Jan. 6, 1942. J. E. BORAH 2,269,247

REINFORCED SHIPPING BOX

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FIG. 1.

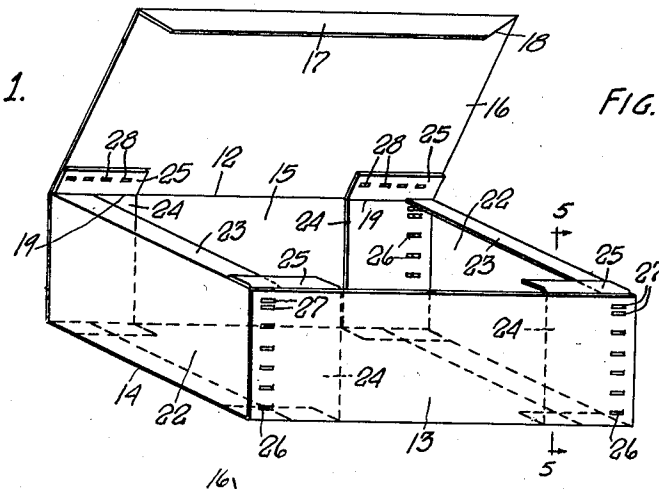


FIG. 5.

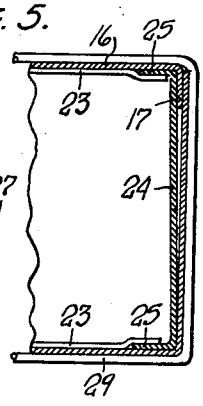


FIG. 2.

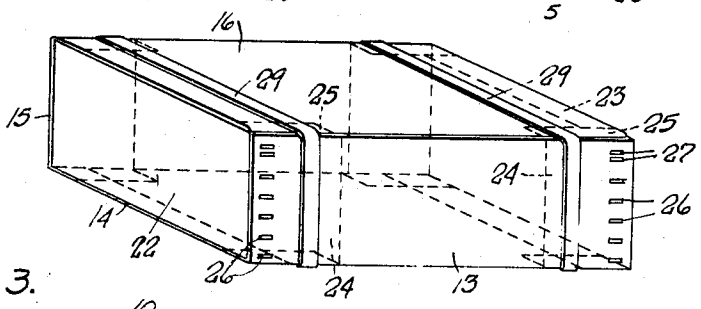


FIG. 3.

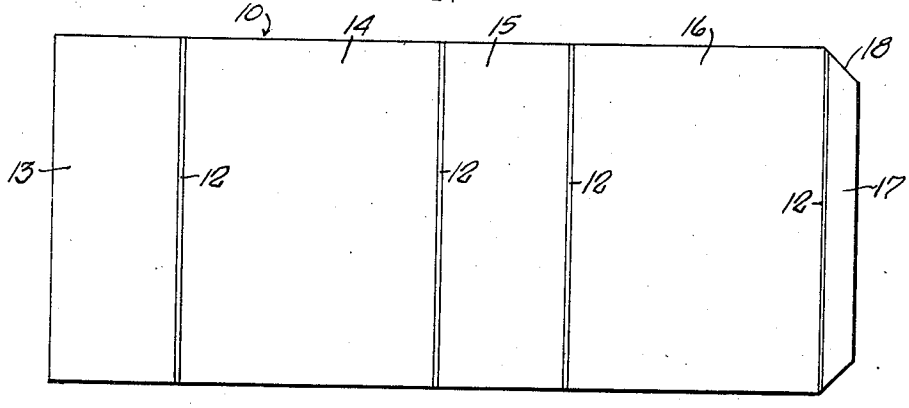
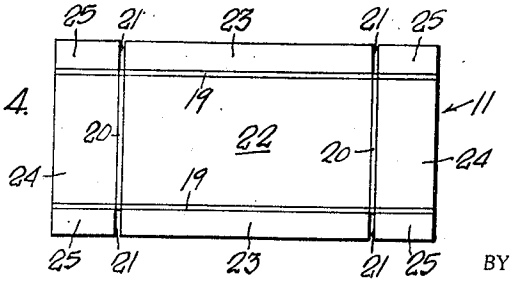


FIG. 4.



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FIG. 6.

