Jan. 16, 1962 W. F. DAVIS 3,017,064

SHIPPING CRATE

Filed July 13, 1959

3 Sheets-Sheet 1

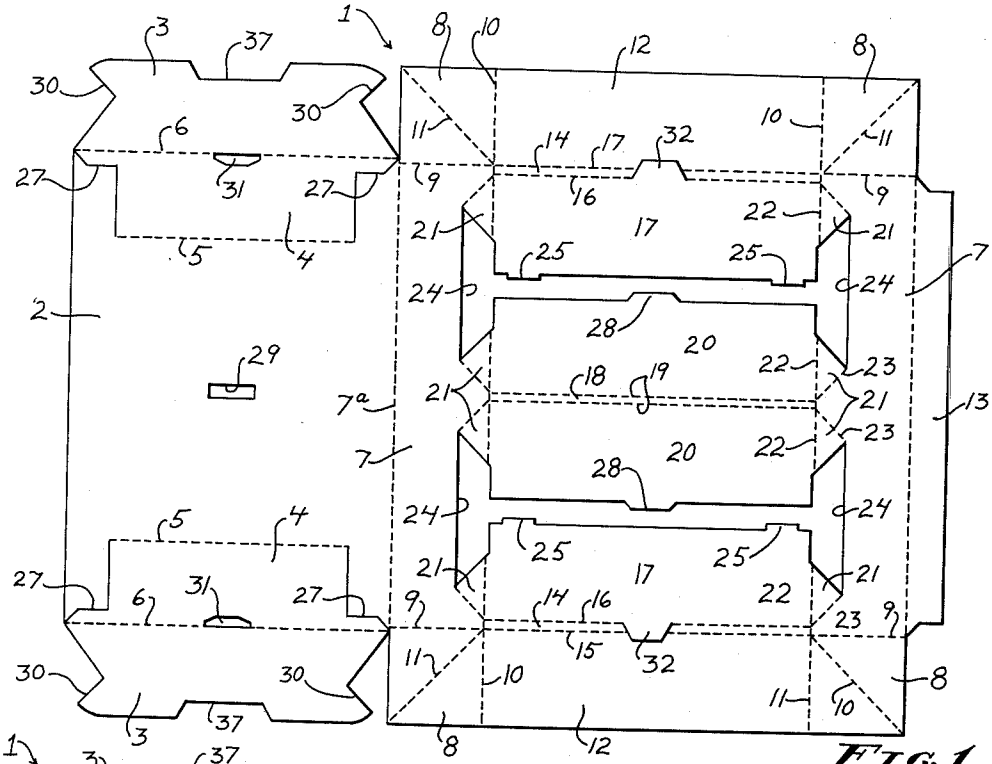


FIG. 1

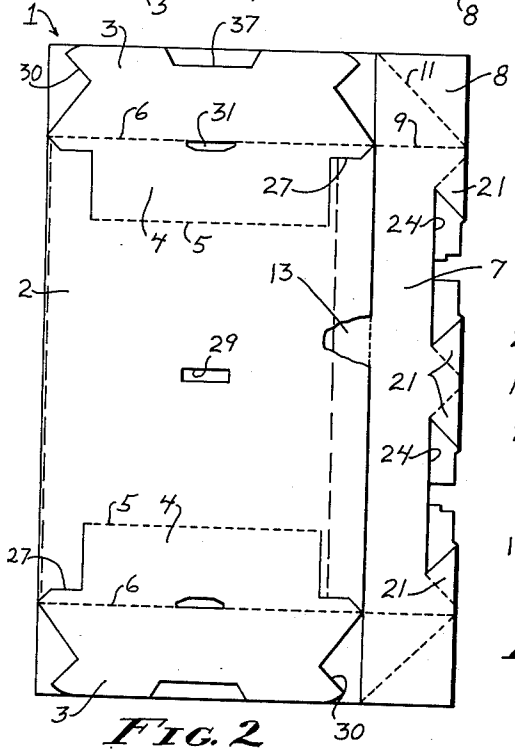


