

[54] **METHOD FOR FORMING CARTON**

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[73] Assignee: **Xepex Industries, Inc.**, Beverly Hills, Calif.

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[21] Appl. No.: **332,426**

Related U.S. Application Data

[62] Division of Ser. No. 139,502, May 3, 1971, Pat. No. 3,749,300.

[52] U.S. Cl. **93/49 M, 93/36.8, 93/39.1 P, 93/55.1 P**

[51] Int. Cl. **B31b 49/02**

[58] Field of Search **93/36.8, 39 R, 39.1 R, 93/39.1 P, 49 R, 49 M, 53 R, 53 M, 53 BF, 55 R, 55.1 R, 55.1 P**

[56] **References Cited**

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Primary Examiner—Roy Lake

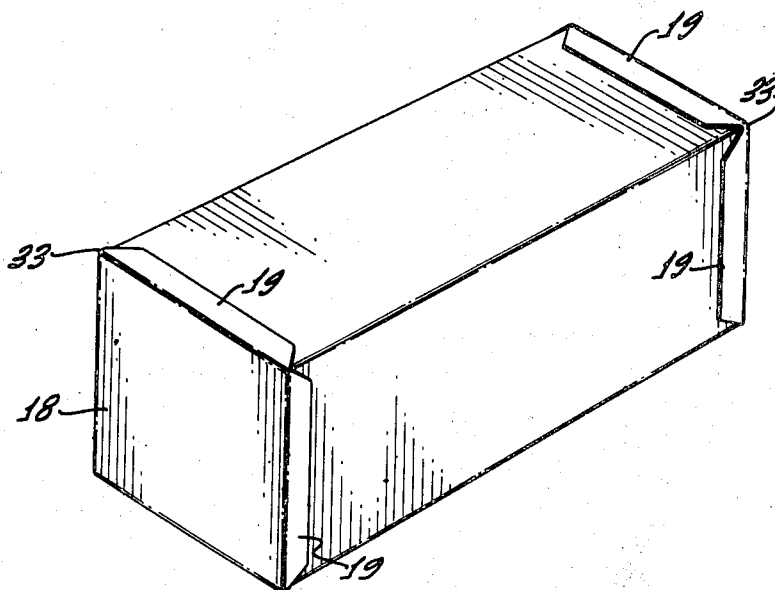
Assistant Examiner—James F. Coan

Attorney, Agent, or Firm—Fowler, Knobbe & Martens

[57] **ABSTRACT**

A one-piece blank which may be formed into a liquid-tight carton without the employment of a mandrel during the forming process is T-shaped and is comprised of side-wall panels integrally interconnected and numbering three or more to provide a carton of polygonal cross-section. One of the side wall panels has integrally connected carton end panels to be folded down upon and sealed to sealing flaps of the other side panels, after the side panels have been bent around into the configuration of an open ended tube and the ends of the blank thus brought together and adhesively interengaged to form a longitudinal seam. The end panels are also provided with sealing flaps which are folded down upon and sealed to the outside surfaces of the other side panels, thus providing internal and external liquid-tight seals.