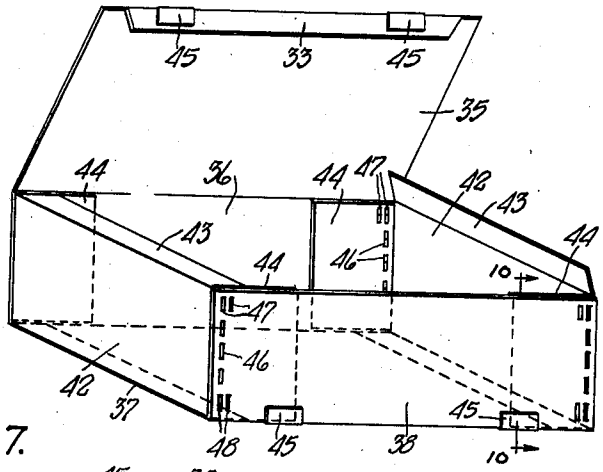


FIG. 10.

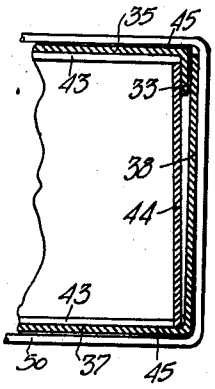


FIG. 7.

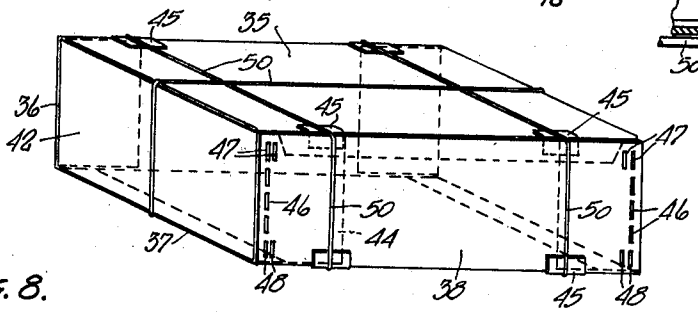


FIG. 8.

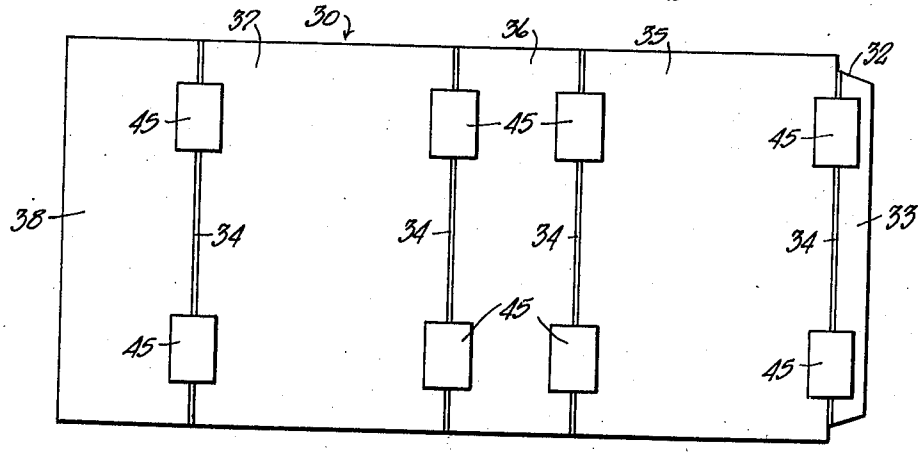
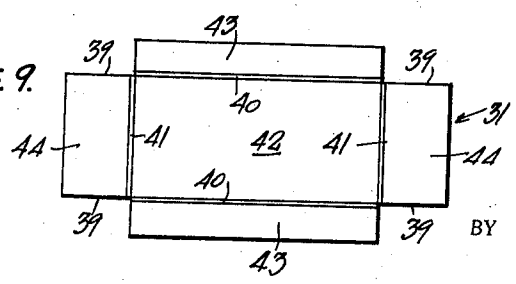


FIG. 9.



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UNITED STATES PATENT OFFICE

2,269,247

REINFORCED SHIPPING BOX

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Application November 16, 1939, Serial No. 304,641

4 Claims. (Cl. 229—23)

This invention relates to improvements in shipping boxes, and particularly to boxes formed of fiber board, cardboard, corrugated paper board, kraft lined board, and the like.

Many commodities, such as clothing, must be bulk packed. Such commodities have a tendency to settle down or flatten after being packed. Therefore, in order to compensate for such settling, the commodity is packed in the box to a level well above the top edge of the box. Such packing in turn requires sealing of the shipping case with either wire binding or metal straps.

