

Nov. 24, 1959

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2,914,235

FOLDABLE INTERLOCKED BOXES

Filed May 31, 1956

3 Sheets-Sheet 1

Fig. 1.

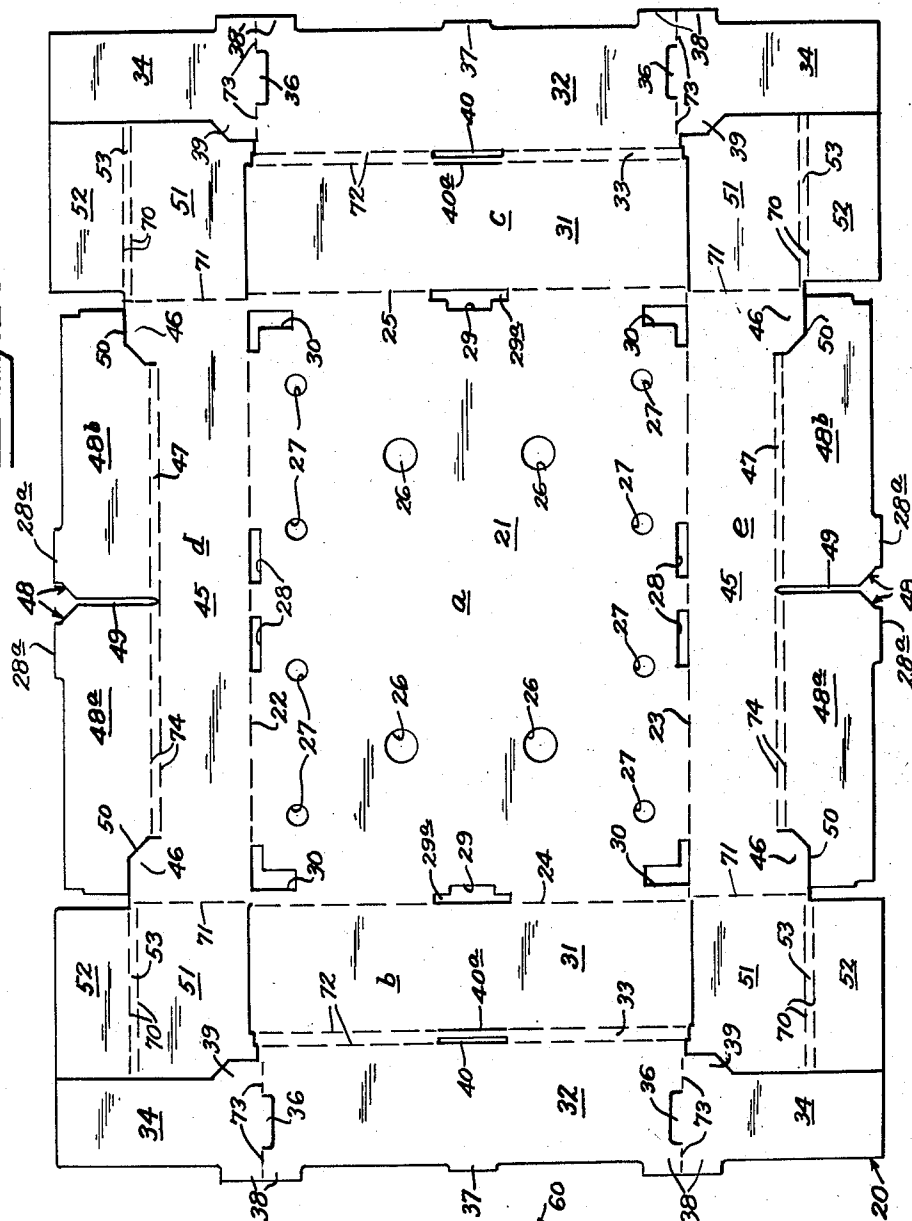
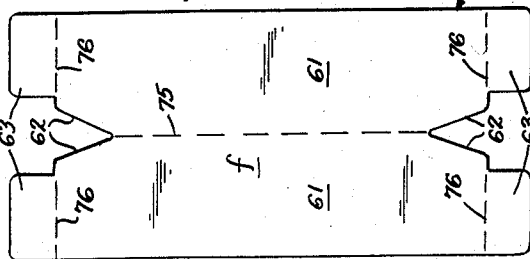


Fig. 2.