FIG. 2

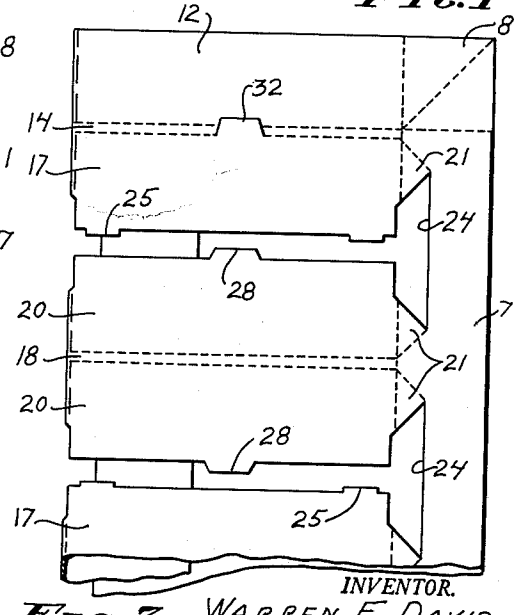


FIG. 3

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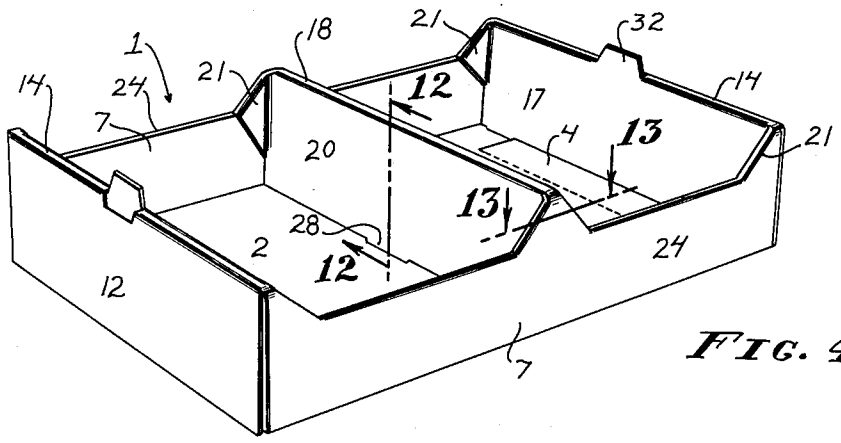