The use of a wire or strap binding necessitates tension to compress the overly filled box, and to take up the looseness of the wire or metal strap ieself. When the necessary sealing tension is applied to present conventional shipping boxes, the boxes do not stand up because they are generally so constructed that the double or triple board thicknesses thereof do not occur at the points at which the wire tends to cut into the box. For example, a "regular slotted" container, is made from a single blank folded to form end, back and front panels each having large projecting flaps which form the top and bottom of the box. In this construction the flaps are arranged in double thicknesses for substantially the entire extent of both the top and bottom of the box, while the vertical walls are all of single thickness. This renders the box expensive from the board consumption standpoint, and at the same time fails to provide reinforcement at the vertical walls and the folds of the box, where the tension of the wire is the greatest.

Likewise, the present three piece box construction employs two separate end blanks having narrow marginal stitching flanges entirely cut-out at their corners, and a four panel main blank, with said flanges stitched at the margins of the main blank. The cut-outs in the narrow flanges weaken the box structure because they form a V-shaped opening at each box corner, and some of the folds of the box at points at which wires press are of single thicknesses and without reinforcement. The stitching flanges do provide a narrow double thickness at the upper and lower folds or edges of the ends, but this does not extend to the horizontal edges or folds at the front and back of the box where the wires press. Hence it is conventional to use heavy liners at all vertical walls of a box of this type to afford the necessary resistance to the wire tension. This construction with liners at all vertical walls unnecessarily increases board consumption, freight costs, and the cost of manufacture, resulting in an excessively high box cost for all users.

Another disadvange in present three-piece box constructions is that the front wall corners thereof must not be stitched above a point spaced below their top a distance substantially equal to the width of the corner tab, if the tab is to be inserted between the front side wall and the end flanges for fastening the cover by frictional engagement between said flanges, front wall and the cover flap. However, it is apparent that such unstitched upper portions of the front wall corners are loose, and hence there is no adequate frictional engagement to hold the cover in position. Also vertical box wall corners that are not stitched to the top afford a loose part which is frequently caught or otherwise unavoidably pulled with the result that the whole side wall is torn away from the end flanges. On the other hand, when said corners are stitched to the top to such an extent that they cannot be separated easily from the rest of the box, then the top flap cannot be inserted between the stitched portion of the front wall and the end flanges, because the stitching staples or rivets do not permit the cover flaps to go between the end flanges and the front wall.

Still another disadvantage of conventional boxes having foldable covers is that the fold between the cover and its connected wall is generally without reinforcement. Hence, when pressure is applied to close the box, a great stress occurs along the fold lines which tends to tear the box along said fold lines, and which prevents repeated use of the box by virtue of frequent tearing along the fold line incident to opening and closing of the cover.

Therefore, it is the primary object of my invention to provide a box construction to which binding members may be applied under tension without danger of cutting of the box walls at the corners, folds or edges at which greatest tension is exerted by said members.

A further object is to provide a rigid box construction which may be made from inexpensive board having comparatively low inherent rigidity, which provides multiple thicknesses of the board at those points of the box where a single thickness is insufficient to supply maximum strength to the box, and which requires only a minimum amount of material and a low labor cost.

A further object is to provide a three-piece box construction having novel end panels each with flanges stitched to a main blank, wherein the front and back flanges have flaps folding against

the top and bottom and of a sufficient width to provide a double corner thickness under a wire binding spaced from the box ends.

A further object is to provide a three-piece box construction having novel end panels with integral inwardly extending liners, including a back liner having a folded top flange which is stitched to a foldable cover to provide a double thickness of material at the fold line of the cover, and thus increase the strength of the hinge or fold for the cover.

A further object is to provide a three-piece box construction having novel end panels with inwardly extending vertical liners each having folded tabs engaging the box top and bottom to provide a double thickness fold which guards the box edges against cutting by a tensioned binder encircling the box.

A further object is to provide a box construction wherein each corner has an overlap providing a double thickness at all portions thereof underlying a box tie or binding member.

A further object is to provide a box construction wherein front extension liners which serve as stitching flanges and provide smooth interior box corners are of ample width to engage and grip end portions of a flap on the free edge of a cover.

A further object is to provide a box construction having end walls separate from the front walls wherein the front wall is stitched to end flanges for substantially its full height to prevent its separation from the end walls.

A further object is to provide a box construction having end walls stitched to the margins of a front wall, wherein a foldable lid has a tuck-in flange at its free edge which is inset from the sides of the lid to avoid obstruction to tucking thereof by the marginal stitching of the front wall.

