Feb. 1, 1966 V. ARSLANIAN 3,232,516

PAPERBOARD CONTAINER

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FIG. 1

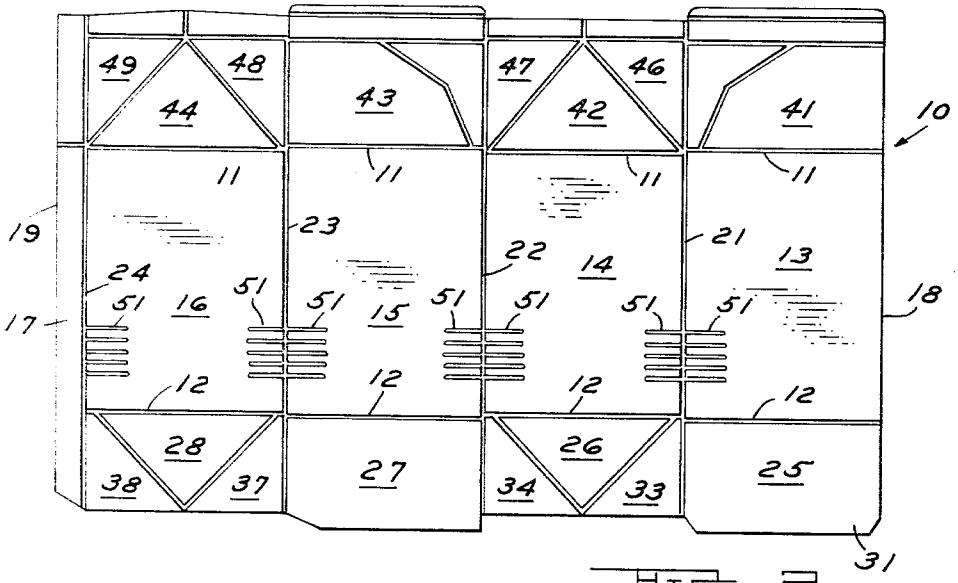

FIG. 2

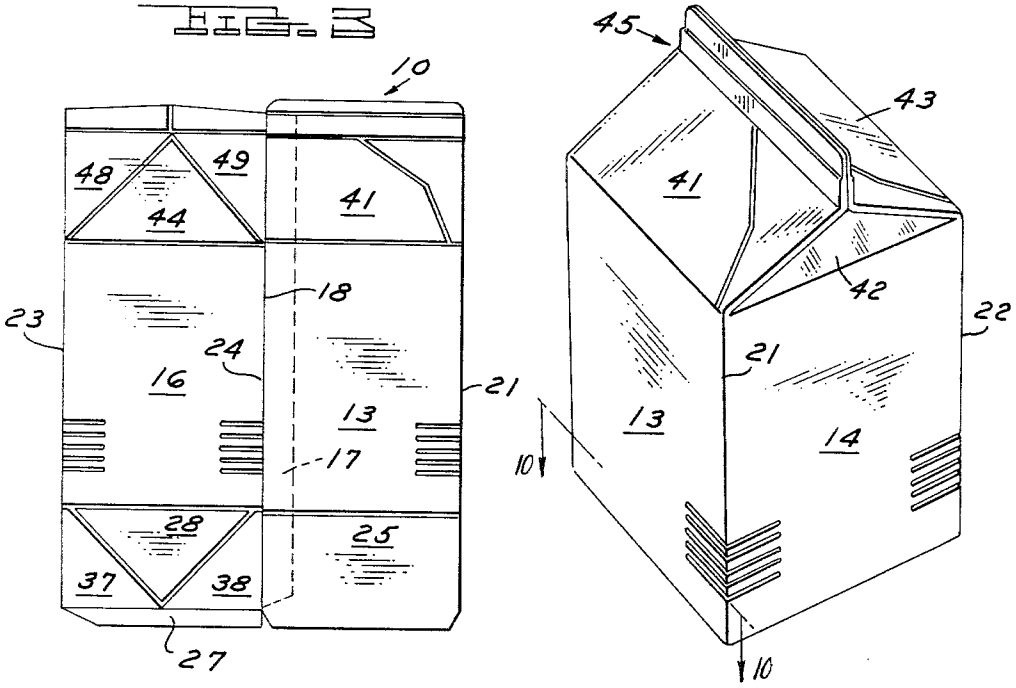

FIG. 3

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FIG. 4

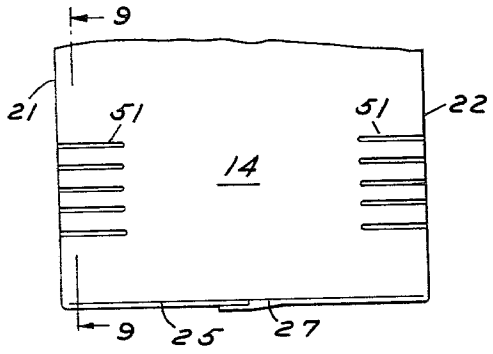

FIG. 5

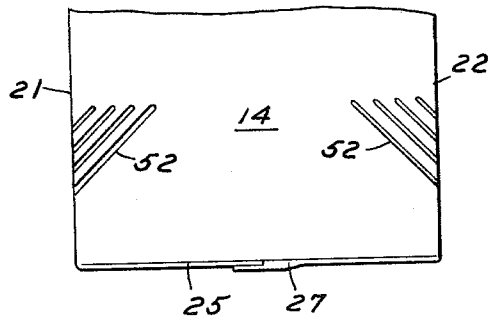

FIG. 6

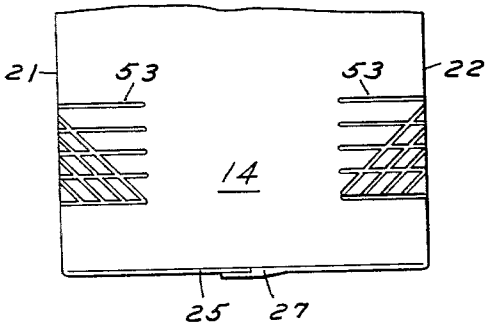

FIG. 7

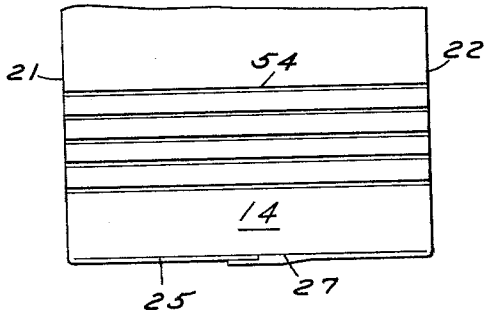

FIG. 8

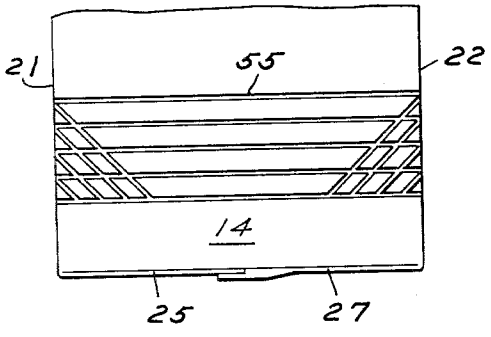

