a single continuous wall. Substantially one-half the length of the side wall 33 extends to a level flush with the planes of the walls 31 and 32. This full depth portion 35 of the wall 33 is connected by an offset 36 to the remaining portion 37 of the side wall 33, the upper edge 39 of the wall portion 37 being considerably below the level of the plane of the upper edges of the end walls 31. In a similar manner, the portion 40 of the side wall 34 which is diagonally opposite the portion 35 of the wall 33 has its upper edge 41 flush with the upper surfaces of the end walls 31 and 32, the wall portion 40 extending substantially one-half the length of the side wall 34. The side wall 34 is provided with a substantially shallower wall portion 42 extending from the central offset 43 to the end wall 32. The upper surface of the wall portion

44 as indicated at 44, is on the same horizontal plane as the wall portion 37 of the wall 33.

From the foregoing description it should be seen that the end wall 32 and an adjoining end portion 35 of the side wall 33 terminates on the same horizontal plane as the upper surface of the other end wall 31 and adjoining end portion 40 of the side wall 34. The upper edge 39 of the remaining portion 37 of the side wall 33 terminates on the same plane as the upper surface 44 of the portion 42 of the side wall 34.

An outwardly extending horizontal flange 45 projects laterally from the side wall portion 35 adjoining the end wall 32. A similar outwardly extending horizontal flange 46 is provided at the upper surface of the side wall portion 40 of the side wall 34 adjoining the end wall 31. The upper surfaces of the flanges 45 and 46 are on the common horizontal plane of the upper edges of the end walls 31 and 32. Downwardly extending hook-shaped flanges 47 and 49 are provided on the flanges

15 45 and 46 respectively, the hook-shaped flanges 47 and 49 being spaced from the outer surface of the wall portion 35 and 40 respectively. The lower ends of the flanges 47 and 49 are bevelled as indicated at 50 to provide upwardly and outwardly inclined cam surfaces.

20 25 An outwardly extending horizontal flange 51 extends outwardly from the wall portion 37 of the side wall 33, and a similar outwardly extending horizontal flange 52 extends outwardly from the wall portion 42. The upper surfaces of the flanges 51 and 52 are flush with the upper surfaces 39 and 44 of the wall portions 37 and 42. Upwardly extending hook-shaped flanges 53 and 54 are supported on the upper surfaces of the flanges 51 and 52, the hook-shaped flanges 53 and 54 being spaced outwardly from the supporting wall portions 37 and 42. As indicated in FIGS. 9 through 13, the hook flanges 53 and 54 are bevelled to provide upwardly and inwardly inclined cam surfaces 55.

30 35 FIG. 13 indicates what takes place as two of the trays B are urged together. The cam surfaces 55 of the hook-shaped flanges 53 and 54 are urged against the cam surfaces 50 of the downwardly projecting lugs 47 and 49. As a result, the hook-shaped flanges 53 and 54 act to raise the corners of the tray bearing the hook-shaped flanges 47 and 49 until the opposed hook-shaped flanges interlock as indicated in FIG. 11 of the drawings.

40 45 Another modified form of tray construction is indicated in FIG. 15 through 23 of the drawings. This structure is quite similar to that shown in FIGS. 7 through 14 of the drawings, but the trays C have interlocking end portions as well as interlocking side portions. In other words, the trays may be interlocked end-to-end as well as side-to-side.

50 55 The trays C each include a rectangular bottom panel 60 having upwardly and outwardly inclined end walls 61 and 62, and upwardly and outwardly inclined side walls 63 and 64. The side and end walls meet at the corners of the bottom panel to form continuous walls.

60 65 The side wall 63 is provided with an end section 65 which extends from the center of the side wall to the end wall 62, and which tapers upwardly from the center of the side wall to a horizontal portion including an outwardly extending horizontal flange 66. The adjoining portion 67 of the end wall 62 tapers upwardly throughout its length to the corner to which is provided with a horizontal flange 69 which is connected to the flange 66 at the tray corner 70. The diagonally opposite cor-

ner 71 of the tray is similarly formed. The side wall 64 has an end portion 72 which tapers upwardly from the center point of the side wall 64 to a horizontal upper portion including an outwardly extending horizontal flange 73. The upper edge 74 of the end wall 61 also tapers upwardly throughout its length to the height of the flange 73 at the corner 71 and includes an outwardly extending flange 75 (see FIG. 23). The flanges 73 and 75 are on a substantially common plane and are joined at the corner 71. The flange 73 is on the same horizontal plane as the previously described flange 66. Hook-shaped flanges 76 and 77 extend downwardly from the flanges 66 and 69 respectively in spaced relation to the side wall 63 and end wall 62. Downwardly extending hook-shaped flanges 79 and 80 are provided on the horizontal flanges 73 and 75 respectively, the hook-shaped flanges 79 and 80 being spaced from the side wall 64 and end wall 61 respectively.

The upper surface of the portion 81 of the side wall 63 extends horizontally and supports an outwardly extending horizontal flange 82. The lower end portion 83 of the inclined wall 61 supports an outwardly extending flange 84. The flanges 82 and 84 are joined at the corner 85. In a similar manner, the end portion 86 of the side wall 64 extends on a horizontal plane and supports an outwardly extending horizontal flange 87. The lower end portion 89 of the end wall 62 also supports an outwardly extending flange 90 which is joined to the flange 87 at the corner 91. The upper surface of the flange 82 is on a horizontal plane with the upper surface of the flange 87. The flanges 82 and 84 are provided with upwardly extending hook-shaped flanges 92 and 93 which are spaced outwardly from the walls 63 and 61 respectively, and the flanges 87 and 90 are provided with upwardly extending hook-shaped flanges 94 and 95 which are spaced from the side wall 64 and end wall 62 respectively.

