United States Patent

[11] **3,549,080**

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[21] Appl. No. **837,062**
[22] Filed **June 27, 1969**
Division of Ser. No. 689,669, Dec. 11, 1967, Patent No. 3,498,521, which is a continuation-in-part Ser. No. 424,946, Dec. 12, 1967, Patent No. 3,357,322
[45] Patented **Dec. 22, 1970**

[54] **CARTON CONSTRUCTION WITH POUR SPOUT**
13 Claims, 29 Drawing Figs.

[52] **U.S. Cl.** **229/17,** 229/48; 93/36
[51] **Int. Cl.** **B65d 5/72**
[50] **Field of Search** 229/17, 48T, 37; 93/36

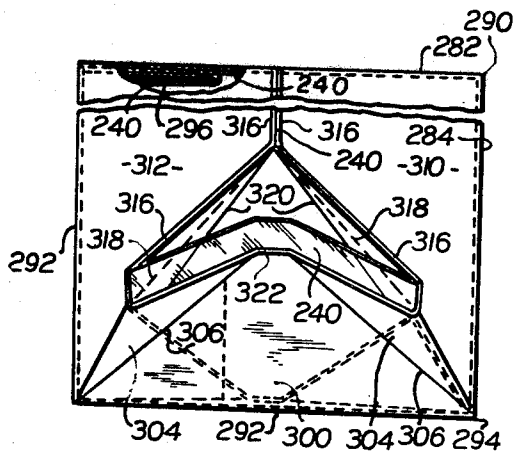
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ABSTRACT: This specification discloses boxes made of paperboard and lined with plastic which makes the boxes suitable for holding liquid. The lining is correlated with the panels of the box in such a way that there are no cut edges of the paperboard exposed to liquid in the container. This prevents "wicking" of the liquid into the paperboard. Some embodiments of the invention are constructed with features that relate to the opening of the panels to provide pour spouts with or without the plastic lining; and in one modification there is a tab on the pour spout that can be tucked in under the other panels when folded down to hold the spout closed after a reclosing operation. The box blanks are shaped so that they are held in a continuous web having spaces beyond critical cut edges where the plastic lining extends beyond the cut edges and over the cut out spaces.



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SHEET 1 OF 5

FIG. 1.

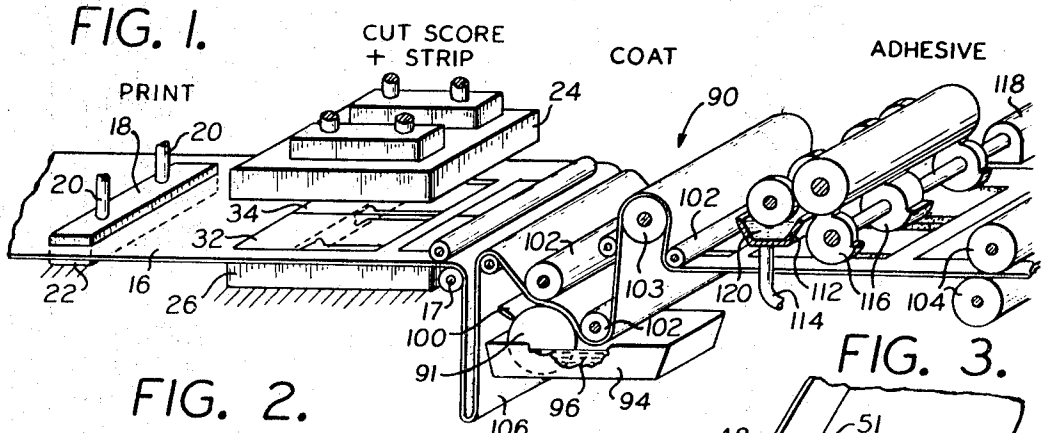


FIG. 2.

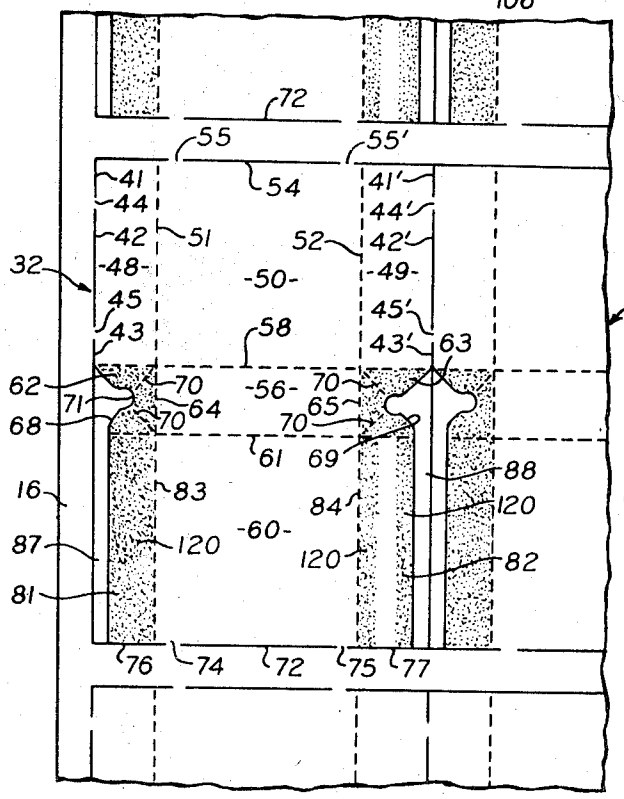
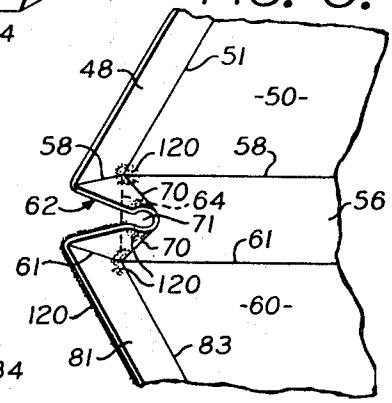


FIG. 3.



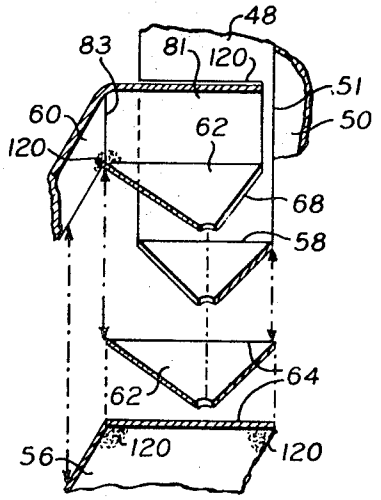


FIG. 5.

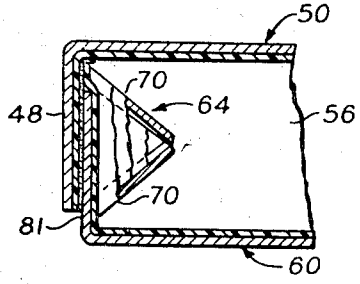


FIG. 4.

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FIG. 6.

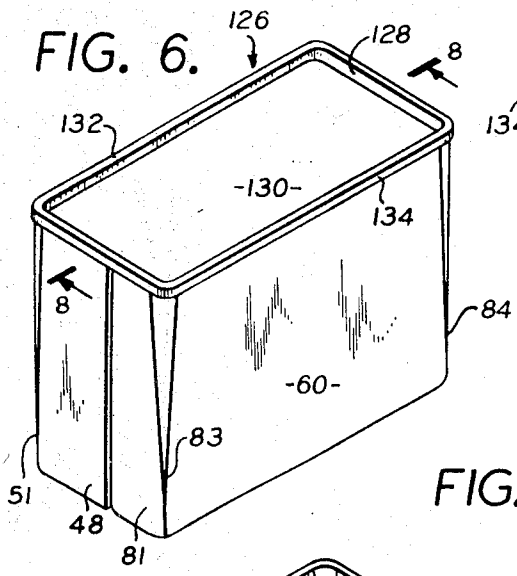
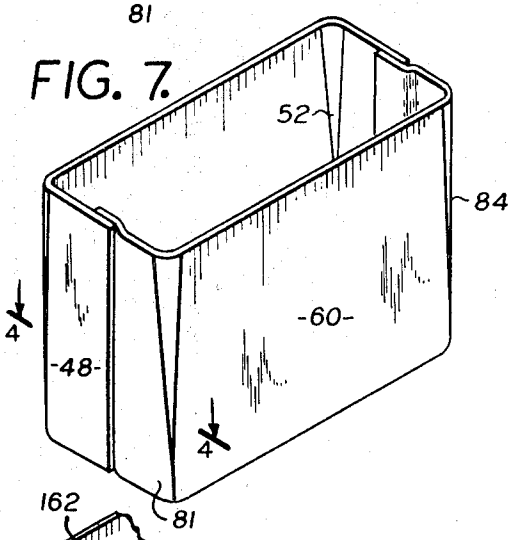


FIG. 7.