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FIG. 9

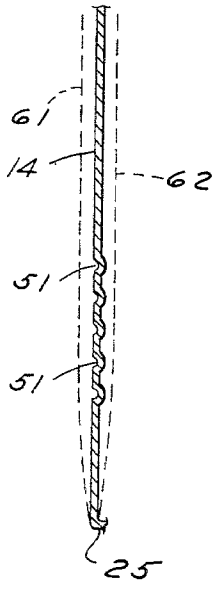


FIG. 10

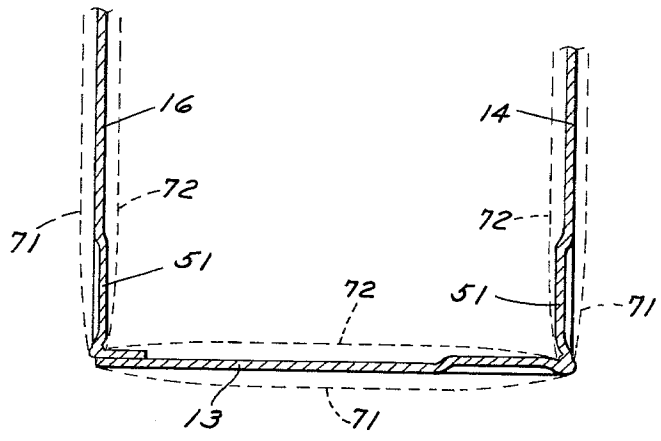
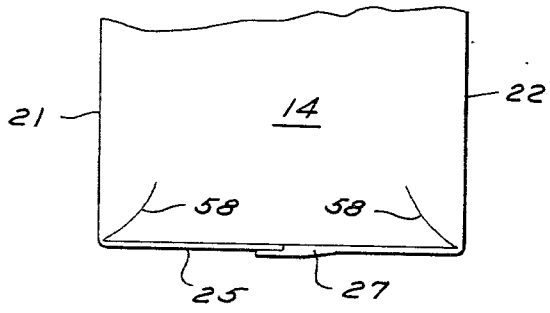


FIG. 11



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PAPERBOARD CONTAINER

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Filed Nov. 8, 1963, Ser. No. 322,296
5 Claims. (Cl. 229—37)

This invention is general relates to paperboard containers and particularly to the liquid carrying type.