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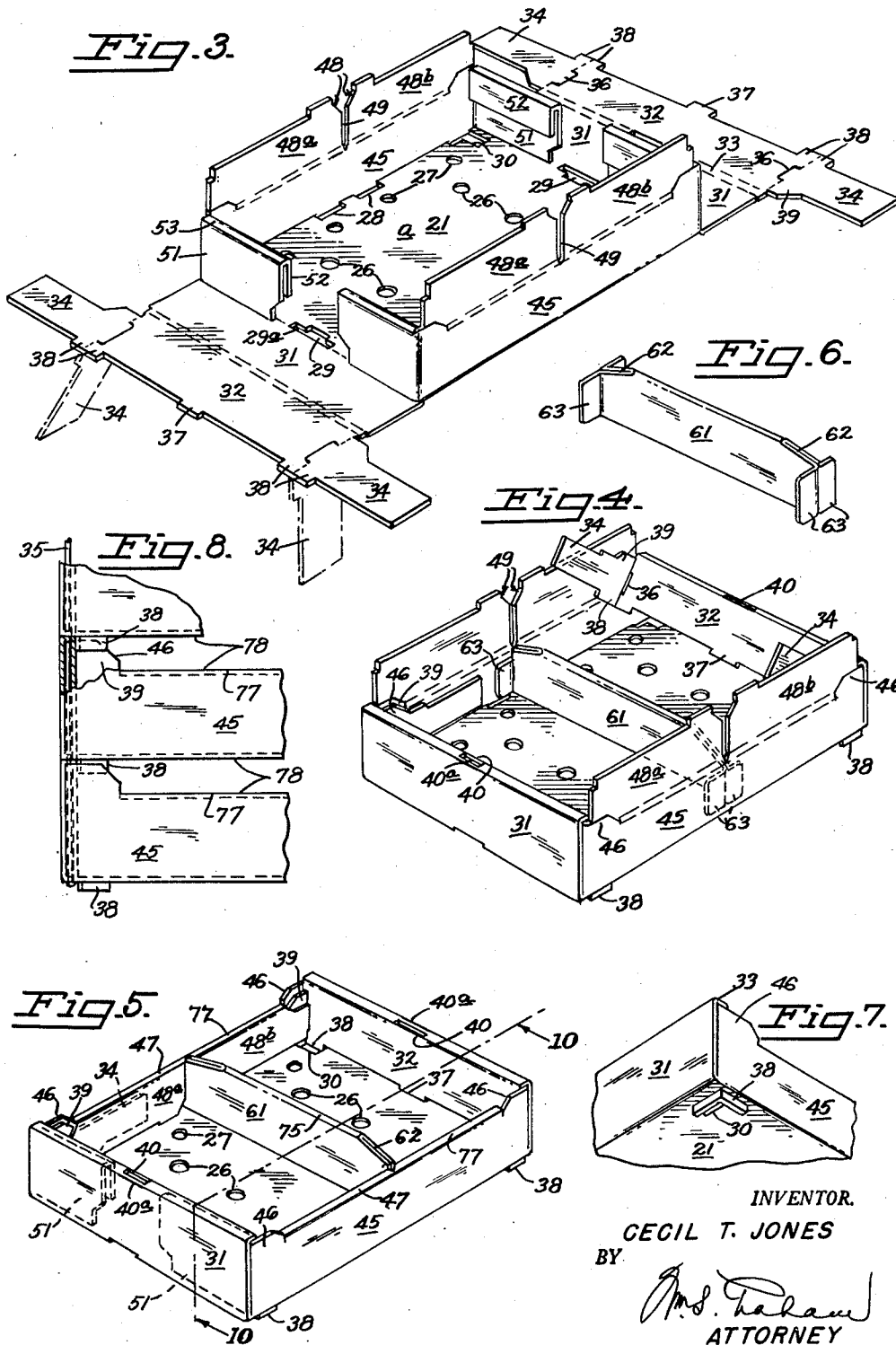
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3 Sheets-Sheet 2



