Leak Proof Bottom for a Paperboard Container

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Filed: July 12, 1973

Appl. No.: 378,535

U.S. Cl. 229/38; 229/31; 229/43; 229/48 T

Int. Cl. B65D 5/08; B65D 5/40; B65D 5/62

Field of Search 229/3.1, 17 G, 37 R, 38, 229/43, 44 R, 48 SC, 48 T

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Abstract

Disclosed is an improved bottom closure for a paperboard container of the type commonly used to package milk. The improvement specifically relates to the blank from which the container is formed. When a container is formed from a blank which embodies this improvement, leaks in the bottom closure thereof are substantially prevented.

11 Claims, 8 Drawing Figures
1 LEAK PROOF BOTTOM FOR A PAPERBOARD CONTAINER

BACKGROUND OF THE INVENTION

1. Field to Which the Invention Pertains

This invention pertains to the fluid packaging art.

A substantial quantity of fluids are packaged in paperboard containers which have been coated with a thermoplastic, e.g. polyethylene. Quantitatively, the major proportion of containers of this type are used for packaging milk. With respect to milk containers, the container construction which is predominantly used is a so-called gable top container which is formed from a one piece blank.

By way of background, milk carton blanks are typically manufactured by paper companies. More particularly, paperboard of the desired basis weight (pounds per 3 thousand square feet) is continuously manufactured on a paper machine and stored in large rolls. Subsequently, the paperboard thus manufactured is unrolled and fed through an extruder wherein polyethylene is extruded onto the surfaces of the paperboard to provide a coating. Thereafter, the thermoplastic coated paperboard is generally rearranged and the coated paperboard is fed into a press which cuts the continuous web of paperboard into container blanks of the desired size. Additionally, the same press may be employed to provide appropriate score lines which facilitate the folding and erecting of the container as well as any printing or art work. Thus, the product resulting at this point is a flat, thermoplastic coated paperboard blank which has been appropriately cut and scored. Generally, at this point, the two longitudinal edges of the blank are joined so as to form a square tube. Commonly, the joining of the two longitudinal edges is achieved through a heat seal, i.e. the polyethylene coating adjacent to the two longitudinal edges is heated and the two heated edges are pressed together. Tubes of the type thus formed are generally sold in a flat condition, by the manufacturing company, to a dairy.

When received by the dairy, the paperboard tubes are usually sequentially fed into a so-called form, fill and seal machine. Typically, in such a manner, the paperboard tube which was shipped in a flat condition is formed into a square tube and deposited upon an upward, standing, square mandrel. The tube is placed on the mandrel so that the part of the tube which will form the bottom of the container extends past the exposed end of the mandrel. Thereafter, the machine proceeds to position the carton under a heater which heats the polyethylene coating on the bottom forming flaps to a temperature at which the polyethylene coating will act as a bonding or adhesive agent. The machine then proceeds to manipulate the flaps extending past the end of the mandrel so as to form a bottom closure. When a bottom closure has been appropriately formed by juxtaposing the integral flaps on the tube, the mandrel moves such that the formed bottom is pressed against a series of cooled plates (pressure pads) for a time sufficient to effect a heat seal between the bottom forming flaps. Thereafter, the open top container thus formed is stripped off the mandrel, filled with milk and the top is appropriately sealed. For the purpose of describing the instant invention, the process steps of filling the container and sealing the top thereof are not particularly significant because the instant invention relates to an improved, bottom closure.

2 What is of significance and what is thought to be apparent from the above description is the fact that, generally, the blanks used to form such containers are manufactured by paper companies while the blanks are formed into containers by dairies using large, expensive equipment which is located at the dairies. This duality is significant because attempts by a paper company to supply a superior container by altering the blank configuration are thus constrained, i.e. a paper company cannot supply a blank which has been modified to the extent that the form, fill and seal machine will not accept it. Thus, any alteration made in the blank configuration must be such that it will not affect the ability of the machine to form a container from the blank.

