Dec. 13, 1966 D. J. CRAWFORD 3,291,369

MEANS FOR SCORING CONTAINERS

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FIG. 1

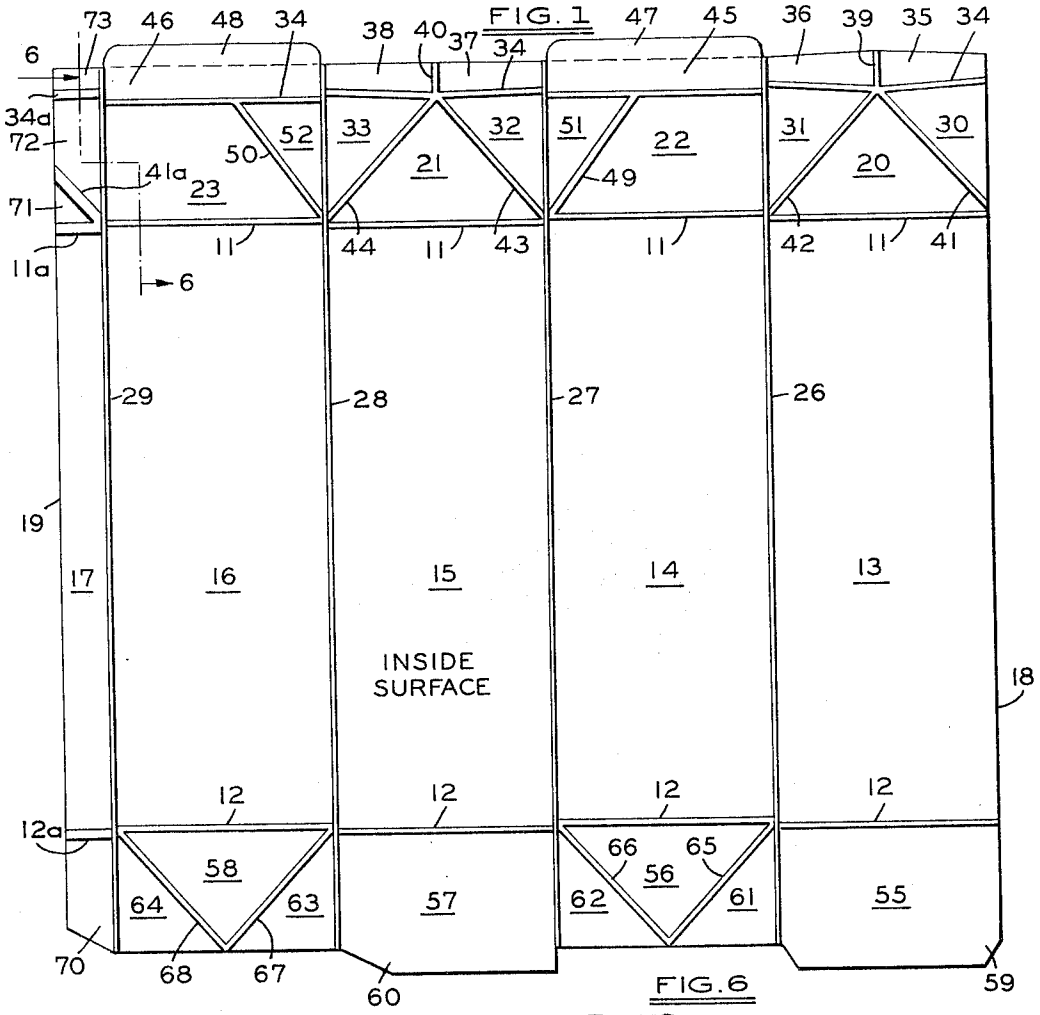

FIG. 2

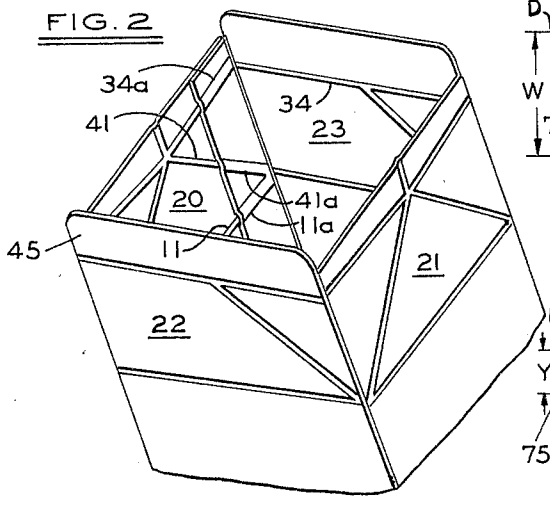

FIG. 6

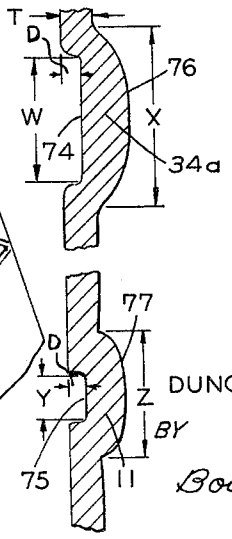

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FIG. 3

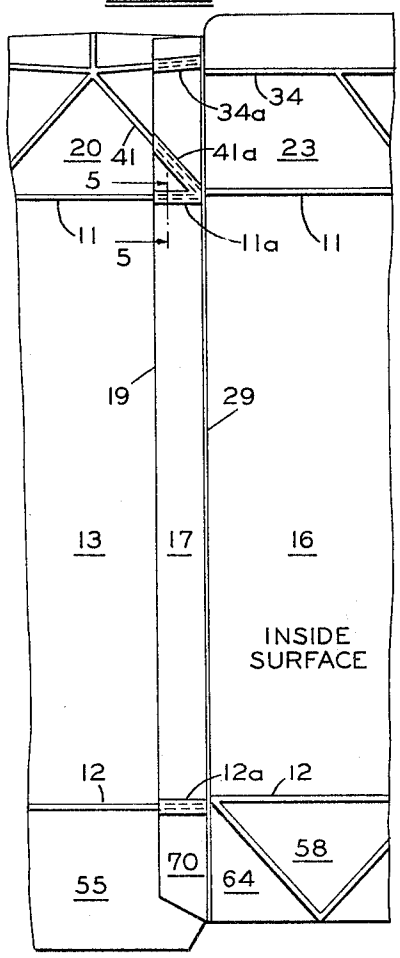


FIG. 5A

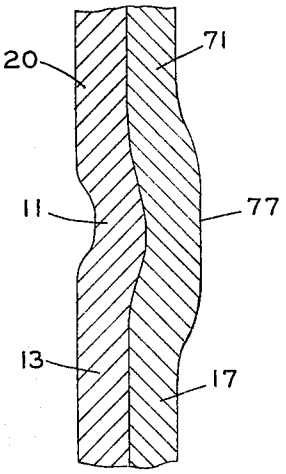


FIG. 5

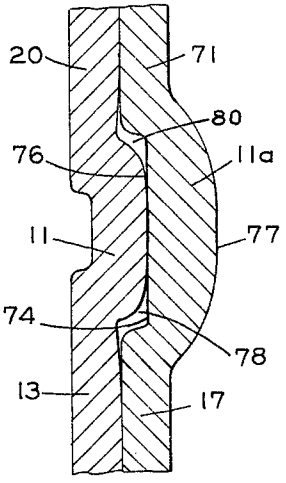
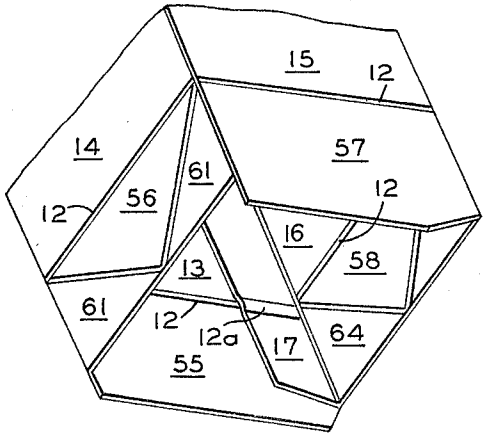


FIG. 4



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MEANS FOR SCORING CONTAINERS

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7 Claims. (Cl. 229—37)

This invention relates generally to thermoplastic-coated paperboard containers, and more particulraly to an improved thermoplastic-coated paperboard container side seam and method of sealing through the use of lines widened to facilitate both liquid-tight sealing and machine forming of the container's bottom and top closures.

