

April 9, 1968

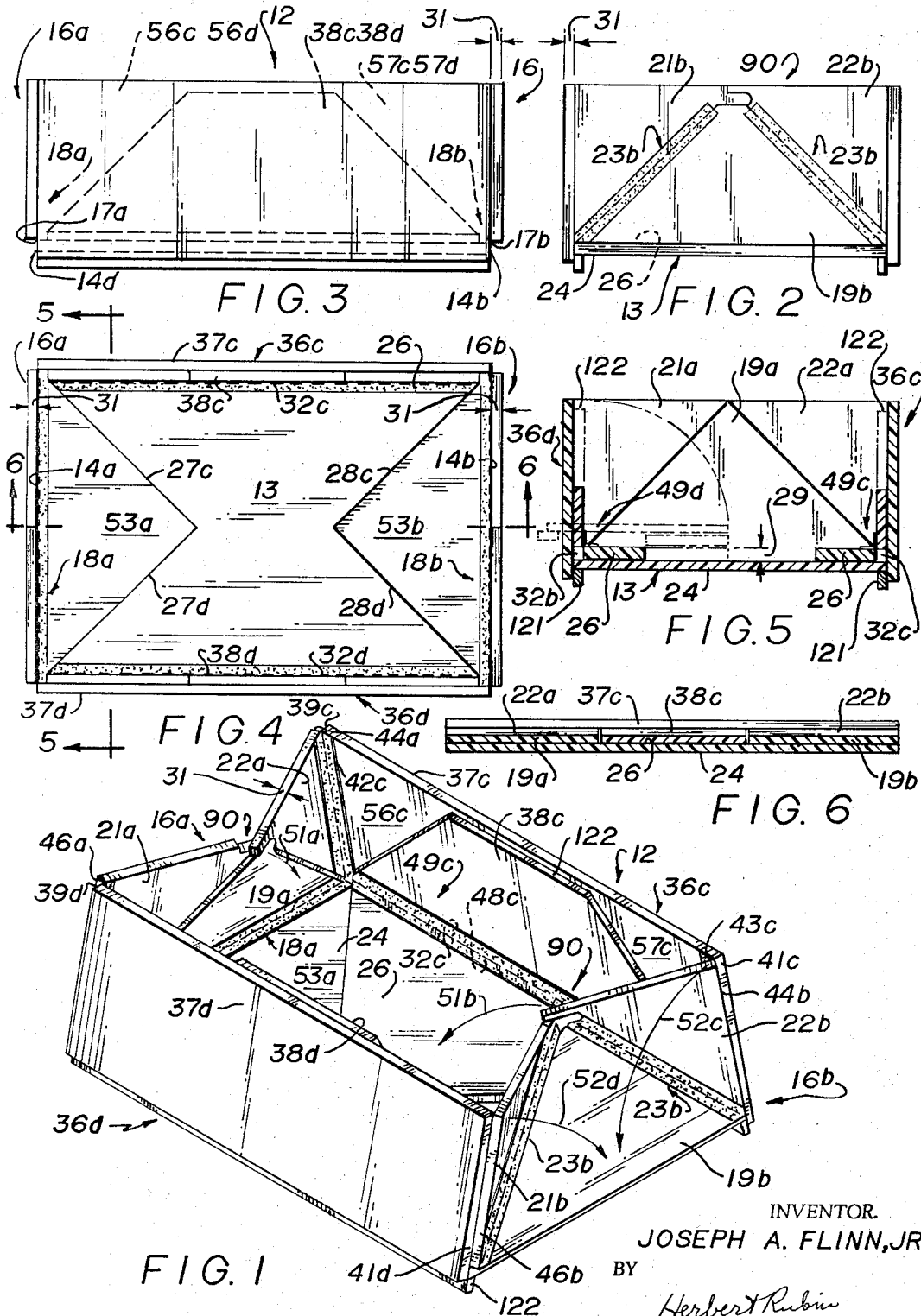
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3,376,994