In general, the problem of supplying blanks to a dairy for use in packaging milk has been resolved since a fully acceptable container blank for packaging milk has been designed and is known to the prior art. However, a very significant problem arises when a dairy elects to package and sell a liquid product other than milk. A similar problem arises when a company other than a dairy desires to use paperboard milk carton type containers to package liquids other than milk. The problem is significant and often quite difficult to solve. The problem is significant because such companies can often achieve substantial economies if paperboard containers can be used. However, the difficulty arises because in order to achieve these economies form, fill and seal machines of the type used by dairies must be employed which, in turn again places a limitation upon the modifications which can be made by a paper company to the blank which they are supplying. In other words, the same container which is used to successfully package milk might not be successfully used to package other liquids. Examples of such other liquids, which may be referred to as penetrative liquids, are cooking oils and diet soft drink syrups. Liquids of this latter type, when packaged in milk carton type containers, frequently leak through the bottom closure of the container notwithstanding the fact that the same bottom closure and container may be used to successfully package milk. Indeed, an index of the difficulty of packaging liquids such as soft drink syrups is the fact that milk carton type containers are often provided with an interior metal foil laminate when such containers are used to package soft drink syrups. A container and container blank employing such a construction is disclosed in U.S. Pat. No. 3,365,111 which is incorporated herein by reference.

The invention disclosed herein comprises the combination of a thermoplastic coated paperboard blank with an improved bottom closure. A blank embodying the instant invention may be formed into a container on a standard form, fill and seal machine which is either unmodified or only slightly modified depending upon the particular embodiment of the invention which is used. Moreover, the container resulting from erecting a blank which embodies this invention (and which may also include an interior metal foil laminate) may be used to successfully package penetrative liquids such as soft drink diet syrups.

2. Prior Art

Referring to the drawings, FIG. 1 shows the lower half of a paperboard blank of the type known to the prior art and which may be erected to form a container for packaging milk. The upper part of the blank shown in FIG. 1 has been omitted since that part of the
blank is known to the prior art and does not particularly pertain to the instant invention.

Referring to FIG. 1, it will be seen that the blank shown therein is comprised of two major portions, i.e., a body forming portion 13 and a bottom forming portion 14. The body forming portion 13 is comprised of four side wall panels 16, 17, 18 and 19, each having an equal width and forming the side walls of the erected container. The side walls 16, 17, 18 and 19 are connected by longitudinal fold lines 67, 78 and 89 respectively. The bottom forming portion 14 is comprised of four flaps 16a, 17a, 18a and 19a. The aforementioned bottom forming flaps are connected to the side panels by transverse fold lines 26, 27, 28 and 29 respectively. Additionally, the four bottom flaps 16a, 17a, 18a and 19a are connected to each other by longitudinal fold lines 67, 78 and 89 respectively, i.e., the longitudinal fold lines which interconnect the bottom forming flaps are extensions of the fold lines which interconnect the side wall panels.

Generally, blanks of the type shown in FIG. 1 are provided with a so-called manufacturer joint 15 which is foldably connected to one of the side walls, e.g. 16. When the blank 12 is formed into a tube, the manufacturer joint is typically heated by an exposed flame and is then overlappingly bonded to the interior surface of the side wall panel 19 adjacent to its longitudinal edge 21.

Referring to bottom forming portion 14, it may be noted that certain of the bottom forming flaps which form this portion have a degree of symmetry. For example, referring to the bottom forming flaps 16a and 18a, which may be defined as gusset forming flaps, it may be noted that these flaps are spaced apart by the flap 17a but are otherwise symmetrical. Thus, their transverse edges 46a, 46b and 48a, 48b are transversely aligned. Additionally, each of the gusset forming flaps is provided with two diagonally disposed score lines which define sub-panels. For example, referring to flap 16b, the diagonal score lines 31, 32 define sub-panels 16c, 16d and 16e. Similarly, diagonal score lines 33, 34 on the flap 18c define sub-panels 18b, 18c and 18d.

Flap 19a may be referred to as a tuck-in flap and flap 17a may be referred to as a cover flap. It may be noted that in the prior art construction shown in FIG. 1, the transverse edge 49 of the tuck-in flap 19a and the transverse edge 47 of the cover flap 17a are substantially aligned.