8 Claims, 7 Drawing Figures



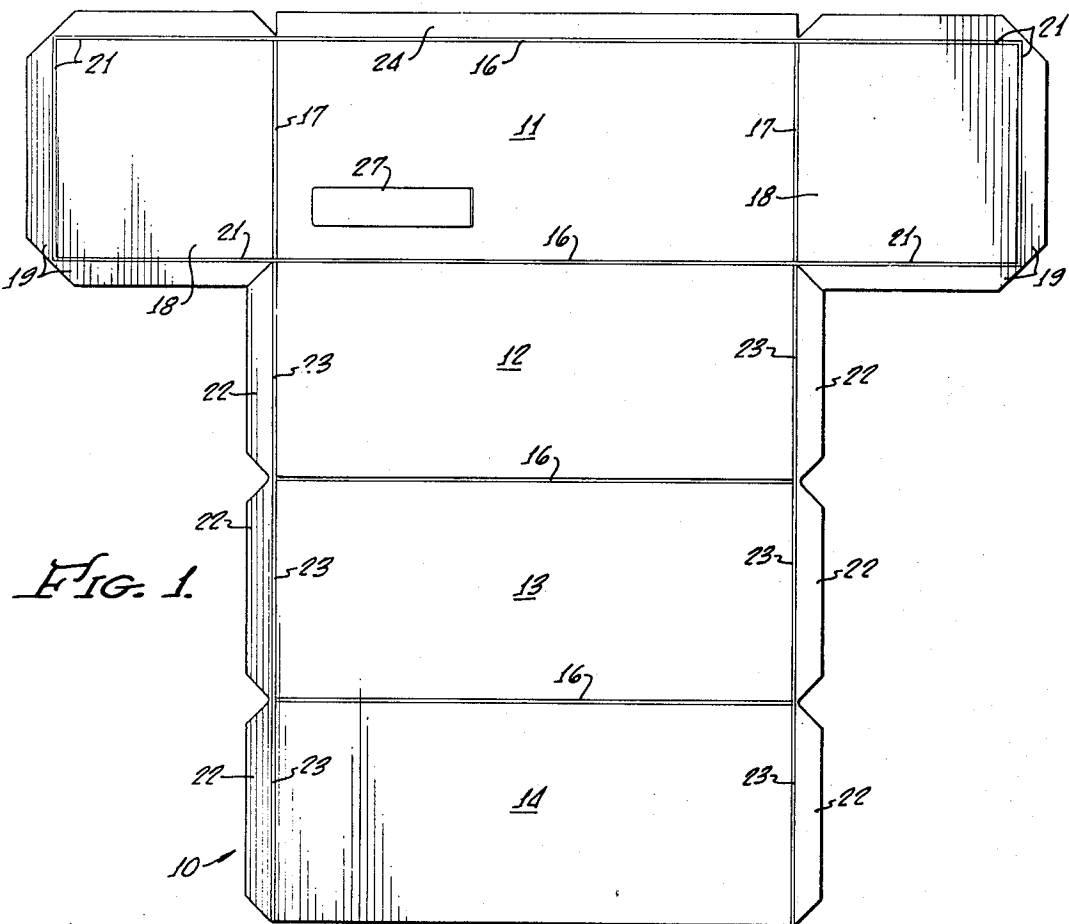


FIG. 1.

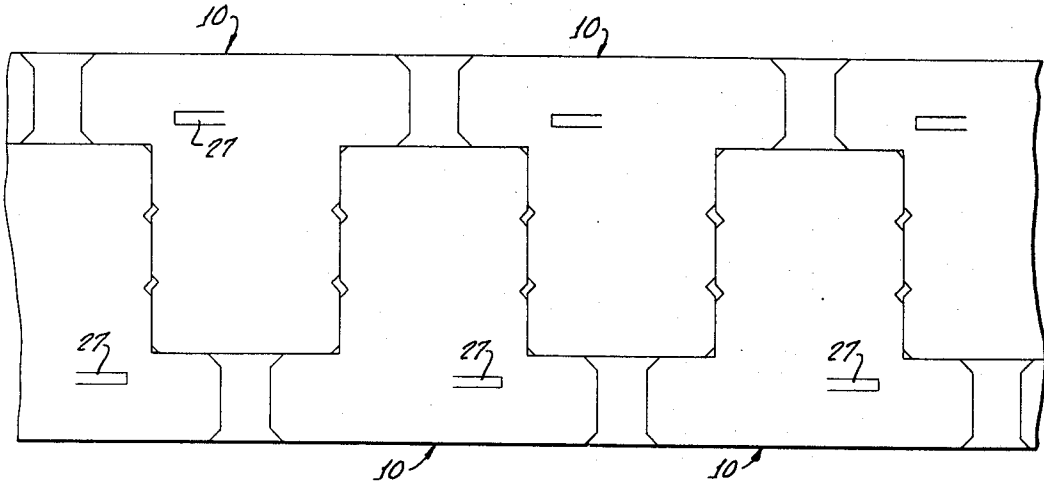


FIG. 2.

FIG. 3.