The tray C thus formed functions in the same manner as the trays B which were previously described. The opposed upwardly and downwardly extending hooked flanges are bevelled in the manner which has been previously described. As a result, if two trays are urged together in end-to-end relation, as indicated in FIG. 19 of the drawings, the hook-shaped flanges interlock and hold the trays in connected relation. The same thing applies when the trays C are urged together in side-by-side relation. When this is done, the hook-shaped flanges which are located on the horizontal flanges of the side walls interlock together and hold the trays connected.

In spite of the fact that diagonally opposite corners of the trays are at a different elevation from the remaining two diagonally opposed corners, the trays can nest together and stack in the manner illustrated in FIG. 20 of the drawings. FIG. 21 shows a plurality of the trays C of stacked relation while FIG. 22 indicates the manner in which the stacked trays may also remain connected when stacked. The position of this view is indicated by the line 22-22 of FIG. 19 of the drawings. While three forms of construction have been shown, the construction function in much the same manner in that the trays interlock together automatically when an edge of one tray is urged against the edge of a similar tray. As the two trays are urged together, one end of one tray edge is lifted and the other end of the other tray edge is lifted. With this arrangement the trays may be made to nest as well as interlock, and either edge of

one tray may interlock with either edge of the other tray. In other words, it is not necessary to carefully arrange the trays so that one particular edge of the tray is oriented to face in a particular direction.

In accordance with the Patent Statutes I have described the principals of construction and operation of my double stack interlocking trays; and while I have endeavored to set forth the best embodiments thereof, I desire to have it understood that obvious changes may be made within the scope of the following claims without departing from the spirit of my invention.

I claim:

1. A tray including:
a generally rectangular bottom panel,
side walls comprising one pair of walls extending
along the sides of said bottom panel,
end walls comprising another pair of walls extending
along the ends of said bottom panel,
said side and end walls extending upwardly from the
edges of said bottom panel and being connected at
the corners thereof,
outwardly extending flanges on one end portions of
the walls of one of said pairs of walls adjoining di-
agonally opposite corners of said tray and terminat-
ing short of the remaining diagonally opposite cor-
ners of the tray,
hook flanges extending downwardly from said out-
wardly extending flanges parallel to, and spaced
from, the outer surfaces of said walls of said one
pair,
cooperable means on the other end portion of the
walls of said one of said pairs of walls adjoining the
other diagonally opposite corners of said tray,
said cooperable means being at a lower level relative
to the plane of the surface of said bottom panel
than said outwardly extending flanges and inter-
lockable with the hook flanges of a similar tray
while the bottom panel of the similar tray is co-
planer with the bottom panel of the first tray, said
construction providing interlocking means adjoining
each end of said walls of one of said pairs.

2. The structure of claim 1 and in which said cooper-
able means comprises portions of the upper edges of
the walls of said one pair.

3. The structure of claim 1 and including interengag-
ing means on the walls of said other pair of walls inter-
locking together when similar trays are nested together
to hold the similar trays in superimposed relation.

50 4. The structure of claim 3 and in which said interengag-
ing means include downwardly extending flange
means, and notch means in the upper portions of said
other pair of walls into which said downwardly extending
flange means of a similar tray may extend.

55 5. The structure of claim 1 and in which said cooper-
able means include outwardly extending flanges on said
one pair of walls adjoining said other diagonally oppo-
site corners of the tray, and upwardly extending hook
flanges on said last named outwardly extending flanges
interlockable with said downwardly extending hook
flanges of a similar tray.

60 6. The structure of claim 5 and in which said other
pair of walls also includes outwardly extending flanges
supporting downwardly extending hook flanges at diag-
onally opposite corners of said tray, and outwardly ex-
tending flanges supporting upwardly extending hook
flanges at the other diagonally opposite corners of said

tray, whereby said trays may be interlocked in side-by-side relation or in end-to-end relation.

7. The structure of claim 5 and in which said upwardly extending hook flanges are bevelled to automatically interlock with said downwardly extending hook flanges when similar edges of similar trays are urged together. 5

8. The structure of claim 1 and in which said other pair of walls also includes outwardly extending flanges supporting downwardly extending hook flanges at diagonally opposite corners of said tray, and cooperable means on the remaining diagonally opposite corners of said tray. 10

9. The structure of claim 8 and in which the outwardly extending flanges on said other pair of walls adjoin the outwardly extending flanges on said one pair of walls at said first named diagonally opposed corners of said tray. 15

10. The structure of claim 1 and in which the outer surfaces of said hook flanges are bevelled downwardly and inwardly toward the walls supporting them to provide cam surfaces to automatically lift the hook flanges over said cooperable means. 20

11. A tray including:

a bottom panel of generally rectangular form, 25
side walls forming one pair of walls extending along

opposite sides of said bottom panel, end walls forming another pair of walls extending along opposite ends of said bottom panel, one wall of one of said pairs having an outwardly projecting flange supporting downwardly extending interlocking means in spaced relation to said one wall, said interlocking means having a bevelled outer surface forming an inwardly and downwardly inclined cam surface, the other wall of said one pair of walls having an outwardly extending flange supporting upwardly extending interlocking means in spaced relation to said other wall, said upwardly extending interlocking means having a bevelled outer surface forming an upwardly and inwardly inclined cam surface engageable with said downwardly extending interlocking means, whereby when two similar trays are urged together, said inclined cam surface on said downwardly extending interlocking means engages said inclined cam surface of said upwardly extending interlocking means of the similar tray to raise the edge of the one tray to interlock with the similar tray.

* * * * *