Coated paperboard containers have been widely used for packaging milk and other food products. These containers are cut from large sheets of paperboard into single-piece blanks and impressed with score lines into a plurality of panels. As an initial step in the construction of a container, a flat side-seamed blank is formed. This is accomplished by means of a side seam flap whose outside surface contacts the inside surface of the end panel. These surfaces are heated to activate their coating if coated with a heat sealable material, or glue material may be applied to these surfces so that they will be bonded together. The mating score lines on these surfaces have made it difficult to attain an effective liquid-proof seal. Present practice is to "fade-out" the score lines on the side seam by making them increasingly shallower as they approach the outside edge of the flap. This has improved the side seam sealing but has created a problem in the machine folding operation which requires standard depth scoring on the side seam flap for effective operation. Accordingly, it is an important object of the present invention to provide an improved coated paperboard container which can be readily folded by machines.

It is another object of the present invention to provide a paperboard container in which an effective liquid-tight seal is provided between the side seam flaps and the remainder of the container.

It is a further object of the present invention to provide a side seam seal which eliminates the tendency to form channels at the juncture of the male and female portions of the scores on the overlapping panels of the container and thus obviate leakage.

It is a further object of the present invention to provide a method for eliminatnig leakage in a coated paperboard side seam by having oversize wide scores on the side seam flap in mating relation to concurrent standard scores of the panel prior to pressure sealing.

Another object is to provide a paperboard container with an oversize wide score for receiving the rib portion of a standard score so arranged with an excess of clearance that when the overlying scores are subjected to pressure sealing means, a liquid-tight seal is attained.

Other objects, features and advantages of this invention will be apparent from the following detailed description, appended claims and accompanying drawings.

In the drawings:

FIGURE 1 is a lay-out view of a thermoplastic-coated paperboard blank from which a container of the present invention is formed, and showing the inside surface thereof;

FIGURE 2 is a fragmentary perspective view of a container made in accordance with the invention, and showing the upper end of the container top closure structure in fully open position.

FIGURE 3 is a fragmentary inside surface view of a flat side seam blank made from the container blank.

FIGURE 4 is a fragmentary perspective view of the lower end of a container made in accordance with the invention and showing the bottom closure structure in fully open position.

FIGURE 5 is an enlarged cross-sectional view taken on line 5—5 of FIGURE 3, the position of the elements shown corresponding to the overlying scores prior to pressure sealing.

FIGURE 5A shows the scores according to FIGURE 5 after the pressure sealing of the side seam.

FIGURE 6 is an enlarged cross-sectional view taken on 6—6 of FIGURE 1 and showing a representative standard score and wide score.

Referring now to the drawings, the numeral 10 generally indicates a paperboard container made in accordance with the principle of the present invention. The container described in this application is made from paperboard having a thermoplastic coating thereon, but it should be understood that other suitable coatings and adhesives may be employed as a coating and side seam sealer for the container.

Referring more specifically to FIGURE 1, the container 10 is shown in flat blank with a pattern of appropriate score lines and having the inside surface of the blank showing. The container blank is separated into three vertically disposed groups of panels by the score lines 11 and 12. The material above the score line 11 is termed the top closure, the material between the score lines 11 and 12 is termed the body panel group and the material below the score line 12 is termed the bottom closure panel groups. The body panel group comprises the four panels indicated by the numerals 13, 14, 15 and 16, and the side seam flap 17. The container blank is defined on the sides by the edges 18 and 19. The body panels 13 through 16 are separated by the score lines 26 through 29.

The top closure contains the end panels 20 and 21 and the roof panels 22 and 23. The end panel 20 is connected to the fold-back panels 30 and 31 at the score lines 41 and 42 respectively. The end panel 21 is connected to the fold-back panels 32 and 33 at the score lines 43 and 44, respectively. Secured to the fold-back panels 30 and 31, at the score line 34, are the inner rib panels 35 and 36, respectively. The inner rib panels 35 and 36 are connected at the score line 39. The fold-back panels 32 and 33 are connected to the inner rib panels 37 and 38, respectively, at the score line 34. The inner rib panels 37 and 38 are connected at the score line 40.