Coated paperboard containers are being used in increasing quantities as fluid containing bottles in place of other commonly used means. The success of this new container has caused much demand for new and various sizes. At the present time the largest size coated paperboard container in general use holds a half gallon of fluid. As the sizes continue to increase and use varies, certain characteristics of the container are required to be modified to give satisfactory service. Liquids, such as milk, are now shipped many miles from bottling plants and in normal transportation methods are subjected to continuous vibrations and shock situations. In this transportation and handling activity the side walls of the container are subjected to considerable pressure from the fluid contents of the container. This causes constant or abrupt breathing, in and out movement, of the side walls which has its greatest effect and concentration near the bottom corner portions of the panels. This breathing and shock action can cause a failure of the carton by the coating becoming fatigued and cracking; thus, allowing the fluid to seep out of the container. One object of the present invention is to provide container side panels that are subject to a minimum of detrimental effect from vibrations or shock actions.

Another objective of the present invention is to prevent paperboard precoating from becoming fatigued or cracked. A further object is to provide a container with a side wall panel construction which will permit a minimum of paperboard precoating and use of smaller caliper paperboard.

Also, the objective of the present invention includes the provision of a container structure capable of accomplishing the above objectives with a mininmum of material cost and fabricating expense, and at the same time being composed of a simple and ruggedly formed structure which is very reliable in application.

Other objectives and advantages of the invention will be apparent from the following detailed description and claims, taken in connection with the accompanying drawings which form part of the instant specification, and which are to be read in conjunction therewith, and wherein like reference numerals are used to indicate like parts in the various views.

FIG. 1 is a layout view of an inside surface of a container blank showing the inventive structure;

FIG. 2 is a perspective view of a container fabricated from the blank shown in FIG. 1;

FIG. 3 is a flat side seamed blank made from the blank shown in FIG. 1 and showing the outside surface thereof;

FIG. 4 through FIG. 8 are side elevation views of the container shown in FIG. 2 showing various modifications of the side panel score arrangements;

FIG. 9 is a fragmentary sectional view through a side panel taken on the line 9—9 of FIG. 4;

FIG. 10 is a fragmentary sectional view through the side panels taken on the line 10—10 of FIG. 2; and

FIG. 11 is a side elevation view of a container shown in FIG. 2 without shock absorbing score lines.

While the invention is susceptible of various modifications and alternative constructions, certain illustrative

embodiments have been shown in the drawings and will be described below in considerable detail. It should be understood, however, that there is no intention to limit the invention to the specific forms disclosed, but on the contrary, the intention is to cover all modifications, alternative constructions and equivalents falling within the spirit and scope of the invention as expressed in the appended claims.

Referring generally to the figures, we have a flat blank form shown in FIG. 1 with a pattern of appropriate score lines and having the inside surface of the blank showing. The container is separated into three groups by staggered score lines 11 and 12. The material above score line 11, as seen in FIG. 1, is the top closure, a complete discussion of which is not necessary for disclosure of the present invention; however, a complete disclosure is given in U.S. Patent 3,185,376 which issued May 25, 1965. The material between score lines 11 and 12, as seen in FIG. 1, is the body and comprises four panels 13 through 16 and side seam flap 17. The body group is defined on the sides by edges 18 and 19 and with the panels being separated by score lines 21 through 24. The material below score line 12, as seen in FIG. 1, is the bottom closure, a complete discussion of which is not necessary for disclosure of the present invention; however, a complete disclosure is given in U.S. Patent No. 3,120,333 which issued February 4, 1964.

The bottom closure group below score line 12 is made up of major flaps 25 and 27 and minor flaps 26 and 28. The minor flaps 26 and 28 are flanked by fold-back members 33–34 and 37–38 respectively. The top closure group is made up of roof panels 41 and 43 and end panels 42 and 44. End panels 42 and 44 are flanked by triangular fold-back panels 46–47 and 48–49 respectively. The panels extending over the top of the aforementioned panels, upon construction as viewed in FIG. 2, form a closure rib 45.