A further object is to provide a box formed of marginally stitched blanks with double stitching adjacent each fold and adjacent each end of each stitched joint to reinforce such stitched joints and prevent separation thereof.

A further object is to provide reinforcing patches at box edges or corners to underlie and encircle a tensioned binder and thus prevent the binder from cutting into the box material.

A further object is to provide a foldable reinforcing member spanning the fold of a cover to increase the strength of said fold.

In the drawings:

Fig. 1 is a perspective view of a box in open position.

Fig. 2 is a perspective view of a box sealed by binding members encircling it.

Fig. 3 is a plan view of the main blank of the box.

Fig. 4 is a plan view of one of the end blanks of a box.

Fig. 5 is a fragmentary vertical transverse sectional view of a sealed box taken on line **5—5** of Fig. 1.

Fig. 6 is a perspective view illustrating a modified form of the box in open position.

Fig. 7 is a perspective view of the modified box secured in closed position and provided with binding members encircling the same.

Fig. 8 is a plan view of the main blank of the modified box.

Fig. 9 is a plan view of the end blank of the modified box.

Fig. 10 is a fragmentary vertical transverse sectional view of a sealed box, taken on line **10—10** of Fig. 6.

Referring to the drawings, which illustrate the preferred embodiments of the invention, and particularly to Figs. 1 to 5 inclusive, illustrating one embodiment thereof; the numeral **10** designates a main blank, and **11** designates a pair of independent end blanks. Both blanks are formed from any suitable material, such as corrugated board, card board, fiber board, kraft lined board, or the like. Blank **10** is of substantially rectangular form, and is provided with a plurality of score lines **12** extending in parallel relation transversely thereof. The score lines **12** define a front panel **13**, a bottom panel **14**, a back panel **15**, a top panel **16**, and a narrow flange **17** whose ends are cut diagonally at **18**. Each of the end blanks **11** is provided with a pair of parallel longitudinally extending score lines **19** adjacent opposite edges of the blank, a pair of transverse score lines **20** extending between the score lines **19**, and with transverse slits **21** aligned with the score lines **20** and extending from the score lines **19** to the edges of the blank. The blank **11**, so formed, constitutes an end panel **22** outlined by score lines **19** and **20** thereof, bottom flaps **23** defined by score lines **19** and slots **21**, end flanges **24** wider than flanges **23** and defined by score lines **19** and **20**, and corner flaps **25** at opposite ends of each end flange **24** and defined by score lines **19** and slots **21**.

The box is assembled by driving staples or fasteners **26** through the front **13** and one of the end flanges **24**, through the bottom **14** and one of the flanges **23**, and through the back **15** and the other flange **24**. The staples or fasteners **26** are positioned substantially one-half inch from the margins of the respective panels of the main blank. At the upper end of the front wall **13**, a pair of closely spaced fasteners **27** is provided, the upper of which is substantially one-half inch from the upper edge of front panel **13**. Fasteners **28** serve to secure the upper end flap **25** of each rearwardly positioned end flange **24** to the cover **16**.

When the box has been assembled as aforesaid, the cover **16** will be hinged along a score line **12**, and additionally at the end portions thereof along a score line **19** between the end flange **24** and flap **25** secured thereto. This permits the lid to be folded and straightened indefinitely, as upon repeated use of the box, without tearing the lid from the box. When the lid is closed, the flange **17** thereof is inserted in face engagement with the inner face of the front wall **13**, and with its opposite end portions tightly tucked between said front wall **13** and the end flanges **24** of the end blanks **11**. The end flaps **25** at the top of the box rest upon, and are supported by, the flanges **23** at the box top when said flanges and flaps are turned inwardly in perpendicular relation to the box parts from which they project. Hence said flanges **23** and flaps **25** prevent the box lid **16** from being pushed into the box. Also, the vertical flanges **24** which underlie the outer edge of the lid assist in operatively positioning the lid. The width of the end flaps **25** and the end flanges **24** is sufficient to position the inner edges thereof in substantially spaced relation to the end **27** and staples or fasteners **26** and **27**, thus providing a substantial extent of frictional engagement thereof with each end of the flange **17** of the box lid. The width of end flanges **24** and tabs **25** is also such that they underlie the binding members, such

as metal straps 29, extending transversely around the box adjacent to opposite ends thereof at each of the horizontal corners of the box engaged by said binding members. Thus each of the said horizontal box edges or corners comprises a double thickness as illustrated in Fig. 1, said double thickness being provided by the thickness of the main blank at said corners together with the thickness of the flanges 24 and flaps 25 of the end blank. It will also be noted that if the binding member is extended around the box at right angles to the direction in which the members 29 illustrated in Fig. 2 extend, double thicknesses are likewise provided at each longitudinal corner or edge of the box engaged thereby. This double thickness is provided by the flanges 23 underlying the cover 16 and bearing against the bottom panel 14. In consequence of this double corner thickness construction, when a box of this character is filled with compressible material, such as clothing, to a level above the upper edge of the front panel 13 of the box, and the lid 16 is then forced down upon the material to compress the same, and the box sealed by use of a binding member 29; the tension applied by the binding member is successfully resisted at the box corners to prevent cutting thereof, even though the box is formed of comparatively lightweight material which would ordinarily be cut if the corners were formed of a single thickness. In addition to permitting use of lightweight material, the construction also effects the further economy of reducing the size of each of the blanks to a minimum and retaining them in substantially rectangular form, whereby waste of material is substantially avoided.

Referring now to the construction illustrated in Figs. 6 to 10 inclusive, the box comprises a main blank 30, and an end blank 31. The main blank 30 is of substantially rectangular form and has a cut-out 32 adjacent each corner of one end thereof to define a narrow cover flap 33 slightly inset from the sides of the main blank and shorter than the width of the main blank. The main blank is provided with transverse parallel score lines 34 which define respectively the cover tongue 33, the cover 35, the rear panel 36, the bottom panel 37, and the front panel 38. Each of the end blanks 31 has a rectangular cut-out 39 formed at each corner thereof, and is provided with a pair of longitudinally extending score lines 40 and a pair of transverse extending score lines 41, each of which is aligned with and parallel to an edge of a pair of adjacent cut-outs 39. Score lines 40 and 41 serve to define a central panel 42 which constitutes the end panel of the box, and the cut-outs 39 and score lines define longitudinally extending flanges 43 at the upper and lower ends of the blanks, and end flanges 44.

The main blank has fixedly applied to the outer face thereof in spaced relation to its opposite edges and overlying each of the score lines 34, a small piece of reinforcing material 45. The material 45 may be formed of fabric tape, cardboard, fiber board or the like, and is preferably adhesively secured to the main blank 30. In the event cloth tape is employed, the same is flexible to fold with the blank 50 when the same is folded along the score lines 34; but in the event fiber board or other rigid material is employed it may be scored to accommodate folding thereof when the main blank is folded along the underlying score line 34.

The box blanks are secured together by staples or fasteners 46 along the margin of the main blank at the front, bottom and back panels thereof as described above in reference to the preferred construction. However, as illustrated in Figs. 5 and 6, the staples may extend in parallel relation to the edge of the main blank. Here again the staples 46 are positioned at a distance of substantially one-half of an inch from the adjacent edge of the blank. A pair of closely spaced staples 47 is positioned at the upper end of the front wall. A second pair of closely spaced staples 48 is provided at the lower end of the front wall 38 and adjacent the bottom 37. If desired, a similar pair of staples 48 may be provided on each side of each of the score lines 34 of the main blank, and a second pair of staples 47 may be applied at the upper end of each margin of the back wall 36.

The box is bound by wire or other tie members 50 which overlie the reinforcements 45 at the corners of the box. These binders 50 may extend both longitudinally and transversely of the box.

It will be seen from the above description that both the embodiments of the invention provide a construction for reinforcing the box at the points at which the binding material passes around and presses against the box corners. Hence it is possible to make the box of much lighter stock than is usually required for the manufacture of a box which is sealed by a tensioned binding member. In the Fig. 1 embodiment, this reinforcement is provided by the combination of the flanges 24 and their flaps 25 underlying the various outer surfaces of the box formed by the main box blank. In this case it will be noted that not only are the corners of double thickness, but also that the double thickness extends for a sufficient distance from the box corner or edge in each direction to form a strong and positive reinforcement. In addition, it will be noted that the flaps 25 are firmly held against the cover 16 at the upper end of the box by the staples 28 at the rear of the box, and by the overlapping relation of flaps 25 with respect to flanges 23 at the front of the box. Hence the double thickness occurs in a manner to directly withstand the cutting action of the tensioned binder members. Some corner reinforcement is also provided in the Fig. 1 embodiment for binding members which extend around the box from end to end by virtue of the flanges 23 bearing against the cover 16 and the bottom 14, respectively. In the Fig. 6 embodiment, the reinforcing members 45, which are preferably formed of fabric, provide a double thickness at the box corners at the points underlying the binding members. In combination with these reinforcing members, the upper ends of the flanges 44, which bear against the free edge of the cover 35, serve as a vertical reinforcement to insure proper positioning of the cover with respect to the front wall. Hence the stress exerted by the bending members is applied directly to the reinforcing members 45 at the free edge of the cover. Were this underlying relation of the upper ends of flange 44 with respect to the cover not present, it will be obvious that the entire stress of the binding member would have to be taken by the upper edge of the front panel 38 alone, and hence the reinforcing members 45 at the free edges of the cover would have no function.

