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## CARDBOARD BOX

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6 Claims. (Cl. 229—16)

This invention relates to new and useful cartons or boxes made of cardboard or other similar material, and blanks therefor which are adapted readily to be set up and converted into finished form for the packaging of various articles.

This application is a continuation-in-part of application Serial No. 619,795, filed November 1, 1956, now abandoned, on a Folding Box, and application Serial No. 644,755, filed March 8, 1957, now abandoned, on a Folding Box. The box construction of the present invention relates to improvements in the type of boxes disclosed in these applications, although some aspects of the present invention have a more general application. The boxes disclosed in said above-mentioned applications are made from a single piece cardboard blank and each has a pair of outwardly-bowed main side walls and one or more inwardly-bowed end walls forming a box structure of very attractive design. In the latter of said applications, the box was provided with one or more self-locking end closures each comprising overlapping convex-concavo flaps which, due to the shape thereof and to the rigidity of the carton material, maintained themselves in either closed or opened positions.

It is one of the objects of the present invention to provide a box, especially of the type disclosed in said above application Serial No. 644,755, which is provided with a novel and improved closure means for enabling the box to be more easily opened and closed. In accordance with this aspect of the invention, instead of providing a closure comprising overlapping flaps, a single flap is utilized formed by an extension of one of the main panels making up one of the side walls of the box, which extension is provided with a pair of oppositely bowed fold lines at the base thereof forming a convex-concavo area which, when the flap is pulled down, forms an inwardly-bowed end enclosure wall. The end or outer section of the flap overlies the other outwardly-bowed side wall of the box. The semi-rigid nature of the material out of which the box is made causes the convex-concavo base portion of the flap to maintain its inwardly-bowed shape and to cause the outer section of the flap to hug the outwardly-bowed contour of the box thereby forming a neat looking, securely closed, yet easily opened lid for the box. To open the box it is merely necessary to grasp the end section of the flap and flip it up.

Another one of the objects of the present invention is to provide a box of the type above described wherein only the top end of the box is openable and the bottom end comprises a continuous inwardly-bowed end wall formed integrally with both side walls of the box. An ancillary object of the present invention is to provide a type of box as just described wherein the carton blank is pre-formed into a flat box structure for economy in storing and handling and which may be formed into a completed box by merely expanding the box structure and then, perhaps, folding an extension thereof into a closure flap. In accordance with the invention, the continuous inwardly-bowed bottom end wall is formed by a convex-concavo

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area defined between a pair of inwardly-bowed fold lines extending inwardly of the bottom of the outwardly-bowing main side walls of the box, and a straight fold line is provided in this convex-concavo area extending between the apexes thereof. The latter line enables the box to be flattened into two superimposed halves along a longitudinal or upstanding plane passing through the latter straight fold line.

The carton blank from which the box is made preferably has two similarly shaped main panels having straight aligned longitudinal sides, and which are formed along a straight fold line at adjacent ends of the panels. The above-mentioned convex-concavo bottom end wall forming area is formed by a bowed fold line in each panel extending from the ends of said straight fold line and bowing inwardly of the associated panel.

In accordance with another aspect of the invention, one of said carton blank panels is provided with a lateral securing flap along each straight longitudinal side thereof, which flap is adhesively or otherwise secured on the outside of the other panel of the carton blank. It can be shown that where such flaps are secured around the outside rather than the inside of the box panel, a substantially stronger box results.

Other objects, advantages and features of the present invention will become apparent upon making reference to the specification to follow, the claims and the drawings wherein:

Fig. 1 is a perspective view of the most preferred form of the present invention;

Fig. 2 is a plan view of the cardboard blank from which the box of Fig. 1 is constructed;

Fig. 3 is a view of the carton blank in Fig. 2 fabricated into a structure which has been flattened or collapsed to form a very compact unit;

Fig. 4 is a longitudinal sectional view of the box in Fig. 1, taken along section line 4—4;

Fig. 5 is a transverse sectional view through the box, taken along section line 5—5 in Fig. 4;

Fig. 6 is a fragmentary perspective view of the top of the box showing the closure flap in its open position;

Fig. 7 is a plan view of a carton blank from which a modified form of the present invention can be constructed;

Fig. 8 is a longitudinal sectional view through the completed box constructed from the blank of Fig. 7; and

Fig. 9 is a view of the box of Fig. 8 which has been flattened to form a compact unit.

