

Aug. 30, 1960

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2,950,852

TOTE BOX

Filed Oct. 30, 1957

3 Sheets-Sheet 1

FIG. 1

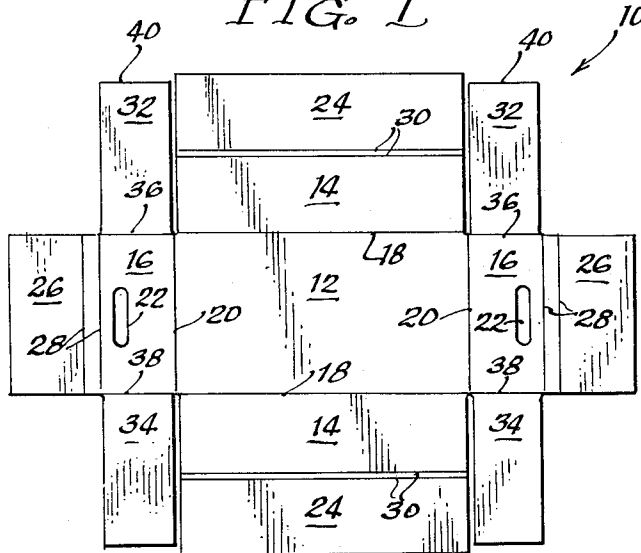
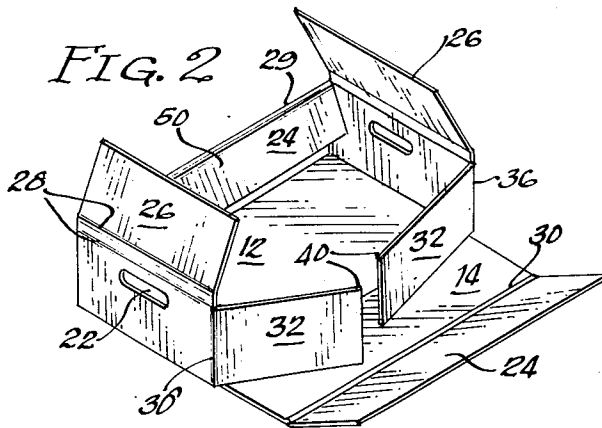


FIG. 3

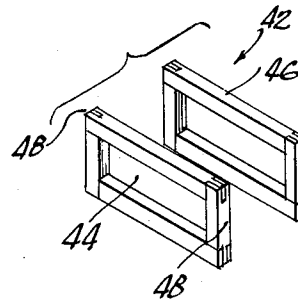


FIG. 4

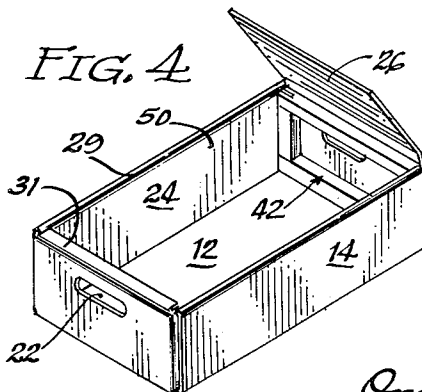
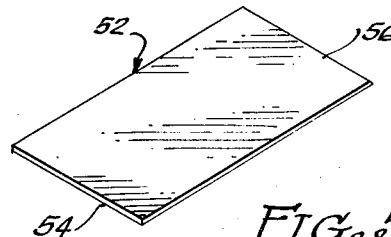