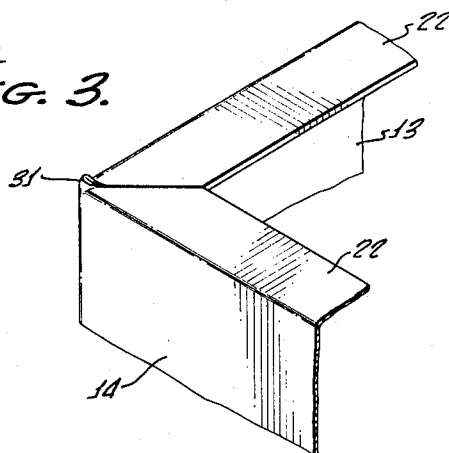


FIG. 4.

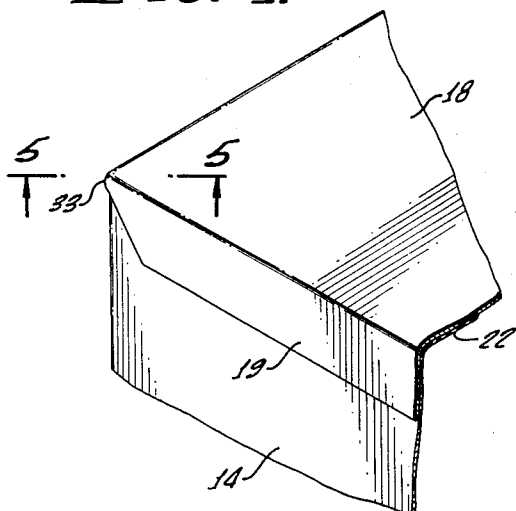


FIG. 5.

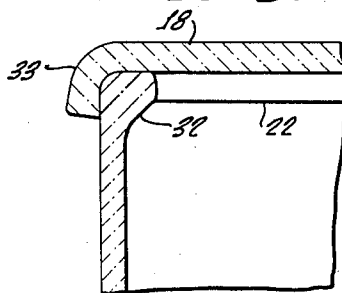


FIG. 6.

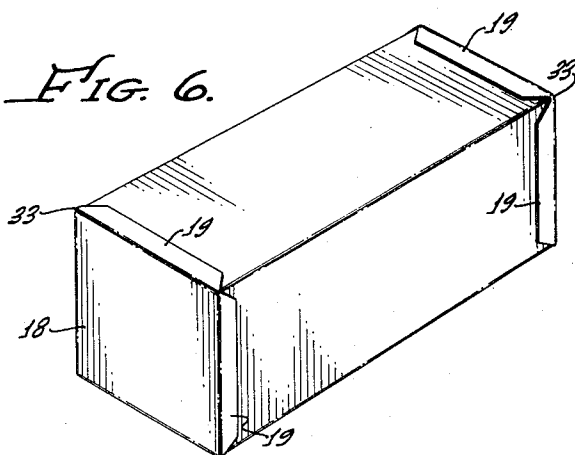
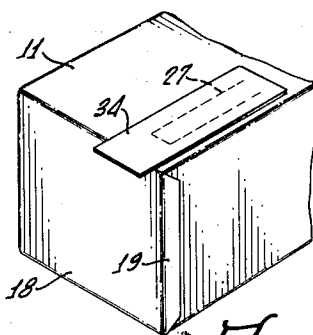


FIG. 7.

METHOD FOR FORMING CARTON

RELATED APPLICATION

This application is a division of application Ser. No. 139,502, filed May 3, 1971, which matured into U.S. Pat. No. 3,749,300, granted July 31, 1973.

BACKGROUND OF THE INVENTION

Heretofore, cartons for marketing beverage types of liquids have been for the most part one or the other of two types. One of these types consists of four separate component parts. These parts are an open ended tubular body, two end closure members which are crimped upon and adhesively interengaged with the ends of the tubular body and a closure cap or plug that is liftably attached to one of the end members and closes an access orifice in that member. The production of such a carton is rendered complex by the necessity for handling and sealing together the several component parts.