COLLAPSIBLE BOX

Filed April 8, 1966

2 Sheets-Sheet 1



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COLLAPSIBLE BOX

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2 Sheets-Sheet 2

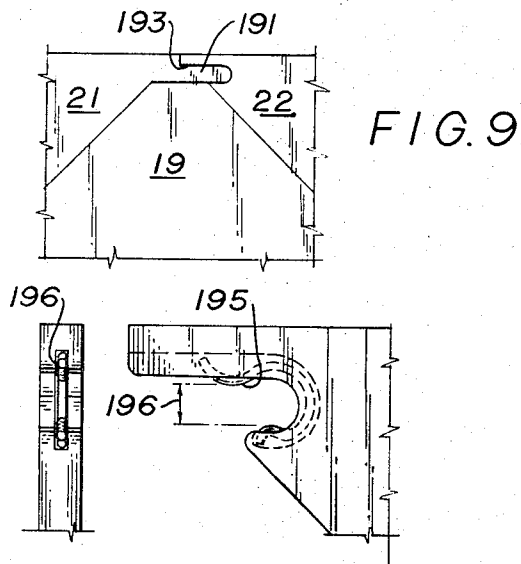


FIG. 9

FIG. 9B FIG. 9A

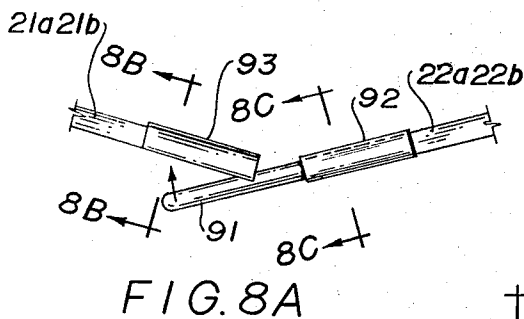


FIG. 8A

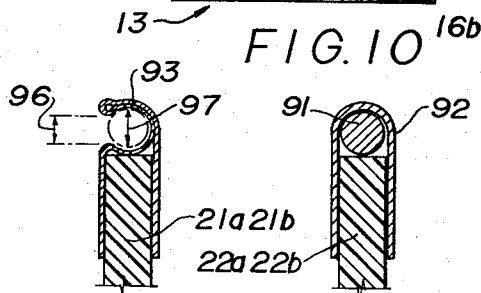


FIG. 10

FIG. 8B FIG. 8C

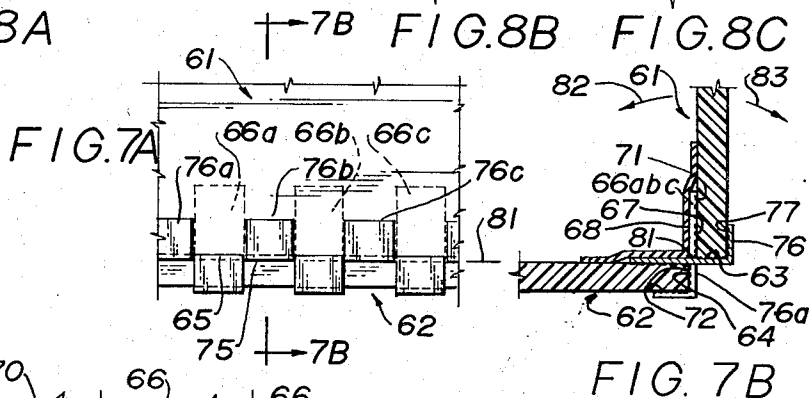


FIG. 7A

FIG. 7B

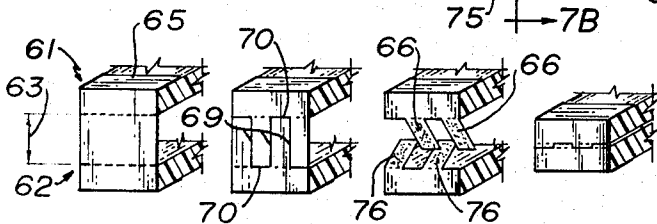


FIG. 11A FIG. 11B FIG. 11C FIG. 11D

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1

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COLLAPSIBLE BOX

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ABSTRACT OF THE DISCLOSURE

A collapsible box having segmented end walls and side walls hingedly secured to a rectangular base and to each other so that the ends and walls may be rotated inwardly toward the base with the segmented end walls thereupon folding inwardly to form an overlay of the segments which in turn are received by pockets formed by raised portions in the base of the box and the inner surfaces of the side walls.