To construct a container as shown in FIG. 2 from the blank in FIG. 1 a flat side seamed blank 10 is formed as viewed in FIG. 3. To form a flat side seamed blank panel 16 and the side seam flap 17 would be folded about score line 23 until their inside surfaces contact the inside surfaces of panels 15 and 14 respectively. The panel 13 would be folded about score line 21 so that its inside surface contacts the inside surface of panel 14 and the outside surface of side seam flap 17. The inside surface of panel 13 along edge 18, which will contact the outside surface of side seam flap 17, and the outside surface of flap 17 can be heated to activate their coating if coated with a heat sealable material. Also glue material may be applied to one or both of these surfaces so they will be bonded together.

The container blank 10 as shown in FIG. 3 is in the form in which it will be fabricated on packaging machines. For example, the unit disclosed in U.S. Patent No. 3,002,328 which issued October 3, 1961.

To form the bottom the container blank 10 is opened up into a tubular form with the major flaps 25 and 27 moving toward each other. Also, the minor flaps 26 and 28 are moved toward each other. This causes fold-back member 38 to rotate around score line 24 so that the inside surfaces of member 38 and flap 25 are coming together. At the same time and during the same movement member 38 is rotating so that the outside surfaces of member 38 and flap 28 are coming together. Fold-back members 33, 34 and 37 make the same movements as member 38 with panels 25–26, 27–26 and 27–28 respectively. Bottom closure major flap 25 moves toward bottom closure major flap 27 just enough faster than flap 27 moves toward flap 25 so that tuck-in member 31 is positioned between fold-back members 34 and 37 and major flap 27.

The top closure group is made as follows. End panels **42** and **44** move toward each other and roof panels **41** and **43** move toward each other. The inside surface of fold-back panel **49** will be moving toward the inside surface of roof panel **41** above score line **24**. However, they will not make contact. The outside surface of fold-back panel **49** will be moving toward the outside surface of end panel **44** as panel **44** rotates about score line **11** toward panel **42**. Fold-back panels **46**, **47** and **48** make the same movements as panel **49** with panels **41–42**, **43–42** and **43–44** respectively. The top extensions will move together in an appropriate manner and form the closure rib **45**.

FIG. 2 shows the container when completely formed. If the container is pre-coated with heat sealable material the top and bottom flaps can be heated to activate their coating to form a bonded surface when joined together. If the container is not of the pre-coated type bonding material may be applied to the flap areas which meet when the container is formed so they will bond when they meet.

FIG. 1 shows a series of shock absorbing score lines **51** on panels **13** through **16** which are the subject of the present invention. FIG. 4 shows a side elevation view of the container showing panel **14** with the preferred embodiment of the invention.

Referring to the drawings in general, and FIG. 9, 10 and 11 specifically, when the container is subjected to vibrations or a shock the liquid will exert pressure against the side walls. This will cause the side panel **14**, as indicated in FIG. 9, to flex in and out as indicated by flex line out **61** and flex line in **62**. The maximum flex will occur at the middle of the panel. The side panels will bow in and out due to this vibration as indicated in FIG. 10 for panels **13**, **14** and **16** as indicated by bow lines out **71** and bow lines in **72**. Their maximum bowing will take place at the middle portion of the panels. The maximum force per unit will concentrate at the score lines **21–24** and the bottom corners of the panels **13–16**. Without shock absorbing score lines, such as lines **51** in FIG. 4, the side panel will form "smiles" **58** in their corners in the normal hauling operation or shock situations. This is due to the fact that the concentration of forces will meet in the corners and become opposed to one another so that the flexing and bowing of the side panels will be opposed to each other on the various panels causing a bending and distortion of these areas. The "smiles" after continuous vibration or shock to the container can cause failure in the surface coating and when liquids are being carried leakage may occur. If only the inner surfaces fail there will be a wicking action in the side walls causing the walls to become soft and spongy. The present invention discloses, through an improved side wall panel for paperboard containers, means which will reduce the concentration of forces in the bottom panel and thus help to eliminate the "smiles" which cause failure in the bottom corners of the container.

As viewed in FIG. 3 and FIG. 10, it is shown that no shock absorbing score lines **51** are applied in the area of panel **13** adjacent the edge **18** which overlies the side seam flap **17**. The score lines may be applied but are usually not necessary in normal practice due to the fact that this double rigidity of the container wall prevents the vibration or shock to damage the side seam bottom corner. Also, with the other panels much of the shock of the vibration or shock force will be taken up by score lines **51** thus preventing the damaging effect to take place in the side seam corner. However, if the side seam were in the middle of one of the panels, such as **13**, score lines **51** would be desired in all the corners.