The other type of carton is derived from a one-piece blank of sheet stock comprised of four side-wall panels that may be folded around to form an open ended tube, each side-wall panel having at each end a closure flap component, each such component being generally rectangular and having an area at least equal to and in some instances exceeding one half the area of the cross-section of the tubular portion. In the case of those closure flaps that form the bottom of the carton, two of them have scoring lines intersecting at the midpoint of the free edge of the flap to form a right angle and extending to the inner corners of the flap. These two flaps are associated with opposite side-wall panels and when they are folded inwardly toward each other they break up into three triangles, two small ones folding in upon and substantially completely covering the larger one to form double-thickness end-wall components of isosceles-triangle configuration with a combined area equal to one-half the cross-sectional area of the tube. The other two side panels fold in upon and cover the double-thickness areas of the two triangles and the two triangular areas left uncovered by the double-thickness triangles, and in addition they overlap each other to some extent. The resulting carton end, when completed, consists of three to four thicknesses of sheet stock where the outside flaps overlap the triangular ones, and each other, and a single thickness in other areas. In order to effect the closure of the bottom of the carton it is necessary to insert a mandrel into the tubular body of the carton from the top and bring it into engagement with the folded-in closure flaps at the bottom, and to apply pressure and heat at the bottom of the carton from the outside in order to melt polyethylene with which the sheet stock is coated, thereby to bring about adhesive interengagement of the components. The mandrel is required as a backing against which the pressure is applied from the outside and the heat must pass through layer after layer of the stock in order to melt the polyethylene coating on the innermost layers.

Following the completion of the bottom of the carton the mandrel must be withdrawn to enable the top closure flaps to be processed. Two opposite ones of the top closure flaps have scorings which delineate a multiplicity of triangles but instead of folding the four flaps down into a flattened assemblage two are folded in and

bent upon the scoring lines delineating the triangles and the other two are brought together at the center in abutting rather than overlapping relation to form a sloping roof-like end. As in the case of the bottom of the carton heat for melting the polyethylene must penetrate superimposed layers of paper stock in order to reach the innermost polyethylene coating.

BRIEF DESCRIPTION OF THE INVENTION

The present invention relates to a blank for forming a carton, particularly a carton to contain liquids, and to the carton formed therefrom. The blank is of relatively stiff material such as paperboard and is of T-shaped configuration. Scoring indentation lines delineate side-wall panels and end panels, and the head of the T is comprised of one of the side-wall panels with an end panel integral therewith at each end. The upright portion of the T-shaped blank is comprised of additional side-wall panels, at least two in number, so that when the scoring indentation lines are flexed and the free edge of the side-wall panel at the bottom of the T is brought around to engage the free edge of the side-wall panel in the head of the T a tube of polygonal cross-section will be produced.

At each end of the side-wall panel sections in the vertical part of the T there is a narrow sealing flap delineated by a scoring indentation line. Similarly at the free edge of the side-wall panel in the head of the T there is a sealing flap delineated by a scoring indentation line, and on each free edge of the end panels that are attached to the top side-wall panel there is a sealing flap delineated by a scoring indentation line.

In closing the ends of the carton following the formation of a tube, the scoring lines delineating the end panels and the sealing flaps having been limbered by flexing at the scoring lines, the end panels may be brought down simultaneously into closure relation to the tube, with their inner surfaces brought into engagement with the sealing flaps of the side-wall panels in the vertical part of the T. Also the sealing flaps associated with the end panels are brought down into engagement with the outer surfaces of the side-wall panels in the vertical part of the T. The overlapping elements having been conditioned for adhesive interengagement, either by the application of an adhesive material or by activation of an adhesive coating on the blank, and with pressure applied against the two ends in a manner to confine the sealing flaps of the end panels, a liquid tight closure may be effected. The tube itself, comprised of side-wall panels folded around at the scoring indentation lines, provides adequate longitudinal rigidity to resist all of the pressure that is needed to effect closure of the ends, so that the two ends may be closed simultaneously and no mandrel or other reinforcing member is required to be used in effecting the closure of the ends.

By using a T shaped blank for the formation of a carton the blanks may be derived, with minimum wastage, from paperboard stock in strip form, by punching the blanks from the stock in a running pattern of inversions, each blank as derived from the stock being inverted relative to the ones adjacent to it on each side.