FIG. 4

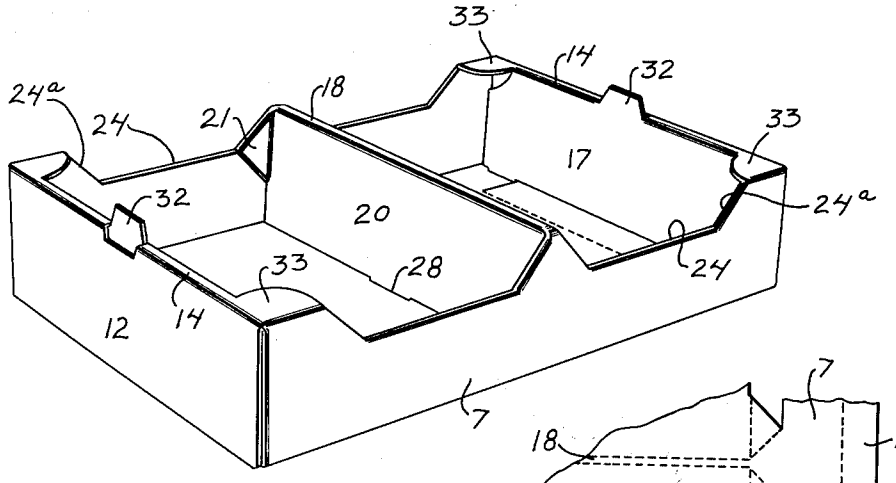


FIG. 5

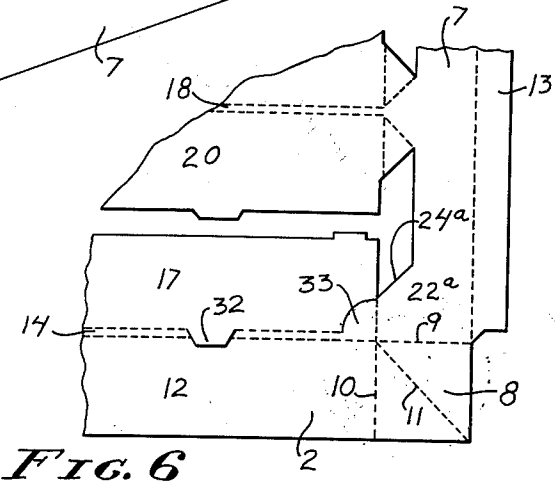


FIG. 6

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SHIPPING CRATE

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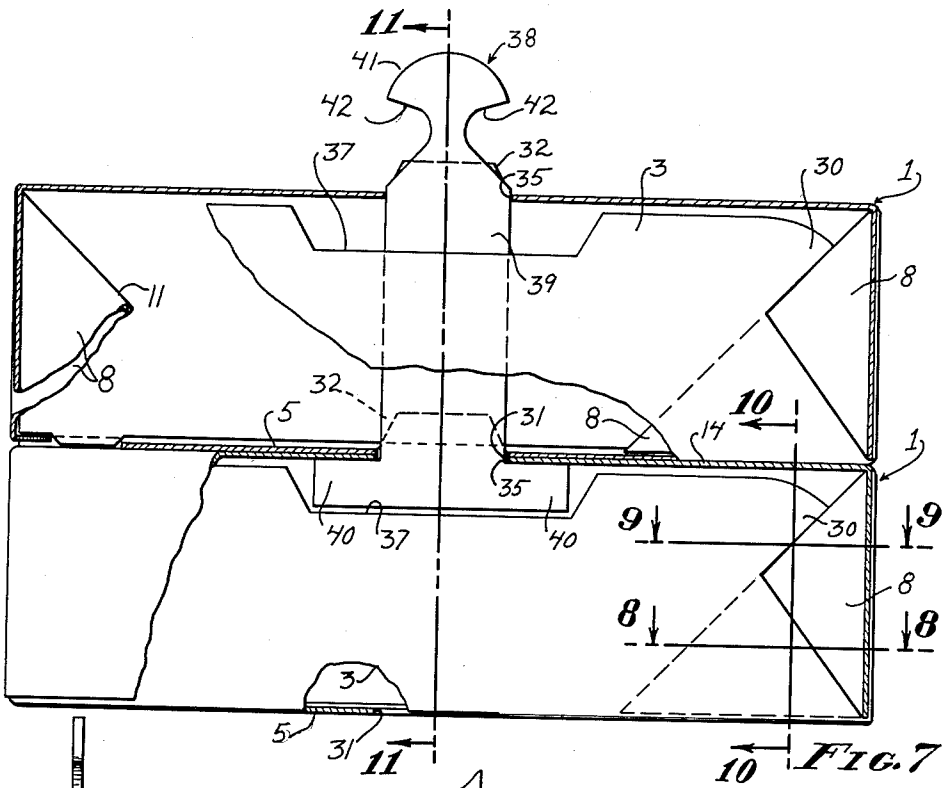