Referring to the embodiment of the invention shown in Figs. 1 through 6, the box, generally indicated by reference numeral 2, in its ready-to-use condition is a wedge-shaped structure comprised of front and rear main side walls 4 and 6 having straight longitudinal margins which intersect at relatively sharp angles to form lateral side edges 8—8. The bottom of the box preferably has an inwardly-bowed end wall 10 bridging and integral with the entire bottom margins of the side walls. The top of the box has a flap 12 extending from the rear outwardly-bowed side wall 6. The closure flap has a convex-concavo base section 12a forming an inwardly-bowed end closure wall and an outer section 12b which overlaps and closely follows the contour of the front outwardly-bowed side wall 4. Extending around the rear of the box from the straight longitudinal sides of the front side wall 4 are a pair of securing flaps 14—14 which are adhesively or otherwise secured to the outside of the rear side wall 6. The securing flaps 14—14 are on the outside rather than the inside of the box because this greatly increases the strength of the box in that it inhibits the splitting thereof along the longitudinal sides of the box. To open the box, the flap is pulled back as shown in Fig. 6, and to close the box the flap is pulled down over the front side wall 4. The flap snaps into its closed position and remains

there due to the inherent rigidity of the material out of which the box is made and the convex-concavo shape thereof.

The bottom, continuous, inwardly-bowed end wall 10 is provided with a center fold line 16 which enables the complete collapsing of the box structure into the almost planar shape shown in Fig. 3. The flap 12 must, of course, be pulled back to enable the collapsing of the box in this manner. This collapsible feature of the box is important because it facilitates storage and shipment of the boxes in compact stacks while enabling setup of the boxes and the subsequent closure of the boxes when filled by simple unfolding and flap turning operations.

The box 2 is made from a single-piece carton blank shown in plan in Fig. 2. The material out of which the carton blank is made is preferably a thin semi-rigid material, such as cardboard, provided most advantageously with a finished outer ply with suitable advertising and ornamental indicia printed or otherwise applied thereto. The blank has two adjacent complementary main panels 4 and 6 of the same size and shape (the various parts of the blank will, in most cases, be numbered in accordance with the parts of the box structure which they form). The panel 6 has parallel, straight longitudinal side edges 17—17 which are respectively in alignment with the parallel straight, longitudinal sides 18—18 of the other panel 4. The two main panels 4 and 6 are joined along a straight fold line 16 extending transversely of the longitudinal panel sides and formed by scoring the inside of the carton blank. The panels 4 and 6 have bowed fold lines 20 and 21 extending inwardly of the respective panels from the ends of the straight fold line 16 at the corner of the panels to form a convex-concavo area 10. The fold lines 20—21 are formed by scoring the inside of the carton blank. The fold lines 20—21 shown have generally straight inclined outer portions joined by rounded intermediate portions 20'—21', respectively. The convex-concavo area 10 defined between the bowed fold lines 20—21 is bisected by a straight fold line 16 formed by scoring the inside of the carton blank and extending between the apexes thereof. The outer end margin of the panel 6 is defined by an inwardly-bowed fold line 24 extending between the outer corners of the panel. The marginal fold line 24 has the same size and shape as the score line 21 at the bottom of the panel 6 except that it bows in the opposite direction. The outer end edge of the other panel 4 has an inwardly-bowed edge 26 extending between the outer corner of the panel and which is of the same size and shape as the score line 20 at the top of this panel except that it bows in the opposite direction. Thus, when the two panels 4 and 6 are superimposed, their longitudinal straight side margins 17—18 and 17—18 are in registry with one another and the inwardly-bowed edge 26 of the panel 4 extends along the inwardly-bowed fold line 24 at the top of panel 6.

Projecting longitudinally of the panel 6 is a closure flap-forming portion or extension 12. The closure flap-forming portion 12 has near the base thereof an internal bowed fold line 32 formed by scoring the inside of the carton and extending from the ends of the margin bowed fold line 24 at the corners of the panel 6. The internal bowed fold line 32 has the same size and shape as, and bows in the opposite direction to, fold line 24, and thus forms therewith a convex-concavo area 12a at the base of the closure flap-forming portion 12 which is of the same size and shape as the aforementioned convex-concavo area 10. The closure flap-forming portion 12 has an outer rounded section 12b beyond the internal bowed fold line 32 which has a length which is in the neighborhood of from  $\frac{1}{3}$  to  $\frac{1}{2}$  the length of panels 4 or 6.

Extending laterally from the straight longitudinal side margins 18—18 of the panel 4 are side securing flaps 14—14. The securing flaps 14—14 are shown to have rather irregular, curved outlines, since this adds to their attractiveness, but they may have other shapes, such as rectangular,

if desired. Respective straight fold lines are formed by scoring the inside of the carton blank at the juncture between the securing flaps 14—14 and the panel 4.