BRIEF DESCRIPTION OF THE DRAWINGS

For a complete understanding of the invention reference may be had to the following detailed description to be interpreted in the light of the accompanying drawings wherein:

FIG. 1 is a plan view of a carton blank in accordance with a preferred embodiment of the invention;

FIG. 2 is a schematic view showing a pattern for derivation of blanks from a strip of stock by a punching operation;

FIG. 3 is a fragmentary perspective view showing the joiner of sealing flaps during the operation of closing the ends of the carton;

FIG. 4 is a fragmentary perspective view of the end of a carton upon completion of the closure;

FIG. 5 is a vertical sectional view taken generally on the line 5-5 of FIG. 4;

FIG. 6 is a perspective view of a completed carton oriented to show two side-wall panels with the sealing flaps of the end panels in engagement with the outer surfaces of the side-wall panels; and

FIG. 7 is a fragmentary perspective view of a completed carton similar to FIG. 6 but with the side-wall panel to which the end panels are attached shown at the top.

DETAILED DESCRIPTION

Referring now to the drawings and particularly to FIG. 1 the reference numeral 10 designates a blank of T-shaped configuration, from which a complete carton, sealed to be liquid-tight, may be derived without requiring any other carton body components. The blank is comprised of four carton side wall panels 11, 12, 13 and 14 separated or delineated by indentation lines or scorings 16 along which folding of the blank into carton configuration may take place. The wall panel 11 has integral therewith, and delineated by indentation lines or scorings 17 the carton end panels 18 which, in the particular instance are square because the four side wall panels 11, 12, 13 and 14 are shown as being of equal width. If two of the side-wall panels were to be of different widths than the other two, in alternation among the four, the resulting carton would be of rectangular cross-section and not square and the end panels 18 would accordingly be rectangular but not square. If there were only three side-wall panels instead of four the end panels would of course be triangular.

The end panels 18 have marginal sealing flaps 19 delineated by the indentation or scoring lines 21. The side-wall panels 12, 13 and 14 have at their ends sealing flaps 22 delineated by indentation or scoring lines 23. Along its free edge the side-wall panel 11 is provided with a sealing flap 24 delineated by the indentation or scoring line 26. Finally, in the case of a carton particularly adapted to hold potable liquids and provided internally with a sipper as taught by Kalajian U.S. Pat. No. 3,259,297 granted July 5, 1966, the side-wall panel 11 is provided with a closure flap 27 adjacent to one end of the panel and extending parallel to the long dimension of the side wall panel 11. The flap is produced by cutting through or so nearly through the side-wall panel 11 as to enable the flap to be lifted readily up out of the plane of the wall panel 11 to reveal an access orifice, and is produced by making two longitudinal cuts and one transverse cut so that the flap remains integrally attached to the wall panel 11.

With the exception of the sealing flap 24 the ends of all others of the sealing flaps, namely the flaps 19 and 22 are cut away at an angle of about 45°. In the case of the sealing flaps 19, the cutoff point is spaced a relatively small distance from the intersection of two adjacent indentation or scoring lines 21 so that there is a small amount of stock between the line defining the ends of two adjacent sealing flaps 19 and the intersection of the two adjacent scoring lines 21. In the case of the end of the flap 19 of an end panel 18 that is adjacent to an end of a sealing flap 22 of the side-wall panel 12, the ends of these two flaps abutting in the blank, their separation does not extend to the intersection of the scoring line 17 and the scoring line 16 between the side-wall panels 11 and 12. In the case of adjacent ones of the sealing flaps 22 of the side-wall panels 12, 13 and 14 the confronting ends of two of the sealing flaps form a V-notch. The angle between the two confronting ends of the adjacent flaps outlining the V-notch is approximately 90° but the confronting ends are so located that if they intersected in a right angle that intersection would barely or not quite coincide with the end of the scoring line 16. In order to assure the provision of a small space between the base of the V-notch and the scoring line, the sides of the notch terminate short of a right angle and are joined in a curve which may be an arc of a circle. The straight sides of the notch may have a relation of tangency to the arc. In other words the V-notch at its base is not a right angle but is rounded.