FIG. 7

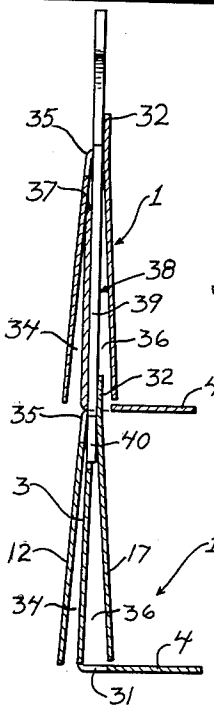


FIG. 11

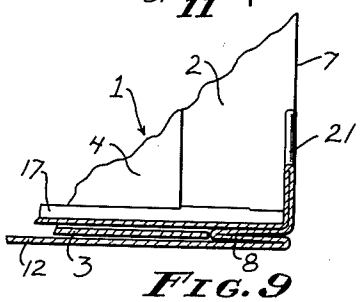


FIG. 9

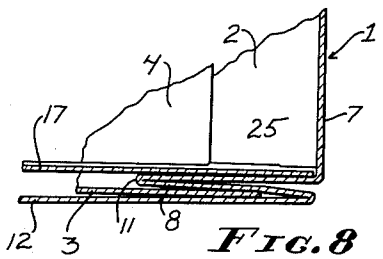


FIG. 8

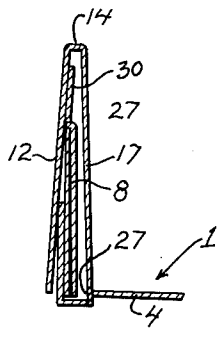


FIG. 10

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3,017,064

SHIPPING CRATE

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Filed July 13, 1959. Ser. No. 826,580
7 Claims. (Cl. 229—16)

This invention relates to shipping crates, more particularly to crates of corrugated cardboard for the purpose of shipping produce.

Included in the objects of this invention are:

First, to provide a shipping crate which is so constructed as to provide effective reinforcing, particularly at the ends thereof, so as to permit stacking of the crates without danger of collapse, even under conditions of high humidity in which the strength of the corrugated cardboard has diminished.

Second, to provide a shipping crate blank which is uniquely related to permit shipment of the blanks in a flat condition, and to permit rapid forming of the shipping crates in the field or at the point of use.

Third, to provide a shipping carton which incorporates a unique latching means in its end walls whereby interlocking connecting members may be readily and quickly slipped in place as the crates are stacked to secure the crates in their stack condition, the connecting members later serving as handles for carrying a pair of crates.

With the above and other objects in view, as may appear hereinafter, reference is directed to the accompanying drawings in which:

FIGURE 1 is a developed view of the crate blank.

FIGURE 2 is a plan view of the folded crate blank shown with the bottom and one side wall uppermost, this being the uppermost side of the blank during the course of forming the blank into a crate.

FIGURE 3 is a similar fragmentary plan view showing the end walls, partition walls, and one side of the crate, this side being the under side of the crate blank during the process of folding the crate blank into a crate.

FIGURE 4 is a perspective view of the completed crate.

FIGURE 5 is a similar perspective view of a modified form of the crate.

FIGURE 6 is a fragmentary developed view showing the modified construction thereof.

FIGURE 7 is an enlarged end view showing a pair of stacked crates with portions of the end walls broken away to show the internal construction and showing the manner in which the end structure of the crate cooperates with an interlocking member for joining a pair of crates together as a unit.

FIGURE 8 is a fragmentary sectional view through 8—8 of FIGURE 7.

FIGURE 9 is a fragmentary sectional view through 9—9 of FIGURE 7.

FIGURE 10 is a fragmentary sectional view through 10—10 of FIGURE 7 showing one of the pair of crates.

FIGURE 11 is a sectional view of 11—11 of FIGURE 7 showing the manner in which a pair of crates are supported in superposed position and held thereby an interlocking member.

The crate blank 1 includes a rectangular bottom 2 at opposite ends of which are tuck-in flaps 3 having approximately the dimensions of the ends of the completed crate. Interposed between the tuck-in flaps 3 and the bottom panel are hinged sections 4 defined between parallel fold lines 5 and 6. One side margin of the bottom panel is joined by a fold line 7a to a side panel 7. The ends of the side panel 7 are joined to folding corner sections 8. The corner sections are adapted to fold into

triangular portions by means of fold lines 9 at the ends of the side panel, fold lines 10 substantially coinciding with the distal edge of the side panel, and oblique fold lines 11 dividing each corner section into two equal triangular portions.