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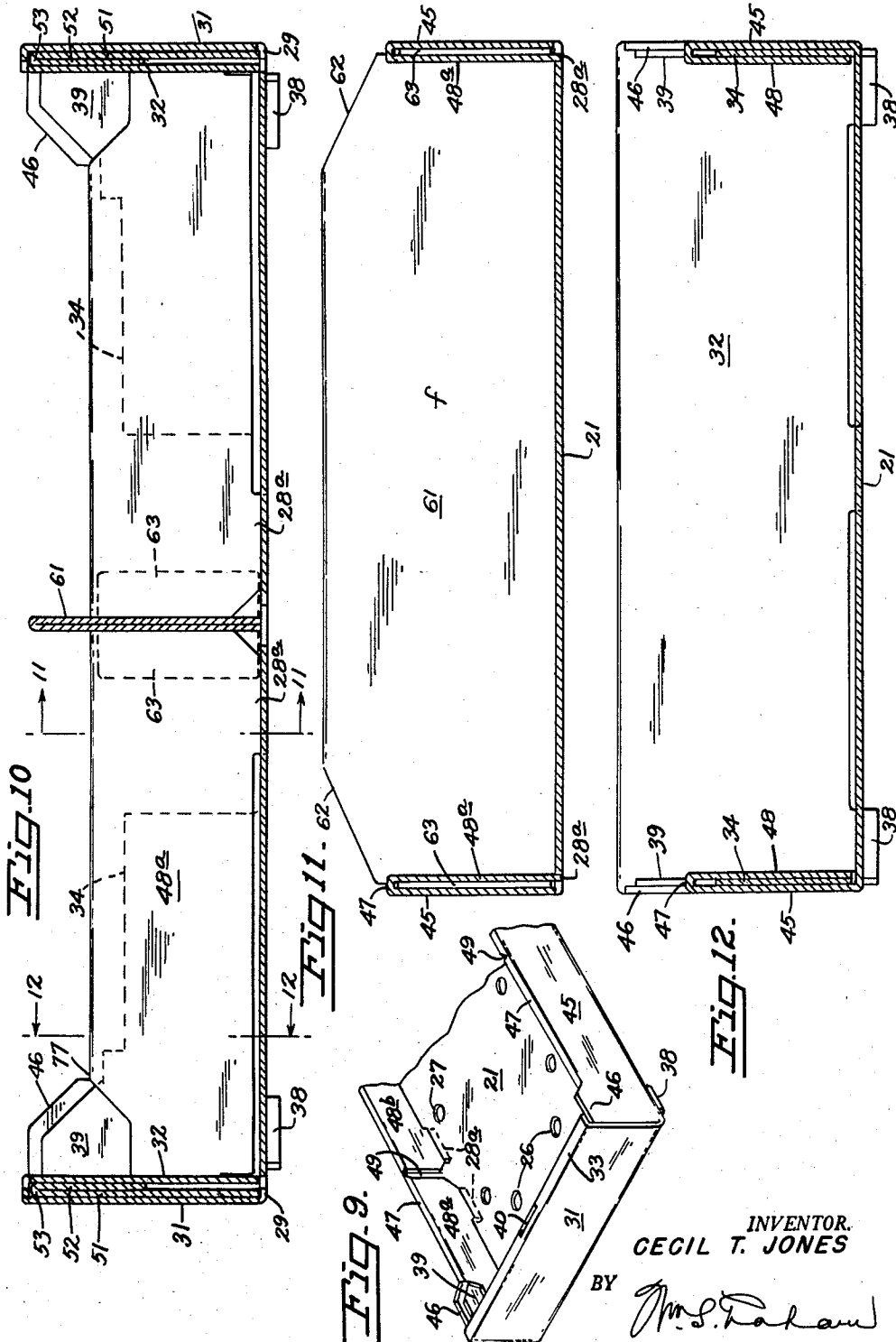
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Filed May 31, 1956

3 Sheets-Sheet 3



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FOLDABLE INTERLOCKED BOXES

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Application May 31, 1956, Serial No. 588,325

8 Claims. (Cl. 229—34)

This invention relates to foldable interlocked and reinforced boxes sometimes called lugs or crates and more particularly relates to such boxes foldable in panels from a substantially rectangular sheet without substantial loss of material, and in which side and end wall panel sections are foldable for mutual reinforcement and provide anchoring feet extending through the bottom panel adjacent the corners and within the horizontal plane of the formed box for interlocking engagement within the walls of the next-below box when boxes are superposed in stacked relation, interlocking foldable panel means being also selectively provided for dividing the box into compartments.

