March 23, 1965 C. W. ROSENBURG, JR 3,174,675

HEXAGONAL CARTONS

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FIG. 1.

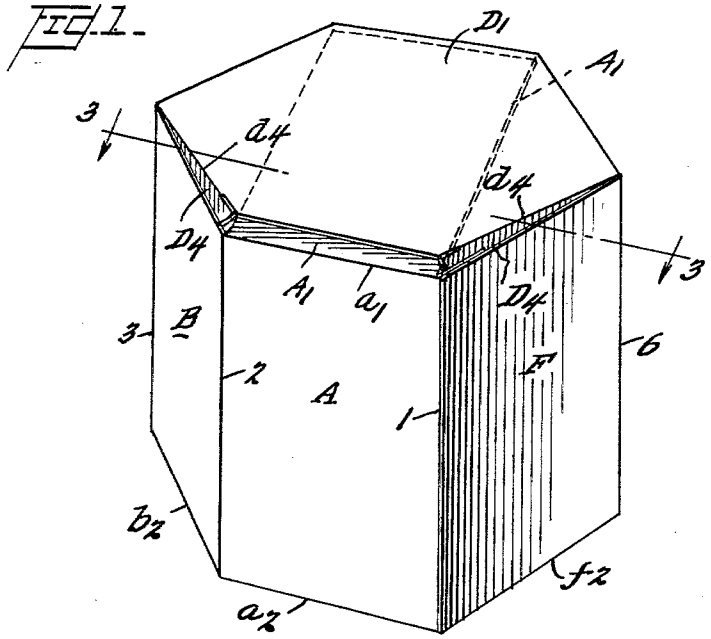
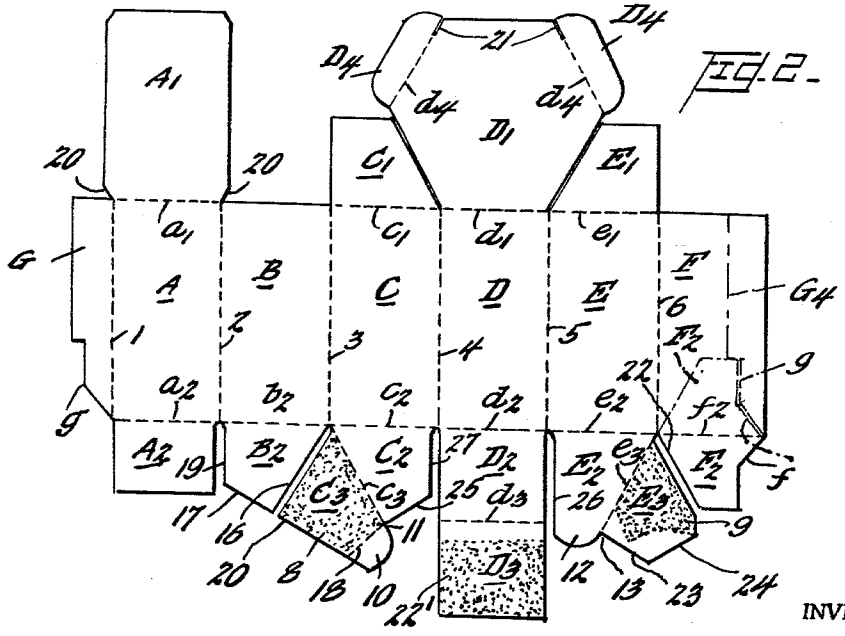


FIG. 2.



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FIG. 3.

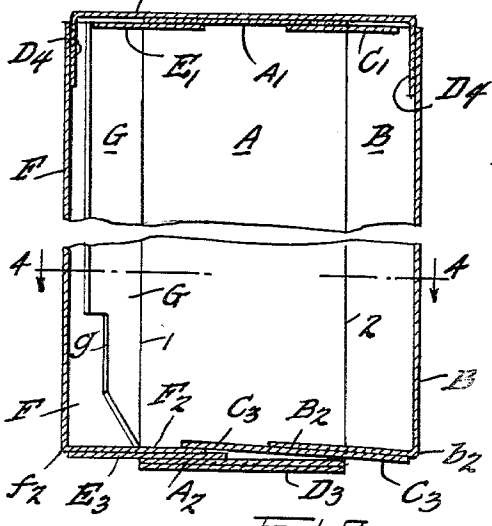


FIG. 4.