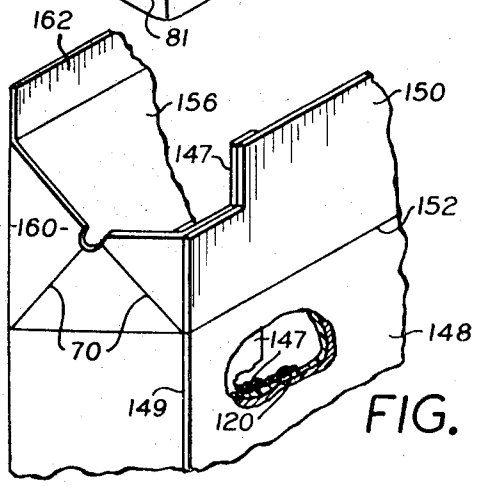


FIG. 10.

FIG. 8.

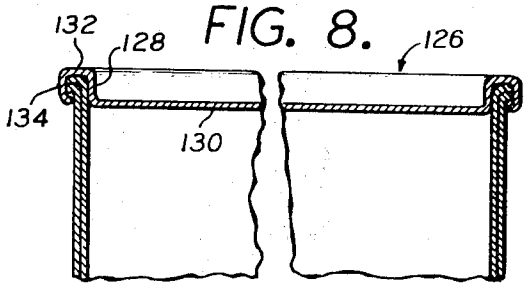


FIG. 9.

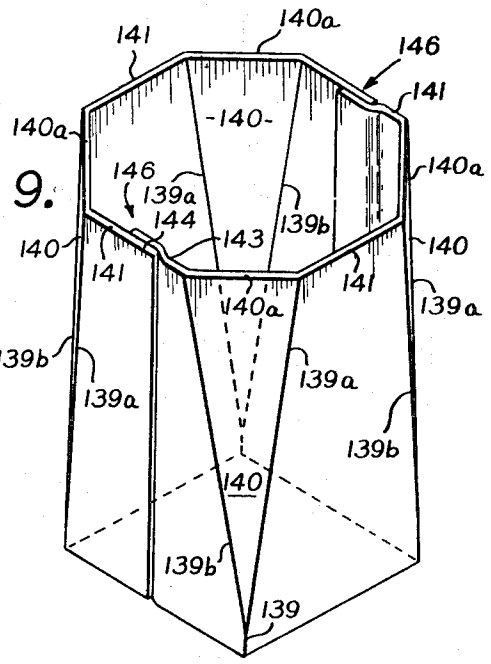
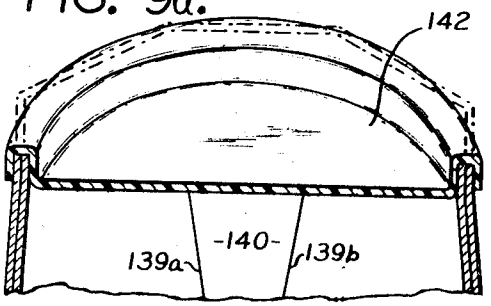


FIG. 9a.



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FIG. 11.

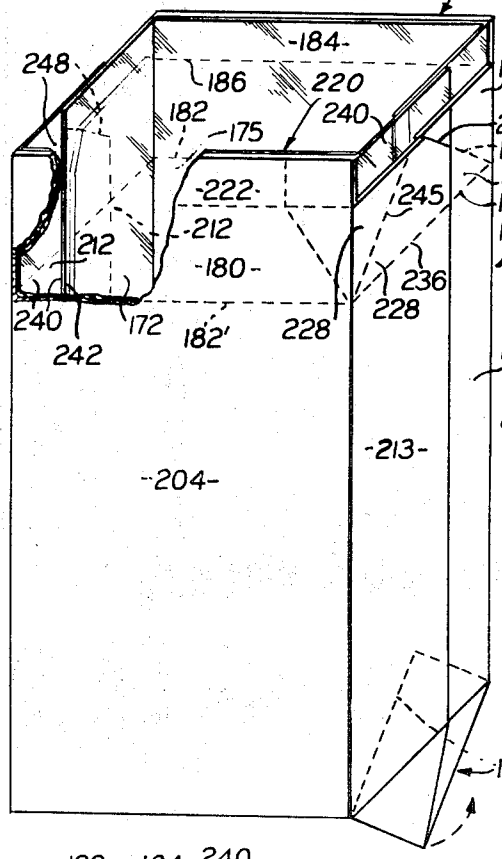


FIG. 16.

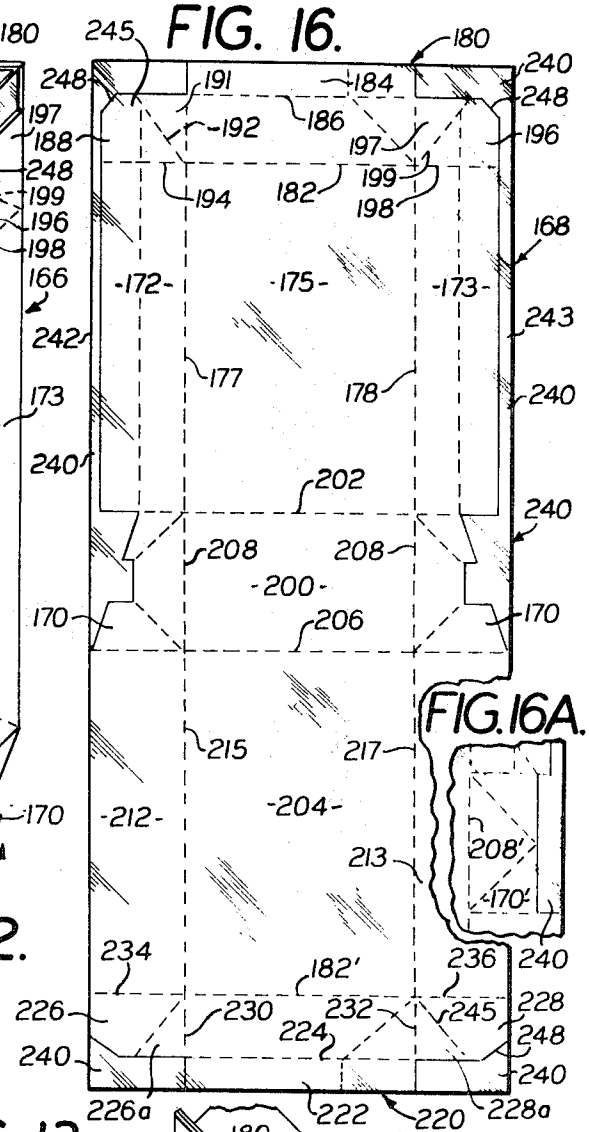


FIG. 16A.

FIG. 12.

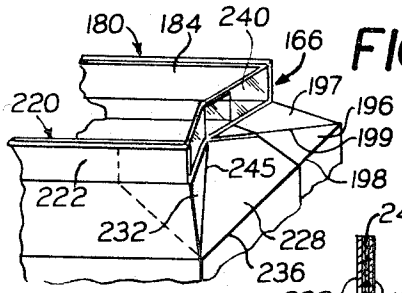


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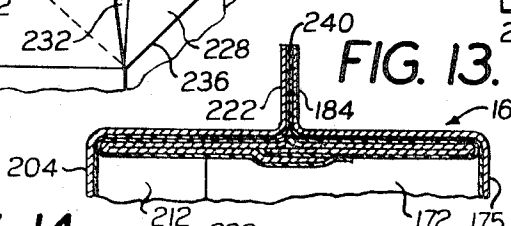


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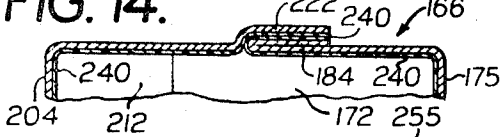


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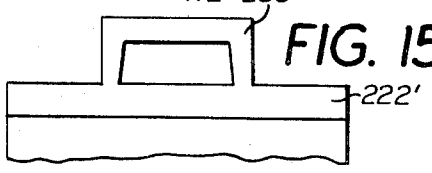
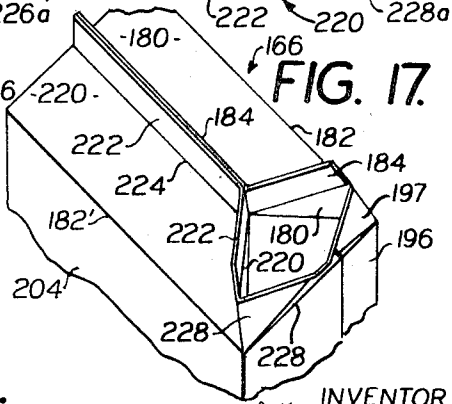


FIG. 17.