The roof panels 22 and 23 are attached to the outer rib panels 45 and 46, respectively, at the score line 34. The outer rib panels 45 and 46 are provided with the sealing flaps 47 and 48, respectively. The roof panels 22 and 23 include the pouring spout flap portions 51 and 52 which are formed by the score lines 49 and 50, respectively.

The bottom closure panel group comprises the panels 55 through 58. The bottom closure panels 55 and 57 are substantially square in plan configuration. The bottom closure panels 56 and 58 are substantially triangular in plan configuration. The bottom closure panel 55 is provided with an extended tuck-in flap 59, and the bottom closure panel 57 is provided with an extended tuck-out or tuck-over flap 60. The bottom closure panel 56 is connected to the adjacently disposed triangular fold-back panels 61 and 62 at the score lines 65 and 66, respectively. The bottom closure panel 58 is connected to the adjacently disposed triangular fold-back panels 63 and 64 at the score lines 67 and 68. Side seam flap extensions 70, 71, 72 and 73 are used to form the blank in a flat tube in a manner to be described.

The forming, filling and sealing of the container 10 is shown in detail in U.S. Patents Nos. 3,002,328, 3,120,335 and 3,166,994. These patents are assigned to the assignee of the subject application and the disclosures thereof are incorporated by reference for a more complete description of the container.

In the illustrative container blank of FIG. 1, the score

lines are compression formed by depressing the blank toward that surface which is to become the inside face of the container. The method for accomplishing this is by means of complimentary compression dies which have projecting male rules on a first block and matching female grooves in a second block. The result is that the scores are formed in the blank to a depth sufficient to provide a rib opposite the score within the erected container.

In carrying the invention into effect, two sizes of score are produced by the dies as illustrated on an enlarged scale by the cross section of FIG. 6. As can be seen in the drawing, the wide score **34***a* which is representative of the other wide scores, **11***a*, **12***a* and **41***a* on the side seam flap **17** is formed having a groove **74** whose width W is more than double the width Y of the standard score groove indicated at **75**. It will be noted that both grooves **74** and **75** have a planar base portion because the impressed male rules used in the dies have a substantially rectangular cross section. Furthermore, the grooves **74** and **75** have equal depths as shown by the measurement D. The depth D must be controlled to ensure a minimal score indentation that will prevent rupturing of the thermoplastic coating during the compression die operation and yet provide satisfactory machine folding for container and closure formation.

While the groove portions **74** and **75** of the scores are well defined as to their widths W and Y and uniform in their depth D, it is not possible to maintain a uniform configuration of their rib surfaces, indicated by the numerals **76** and **77**. As seen by the dimension lines of FIG. 6, the scores are held to a controlled tolerance as to widths X and Z by the vertical walls of the female compression dies, but are allowed to assume an irregular convex shape over the surfaces **76** and **77**. This freedom to move in a vertical direction is necessary to prevent damage to the thermoplastic coating of the paperboard.

As a first step in the formation of a container, the blank is transformed into a flat side seamed blank as partially illustrated in FIG. 3 by folding the panel **16** and its side seam flap **17** about score line **28** until they contact the panels **15** and **14** respectively. The panel **13** is folded about scoreline **26** until it contacts the inside surface of panel **14** and the outside surface of side seam flap. **17**. The surface along edge **18**, which will meet the outside face of the side seam flap, will be heated to activate its coating and the outside surface of the side seam flap will be heated to activate its coating so that when the two surfaces meet they will be bonded together upon cooling. Pressure is applied to secure the best possible bond. The edge **18** and the score line **29** now appear as one line.

The panels **14** and **15** of the side seam blank of FIG. 3 have been removed to show the overlying relation between the scores **11**, **12**, **34** and **41** adjacent edge **18** and the wide scores **11A**, **12A**, **34A** and **41A** of flap **17**. The container blank as shown in FIG. 3 is in the form in which it will be fabricated on packaging machines.

As can be seen in FIG. 5, the convex rib configuration **76** of standard score **11** is received within the wide score **11***a*. It will be noted that applicant has provided a clearance, indicated at numerals **78** and **80** and sufficient to allow the mating scores to conform to one another during the pressure sealing operation. The result is a liquid-tight seal that eliminates the formation of leakage channels, as shown in FIG. 5A.