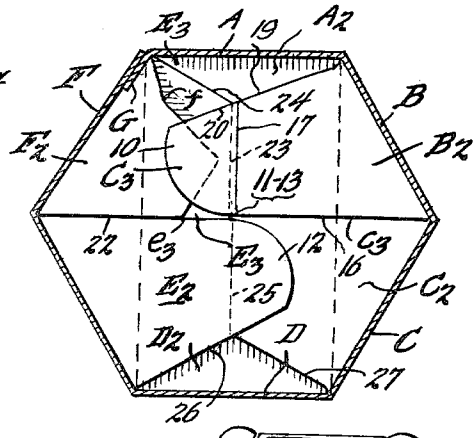


FIG. 5.

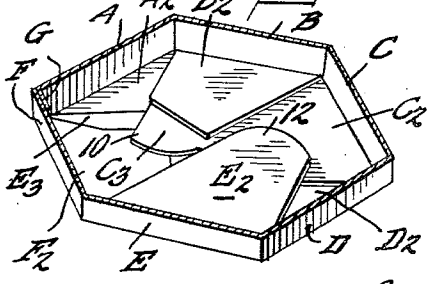


FIG. 7.

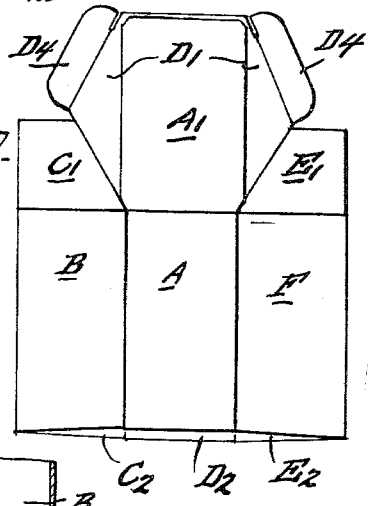
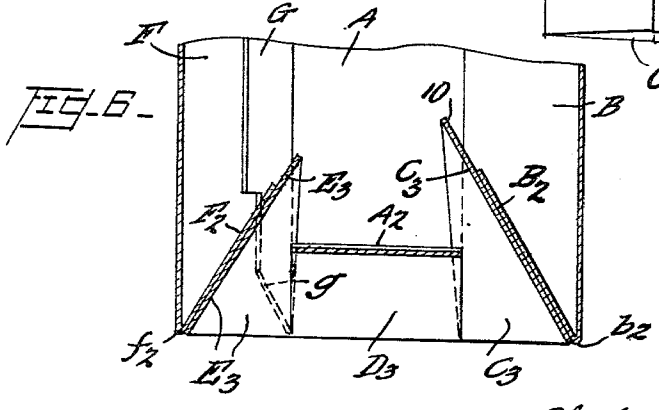


FIG. 6.



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HEXAGONAL CARTONS

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8 Claims. (Cl. 229—41)

This invention relates to foldable boxes or cartons which when erected have the configuration of a hexagonal prism, and more particularly to the collapsible end structures of such cartons.

The general object of the invention is to provide a novel and improved collapsible container or carton of hexagonal section which is of sturdy construction, and has a bottom structure capable of sustaining relatively heavy lading without excessive outward bulging.

One of the principal features of novelty of the container involves the configuration of the six flaps which are hingedly connected to the respective bottom edges of the six side panels. While certain of these flaps are glued to adjacent or opposite flaps, it is noteworthy that two of the flaps which flank a principal diametric cross-over flap, are provided with ears which effect an interlock between these flaps, when the box or carton is erected. This feature, together with the joining of the diametric or cross-over bottom flaps, cooperate to produce a sturdy bottom structure for the support of articles of mechandise of considerable weight.

It is to be noted also that these objects are attained by the use of a one-piece unitary blank of novel configuration and construction.

Other objects and features of novelty will be apparent from the following specification when read in connection with the accompanying drawings in which one embodiment of the invention is illustrated by way of example.

