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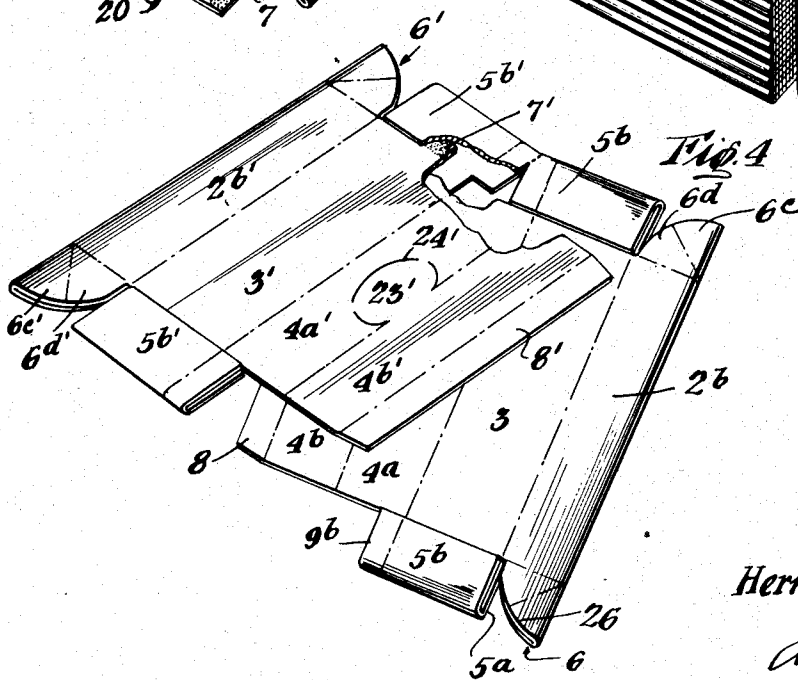
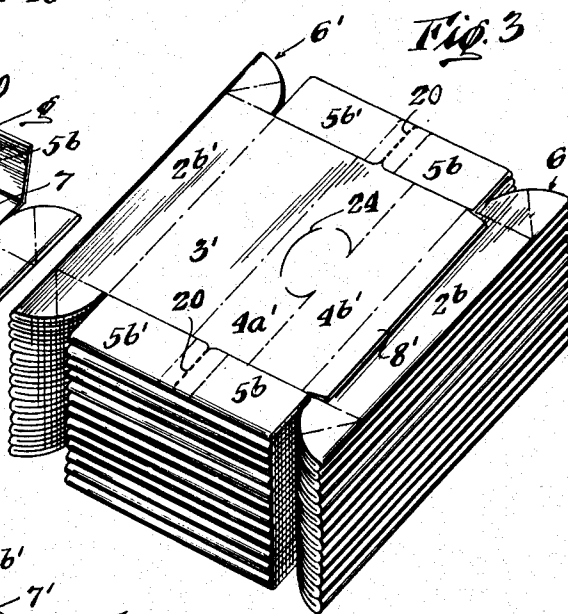
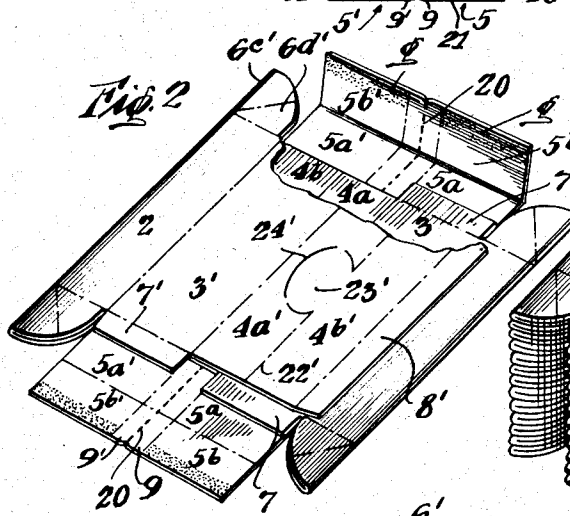
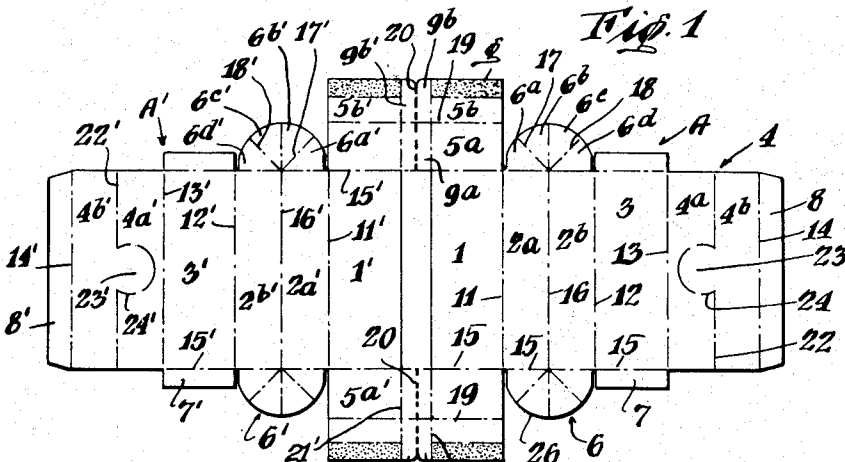
H. A. CARRUTH