To fabricate the box 2, the carton blank is first folded along the straight fold line 16 between panels 4 and 6 to bring the panels into superimposed relation. Then securing flaps 14—14 are adhesively or otherwise secured along substantially their entire inner surface areas to the outside surface of the panel 6, to form the flattened box structure shown in Fig. 3. The expanded box structure shown in Fig. 1 is obtained by pushing-in the bottom of the flattened structure to form the inwardly-bowed bottom end wall 10 which separates the portions of the panels 4 and 6, between the convex-concavo areas 10 and 12a to form the above-mentioned outwardly-bowed side walls. The rigidity of the carton blank material is sufficient to maintain the inwardly-bowed shape of the bottom closure wall 10 and hence the expanded wedge or tapered shape of the box.

After the box is filled, the outer section 12b of the flap 12 is pulled down. Automatically, the convex-concavo area 12a of the flap snaps into an inwardly-bowed shape to form an inwardly-bowed end enclosure wall for the box, and the end portion 12b of the flap is held closely against the outwardly-bowed wall 4 by the inherent rigidity of the carton material.

The box of the present invention is thus a highly attractive container of relatively irregular and unconventional shape, which can be simply and inexpensively made from a single piece of cardboard material suitably scored to form the various folds of the resultant box structure. Moreover, the box can be repeatedly easily opened and closed by merely alternately snapping the flap 12 up and down.

Figs. 7 through 9 show a somewhat less preferred form of the present invention which has the advantageous closure flap structure just described. The modified box structure is shown generally by reference numeral 2' and has oppositely outwardly-bowed main side walls 4' and 6', an inwardly-bowed bottom wall 10' formed by overlapping convex-concavo flaps 10a' and 10b' extending respectively from the walls 4' and 6', and closure flap 12'. Closure flap 12' has a convex-concavo base portion 12a' which forms an inwardly-bowed end wall at the top of the box, and an outer section 12b' closely hugging the outwardly-bowed contour of the outwardly-bowed side wall 4'. The flattened box structure shown in Fig. 9 can be obtained by pulling back overlapping flaps 10a' and 10b' and the closure flap 12' and collapsing the resultant box.

The blank from which the modified box 2' is formed is shown in Fig. 8 and comprises laterally adjacent panels 4' and 6' separated by a straight fold line 35. Panel 6' has a longitudinal straight outer side edge 17 parallel to the straight fold line 35, and the panel 4' has a corresponding straight longitudinal outer side margin 18 also parallel to the fold line 35. Extending longitudinally from the panel 4' is a closure flap-forming portion 12' substantially of the same construction as the corresponding flap-forming portion 12 of the blank shown in Fig. 2, except that the associated oppositely-bowed fold lines 24'—32' defining the convex-concavo area 12a' each have a circular segmental shape rather than the sharper angled straighter fold lines 24—32 previously described.

Extending between the bottom corner of panel 6' is an internal, circular segmental, inwardly-bowed fold line 20'. The bottom margin 37 of the panel 6' has a circular segmental, outwardly-bowed contour which forms with fold line 20' a convex-concavo area 10a'.

The upper margin of the other panel 4' has an inwardly-bowed contour 39 of a circular segmental shape corresponding to the shape of the score line 24' at the top of the panel 6'. The panel 4' has near the bottom thereof an inwardly or upwardly bowed circular segmental fold line 26' extending between the bottom cor-

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ners thereof and of the same size and shape as, and similarly positioned to, the score line 20' at the bottom of the panel 6'. The bottom margin 41 of panel 4' has an outwardly-bowed, circular segmental contour which forms with fold line 26' a convex-concavo area 10b.

Extending from the straight longitudinal outer side margin 18 of the panel 4' is a securing flap 14' of generally rectangular shape but having bevelled end edges 43—43, so that, when the flap 14' is turned-in, the outer end edges thereof will not extend beyond the inwardly-bowed panel edge 39 and the inwardly-bowed fold line 26'.

To fabricate the modified box structure 2' from the blank shown in Fig. 8, the blank is first folded along the longitudinal fold line 35, and securing flap 14' is turned in and adhesively secured to the inner surface of the panel 6'. The resultant structure is shown in Fig. 9, which, as illustrated, has a substantially flat structure which is adapted to occupy a minimum of space. To complete the fabrication of the box 2', the convex-concavo areas 10a' and 10b' of the panels 6' and 4' are successively folded to form inwardly-bowed overlapping closure walls. When this is done, the box body is expanded into the form shown in Fig. 8 having the outwardly-bowed main side walls 4' and 6'. The top of the box is closed by merely pulling the flap 12' down, the flap locking into its closed positions as the convex-concavo area 12a' thereof snaps into an inwardly-bowed shape.

It should be understood that numerous modifications may be made of the most preferred forms of the invention above described without deviating from the broader aspects of the present invention.