Copending Application Ser. No. 139,399 filed on May 3, 1971 by Charles Wright Jones and Dwight L. Stetler and assigned to the assignee of the present application discloses apparatus for forming a carton from a blank of the type herein disclosed. As disclosed in that application the steps preparatory to folding the blank into a carton are the limbering of all of the scoring lines by flexing the several component parts of the blank about those lines. Next the side-wall panel 11 which has associated with it the end panels 18 is bent back upon the side-wall panel 12 and the side wall panel 14 is bent back upon the side wall panel 13 and brought into overlapping relation to the sealing flap 24 of the side-wall panel 11. A longitudinal seal is then effected by adhesive interengagement of the outer surface of the sealing flap 24 with the inner surface of the side wall panel 14 marginally along the free edge thereof. This forms an open ended tube which is then expanded to its rectangular cross-section. Finally the end panels 18 are bent down into surface engagement with the sealing flaps 22 of the side-wall panels 12, 13 and 14, bending the sealing flaps into generally right angled attitude with respect to their side-wall panels and bending the sealing flaps 19 of the end panels 18 down into surface engagement with the outer surfaces of the side-wall panels 12, 13 and 14 marginally at their ends. Prior to this the portions that are to be overlapped are made adhesive, by the application of liquid adhesive or by the activation of a coating, and pressure is applied to the end panels 18 at the opposite ends of the carton, with the sealing flaps 19 confined in close contact with the outside of the side-wall panels 12, 13 and 14 until the adhesive has set. In one embodiment of the invention the blank is coated on both surfaces with polyethylene, which renders it impervious to liquids of the type that it is intended to contain, and the polyethylene may be melted in the areas of the surfaces

that are to be interengaged, and upon cooling the polyethylene sets and a liquid-tight seal is established.

FIG. 3 shows in perspective a corner of a carton in the process of being formed from a blank 10, at the point where the sealing flaps 22 of two of the side panels, which may be the side panels 13 and 14, have been brought down into the positions that they will occupy in the completed carton. The bringing of these two flaps down into this position is accomplished by the bringing of the end panel 18 into end closing position but the end panel 18 has been omitted from FIG. 3 in order to show the corner. The bending of the flaps 22 into this position results in the closing of the V-notch, and with a 90° angle between the two sides of the notch it closes completely, bringing the ends of the sealing flaps 22 into abutting relation and permitting them to be sealed together by means of the adhesive. Because of the arcuate intersection of the edges of the V-notch short of the scoring lines 23 along which the sealing flaps 22 are bent, a slight bulge or protuberance 31 is raised at the corner. When the end panel 18 is brought down into generally flush closure relation to the open ended tube and into surface engagement with the sealing flaps 22, and pressure is applied, two things happen at the corner. The first of these occurrences is that the protuberance 31 is flattened down and pressed inwardly of the carton, and forms a thickening at the corner and thus an additional seal as shown at 32 in FIG. 5. The second occurrence is that because the ends of the adjacent sealing flaps 21 of the end panel 18 intersect at a short distance outside the two scoring lines 21 along which the sealing flaps are bent the stock in that area is bent downwardly on the corner of the carton along with the sealing flaps 19 as shown at 33 in FIG. 4. This provides an external seal supplementing the internal seal comprised of the interconnected sealing flaps 22 and the thickened corner 32.

Because the movement of the end panel into closure position, after melting the polyethylene, and the application of pressure, all done exteriorly of the carton, are the only steps involved in the capping of the ends of the carton, the closure of the two ends may be accomplished simultaneously without the utilization of a mandrel. The pressure applied to each end serves as a back-up for the pressure applied to the other end, the two pressures being absorbed by the body which, being tubular and strengthened in an endwise direction by the rib-like intersection of each two adjacent side wall panels at a substantial angle, will absorb all pressure needed to effect liquid-tight closure and sealing of the ends, without being crushed. Moreover, the heat needed to melt the polyethylene may be applied directly to the polyethylene coating on each surface where melting is to occur rather than through a layer or layers of sheet stock, followed quickly, and without further heating, by movement of the end panels into closure position, confinement of the outside sealing flaps and the application of the necessary pressure.

FIG. 6 shows a completed carton formed from the blank 10 shown in FIG. 1. In this showing the two side-wall panels might be 12 and 13 or 13 and 14, since sealing flaps 19 of the end panels 18 are shown folded down and engaging both of the side-wall panels.