2,280,793

COLLAPSIBLE BOX

Filed June 12, 1939

2 Sheets-Sheet 1



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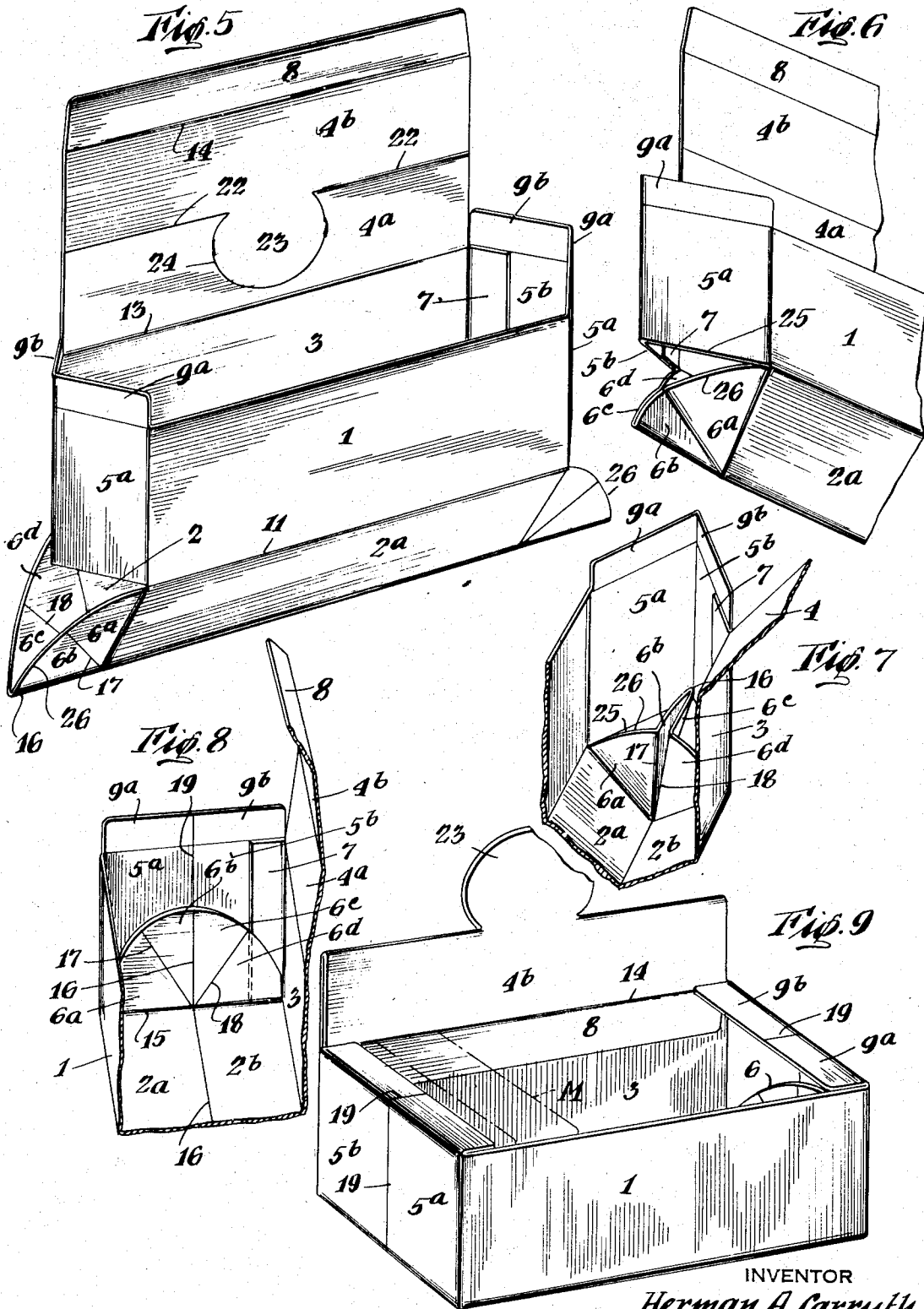
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COLLAPSIBLE BOX

