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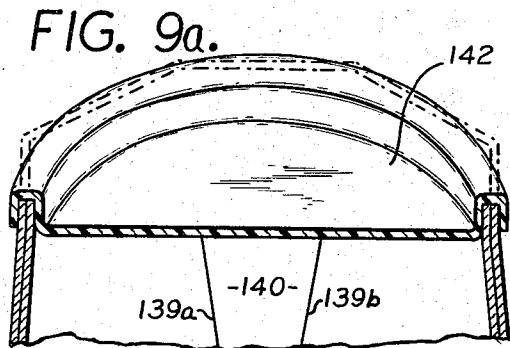
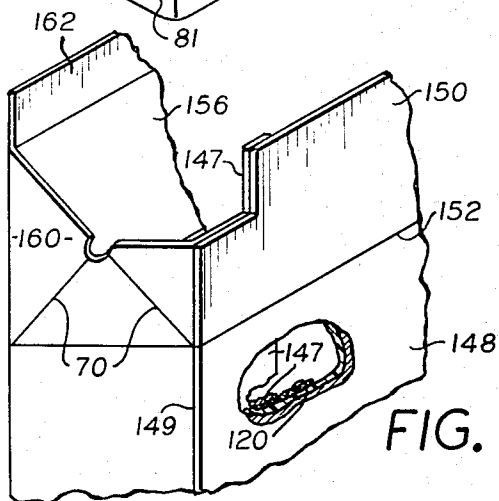
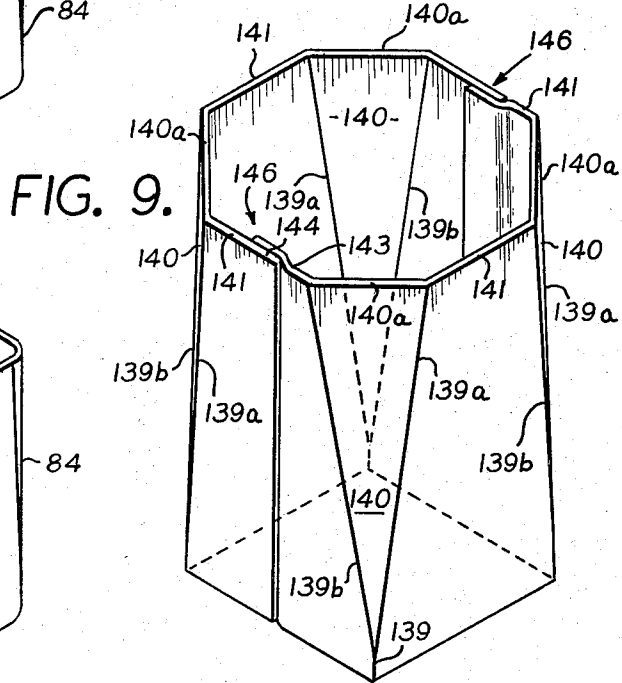
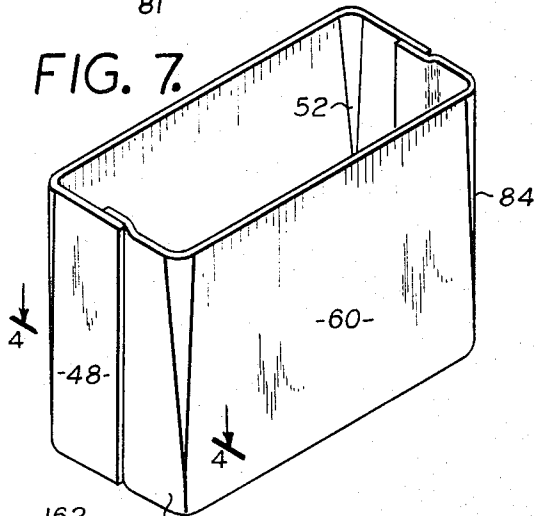
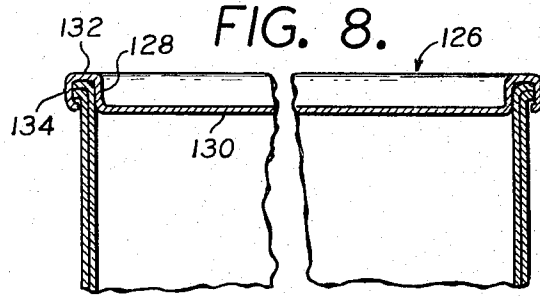
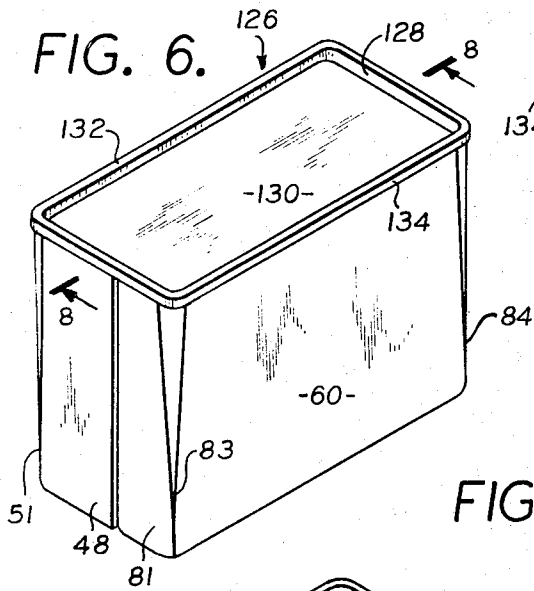
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3,357,322