When a blank of the type shown in FIG. 1 is to be erected to form a container, the blank is first formed into a tube as heretofore described. Thereafter, the gusset forming flaps 16a and 18a are urged downwardly into the container. As a result of this action, the triangular sub-panels 16b and 18b may be moved into a generally horizontal position. As a result of this action, the subpanels 16c, 16d and 18c, 18d are folded back to horizontally overlie the sub-panels 16b, 18b respectively. Thus, a so-called gusset or triangular configuration is formed. The resulting triangular panels or gusset panels have an apex of the gusset points 40, 41.

Because all of the bottom forming flaps are foldably interconnected, the tuck-in flap 19a and the cover flap 17a will be moved into a horizontal position when the gusset forming flaps 16a, 18a are positioned as described above. More particularly, it may be noted that the longitudinal length of the tuck-in flap 19a and the cover flap 17a is greater than the longitudinal length of the gusset forming flaps. With regard to these dimensions, a number of factors should be pointed out. First, it may be noted that the adjacent transverse score lines are slightly displaced from each other. Thus, score lines 26, 28 are aligned with each other but are slightly longitudinally displaced from the aligned score lines 27, 29. This slight displacement of the longitudinal score lines is provided to insure that when the bottom is formed there is relatively no interference. Thus, the transverse score lines associated with the gusset forming flaps 16a, 18a are displaced slightly above the transverse score lines associated with the flaps 17a and 19a because the gusset forming flaps will be folded first and the flaps 17a and 19a will overlie the gusset forming flaps.

With further regard to the dimensions of the bottom forming flaps, it should be noted that containers of the type erected from a blank shown in FIG. 1 are generally square. Thus, the longitudinal height of the gusset forming flaps is generally equal to or slightly less than the width of the side wall panels so as to insure that when the gusset forming flaps are positioned within the container, the gusset points 40, 41 are almost touching.

Returning to a consideration of the manner in which the bottom forming portion of the blank 12 is erected, after the gusset forming flaps have been positioned horizontally within the container, the tuck-in flap 19a is horizontally positioned. Similarly, the cover flap 17a is also horizontally positioned so as to overlie the tuck-in flap 19a. Thus, it will be appreciated that the word tuck-in accurately describes the flap 19a since, when the bottom is formed, the edge 49 of the tuck-in flap 19a is, in fact, tucked in between the cover flap 17a and the sub-panels 16c, 16d and 18c, 18d.

Referring to FIG. 2, there is shown a view which illustrates a container bottom which would result from erecting the blank shown in FIG. 1. More particularly, the view shown in FIG. 2 is that which would appear if one viewed the resulting bottom closure looking down into the tube or open ended container. The resulting construction shown in FIG. 2 exemplifies the prior art and is representative of the bottom construction used on most paperboard milk cartons. Thus, it is instructive to consider this construction in some detail in order to obtain an understanding as to why this construction is deficient when one attempts to package certain liquids.

Considering the construction shown in FIG. 2, it may be noted that the gusset points 40, 41, disposed in the center of the container, are almost touching and define what might be referred to as a central axis. As previously indicated, the tuck-in flap 19a is disposed between the gusset forming flaps and the cover flap 17a. This is particularly evident in FIG. 2 where it may be noted that the edge 49 of the tuck-in flap 19a is clearly visible.

Another exposed edge which is clearly visible is the edge 20 associated with the manufacturers joint 15. As previously indicated, when the gusset forming flaps 16a and 18a are folded into a horizontal position, their respective sub-panels 16c, 16d and 18c, 18d are folded back so as to form the gusset points 40, 41. As a result of this fold back action, the transverse edges associated with the gusset forming flaps are ultimately disposed in a channel forming relation. Thus, referring to FIG. 2, it may be seen that the transverse edges 46a and 46b associated with the gusset forming flap 16a are disposed parallel to each other and underneath the gusset panel 16b. Similarly, the transverse edges 48b and...
Having described in considerable detail the prior art bottom configuration shown in FIG. 2, the deficiencies thereof and the manner in which these deficiencies arise may be clearly understood. Fundamentally, it has been discovered that all of these deficiencies are in the nature of leakage paths and appear to arise when there is a discontinuity between overlapping flaps or panels. Thus, it is believed that such discontinuities essentially form a channel through which leakage may occur. For example, referring to FIG. 2, when a bottom of the type shown therein is formed, a leakage channel is often simultaneously created along the exposed edge 49 of the tuck-in flap 19a. Liquid entrance to this leakage channel would occur at the intersection of the exposed edge 49 and the fold lines 32, 33. The manner in which this channel is formed may be appreciated by referring to FIG. 3 wherein the interrelation between various overlying panels and flaps is shown. Thus, in FIG. 3, it will be seen that the transverse edge of the tuck-in flap 19a causes a channel to form which is shown in cross section at 60 and may be referred to as the tuck-in flap channel.