FIG. 7 illustrates an important feature of the carton as derived from the blank 10 when the carton is provided with an access orifice covered by the access flap 27. Such a carton may be sealed at the access orifice,

after it has been filled, by attaching adhesively a length of tape to the side wall panel 11 covering the flap 27 and preferably extending a short distance beyond the end of the carton. Such a sealing tape is indicated at 34 in FIG. 7. It will be noted that the tape 34 is enabled to lie flat and in engagement with the surface of the carton throughout the entire portion of its length that is superimposed upon the carton because of the fact that the end panel 18 is integral with the side wall panel 11 and there is no exposed sealing flap as there are on the other three side wall panels on the carton. If instead of being integral with one wall of the carton the end panels 18 were separate components requiring sealing flaps on all four sides the attachment of a sealing tape that would affect a completely liquid-tight seal at the access orifice could be greatly complicated by the necessity for having a portion of the tape 34 overlying a sealing flap. The reason for extending the tape beyond the end of the carton as shown in FIG. 7 is to provide a tab-like termination of the tape that may be gripped by the fingers and lifted to lift the closure flap 27 adhesively engaged by the tape and thus gain access to the contents of the carton.

FIG. 2 shows schematically how carton blanks 10 may be punched from a web of sheet stock with a minimum of waste. Because of the fact that the blank is T-shaped, with the end flaps integral with an outside one of the side-wall panel and thus forming the top of the T the blanks may be derived from a web of sheet stock in a sequence or arrangement of interspersed inversions, in which the blanks are alternately upright and inverted along the web of sheet stock. Such an economy of raw material could not be achieved with end flaps integral with side wall panels other than those at the ends of the blank. It will be seen that the scrap material consists only of the stock material between the end panels of two successive blanks standing in the same direction, either upright or inverted, and the Chad resulting from the punching out of the V-notches. It will be apparent that the scrap between the end panels of two adjacent blanks 10 standing in the same direction could be reduced by changing the proportions of the carton so as to bring the two end panels and more precisely their end sealing flaps into substantially abutting relation.

I claim:

1. The method of forming a carton from a T-shaped blank having a plurality of parallel first indentation lines defining side-wall panels of the carton and establishing folding lines, and further having second indentation lines generally normal to the first indentation lines defining and establishing folding lines for sealing flaps at the ends of all but one of said side-wall panels and in the case of said one side-wall panel the second indentation lines defining and establishing folding lines for end panels of the carton, and further having third indentation lines defining and establishing folding lines for sealing flaps at the free edges of the end panels, and further having a sealing flap along the free edge of one of the two outer side-wall panels which comprises the steps of:

folding the side-wall panels inwardly along the indentation lines defining them to the configuration of an open-ended tube with the sealing flap along the free edge of said one of the two outer side-wall panels overlapped by the free edge of the side-wall panel most remote therefrom in the blank;

attaching together the overlapping side-wall panel and sealing flap to form an open-ended empty tube;

folding the end panels in upon the ends of the open-ended empty tube and into overlying engagement with the sealing flaps at the ends of the side-wall panels having end flaps;

folding the sealing flaps of the end panels into engagement with the side-wall panels;

attaching together the sealing flaps of the side-wall panels and the end panels overlapping them; and attaching together side-wall panels and the sealing flaps overlapping them.

2. The method of forming a carton as defined in claim 1 including the step of establishing a condition for adhesive interengagement between the outer surfaces of the sealing flaps at the ends of side-wall panels and the inner surfaces of the end panels prior to attaching them together.

3. The method of forming a carton as defined in claim 1 including the step of establishing a condition for adhesive interengagement between the inner surfaces of the sealing flaps of the end panels and the outer surfaces of the side-wall panels prior to attaching them together.

4. The method of forming a carton as defined in claim 1 which includes the step of simultaneously applying pressure against the end panels after they have been folded is upon the ends of the open-ended empty tube, which opposing pressures are borne solely by the empty tube itself.