COATED BOX AND METHOD OF MAKING

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2 Sheets-Sheet 2



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3,357,322
COATED BOX AND METHOD OF MAKING

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This invention relates to boxes and to the manufacture of boxes.

It is an object of the invention to provide an improved box suitable for manufacture from relatively light paper board (cardboard) up to .040", and which is liquid-proof and moisture-proof, and can be made gas-proof, if desired. Laminated foil and corrugated paper can be used.

Another object is to provide a canister type of box which can be supplied to packer in a flat and knocked-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 it its final volume so that large space is required for both shipping and storing; and with resulting increase in packaging cost.

Another object is to make 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 to form a continuous coating on the inside 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.

Another object is to provide an improved method of making boxes of the character indicated.

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

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

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

FIGURE 2 is a greatly enlarged fragmentary view of a portion of the web shown in FIGURE 1;

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

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

FIGURE 5 is a diagrammatic exploded view showing more clearly the relation of the folds of FIGURE 4;

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

FIGURE 7 is a view similar to FIGURE 6 but showing the box with the cover removed;

FIGURE 8 is an enlarged fragmentary view taken on the line 8—8 of FIGURE 6;

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

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

FIGURE 10 is an isometric view showing another modified form of the invention.

FIGURE 1 shows a web 16 which is advanced with intermittent motion toward the right in the drawing by feed rollers 17. This web 16 is preferably made of paper board 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 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 cuts box blanks 32 and 34 from the web 16.

One of the blanks 32 is shown in detail in FIGURE 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 or nicks 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 side panels 48 and 49 of the box blank. These 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 lands or inches 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 bottom side panels 62 and 63 connected with the opposite ends of the bottom panel 56 by scored fold lines 64 and 65, respectively, and these bottom side panels 62 and 63 join the side panels 51 and 52 along extended portions of the scored fold line 58.

In order to facilitate the folding of the blank, the bottom side 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 of the cut back edges 68 and 69 back to the intersections of the fold lines 64 and 65 with the transverse fold line 58.

The front panel 60 is cut from the web 16 along a slit line 72 which terminates at lands 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 no waste between successive blanks and a single slit replaces the slits 54 and 72.

There are side panels 81 and 82 connected with the front panel 60 along scored fold lines 83 and 84, respectively, and these side panels 81 and 82 join the bottom side 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 cut out areas 87 and 88, respectively, and these cut out areas 87 and 88 extend along the side edges of the bottom side 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 rollers 24 and 26 of FIGURE 1. The actual apparatus for stripping the waste from the areas 87 and 88 is omitted from FIGURE 1 for clearer illustration since such apparatus for stripping waste material from webs is well understood in the art and its illustra-

tion is not necessary for a complete understanding of this invention.

Referring again to FIGURE 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 FIGURE 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 a 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.

It will be understood that the roller 91 is merely representative of means for applying a coating of plastic to the web 16. 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 plastic or foil to the web by extension and laminating procedure in addition to that illustrated.

Beyond the coating station, the web 16 passes an adhesive-applying station which 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 side panels 62 and 63 (FIGURE 2) and the front side panels 81 and 82. Optionally adhesive may be applied to the back side 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 knocked-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 set up boxes and filled, but if desired, adhesive other than hot-melt adhesives can be used.

In applying the coating 96 (FIGURE 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 cut out areas 87 and 88. In the preferred operation of the invention, the coating spans the cut out areas 87 and 88, and when the box blanks are stripped from the web, this coating 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.

FIGURE 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 62, respectively, while the side panels 48 and 81 are folded inward along the fold lines 51 and 83, respectively. This causes the side panel 62 to fold along the line 64 and at the same time to fold along the diagonal fold lines 70 and along the extended portions of the fold lines 58 and 62.

In the construction shown in FIGURE 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 meet the score lines 58 and 61.

FIGURES 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. It also shows the folds where the side panels 48 and 81 overlap one another and the bottom side panel 64 breaks into folds along the diagonal fold lines 70 so as to form three superimposed thicknesses of the folded panel 64 overlying the bottom panel 56.

The adhesive 120 on the bottom side panel 64 bonds the folds of the bottom side panel together.

FIGURE 6 showed 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.