Referring again to FIG. 2, the arrows 61 generally indicate paths of leakage along the exposed edge 49. The arrows 61 terminate at the edges of the container where the final leakage may occur. In an effort to block the leakage path formed by the exposed edge 49, the prior art has resorted to what are referred to as stakes. Briefly, stakes are indentations (22, 23 FIG. 2) formed in the bottom of container blanks perpendicularly across a leakage path. The stake or indentation is formed by providing a small, correspondingly shaped protuberance on the pressure pad on the form, fill and seal machine. The theory of staking is to provide, during the formation of the bottom, a zone which is subjected to high pressure and, thus, it is hoped the leakage channel will be blocked. While the use of stake points has been successful in preventing the leakage of milk, the same procedure has been relatively unsuccessful when attempts have been made to use milk carton type containers to package liquids such as diet soft drink syrups.

Another leakage channel which is commonly formed and difficult to seal may be referred to as the gusset channel and is formed by the transverse edges of the gusset forming flaps. Thus, referring to the sectional view of FIG. 4, it may be seen that a gusset channel, shown in cross section at 61, is formed between the two sub-panels 18d, 18c, the gusset panel 18b and the tuck-in flap 19a. Entrance to the gusset channel is generally afforded at the gusset points 40, 41.

In general, attempts to package penetrative liquids in containers which have a bottom of the type shown in FIG. 2 have been unsuccessful because leakage occurred along either the channel 60 formed by the exposed edge 49 or the gusset channel 61. As will hereinafter be described, the instant invention prevents leakage along these channels.

Although the prior art has recognized the need to provide a leak proof bottom, an effective and economical solution to this problem has not heretofore been found when such containers are used to package penetrative liquids such as diet soft drink syrup. The art has attempted to provide a leak proof bottom by overcoating the entire bottom of the container. For example, one such prior art approach contemplates spraying the entire bottom interior of a carton with wax or a thermoplastic material after it is erected. Of course, such an approach requires a substantial addition to and modification of the forming machine and, additionally, consumes a considerable quantity of coating material. U.S. Pat. No. 3,365,111 discloses such a formed container wherein the bottom exterior is overcoated with a film. A similar overcoating, in the nature of an increased coating of the bottom panels, is disclosed in U.S. Pat. No. 3,421,678. Apparently, the prior art resorted to the overcoating approach because of the assumed "difficulty or impossibility of selectively applying a bead or globule of thermoplastic coating material at the prime location of the leak forming creases" described in U.S. Pat. No. 3,421,678.

In summary, the two leakage channels associated with a bottom closure of the type most commonly used by the prior art have been described. The invention disclosed herein and hereinafter described seals these leakage channels.

SUMMARY OF THE INVENTION

In combination with a thermoplastic coated paperboard blank of the type commonly used to form milk containers, an improved bottom forming portion is provided. In accordance with the improvement, the center portion of the transverse edge of the tuck-in flap is transversely aligned with the transverse edges of the gusset forming flaps. Additionally, thermoplastic film patches are provided on the blank which seal the two leakage channels described above when the blank is erected.

In the preferred embodiment of the invention, the thermoplastic film patches are bonded to the paperboard blank on the interior side thereof and overlying the gusset points.