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FIG. 18.

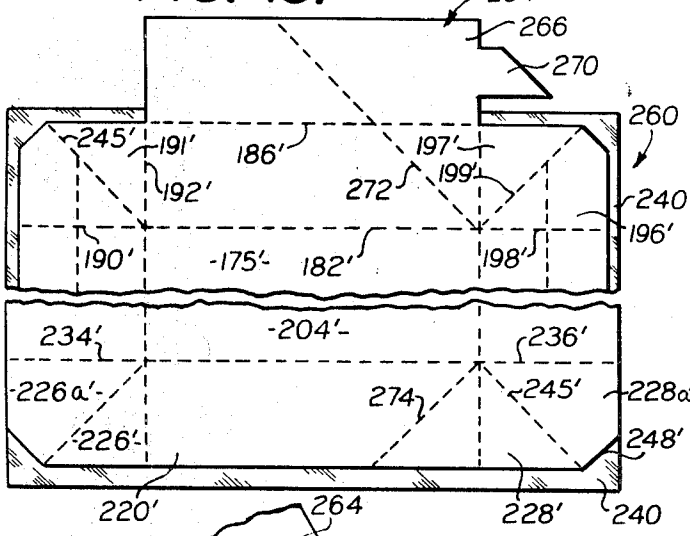


FIG. 19.

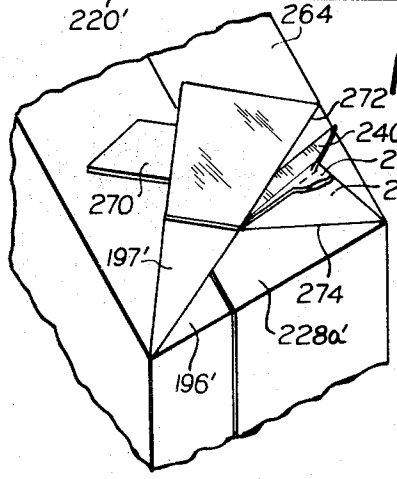


FIG. 20.

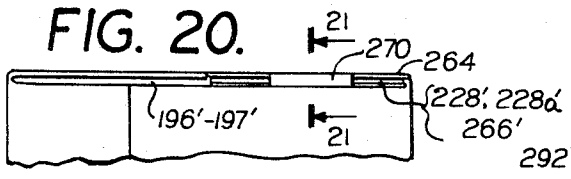


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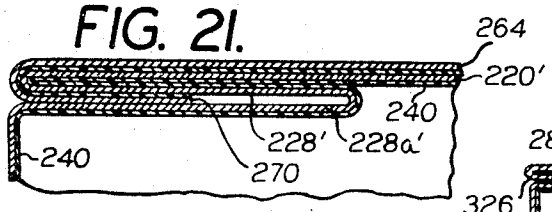


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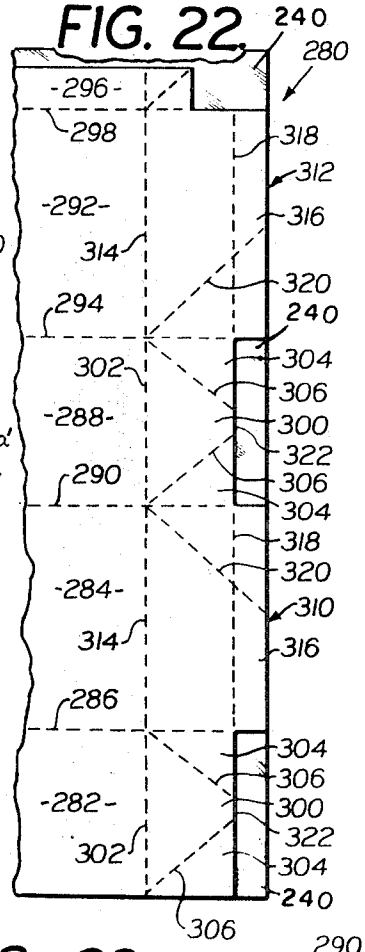


FIG. 23.

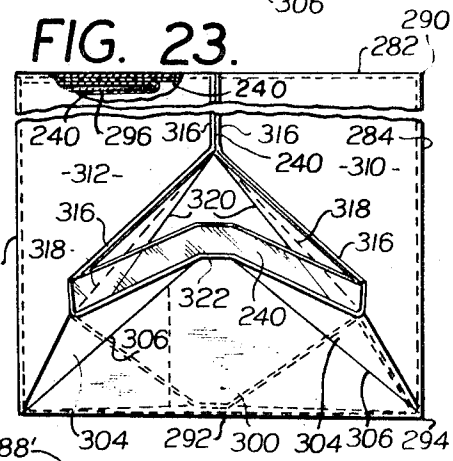
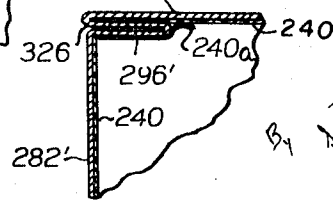


FIG. 24.



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FIG. 25.

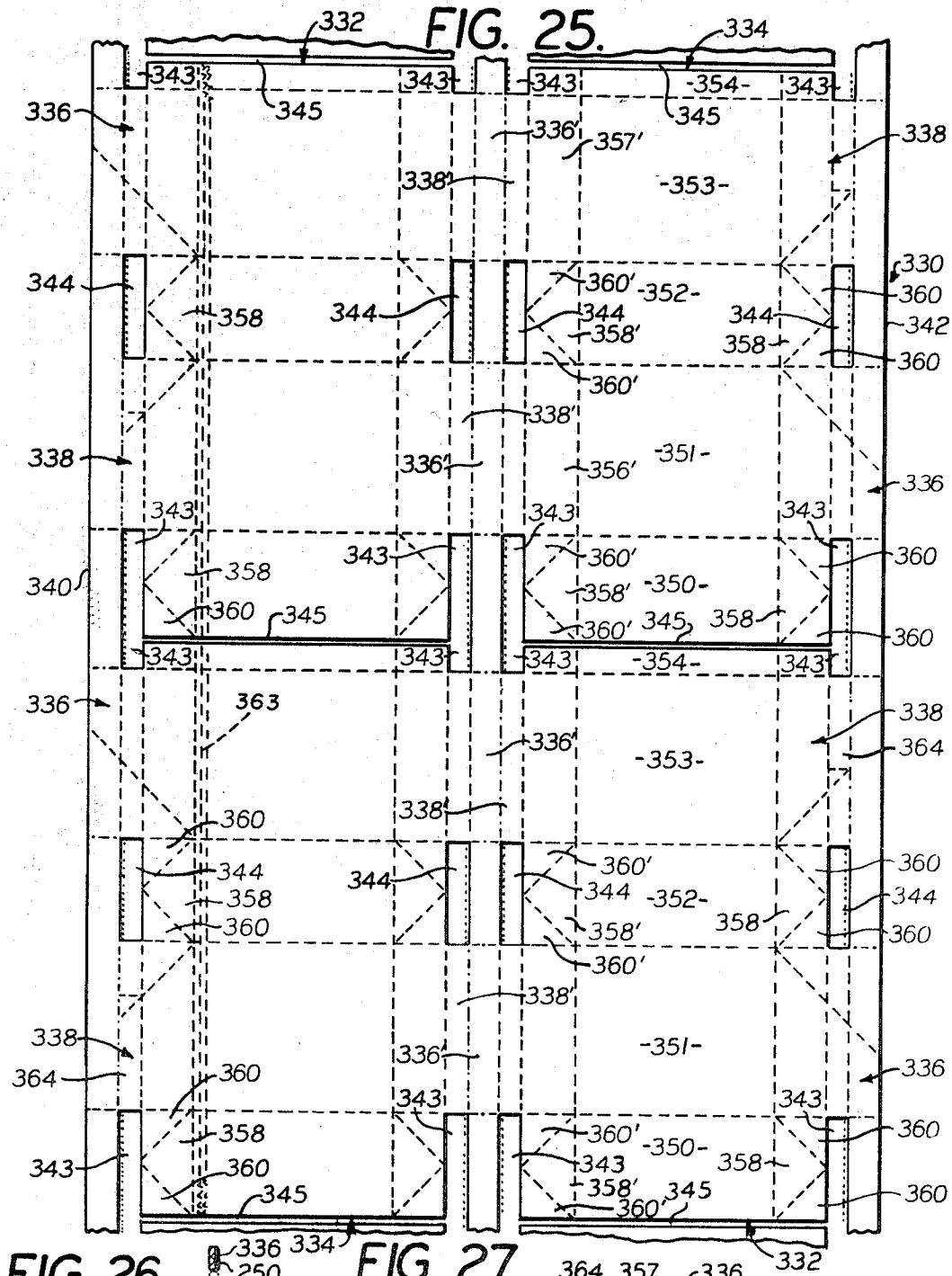


FIG. 26.