This invention introduces the method of putting the shock absorbing score lines **51** on the container side wall in non-critical areas and away from the corners or critical areas of the container. Thus, taking the force of vibration, shock, etc. away from the critical small corner areas which would result in high density of force in a small area causing failure.

This distribution of energy from the concentrated corner areas result in absorbing the force in a larger area. Thus, due to the fact the thermoplastic coating adheres to the board the fiber deformation per unit is greatly reduced and this eliminates or reduces the failure by the large deformation per unit in the corners, as illustrated in FIG. 11.

Because of these score lines **51** the wall board thickness of the container may be of lower caliper than would be required if such a shock absorbing device were not applied to the side wall. FIG. 4 is a representation of panel **14** with the score lines **51** and is the preferred embodiment of the present invention.

FIG. 5 discloses a series of shock absorbing score lines **52** which are placed at an angle leading into the corner score lines. This method directs and absorbs the forces in this direction, which is somewhat in a parallel relationship to the development of the "smiles" **58**.

FIG. 6 shows shock absorbing score line patterns **53** which includes a combination pattern similar to **51** with cross score lines which would be generally at right angles to the corner "smiles" **58** as developed in panels not having shock absorbing provisions, as illustrated in FIG. 11.

FIG. 7 discloses shock absorbing score lines **54**. These score lines are similar to score lines **51**, shown in FIG. 4, but having the score lines extending completely across the panels.

FIG. 8 discloses pattern of shock absorbing score lines **55** which are a combination of the shock absorbing score lines **53** and **54**, as shown in FIGS. 6 and 7 respectively.

The preferred shock absorbing score lines **51** in FIG. 4 are placed above the bottom score lines **12** an appropriate distance. For example, score lines **51** could be one inch long and start one inch up from the bottom score lines **12** with the score lines separated approximately five-sixteenth ($\frac{5}{16}$) of an inch on a panel that would be approximately seven and one-half inches from score line **11** to score line **12**.

While the embodiments of the present invention herein discloses a preferred form and several alternate forms, it is to be understood that other forms, such as having score lines **52** running generally perpendicular to the "smiles" **58** and the slant lines in FIGS. 6 and 8 running similar to the slant lines in FIG. 5, might be adapted and still be within the spirit of the disclosed invention.

I claim the following:

1. A tubular liquid-tight container formed from a one piece foldable blank of paperboard having an overall surface coating of thermoplastic material, said container having four side panels and a flat bottom closure defining a substantially rectangular compartment, said container comprising:

(a) a body portion defined by four rectangular side panels the adjacent edges of which are joined at right angles to each other along a vertical score line extending from the horizontal plane of the bottom closure the full height of said body portion, said panels having generally uniform cross sections,

(b) the bottom closure of said container formed by inwardly folding and sealing bottom closure panels joined to said side panels along horizontal score lines extending the full width of said side panels and intersecting said vertical score lines at the bottom corners of the container,

(c) a plurality of collateral substantially horizontally disposed shock absorbing score lines on each of said side panels extending from points on a common vertical score line and located solely in an area more than 10% and not more than 25% of the height of said side panel from the horizontal plane of the bottom closure, and

(d) said plurality of shock absorbing score lines on

each of said side panels extending at least 10% and not more than 25% of the width of said side panel.

2. A tubular container according to claim 1, having said plurality of score lines consisting of at least four in number and vertically spaced at least ⅛ inch apart.

3. A tubular container according to claim 1 having:

(a) a second plurality of shock absorbing score lines positioned within the confines of each said first plurality of shock absorbing score lines, and

(b) said second plurality of score lines parallel to each other and disposed in angular relation to said first plurality of score lines.

4. 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 extending longitudinally from the bottom edge of said blank for the full height of said side panels,

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

(c) a plurality of collateral horizontally disposed shock absorbing score lines on each adjacent pair of side panels extending from points on the vertical score lines therebetween and located solely in an area more than 10% and not more than 25% of the height of said panels from said horizontal score lines,

(d) a similarly positioned plurality of collateral horizontally disposed shock absorbing score lines on the side panel adjacent said side seam flap and extending from points on the vertical score line adjacent said side seam flap, and

(e) said shock absorbing score lines on each of said panels extending at least 10% and not more than 25% of the width of said panels.

5. A one piece blank for a liquid-tight tubular container as set forth in claim 4, wherein said plurality of score lines consisting of at least four in number are vertically spaced at least ⅛ inch apart.

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