FIG. 5



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FIG. 6

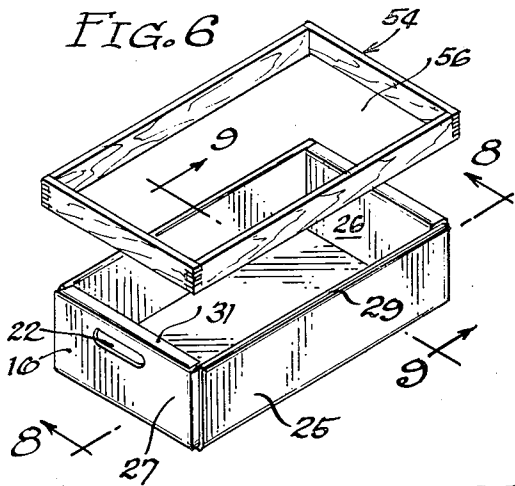


FIG. 7

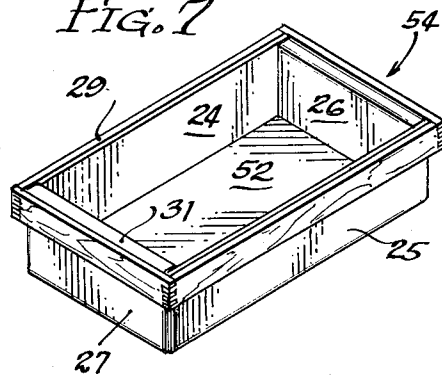


FIG. 8

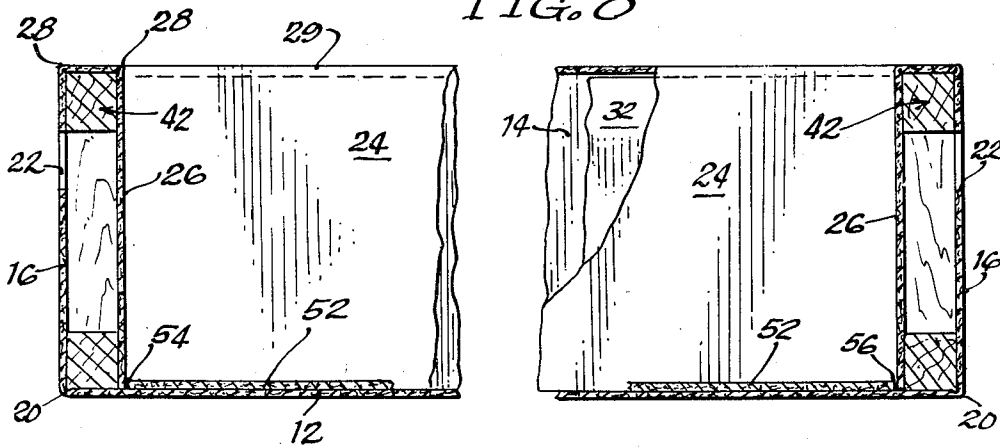
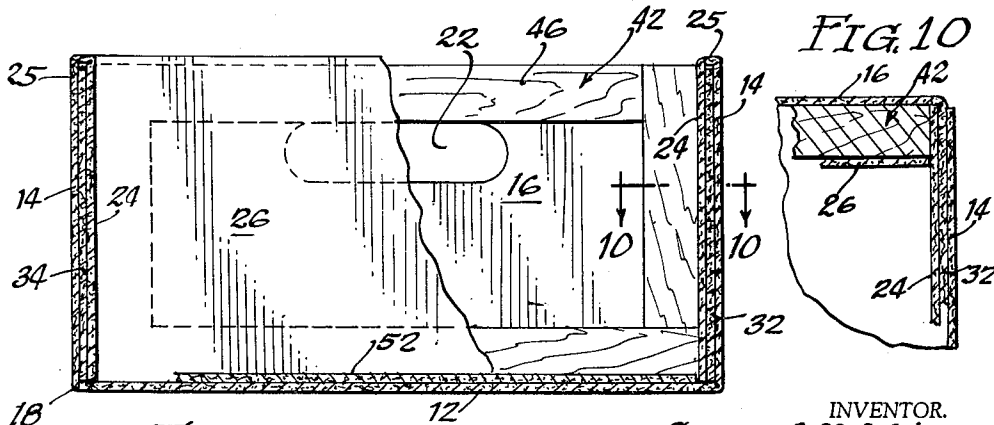