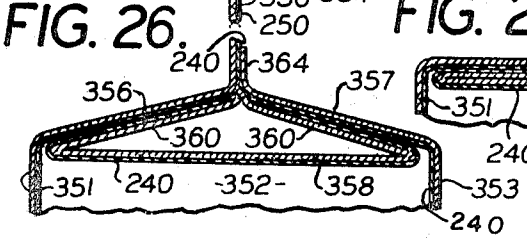
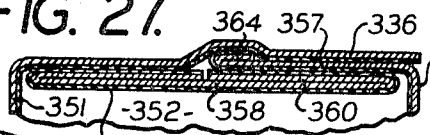


FIG. 27.



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CARTON CONSTRUCTION WITH POUR SPOUT

RELATED PATENTS

This application is a division of application Ser. No. 689,669 filed Dec. 11, 1967; now U.S. Pat. No. 3,498,521 and that application was a continuation-in-part of my patent application Ser. No. 424,946, issued on Dec. 12, 1967, as U.S. Pat. No. 3,357,322.

The invention is an improvement on the box construction shown in Bianchi, U.S. Pat. No. 3,114,300, issued Dec. 17, 1963.

SUMMARY OF THE INVENTION

This invention provides an improved box suitable for manufacture from relatively light paperboard ("cardboard") up to approximately 0.050 inches, and which is liquid-proof and moisture-proof, and can be made gas-proof, if desired. Laminates of various materials such as kraft paper, foil and the different plastic films can be used. These materials can be applied by different methods such as lamination or extrusion on different materials such as paperboard or corrugated paperboard. Exact materials used are controlled by customers specifications to accomplish proper protection for product.

The boxes of this invention can be made as canister-type boxes which can be supplied to packers in a flat and knock down condition. Canister boxes of the prior art have required construction at the box factory to a form that has to be shipped and stored with the box in a condition which gives its final volume so that large space is required for both shipping and storing; and with resulting increase in packaging costs.

The boxes of this invention include also pouring cartons with panels that fold outward to provide pour spouts. These cartons have a plastic lining with extensions of the plastic which seal to confronting faces of plastic to provide containers that are liquid-proof and that do not wick at the cut edges of their lap seams or end panels.

The invention provides a lower cost box for liquids, the box having its inner surface coated with a liquid-proof coating and having any uncoated portions of the box material located on panels that are on the outside of the box seam. In the preferred construction, the coating on the box material is applied so as to extend somewhat beyond the edges of certain die-cut panels of the box, and in the assembled box the extending coating along edges of seam-forming panels is bonded to the coating on adjacent areas of the inside surface of the box with no interruption at the seams, and thus to seal raw cut board edges and to prevent liquid contents of the box from wicking through the board centers, and also to prevent escape of gases.

Other objects, features and advantages of the invention will appear or be pointed out as the description proceeds.

DESCRIPTION OF THE DRAWING

In the drawing, forming a part hereof, in which like reference characters indicate corresponding parts in all the views:

FIG. **1** is a diagrammatic, isometric view showing steps in the manufacture of box blanks in accordance with this invention;

FIG. **2** is a greatly enlarged fragmentary view of a portion of the web shown in FIG. **1**;

FIG. **3** is a fragmentary view illustrating the way in which the panels of a box blank of FIG. **1** are initially folded when starting to form the box;

FIG. **4** is a sectional view, partly broken away and illustrating the completion of the fold which is shown in its starting condition in FIG. **3**; the section in FIG. **4** being taken on the line **4–4** of FIG. **7**;

FIG. **5** is diagrammatic exploded view showing more clearly the relation of the folds of FIG. **4**;

FIG. **6** is an isometric view showing the top of the box of FIG. **4** in a completed condition;

FIG. **7** is a view similar to FIG. **6** but showing the box with the cover removed;

FIG. **8** is an enlarged fragmentary view taken on the line **8–8** of FIG. **6**;

FIG. **9** is a fragmentary view, similar to FIG. **7**, but showing a modified construction of the invention;

FIG. **9***a* is a fragmentary sectional view showing the way in which a plastic top is applied to the upper end of the box shown in FIG. **9**;

FIG. **10** is an isometric view showing another modified form of the invention;

FIG. **11** is an isometric view showing the invention applied to a pour spout type of box;

FIG. **12** is a fragmentary view of a part of the upper portion of the box shown in FIG. **11** with the panels partly folded as the box is closed;

FIG. **13** is a sectional view through the box shown in FIGS. **11** and **12** after the box has been closed and sealed;

FIG. **14** shows the panels of the sealing ridge of FIG. **13** folded over against the top of the box to facilitate stacking, this section being taken near the center of the box beyond the fold-in end panels;

FIG. **15** is a side elevation showing a modified form of the box illustrated in FIGS. **11—14**;

FIG. **16** is a plan view, on a reduced scale, showing the blank from which the box of FIGS. **11—14** is made;

FIG. **16***a* is a modification of FIG. **16**;

FIG. **17** is an isometric view, on a reduced scale, of the box shown in FIGS. **11—14** with the box sealed and the pour spout open;

FIG. **18** is a fragmentary plan view of a modification of the blank shown in FIG. **16**;

FIG. **19** is an isometric view showing the upper part of a box made from the blank shown in FIG. **18**, the box being shown partly open in order to illustrate the relation of the panels;

FIG. **20** is a fragmentary end view, on an enlarged scale, of the the box shown in FIG. **19** with the locking tab tucked in after reclosing of the box;

FIG. **21** is a sectional view, on an enlarged scale, taken on the line **21–21** of FIG. **20**;

FIG. **22** is a fragmentary view of a portion of another box blank for making boxes embodying this invention but with a single lap seam instead of the construction shown in the other views, with seams at both sides of the box;

FIG. **23** is a top plan view, on an enlarged scale, of a box made from the blank shown in FIG. **22** and with the pour spout partially open;

FIG. **24** is a detail sectional view showing a modified corner construction for the container shown in FIG. **23**;

FIG. **25** is a plan view of a web having box blanks delineated therein and cutouts and score lines for producing boxes in accordance with this invention;

FIG. **26** is a sectional view showing the way in which the top panels are brought together when closing a box made from one of the box blanks from the web shown in FIG. **25**; and

FIG. **27** is a sectional view, corresponding to FIG. **26**, but showing the top panels in fully closed position.

FIG. **1** shows a web **16** which is advanced with intermittent motion toward the right in the drawing by feed rollers **17**. This web is moved with continuous motion if manufacturing equipment permits. This web **16** is preferably made of paperboard which usually has one side smoother than the other. In the preferred operation of the invention the web is advanced with the smooth side uppermost for receiving the impression of a printer **18** which is moved into and out of contact with the web by actuators **20**. A platen **22** is located under the printer **18** at the printing station. This construction is merely representative of printing means; and where the printing is in color, it may be done with a separate cylinder for each color.

Beyond the printing station, the web **16** travels past a cutting, scoring and stripping station, indicated diagrammatically by an upper platen **24** and a lower platen **26**. The upper platen **24** has cutting rule and scoring rule which cut box blanks **32** and **34** from the web **16**.

One of the blanks **32** is shown in detail in FIG. **2**. The web is slit along lines **41**, **42** and **43**, which are in alignment but

separated from one another by lands or nicks 44 and 45 where the web remains uncut. Similar lines 41', 42' and 43' are slit along the other side of the box blank and these lines are separated by similar lands or nicks 44' and 45'.

The lines 41, 42 and 43 and the corresponding lines on the other side of the box blank form the side edges of end or side panels 48 and 49 of the box blank. These end or side panels 48 and 49 connect with a back panel 50 along scored fold lines 51 and 52.

At one end of the back panel 50 there is a slit line 54 extending across the entire width of the box blank from the slit line 41 to the slit line 41'; but with lines or nicks 55 and 55', if necessary.

The back panel 50 joins a bottom panel 56 along a scored fold line 58; and the bottom panel 56 is joined to a front panel 60 along another scored fold line 61. There are fold-back end panels 62 and 63 connected with the lower ends of the end panels 48 and 49 along extended portions of the scored fold line 58.

In order to facilitate the folding of the blank, the fold back end panels 62 and 63 have cut back edges 68 and 69, respectively, and further to facilitate the folding, there are diagonal scored fold lines 70 extending from a cut back center region 71 at one end of the cut back edges 68 and 69 back to the intersections of the fold lines 51 and 58.

At the score lines 70, the fold-back panels 62 and 63 join fold-in end panels which connect with the bottom panel 56 along score lines 64 and 65, respectively. At their forward ends, the fold-in end panels are connected at other score lines 70' to other fold-back end panels 62' and 63'. These other fold-back end panels 62' and 63' correspond to the panels 62 and 63 and have similar cut back edges 68' and 69', respectively.