This invention relates to a collapsible box and more particularly to such a box which, in its collapsed condition, forms a relatively compact and solid laminar structure adapted to resist crushing and impact forces.

I am familiar with various prior art containers having collapsible end and side walls, but these are usually directed to relatively small paper devices; and, even where more rigid materials are used, the structure in its collapsed form usually includes internal voids into which the sides or ends of the collapsed box may be deformed by crushing or impact thereby causing permanent damage.

Moreover, aside from the aforementioned structural weaknesses, collapsible containers for produce, packaged substances, and other items of commerce have not been more widely adopted because, generally, present techniques for producing such containers usually involve relatively complex and costly methods of fabrication and assembly.

Thus, even though collapsible containers have various advantages including vastly reduced empty storage and return space and have long been sought in industry, the various disadvantages of most prior art devices have generally prevented their widespread appearance on the market.

It is an object of my present invention to provide a collapsible box which, in its closed or collapsed condition, comprises a relatively solid laminar structure in which the lamina are the base, sides and ends of the box; and which occupies a relatively reduced volume compared to its open condition.

More specifically it is an object of this invention to provide a collapsible box having a rectangularly shaped base with inwardly foldable end walls hingedly connected to opposite ends of the base. Each of the end walls are also hingedly connected at their opposite end edges to the proximate end edges of the container side walls which are also hinged to opposite sides of the base for rotatable movement toward the base. Further, I provide the base with a raised section located in the intermediate area of the base, which is not contacted by either of the end walls in their folded condition, having a thickness comparable to the thickness of the folded end walls. I also provide each of the side walls with a raised section which spaces the side walls outwardly when they are folded down against the raised section of the base and which defines unraised portions at the ends of the side walls for housing the folded overlay of the end walls.

It is a feature and an advantage of this invention that the raised portions in the base and side walls of my collapsible box not only reinforce the center portions thereof, which are normally subject to the greatest strain during usage of the container; but, when the container is in

2

the folded condition, the relatively solid laminate structure provided by the aforementioned construction resists impact and crushing forces without having the walls or base deflected into void spaces within the folded box which could cause permanent distortion or damage of the container.

Another object of this invention is to shape the raised portions of the sides and base of the container to provide a space or pocket at each end of the box in its collapsed condition between the base and the side walls to receive the proximate overlaying folded end walls.

Another object of this invention is to shape the aforementioned raised sections of the base and side walls to form edge portions parallel to and inwardly of at least one of the sides of each of the walls and opposite edges of the base to provide a support for the hinge assemblies which secure the sides and base to each other.

A feature and an advantage of the aforementioned object is that by hinging the sides to the base along parallel edges of their respective raised portions, the unraised portions of the base and sides at the ends thereof form a gap for housing the end walls in folded condition with the sides rotated downwardly against the base. In this way a relatively solid laminate structure in which the base, end and side walls are the lamina thereof, is provided which is capable of resisting relatively high impact and crushing forces.

Another object of this invention is to provide a securing latch for each of the end walls to lock releasably the end wall panels in co-planar relationship when the box is in the open position.

More specifically it is an object of this invention to provide a securing latch having a tongue-like bar secured to one of the panels and shaped to extend into a slot located in a portion of the adjacent panel. The slot in the adjacent panel is shaped to receive and retain releasably the tongue-like bar when the panels are in the open and co-planar position.

It is another object of this invention to provide a novel hinge assembly to secure hingedly one adjacent member to the other. Such hinge assembly comprises a plurality of flat bendable strips each having an obverse face and a reverse face. All of the obverse faces are oriented in one direction and the reverse faces in the opposite direction. Portions of opposite faces of each of the strips are secured to surfaces of adjacent members which are in hinged relationship to each other. The strips are arranged so that the transverse fold line formed in each of them, when one hinged member is rotated relative to the other, is in axial alignment with the hinge line of the hinge assembly.

A feature and an advantage of the aforementioned object is that such a hinge develops a relatively high degree of strength to accommodate a variety of sizes of crates or other collapsible containers with a minimum of cost and complexity of fabrication.

It is also an object of this invention to provide a method for making the aforementioned hinge assembly comprising the steps of providing a continuous strip of suitable foldable material with opposite edges and portions of the surfaces thereof secured to members to be hingedly secured to each other; forming the strip into an elongate trough-like configuration by separating and spacing the members secured to the strip; cutting the strip longitudinally between alternate pairs of transverse cut lines, and, by step of longitudinal cutting, severing the strip into two similar portions having alternately spaced strip segments; and securing portions of the alternately spaced strips to the surface of the member to which the other portion of the same strip is not secured.

Turning now to the drawings, FIG. 1 is an end perspective view looking down on a collapsible container

embodying my invention and in the partially collapsed condition;

FIG. 2 is an end elevation of a collapsed box embodying my invention;

FIG. 3 is a side elevation of the box shown in FIG. 2;

FIG. 4 is a top plan view of the box shown in FIG. 2 embodying my invention;

FIG. 5 is a sectional elevation taken along line 5—5 in FIG. 4;

FIG. 6 is a sectional view of my invention as it would appear along the longitudinal center line of the box shown in FIG. 4 were it in the collapsed condition;

FIG. 7A is a side elevation of a portion of a collapsible box embodying my invention and showing in greater detail the novel hinge assembly thereof;

FIG. 7B is a sectional view taken along line 7B—7B of FIG. 7A;

FIG. 8A illustrates one type of releasable catch that may be utilized with my invention;

FIG. 8B is a sectional view taken along line 8B—8B of FIG. 8A;

FIG. 8C is a sectional view taken along line 8C—8C of FIG. 8A;

FIG. 9 is an elevational view of a portion of an end wall embodying my invention and showing a particular portion thereof and an alternate embodiment of my novel releasable latch;

FIG. 9A is an enlarged detail of the novel releasable latch shown in FIG. 9;

FIG. 9B is an end elevation of FIG. 9A;

FIG. 10 shows a plurality of boxes embodying my invention and utilizing one feature thereof;

FIG. 11A is the first of a sequence of four partial perspective views illustrating steps of one mode of practicing the novel method of my invention for making a portion of the structure thereof;

FIG. 11B is the second of the sequence of views referred to in the description of FIG. 11A;

FIG. 11C is the third of the sequence of views referred to in the description of FIG. 11A; and

FIG. 11D is the fourth of the sequence of views referred to in the description of FIG. 11A.

Referring first to FIGS. 1 through 6, a collapsible box is generally indicated at 12 with a rectangularly shaped base indicated at 13 having end edges 14a and 14b and fabricated of a suitable relatively rigid material such as plastic, wood, metal, or the like, as are the end and side walls described hereinafter. The end walls indicated at 16a, 16b are hingedly secured along their respective lower edges 17a, 17b to opposite ends 14a, 14b of the base by means of the hinge assembly generally indicated at 18a, 18b. The end walls in the particular embodiment which I show are each comprised, respectively, of triangularly shaped panels or segments 19a, 19b; 21a, 21b; and 22a, 22b. Each of the aforementioned end wall panels are hingedly secured to the one adjacent thereto as best seen in FIGS. 1 and 2 by means of hinge assemblies generally indicated at 23b (FIG. 1) which permit the end walls to be folded inwardly against the base to form a form a folded end wall of double wall thickness overlaying a portion of the base. The location and configuration of the double wall thickness end walls in folded condition is best seen in FIGS. 5 and 6.

The base indicated at 13 includes rectangular plate 24 and raised section 26 covering the intermediate area of the base which does not come into contact with the end walls in folded condition. Although I show raised section 26 as a solid sheet, this portion of the base may be perforated, corrugated, intermittently stripped or otherwise suitably shaped in accordance with preferred design and production techniques compatible with the particular material selected. In the embodiment which I show on the accompanying drawings, and best seen in FIGS. 1 and 4, raised section 26 is terminated at edges 27c, 27b and 28c, 28b, which are located short of the end of the base and,

respectively, define a triangular pocket at each end of the base located to receive the proximate overlaying end wall when it is placed against the base in its folded condition. The thickness of the raised portion 26, as seen in dimension 29 in FIG. 5, is about equal to thickness dimension 31 of the end walls; thus, when an end wall is folded down into one of the triangularly shaped pocket recesses at each end of the base, the upper surface of panels 19a, 19b is positioned in substantially co-planar relationship with the upper surface of raised section 26. As will become apparent hereinafter, a similar relationship exists between the other panels of the folded end wall and portions of the side walls indicated at 36c and 36b.

The side walls indicated at 36c and 36d are located between opposite proximate ends of the end walls and include outer plates 37c, 37d, respectively, and raised sections 38c, 38d respectively. End edges 39c and 41c of the wall at 36c are connected by means of the hinge assemblies indicated at 42c and 43c (mostly hidden) to the end edges 44a and 44b of end walls indicated at 16a and 16b, respectively. Lower edge 48c of raised section 38c of the side wall indicated at 36c is connected by means of the hinge assembly indicated at 49c to edge 32c of raised portion 26 which forms part of the base indicated at 13. Similarly, side wall 37d is secured along its lower edge and side edges to the opposite proximate edges of the end walls indicated at 16a and 16b and opposite edge 32d of raised section 26.

With the foregoing structural relations in mind, it can be seen by a study of the isometric perspective view of FIG. 1 that, as the end walls of the box indicated at 12 are urged inwardly in the directions of arrows 51a and 51b to fold along the hinge lines of the hinge assemblies indicated at 23b at one end of the box, and by similar hinge assemblies at the other end of the box which are hidden from view, the end walls indicated at 36c and 36d will tend to rotate inwardly in the direction of arrows 52c and 52d. As the aforementioned movement and rotation of the side and end walls continues, panels 19a and 19b become nested in recess portions 53a and 53b, respectively, located at opposite ends of the base with the surfaces of panels 19a and 19b facing upward being in substantial co-planar relationship with the upper surface of raised portion 26 of the base. At the same time segments 21a, 21b and 22a, 22b are folded into overlaying relationships with adjacent halves of panels 19a and 19b, respectively. Simultaneously the side walls indicated at 36c and 36d are brought into position with the inward surfaces of raised portions 38c and 38d in contact with raised portion 26 of the base; while panels 21a, 21b and 22a, 22b are positioned into unraised portions or recesses 56c and 57c at opposite ends of side wall at 36c, and similar recesses 56d and 57d at opposite ends of side wall indicated at 36d.

Thus, in its fully closed position, my collapsible box becomes a relatively solid laminate structure as shown in FIG. 6 which is free of excessive void spaces within the structure itself, the lamina being the base, end wall panels and side walls in folded position. The exposed flat surfaces of the fully collapsed box are capable of resisting localized impact or pressure which might occur in ordinary usage since substantially all portions of the structure are solidly supported throughout by the inner lamina which support the outer exposed surfaces. Similarly if a plurality of my collapsed boxes are stacked one upon the other, but not necessarily in alignment, excessive edge pressures will be unlikely to cause distortion or permanent damage of any of the side panels or hinge structures since deflection of those portions into voids within the box in its collapsed condition is virtually eliminated.

Although I have shown the raised portions of the base and side wall of my invention as relatively solid layers of material, they may be formed into any shape so long as a reasonable amount of side and end wall support is provided.

5

In order to open the collapsed container for normal usage such as storage and transportation of various items, and the like, it is merely necessary to rotate the side walls upwardly and outwardly until all of the segments or panels of the end walls are in co-planar relationship and with the side walls and end walls perpendicular to the plane of the base. Then the crates, lugs, or the like, may be filled with items to be transported and/or stored in a conventional manner. It is to be noted that an added feature of my novel invention is that the above described raised sections also serve as effective reinforcement at the midsections of the base and side walls where such reinforcement is most effective.

The hinge assemblies which I have indicated hereinabove at 18a and 18b for hingedly securing the lower edges of the end walls to the base; at 23b for joined together the panels of the end walls; at 42c and 43c for hingedly securing the end walls to the side walls; and at 49c and 49d for securing the side walls to the base are exemplified by the hinge assembly shown in FIGS. 7A and 7B which I now explain in greater detail. For purposes of illustration, typical panels to be hingedly secured are indicated at 61 and 62 having end edges 63 and 64 respectively and may be considered as representing any of the aforementioned components of my collapsible box which are hingedly secured to each other. A plurality of bendable strips 66a, 66b, 66c, 66d, etc., fabricated of plastic fabric or other suitable flexible material, are each spaced apart from the one adjacent thereto by a distance equal to the width of such strip. Each of the strips 66 has an obverse face 67 and a reverse face 68; a portion of each reverse face is secured along edge surface 64 of the member generally indicated at 62 while a portion of the obverse face at the other end of the strip is suitably secured to a surface of the member indicated at 61 immediately adjacent to hinged edge 64 of the member at 62. Suitable securement of the strips to the adjacent hinged members is indicated in FIG. 7B by shaded lines 71 and 72 and may comprise any suitable adhesive material or may be by means of stapling, riveting, or other conventional attachment.

Between each of strips 66a, 66b, etc. alternate strips 76a, b, c, etc. are applied in a manner similar to that described hereinabove for strip 66. The difference in the application of alternate strips 76 as compared to strips 66 is that strips 76 are so arranged that the obverse faces of these strips are secured to the surfaces of the member indicated at 62 to which reverse faces of strips 66 are secured. This staggered or alternating arrangement of strips 66, 76 is best understood by referring to FIG. 7B. There is a typical strip 66 shown with its obverse face 67 secured to a surface of the member at 61; and reverse face 77 of strip 76 is secured to adjacent portions of the surface of the same member. Conversely the opposite sides or faces of each of the aforementioned strips are secured to surfaces of the member indicated at 62. By the arrangement of this novel hinge assembly, it can be seen that a member such as the one indicated at 61 may be rotated about hinge line 81 in a direction of arrow 82 to fold into contact with member 62. Each of strips 66 and 76, when either of members 61, 62 are rotated about hinge line 81, form transverse fold lines 65 and 75, which are in axial alignment with hinge line 81.

It should also be noted that members 61 and 62 may be rotated relative to one another in the direction of arrow 83 until prevented from further motion by abutment of edges 63 and 64 with each other. It is this latter described arrangement and assembly that is exemplified by the hinge assemblies indicated at 23 in the end wall construction which permits only inward folding of the end wall panels away from co-planar relation to each other. FIG. 7B as shown is typical of the hinge line assemblies shown at 18a, 18b, 42c, 43c, 49c and 49d.

When the box is in the open condition, for example as shown in FIGS. 2 through 5, articles may be placed there-

6

in for storage or shipment, and the presence of the articles themselves tends to retain the box in its open position. However, it may be desirable, and I have found it preferable, to provide a catch mechanism as indicated generally at 90 in FIGS. 1 and 2 to maintain the panels of the end walls in relatively fixed co-planar relationship thereby fixing the entire box structure in its open position. One such catch mechanism is shown in FIGS. 8a, 8b, and 8c. Bar extension 91 is suitably secured by means of a sleeve 92 or other suitable fastener to the upper edge of each of panels 22a, 22b. A resilient pocket shaped clasp 93, best seen in FIG. 8B, is provided secured to each of end panels 21a, 21b. As seen in FIG. 8A, panels 21a and 22b are shown in their near open position relative to an adjacent panel 22a, 22b with bar 91 partially engaging the receiving pocket defined by member 93. As seen in FIG. 8B, bar 91 is shown in dashed line as it will locate when the end walls are in completely open position. A slight amount of interference between the opening to the pocket of clasp 93 and the diameter of bar 91 is indicated by dimension 96 being somewhat less diameter 97 of bar 91. When the end walls are in a completely open position, and the end panels in co-planar relationship, the end bar is snugly secured in pocket member 93 and hence maintains the folded end walls in their open position.

An alternate form of my latch mechanism is shown in FIGS. 9, 9A and 9B. Here I employ tongue-bar 191 shaped to fit into slot 193. Slot 193 is provided with a longitudinal groove 196 formed throughout the wall of the slot. The groove is provided with resilient means, such as shaped spring 195, retained within the groove by bearing resiliently against portions thereof but which has sections inwardly of the slot between the opposite walls thereof to provide an interference as indicated by dimension 196. As end walls panels 19, 21 and 22 are folded outwardly and brought into co-planar relationship, tongue 191 is forced into slot 193, separating and interfering portions of resilient member 195 which then maintains the tongue in relatively secure position in the slot. Tongue 191 may be provided with a complementary groove shaped to fit and receive the interfering portions of resilient member 195 when the tongue is in position in the slot, thereby further enhancing the latching effort of latch assembly.