FIG. 9

FIG. 10

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FIG. 11

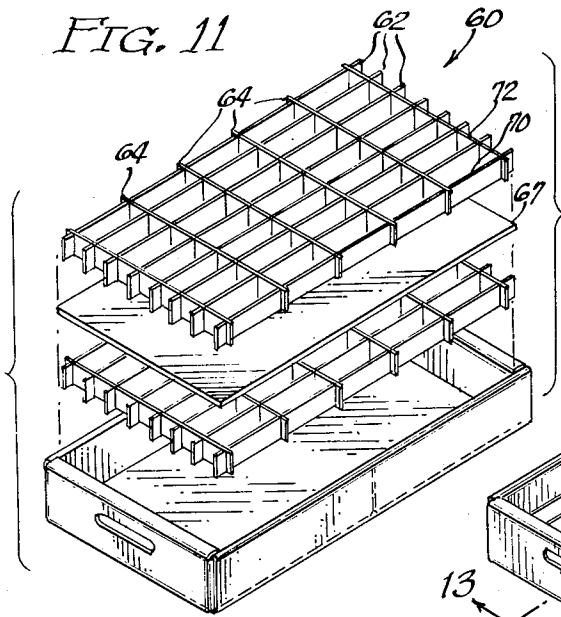


FIG. 12

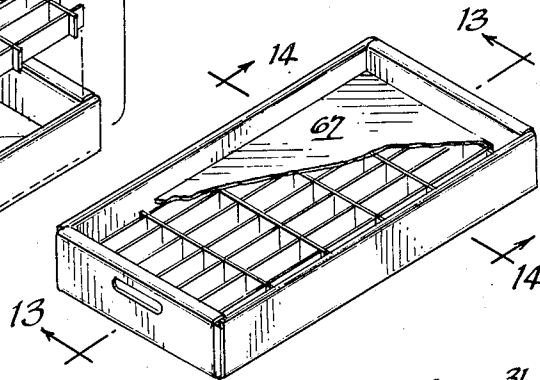
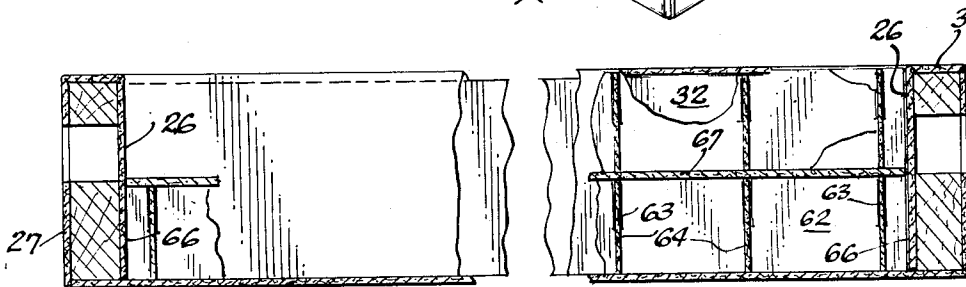


FIG. 13

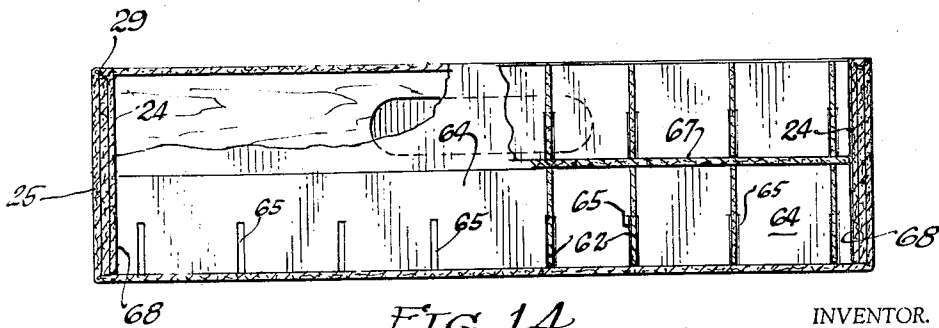


FIG. 14

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2,950,852

TOTE BOX

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12 Claims. (Cl. 229—23)

This invention relates to a box and more particularly to a fiberboard (cardboard) tote box which is strong and which can be entirely formed without the use of adhesives or nails of any sort.

Breakage of tools and supplies due to careless handling by employees is the source of a considerable loss to industrial concerns. A significant portion of this loss is traceable to the rough treatment accorded to the common metallic tote boxes which are used for carrying and storing the tools and supplies. The reason for this rough treatment is apparently based on the subconscious reliance by the employees on the strength of these metallic boxes to insulate the material inside from shocks and jars. It has been found that this psychological attitude can be reversed by using tote boxes made from a more flimsy material such as corrugated fiberboard. When this is done, the employees, no longer subconsciously relying on the strength of the boxes to protect the material inside, treat them more gently, and this has actually resulted in a large decrease in breakage and damage of material.

Despite the rather flimsy appearance suggested by corrugated fiberboard tote boxes, and which is necessary for the psychological reasons described above, they must be strong enough to serve their prime function, that of carrying and storing material. More particularly, they must be strong enough to be stacked in large piles without damage to the boxes or to the material inside. In addition, they must be capable of being formed from fiberboard blanks for convenience in shipping and economy in storage. This requires that the resulting tote boxes be specially reinforced.