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Application June 12, 1939, Serial No. 278,652

6 Claims. (Cl. 229—16)

This invention relates to collapsible boxes, and more particularly to boxes that can be economically made and produced from a single blank of paperboard material, that can be shipped and stored in fully collapsed condition and thereafter quickly and expeditiously set up and expanded by the user as needed.

Set-up boxes in common use, while reasonably economical to manufacture and while possessing requisite strength and stiffness to support and protect the contents, have certain serious inherent drawbacks. Such rigid set-up boxes occupy enormous cubical space in relation to the number of boxes occupying such space, with the result that shipping and storage costs play a highly important part in the final cost of such boxes up to the time merchandise is packed therein. Furthermore, such boxes often become damaged during shipment and storage, since the superimposed weight of the stacked boxes and the incidental shifting of the boxes during shipment result in substantial breakage and splitting at the corners and bulging of the side, bottom, and end walls, to the point where they are no longer serviceable. To reduce this damage and loss to a minimum, the set-up boxes must be carefully packed in strong packing cases with only a limited number of boxes therein. In many instances it has been found necessary to provide separating partitions between the individual boxes to protect them from damage.

It is an object of this invention to provide a highly serviceable merchandising box or carton that can be produced and assembled by automatic machinery at relatively low cost, which can be shipped and stored in flat, completely collapsed condition so that large numbers of collapsed boxes may be contained in a limited space and when thus collapsed are not subjected to damage or breakage.

It is another object of this invention to provide a single sheet of paperboard material so cut and scored that two collapsible boxes may be formed therefrom simultaneously and with the speed of production equivalent to that heretofore required in assembling a single collapsed box.

It is a further object of this invention to provide an improved collapsible box which can be quickly erected and expanded from collapsed form to merchandise-containing expanded form quickly and expeditiously by the user as needed, which box has means associated therewith to maintain the bottom, end, and side wall panels in rigid, flat wall-forming position, and which has rigidity, strength, stiffness and serviceability

when the merchandise is packed therein fully comparable to the set-up box.

Other objects and advantages of this invention will become apparent as the disclosure proceeds.