FIG. 10 shows how my novel collapsible boxes may be arranged one on top of the other by means of a novel stacking arrangement which is best understood by referring again to FIGS. 1 and 5. As shown in FIG. 5, elongate strips 121 may be provided and suitably secured either to the lower inside surface of the side walls indicated at 36c and 36d, or to the lower outside edges of the base indicated at 13. These elongate strips may be continuous or of short segments provided that at least one end edge 122, as seen in FIG. 5 is provided on opposite sides and at opposite ends of the box. It is then possible to stack one open container on top of one below with strip 122 nesting against the end wall face neatly therebelow; and, if the strip is extended to the midsection of the sidewall, rest upon the edge portions 122 of the raised sections of the side walls of successive boxes. In this manner any collapsible container of my invention stacked one upon the other provides a cover or lid for the box below and at the same time a structurally unified array of boxes which may resist tipping and spilling under ordinary usage.

A novel method of producing the hinge assembly of my invention is illustrated in FIGS. 11A, 11B, 11C and 11D. Typical members to be hingedly joined are indicated at 61 and 62 in FIG. 11A mounted with spacers therebetween positioning adjacent proximate surfaces of the members at distance 63 apart from one another. A continuous strip 65 of a plastic or other suitable material having obverse face 65a and reverse face 65b, is provided with portions 65c, 65d suitably adhered, for example by adhesive layers 67a, 67b, to a portion of the outer surfaces and edges of members 61 and 62. Strip 65 is then

cut along transverse lines 69 between the proximate adjacent surfaces of the members to be hingedly joined; and, between every other pair of transverse lines 69, strip 65 is cut longitudinally along line 70a, 70b, etc., each cut 70a being located proximate and inward of the inner surface of the member at 61 and each cut at 70b being located similarly in respect to the member at 62; thus cuts 70a, 70b, etc. are in staggered, alternating relationship in respect to each other and the face of strip 65. Strip segments 66, 76 having castellated profiles formed by cut lines 69 and 70a, 70b, etc., are best seen separated from each other in FIG. 11C with alternately spaced fingers folded slightly inwardly. The reverse surface of strip 65 comprising the alternately spaced fingers are adhered to the inner proximate surfaces of the members to be hingedly secured to each other to form the hinge assembly shown in FIG. 11D. This novel method of producing my novel hinge connection may be practiced in a variety of manners, as well as manually; and the foregoing indicates but one embodiment of my invention that may be utilized.

Although the preceding specification describes one embodiment of my invention in some detail, this is done for purposes of illustration and clarity and not to impose unnecessary limitations upon the scope of my invention. The method and apparatus of my invention as set forth herein may be practiced in a variety of manners within the spirit thereof and scope of the appended claim.

I claim:

1. A collapsible box, having a rectangularly shaped base comprising, in combination:

first and second end walls; means hingedly securing one edge of one of said end walls to one end of said base and one edge of the other of said end walls to the opposite end of the base, for rotatable inward movement of each of the end walls against the base, said end walls each comprising a plurality of segments and means hingedly securing the proximate edges of adjacent ones of said segments to each other for foldable inward movement along the edges of the segments when the end wall thereof is rotated from an unfolded position to a folded position to form a folded end wall of at least double wall thickness overlaying a portion of the base, said end walls when in folded condition leaving an intermediate area of said base uncovered when said box is collapsed;

a raised section of said base in said intermediate area having a thickness comparable to the thickness of said end walls; a first side wall including an inwardly located raised section having a thickness comparable to the thickness of said end walls; means hingedly securing an edge portion of said first side wall to an edge portion of said base and means hingedly securing the ends of said side wall to the proximate ends of said end walls at one side of the box; and

a second side wall similar to said first and similarly secured to the other side of said box and ends of said end walls proximate thereto; said side walls being inwardly rotatable toward said base to cause said end walls to rotate inwardly and said segments thereof to fold along the proximate edges of the segments to form an overlay housed between portions of said base and the side walls adjacent thereto with at least parts of said raised section of the base and said raised sections of said side walls in contact with each other to form a flat and relatively solid laminar structure of relatively small volume adapted to resist impact and crushing, and said side walls being rotatable outwardly away from the base to cause the end walls to unfold outwardly to form an open receptacle bounded by said base and hingedly secured end and side walls.