In the drawings:

FIGURE 1 is a view in perspective of a box or container embodying the principles of the invention, the box being in erected condition and with the top closure flaps approaching closed positions;

FIGURE 2 is a plan view of a one-piece blank from which the novel container is formed;

FIGURE 3 is a vertical sectional view taken substantially on line 3—3 of FIGURE 1;

FIGURE 4 is a horizontal sectional view taken on line 4—4 of FIGURE 3;

FIGURE 5 is a fragmentary view in perspective of the inside bottom portion of the box with the upper wall portions broken away;

FIGURE 6 is a vertical sectional view generally similar to FIGURE 3 and taken approximately on line 3—3 of FIGURE 1, but with the carton in semi-collapsed condition, with the bottom flaps buckled inwardly and rising to assume a flat condition as for packing, transportation or storage; and

FIGURE 7 is a diagrammatic plan view showing the carton in approximately fully collapsed condition.

A logical approach to the disclosure of the novel container would be to describe the one-piece blank from which it is made, as it is shown in FIGURE 2 of the drawings. The six principal side panels of the box or container, which are preferably of the same rectangular configuration and dimension are designated A, B, C, D, E, and F. An extension panel G projects from the outward edge of panel A for securement to the inner face of the outer portion of panel F when the box is being set up. It will be readily perceived that these panels are hingedly connected together along the score lines 1, 2, 3, 4, 5, and 6.

When the securing flap or panel G is laid over the edge

of the panel F as suggested in outline at G_4 the blank has assumed a continuous tubular configuration and may be held in its ultimate hexagonal shape with the side wall panels disposed in opposed relationship as follows: A–D; B–E; C–F.

Since the principal novelty of the invention lies in the bottom construction, the top end closure structure will be described only briefly. It is sufficient to point out that a top flap A_1 is hinged to the upper edge of the side panel A as at a_1; the side panels C and E have top flaps C_1 and E_1 hinged respectively thereto along the score lines c_1 and e_1. Finally, the side wall panel D has a substantially hexagonal flap or closure D_1 hinged thereto along the score line d_1, and upward and outer portions of the closure flap D_1 are provided with the insert tabs D_4 foldable along score lines d_4 and provided with slits 21 near their upper portions.

The upper closure devices are folded in usual fashion by turning in the flaps C_1 and E_1, to a substantially horizontal position bending the elongated flap A_1 at right angles to its wall panel A and then bending the closure panel D_1 downwardly to horizontal position, at the same time inserting the tabs D_4 behind the forward portions of the wall panels B and F and straddling the root portion of the flap A_1, the slits 21 cooperating with the bevelled roots 20 of the flap A, to assist in interlocking the cover or closure panel when it is finally brought to horizontal position. The parts are approaching closed position in the view depicted in FIGURE 1 of the drawings.

The novel bottom structure will now be described in reference to the blank shown in FIGURE 2.

A short bottom flap A_2 is hinged along the line a_2 to the bottom edge of the wall panel A. Along the score line b_2 at the bottom of the panel B is connected a bottom flap B_2, of the shape of a trapezium having side edges 15 and 19 and a remote edge 17 of such angularity as will preferably align it approximately with the center lines of wall panels A and D in erected condition as shown in FIGURE 4.

At the bottom edge d_2 of the wall panel D there is hinged a double cross-over flap D_2, D_3 which cooperates with the flap A_2, the parts D_2 and D_3 being joined by a crease or score line d_3.

At the bottom of the panel F there is hinged at f_2 an irregularly shaped bottom panel or flap F_2. It will be noted that the lower portion of the wall securing flap G is cut away in a peculiar angular configuration as at g; and similarly the right-hand margin of the bottom flap F_2 is angularly cut away as at f. As will be more fully described later, this arrangement is to provide an interfitting of the edges of the flaps or tabs G and F_2 when the latter is folded up against the wall panel F (as suggested by the arrow in FIGURE 2), the contour f of the flap F_2 following the contour g of the flap G when it is secured against the panel F. An angularly disposed side edge 22 is designed to extend along a transverse axis of the bottom of the carton as in FIGURE 4.

Now there remains to be described a pair of unusually shaped flaps which not only involve the adhesive securement of portions thereof in assembling the carton but also provide an interlock feature which tends to prevent bottom bulging under load.

At the lower edge of the wall panel C there is hinged as at c_2 the double flap C_2, C_3. These two flap portions are connected by the fold or score line c_3. The inner portion C_2 is trapezium shaped. The outer portion C_3 has a body area 8 which is approximately coextensive with the area of the flap B_2 and adapted to carry a coating of adhesive. The portion C_3 also has a projecting ear 10 which protrudes beyond the edge 25 of the base

flap portion C_2 and provides a notched-out contour indicated at **11**. The portion C_2 also has a side edge **27**, and the portion C_3 has an elongated remote edge **20**. The edge **25** occupies an axial position in FIGURE 4.