While the ratio between the wide score width W and the standard score rib width Z is not critical in any narrow sense, it will be appreciated that a width W providing only a narrow clearance for rib **11** will result in the lack of space for the rib material within groove **74** upon pressure sealing with resultant channeling, while too great a width will result in an improper score for folding together with the formation of channels within the groove. For practical purposes, satisfactory results may be obtained with the wide scores having a width W in excess of the rib width Z by about one-half the gauge thickness T of the paperboard material.

For practical case, a thermoplastic coated paperboard of sheet gauge thickness of $T=0.0175$ inch with a standard score having dimensions $Y=0.0030$ inch and $Z=0.064$ can be mated and pressure sealed with a wide score having a groove width $W=0.072$ inch and rib width $X=0.016$ inch, providing a difference of approximately 0.008 inch between the widths W and Z.

It will be seen that by applicant's invention, the blank of FIG. 1 can be side seamed to form a flat tube providing a liquid-tight seal. The flattened blank can then be erected into a tube and the bottom and top closure completed by being folded about the scores **11**, **12**, **34** and **41** and their respective mating wide scores **11A**, **12A**, **34A** and **41A**. By virtue of the prominent scoring of the side seam, flap **17**, by means of wide scores having a standard depth throughout, applicant has enhanced the container folding operation, eliminating objectionable fading of the score lines formerly required to attain a fluid-tight seal.

While it will be apparent that the preferred embodiment of the invention herein disclosed is well calculated to fulfill the objectives above stated, it will be appreciated that the invention is susceptible to modification, variation and change without departing from the proper scope, a fair meaning of the subjointed claims.

I claim as my invention:

1. A one-piece blank for a liquid-tight tubular container of rectangular cross section formed of foldable paperboard having an overall surface coating of thermoplastic material, said blank comprising in combination:

(a) four rectangular side panels and a side seam flap joined along four spaced vertical score lines,

(b) a plurality of bottom closure panels connected to said side panels as extensions thereof along a horizontal score line extending the full width of said side panels,

(c) a side seam flap extension secured to one of said bottom closure panels,

(d) a wide score line located adjacent said side seam flap and said side seam flap extension and collinear with said horizontal score line, and

(e) said wide score line indented in a common direction with said horizontal score line and having a groove width at least twice the groove width of said horizontal score line.

2. A blank for a container as defined in claim **1** wherein said wide score line groove and said horizontal score line groove are compression formed to provide planar base portions when viewed in cross section having substantially equal depths.

3. A blank for a container as defined in claim **1** wherein said groove portion of said wide score line has a width that exceeds the width of the rib portion of said horizontal score line by an amount approximately equal to one-half the gage thickness of the paperboard material.

4. A tubular liquid-tight container of rectangular cross section formed from a one-piece foldable blank of paperboard having an overall surface coating of heat sealable thermoplastic material, said container comprising:

(a) a group of rectangular body panels defined by a network of spaced vertical and horizontal score lines,

(b) a top closure connected to said body panels,

(c) a group of bottom closure panels connected to said body panels,

(d) at least one side seam flap connecting said body panels, top closure and bottom closure panels together to form a tubular container, and

(e) said side seam having wide score lines positioned wherein the groove portions of said wide score lines mate with the overlying rib portions of said horizontal score lines to form a liquid-tight juncture.

5. A container as defined in claim 4 wherein said groove portions of said wide score lines have a width that exceeds the width of the rib portions of said horizontal score lines by an amount approximately equal to one-half the gage thickness of the paperboard material.

6. A container as defined in claim 4 wherein said groove portions of said wide score lines and the groove portions of said horizontal score lines are compression formed to substantially equal depth.

7. A blank for a liquid-tight tubular container of foldable material having overall surfaces of thermoplastic material that becomes adhesive when subjected to heat, said blank comprising in combination:

(a) a plurality of panels divided by parallel longitudinal score lines,

(b) a side seam flap adjacent one of said panels,

(c) a plurality of horizontal score lines indented in a common direction to a depth sufficient to provide a rib opposite the score line wherein the rib will be located within the erected container,

(d) said side seam flap having a plurality of wide score lines indented in the same direction as said panel score lines, and

(e) said wide score lines positioned to mate with the rib portion of certain of said panel score lines wherein when said side seam flap is pressure sealed to areas of said panels, a liquid-tight juncture is attained.

References Cited by the Examiner

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