The front panel 60 is cut from the web 16 along a slit line 72 which terminates at lines or nicks 74 and 75 where the web is uncut. Other slit lines 76 and 77, in alignment with the slit line 72, extend across the remainder of the box blank. The layout can be changed so that there is not no waste between successive blanks and a single slit replaces the slits 54 and 72.

There are end or side panels 81 and 82 connected with the front panel 60 along scored fold lines 83 and 84, respectively, and these end panels 81 and 82 join the fold-back end panels 62' and 63', respectively, along extensions of the scored fold line 61.

The side edges of the panels 81 and 82 are separated from the remainder of the web by cutout areas 87 and 88, respectively, and these cutout areas 87 and 88 extend along the side edges of the fold-back end panels 62' and 63', respectively. The material of the web is stripped from the web to leave the areas 87 and 88 open after the web passes beyond the cutting, scoring and stripping station formed by the platens 24 and 26 of FIG. 1. The actual apparatus for stripping the waste from the areas 87 and 88 is omitted from FIG. 1 for clearer illustration, since such apparatus for stripping waste material from webs is well understood in the art and its illustration is not necessary for a complete understanding of this invention.

Referring again to FIG. 2, it will be apparent from the foregoing description that the side edges of the box blank from the line 58 to the lower end of the blank (lines 72, 76 and 77) are entirely free of any connections to the web and are spaced from the other material of the web. This lower portion of the box blank remains in place in the web, and advances as a unit with the web as a result of the connection formed by the lands or nicks 74 and 75. For some constructions and configurations these nicks 74 and 75 are unnecessary and the side nicks 44, 45, 44' and 45' are sufficient.

Referring again to FIG. 1, the web 16 continues its travel to a coating station 90 including rotogravure coating roller 91 which applies a coating 96 of plastic to the bottom of the web 16. The roller 91 receives plastic from the container 94 into which the roller 91 dips. The amount of plastic on the roller 91, and the resulting thickness of the film of plastic applied to the web, can be controlled by adjusting a doctor blade 100. The web 16 passes over guide rolls 102 and a chill roll 103. The drive of the web 16 through the coating station 90 is by means of feed rolls 104 which operate continuously. There is a loop 106 in the web between the intermittently moving part of the web ahead of the feed rolls 17 and the continuously moving part of the web travels through the coating station 90 by the pull of the feed rolls 104.

This coating apparatus is merely representative of any printing process or any coating process which can be substituted for that shown. For more economical construction of the box, the coating is applied only to the undersurface of the web 16. Where the boxes which are made from the box blanks require outside protection, the coating is applied also to the upper surface of the web. A curtain coater may be used. The term "coating" is used herein in a generic sense to include application of any sheet, film, or foil of any material required for proper protection of product using any coating method in addition to that illustrated.

Beyond the coating station, the web 16 passes an adhesive-applying station to be used when carton style or specifications require an adhesive. This station includes an adhesive container 112 which is maintained in a heated condition by burners 114. This adhesive container 112 is used for hot-melt adhesive which is applied to limited areas of the top surface of the web 16 by applicator rollers 116. These rollers 116 are driven through a gear box 118 so as to make one revolution for each box blank; and the rollers 116 are shaped so that they have high arcs which touch only that portion of each box blank to which adhesive is to be applied. When only one side of the web is coated, the rollers 116 apply hot-melt adhesive 120 to the uncoated outside side of the web.

The areas of each box blank to which the rollers 116 apply adhesive are the bottom end panels 62; 63; 62'; 63' and the fold in end panels between the score lines 70 and 70' (FIG. 2) and the front end panels 81 and 82. Optionally, adhesive may be applied to the back end panels. These rollers 116 may be shaped to apply the adhesive 120 across the full width of the panels, as shown on the panel 81, or with the adhesive 120 in parallel zones, as shown on the panel 82. In any event however, the adhesive 120 extends to the side edge of the panels so that in the sealing of the box, some adhesive can be squeezed out beyond the edges of the panels 62, 63, 81 and 82, for purposes which will be described.

Beyond the adhesive-applying station, the box blanks are severed from the web and folded to form boxes. If the boxes are not to be completed, but are to be shipped in knock down condition to a packaging plant, then the box blanks may be stripped from the web without applying the adhesive 120, or the adhesive can be applied and permitted to cool for reactivation at the packaging plant where the box blanks are to be folded into setup boxes and filled, but if desired, adhesive other than hot-melt adhesives can be used.

In applying the coating 96 (FIG. 1) to the web 16, the coating is applied across the full width of the box blanks and across the web beyond the box blanks so that a film of coating extends beyond the edges of the blanks, and particularly beyond the edges of the panels from which waste material is removed to form the cutout areas 87 and 88. In the preferred operation of the invention, the coating 96 spans the cutout areas 87 and 88, and when the box blanks are stripped from the web, this coating 96 is severed substantially mid way between the box blanks and some distance out from the edges of the box blanks that are near the side edges of the web, so that at least a part of the extending portion of the coating, which spanned these areas 87 and 88, remains attached to each side box blank.

FIG. 3 shows the way in which the box blank is folded. The back panel 50 and front panel 60 are folded upward along the fold lines 58 and 61, respectively, while the end panels 48 and 81 are folded inward along the fold lines 51 and 83, respectively. This causes the fold-in end panel between score lines 70 and 71' at the score line 64 to fold along the line 64 and at the same time the folded end panels 62 and 62' fold along the diagonal fold lines 70 and 70' and along the extended portions of the fold lines 58 and 61, respectively.

In the construction shown in FIG. 3, there is some adhesive 120 on the inside of the box blank around the cut back center region 71 and at the regions where the diagonal lines 70 and 70' meet the score lines 58 and 61, respectively.

FIGS. 4 and 5 show the panels 50 and 60 folded up into positions parallel to one another and at right angles to the bottom panel 56. They also show the folds where the end panels 48 and 81 overlap one another and the connections of the panels that fold along the diagonal fold lines 70 and 70' so as to form three superimposed thicknesses overlying the bottom panel 56. The adhesive 120 on the bottom of the fold-in end panel, that folds along the fold line 64, bonds it to the bottom panel 56.

FIG. 6 shows the box after it had been formed into setup condition and has had a top 126 applied to the upper edges of all of the panels. FIG. 7 shows a box in setup form and before the cover 126 is applied. FIG. 8 shows the cover 126 with an upwardly extending portion 128 at right angles to a depressed top area 130. An extending edge 132 at the upper end of the portion 128 contacts with the top edge of the box and the cover is secured to the box by turning the top edge portion 132 downward to form a rim 134 which clinches the upper part of the side walls of the box to secure the cover to the box. This type of cover with the rolled edge forming a gripping rim 134 is well known in the art and it is not necessary to illustrate apparatus for attaching this top in order fully to understand the present invention.

Although the attaching of a plastic top, molded paper top, or rolled metal top such as the top 126, requires a substantial downward pressure on the box, the box of this invention can withstand such pressure because of the double thickness of the side walls along the lap seam, as is well illustrated in FIG. 7. While there is a break in the contour of the side surfaces where the side panels terminate, this does not present a problem in the use of a rolled metal top because the thickness of the material in proportion to the size of the box is exaggerated in FIG. 7 and in all the figures of the drawing for clearer illustration and to permit the showing of the sections and in addition to the thickness actually being less than that indicated in the drawing, there is sufficient resilience in the material of which the box is made to permit the rim 134 (FIG. 8) to be imbedded into the paperboard so that there is no place where the top 126 does not contact with both sides of the walls of the box and thus prevent leakage.

FIG. 9 shows a construction similar to that described in connection with the other figures except that the panels are joined together at Y score lines 138 having branches 139*a* and 139*b* which take the place of the fold lines 52 of FIG. 7 and which leave triangular intermediate panels 140 (FIG. 9). This construction permits the box to have an octagonal top and a rectangular bottom for folding, as already described. The intermediate panels 140 can be made as deep as desired and can extend all the way to the bottom of the box. By making top edges 140*a* of the panels 140 equal to the length of the other top edges 141 and arcing these edges, the top of the box can be circular. This construction gives the upper end of the box a shape having corners which are not as sharp as those of FIG. 7. These corners shown in FIG. 9 make it easier to construct a cover for the box and the auxiliary panels 140 at each of the corners can yield to accommodate a cover which is rounded at the corners instead of square, as shown in FIG. 6; or a circular top with arcs on each of the top edges of the side panels. FIG. 9*a* shows a round plastic top 142 applied to the upper end of the container shown in FIG. 9, the section being through a seam of the container where the wall is of double thickness. Metal tops, such as aluminum and tin, can be used; also molded paper tops. In the construction illustrated in FIG. 9, there are two score lines 143 and 144 with the scores on opposite sides of the board and spaced from one another by a distance substantially equal to the thickness of the board, so as to give the side wall an offset that keeps the outside walls on both sides of the seam 146 flush with one another.