The corner sections 8 are joined by the fold lines 10 to outer end panels 12 which are in alignment with the tuck-in flaps 3. The distal ends of the end panels 12 are joined to a second pair of folding corner sections 8 by means of a second pair of fold lines 10. The fold lines 9 of the second pair of corner sections 8 are joined to the ends of a second side panel 7. The second side panel 7 is provided along its distal margin with a glue strip 13 which is adapted to be joined to the remaining margin of the bottom panel 2 so as to place a side panel 7 along each longitudinal margin of the bottom panel.

The two side panels 7 and outer end panels 12 define a rectangle. Within this rectangle adjacent each outer end panel 12 is a top edge strip 14 joined to the corresponding end panel 12 by a fold line 15. Each top edge strip 14 is joined by a second parallel fold line 16 to an inner end panel 17. Midway in the rectangle formed by the side panels 7 and outer end panels 12 is a central edge strip 18 extending between the side panels 7 and dividing the rectangle into two equal portions. The central edge strip is joined by fold lines 19 to a pair of central partitions 20 which extend toward the inner end panels 17. The outer end panels 12, inner end panels 17, and central partitions 20 are substantially equal in area.

The narrower edges of each inner end panel 17 and the narrower edges of the central partitions 20 are joined to the proximal margins of the side panels 7 by gussets 21 defined by fold lines 22 and 23.

Between the gussets of confronting inner end panels and central partitions the side panels 7 are provided with cut-away portions 24. The fold lines 22 along corresponding narrower extremities of the inner end panels 17 and central portions 20 are in coincidence and also coincide substantially with the axes of the fold lines 10.

The edge of each inner end panel 17 remote from the top edge strip 14 is provided near its lateral edges with a pair of projecting tabs 25. The lateral ends of the hinged sections 4 between the fold lines 5 and 6 are joined by slits which extend from the fold lines 5 parallel to the side margins of the bottom panel to points near the fold lines 6 and then extend laterally to form shoulders 27 when the hinged section 4 is displaced slightly from the bottom panel 2. These shoulders 27 are so located as to be engageable by the tabs 25 as shown best in FIGURE 10.

The central partitions 20 are provided with tabs 28 at their extended edges which are adapted to engage opposite sides of a common slot 29 provided in the center of the bottom panel 2.

The lateral ends of each tuck-in flap 3 are notched to form edges which converge from the corners of the bottom panel 2, then diverge to form interlocking tabs 30. The end notches are so proportioned that when the corner sections 8 are folded as shown in FIGURE 7 the notched portions extend across the folded corner sections and the tabs 30 hook over the folded edges thereof defined by the fold lines 11.

Each hinged section 4 is provided in its central portion adjacent the fold line 6 with a slot 31. Each top edge strip 14 is interrupted by a tongue 32 projecting from the adjacent inner end panel 17. When the completed carton is stacked one on another the tongues 32 of the underlying carton enter the slots 31 of the superposed carton.

The reference is now directed to FIGURES 5 and 6.

The construction here illustrated is identical to the first-described structure with the exception that the triangular gussets **21** at the ends of the inner end panels **17** are omitted and in its place the ends of the top edge strips **14** are enlarged to form quadrant corners **33** cut from the adjacent corners of the inner end panels **17**. A fold line **22***a* located in the same position as the fold line **22** joins each quadrant corner **33** to the corresponding side panel **7**. Also, the cut-out portions **24** are modified as indicated by **24***a*.

Reference is now directed to FIGURES 7 and 11. When the crate blank is folded into the crate, as will be described in more detail hereinafter, the tuck-in flaps **3** extend upwardly between the outer end panels **12** and inner end panels **17**. Each end structure of the crate thus comprises three plys. The plys are spaced so that an outer passage **34** is formed between each outer end panel **12** and tuck-in flap **3** extending from the bottom of the crate upwardly through the slot designated **35** formed in the top edge strip **18** by removal of the tongue **32**. A second or inner passage **36** is formed between each tuck-in flap **3** and inner end panel **17** between the slots **31** and **35**.