FIGURE 7 shows a box in set up form and before the cover 126 is applied. FIGURE 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 to fully 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 FIGURE 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 FIGURE 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 (FIGURE 8) to be embedded 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.

FIGURE 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 139 having branches 139a and 139b which take the place of the fold

lines 52 of FIGURE 7 and which leave triangular intermediate panels 140 (FIGURE 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 140a 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 FIGURE 7. These corners shown in FIGURE 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 FIGURE 6; or a circular top with arcs on each of the top edges of the side panels. FIGURE 9a shows a round plastic top 142 applied to the upper end of the container shown in FIGURE 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 FIGURE 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 that outside walls on both sides of the seam 146 flush with one another.

FIGURE 10 shows a modified construction in which the box blank is coated on its inside surface with a portion of the coating 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 and is secured to the plastic coating on the inside surface of the panel 148 at a location adjacent to the edge of the panel 147 where the coating extends beyond the raw cut edges as already described, and by adhesive squeezed from between the panels 147 and 148, when the seam is formed. This box can be sealed by the "hammer and anvil" method.

The box of FIGURE 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 the panel by adhesive. There are die panels 160 secured to adjacent panels of the box blank on three sides and these side panels 160 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 144 and provides a pull tab for opening the box. The box shown in FIGURE 10 is preferably closed in the same way at both ends.

The preferred embodiments of the invention have been illustrated and described but changes and modifications can be made and some features can be used in different combinations without departing from the invention as defined in the claims.

What is claimed is:

1. The method of making a box which comprises,
 - (a) cutting and scoring a web to form a box blank having front, back and side panels, and also bottom panels, that meet along fold lines,
 - (b) orienting the box blank in the web with the fold lines along which side panels meet extending generally parallel to the side edges of the web, the web being cut out and waste material being stripped from the web along the full length of the edge of at least one side panel and also along the full length of an edge of a bottom panel,
 - (c) leaving uncut portions of the blank integral with the web to retain the blank in position in the web,

- (d) covering at least one side of the blank with plastic material while in position in the web and extending the plastic material across the cut-outs in the web, beyond those edges of the side panel and bottom panel, from which waste material has been stripped,
- (e) applying an adhesive coating to the other side of the blank over at least the areas of the blank adjacent to the edges from which material was stripped;
- (f) subsequently severing the uncut portions of the blank and removing the plastic covered blank from the web; and
- (g) folding the blank into a box with the panels having adhesive thereon confronting other panels to form the seams of the box, the panels having the subsequently cut portions being on the outside of the seam.

2. The method of making a box as described in claim 1 characterized by cutting the blank with side panels on both sides of each of the front and back panels and removing waste materials from the edges of the side panels that connect with both sides of the front panel.

3. The method of making a box as described in claim 2 characterized by cutting the blank with a center bottom panel and side bottom panels connected to both sides of the center bottom panel and also side panels of the box to form a bellows fold, said side bottom panels having portions cut inward from the sides of said other panels to facilitate the folding of the blank, and having the plastic material extending beyond the portions that are cut inward from the sides.

4. The method of making a box as described in claim 3 characterized by the front and back panels having their lower ends connected to opposite sides of the bottom panel, and said front and back panels being connected at both sides in position to overlap and form seams on both sides of the box, at least the inside side panel of each seam having the plastic material extending beyond the edge of the panel for the full height thereof.

5. The method of making a box as described in claim 2 characterized by covering both sides of the blank with plastic while the blank is in position in the web.

6. The method of making a box as described in claim 2 characterized by moving the web continuously and cutting successive blanks from the moving web with the blanks spaced from one another lengthwise of the web, and cut from the web along transversely extending lines having interruptions at spaced locations along the transversely extending lines forming lands that connect the blanks to the web to hold them in position in the web for applying the plastic covering to the blank and web, all portions of the web from which material is stripped having their longer dimensions extending in the direction of movement of the web.

7. The method of making a box as described in claim 1 characterized by covering the blank with a vapor proof layer and folding the blank so as to have the coating on the inside of the box, and with the plastic material extending beyond all edges of the box that are on the inside thereof and beyond the inside edge into contact with areas of the plastic material on adjacent panels, the plastic at the areas of contact being sealed to itself.

8. The method of making bags as described in claim 1 characterized by the cut-outs in the web along said edge of at least one side being a continuation of the cut-out along an edge of a bottom panel.

9. The method of making a box as described in claim 8 characterized by applying adhesive in a hot condition to areas of the blank that are on the outside of panels which form the insides of seams of the box, and folding the box blank with other panels overlying the adhesive and in contact therewith before the adhesive cools and hardens.

10. The method of making a box as described in claim 8 characterized by folding the blank with certain of the panels overlapping to form a seam and with the covering

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that is beyond the edges of a panel secured to a confronting panel by part of the area of adhesive which secures the seam together.

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