Where material permits and specifications require it, the Y scores need extend only part way toward the to top or can be eliminated to facilitate forming a perfect circle or round top.

FIG. 10 shows a modified construction in which the box blank is coated on its inside surface with a portion of the coating 96 extending beyond the edge of an inside panel 147 which is lapped by an outside panel 148 to form a seam 149. Adhesive 120 that bonds the panels 147 and 148 together extends beyond the edge of the inner panel 147, to the coating 96 that extends beyond the raw cut edge of panel 147, as already described. Adhesive squeezed from between the panels 147 and 148 when the seam is formed, adds to the seal securing the plastic coatings together. This box can be sealed by the "hammer and anvil" method.

The box of FIG. 10 has a panel 150 connected with the panel 148 along a scored fold line 152 and has a back panel 156 secured to the back panel of the box along a similar scored fold line. The back panel 156 is long enough to cover the top of the box when folded down over the panel 150 after being secured to that panel by adhesive. There are a fold-in end panel 160*a* and fold-back end panels 160 and 160' secured to adjacent panels of the box blank on three sides and these panels fold along fold lines 70 in a manner similar to that already described in connection with the other views.

A panel 162 connected to the edge of the back panel 156 folds down over the upper part of the front panel 148 and provides a pull tab for opening the box. The box shown in FIG. 10 is preferably closed in the same way at both top and bottom.

FIG. 11 shows a box 166 which is made from the box blank 168 shown in FIG. 16. The bottom of this box is of the same type as shown in FIGS. 2—5 except that the folded bottom end or side panels 170 (FIG. 11) are preferably located outside of the box, and either folded in under or on top of the bottom or folded up along the side of the box 166, preferably outside, as shown in broken lines.

The box blank 168 shown in FIG. 16 has side or end panels 172 and 173. These end panels connect with a back panel 175 along scored fold lines 177 and 178. As the upper end of the back panel 175 there is a top closure panel 180 connected to the back panel 175 along a score line 182. The upper part of the top closure panel 180 has a sealing ridge panel 184 which joins the lower part of the top closure panel 180 along a score line 186.

There is a fold-in end panel 188 joined to the end panel 172 along a score line 194 and joined to a fold-back end panel 191 along a score line 192. At the other end of the top closure panel 180 there is another fold-in end panel 196 joined to the end panel 173 and to a fold-back end panel 197 along score lines 198 and 199, respectively.

There are other score lines at the top, the purpose of which will be explained in connection with the pour spout.

The back panel 175 joins a bottom panel 200 along a score line 202; and the bottom panel 200 joined to a front panel 204 along a score line 206.

There are fold-in and fold-back end panel groups, designated generally by the reference character 170, joined to the bottom panel 200 along score lines 208 and joined to the end panels of the front and back of the box in the same way as already described in connection with FIG. 2 and no detailed description of the bottom construction is necessary since the differences from FIG. 2 are essentially only differences in shape.

There are end panels 212 and 213 connected to the front panel 204 along score lines 215 and 217, respectively, and there is a top closure panel 220 corresponding to the top closure panel 180 of the panel back panel and having a sealing ridge panel 222 at its upper end connected with the remainder of the closure panel 220 along a score line 224. There are fold-back end panels 226 and 228 connected with opposite ends of the closure panel 220 along fold lines 230 and 232, respectively. There are fold-back end panels 226*a* and 228*a* connected with the end panels 212 and 213 along score lines 234 and 236, respectively.

The end panels 172 and 173 are somewhat narrower than the end panels 212 and 213; but a plastic coating or lining 240, which extends across the entire area of the blank 168, is the same width at the back of the blank as at the front and this

plastic lining **240** extends, therefore, beyond the edges of the end panels **172** and **173** to form extending plastic panels **242** and **243**. In FIG. **11**, the plastic covers the entire blank **168** and the plastic is indicated by surface shading which is used mostly on those parts of the plastic that extend beyond the edges of the blank.

When the blank **168** is formed into the box **166** (FIG. **11**), the side or end panels **212** and **213** overlap the outside of the side panels **172** and **173**, respectively, to form lap seams for the sides of the box. The extending plastic side panels **242** and **243** are sealed to the lining **240**, on the panels **212** and **213**, respectively, which confront them beyond the edges of the side panels **172** and **173** and this sealing of the confronting lining or coating faces to one another protects the raw cut edges of the end or side panels **172** and **173** from contact with liquid within the box or container.

The fold-in end panels **196** and **228** have diagonal score lines **199** and **245**, respectively, which extend from the ends of the score lines **198** and **236**, respectively. There are diagonal cuts **248** on the fold-in end panels in register with the score lines **199** and **245** of the adjacent fold-in end panels so as to reduce the thickness of board at the score lines **199** and **245**; but the plastic lining **240** extends beyond the diagonal cuts **248** and all the way to the level of the top edges of the closure panels **180** and **220** these closure panels being higher than the fold-in end panels by the height of the sealing ridge panels **184** and **222**.

The top of the box **166** is closed by folding the top closure panels **180** and **220** toward one another along their score lines **182** and **182'** while folding the fold-in end panels inward along their score lines **190**, **198**, **234** and **236**.

FIG. **12** shows one end of the box partly closed. The lower portions of the top closure panels **180** and **220** are converging toward one another as they extend upwardly, but the sealing ridge panels **184** and **222** are maintained in substantially parallel relation to a one another, and the the plastic **240**, which extends above the upper ends of the fold-back end panels **197** and **228**, is held substantially upright by these sealing ridge panels **184** and **222**. The fold-in end panels **196** and **228*a*** are shown folded along their score lines **198** and **236**, respectively, and the fold-back panels **197** and **228** are folded along score lines **199** and **245** and at their junctures with the top closure.

FIG. **13** shows the upper end of the box **166** closed. The confronting faces of the plastic lining **240** on the sealing ridge panels **184** and **222** are bonded together to close the top of the container across its entire width. The upstanding portions of the plastic **240**, which projects above the upper edges of the fold-back panels **197** and **232**, is clamped between the faces of the sealing ridge panels **184** and **222** for the full extent of this upstanding plastic **240** so that there can be no leakage over the top edges of the panels which are folded in and back. This construction provides a seal with only two layers of board and one that is easier to open than boxes having four layers and with folded panels that have to meet at the center of the top. Two layers permit faster sealing.

FIG. **14** shows the sealing ridge panels **184** and **222** folded down against the top of the box to facilitate stacking.

FIG. **15** shows a modified construction in which a sealing ridge panel **222'** is formed with an upward extension which provides a handle **255**. This handle **255** is preferably of one-piece construction with the rest of the box blank. For small and relatively light boxes it is sufficient to have the handle **255** extend upward from only one of the sealing ridge panels, but for heavier boxes both of the sealing ridge panels, corresponding to the panels **184** and **222** of FIGS. **11—14**, are made with handle extensions **255**. For convenience, the handle **255** should be limited in height so that when the sealing ridge panels are folded over as shown in FIG. **14**, the folded-over handle will not reach beyond the side of the box since doing so would interfere with packing of the boxes side by side and removal of the boxes from a shipping container.

FIG. **17** shows the way in which the box of FIGS. **11—14** is opened to form a pour spout. The sealing ridge panels **184** and **222** are separated from one another by breaking the seal between their confronting faces. As these sealing ridge panels **184** and **222** are pulled apart from their front ends, as shown in FIG. **17**, the corresponding portions of the top closure panels **180** and **220** are pulled up and outward and this pushes the fold-back panels **197** and **228** outward and pulls the fold-in end panels **196** and **228*a*** upward to provide a pour spout.

FIG. **18** shows a box blank **260** which differs from the box blank of FIG. **16** in that a top closure panel **264** extends much further up from a score line **182'** which corresponds to the score line **182** of FIG. **16**. All parts of FIG. **18** which correspond to parts of FIG. **16** are indicated by the same reference characters with a prime appended. This top closure panel **264** has an upper part **266** which takes the place of the ridge panel **184** of FIG. **16** and which is joined to the lower part of the top closure panel along a score line **186'**. There is a tab **270** extending beyond one end of the top closure panel **264**.

FIG. **16*a*** shows a modification of the bottom sealing areas shown in FIG. **16**. Corresponding parts in FIG. **16*a*** are indicated by the same reference characters as in FIG. **16** with a prime appended. When using paper stock heavier than that for which the blanks of FIG. **16** are intended, the combination of panels and score lines shown in FIG. **16*a*** is advantageous. This difference in shape and score line location permits the packaging machinery to operate more rapidly and decreases the risk of jamming if score lines are imperfect.