The extended or upper edge of each tuck-in flap **3** is provided with a recess **37** which is wider than the slots **35** and disposed in confronting relation therewith in the completed crate, as shown in FIGURE 7.

Each end structure of the completed crate is adapted to receive an interlocking member **38**. Each interlocking member includes a flat shank **39** having laterally extending lugs **40** at its lower end, a rounded upper end **41**, and side notches **42** adjacent the upper end. Each interlocking member **38** is adapted to be inserted upwardly through the outer passage **34** and slot **35** until the lateral lugs **40** enter the recess **37**. When each interlocking member is so positioned it is restrained against upper movement by the top edge strip **14** and is restrained against downward movement by the tuck-in flap **3**. The interlocking members are preferably of such length that they may be thrust entirely through a superposed crate with the notches **42** located above the superposed crate to form handle means. In inserting the shank through the superposed carton or crate it is preferably extended through the inner passage **36**, that is, through the slot **31** and the slot **35** of the superposed crate. If desired, the interlocking members may be made of greater length to extend through additional crates, so that three or more crates may be handled as a unit.

It will be observed that when the flaps **3** are tucked between the folded corner sections **8** and the outer end panel **12** that the interlocking tabs **30** tend to hook over the folded hypotenuse defined by the fold lines **11** of the corner sections, as shown best in FIGURES 7 and 10. By reason of the folded corners interlocked with the tuck-in flaps **3** and the additional provision of both outer end panels **12** and inner end panels **17**, the ends of the crate are exceptionally strong.

By reason of the top edge strips **14** and central edge strip **18**, and further, by reason of the tongues **32** and the slots **31**, the crates may be readily stacked one on the other in proper alignment and all compression loads are taken by the reinforced end wall structures and central partition structures.

Although the top edge strips provide substantial area to permit misalignment of the crates, the construction shown in FIGURES 5 and 6 permits additional misalignment by reason of the extended quadrant corners 33.

It will be observed that the interlocking members **38** permit the grouping and handling of the crates in pairs or in groups of three or more, if desired. However, the conventional size of crates for handling produce and the like is such that manually handling more than a pair of crates as a unit is probably impractical. In practice a pair of interlocking members is inserted upwardly through the lowermost of each pair of crates. The projecting upper ends of the interlocking members enter into the lowermost crate of the superposed pair and supplement the tongues **32** in maintaining the crates in a properly stacked condition. By reason of the fact that the interlocking members are held in their upper or extended positions by the upper edges of the tuck-in flaps **3**, the protruding upper ends of the interlocking members stay in position and are not pushed downward as the next pair of crates are stacked. When unloading the stack of crates each pair of crates is freely removed from the underlying pair of crates.

While particular embodiments of this invention have been shown and described, it is not intended to limit the same to the exact details of the constructions set forth, and it embraces such changes, modifications, and equivalents of the parts and their formation and arrangement as come within the purview of the appended claims.

What is claimed is:

1. A shipping crate, comprising: an inner and an outer end wall panel joined by fold lines along their top margins; corner reinforcing panels foldably connected with said outer end wall panel at the ends thereof; side wall panels foldably connected to said corner reinforcing panels, said corner reinforcing panels having angular fold lines dividing said corner reinforcing panels into complementary sections foldable between said inner and outer end walls; a bottom panel having a hinge section at each end defined between a fold line at the extremity of said bottom panel and a fold line inwardly therefrom the lateral ends of said hinge sections being stepped whereby said bottom panel forms shoulder elements when said hinge section is displaced from the surface of said bottom panel; and a tuck-in flap substantially the dimensions of said end wall panels foldably connected to an end of said bottom panel for upward insertion between said inner and outer end wall panels; and said inner end panel having tabs at its bottom edge engageable with said shoulder elements to hold said inner end panel in a crate end forming position.