Although the novel features which are believed to be characteristic of this invention will be particularly pointed out in the claims appended hereto, the invention itself, as to its objects and advantages, and the manner in which it may be carried out, may be better understood by referring to the following description taken in connection with the accompanying drawings forming a part hereof, in which

Fig. 1 is an expanded view of a prepared blank suitably cut and scored ready to form the two box structures;

Fig. 2 is a perspective view of the blank shown in Fig. 1 as it appears when partially assembled to form two complementary connected box structures;

Fig. 3 is a perspective view of a plurality of paired connected box structures as they may be arranged in stacked relationship ready for storage and shipment;

Fig. 4 is a perspective view of a pair of complementary box structures as they appear in collapsed position in the process of being separated;

Fig. 5 is a perspective view of one of the assembled boxes in the process of erection;

Fig. 6 is an exterior fragmentary perspective view of the box in process of erection, this view showing the bottom flap partially collapsed and undergoing insertion into the box to overlie the inside face of the adjacent end wall panel;

Fig. 7 is an interior fragmentary perspective view of the partly erected box shown in Fig. 6;

Fig. 8 is a further fragmentary perspective view of the fully erected box as it appears when looking into the interior thereof; and

Fig. 9 is a perspective view of the fully assembled erected box as it appears when merchandise has been positioned therein and the box set up for display purposes, this view further showing in dotted lines the position of the cover section when placed in closed position.

Similar reference characters refer to similar parts throughout the several views of the drawings and the specification.

In accordance with my invention, two complementary connected boxes may be formed from a single blank of paperboard material of the requisite strength and stiffness to hold the desired merchandise. Each blank may be cut from a large sheet or roll of the selected paperboard material, the cutting of the blanks from the sheet

or roll into proper shape and the scoring thereof being advantageously performed by an automatic cutting and scoring machine. As shown in Fig. 1, each blank comprises two half portions A and A' severably joined together by a perforated tear line 20, both half portions of which may be manipulated in unison to form two fully assembled collapsed boxes connected together only along the severable tear line 20. Since the half portion A' is a substantial duplicate of the half portion A, it will only be necessary to describe the construction of the half portion A in detail.

A side wall panel 1 is hinged to bottom panel 2 along the fold line 11, and side wall panel 3 is hinged to bottom panel 2 along the opposite fold line 12. A cover panel 4 may be provided which is hinged to the top-forming edge of the side wall panel 3. An end wall panel 5 is hinged to each end of the side wall panel 1 along a fold line 15 and an end wall securing tab 7 is also hinged to each end of the side wall panel 3 along the fold line 15. A bottom-forming flap 6 is hinged to each end of the bottom panel 1 along the fold line 15.

In order that the box may be made collapsible, a fold line 16 extends longitudinally through the bottom panel 1 and bottom flaps 6, the fold line 16 extending generally parallel to and spaced substantially midway between the fold lines 11 and 12. Each bottom flap 6 is preferably provided with an arcuate shaped exterior edge 26 to facilitate insertion thereof into the box interior when the box is erected, as will be more fully explained hereinafter. Each bottom flap 6 is divided into four substantially equal sectors 6a, 6b, 6c and 6d, which are defined between the adjacent fold lines 15 and 16 and the radiating fold lines 17 and 18 which radiate from the point of intersection of the fold lines 15 and 16. Thus each of the bottom flaps 6 may be partially collapsed to further facilitate insertion thereof into the interior of the box, as will be more fully described hereinafter.

Each end wall panel 5 is divided into two end sections 5a and 5b by a fold line 19 extending generally parallel to and equally spaced between the adjacent fold line 15 and the outer free edge of the end wall panel. Each end wall panel 5 has hinged thereto along the fold line 21 a top wall turn-in flap 9. The fold line 19 extends across the top wall turn-in flap 9 so as to divide the same into top wall turn-in sections 9a and 9b.

Cover panel 4 may be provided with a tuck-in flap 8 hinged thereto along the fold line 14 and may be further divided into two foldable sections 4a and 4b by the aligned fold lines 22 spaced intermediate and extending generally parallel to fold lines 13 and 14. Thus, the cover section 4 may be used as a display easel when the box is set up on the counter or the merchant's shelf. In order to attract attention to the box and its contents, a projecting advertising tab 23 may be provided which is formed by providing a cut line 24 of the desired configuration which extends into cover section 4a and which joins the ends of the inwardly extending fold line 22. It will be appreciated, however, that the closure panel 4 may be completely eliminated or if desired, another type of convenient closure panel may be provided.

The various panels, sections, tabs and flaps above described in connection with half portion A are duplicated in half portion A', and the equivalent parts shown in half portion A' have been given the same designating numerals except

that each numeral has been primed to avoid confusion. It will be particularly noted that the two half portions A and A' of the blank have their top wall turn-in flaps 9 and 9' severably connected together by a tear or perforated line 20. This is an important feature of the invention since it permits simultaneous gluing and assembly of both boxes at the same time and at the same speed with which one box could be assembled, thus effecting substantial economies in assembly cost. It will be further noted that the end walls 5 and 5' extend at each side edge of the blank beyond the bottom flap 6 and securing tab 7, which permits the blank to be fed into an automatic strip gluing machine whereby the strips of adhesive *g* may be applied to the end sections 5b and 5b' at both ends of the blank simultaneously and at a high production rate. In order that the inturned top wall sections 9b and 9b' receive no adhesive, a pair of notched glue-applying rollers may be used, synchronized with the advancing movement of the blank so that the peripheral surfaces of the glue rollers will fully contact and apply adhesive in strip form to the inside face of the end sections 5b and 5b' only and will not apply adhesive to the top wall turn-in sections 9b and 9b'.

It will be further noted that the cover panels 4 and 4' may be completely eliminated so as to provide two duplicate open top box structures. If desired, one of the box structures A can be used as the merchandise container and the other structure A' can be used as a telescoping cover for the merchandise container by displacing the fold lines 15' slightly out of alignment with the fold line 15 a distance approximately corresponding to the thickness of the paperboard. In this event the end wall sections 5' will be made longer in length than the end wall sections 5 by approximately two thicknesses of paperboard, fold lines 19' being correspondingly slightly offset with respect to the fold lines 19. Likewise, fold lines 11' and 12' will be spaced apart approximately the thickness of two layers of paperboard greater than the distance between the fold lines 11 and 12. The thus slightly disaligned fold lines can be pressed into the blank by suitable adjustment of the creasing elements and cutting knives on the automatic cutting and scoring machine. Likewise, the glue rollers of the automatic strip gluer could have arcuate peripheral sections thereof slightly displaced so as to apply the adhesive *g* to the end sections 5b' a greater distance from the center of the blank than adhesive *g* applied to the end sections 5b. It will thus be appreciated that an integral blank can be formed having two joined but separable half portions, one to form the container structure of the box and the other to form a telescoping cover structure, both being presented in an integral assembly.

After the blank has been fully prepared as shown in Fig. 1 and above described, with the strips of adhesive *g* applied to the end wall sections 5b and 5b', the blank is assembled into two joined but severable collapsed boxes by folding the blank along the fold line 16 so that bottom section 2b will overlie bottom section 2a, side wall panel 3 will overlie side wall panel 1, and cover panel 4 will overlie side wall panel 1'. The other end of the blank is then folded along the fold line 16' so that bottom section 2b' will overlie bottom section 2a' and the extended tuck-in tab 8, side wall panel 3' will overlie cover panel 4, and cover panel 4' will overlie a part of cover section 4a, side wall section 3 and part of bottom