2. The collapsible box in accordance with claim 1 wherein: said raised section of the base is shaped to form edge portions parallel to and inwardly of each of the two opposite sides of said base, last said raised section being

terminated short of the ends of said base to define a pocket at each end of the base located to receive the proximate overlaying folded end wall segment.

3. The collapsible box in accordance with claim 1 wherein: each raised section of said side walls is shaped to form edge portions parallel to and inwardly of one of the sides of said wall, last said edge portions comprising a support for said hinge means for hingedly securing said side wall to said base, said raised section being terminated inwardly of the ends of said side wall to define an unraised portion at each end of the side wall, each said unraised portion being located to receive a different one of said end wall segments in folded condition.

4. The collapsible box in accordance with claim 1 and means to secure releasably said end walls in the open position.

5. A collapsible box in accordance with claim 1 wherein said end wall comprises a plurality of panels, a securing latch for each of the end walls to lock releasably said panels in each of the walls in co-planar relationship when the box is in the open position.

6. A collapsible box having foldable end walls, each of said end walls comprising a plurality of panels, a securing latch for each of the end walls to lock releasably said panels in each of the walls in co-planar relationship when the box is in the open position, said latch comprising:

a tongue-shaped bar secured to one of said panels and shaped to extend outwardly and substantially coplanar therefrom; a slot located in a portion of another of said panels proximate to the one said panel and shaped to receive said bar; a longitudinal groove in the wall of said slot; and resilient means housed in said groove to grip resiliently said tongue-shaped bar when the bar is received into said slot with said end wall in the unfolded position.

7. A collapsible box in accordance with claim 1 wherein:

each raised section of each side wall is shaped to form unhinged edge sections parallel to and inwardly of the unhinged edge of the side wall; and elongate strips secured to the base of said box and extending outwardly therefrom in a direction generally normal to the outer surface of said base when the box is in the open position, said strips when said collapsible box is in the open position being shaped and located to fit between the end walls of a second box in open condition similar to said collapsible box upon which the collapsible box may be placed with the edges of said elongate strips furthestmost from said base in bearing contact with the unhinged edges of the raised portions of the side walls of said second box.

8. A collapsible box in accordance with claim 1 wherein the means hingedly securing each said end wall to said base, and each said side wall to opposite end walls and base, each of said end walls, side walls and base so hingedly secured to another hereinafter referred to, respectively, as a first member and a second member, comprises:

a plurality of flat bendable strips, portions of the obverse faces of the first of said strips secured to a surface of a first member proximate to the hinge line of said means hingedly securing said first member to a second member, and portions of the obverse faces of the second of said strips secured to a surface of said second member proximate to said hinge line, said obverse faces all facing in one direction and said reverse faces all facing in the opposite direction; and portions of the reverse faces of said first strips secured to a surface of said second member proximate to said hinge line and portions of the obverse faces of said second strips secured to a surface of said first member proximate said hinge line, said strips being foldable when said first and second members are hingedly rotated in respect to each other

9

about said hinge line with the fold line of said strips being in axial alignment with the hinge line.

9. The method of making a hinge for hingedly securing a first panel to a second panel comprising the steps of: providing said first and second panels in predetermined spaced relationship to each other with two edges thereof to be proximate the hinge line of said hinge positioned in co-planar relationship; providing a strip of bendable sheet material; adhering portions of the obverse face of said strip to the edges of said first and second panels with the longitudinal axis of said strip parallel and midway between said two edges; cutting said strip along transverse lines from the inner surface of one of said panels to the proximate surface of the other; cutting said strip along first longitudinal lines between alternate pairs of said transverse cut lines proximate the inner face of one of said panels; cutting said strip along second longitudinal lines between alternate pairs of said transverse cut lines proximate the inner face of the other of said panels, said second longitudinal lines being in staggered rela-

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tionship to said first longitudinal lines; forming, by said steps of cutting, said strips into strip segments having obverse and reverse faces corresponding to the orientation of said faces of the strip, said strip segments including first segments secured to said first panel and second segments secured to said second panel; contacting said two edges of the panels together and adhering portions of the reverse side of said first segments to said second panel and portions of the reverse side of said second segments to said first panel.

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