The wall panel E is provided at the hinge line e_2 with a double flap E_2, E_3, these flap portions being hinged along the score line e_3. It is the inner or base flap portion E_2 which is provided with an ear in this instance, and this ear is indicated at **12**. The portion E_2 has a side margin **26**. The outer flap portion E_3 is of a configuration which embraces an area suggested at **9** which is coextensive with the area of the adjacent flap F_2. Also the outer edge **23** of the flap portion E_3 makes with the ear **12** of the portion E_2, an angular indentation indicated at **13** and occupies a substantially axial position in approximate alignment with the edges **17** and **25** in the erected carton. An outer edge of the portion E_3 is indicated at **24**.

There will now be described the inter-folding and securement of the bottom flaps which have been broadly indicated above. In the following description, it should be borne in mind that the surface of the one-piece blank shown in FIGURE 2 comprises the inside surfaces of the various parts of the carton.

In the process of bringing the blank to a hexagonal configuration, it is preferred that the outer surface of the securing flap or tab G be coated with adhesive or the inner portion G_4 of the flap coated or both of these areas, and then brought together into firm securement.

Of course it does not matter which of two areas to be adhesively secured carry the glue applications or whether both of them are coated prior to bringing them in contact. Therefore, when it is stated that a certain face of a flap is coated, it shall be taken to mean that this face is to be brought into contact with another face for adhesive securement, regardless of which surface the adhesive is applied to. Thus, the adhesive bearing surface of flap A_2 is on the reverse side of that shown in FIGURE 2; the adhesive coated face of the flap B_2 is also the outside or reverse side; the area **8** of the flap C is coated on the inside; the projecting flap portion D_3 is coated on the inside; the area **9** of the flap E_3 is coated on the inside; and the surface of the flap F_2 which bears the adhesive is the outside one.

Now in bringing the flaps together for adhesive securement, the flap B_2 is brought over the top of the flap portion C_3 until the edge **16** coincides with the fold c_3. The edge **17** extends along the edge **18** of the glue area of flap C_3 and the edge **19** coincides with the edge **20** of the flap C_3. (See FIGURE 4.)

Similarly, the flap F_2 is folded behind the corresponding area **9** of the flap E_3 and adheres thereto, the irregular contour of the flap F_2 being clearly reproduced by the margins of the area **9**. Finally, the outside of flap A_2 is brought into adhesive contact with the area **22'** of the cross-over flap D_3 and the adhesive securement of the various parts of the bottom structure is complete.

Now reference to the remaining figures of drawing will clearly show the inter-action of the bottom flap structures, the parts moving from the erected positions shown in FIGURES 3, 4 and 5, through the intermediate position illustrated in FIGURE 6, to the substantially final collapsed condition suggested in the diagrammatic view of FIGURE 7.

As clearly indicated in FIGURE 6 the united bottom flap structures comprise the cross-over flap arrangement A_2, D_2, D_3, the adhesively secured flaps B_2, C_3 and C_2, and the adhesively secured flaps F_2, E_3 and E_2, are all adapted to be collapsed inwardly or upwardly when the container is folded to flat condition. The flap structures B_2, C_3, C_2 and F_2, E_3, E_2 each having the form of a tent-like structure in intermediate position.

Now in moving from collapsed condition back through the intermediate position of FIGURE 6 toward the positions of FIGURES 3, 4 and 5, the utility and effectiveness of the ears **10** and **12** and the notches **11** and **13** come into play. This is most clearly shown in FIGURE 4 of the drawings where the apices **11** and **13** of the contours of the double flap C_2, C_3 and E_2, E_3, substantially coincide. However, the ear **12** of the second combination overlaps the flap C_2 of the first double flap assembly arrangement. The ear **10** of the first-named assembly overlaps the structure E_3, F_2 of the second-named structure. Thus it becomes impossible for the two combined flap structures to buckle downwardly of the container, but they must hold the position shown in FIGURE 3, unless the material of which the box is composed should rupture. In addition to this interlocking ear structure, the downward bulging of the bottom construction is further deterred by the cross-over band comprised by the flaps A_2, D_3, D_2.