FIG. **19** shows the way in which the top of the box is closed when using the blank shown in FIG. **18**. The portion of the plastic **240** which extends beyond a top closure panel **220'** and beyond the upper ends of the fold-back end panel **228'** and the fold-in end panel **228*a*'** folds back over the top edges of these panels **220'**, **228'**, and **228*a*'**, to confront the plastic lining which covers the inside or bottom surface of the top closure panel **264**. This seals the box across its entire width when the end panels are folded in and the top closure panels are folded down. The top closure panel **264** extends all the way to the edge of the box in FIG. **19** and this provides a smoother top surface than the construction shown in FIG. **14**.

In order to facilitate the opening of the box, a score line **272** extends transversely across the full width of the top closure panel **264** so that the panel **264** can be bent back at the pour spout side of the box, as shown in FIG. **19**. The other side of the pour spout is opened by bending up a portion of the panel **220'** along a score line **274** and the end panels open in essentially the same way as already described in connection with FIG. **17**.

It is a feature of the construction shown in FIGS. **18—21** that the pour spout can be reclosed and the tab **270** tucked in under a fold-back panel **228'** to hold the pour spout closed. Thus the tab **270** provides a "lock" for holding the pour spout closed after it has been initially opened and then reclosed by folding the parts back to their original positions. This covers pouring spout and is a sanitary precaution preventing foreign objects from attacking themselves.

One of the advantages of the constructions thus for described, with lap seams at both ends of the box or container located at intermediate locations between corners of the box, and preferably midway between the corners, is that the seams at both ends increase the stacking strength of the boxes. The locating of the seam intermediate the corners greatly increases the strength against bursting when a box filled with liquid is dropped. Also since seam is not at a corner, there are no laps to be separated where pressure is greatest. Especially, if dropped on a corner.

The folded panel bottom closure, with the folded panels extending upward along the sides ends of the box distributes the strain when a box of liquid is dropped, and distributes force across the sides of the box and to seams located intermediate the corners of the box.

Because of the greater strength of the construction it can be made with lower board caliper caliper if the added strength is not desired. This effects an economy in manufacture. Other economies can be obtained with this invention having flat top sealed containers of high stacking strength. For example wire or wooden cases can be eliminated; and bundling with plastic film can be substituted. This saves the cost of returning cases.

If the carton is originally sealed, the tab **270** can be left free. This simplifies the original sealing and makes the tab **270** available to assist in initially tearing the top closure panel **264** loose from the underlying closure panel **220**.

FIG. **22** shows a box blank **280** which differs from the other blanks in that it forms a container having a single lap seam and a bottom construction which can be similar to the top but without score lines for forming a pour spout.

The blank **280** has a side panel **282** for one end wall of the container, a back panel **284** connected to the side panel **282** at a score line **286**. The blank has a panel **288** for the opposite end of the box from the panel **282**, and this other side panel **288** is joined to the back panel **284** along a score line **290**. A front panel **292** is joined to the side panel **288** by a score line **294**; and there is a sealing lap **296** connected to the other side of the front panel **292** along a score line **298**.

The plastic lining **240** extends beyond the edge of the sealing lap **296** and when the sealing lap **296** is attached to the panel **282** as shown in FIG. **23**, the lining **240** can be folded back under the cut edge of the sealing lap **296** or it can extend beyond the sealing lap, but in any event this coating is bonded to the confronting face of the coating on the panel **282** to which the sealing lap is attached. If the sealing lap **296** is to go on the outside of the container, the coating is extended beyond the edge of panel **282**.

Fold-in panels **300** are joined to the upper ends of the side panels **282** and **288** along score lines **302** across the full width of the side panels **282** and **288**. The fold-in panels **300** have fold-back panels **304** connected to their opposite sides along score lines **306**. Top closure panels **310** and **312** are connected with the upper ends of the back and front panels **284** and **292**, respectively, along hinge lines **314**. Each of the top closure panels **310** and **312** has a sealing ridge panel **316** connected with the lower part of the top closure panel by a score line **318**. Score lines **320** in the top closure panels **310** and **312** facilitate opening of the pour spout as shown in FIG. **23**.

The top of the container made from the blank **280** of FIG. **22** is closed in a manner similar to that already described in connection with FIG. **11**, and the upwardly projecting panels of plastic **240** above the top edges of the panels **300** and **304** are sealed between the plastic covered faces of the sealing ridge panels **316**.

A feature of the construction shown in FIGS. **22** and **23** is that the score lines **306** along each of the fold-in end panels **300** converge toward the top of the panels **300** but do not meet. There is a straight edge **322** in the space between the upper ends of the score lines **306** and this construction causes the upper parts of the plastic **240**, above the top edges of the panels **300** and **304**, to stand up straight so that they are caught between the confronting faces of the sealing ridge panels **316** as the latter come together during the closing of the top of the container.

Another feature of the construction shown in FIGS. **22** and **23** is that the score lines **320** make a different angle with the top edge of the blank **280** than do the score lines **306**. The difference in angle is such that the score lines **320**, between the score lines **314** and **318**, are substantially longer than the score lines **306**. This difference in length causes the pour spout to burst open more easily when the sealing ridge panels **316** are pulled apart as shown in FIG. **23**.

It will be understood that the pour spout is shown only part way open in FIG. **23** and that when fully open the panels **300** and **304** spring out into the positions indicated by broken lines in FIG. **23**.

FIG. **24** shows a corner having a double fold seam that adds additional strength to that obtained with the single folded seam shown in FIG. **23**. In addition to the glue lap **296'**, corresponding to the glue lap **296** of FIG. **22**, there is another glue lap **326** at the opposite side of the box blank. Corresponding parts in FIG. **24** are indicated by the same reference character as those in FIG. **23**, but with a prime appended. An extension **240***a* of the plastic **240** projects across and beyond the edge of the glue lap **296'** and is sealed against the plastic lining on the panel **288'** to protect the cut edge of glue lap **326**, from contact with liquid or other contents of the container. This double sealing lap can also be sealed on the outside of the package.

FIG. **25** shows a sheet or web **330** which will vary to conform with customers specifications and manufacturing machinery or equipment. The sheet contains four box blanks, two of which are designated by the reference character **332** and two of which are designated by the reference character **334**. These boxes are similar except that the laps are at different ends. The correlation of blanks in FIG. **25** makes it possible to locate the blanks in the web so that the higher or longer of the top closure panels of one blank register with the lower or shorter top closure panels of the other blank to reduce waste and to make possible the use of a narrower web.

The blanks **332** and **334** of FIG. **25** are similar to the blank **280** of FIG. **22** except that each blank **332** and **334** has one top closure panel **336** and one bottom closure panel **336'** which is higher than the other top closure panel **338** and bottom closure panel **338'** of the same blank. It will be evident from FIG. **24** that the blanks are arranged in the web to bring panels **336'** and **338'** of transversely adjacent blanks opposite to one another. The edges of the sheet or web **330** are designated by the reference characters **340** and **342**. Before the plastic is applied to the material of the web, the web is die cut to remove the material from all of the areas **343**, **344** and **345** indicated by solid rectangular outlines in FIG. **25**. The dash lines are score lines.

These cutout areas **343**, **344** and **345** leave continuation portions along both sides of the web and along the midsection of the web so that the web can continue to run as such after the cutting operation which removes the material from these areas **343**, **344** and **345**. The plastic **240** or other coating material is then applied to the web **330**. The plastic may be applied as a thin sheet of the same width as the web, and it covers the entire area of the web including the cutout areas **343**, **344** and **345**.

With the sheet or web **330**, and with any of the box blanks previously described, the plastic **240** can be extruded over the web, if desired, in any way that will cover the entire area including the cutout areas. The plastic **240** can be a coat or laminate or it can be a separate film that is sealed to the web at enough places to cause it to stay in place on the web and on the box blanks that are cut from the web.

For the box blanks shown in FIG. **25**, and for any of the box blanks disclosed in this application, the plastic lining can be bonded to the blank near all edges of the blank but left unbonded or only lightly bonded to the large areas such as the front, back and side panels of a container. In the case of containers that are seal closed, such an arrangement has the advantage that a vacuum can be drawn on the contents of the container when it is sealed, and the plastic can move inward away from the vertical panels, as a result of the vacuum, without tending to collapse the sides of the container, or give them concave surfaces.

The package is stronger when the area of coating material bonded to the paperboard is larger. When areas of the coating material are left unbonded to accommodate vacuum sealing, the extent of these areas is determined by the density and other physical properties of the product. For example, a hydroscopic granular material may need accommodation for more volume change under vacuum than a liquid, but the strength of the package for the lighter material need not be as great.

After the plastic **240** has been applied to the web, the box blanks are cut apart, the plastic and paperboard both being

cut along the dot and dash lines and the plastic only being cut along the dotted lines where the paperboard had already been cut away before the plastic was applied to the board.