Briefly described, the invention comprises an integral box-forming foldable box blank appropriately scored and slitted, with panel sections providing a substantially rectangular bottom panel, around the four sides of which is provided with a plurality of panels relatively foldable on scored lines, and each panel section having panels which, in the folded box, overlies other panels for reinforcing and locking purposes. The opposite end wall panel sections are relatively similar and the opposite side wall panel sections are relatively similar. Within its plane, the bottom panel has slotted openings therethrough adjacent the edges of its perimeter into which locking tongues of the wall panels engage, and at the four corners of the bottom panel section are angled openings through which anchoring foot members or locking and positioning tabs of the wall panels may extend, both to more firmly interlock the walls, and to extend beyond the plane of the bottom panel to provide projecting foot members within the plane of the bottom panel of the folded box for lockingly engaging within the upper corners of the side walls of next-below boxes when a plurality of the boxes are superposed in stacked relation. The box may be selectively divided into compartments by a divider panel which is lockable in a transverse position by folding of the side wall panels thereagainst.

One form in which the invention may be exemplified is described herein and illustrated in the accompanying drawings which are made a part thereof.

In the drawings:

Fig. 1 is a plan view of a box blank illustrating the invention.

Fig. 2 is a plan view of blank of a divider member.

Fig. 3 is a perspective view of partly formed box showing in broken lines a position of wing members at one stage of forming of the box.

Fig. 4 is a perspective view of partly formed box at a stage advanced relative to Fig. 3, with a divider panel mounted therein.

Fig. 5 is a perspective view of a partly formed box at a stage advanced relative to Figs. 3 and 4, and including a divider panel mounted therein.

Fig. 6 is a perspective view of a divider member folded from the blank of Fig. 2.

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Fig. 7 is a fragmentary perspective bottom view of the corner portion of assembled box of Fig. 5.

Fig. 8 is a fragmentary side elevation partly in section of portions of superposed boxes of the invention.

Fig. 9 is a fragmentary perspective view of an end portion of the box as a single compartment box.

Fig. 10 is an enlarged longitudinal vertical section on line 10—10 of Fig. 5.

Fig. 11 is an enlarged laterally transverse vertical section on line 11—11 of Fig. 10.

Fig. 12 is an enlarged laterally transverse vertical section of 12—12 of Fig. 10.

Referring to the drawings in which like reference characters indicate corresponding parts of the several views, 20 indicates generally a substantially rectangular flat box-forming blank of foldable material such as pressed paper sheet composition, which comprises integrally connected panel sections, including a single-panel bottom section *a* at the opposite ends of which are end panel sections *b* and *c*, and at opposite sides of which are side wall panel sections *d* and *e*, said panel sections being thus described in the manner as they appear in the flat blank in Fig. 1. Slitted severance lines between these panel sections are indicated by heavy lines and bendable score lines in the panel sections are shown in broken lines. Supplementally and for selective inclusion in the formed box, there is provided a divider panel section *f*, as shown in flat form in Fig. 2.

With the exception of the bottom panel section *a*, which consists of a single panel 21, each of the other panel sections are subdivided into a plurality of panels integrally connected, and relatively bendable on score lines, as will be described.

Since the inter-related position of some of the panels change in folding the blank into a formed box, the nomenclature applied to the panels indicates their position in the formed box. For example, the panels 32 are outer panels of the end sections *b* and *c* in the flat blank, but in the formed box said panels 32 become inner end wall panels. Likewise, the panels 31 are inner end wall panels in the flat blank of Fig. 1, but become outer end wall panels in the formed box.