The thermoplastic film patches preferably have a melt index in the range of 3.0 to 300.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a view of a paperboard blank known to the prior art.
FIG. 2 is a plan view of a container bottom of the type resulting from erecting the blank of FIG. 1.
FIG. 3 is a fragmentary, sectional view taken along the section lines 3—3 of FIG. 2.
FIG. 4 is a fragmentary, sectional view taken along the section lines 4—4 of FIG. 2.
FIG. 5 is a view illustrating an embodiment of the instant invention.
FIG. 6 is a plan view of a container bottom of the type resulting from erecting the blank of FIG. 5.
FIGS. 7 and 8 are plan views of a container bottom and illustrate a structural requirement of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIG. 5, a paperboard blank 12' is shown and represents one embodiment of my invention. As may be noted, a major portion of the blank 12' shown in FIG. 5 is substantially identical to the blank 12 of FIG. 1. Thus, the extent that these two blanks are the same, the same reference numbers have been employed.
The first structural difference between the blank 12' of FIG. 5 and the blank 12 of FIG. 1 comprises a notch or cutout 80 in the tuck-in flap 19a. The purpose of the cut-out 80 is to alter the structure of the tuck-in flap 19a such that the center portion of the transverse edge thereof is aligned with the transverse edges of the gusset forming flaps 16a and 18a. Thus, it will be seen that there is provided a transverse edge 81 which is centrally located on the flap 19a and aligned with the transverse edges 46a, 46b and 48a, 48b of the gusset forming flaps.

The second structural difference between the prior art blank shown in FIG. 1 and the embodiment shown in FIG. 5 relates to the addition of thermoplastic film patches. More particularly, referring to FIG. 5, it may be noted that two patches 90 and 91 have been provided. The patches 90, 91 are thermoplastic material, e.g. patches of thermoplastic film. The patches are bonded, by heat sealing, preferably to the interior surface of the blank 12 and are disposed on each of the gusset forming flaps 16a, 18a in a position such that they cover the gusset points and, extend slightly beyond the transverse edges of the associated gusset forming flaps. The significance of providing such thermoplastic film patches (the patches 90 and 91) in combination with a tuck-in flap having the center portion of its transverse edge aligned with the transverse edges of the gusset forming flaps will now be described.

Referring to FIG. 6, there is shown a plan view of the interior bottom of a container formed from a blank of the type shown in FIG. 5. Considering in detail the structure shown in FIG. 6, it may initially be noted that the effect of providing the cut-out 80 as previously described is to produce a bottom closure wherein the edge of the tuck-in flap 19a which is exposed to the interior of the container (i.e. exposed to the liquid packaged therein) is aligned with and disposed immediately beneath the gusset points. Thus, in terms of the leakage channels heretofore described, the effect of this construction is to insure that the gusset channels and at least a portion of the tuck-in flap channel are coincidently aligned. Having achieved this result, the thermoplastic film patches 90, 91 may now be used to uniquely cooperate so as to seal these leakage channels. Thus, when the container blank 12' of FIG. 5 is formed and subjected to a heat sealing step, the thermoplastic patches 90, 91 which are touching or substantially abutting, are melted and locally flow so as to cover and adhere to not only the gusset points to which they were attached, but, as well, to the adjacent center portion of the tuck-in flap 19a and the cover flap 17a. As a result, the gusset points are sealed and, simultaneously, the melted patches form a seal 99 blocking the entrance to the tuck-in flap channel. Thus, it will be appreciated that, by providing the patches 90, 91 and providing a tuck-in flap having the center portion of its transverse edge aligned with the transverse edges of the gusset forming flaps, a blank is provided which, when erected, has an improved bottom closure, i.e. a bottom closure wherein the two major sources of leaks have been eliminated.

Since the purpose of the thermoplastic film patches is to insure a sealing action of the type previously described, it will be appreciated that such a sealing means can be provided, on a paperboard blank, in positions other than the positions of the patches 90, 91 as shown in FIG. 5. Thus, although the construction shown in FIG. 5 and previously described represents one of the preferred embodiments of my invention, an essentially acceptable erected container can also be obtained if the thermoplastic film patches are in the form of a single patch disposed upon and heat-sealed to the tuck-in flap 19a at the center of the flap and adjacent the transverse edge thereof. Thus, in FIG. 5 a dotted line representation of a patch 86 is shown as being disposed upon the interior surface of the tuck-in flap 19a. Once again, when the container is erected and sealed, the patch 86 will seal both the gusset points and the entrance to the tuck-in flap channel.

Another configuration which will result in an essentially acceptable container bottom involves the provision of a thermoplastic patch on the interior of the surface of the cover flap 17a. Thus, in FIG. 5, such a patch is shown by the dotted line representation 87.