What I claim as new and desire to protect by Letters Patent of the United States is:

1. A box made from a single piece folded carton blank of semi-rigid material and comprising opposed outwardly-bowed side walls having opposite straight sides joined together to form parallel straight side edges, and a self-locking flap at one end of said box which flap is formed from an extension of one of said outwardly-bowed side walls, said flap having a first convex-concavo base portion forming an inwardly-bowed end wall of the box and joining said latter side wall along an inwardly bowed fold line which fold line intersects the adjacent ends of said straight side edges of the box, and said flap having an outer portion which overlies the other outwardly-bowed side wall, said flap being held in its box-closing position with said convex-concavo base portion assuming an inwardly bowed shape by virtue of the rigidity of the material out of which the flap is made and the aforesaid relationship thereof with the rest of the box.

2. A box made of a semi-rigid cardboard or cardboard-like material comprising a first pair of opposite outwardly-bowed side walls meeting at their confronting sides in parallel edges, one of said side walls having a closure flap at one end thereof, said closure flap joining said latter side wall along a first marginal fold line bowing inwardly of the latter wall and terminating at the corners thereof, the other side wall having a flapless inwardly-bowed edge located in the same relative position as said inwardly-bowed marginal fold line, said flap having an internal bowed fold line which joins the ends of said marginal bowed fold line and bows in the opposite direction thereto, said internal fold line of the flap being positioned along said inwardly-bowed edge of said other side wall, and the portion of the flap located outside of said internal fold line overlying and hugging said other outwardly bowed side wall, the inside of the box being exposed by the mere pulling back of said flap.

3. A box structure comprising a completed but flattened structure adapted to be formed into an expanded box comprising: superimposed panels of semi-rigid material having confronting longitudinal straight sides and

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joined together along a straight fold line at the bottom of the structure which line extends at right angles to said confronting straight sides, each of said panels having adjacent the bottom thereof a bowed fold line extending inwardly of the associated panel and extending between the ends of said straight fold line, and the portion of said box panels between said last-mentioned bowed fold lines being adapted to form an inwardly bowed bottom wall when the bottom end of the box structure is pushed inwardly to separate the confronting panels of the box.

4. A box structure comprising a completed but flattened structure adapted to be formed into an expanded box comprising: superimposed panels of semi-rigid material having confronting longitudinal straight sides and joined together along a straight fold line at the bottom of the structure which line extends at right angles to said confronting straight sides, each of said panels having adjacent the bottom thereof a bowed fold line extending inwardly of the associated panel and extending between the ends of said straight fold line, the portion of said box panels between said last-mentioned bowed fold lines forming an inwardly bowed bottom wall when the bottom end of the box structure is pushed inwardly to separate the confronting panels of the box, and a flattened closure flap-forming means extending from the top end of at least one of said panels and forming a self-locking inwardly-bowed top closure wall for the box when the box is expanded and the flap-forming means is pulled down over the top of the box, said closure flap-forming means extending generally in the plane of the flattened box structure.

5. A box structure comprising confronting outwardly-bowing panels of semi-rigid material having confronting longitudinal straight sides, respective securing flaps extending from the straight sides of one of said panels and secured around the outside of the other of the panels together, each of said panels having adjacent the bottom thereof a bowed fold line extending inwardly of the associated panel, and the portion of said box panels between said last-mentioned bowed fold lines forming an inwardly bowed bottom wall when the bottom end of the box structure is pushed inwardly to separate the confronting panels of the box.

6. A one-piece carton blank for a box comprising: adjacent panels of approximately the same size and shape each having straight, parallel opposite sides in alignment with the corresponding sides of the other panel and adapted to form outwardly-bowed box side walls meeting along said parallel straight panel sides, respective securing flaps extending from the straight sides of one of the side panels and adapted to be secured around the outside of the other panel to secure the straight sides of said panels together, a straight fold line at the juncture of panels and extending at right angles to said straight sides thereof, said panels additionally having adjacent the juncture thereof respective oppositely bowed fold lines terminating at the ends of said straight fold line and respectively extending inwardly of the associated panels, the area between said bowed fold lines forming a convex-concavo area adapted to form an inwardly-bowed end closure wall and said straight fold line permitting the completed box to be longitudinally flattened, the outer end of one of said panels having an inwardly-bowed contour which terminates at the corners thereof, the corresponding outer end of the other panel having a closure flap-forming portion extending therefrom in a direction generally parallel to the straight sides thereof and joining said latter panel along a first bowed line extending inwardly of such panel and terminating at the corners thereof, said closure flap-forming portion having an internal bowed fold line bowing in the opposite direction from and extending between the ends of said first bowed

fold line whereby to form therewith a convex-concavo area which is adapted to form an inwardly-bowed end closure wall, and said closure flap-forming portion having a section beyond said internal bowed fold line thereof which, when the box blank is formed into a completed box structure, overlies the side wall of the box from which it does not extend.

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