The single rectangular bottom panel 21 has its perimeter defined at its opposite sides by score lines 22, 23, and its opposite ends defined by score lines 24, 25. The other score lines of the box will be indicated by reference characters in describing the folding of the box. In the central portion of the plane of panels 21, there may be provided relatively spaced openings 26, 27 therethrough, those indicated 26 serving as openings through which pegs may be received to position the box blank in assembly thereof, and those indicated 27 permitting raising of fruit baskets for inspection purposes, by finger pressure from the bottom, said openings also incidentally serving as ventilating openings. Within the area of bottom panel 21 and closely adjacent to the defining score lines 22 to 25, are perforated lock slots 28 and 29 for receiving locking tongues of the respective side and end panels. The lock slots 28, 29 are elongated and intermediate the length of the respective side and end edges of the bottom panel. Closely adjacent to the four corners of the bottom panel there are foot-anchor openings or slots 30 which are preferably L-shaped, the stem of the L which parallels the end of the bottom preferably being wider than the other stem.

The relatively opposite end sections *b* and *c* are similar, and are connected to the bottom panel at the end score lines 24 and 25. The end sections each comprise a plurality of panels integrally connected at score lines, and include outer end wall panels 31 similar in length to the end of the bottom panel, at the opposite edge of which is connected by score lines a parallel inner end

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wall panel 32 relatively bendable to overlie the panel 31 in the formed box, a spacer panel 33 intervening therebetween. The inner end wall panels 32 have at each longitudinal end a side wing panel 34 foldably connected thereto by score lines, intermediate the length of which there is an elongated slitted tongue 36. Centrally of its free edge each of the inner end wall panels 32 has a locking tongue 37 to engage in the lock slots 29. At said outer free edge of the end panel sections *b* and *c* there are tab extensions which comprise foot anchors 38 which overlap the score line between the panel 32 and each wing 34, thus extending partly into the free longitudinal edge of side wing panels 34 and partly into the free edge of inner end panels 32, the score line providing for bending the tab 38 at right angles centrally of its length for insertion in the L-shaped foot anchor openings 30. It is noted that the side wing panels 34 are transversely narrower than the inner end panels 32 and have an inner corner locking ear 39 at the edge portion opposite the anchor foot, as will be further described.

As an incidental, the spacer panels 33 of end section panels *b* and *c* have centrally of the length thereof an elongated slotted opening 40 and a bending-relief slit 40a, which, when the box is formed, overlie a correspondingly elongated slotted portion 29a of lock slots 29 at opposite ends of the bottom panel, whereby a wire locking member 35 may be inserted therethrough to lock a plurality of superposed boxes together for facilitating handling in units, as shown in Fig. 8.

The side wall panel sections *d* and *e* are relatively similar, being integrally connected to the side edges of the bottom panel on the respective bendable score line 22, 23. Each side wall panel section comprises a plurality of panels connected on bendable score lines, and including outer side wall panels 45 connected at one of their longitudinal edges to the side edge of the bottom panel at score lines 22, 23. Relative parallelly inner side wall panels, generally indicated 48, are connected to the opposite edge of panels 45 with a spacer panel 47 intervening therebetween. Throughout the major central portion of their length the panels 45 and 48 are of lesser transverse width than the end walls 31, 32 and at the opposite end of the outer edge portion of panels 45 there is an extended outer corner anchor ear 46 of a transverse width to make the end portions of panels 45 substantially similar in height to the height of the said end walls in the formed box. The inner side wall panel 48 may be a single elongated strip, or if it is desired that the box may be divided into compartments by a divider member 60 (to be later described), the said inner side wall panel 48 may be divided into a pair of juxtaposed end-to-end panels 48a and 48b having a cut-out slot 49 transversely therebetween, whereby the said inner side wall panels 48a and 48b may be folded at the separator panel 47 to lie on the opposite side and at the end of such a divider member when the box is formed, said inner side wall panels 48a and 48b being separated from the outer corner ears 46 by perforating slits 50. At the outer free longitudinal edge of the panel or panels 48a, 48b there are locking tongues 28a which, when the blank is folded into box-forming relation, are lockingly engaged in the lock slots 28.

At each of the opposite ends of the outer side wall panels 45, there are a plurality of relatively connected reinforcing end wall panels 51 and 52 bendable as a unit on score lines at the right angles to the connected side wall panels. These end wall panels 51 and 52 are foldable on score lines defining an intervening spacer panel 53 whereby the said foldable reinforcing end panels may be folded to relatively overlie, and may then be folded at right angles to the outer side wall panels 45 whereby they become supplemental reinforcing end wall panels at the end of the box.