section 4b, as fully illustrated in Fig. 2. As thus arranged, the end wall securing tab 7 at each end of the blank will overlie and align with the adjacent end wall section 5a, and each end wall securing tab 7' will overlie and align with the adjacent end wall section 5a'. Each of the end wall sections 5b and 5b' is then folded inwardly so that the inside face thereof, to which adhesive g has been applied, will be brought into contact with the exterior face of the corresponding end wall securing tab 7 or 7', as shown more particularly in Fig. 3. It will thus be noted that two fully assembled collapsed boxes are fully formed and assembled by a single pass through the automatic gluing and folding machine by three relatively simple operations, namely, applying the glue in strip form to the end wall sections 5b and 5b', folding the wing sections of the blank in superimposed relationship along the fold lines 16 and 16', and finally, folding and pressing the end wall sections 5b and 5b' into adhesive contact with the aligned securing tabs 7 and 7'.

The connected but severable pairs of fully assembled collapsed boxes may be stacked in superimposed relationship, as shown in Fig. 3, so as to occupy a minimum of space during shipment and storage. When the boxes are to be packed with merchandise, a connected pair of boxes may be removed from the stack and separated by pulling the two boxes apart along the tear lines 20, as shown in Fig. 4. The tear lines 20 may be such as to permit easy and positive separation by grasping bottom sections 2a and 2b with one hand and bottom sections 2a' and 2b' with the other hand and pulling the collapsed boxes apart. Cover panel 4 easily withdraws from its housed position beneath the side-wall panel 3'.

Each box may be expanded into merchandise-containing position by pinching bottom flap sectors 6b and 6c together at each end of the box, as shown more particularly in Fig. 6, which operation is permitted by reason of the fold lines 17 and 18. When the bottom flap sectors 9b and 9c have been thus pinched together, as by grasping the same with the fingers, pinching tool or other mechanism, each bottom flap 6 may be swung inwardly under the adjacent free edge 25 of the end wall panel, the arcuate edge 26 of each bottom flap being so shaped as to permit this operation. When each bottom flap 6 has been inserted into the box as shown in Fig. 7, the paired sectors 6b and 6c are released and the end panel sections 5a and 5b are brought into alignment, thus forcing each bottom flap 6 to fan outwardly so as to lie substantially flat against the inside face of the adjacent end wall panel 5, as illustrated more particularly in Fig. 8.

Merchandise M is then placed within the expanded box, the merchandise being preferably so positioned and arranged as to occupy the full interior cubical area of the box. After packaging each top wall flap 9 is turned inwardly so as to extend generally perpendicular to its associated end wall panel 5, the cover panel 4 is then folded over the top of the packed box and the tuck-in flap 8 is inserted into the box so as to lie against the inside face of the side wall panel 1, as illustrated in dotted lines in Fig. 9. A suitable sealing strip may be provided, if desired, to seal the box and thus prevent unauthorized removal of the contents.

The box as thus assembled and packed provides a rigid, strong and highly serviceable container for numerous products. When the merchandise is packed in the expanded box and the

top wall flaps 9 folded inwardly, it will be noted that the inwardly turned top wall flaps 9 act as stiffening struts to prevent either inward or outward collapse of end wall sections 6a and 6b, thus holding the hingedly connected end panel sections 5a and 5b in rigid and positive straight wall alignment. The hingedly connected end panel sections 5a and 5b are further held in rigid straight wall alignment by reason of the pressure of the merchandise against the inside faces of the side wall panels 1 and 3, and, finally, the cover panel 4, with the tuck-in flap 8 abutting the side wall 1, also acts as a shape-maintaining end panel strut. It will be further appreciated that when the hingedly connected end wall sections 6a and 6b are rigidly held and maintained in straight wall alignment by reason of the three forces above indicated, the fan-shaped bottom flaps 6 are also maintained in fully expanded form and in close abutting relationship with the inside face of the adjacent end wall panels 5 and, additionally, the bottom panel sections 2a and 2b are also maintained in straight wall alignment.