Each blank includes a side panel **350**, a front panel **351**, an opposite side panel **352**, a back panel **353** and a sealing lap panel **354**. There are top closure panels **336** and **358**, fold-in end panels **358** and fold-back panels **360** connected with the top closure panels. At the bottom of the back, there are bottom closure panels **336'** and **338'** fold-in end panels **358'** and fold-back panels **360'**.

Some of the blanks **332** and **334** can be incised to produce tear strips **363** around each of the containers just below the top of the containers. For a container used for granular material this gives a choice of opening a pour spout or tearing off the entire top of the container if it is to be emptied out at one time. If the tear strip extends around only three sides of the container, then the fourth side serves as a hinge connection of the top to the rest of the container. The incisions for the tear strips are made before the coating is applied to the web. The coating covers the incisions so that they do not interfere with the complete sealing of the contents of the closed container. Since the coating is bonded to the tear strip **363** and is of thin gauge, it tears with the strip when the container is being opened by tearing. The tear strip **363** can be used on containers that have sealed tops without provision for a pour spout.

FIGS. **26** and **27** show the way in which one of the blanks of FIG. **25** is closed at the top. A sealing ridge panel **364**, which is the upper part of the shorter top closure panel **338**, has its plastic lining **240** sealed to the plastic on the confronting face of the longer top closure panel **336** as the top panels are folded as shown in FIG. **26**. This sealing of the container is similar to that of the other containers already described, and when the panels are fully folded, the extending part of the longer panel **336** is pushed down flat on top of the shorter top closure panel **338** as shown in FIG. **27**.

The preferred embodiment of the invention has been illustrated and described and the invention as defined in the claims.

I claim:

1. A pour container including front, back and sidewalls joined along score lines and one of which includes a seam for completing the side enclosure of the container, panels at the upper ends of the sidewalls for forming a top for the container, said panels including a fold-in panel at the upper end of a sidewall, and fold-back panels hinged to opposite ends of the fold-in panel along hinge lines that coverge as they extend toward the upper end of the fold-in panel, said fold-back panels covering the fold-in panel, top closure panels hinged to the upper ends of the front and back walls, means sealing the upper ends of the fold-back panels and the top closure panels to form a closed spout for the container, said upper ends of the top closure panels being longer than the upper ends of the fold-back panels along the seal so that the upper ends of the fold-back panels pull away from the top closure panels and break open the seal as the fold-back panels are pulled toward straight line relation to one another when opening the pour spout.

2. The pour container described in claim **1** characterized by sealing ridge panels connected with and extending up from the upper ends of both of the top closure panels and the fold-back panels, said sealing ridge panels being part of said means for sealing the upper ends of the panels.

3. The pour container described in claim **1** characterized by the fold-in panel being generally triangular with its juncture with the sidewall as the base of the triangle and the hinge lines joining the fold-in panel with the fold-back panels being the sides of the triangle, said hinge lines joining the fold-in panel with the fold-back panels being spaced some distance from one another at their upper ends so that the fold-in panel terminates short of the apex of a complete triangle.

4. A pour container having front, back and sidewalls and top panels joined to the walls along score lines, the top panel of at least one of the walls including a fold-in panel and fold-back panels that cooperate with the top panels of the adjacent walls to form a pour spout that is folded into a closed position when the container is in condition for shipping, upper end portions of the container that form the pout spout being in sealed relation with one another before the spout is originally opened, said adjacent walls of the container being of greater width than the wall between them that forms the pour spout, and with the spout folded, said adjacent wall panels that form the pour spout extending for less distance toward the wall at the other end of the container than do the top panels of the side walls that cooperate to form the pour spout.

5. The pour container described in claim **4** characterized by the fold-back panels being joined to the fold-in panel by hinge score lines that extend from opposite ends of a base score line that joins the fold-in panel to its wall and being at acute angles to the base score line so that said hinge score lines converge toward one another as they extend upward, the top panels of said adjacent walls having portions that extend over the fold-back panels of the wall between said adjacent walls to form an upper part of the pour spout, said portions being joined to the rest of the top panels by other score lines, and said other score lines extending at acute angles to the score lines that join the top panels to the walls, these latter acute angles being smaller than the acute angles of said hinge score lines.

6. The pour container described in claim **4** characterized by the panels that form the pour spout having sealing ridge panels at their upper ends joining together across the inside faces of the ridge panels of said adjacent wall panels and joined together across the outside faces of the ridge panels that are at the upper ends of the fold-back panels.

7. The pour container described in claim **6** characterized by the converging score lines that join the fold-back panels to the fold-in panel being spaced from one another at the upper end of the fold-in panel but converging in directions that intersect within the height of the ridge panels that are at the upper ends of the fold-back panels.

8. A blank for making a pour spout container including front, back and sidewall panels joined together along score lines and with a tab for forming a seal of the container, panels at the upper ends of the front, back and sidewall panels and joined to said wall panels along base score lines, sloping score lines dividing the panels at said upper ends into smaller panels some of which fold in relation to one another to form a pour spout which in a folded position closes the container and which opens out into an open pouring position, the sloping score lines at the upper ends of one of the sidewall panels extending from the ends of a base score line in converging directions and at acute angles to the base score line, and a pour spout back score line in each of the panels at the upper ends of the front and back wall panels, each of which pour spout back score lines extend from a base score line near a different one of the converging score lines and diverging therefrom, and each of said pour spout back score lines being at an acute angle to its base score line smaller than the acute angle of each of said converging score lines to their base score line, sealing means at the upper ends of said smaller panels in position to contact with one another to seal the spout when in its original closed condition.

9. A paperboard container having four vertical walls, panels for closing the bottom of the container and panels for closing the top of the container including:

a. top closure panels connected to the upper ends of alternate sidewalls along score lines;

b. fold-in end panels connected to the upper ends of the other alternate vertical walls along score lines;

c. fold-back panels joining each side of each fold-in end panel with a side of one of the top closure panels; and

d. the top closure panels having score lines that extend from opposite corners at one side of the container inwardly to a location along the center of the top of the container for turning up triangular portions of the top closure members to expose fold-back and fold-in panels at the wall of the

container below the triangular portions of the top closure panels, said score lines in the top closure panels being substantially longer than the score lines at the junctures of the fold-in end panel with the fold-back panels to which the fold-in end panel is connected.

10. A box blank having front, back and side panels that meet along fold lines of the blank, coating on at least one side of the material from which the blank is made, the coating extending beyond the edges of side panels on each side of the blank along the entire length of those side panels, the edges beyond which the coating extends being the inner edges along which the blank is to be sealed to form a box, another panel of the blank having portions along its side edges for connecting the blank in position in a web from which the blank is cut, the blank having two of its side panels in positions to overlap the outside of the side panels beyond which the coating extends to form a seam, adhesive on areas of the side panels that overlap to form the seam, the adhesive extending to the edge beyond which the coating extends along the entire length of said side panels and being in position to secure the extending coating to the surface of its overlapping panel adjacent to the overlap of the panels when the panels are brought together when setting up the container thereby maintaining a continuity of the coating across the seam.

11. A box formed from a blank of paper board and having front, back and side panels and fold lines where the panels meet with one another, a coating of plastic vapor barrier on the inside surface of the box and extending across the inside surfaces of all the panels and across the fold lines along which the panels meet with one another, the box having two side panels on each side of the box and the side panels on each side overlapping one another and forming lap seams of the box, the vapor barrier coating of the inside of the box being also on the inner of the overlapping panels and extending beyond the seamwise edges of said inner panels, adhesive connecting the overlapping panels to one another over the entire length of the seam, said adhesive also securing the extending coating on the inner overlapping panel on each side of the box to the coating on the inside surface of the panel that is adjacent to said extending coating.

12. A paper board container having four sidewalls, panels for closing the bottom of the container and panels for closing top of the container including:

a. top closure panels connected to the upper ends of alternate sidewalls along score lines;
b. fold-in end panels connected to the upper ends of the other alternate sidewalls along score lines;
c. fold-back panels joining each side of each fold-in end panel with a side of one of the top closure panels;
d. each of the top closure panels having a ridge portion at its upper end beyond the tops of the fold-back panels for sealing to a confronting face on the ridge portion of the other top closure panel;
e. coating on the inside surfaces of all of the panels; and
f. said coating and only the coating extending beyond the top edges of the fold-back panels and between the confronting faces of the ridge portions of the top closure panels when the container is closed and sealed, whereby the portions of the top closure panels above the fold-back panels have only coating material between their confronting faces when the container is sealed.

13. A paperboard container made of sheet material having a coating thereon covering its inside surface, the container having top, bottom and side panels sealed to protect the contents of the box, a tear strip formed by two rows of incisions extending through the sheet material in at least one side of the box near the top thereof, the coating on the incised side extending across the incisions and itself being free of incisions and being bonded to the tear strip so as to tear therewith.