In the past, boxes formed from fiberboard blanks have been provided with reinforcing members. These reinforcing members were made of wood or some other strong material, and they were often stapled or glued to the fiberboard surfaces of the box. In addition, the fiberboard surfaces of the fiberboard blank were glued or stapled together to form the completed box and to hold the reinforcing members in position. Fastening the reinforcing members to the surfaces of the box was objectionable because they cost a very substantial portion of the price of the entire box, and it would be economically desirable to be able to use them again when the fiberboard portion of the box wears out. If these reinforcing members are nailed or stapled to the box, they may be damaged, and care will have to be taken to remove the old nails or staples and to avoid the old nail holes when they are nailed or stapled to the new fiberboard blank. If these reinforcing members are glued to the surfaces of the box, they may have to be scraped clean before they can be reused. All this takes time and it may be uneconomical to use such reinforcing members, taking into account the high cost of labor.

In addition, securing the surfaces of the fiberboard blank together by nails or adhesives to form the box and to hold the reinforcing members in position is objectionable because the resulting structure is only as strong as the fastening members, and these may deteriorate or

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change in time, permitting the box to become disassembled. In addition, it is time-consuming and comparatively expensive to go to the trouble of acquiring and using the nails and adhesives required. Furthermore, on occasions, it is desirable to be able to dismantle the boxes and reform the original fiberboard blanks so they may be stored more compactly. This cannot be done if the surfaces of the completed box are permanently secured together. What is needed, therefore, and comprises the principal object of this invention, is a fiberboard tote box having strong reinforcing members which can be formed entirely without the use of any nails or adhesives, or permanent fasteners of any description.

Yet another object of this invention is to produce a fiberboard box of the type described which is characterized by high strength and rigidity to permit its use in storage and shipment of heavy loads without collapse or deterioration, even when the filled cartons are stacked one upon the other during storing or shipment.

Still another object of this invention is to produce a blank formed of fiberboard and the like which is easily assembled to form a sturdy and strong tote box without the use of any nails, or adhesives, or permanent fasteners of any description.

A further object of this invention is to produce a fiberboard tote box which can carry a large number of delicate parts in separate compartments and which is strong enough to prevent the collapse or deterioration of the box, and consequent damage to the parts in the separate compartments, even when the filled boxes are stacked upon each other during storage or shipment.

Still another object of this invention is to provide a means for strengthening a fiberboard tote box so that larger numbers of them can be stacked one upon the other for storage or shipment than would otherwise be possible.

Yet another object of this invention is to provide a fiberboard tote box wherein the reinforcing members are reusable and in addition serve as a box-forming tool and as a lifting handle for carrying the box when it is filled with heavy parts.

Another object of this invention is to provide a fiberboard tote box which is strong and easy to make and economical to manufacture.

These and other objects of this invention will become more apparent when read in the light of the accompanying drawings and specifications wherein—

Figure 1 is a plan view of the blank which is employed in the manufacture of the box, and embodying features of the invention;

Figure 2 is a perspective view of the box in an intermediate stage in its assembly;

Figure 3 is a perspective view of the reinforcing end members which also serve as a box-forming tool and as a handle for carrying the box when it is filled with heavy parts;

Figure 4 is a perspective view of the box in a later state in its assembly, showing the reinforcing end members in position in the box;

Figure 5 is a perspective view of the combined end flap and base surface reinforcing member;

Figure 6 discloses an exploded perspective view of a tote box and an attachment which permits larger numbers of loaded boxes to be stacked one upon the other than was heretofore possible;

Figure 7 is a perspective view of the tote box with the attachment shown in Figure 6 rigidly mounted thereon;

Figure 8 is a sectional view taken on the line 8—8 of Figure 6, and looking in the direction indicated;

Figure 9 is a sectional view taken on the line 9—9 of Figure 6, and looking in the direction indicated;

Figure 10 is a sectional view taken on the line 10—10 of Figure 9, and looking in the direction indicated;

Figure 11 is an exploded perspective view showing a tote box adapted to carry large numbers of different or delicate articles in separate compartments;

Figure 12 is a perspective view of the tote box shown in Figure 11 with parts broken away to disclose mounting details; and

Figures 13 and 14 are sectional views taken on the lines 13—13 and 14—14 of Figure 12.

Referring now to Figure 1 of the drawings, the fiberboard blank for use in the manufacture of the carton or tote box and indicated generally by the reference numeral 10, comprises a rectangular base section 12. Rectangular side and end wall sections 14 and 16 are integrally secured to the sides and ends of the base section 12 and are separated therefrom by score lines 18 and 20. The end wall sections 16 have hand openings 22 formed therein which are adapted to register with a carrying handle to be positioned in the assembled tote box. Side and end flap sections 24 and 26, corresponding in size and shape to the side and end wall sections 14 and 16, are integrally attached to the ends of the side and end wall sections remote from the base section 12, and are separated therefrom by spaced score lines 28 and 30. The spacing between the spaced score lines 28 is substantially equal to the thickness of a combined reinforcing end member and handle which is adapted to be positioned between the end wall section 16 and the end flap section 26 in the assembled box. End wall flap sections 32 and 34 are integrally secured to the opposite sides of the end wall sections 16 and are separated therefrom by score lines 36 and 38. These end wall flap sections are rectangularly shaped and have a width equal to the depth of the tote box and a length equal to half the length of the box, so that when they are folded in a vertical position, their adjacent ends 40 will move into abutting engagement on each side of the box, see Figure 2. The spacing between score lines 30 is sufficient to permit the side flap sections 24 to be folded parallel to the side wall sections 14 and in embracing engagement with the end wall flap sections 32 and 34 positioned therebetween in the assembled tote box, see Figures 9 and 10.

To assemble the tote box from the fiberboard blank shown in Figure 1, the side and end wall sections 14 and 16, are first folded perpendicular to the base section 12, see Figures 8 and 9. Then end wall flap sections 32 and 34 are folded perpendicular to the end wall sections 16 and parallel to the side wall sections 14 in contiguous engagement therewith, as seen in Figures 2 and 9. Next, the side flap sections 24 are folded over the end wall flap sections 32 and 34, as shown in Figure 9, to form the tote box.

Folding the side flap sections 24 to their required position, which provides side walls 25 of triple thicknesses, see Figure 9, may be a difficult operation depending upon the thickness and rigidity of the sheet material composing the carton or tote box. To simplify and expedite this operation, the combined end frame members and handle, indicated generally by the reference numeral 42, may be used as a box-forming tool, see Figures 3 and 4. These end frame members are formed from a plurality of rigid rods which are connected together in the shape of a closed loop defining a rectangular opening 44 therein. The width and height of the end frame members are substantially equal to the width and depth of the tote box, so that by grasping the top rod member 46 of the end frame 42, and using it as a tool to forcibly insert it in the partially formed box so its opposed ends 48 bear against the inner surfaces 50 of the side flap sections 24 on each side of the box, the side flap sections 24 can be forced and held in their folded position. With this arrangement, the assembler of the box can be called away while the box is only partially formed, or his attention can be directed to other parts of the box without the box becoming disassembled due to the natural resilience of the sheet

material composing it. When the side flap sections 24 are properly folded, the end frames 42 are moved to the opposite ends of the tote box and into contiguous engagement with the inner surfaces of the said side and end wall sections 14 and 16 throughout the depth of the box, and with their bottom portions resting on the base section 12, see Figure 4. This effectively locks the side flap sections 24 in their correct position, as shown in Figure 2, and at the same time reinforces the tote box.

Next, the end flap sections 26 are folded over the end frame members 42. These end flap sections must also be locked in place. This can conveniently be done by employing a removable and reusable base surface reinforcing member 52, see Figure 5. This base surface reinforcing member may be made of cardboard or some other more durable sheet material and substantially corresponds in size to the inner surface of the base section 12 resting thereon in contiguous engagement, see Figures 8 and 9. This is important because the base section 12 would otherwise have only one thickness, and this thickness would have to bear the entire load in the tote box. In addition, the strength of fiberboard drops rapidly upon exposure to moisture, and so this added reinforcing member 52 also helps insulate the base section 12 from the weakening effect of moisture. To install the reinforcing base member 52 it is merely forced into the box, with its ends 54 and 56 in abutting engagement with the folded end flap sections 26, as seen in Figure 8. This locks the end flap sections in their folded position and keeps the tote box assembled without the use of any auxiliary fasteners. Where added strength is desirable, the locking effect of the reinforcing end members 42 and the base member 52 can be supplemented by the more conventional locking staples and adhesives.

The structure described above provides a tote box formed of sheet material which is very strong and light and which is more satisfactory than the tote boxes heretofore in use because of the abovementioned psychological reasons. For storage purposes, however, it is sometimes necessary to arrange these tote boxes in large stacks. In such an event, the load on the bottom boxes may be in excess of the strength of the box, causing the box to collapse and possibly destroying the material inside. Since these tote boxes do not have any side reinforcing frame members, the sides 25 are the first to break down when large loads are placed on the box. If this load on the sides could be transferred or shifted to the reinforcing end frame members, the tote box could be stacked in much larger piles than would otherwise be possible.

The required load-shifting means indicated generally by the reference numeral 54, see Figure 6, comprises rod members made of wood or some other rigid material which are connected together by any conventional means to form a rectangularly shaped loop. The opening 56 in the loop is sized so it can fit over and embrace the side and end walls 25 and 27 of the tote box with the top edges of the rods preferably in the same plane as the top edges 29 and 31 of the side and end walls 25 and 27 of the tote box, see Figure 7. The rod loop 54 is adapted to be rigidly connected to the solid rods forming the end frames 42 by staples or other conventional means (not shown). With this arrangement, loads on the side walls 25 are transferred to the reinforcing end frames, which permits the heavily loaded tote boxes to be stored in larger stacks than was heretofore possible.

Compartment-forming means, indicated generally by the reference numeral 60, may also be provided for the tote boxes when it is necessary that fragile or different kinds of material in the tote boxes be stored in separate compartments, see Figure 11. This compartment-forming means comprises interconnected first and second groups 62 and 64 of strips of comparatively stiff sheet material. The strips in the first group 62 are substantially equal to the internal length of the tote box and are positioned

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in uniformly spaced parallel relation to each other and are parallel to the side walls 25 of the tote box. Each strip in group 62 is identical and is provided with uniformly spaced slots 63 disposed along its length. These slots are vertically disposed and project half-way through the width of the strip, see Figure 13. The strips in the second group 64 are substantially equal to the internal width of the tote box and are perpendicular to the first group. Each strip in this group is identical and is also provided with uniformly spaced slots 65 disposed along their length. These slots 65 are vertically disposed and they also project about half-way through the strips in that group. The separation of the slots 65 in the strips in the second group 64 corresponds to the separation of the strips in the first group 62, and the separation of the slots 63 in the strips in the first group corresponds to the separation of the strips in the second group 64. With this arrangement, the open ends of the slots in both strips can be positioned in facing relation to each other and the strips can be interlocked together as shown in Figures 13 and 14. Since the width of the strips in both groups is the same when the strips are interlocked together to form the rectangular compartments shown in Figures 11 and 12, their top edges will be in a common plane. This is important for the reasons to be described below.

When the strips in the first group are in position, their opposed ends 66 will be in abutting engagement with the end flap sections 26, see Figure 13. This holds these flap sections in their folded position and provides additional internal support for the end wall 27 against horizontally directed buckling pressures from the end walls, because all the strips in the first group 62 are parallel to each other and their individual resistance to these pressures, though small, is additive. Similarly, the opposed ends 68 of the second group 64 are in abutting engagement with the side flap sections 24, see Figure 14. This engagement holds the side flap sections in their folded position and reinforces the side walls 25 in the manner described above for the end walls 27. In addition, if the strips are made wide enough so their top edges 70 and 72 in groups 62 and 64 are in the same plane as the top edges 29 and 31 of the side and end walls 25 and 27, see Figure 13, vertically directed forces on the sides and ends 25 and 27 of the tote box caused by their being arranged in large stacks, will be distributed among all the strips in each group. This will greatly increase the strength of the tote box and prevent the sides and ends 25 and 27 from buckling under the weight. If, as seen in Figure 11, the width of each strip is less than the depth of the boxes, additional layers of compartment-forming strips will be required to raise the top edges of the top layer of strips to the same plane as the top edges of the side and end walls. The added layers may be separated by a reinforcing floor 67 which rests on the top edges of the strips in the bottom layer, see Figures 11 and 12. This doubles the number of compartments in the tote box and results in the tote box which can withstand large vertically directed forces on its sides and ends, and which is provided with internal supports to help it withstand horizontally directed buckling forces.

The invention may be embodied in other forms without departing from the spirit or essential characteristics thereof as set forth in the claims. For example, it will be understood that the various elements including the end frames 24 and the side frames 54 may be glued or stapled together, and that the flaps may be joined by adhesive to underlying sections although, as described, such additional fastening means are not essential. The present embodiment is therefore to be considered as illustrative and not restrictive, and it is intended to include all changes which come within the scope and range of the claims.

As used herein the term fiberboard or corrugated board

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is intended to include corrugated fiberboard or other fiberboard panels.

I claim:

1. A reinforced tote box, comprising a base surface and integrally attached vertically positioned side and end walls, side and end flaps integrally attached to the top edges of said side and end walls, end wall flaps integrally attached to the side edges of the end walls, said end wall flaps adapted to be folded parallel to and contiguous with said side walls on each side of the box, said side flaps adapted to be folded over said end wall flaps to assemble the box, a removable and reusable vertically positioned end frame member at each end of the box, each end frame member having vertically disposed sides and ends, at least one of the said vertically disposed ends on each end frame member positioned in contiguous engagement with the inner surface of each of the end walls and the vertically disposed sides of the end frame members engaging the side flaps over a substantial portion of their vertical dimension to lock the side flaps in their folded position, to help shape the tote box, and to hold the tote box in its assembled condition, said end flaps folded over said end frame members, and a removable and reusable base surface-reinforcing member having opposed ends, said base surface-reinforcing member in contiguous engagement with the base surface with its opposed ends engaging and locking the end flaps in their folded position over the end frame members.

2. The apparatus set forth in claim 1 including load-shifting means embracingly connected to said side walls and end frame members for shifting loads on said side walls to said end frame members to permit large numbers of heavily loaded tote boxes to be stored in large stacks without damage to the tote boxes or to the material stored within them.

3. The apparatus set forth in claim 2 wherein said load-shifting means comprises rod members connected together to form a rectangularly shaped loop, the opening in said loop sized to permit it to fit over and embrace the side and end walls of said tote box, said rectangularly shaped loop adapted to be connected to said end frames whereby said end frame members carry the principal load applied to said side walls permitting large numbers of heavily loaded tote boxes to be stored in large stacks without damage to the tote boxes or to the material stored within them.

4. The apparatus set forth in claim 1 including compartment-forming and reinforcing means mounted inside said tote box for locking said side and end flaps in their folded position to reinforce said box and for forming compartments therein to maintain the separation of the material carried in the box.

5. A reinforced collapsible rectangular tote box formed of sheet material, comprising a base surface and integrally attached vertically positioned rectangularly shaped side and end walls, side and end flaps corresponding in size and shape to said side and end walls integrally attached to their top edges, end wall flaps integrally attached to the side edges of said end walls, said end wall flaps adapted to be folded parallel to and contiguous with said side walls in end-to-end relationship on each side of the tote box, said side flaps adapted to be folded over said end wall flaps to assemble the box, a removable and reusable vertically positioned end frame member at each end of the box, each end frame member made from rods connected together to form a substantially closed rectangularly shaped loop having vertically disposed sides and ends, the width of said loop substantially equal to the distance between the inner side wall surfaces of the tote box whereby said end frame members can function as a tool for forcing said side flaps to their folded position over said end wall flaps during the formation of the tote box, at least one of the said vertically disposed ends on each end frame member positioned in contiguous engagement with the inner surface of each of the end walls and

the vertically disposed sides of the end frame members engaging the side flaps over a substantial portion of their vertical dimension to lock the side flaps in their folded position, to help shape the box, to hold the box in its assembled condition, and to strengthen the box so when such boxes are stacked one on top of the other in a heavily loaded condition neither the box nor its contents will be injured, hand openings in said end walls registering with the loop in said end frame members whereby said end frame members function as a handle for carrying said tote box, said end flaps folded over said end frame members, a removable and reusable base surface-reinforcing member having opposed ends, said base surface-reinforcing member corresponding in size to the inner surface of the base surface and in contiguous engagement therewith, with its opposed ends engaging and locking the end flaps in their folded position over the end frame members to keep the tote box assembled without the use of any auxiliary fasteners and to permit it to be disassembled and collapsed without injury.

6. A reinforced collapsible rectangular tote box formed of sheet material and comprising a rectangular base member, rectangularly shaped and vertically positioned side and end walls integrally attached to the peripheral edges of said base member, side and end flaps corresponding in size and shape to said side and end walls integrally attached to the top edges of said side and end walls, end wall flaps integrally attached to the side edges of said end walls, said end wall flaps adapted to be folded parallel to and contiguous with said side walls on each side of the box in end-to-end relationship, said side flaps adapted to be folded over said end wall flaps to assemble the box, a removable and reusable vertically positioned end frame member at each end of the box, each end frame member made from rods connected together to form a substantially closed rectangularly shaped loop having vertically disposed sides and ends, the width of said loop substantially equal to the distance between the inner side wall surfaces of the tote box whereby said end frame members can function as a tool for forcing said side flaps to their folded position over said end wall flaps during the formation of the tote box, at least one of the said vertically disposed ends on each end frame member positioned in contiguous engagement with the inner surface of each of the end walls and the vertically disposed sides of the end frame members engaging the side flaps over a substantial portion of their vertical dimension to lock the side flaps in their folded position, to help shape the box, to hold the box in its assembled condition, and to strengthen the box so when such boxes are stacked one on top of the other in a heavily loaded condition, neither the box nor its contents will be injured, hand openings in said end walls registering with the loop of said end frame members whereby said end frame members function as a handle for carrying the tote boxes, said end flaps folded over said end frame members, a removable and reusable base surface-reinforcing member corresponding in size to the inner surface of the base member and in contiguous engagement therewith, the opposed ends of said base surface-reinforcing member engaging and locking the end flaps in their folded position over the end frame members to keep the end frame members positioned against the ends of the box, and to keep the tote box assembled without the use of any auxiliary fasteners and to permit it to be disassembled and collapsed without injury.