While the box may be employed as a single compartment, a divider section *f* is provided for the purpose of

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dividing the box into two compartments, if desired. The divider section panels, generally indicated 60, as shown in Fig. 2, is comprised of two elongated relatively parallel and longitudinally connected panels 61 of a length substantially equal to the transverse width of the bottom panel 21 for extending thereacross, and of a height equal to the transverse width of the inner end wall panels 32, since these inner end wall panels define the interior depth of the box and it is desired that the divider panels when folded one upon the other, shall be of substantially equal height to serve the double purpose of a divider and also furnish support at the center of stacked boxes.

The panels 61 of the divider section *f* preferably do not have a spacer panel therebetween, being directly retroverted one upon the other on the longitudinal score line therebetween to overlie congruently. At its opposite ends the connected edges of panels 61 are divergently tapered at 62 so that when folded relatively the height of the opposite ends of the divider panel is substantially similar to the interior height of the side wall panels, as folded, as best shown in Figs. 4 and 5. Each of the divider panels has at its opposite ends a foldable flap 63, the purpose of which will be described in the description of the folded and formed box.

The steps in folding the panels of the blank into box-forming relation is best illustrated by Figs. 3, 4 and 5. Assuming the blank to be flat in a horizontal plane, the first step is to raise the two side wall sections *d* and *e* in their entirety to a vertical plane along the score lines 22 and 23, then bend the panels 52 on the score lines 70 of spacer panels 53, and then bend the groups of panels 51, 52, 53 at right angle inwardly on the score line 71 to the position shown in Fig. 3. Whereupon, the end sections *b* and *c* in their entirety are bent upwardly from the planar blank on score lines 24, 25 to a vertical position, and the inner end wall panels 32 are then bent inwardly and downwardly on the score lines 72 of spacer panels 33 thus folding over and enclosing the previously folded panels 51, 52 which thus reinforce the end walls and lock the sidewalls into the end walls at the corner of the box. In the course of bending said inner end wall panels inwardly and downwardly, the side wing panels 34 are first bent rearwardly on score lines 73 to the position shown in broken lines of Fig. 3, whereby as the said inner end wall panels 32 are folded down into the box, the side wing panels 34 reverse such rearward position and extend inwardly within the box and will thus parallel and lay against the inner face of the outer side wall panels 45 to reinforce the side walls and lock the end wall into the side wall at the corner of the box (see Fig. 5), the slitted tongue 36 on score line 73 extending rearwardly of the panel 32 and bearing upon the panel 52 which is enclosed within the end walls, thus serving as a frictional drag which maintains the panels 34 securely in place until they are further locked within the side walls. When the panels 34 are bent at right angles to the panels 32 on the score line 73 the foot anchor extensions or tabs 38 each forms a right angle L-shaped foot which locks into the L-shaped slots 30 when the end panels are folded inwardly, the anchor foot extending beyond the bottom panel, as best shown in the fragmentary view of Fig. 7, whereupon the locking tongues 37 of the end panels lockingly engage in lock slots 29. The folding in of panels 34 positions the foot supporting ears 39 against the inner face of the outer side wall of the box.

At this stage of the forming of the box the side wall panels 45, 47, 48 have remained at their upward or vertical position to which they were originally bent. In those instances wherein it is desired to employ the box as a single compartment tray or lug, without employing the divider panel *f*, the next step in forming the box is to bend the inner side wall panels 48a and 48b inwardly and downwardly on the score lines 74 of spacer panels 47 into overlying relation with the outer side wall panels 45, thus engaging the winged panels 34 therebetween for

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reinforcing the side wall and locking the end wall and side wall at the adjacent corner. The locking tongues 51 may then be engaged in the lock opening slots 28, thus also enclosing the panels 34 firmly and securely within the formed side walls, and thereby securely locking the tabs 38 in the receiving anchor slots 30. Since the anchor ears 46 are separated from the panels 48 by the slit 50, said locking anchor ears 46 remain upstanding at the opposite ends of the side walls of the box, and being of substantially the full height of the end walls of the box, provide, at the corner of the box an outer locking ear 46 which overlies and reinforces the inner locking ear 39 in receiving and anchoring the tabs 38 when the boxes are in stacked relation.