If desired the cover panel 4 may be so formed as to provide an attractive display easel. When the box is opened to display the merchandise, the tuck-in flap 8 may be inserted between the free end of each infolded top flap section 9b and the inside face of side wall panel 3, as illustrated in Fig. 9, thus holding the cover sections 4a and 4b in erect overlying relationship with the easel tab 23 extending upwardly. It will be appreciated, however, that this cover panel construction may be of simple form without the display easel feature or, as above indicated, the cover panel may be completely eliminated. The cover panel above described has been illustrated in the drawings to indicate the ease with which a more complicated box structure may be made, formed and assembled.

The blanks from which my paired collapsible boxes are formed can be economically produced at a high production rate by scoring and cutting the blanks on an automatic scoring and cutting machine from large sheets or rolls of the selected paperboard material. Paired boxes with or without cover panels may be made and assembled at twice the production rate which would normally be considered very high if only a single box were being made and assembled. Strips of adhesive g may be applied to the inside face of each of the end panel sections 5b and 5b' by suitable automatic gluing mechanism and each panel section 6b and 6b' may be folded inwardly and secured to the outside face of the adjacent end wall securing tab 7 or 7' at a high production rate. The paired boxes are ejected from the box-assembly machine in collapsed condition. The collapsed boxes are stacked together, as shown in Fig. 3, and packed in suitable shipping boxes. A large number of paired collapsed boxes may be contained in a shipping box of limited cubical content.

When the user is ready to pack the merchandise, each collapsed box is expanded by hand or by a suitable automatic jig, which box-expanding operation comprises pinching together of the bottom flap sectors 6b and 6c and then swinging each bottom flap inwardly under the adjacent free edge 25 of the partially collapsed end wall panel 5 so as to position the bottom flap over the inside face of the adjacent end wall panel. The merchandise is then packed within the box and the merchandise during packaging thereof serves to further expand the box so as to bring

the hingedly connected end panel sections 5a and 5b and the hingedly connected bottom panel sections 2a and 2b into straight wall alignment. The top wall flaps 9 are then turned inwardly, providing an end wall bracing strut for each end of the box, the cover panel 4 is brought into closed position, the tuck-in flap 8 inserted into the box and, if desired, a sealing strip applied. My improved box as thus packaged and closed is substantially as stiff and rigid as boxes of the set-up type which do not possess the collapsible feature. My improved box may be produced at even less cost than set-up boxes of the simplest type, and substantial economies can be effected in shipping and storage costs.

While certain novel features of the invention have been disclosed herein, and are pointed out in the annexed claims, it will be understood that various omissions, substitutions and changes may be made by those skilled in the art without departing from the spirit of the invention.

What is claimed is:

1. A collapsible box formed from paperboard material including, an uncut bottom wall panel, oppositely arranged side wall panels hinged to said bottom wall panel, oppositely arranged end wall panels hinged to said side wall panels but otherwise free of said bottom wall panel, said bottom wall panel and end wall panels each having a fold line extending generally parallel to and substantially equidistantly spaced between the side edges thereof thereby permitting substantially flat collapse of said box, a bottom flap hinged to each end of the bottom wall panel having radially extending fold lines radiating from the hinge line defining said bottom flap, said bottom flap having its free edge so shaped when collapsed along said radiating fold lines as to permit insertion thereof under the free edge of the adjacent end wall panel during erection of the box from its collapsed position, and a top flap hinged to each of said end wall panels adapted to be turned inwardly to serve as a box bracing and rigidifying strut.

2. A collapsible box formed from paperboard material including, a bottom wall panel, oppositely arranged side wall panels hinged to said bottom wall panel, oppositely arranged end wall panels hinged to said side wall panels but otherwise free of said bottom wall panel, said bottom wall panel and end wall panels each having a fold line extending generally parallel to and substantially equidistantly spaced between the side edges thereof thereby permitting substantially flat collapse of said box, a bottom flap having a generally arcuate free edge hinged to each end of said bottom wall panel, each of said bottom flaps having at least two radially extending fold lines radiating from the hinge line defining said bottom flap, said generally arcuate free edge and radially extending fold lines permitting manipulation of each bottom flap to effect insertion thereof under the free edge of the adjacent end wall panel during erection of the box from its collapsed position.