7. The apparatus set forth in claim 6 including load-shifting means embracingly connected to said side walls and end frame members for shifting loads on said side walls to said end frame members to permit large numbers of heavily loaded tote boxes to be stored in large stacks without damage to the tote boxes or to the material stored within them.

8. The apparatus set forth in claim 7 wherein said load-shifting means comprises rod members connected together to form a rectangularly shaped loop, the opening

in said loop sized to permit it to fit over and embrace the side and end walls of said tote box, said rectangularly shaped loop adapted to be connected to said end frames whereby said end frames carry the principal load applied to said side walls permitting large numbers of heavily loaded tote boxes to be stored in large stacks without damage to the tote boxes or to the material stored within them.

9. The apparatus set forth in claim 6 including compartment-forming and reinforcing means mounted inside said tote box for locking said side and end flaps in their folded position to reinforce said box and for forming compartments therein to maintain the separation of the material carried in the box.

10. The apparatus set forth in claim 9 wherein said compartment-forming and reinforcing means comprises first and second groups of strips of comparatively stiff sheet material, said first group of strips positioned in uniformly spaced, parallel relationship to each other and to the side walls of the tote box with their opposed ends in abutting engagement with the end flaps to lock them in their folded position, each strip of sheet material in said first group having uniformly spaced, vertical slots disposed along their length which extends partially therethrough, said second group of strips of sheet material positioned transverse to said first group with their opposed ends in abutting engagement with said side flaps to lock them in their folded position and to reinforce said side walls, each strip of sheet material in said second group having uniformly spaced, vertical slots disposed along their length which extend partially therethrough, the separation of the slots in said second group of strips corresponding to the separation of the strips in the first group, and the separation of the slots in said first group of strips corresponding to the separation of the strips in said second group to permit the strips in both groups to be interlocked together to form separate compartments, the length of said slots in said both groups and strips adjusted so their upper edges are in a common plane, said plane adapted to be coextensive with the plane of the upper edges of said side and end walls so that when a plurality of tote boxes are stacked one upon the other the load on the side and end walls is distributed among all the strips to prevent the walls of the tote box from deteriorating under the weight and damaging the material in the compartments.

11. The apparatus set forth in claim 10 including a plurality of layers of compartment-forming strips, said layers separated by a reinforcing floor in spaced parallel relation to said base surface, said layers of compartment-forming strips added until the upper edges of the upper layer of compartment-forming strips is in a plane coextensive with the plane of the upper edges of the side and end walls whereby the load on said side and end walls when the boxes are piled on each other in large stacks is distributed through each of the strip members.

12. A reinforced collapsible rectangular tote box formed of sheet material comprising a base surface and integrally attached vertically positioned rectangularly shaped side and end walls, side and end flaps integrally attached to the top edges of said side and end walls, end wall flaps integrally attached to the side edges of said end walls, said end wall flaps adapted to be folded parallel to and contiguous with said side walls on each side of the box, said side flaps adapted to be folded over said end wall flaps to assemble the box, a removable and reusable vertically positioned end frame member at each end of the box, each end frame member made from rods connected together to form a substantially closed rectangularly shaped loop having vertically disposed sides and ends, the width of said loop substantially equal to the distance between the inner side wall surfaces of the tote box whereby said end frame members can function as a tool for forcing said side flaps to their folded position over said end wall flaps during the formation of the tote box, at least one of the said vertically disposed ends

on each end frame member positioned in contiguous engagement with the inner surface of each of the end walls and the vertically disposed sides of the end frame members engaging the side flaps over a substantial portion of their vertical dimension to lock the side flaps in their folded position, to help shape the box, to hold the box in its assembled condition, and to strengthen the box so when such boxes are stacked one on top of the other in a heavily loaded condition neither the box nor its contents will be injured, said end flaps folded over said end frame members, and a removable and reusable base surface-reinforcing member having opposed ends, said base surface-reinforcing member in contiguous engagement with the base surface with its opposed ends engaging and locking the end flaps in their folded position

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over the end frame members to keep the tote box assembled without the use of any auxiliary fasteners and permit it to be disassembled and collapsed without injury.

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