As previously mentioned, during the collapsing of the carton the combined bottom structure E_2, E_3, E_2 moves upwardly toward the planes of the wall panel F and the securing flap G adhering thereto, and the notched edge *f* of the flap portion F_2 interfits with the angled lower portion *g* of the securing tab or flap G.

At the same time the tab edges **17**, **23** and **25** extend approximately along one axis of the bottom structure, and the edges **22** and **16** with the scored hinge lines c_3 and e_3 coinciding substantially with the transverse axis.

It is understood that various changes and modifications may be made in the embodiment illustrated and described herein when departing from the scope of the invention as defined by the subjoined claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. A collapsible carton of hexagoanl prismatic form, comprising a series of six rectangular wall panels hingedly connected along vertical score lines with the terminal edges of said series secured together to form an essentially tubular wall structure when erected; a collapsible end structure for the carton composed of six cooperating flaps, one flap hingedly connected with an end edge of each of said wall panels; the two flaps extending from one pair of oppositely disposed wall panels secured together to form a continuous and permanent strap bridging the end of the carton and resisting separation of said pair of wall panels beyond their positions for hexagonal configuration of the carton; the flaps of each pair of flaps which extend from and are hinged to adjacent wall panels upon either side of said first-named oppositely disposed wall panels, being hingedly secured together to provide collapsible tent-like structures at opposite angular sides of the carton, the two said pairs of adjacent connected flaps and the pair of oppositely connected flaps, when flattened to lie at right angles to the several wall panels constituting the end wall structure of the erected carton; and tongues extending inwardly from the tent-like structures in opposite directions toward the opposite tent-like structure and engaging with the opposite tent-like structures to provide an interlocking connection between the tent-like structures and to prevent the various flaps forming said carton end structure from buckling outwardly beyond the transverse plane of the end structure of the carton.

2. The collapsible carton as set forth in claim 1 in which one of the flaps of each pair constituting the tent-like structures is a double flap comprising a basic proximal flap portion hinged directly to its wall panel, and a distal flap portion hinged to the proximal flap portion, which distal portion is adhesively secured to the other flap of its pair; the interlocking tongue of one of said pair of flaps being formed on the basic proximal flap portion of the double flap of that pair, and the tongue of the other of said pairs being formed on the distal flap portion of the double flap of said other pair.

3. The collapsible carton as set forth in claim 1 in which the flaps of the pair forming the cross-over strap are rectangular and the remaining flaps and flap portions are all substantially trapezium shaped.

4. The collapsible carton as set forth in claim 1 in which an edge of each of said tognues forms an acute angle with an adjacent edge of the adjoining hinged flap portion, the opposite tent-like flap structures interlocking at the apices of said acute angles.

5. The collapsible carton as set forth in claim 4 in which said adjacent edges of the adjoining hinged flap portion lie in substantial transverse axial alignment across the end structure of the carton when in erected condition.

6. The collapsible carton as set forth in claim 1 in which the said end edges of the series of wall panels are secured together by means of a tab hinged to a terminal wall panel of the series and adhesively secured to the opposite wall panel of the series, said tab being angularly cut away near the end structure; and the end flap extending from said opposite wall panel being cut away complementary with respect to the cut-away portion of said tab, whereby the said tab and last-named flap may be disposed in coplanar positions when the carton is collapsed to flat condition.

7. A one-piece blank for the production of a hexagonal prismatic carton, said blank comprising a series of six side wall paenls connected along score lines; a plurality of end-structure-forming flaps extending from the several side wall panels and connected thereto along score lines,

the flaps extending from the first and fourth wall panels in said series comprising cross-over flaps for interconnection diametrically of the end structure in the erected carton; the flaps extending from the second and sixth wall panels being of approximately trapezium configuration and adapted to be connected to the respective adjacent flaps of the third and fifth panels; the third and fifth flaps being double flaps each having a proximal flap portion and a distal flap portion connected along a diagonal score line; one of the flap portions of each of said double flaps having an outwardly projecting tongue, the two tongues adapted to interlock with the flaps of the opposite flap structure in the erected carton.

8. The carton blank as set forth in claim 7 in which one of said tongues is formed on the proximal flap portion of one of the double flaps and the other of said tongues is formed on the distal flap portion of the other of the double flaps.

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