2. A shipping crate, comprising: an inner and an outer end wall panel joined by fold lines along their top margins; corner reinforcing panels foldably connected with said outer end wall panel at the ends thereof; side wall panels foldably connected to said corner reinforcing panels, said corner reinforcing panels having angular fold lines dividing said corner reinforcing panels into complementary sections foldable between said inner and outer end walls, said reinforcing panels when folded converging downwardly toward each other; a bottom panel; and a tuck-in flap having substantially the dimensions of said end wall panels foldably connected to said bottom panel for upward insertion between said inner and outer end wall panels, said tuck-in flap being notched at its lateral ends forming edge portions traversing the folded reinforcing panels and tab elements adapted to hook over the converging edges of said reinforcing panels to retain said tuck-in flap between said end wall panels.

3. A shipping crate, comprising: an inner and an outer end wall panel joined by fold lines along their top margins; corner reinforcing panels foldably connected with said outer end wall panel at the ends thereof; side wall panels foldably connected to said corner reinforcing panels, said corner reinforcing panels having angular fold lines dividing said corner reinforcing panels into complementary sections foldable between said inner and outer end walls, said reinforcing panels when folded converging downwardly toward each other; a bottom panel having a hinge section at each end defined between a fold line at the extremity of said bottom panel and a fold line inwardly therefrom, the lateral ends of said hinge sections being stepped whereby said bottom panel forms shoulder elements when said hinge section is displaced from the surface of said bottom panel; and a tuck-in flap having substantially the dimensions of said end wall panels fold-

ably connected to said bottom panel for upward insertion between said inner and outer end wall panels, said tuck-in flap being notched at its lateral ends forming edge portions traversing the folded reinforcing panels and tab elements adapted to hook over the converging edges of said reinforcing panels to retain said tuck-in flap between said end wall panels; and said inner end panel having tabs at its bottom edge engageable with said shoulder elements to hold said inner end panel in a crate end forming position.

4. A shipping crate end wall construction, comprising: an inner end wall; an outer end wall; a top edge strip foldably connected to said inner and outer end walls; folded reinforcing members extending between said walls from opposite lateral ends thereof and defining interlocking shoulders and a panel extending upwardly between said walls said panel having ends shaped to interlock with said shoulders.

5. A shipping crate, comprising: a bottom; a pair of side walls joined to said bottom; a pair of inner end walls; a pair of outer end walls; a top edge strip joining each inner and outer end wall; a foldable corner reinforcing foldably joined to the lateral edges of each outer end wall and to the adjacent edges of said side walls, and disposed between said inner and outer end walls; flaps foldably connected to the ends of said bottom and extending upwardly between said inner and outer end walls; and interlocking notch means at the lateral extremities of said flaps engageable with said corner reinforcing to retain said flaps between said inner and outer end walls.

6. A shipping crate end wall construction, comprising: an inner end wall; an outer end wall; a top edge strip foldably connected to said inner and outer end walls, said top edge strip having a slot therein; folded reinforcing members extending between said walls from opposite lateral ends thereof; a panel extending upwardly between

said inner and outer end walls and having a notched portion in its upper edge disposed under said slot; and a handle element having a shank portion adapted to be inserted upwardly adjacent said panel for extension through said slot, and a cross portion adapted to be positioned in said notched portion and retained between said top edge strip and said panel.

7. A shipping crate, comprising: a bottom; a pair of side walls joined to said bottom; a pair of inner end walls; a pair of outer end walls; a top edge strip joining each inner and outer end wall; a foldable corner reinforcing foldably joined to the lateral edges of each outer end wall and to the adjacent edges of said side walls, and disposed between said inner and outer end walls; flaps foldably connected with said bottom and extending upwardly between said inner and outer walls, said flaps having recesses in their upper edges in alignment with the slots in said top edge strips; a pair of handle elements each having a shank of greater length than the height of said end walls, and a cross portion at the lower end of said shank, said shanks being insertable upwardly alongside said flaps for extension through the slots in said top edge strips and through the aligned slots of a superposed crate, said cross portions adapted to be received in said flap recesses and restrained between the top edge strips and flaps of the underlying crate.

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