With regard to the thermoplastic patches described above, the thermoplastic material selected must meet certain criteria. For example, the material which comprises the thermoplastic patch must be such that it will, upon melting and rehardening, adhere to the thermoplastic coating on the paperboard blank. Thus, if the blank is coated with polyethylene, the thermoplastic material used for the patch must satisfy this requirement with respect to polyethylene. Another requirement which such thermoplastic material must satisfy relates to the so-called melt index. Essentially, the melt index is a measure of the flowability or viscosity of a thermoplastic at an elevated temperature. In order for a thermoplastic material to perform satisfactorily as a thermoplastic gusset point sealing means, the thermoplastic must have a degree of flowability at the heat sealing temperatures which are encountered in order to insure that the heated thermoplastic material will flow onto adjacent flaps and will flow into and seal the entrance to the leakage channels. However, the viscosity of the heated thermoplastic cannot be so low that the heated thermoplastic will be unduly dissipated by flowing over too large an area. Experiments conducted upon the occasion of this invention have determined that a thermoplastic with a melt index in the range of, approximately, 3.0 to 300 is acceptable. Examples of an acceptable thermoplastic are DuPont's Surlyn AD 8109 and polyethylene. If a thermoplastic is used which has a melt index in the range of 3.0 to 300, an acceptable patch may be approximately 0.75 inches square and 0.073 thick.

With general regard to the embodiment of this invention shown in FIG. 5, it has been heretofore pointed out that one element of the invention relates to the provision of a cut-out 80. From a structural point of view, the cut-out 80 must provide a blank construction which satisfies two criteria. First, the center portion of the transverse edge of the tuck-in flap at least must be substantially aligned with the transverse edge of the gusset forming flaps so that when a container is formed, the gusset points are substantially aligned with the exposed edge of the tuck-in flap. Second, the remainder of the exposed edges of the tuck-in flap must be so disposed as to underlie the gusset forming flaps when the blank is erected. The second requirement must be satisfied to insure that the only entrances to the tuck-in flap channel are adjacent to the gusset points. Thus, the edges of the tuck-in flap may be disposed as shown in FIG. 7 but not as shown in FIG. 8 wherein the remainder of the edges of the tuck-in flap do not all underlie the gusset.
flaps, e.g. as at 101 and 102. An acceptable alternative construction would be to transversely cut the tuck-in flap so that it was longitudinally co-extensive with the gusset flaps as suggested by the dotted line representation 104, 105 in FIG. 5.

As previously indicated, structural changes made to a paperback blank of the type shown in FIG. 5 may necessitate minor modifications to the machine which forms such a blank into a container. In this regard, those skilled in the art will appreciate that it is common to modify the so-called pressure pad of a form, fill and seal machine in order to insure that the pressure pad conforms to the exterior of the bottom of the container. Thus, when a container blank of the type shown in FIG. 5, i.e. a container blank having a cut-out, is erected on a form, fill and seal machine, it has been found to be beneficial to add a boss to the face of the pressure pad in order to occupy the slight indentation which results from the absence of the cut-out material. This preferred machine modification may be rapidly accomplished, requires no significant alteration of the machine and involves a negligible material cost.

Reflecting upon the above description of the instant invention, it will be evident that, in general, the improvement which characterizes the invention includes two separate and distinct structural changes or additions to prior art blanks and the structural changes cooperate to prevent leakage through the gusset channels and the tuck-in flap channels. Thus, the invention generally contemplates providing, in combination with a paperback blank, a bottom forming portion wherein at least the center portion of the transverse edge of the tuck-in flap is substantially aligned with the transverse edges of the gusset forming flaps and the remainder of the exposed transverse edges of the tuck-in flap are disposed to underlie the gusset forming flaps when the blank is erected. Additionally, the blank is provided with at least one thermoplastic film patch which is disposed on the container such that when the container is erected and heat sealed, the thermoplastic film patch will seal the gusset points and the substantially coincident tuck-in flap channels. Further, it is important to note that the thermoplastic patch or patches must be shown disposed upon their respective bottom forming flaps such that the lower transverse edge of the patch extends beyond the transverse edges of the gusset forming flaps. Such a positioning of the thermoplastic patches is important because of the mechanism by which sealing occurs. Thus, with the thermoplastic patch or patches disposed in this manner, when the bottom of the container is formed, the portion of the patch which extends beyond the edge of the gusset flaps will overlie and be disposed in the center of the container. In this manner, when the patch melts, the entrances to the gusset channel and the tuck-in flap channel will be sealed. Referring to FIG. 5, it may clearly be seen that each of the four patches shown therein has a portion which extends beyond the transverse terminal edge of the gusset forming flaps.