When it is desired to separate the box into compartments the divider panel section *f* is employed. Its two panels 61 are folded into overlying relation on score line 75, its end flap 63 folded outwardly on score lines 76 and it is positioned into the box immediately prior to folding down the inner side wall panel sections 48*a* and 48*b* as shown in Fig. 4. The divider section *f* is positioned transversely of the box interior compartment so that the score line ridge 75 of the bended panel is aligned with the cutout slot openings 49, the end flaps 63 being turned oppositely outwardly as in Figs. 4 and 6, whereupon the inner side wall panels 48*a*, 48*b* are bent inwardly and downwardly to overlie said end flaps of the divider member, and when securely locked by the tongues 51 in lock slot 28 the box is complete and divided into two compartments.

It will be noted that the side walls in the formed box have the central portion of the upper longitudinal edges thereof below the height of the end walls as at 77, thus providing the advantage that the enclosed product may be viewed or inspected from the side of the box. Since the opposite end walls are of greater height than the height of the major central portion of the length of the side walls, at the top edge 77 of the side walls also is advantageous for providing ventilation between stacked boxes, and affords open space 78 between stacked boxes for inspection, which is particularly advantageous if the produce is packed in separate small baskets which may be pushed up for inspection by inserting a finger through the openings 27 in the bottom to raise selective baskets to view from the side of the stacked unit.

The separate boxes may be supported in spaced relation to a supporting surface by the tabs 38 which extend through the bottom panel and are of a height substantially greater than the thickness of the bottom panel. The tabs 38 extend a material distance below the bottom panel and the boxes are stacked in superposed relation as shown in Fig. 8, which they usually are for handling as a unit, the tabs 38 of the upper boxes lock within the angle formed by the outer and inner anchoring ears 39 and 46 in conjunction with the end walls 32 of the box, said end walls being normal to the anchoring ears. When the boxes are superposed the elongated slotted openings 29*a* in the bottom register vertically with the slotted openings 40 and the binding wire 35 may be passed therethrough to hold the boxes in that relation as units.

Having thus described the invention, what is claimed as new and patentable is:

1. A box formed from a one piece blank of foldable sheet material, said box comprising a rectangular bottom panel, side walls and end walls perpendicular to said bottom panel and respectively comprising an outer panel and an inner panel attached at its upper edge to the upper edge of said outer panel, said bottom panel having slots extending therethrough at the corners thereof approximately in the planes of said inner end wall panels respectively and extending approximately to the planes of said inner side wall panels respectively, and positioning and locking tabs approximately conforming to said slots attached to the lower edges of said inner end wall

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panels at the ends thereof and extending downward through said slots, said tabs being of a height substantially greater than the thickness of said bottom panel and projecting a material distance therebelow and being disposed to fit into the upper corners of a similar and subjacent box effective for restraining both of said boxes against relative transverse and lengthwise movement.

2. A box formed from a one piece blank of foldable sheet material, said box comprising a rectangular bottom panel, side walls and end walls perpendicular to said bottom panel and respectively comprising an outer panel and an inner panel attached at its upper edge to the upper edge of said outer panel, said bottom panel having slots of approximately L-shape extending therethrough at the corners thereof with the arms of the respective slots disposed approximately in the planes of the end and side wall inner panels respectively, and approximately L-shaped positioning and locking tabs approximately conforming to said slots attached to the lower edges of said inner end wall panels at the ends thereof and extending downward through said slots, said tabs being of a height substantially greater than the thickness of said bottom panel and projecting a material distance therebelow and being disposed to fit into the upper corners of a similar and subjacent box.

3. A box formed from a one piece blank of foldable sheet material, said box comprising a rectangular bottom panel, side walls and end walls perpendicular to said bottom panel and respectively comprising an outer panel and an inner panel attached at its upper edge to the upper edge of said outer panel, said side wall outer panels having extensions comprising outer and inner panels confined between the outer and inner panels of said end walls, said end wall outer panels having extensions confined between the outer and inner panels of said side walls, said bottom panel having slots extending therethrough at the corners thereof approximately in the planes of said inner end wall panels respectively and extending approximately to the planes of said inner side wall panels respectively, and positioning and locking tabs approximately conforming to said slots attached to the lower edges of said inner end wall panels at the ends thereof and extending downward through said slots, said tabs being of a height substantially greater than the thickness of said bottom panel and projecting a material distance therebelow and being disposed to fit into the upper corners of a similar and subjacent box effective for restraining both of said boxes against relative transverse and lengthwise movement.