Another important feature of the invention is the use of double stitching, as illustrated at 27

and 47 at the upper ends of the margins of the front panels 13 and 38. The spacing thereof substantially one-half inch from the upper edge and the side edges of the box front insures solid seating of the staples or fasteners so that they will not permit tearing of the edges of the box. At the same time, these fasteners 27 and 48 are close enough to the edges of the front, and the natural rigidity of the board is sufficient to prevent any substantial bending of the board exteriorally of the fasteners, so that no adequate leverage or grip can be had on the edges of the front panel to permit tearing of said panel from its fasteners. The double stitching 48 adjacent each fold line of the main blank, as illustrated in the Fig. 6 embodiment, serves as an additional reinforcement for the corners of the box. A further function of the close spacing of the stitches with respect to the edges of the box is that it affords a substantial extent of each of the flanges 24 and 44 which is unstitched and which may bear against the flanges 17 and 33, respectively, of the box covers, without in any way weakening the box construction or its stitching. The double stitching 27 and 47, respectively, obviously requires either the inset relation of the ends of the cover flange 33 at 32, as illustrated in the Fig. 6 construction, or a formation of the edges 18 of the cover flange 17 of the Fig. 1 embodiment at an angle of at least 45 degrees.

Still another important feature of the invention is the stitching of the flanges 25 at the upper end of the rear of the box to the cover 16 by means of fasteners 28. This provides a double thickness hinge structure of reinforcing character through a substantial extent of the hinge length along the score lines 12 and 19 to facilitate repeated opening and closing of the cover 16 without tendency to tear the box at the hinge. The double thickness reinforced hinge construction also has a further advantage that when used with a box which is packed with compressible material above the level of its upper edge and whose cover is then forced down to compress the material which is packed, the normal stress applied to the hinge 12 incident to such forced closing is fully compensated for by the double thickness construction. Hence there is no possibility that the cover 16 can be torn from the box during the application of pressure to compress the contents and close the box.

The box is obviously susceptible of other embodiments differing from those herein illustrated in specific construction but not in principle or spirit; and it is understood that the drawings and description herein are to be considered as illustrative only, and not as restrictive.

I claim:

1. A box having a main blank forming front, bottom, back and cover panels, a pair of end blanks, said end blank each having marginal flanges secured to the margin of said front, bottom and back panels respectively, the front and back flanges being wider than the bottom flanges and having flaps folded from the ends thereof to engage and reinforce the cover and bottom, and binding members encircling the box at points reinforced by said last named flaps and flanges.

2. A box having front, bottom, and back walls, a foldable cover, and a pair of end blanks, each of said end blanks having integral marginal flanges folded therefrom, including vertical flanges of a length coextensive with the height of said front and back walls and secured thereto to provide a double wall thickness at portions of said front and back, each of said vertical flanges having integral flaps folded from the upper and lower ends of said flanges and coextensive with the width of said flanges, said flaps bearing against said bottom and cover, and a pair of binding members parallel to said end blanks and each tightly encircling the box at the double thickness portions thereof reinforced by said vertical flanges and flaps.

3. A box having a rigid front, back, bottom, and end walls, a foldable rigid cover, and a pair of vertical flanges formed integrally with each end wall and secured to said front and back walls, said flanges having integral inturned tabs at their upper and lower ends, said front, upper tabs supporting the free end of said cover, and a pair of tensioned binding members encircling said box and overlying the horizontal corners of said box at the upper and lower margins of said front and back walls, said flanges and tabs forming double thickness box portion at the portions of said horizontal corners under said binding members.

4. A box comprising a plurality of folded blanks secured together to form front, bottom, back, and end walls and a foldable cover, said back wall and said end walls being parts of different blanks, said end walls each having marginal integral flanges folded therefrom and including a vertical flange secured to said back walls, each of said vertical flanges having a flap formed integrally therewith and folded from the upper end thereof, said flaps being secured to said cover to reinforce said cover fold.

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