In the context of this description of this invention, it should be understood that the phrases coincidently aligned or transversely aligned refer to an alignment of at least the center portion of the transverse edge of the flap 19a with the gusset points such that when the thermoplastic patches melt, the gusset points and the tuck-in flap channels are sealed.

In summary, a number of embodiments of the instant invention have hereinbefore been disclosed and described. However, it will be appreciated that other embodiments may be apparent to those skilled in the art which are nevertheless within the scope of the invention as set forth in the claims appended hereto.

We claim:

1. In combination with a thermoplastic coated paperback blank adapted to be erected to form a square, heat sealed container, said blank having a body forming portion and a bottom forming portion, said bottom forming portion including two spaced apart gusset forming flaps having substantially aligned transverse edges and forming gusset points when said blank is erected, a cover flap foldably connected by a longitudinal fold line to at least one of said gusset forming flaps, and a tuck-in flap foldably connected by a longitudinal fold line to at least one of said gusset forming flaps, the improvement which comprises:
   a. at least the center portion of the transverse edge of said tuck-in flap being substantially aligned with the transverse edges of said gusset forming flaps and the remainder of the edges of said tuck-in flap disposed to entirely underlie said gusset forming panels when said blank is erected; and
   b. a thermoplastic film patch bonded to at least one of said flaps adjacent to the center of the transverse edge thereof and extending beyond the transverse edge of said gusset forming flaps whereby, when said blank is erected and heat sealed to form a container, both said gusset points and the center portion of the transverse edge of said tuck-in flap are sealed by said thermoplastic film patch.

2. The blank of claim 1 wherein a thermoplastic film patch is bonded to each of said gusset forming flaps and overlies said gusset points.

3. The blank of claim 2 wherein said blank is coated with polyethylene and said thermoplastic film patch is polyethylene.

4. The blank of claim 2 wherein said tuck-in flap is notched.

5. The blank of claim 4 wherein said notch has parallel, longitudinal side edges.

6. The blank of claim 5 wherein said thermoplastic patch has a melt index in the range of approximately 0.3 to 3.0.

7. The blank of claim 4 wherein said notch has divergent side edges.

8. The blank of claim 7 wherein said thermoplastic patch has a melt index in the range of approximately 3.0 to 300.

9. The blank of claim 2 wherein said thermoplastic film patches are bonded to the interior surface of said gusset forming flaps.

10. The blank of claim 1 wherein said thermoplastic film patch is bonded to the interior surface of said tuck-in flap and overlies the center portion of said tuck-in flap adjacent to the transverse edge thereof.

11. In combination with a thermoplastic coated paperboard blank adapted to be erected to form a heat sealed container, said blank having a body forming portion and a bottom forming portion, said bottom forming portion including two spaced apart gusset forming flaps having substantially aligned transverse edges and forming gusset points when said blank is erected, a cover flap foldably connected by a longitudinal fold line to at least one of said gusset forming flaps, and a
tuck-in flap foldably connected by a longitudinal fold line to at least one of said gusset forming flaps, the improvement which comprises:

a. at least the center portion of the transverse edge of said tuck-in flap being cut so as to be aligned with said gusset points when said carton is formed and the remainder of the edges of said tuck-in flap disposed to entirely underlie said gusset forming flaps when said blank is erected; and

b. two thermoplastic film patches; each bonded to a respective one of said gusset forming flaps so as to overlies said gusset points and each of said patches extending beyond the transverse edge of said gusset forming flaps whereby, when said blank is erected and heat sealed to form a container, both said gusset points and the center portion of the transverse edge of said tuck-in flap are sealed by said thermoplastic film patch.

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