4. An open top box intended for stacking, said box comprising a rectangular bottom panel, side walls and end walls perpendicular to said panel, said end walls respectively comprising an inner panel folded downwardly and inwardly of said box, said bottom panel having slots extending therethrough at the corners thereof approximately in the planes of said inner end wall panels respectively and extending approximately to the planes of the inner faces of said side walls, and positioning and locking tabs approximately conforming to said slots attached to the lower edges of said inner end wall panels at the ends thereof and extending downward through said slots, said tabs being of a height substantially greater than the thickness of said bottom panel and projecting a material distance therebelow and being disposed to fit into the upper corners of a similar and subjacent box effective for restraining both of said boxes against relative transverse and lengthwise movement.

5. An open top box intended for stacking, said box comprising a rectangular bottom panel, side walls and end walls perpendicular to said panel, said end walls respectively comprising an inner panel folded downwardly and inwardly of said box, said bottom panel having slots of approximately L shape extending therethrough at the corners thereof with arms of the respective slots disposed approximately in the planes of the

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inner end wall panels and the inner faces of the side walls respectively, and positioning and locking tabs approximately conforming to said slots attached to the lower edges of said inner end wall panels at the ends thereof and extending downward through said slots, said tabs being of a height substantially greater than the thickness of said bottom panel and projecting a material distance therebelow and being disposed to fit into the upper corners of a similar and subjacent box.

6. A box formed from a one piece blank of foldable sheet material, said box comprising a rectangular bottom panel, side walls and end walls extending upwardly from said bottom panel and respectively comprising an outer panel and an inner panel attached at its upper edge to the upper edge of said outer panel, said bottom panel having slots of approximately L shape extending therethrough at the corners thereof with the arms of the respective slots disposed approximately in the planes of the end and side wall inner panels respectively, and approximately L shaped positioning and locking tabs approximately conforming to said slots attached to the lower edges of said inner end wall panels at the ends thereof and extending downward through said slots, said tabs being of a height substantially greater than the thickness of said bottom panel and projecting a material distance therebelow and being disposed and adapted to fit within the upper corners of a similar and subjacent box.

7. A box formed from a one-piece blank of foldable sheet material, said box comprising a rectangular bottom panel, side walls and end walls extending upwardly from said bottom panel and respectively comprising an outer panel and an inner panel attached at its upper edge to the upper edge of said outer panel, said bottom panel having slots of approximately L shape extending therethrough at the corners thereof with the arms of the respective slots disposed approximately in the planes of the end and side wall inner panels respectively, and approximately L shaped positioning and locking tabs approxi-

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mately conforming to said slots attached to the lower edges at the ends of the inner wall panels of one of the opposite pairs thereof and extending downward through said slots, said tabs being of a height substantially greater than the thickness of said bottom panel and projecting a material distance therebelow and being disposed and adapted to fit within the upper corners of a similar and subjacent box.

8. A one piece blank of sheet material foldable to provide a box having a rectangular bottom panel and side and end walls perpendicular to said panel, said blank comprising a rectangular bottom panel, side and end wall forming sections integrally attached to the sides and ends of said panel and foldable to positions perpendicular thereto, each of said sections including an outer wall panel and an inner wall panel attached to the upper edge of said outer wall panel and foldable downwardly and inwardly thereof, said bottom panel having at its corners substantially L-shaped slots therethrough with one arm of each slot parallel with the adjacent end wall panel and the other arm parallel with the adjacent side wall panel, and positioning and locking tabs integrally attached to the lower edge of the respective inner end wall panels at the ends thereof, said tabs being foldable to substantially L-shape and being of a height substantially greater than the thickness of said bottom panel and disposed to extend downwardly through said slots a material distance beyond said bottom panel at the corners thereof when said inner end wall panels are folded over onto the inner faces of said outer end wall panels with the latter perpendicular to said bottom panel.

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