3. Paired collapsible box-forming blanks joined together and made from a single sheet of paperboard material, each box-forming blank including a bottom wall panel, oppositely arranged side wall panels hinged to said bottom wall panel, a bottom flap hinged to each end of said bottom wall panel, said bottom wall panel and bottom flaps having a fold line extending parallel to and substantially equidistantly spaced between the hinged side edges of said bottom wall panel, an

end wall panel at each end of the blank, each end wall panel being hinged to one end of a side wall panel but otherwise free of said bottom wall panel, a top flap hinged to each of said end wall panels, each of said end wall panels and top flaps having a fold line therein extending generally parallel to and spaced substantially equidistantly between the side edges of the end wall panel, the top flaps of one box-forming blank being separably connected to the top flaps of the other box-forming blank by severable lines of perforations whereby the paired blanks may be glued and assembled simultaneously into a pair of connected collapsed boxes.

4. Paired collapsible box-forming blanks joined together as an integral structure and formed from a single sheet of paperboard material, each box-forming blank including a bottom wall panel, oppositely arranged side wall panels hinged to said bottom wall panel, a bottom flap hinged to each end of said bottom wall panel, said bottom wall panel and bottom flaps having a fold line extending generally parallel to and substantially equidistantly spaced between the side edges of said bottom wall panel, an end wall panel at each end of the blank, each end wall panel being hinged to one end of the side wall panel but otherwise free of said bottom wall panel, a cover panel hinged to one of said side wall panels, each of said end wall panels having a fold line therein extending generally parallel to and spaced substantially equidistantly between the side edges of the end wall panel, the adjacent end wall panels of said box-forming blanks being separably connected together by a severable line whereby the paired blanks may be glued and assembled simultaneously into a pair of connected collapsed boxes.

5. A pair of collapsed boxes joined together as an integral structure and formed from a single sheet of paperboard material, each box including a bottom wall panel, oppositely arranged side wall panels hinged to said bottom wall panel and arranged in superimposed relationship, a bottom flap hinged to each end of said bottom wall panel, said bottom wall panel and bottom flaps having a fold line therein extending substantially parallel to and spaced equidistantly between the side edges of said bottom wall panel providing superimposed bottom sections and superimposed bottom flap sections, oppositely arranged end wall panels each hingedly connected to the adjacent ends of said side wall panels but otherwise free of said bottom wall panel, a cover panel hinged to one of said side wall panels, each of said end wall panels having a fold line therein extending generally parallel to and spaced substantially equidistantly between the side edges of the end wall panel defining superimposed end wall panel sections, the adjacent end wall panels of said paired collapsed boxes being separably connected together by a severable line whereby the collapsed boxes may be simultaneously glued and assembled while connected together.

6. A pair of connected collapsed boxes formed from a single blank of paperboard material, each box including a bottom wall panel, oppositely arranged side wall panels hinged to said bottom wall panel arranged in superimposed relationship, a bottom flap hinged to each end of said bottom panels, said bottom wall panel and bottom flaps having a fold line therein extending generally parallel to and spaced substantially equidistantly between the hinged side edges of said bottom wall panel providing superimposed,

substantially side-contacting bottom sections, and superimposed, substantially side contacting bottom flap sections, oppositely arranged end wall panels each hingedly connected to the adjacent ends of said side wall panels but otherwise free of said bottom wall panel, a top flap hinged to each of said end wall panels, each of said end wall panels and top flaps having a fold line therein extending generally parallel to and spaced sub-

stantially equidistantly between the side edges of the end wall panel defining superimposed substantially side-contacting end wall panel sections and top flap sections, the top flap sections of the paired boxes being severably connected together whereby the collapsed boxes may be simultaneously glued and assembled while connected together.

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