5. The method of forming a carton from components comprising an open-ended tube of polygonal cross-section having inwardly foldable sealing flaps integral with at least some of the walls of the tube at both ends of the tube and end-closure panels integral with at least one of said side walls and having a polygonal configuration matching that of the tube, which comprises the steps of:

establishing a condition for permanent interengagement between the outer surfaces of the sealing flaps and the inner surfaces of the end-closure panels;

folding the sealing flaps inwardly and bringing the integral end-closure panels into generally flush closure relation to the ends of the open-ended empty tube with the inner surfaces of the end-closure panels in surface engagement with the sealing flaps; and

simultaneously applying pressure against the end-closure panels which opposing pressures are borne solely by the empty tube itself, to complete the permanent interengagement between the end-closure panels and the sealing flaps.

6. The method of forming a carton from components comprising an open-ended tube of polygonal cross-section having inwardly foldable sealing flaps integral with at least some of the walls of the tube at both ends of the tube and end-closure panels integral with at least one of said walls and having a polygonal configuration matching that of the tube and provided with sealing flaps, which comprises the steps of:

establishing a condition for permanent interengagement between the outer surfaces of the sealing flaps on the walls of the tube and the inner surfaces of the end-closure panels;

establishing a condition for permanent interengagement between the sealing flaps of the end-closure panels and the surfaces of the walls of the tube;

folding the sealing flaps of the walls of the tube inwardly and bringing the intergal end-closure panels into generally flush closure relation to the ends of the open-ended empty tube with the inner surfaces of the end-closure panels in surface engagement with the sealing flaps;

folding the sealing flaps of the end-closure panels into surface engagement with the walls of the tube; and

simultaneously applying pressure against the end-closure panels which opposing pressures are borne solely by the empty tube itself, to complete the permanent interengagement between the end-closure panels and the tube.

7. The method of forming a carton from components comprising an open-ended tube of polygonal cross-section having inwardly foldable end-to-end interconnected sealing flaps integral with at least some of the walls of the tube at both ends of the tube and end-closure panels integral with at least one of said walls and having a polygonal configuration matching that of the tube and provided with sealing flaps, which comprises the steps of;

establishing a condition for permanent interengagement between the outer surfaces of the sealing flaps on the walls of the tube and the inner surfaces of the end-closure panels;

establishing a condition for permanent interengagement between the sealing flaps of the end-closure panels and the surfaces of the walls of the tube;

folding the sealing flaps of the walls of the tube inwardly and thereby producing bulging protuberances at the points of interconnection of flaps;

bringing the end-closure panels into generally flush closure relation to the ends of the open-ended empty tube with the inner surfaces of the end-closure panels pressing upon the protuberances and into surface engagement with the sealing flaps;

folding the sealing flaps of the end-closure panels into surface engagement with the walls of the tube; and

simultaneously applying pressure against the end-closure panels which opposing pressures are borne solely by the empty tube itself, to complete pressing down of the protuberances and the permanent interengagement between the end-closure panels and the tube.

8. The method of forming a carton from components comprising an open-ended tube of polygonal cross-section having inwardly foldable end-to-end interconnected sealing flaps integral with at least some of the walls of the tube at both ends of the tube and end-closure panels integral with at least one of said walls and having a polygonal configuration matching that of the tube and provided with sealing flaps, which comprises the steps of:

establishing a condition for permanent interengagement between the outer surfaces of the sealing flaps on the walls of the tube and the inner surfaces of the end-closure panels;

establishing for permanent interengagement between the sealing flaps of the end-closure panels and the surfaces of the walls of the tube;

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folding the sealing flaps of the walls of the tube inwardly and thereby producing bulging protuberances at the points of interconnection of flaps; bringing the end-closure panels into generally flush closure relation to the ends of the open-ended 5 empty tube with the inner surfaces of the end-closure panels pressing upon the protuberances and into surface engagement with the sealing flaps;

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folding the sealing flaps of the end-closure panels into surface engagement with the walls of the tube; and applying pressure against the end-closure panels to complete pressing down of the protuberances and the permanent interengagement between the end-closure panels and the tube.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,815,484

Dated June 11, 1974

Inventor(s) Charles Wright Jones

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Col. 1, line 24, after "tube" delete "." and insert --,--
Col. 1, line 36, "triangles" should be --triangles--
Col. 7, line 29, "is" should be --in--
Col. 8, line 65, after "establishing" insert --a condition--

Signed and sealed this 5th day of November 1974.

(SEAL)
Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents