A blank capable of being formed into a carton with multiple closure formations that includes combinations of closure features that enable formation of the carton into different enclosed arrangements. These arrangements include a traditional gable top formation, a closed-end, flat-top formation with ends tucked in for stacking, and a handle insertable into an opposing flap, a closed-end, flat-top formation with ends tucked into end walls and an exposed handle, and a closed carton with end flaps tucked into end walls in flat-top formation with handle flap inserted into an opposing flap for stacking. The carton can also include internal fold-flap auto-bottom features.
CARTON WITH MULTIPLE CLOSURE FORMATIONS

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefit of U.S. Provisional Patent Application Ser. No. 60/623,767, filed Oct. 28, 2004, the entire contents of this application being hereby incorporated by reference as if repeated in its entirety.

FIELD OF THE INVENTION

[0002] The present invention generally relates to cartons for holding and packaging articles. More specifically, the present invention relates to cartons with multiple closure formations.

BACKGROUND

[0003] Several formations for enclosing cartons have been used in the past. These formations have been used in various applications, ranging from gift-wrapping boxes to containers for hazardous waste products. However, such prior cartons typically include only one possible folding arrangement. What is needed is a carton that incorporates multiple combinations of closure arrangements capable of being used in several applications.

SUMMARY

[0004] The present invention generally relates to a carton with multiple closure formations, including combinations of closure features that allow the carton to be formed in different enclosed arrangements. These arrangements combine, for example, a traditional gable top formation, a closed-end, flat-top formation with ends tucked in for stacking and a handle insertable into an opposing flap, a closed-end, flat-top formation with ends tucked into end walls and an exposed handle, and closed with end flaps tucked into end walls in flat-top formation with handle flap and inserted into opposing flap for stacking. The present carton can also be combined with internal fold-flap auto-bottom features.

[0005] As discussed herein, the present invention includes carton blanks that are foldable and/or closable into a number of different orientations to provide enclosed cartons of varying shapes, sizes, and orientations. Specifically, in one embodiment, the enclosure forms a closed-end traditional gable top formation. In another embodiment, the enclosed carton forms a closed-end, flat-top formation with ends tucked in for stacking and with a handle inserted into the internal carton cavity below the opposing handle flap. In yet another embodiment, the closed carton forms a closed-end, flat-top carton with end flaps folded outward and tucked into end walls with the handles exposed for easy carrying. In still another embodiment, the carton blank forms a closed carton with end flaps folded outwardly and tucked into end walls in a flat-top formation with a handle flap inserted into opposing flaps for easy stacking. These and other embodiments generally can be configured in any size carton, e.g. 5 pound, 10 pound, or larger barn-type cartons. The closure formations as detailed above, and combinations of the features of these closures, can be used to form a variety of other, similar designs of carton blank arrangements. The present carton blanks alternatively can include additional folding orientations and/or to modify the features and/or folding requirements of each closure formation for the enclosed cartons.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] FIG. 1 is a plan view of a blank.

[0007] FIG. 2 is a plan view of an alternate embodiment of a blank from which a carton according to the present information can be formed.

[0008] FIG. 3 is a plan view of another alternate embodiment of a blank from which a carton according to the present information can be formed.

[0009] FIG. 4 is an example of a carton that can be formed from the blank of FIG. 1.

[0010] FIG. 5 shows the carton of FIG. 4 formed with a traditional gable top formation with exposed handles.

[0011] FIG. 6 shows the carton of FIG. 4 with a handle flap inserted into an opposing flap for stacking.

[0012] FIG. 7 shows an enclosed carton with the ends tucked into the end walls and a handle exposed for carrying.

[0013] FIG. 8 shows the carton of FIG. 7 with the handle flap folded for stacking.

[0014] FIG. 9 is a plan view of the blank of FIG. 1 with example dimensions.

[0015] FIG. 10 is a plan view of the blank of FIG. 2 with example dimensions.

[0016] FIG. 11 is a plan view of the blank of FIG. 3 with example dimensions.

DETAILED DESCRIPTION

[0017] For a more complete understanding of the present invention, reference should be made to the following detailed description and accompanying drawings, wherein like reference numerals designate corresponding parts throughout the figures. The invention also includes carton blanks, such as cardboard blanks, which are cut to a specific shape, and creased, scored, cut, or perforated in specific areas. The carton blanks define elongate panels between the creases or fold lines, and include flaps at respective ends of the panels. The blanks form cartons when fully assembled, so that when generally all flaps are closed, the assembled cartons have a series of sidewalls, e.g. four side walls, one or more top panels, one or more top side panels, and a bottom. For ease of nomenclature, the lines of folding, perforation, creasing, scoring, or other separation between panels are referred to herein generally as fold lines. In several places herein, these fold lines are shown in the figures as a series of non-continuous cuts interspersed by nicks. This shorthand is not intended to constitute the composition of the fold lines or of only fold lines and is intended to encompass any number or arrangement of spaces, nicks, cuts, creases, scores, cut scores, solid scores, other inclusions or spaced areas, or any combinations of these. For example, the fold lines could include substantially continuous fold lines as desired (not shown).

[0018] To facilitate understanding and explanation of the blanks and cartons formed therefrom, the elements and numerals described herein utilize the terms "upper," "lower," "top," "bottom," "front," "back," "north," "south," "east," and
“west” to distinguish portions of the carton and of the blank. These conventions are included merely for ease of explanation and understanding of the present description, however, and should not be limiting in any manner. The descriptions of the panels and the elements as “upper,” “lower,” etc., also can be referred to as “first,” “second,” etc.

[0019] FIG. 1 is a plan view of a blank 10 from which a carton can be formed. The blank 10 includes side panels 12, 16, 20, 24 attached respectively to each other along fold lines 14, 18, 22. A glue flap or panel 28 is attached to side panel 24 at fold line 26 and is capable of receiving an adhesive during formation of the carton from the blank 10. The blank 10 includes top folding panels 30, 34, 38, 42, 46, 50, 58, 62, 66, 70, 74, 78, which are capable of being articulated into several positions to form multiple closure formations.

[0020] Top folding panel 30 is connected to panel 34 by fold line 32, top folding panel 38 is connected to panel 42 by fold line 40, and top folding panel 46 is connected to panel 50 by fold line 48. Top folding panels 30 and 34 are respectively connected to top folding panels 38 and 42 by fold line 36, and top folding panels 42 and 38 are respectively connected to top folding panels 50 and 46 by fold line 44. Top folding panel 46 is connected to top panel 54 by fold line 52. Top panel 54 is connected to top folding panel 58 by fold line 56. Top folding panel 58 is connected to panel 62 by fold line 60, top folding panel 66 is connected to panel 70 by fold line 68, and top folding panel 74 is connected to panel 78 by fold line 76. Fold lines 32, 40, 48, 60, 68, and 76 can be spaced or located as needed for forming substantially any size or shape top folding panels, but are shown for purposes of illustration only in FIG. 1 with fold lines 32, 48, 60, and 70 extending inwardly, within a range between approximately 0.1-inch to 5-inches, such as at one inch, from the top edge of the blank 10 and with fold lines 40 and 68 extending inwardly, within a range between approximately 0.1-inch to 5-inches, such as at two inches, across a mid or intermediate portion of their respective top folding panels. All dimensions referred to in the present disclosure are provided for example purposes only and should not be limiting in any manner.

[0021] Top folding panels 58 and 62 are respectively connected to top folding panels 66 and 70 by fold line 64, while top folding panels 70 and 66 are respectively connected to top folding panels 78 and 74 by fold line 72. Top folding panel 74 is connected to top panel 82 by fold line 80, while top panel 82 in turn is connected to glue flap 86 by fold line 84. Glue flap 86 operates similarly to glue flap 28 and is capable of receiving glue or other adhesive material during formation of the carton from the blank 10. As further indicated in FIG. 1, side panels 12, 16, 20, and 24 generally are connected to panels 38, 54, 66, and 82 by fold line 29.

[0022] Handle 88 is connected to top panel 54 by a fold line 89 and has a handhold or slot 90 formed therein. As shown in FIG. 1, the handhold 90 generally is formed at line 91, extends into the handle 88, within a range between approximately 0.1-inch to 5-inches, such as at one inch, and can have rounded corners formed with radius cuts, within a range between approximately 0.1-inch to 5-inches, such as at 0.5-inch. Handhold 90 can comprise either a void formed in the blank 10, or can include a perimeter defined by the fold line 89, with one or more nicks formed therein to allow the handle slot to be formed in the carton by folding inward, hinging outward, or by detaching and removing part of or substantially all of any flap portion to form an opening. The handle 90 constructed in accordance with the present disclosure is provided with a width score, within a range between approximately 0.1-inch to 5-inches, such as at 3-inches, at an upper portion and with a width within a range between approximately 0.1-inch to 5-inches, such as at 4-inches, at a lower portion.

[0023] Handle 92 is similarly connected to top panel 82 by a fold line 93 and has a handhold 94 formed therein. As shown in FIG. 1, the handhold 94 generally is formed at line 95, extends into the handle 92, within a range between approximately 0.1-inch to 5-inches, such as at one inch, and can have rounded corners formed with radius cuts, within a range between approximately 0.01-inch to 5-inches, such as at 0.5-inch. Handhold 94 can comprise either a void formed in the blank 10, or can include a perimeter defined by the fold line 93, with one or more nicks formed therein to allow the handle 94 to be formed in the carton by folding inward, hinging outward, or by detaching and removing part of, or substantially all of, any flap portion to form an opening. The handhold 94 generally includes a portion wide enough to receive a user’s fingers or fingers and is shown in FIG. 1 with a width score, within a range between approximately 0.1-inch to 10-inches, such as at 3-inches, at an upper portion and with a width, within a range between approximately 0.1-inch to 10-inches, such as at 4-inches, at a lower portion.

[0024] Locks or slots 114 and 116 are formed in side panels 12 and 20, respectively, and provide recessed areas capable of receiving top folding panel sections of the formed carton for a closure configuration that receives top folding panel sections in side panels 12 and 20. Generally, lock 114 includes a formation geometry capable of receiving portions of top folding panels 34, 42, and 50, and lock 116 includes a formation geometry capable of receiving portions of top folding panels 62, 70, and 78, when folded therein. The locks 114 and 116 are shown in FIG. 1 with a depth within a range between approximately 0.1-inch to 5-inches, such as at 0.5-inch, and a width, within a range between approximately 0.1-inch to 5-inches, such as at 1-inch at their lower portions, although other varying dimensions also can be used. The locks 114, 116 also are shown with a rectangular portion and a bulbous portion although other designs or configurations also can be used. The rectangular portions of locks 114 and 116 further are shown in FIG. 1 for purposes of illustration with depths, within a range between approximately 0.01-inch to 5-inches, such as at 0.25-inch, and widths, within a range between approximately 0.1-inch to 5-inches, such as at 0.75-inch, with variations in such dimensions being made thereto as needed. The locks 114 and 116 generally are formed in the middle portions of the panels 12 and 20, respectively, but can be formed slightly off-center to accommodate the panels 34, 42, 50 and 62, 70, 78, respectively, as constructed. In FIG. 1, the locks 114 and 116 are spaced from the periphery 8 and the fold line 18, respectively, a distance, within a range between approximately 0.1-inch to 5-inches, such as at 2.5-inches. Locks 114 and 116 also are spaced from the fold lines 14 and 22, respectively, a similar distance, within a range between approximately 0.1-inch to 5-inches, such as at 2.359 inches, indicated for illustration in FIG. 1, within a range between approximately 0.1-inch to 5-inches, such as at 2.359 inches. The bottom of the bulbous portions of locks 114 and 116 are
shown in FIG. 1 a distance within a range between approximately 0.1-inch to 5-inches, such as at 1.3-inches, from fold line 99.

[0025] The lower or bottom part of the blank 10 generally includes several bottom panels such as panels 96, 104, 108, and 112. Bottom panel 96 is connected to side panel 12 by fold line 99, bottom panel 104 is connected to side panel 16 by fold line 99, bottom panel 108 is connected to side panel 20 by fold line 99, and bottom panel 112 is connected to side panel 24 by fold line 99. Although the bottom of the blank 10 can be formed in any configuration desired, generally the bottom of the blank 10 will include foldable features that are capable of receiving glue or other adhesive and are capable of providing support to the formed carton. As shown in FIG. 1, bottom panels 96, 104, and 112 include portions 98, 106, 110, with corresponding surfaces capable of receiving adhesive to secure the panels into a formed carton.

[0026] The bottom panels 96, 104, 108, and 112 also can be formed in specific orientations to facilitate ease of constructing a carton from the blank 10. For example, as shown in FIG. 1, bottom panels 96, 104, and 108 extend within a range between approximately 0.1-inch to 5-inches, such as at 2.688 inches, from fold line 99, while bottom panel 112 extends within a range between approximately 0.1-inch to 10-inches, such as at 5.066 inches, from fold line 99. Bottom panels 96 and 104 include end portions that extend at angles, within a range between approximately 1 to 85-degrees, such as at 5-degrees (5°), from a plane perpendicular to fold line 99. Further, bottom panel 104 includes a portion 100 on the opposite end as the adhesive receiving surface 106. Portion 100 extends from bottom panel 104 as defined by a line 102, which includes combinations of fold lines, cut lines, and nicks. The line 102 extends at angles, within a range between approximately 1 to 85-degrees, such as at 45-degrees, from fold line 99. Additionally, bottom panel 108 includes a portion 109 defined by a fold line 107 and bottom panel 112 includes a cutout formed in the adhesive receiving surface 110 that extends within a range between approximately 0.1-inch to 5-inches, such as at 1.25-inches, from the lower end of the panel 112 and that has a curved cutout with a radius within a range between approximately 0.1-inch to 5-inches, such as at 0.798-inches.

[0027] Side panels 12, 16, 20, and 24 further are connected to bottom panels 96, 104, 108, and 112 by a fold line 99, while the bottom panels 96, 104, 108, and 112 generally have end portions that are cutout during manufacture and that allow spaces between the intersections of the bottom panels at fold line 99. As shown in FIG. 1, a space within a range between approximately 0.01-inch to 5-inches, such as at 0.026-inches, is defined between bottom panels 96 and 104 and fold line 99, a space within a range between approximately 0.01-inch to 5-inches, such as at 0.063-inches, is defined between bottom panels 104 and 108 and fold line 99, and a space within a range between approximately 0.01-inch to 5-inches, such as at 0.032-inches, is defined between bottom panels 108 and 112 and fold line 99. These features can provide auto bottom aspects and benefits, such as ease of folding, to the carton and to the methods of forming the cartons from the blanks.

[0028] Top panels 54 and 82 each include knife cuts 118 that extend north, south, east, and west and form slots or other opening capable of venting the contents of the formed carton as desired. The cuts 118 allow venting of, for instance, heat or moisture, such as from hot, moist food, without exposing a large amount of the contents of the carton to the exterior environment. The configurations of the cuts 118 also allow receipt of graphics and the cuts, while provided in the carton, do not have to be utilized unless desired. As shown in FIG. 1, the cuts 118 typically have centers that are disposed within a range between approximately 0.1-inch to 5-inches, such as at 2-inches, from fold lines 56 and 84 in panels 54 and 82, respectively, and within a range between approximately 0.1-inch to 5-inches, such as at 1.312-inches, from fold line 29, with the cuts 118 being within a range between approximately 0.1-inch to 5-inches, such as at 1-inch, in total width, within a range between approximately 0.1-inch to 5-inches, such as at 0.5-inch, disposed in each direction from the centers.

[0029] The fold lines, as shown in several places in FIG. 1, can include any number or arrangement of spaces, nicks, cuts, creases, scores, cut scoring, solid scoring, spacing, or other inclusions or spaces, or any combination of these, to aid in the formation of a carton from the blank 10 and/or to aid in the formation of the multiple closures defined herein. For example, the nicks shown in FIG. 1 can be spaced from each other, for example as shown in bottom panel 104, extending approximately 100% through, for example, two places along line 102 and being spaced within a range between approximately 0.01-inch to 5-inches, such as at 0.142-inches. The nicks can also be formed in any size, such as within a range between approximately 0.1-inch to 5-inches, for example, 0.125-inch cuts with 0.125-inch spaces in the bottom panels. For example, at 0.25-inch cuts with 0.25-inch creases cut within a range between approximately 10-100%, such as between 70-90%, through, for example, eight places in fold line 29. For example, at 0.125-inch cuts with 0.063-inch spaces cut, such as between 70 to 90%, a through cut in a channel at, for example, eight places in the long fold lines in the top folding panels. For example, at 0.125-inch cuts with 0.125-inch spaces cut approximately, such as between 70-90%, through a channel in, for example, six places in the short fold lines in the top folding panels. Further, several other cuts/nicks/spaces/ creases as shown in FIG. 1 (including nicks in the locks 114 and 116, such as at 0.031-inch, nicks in the long fold lines in the top folding panels, such as at 0.132-inch, and numerous others) can be included. These cuts or other inclusions along the fold lines and otherwise can vary according to the blank size, according to the formed carton size, the substrate used to form the carton (e.g. SBS in lieu of paperboard), or other factors.

[0030] The dimensions of the various elements shown in FIG. 1 are disclosed for example purposes only. One of skill in the art will realize that the dimensions shown provide a blank capable of being formed into a carton to more readily hold specific sized items, and thus the blank can be formed with different dimensions than those shown in FIG. 1 without departing from the spirit and scope of the invention. Further, FIGS. 2 and 3 provide additional examples of cartons with different dimensions than those shown and described in FIG. 1. Specifically, FIG. 2 is a plan view of a blank from which a medium-sized carton according to the present information can be formed. FIG. 3 is a plan view of a blank from which a larger-sized carton according to the present information can be formed. One of ordinary skill
will recognize that the size of the constructed carton can vary as desired or necessitated and yet include the multiple closure formations available for the present carton.

[0031] FIG. 2 is a plan view of a blank 210 from which a carton can be formed. The blank 210 includes side panels 212, 216, 220, 224 attached respectively to each other along fold lines 214, 218, 222. A glue flap or panel 228 is attached to side panel 224 at fold line 226 and is capable of receiving glue or other adhesive during formation of the carton from the blank 210. The blank 210 includes top folding panels 230, 234, 238, 242, 246, 250, 258, 262, 266, 270, 274, 278, which are capable of being articulated into several positions to form multiple closure formations. Side panels 212, 216, 220, and 224 are connected to panels 238, 254, 266, and 282 by fold line 229.

[0032] Top folding panel 230 is connected to panel 234 by fold line 232, top folding panel 238 is connected to panel 242 by fold line 240, and top folding panel 246 is connected to panel 250 by fold line 248. Top folding panels 230 and 234 further are respectively connected to top folding panels 238 and 242 by fold line 236, while top folding panels 242 and 238 are respectively connected to top folding panels 250 and 246 by fold line 244, and top folding panel 246 is connected to top panel 254 by fold line 252. Top panel 254 is connected to top folding panel 258 by fold line 256. Top folding panel 258 is connected to panel 262 by fold line 260, top folding panel 266 is connected to panel 270 by fold line 268, and top folding panel 274 is connected to panel 278 by fold line 276. Top folding panels 258 and 262 are respectively connected to top folding panels 266 and 270 by fold line 264 and top folding panels 270 and 266 are respectively connected to top folding panels 278 and 274 by fold line 272. Top folding panel 274 is connected to top panel 282 by fold line 280. Top panel 282 is connected to glue flap 286 by fold line 284. Glue flap 286 operates similarly to glue flap 228 and is capable of receiving glue or other adhesive during formation of the carton from the blank 210. It will be understood that the fold lines 232, 240, 248, 260, 268, and 276 can be of any size or shape in the top folding panels, but are shown for illustration in FIG. 2 as extending within a range between approximately 0.1-inch to 5-inches, such as at one inch, from the top edge of the blank 210 and at a width across within a range between approximately 0.1-inch to 5-inches, such as at two inches.

[0033] A handle 288 is connected to top panel 254 by a fold line 290 and has a handhold 294 formed therein. As shown in FIG. 2, the handhold 290 generally is formed at line 291, extends into the handle 288 within a range between approximately 0.1-inch to 5-inches, such as at 1-2 inches, and can have rounded corners formed with radius cuts, within a range between approximately 0.01-inch to 5-inches, such as between 0.5 and 0.75 inch. Handhold 290 also can comprise either a void formed in the blank 210, or can include a perimeter defined by the fold line 289 and a nick formed therein to allow the handle slot to be formed in the carton by folding inward, hinging outward, or by removing any flap portion entirely to form an opening. The handhold 290 generally includes a portion wide enough to receive a user's finger or fingers and is shown in FIG. 2 at a width within a range between approximately 0.1-inch to 5-inches, such as at 2.937-inch, an upper portion and within a range between approximately 0.1-inch to 5-inches, such as at 3.937 inches, at a lower portion. Handle 292 is connected to top panel 282 by fold line 293 and has a handhold 294 formed therein. As shown in FIG. 2, the handhold 294 generally is formed at line 295, extends into the handle 292 within a range between approximately 0.1-inch to 5-inches, such as at 1-2 inches, and can have rounded corners formed within a range between approximately 0.01-inch to 5-inches, such as between 0.5 and 0.75-inch, radius cuts. Handhold 294 can comprise either a void formed in the blank 210, or can include a perimeter defined by the fold line 293 and a nick formed therein to allow the handhold 294 to be formed in the carton by folding inward, hinging outward, or by removing any flap portion entirely to form an opening. The handhold 294 generally includes a portion wide enough to receive a user's finger or fingers and is shown in FIG. 2 with a width score within a range between approximately 0.1-inch to 5-inches, such as at 2.937-inch, at an upper portion and a width score within a range between approximately 0.1-inch to 5-inches, such as at 3.937-inches, at a lower portion.

[0034] Locks or slots 314 and 316 are formed in side panels 212 and 220, respectively and provide recessed areas capable of receiving top folding panel sections of the formed carton for a closure configuration that receives top folding panel sections in side panels 212 and 220. Generally, lock 314 includes any formation geometry capable of receiving portions of top folding panels 234, 242, and 250 and lock 316 includes any formation geometry capable of receiving portions of top folding panels 262, 270, and 278, when folded therein. The locks 314 and 316 are shown in FIG. 2 with a depth within a range between approximately 0.01-inch to 5-inches, such as at 0.5-inch, and a width within a range between approximately 0.1-inch to 5-inches, such as at 1-inch, at their lower portions. The locks 314, 316 are shown with a rectangular portion and a bulbous portion. The rectangular portions of locks 314 and 316 are shown in FIG. 2 with depths within a range between approximately 0.01-inch to 5-inches, such as at 0.281-inches, and widths within a range between approximately 0.01-inch to 5-inches, such as at 0.75-inch. The locks 314 and 316 generally are formed in the middle portions of the panels 212 and 220, respectively, but can be formed slightly off-center to accommodate the panels 234, 242, 250 and 262, 270, 278, respectively, as constructed. In FIG. 2, locks 314 and 316 are spaced from the periphery 208 and fold line 218, respectively, within a range between approximately 0.1-inch to 5-inches, such as at 2.375 inches. Locks 314 and 316 also are spaced from the fold lines 214 and 222, respectively, within a range between approximately 0.1-inch to 5-inches, such as at 2.625-inches. The bottom of the bulbous portions of locks 314 and 316 are shown in FIG. 2 within a range between approximately 0.1-inch to 5-inches, such as at 3.938-inches, from fold line 299.

[0035] Side panels 212, 216, 220, and 224 are connected to bottom panels 296, 304, 308, and 312 by a fold line 299. In addition, the lower or bottom part of the blank 210 includes bottom panels 296, 304, 308, and 312. Bottom panel 296 is connected to side panel 212 by fold line 299, bottom panel 304 is connected to side panel 216 by fold line 299, bottom panel 308 is connected to side panel 220 by fold line 299, and bottom panel 312 is connected to side panel 224 by fold line 299. Although the bottom of the blank 210 can be any configuration desired, generally the bottom of the blank 210 can include easily foldable features capable of receiving glue or other adhesive and capable of providing
support to the carton when formed from the blank 210. Bottom panels 296, 304, and 312 include portions 298, 306, 310, with corresponding surfaces capable of receiving adhesive to secure the panels into a formed carton. Additionally, the bottom panels 296, 304, 308, and 312 can be formed in specific orientations designed to facilitate ease of constructing a carton from blank 210. For example, as shown in FIG. 2, bottom panels 296, 304, and 308 can extend within a range between approximately 0.1-inch to 5-inches, such as at 3.187-inches, from fold line 299, while bottom panel 312 extends within a range between approximately 0.1-inch to 10-inches, such as at 5.562-inches, from fold line 299. Further, bottom panels 296 and 304 can include end portions that extend at an angle within a range between approximately 1 to 85-degrees, such as at approximately 5-degrees, from a plane perpendicular to fold line 299.

[0037] As also indicated in FIG. 2, bottom panel 304 typically includes a portion 300 on the opposite end as the adhesive receiving surface 306. The portion 300 extends from bottom panel 304 defined by a line 302, which includes combinations of fold lines, cut lines, and nicks, and extends approximately 45-degrees from fold line 299. Additionally, bottom panel 308 includes a portion 309 defined by a fold line 307 and bottom panel 312 includes a cutout formed in the adhesive receiving surface 310 that extends within a range between approximately 0.1-inch to 5-inches, such as at 1.75-inches, from the lower end of the panel 312 and has a curved cutout. The bottom panels 296, 304, 308, and 312 generally have end portions that are cutout during manufacture and that provide spaces between the intersections of the bottom panels at fold line 299. As shown in FIG. 2, a space within a range between approximately 0.01-inch to 5-inches, such as at 0.028-inches, is defined between bottom panels 296 and 304 and fold line 299, a space within a range between approximately 0.01-inch to 5-inches, such as at 0.063-inches, is defined between bottom panels 304 and 308 and fold line 299, and a space within a range between approximately 0.01-inch to 5-inches, such as at 0.032-inches, is defined between bottom panels 308 and 312 and fold line 299.

[0038] Top panels 254 and 282 each include knife cuts 318 that extend north, south, east, and west from slots or other holes capable of venting the contents of the formed carton as desired. The cuts 318 allow venting of, for instance, heat or moisture, such as from hot, moist food without exposing a large amount of the contents of the carton to the exterior environment. The configuration of the cuts 318 can allow receipt of graphics, and while the cuts can be provided in the carton, they do not have to be utilized for opening/venting the carton unless desired. As shown in FIG. 2, the knife cuts 318 have centers that are disposed within a range between approximately 0.1-inch to 5-inches, such as at 2-inches, from fold lines 256 and 264 in panels 254 and 282, respectively, and approximately 1.312 inches from fold line 229. The cuts 318 are within a range between approximately 0.1-inch to 5-inches, such as at 1-inch, in total width, within a range between approximately 0.01-inch to 5-inches, such as at approximately 0.5-inches, disposed in each direction from the centers.

[0039] The fold lines, as shown in several places in FIG. 2, can include any number or arrangement of spaces, nicks, cuts, creases, scores, cut scores, solid scores, or other inclusions or spaces, or any combination of these, to aid in the formation of a carton from the blank 210 and/or to aid in the formation of the multiple closures defined herein. Additionally, these nicks can be spaced from each other, for example as shown in bottom panel 304, extending approximately 100% through, for example, 2 places along line 302, spaced within a range between approximately 0.01-inch to 5-inches, such as at for example 0.1-0.124-inches apart. The nicks can also be formed in any size, such as within a range between approximately 0.01-inch to 5-inches, such as at, for example, 0.065-inch spaces or 0.125-inch cuts with 0.125-inch spaces in the bottom panels. For example, at 0.25-inch cuts with 0.25-inch creases cut within a range between approximately 10 to 100%, such as between 70-90% through, for example, twelve places in fold line 229. For example, at 0.125-inch cuts with 0.125-inch spaces cut, such as approximately 70-90%, a through cut in a channel at, for example, fourteen places in the short fold lines in the top folding panels. Further, several other cuts/nicks/spaces/creases as shown in FIG. 2 (including nicks in, for example, two places in the locks 314 and 316, such as at 0.031-inch, nicks in, for example, two places in the long fold lines in the top folding panels, such as at 0.132-inch and several others) can be included. These cuts or other inclusions along the fold lines and otherwise can vary according to the blank size, according to the formed carton size, the substrate used to form the carton (e.g. SBS in lieu of paperboard), or other factors.

[0040] FIG. 3 is a plan view of a blank 410 from which a carton can be formed. The blank 410 includes side panels 412, 416, 420, 424 attached respectively to each other along fold lines 414, 418, 422. A glue flap or panel 428 is attached to side panel 424 at fold line 426 and is capable of receiving an adhesive during formation of the carton from the blank 410. The blank 410 includes top folding panels 430, 434, 438, 442, 444, 450, 458, 462, 466, 470, 474, 478, which are capable of being articulated into several positions to form multiple closure formations.

[0041] Top folding panel 430 is connected to panel 434 by fold line 432, top folding panel 438 is connected to panel 442 by fold line 440, and top folding panel 446 is connected to panel 450 by fold line 448. Top folding panels 430 and 434 are respectively connected to top folding panels 438 and 442 by fold line 436, and top folding panels 442 and 438 are respectively connected to top folding panels 450 and 446 by fold line 444. Top folding panel 446 is connected to top panel 454 by fold line 452. Top panel 454 is connected to top folding panel 458 by fold line 456. Top folding panel 458 is connected to panel 462 by fold line 460, top folding panel 466 is connected to panel 470 by fold line 468, and top folding panel 474 is connected to panel 478 by fold line 476. Side panels 412, 416, 420, and 424 generally are connected to panels 438, 454, 466, and 482 by fold line 429.

[0042] Top folding panels 458 and 462 are respectively connected to top folding panels 466 and 470 by fold line 464, while top folding panels 470 and 466 are respectively connected to top folding panels 478 and 474 by fold line 472. Top folding panel 474 is connected to top panel 482 by fold line 480, while top panel 482 in turn is connected to glue flap 486 by fold line 484. Glue flap 486 operates similarly to glue flap 428 and is capable of receiving glue or other adhesive material during formation of the carton from the blank 410. Fold lines 432, 440, 448, 460, 468, and 476 can be spaced or located as need for forming substantially
any size or shape top folding panels, but are shown for purposes of illustration only in FIG. 3 with fold lines 432, 448, 460, and 470 extending inwardly within a range between approximately 0.1-inch to 5-inches, such as at one inch, from the top edge of the blank 410 and with fold lines 40 and 68 extending within a range between approximately 0.1-inch to 5-inches, such as at two inches, across a mid or intermediate portion of their respective top folding panels.

[0043] Handle 488 is connected to top panel 454 by fold line 489, and has a handhold or slot 490 formed therein. As shown in FIG. 3, the handhold 490 generally is formed at line 491, extends into the handle 488 approximately one inch, and can have rounded corners formed with radius cuts within a range between approximately 0.1-inch to 5-inches, such as at 0.5-inch. Handhold 490 can comprise either a void formed in the blank 410, or can include a perimeter defined by the fold line 489, with one or more nicks formed therein to allow the handle slot to be formed in the carton by folding inward, hinging outward, or by removing part of or substantially all of any flap portion to form an opening. The handhold 490 generally includes a portion wide enough to receive a user’s finger or fingers and is shown in FIG. 3 with width scores within a range between approximately 0.1-inch to 5-inches, such as at 2.937 inches, at an upper portion and with width scores within a range between approximately 0.1-inch to 5-inches, such as at 3.937-inches, at a lower portion.

[0044] Handle 492 is similarly connected to top panel 482 by fold line 493, and has a handhold 494 formed therein. As shown in FIG. 3, the handhold 494 generally is formed at line 495, extends into the handle 492 within a range between approximately 0.1-inch to 5-inches, such as at one inch, and can have rounded corners formed with radius cuts within a range between approximately 0.01-inch to 5-inches, such as at approximately 0.5-inch. Handhold 494 can comprise either a void formed in the blank 410, or can include a perimeter defined by the fold line 493, with one or more nicks formed therein to allow the handhold 494 to be formed in the carton by folding inward, hinging outward, or by removing part of or substantially all of any flap portion to form an opening. The handhold 494 generally includes a portion wide enough to receive a user’s finger or hands and is shown in FIG. 3 with width scores within a range between approximately 0.1-inch to 5-inches, such as at 2.297 inches, at an upper portion, and width scores within a range between approximately 0.1-inch to 5-inches, such as at 3.937-inches, at a lower portion.

[0045] Locks or slots 514 and 516 are formed in side panels 412 and 420, respectively and provide recessed areas capable of receiving top folding panel sections of the formed carton for a closure configuration that receives top folding panel sections in side panels 412 and 420. Generally, lock 514 includes a formation geometry capable of receiving portions of top folding panels 434, 442, and 450, and lock 516 includes a formation geometry capable of receiving portions of top folding panels 462, 470, and 478, when folded therein. The locks 514 and 516 are shown in FIG. 3 with a depth within a range between approximately 0.01-inch to 5-inches, such as at 0.5-inch, and a width within a range between approximately 0.1-inch to 5-inches, such as at 1-inch, at their lower portions, although other varying dimensions also can be used. The locks 514, 516 also are shown with a rectangular portion and a bulbus portion although other designs or configurations also can be used. The rectangular portions of locks 514 and 516 have depths within a range between approximately 0.01-inch to 5-inches, such as at 0.281 inches, and widths within a range between approximately 0.01-inch to 5-inches, such as at 0.75-inch, with variations in such dimensions being made thereto as needed. The locks 514 and 516 generally are formed in the middle portions of the panels 412 and 420, respectively, but can be formed slightly off-center to accommodate the panels 434, 442, 450 and 462, 470, 478, respectively, as constructed. In FIG. 3, the locks 514 and 516 are spaced from the periphery 408 and fold line 418, respectively, within a range between approximately 0.1-inch to 5-inches, such as between 2-3 inches. The bottom of the bulbus portions of locks 514 and 516 are shown in FIG. 3 with a range between approximately 0.1-inch to 5-inches, such as at 2.75-inches, from fold line 499.

[0046] The lower or bottom part of the blank 410 generally includes several bottom panels such as panels 496, 504, 508, and 512. Bottom panel 496 is connected to side panel 412 by fold line 499, bottom panel 504 is connected to side panel 416 by fold line 499, bottom panel 508 is connected to side panel 420 by fold line 499, and bottom panel 512 is connected to side panel 424 by fold line 499. Although the bottom of the blank 410 can be any configuration desired, generally the bottom of the blank 410 will include easily foldable features that are capable of receiving glue or other adhesive and capable of providing support to the carton when formed from the blank 410. As shown in FIG. 3, bottom panels 496, 504, and 512 include portions 498, 506, 510, with corresponding surfaces capable of receiving adhesive to secure the panels into a formed carton. Additionally, the bottom panels 496, 504, 508, and 512 also can be formed in specific orientations to facilitate ease of constructing a carton from the blank 410. For example, as shown in FIG. 3, bottom panels 496, 504, and 508 extend within a range between approximately 1-inch to 10-inches, such as at 5-inches, from fold line 499, while bottom panel 512 extends within a range between approximately 1-inch to 20-inches, such as at 9.188-inches from fold line 499. Further, bottom panels 496 and 504 include end portions that extend at 5-degrees, from a plane perpendicular to fold line 499. Further, bottom panel 504 includes a portion 509 on the opposite end as the adhesive receiving surface 506. The portion 509 extends from bottom panel 504 defined by a line 502, which includes combinations of fold lines, cut lines, and nicks. The line 502 extends at an angle within a range between approximately 1 to 85-degrees, such as 45-degrees, from fold line 499. Additionally, bottom panel 508 includes a portion 509 defined by a fold line 507 and bottom panel 512 includes a cutout formed in the adhesive receiving surface 510 that extends approximately 1.75-inches from the lower end of the panel 512 and that has a curved cutout with a radius within a range between approximately 0.1-inch to 5-inches, such as at 1.25-inches.

[0047] Side panels 412, 416, 420, and 424 further are connected to bottoms panels 496, 504, 508, and 512 by a fold line 99, while the bottom panels 496, 504, 508, and 512 generally have end portions that are cutout during manufacture and that provide spaces between the intersections of the bottom panels at fold line 499. As shown in FIG. 3, a space within a range between approximately 0.01-inch to 5-inches, such as at 0.028-inches, is defined between bottom panels 496 and 504 and fold line 499, a space within a range
between approximately 0.01-inch to 5-inches, such as at 0.063-inches, is defined between bottom panels 504 and 508 and fold line 499, and a space within a range between approximately 0.01-inch to 5-inches, such as at 0.052-inches, is defined between bottom panels 508 and 512 and fold line 499.

[0048] Top panels 454 and 482 each include knife cuts 518 that extend north, south, east, and west and form slots or other holes capable of venting the contents of the formed carton as desired. The cuts 518 allow venting of, for instance, heat or moisture, such as from hot, moist food, without exposing a large amount of the contents of the carton to the exterior environment. The configurations of the cuts 518 also can allow receipt of graphics and do not have to be utilized unless desired. As shown in FIG. 3, the cuts 518 typically have centers that are disposed within a range between approximately 0.1-inch to 5-inches, such as at 2.5-inches, from fold lines 456 and 484 in panels 454 and 482, respectively, and within a range between approximately 0.1-inch to 5-inches, such as at 2-inches, from fold line 429, with the cuts 518 being within a range between approximately 0.1-inch to 5-inches, such as at 1-inch, in total width, within a range between approximately 0.01-inch to 5-inches, such as at 0.5-inches, disposed in each direction from the centers.

[0049] The fold lines, as shown in several places in FIG. 3, can include any number or arrangement of spaces, nick, cuts, creases, scores, cut scoring, solid scoring, spacing, or other inclusions or spaces, or any combination of these, to aid in the formation of a carton from the blank 410 and/or to aid in the formation of the multiple closures defined herein. Additionally, these nicks can be spaced from each other, for example as shown in bottom panel 504, extending approximately 100% through, for example, 2 places along line 502 with spaces within a range between approximately 0.01-inch to 5-inches, such as at for example, 0.125-inches. The nicks can also be formed in any size, such as within a range between approximately 0.01-inch to 5-inches, such as at, for example, 0.125-inch cuts with 0.222-inch spaces in the bottom panels. For example, at 0.25-inch cuts with 0.25-inch creases cut within a range between approximately 10 to 100%, such as between 70-90%, through, for example, 8 places in fold line 429. For example, at 0.125-inch cuts with 0.0125-inch spaces cut, such as between 70 to 90%, a through cut in a channel at, for example, the places in the long fold lines in the top folding panels. For example, at 0.125-inch cuts with 0.125-inch spaces cut, such as between 70-90%, through a channel in, for example, 6 places in the short fold lines in the top folding panels. Further, several other cuts/nicks/spaces/creases as shown in FIG. 3 (including nicks in the locks 514 and 516, such as at 0.003-inch, nicks in the long fold lines in the top folding panels, such as between 0.187 and 1.53-inches, 0.5-inch cut with 0.5-inch creases cut, such as between 70-90%, through, for example, in four places along line 499 and several others) can be included. These cuts or other inclusions along the fold lines and otherwise can vary according to the blank size, according to the formed carton size, the substrate used to form the carton (e.g., SBS in lieu of paperboard), or other factors.

[0050] The blanks as shown in FIGS. 1-3 also are shown as including bleed-area lines for illustration. The actual size of the cartons is better represented by the interior of the double lined edges, with the interior forming the actual perimeter of the blanks. The outside line is the bleed-area limit shown for graphics and graphical illustrations on the formed carton. Likewise, the hash-marked areas on the blank indicate generally areas that are not exposed when the carton is fully formed.

[0051] For purposes of illustration of the use of the present invention, FIG. 4 shows an example of a carton formed according to the invention, for example, from the blank of FIG. 1. In constructing the carton from the blank 10, the bottom panels 96, 104, 108, and 112 are folded upwardly along fold line 99. For example, panel 109 is folded inwardly and attached by glue or other adhesive to portion 110 of panel 112, portion 106 tucks under bottom panel 108 and receives adhesive, portion 100 folds inwardly and attaches to portion 106 by glue or other adhesive, and panel 96 covers part of portion 110, with a glue or other adhesive attaching these two panel portions. Once the bottom panels are folded along line 99, the side panels 12, 16, 20, and 24 and glue flap 28 are folded along respective fold lines, 14, 18, 22, and 26. Simultaneously, the top folding panels 46, 58, and 74 and top panels 54 and 82 are folded along respective fold lines 52, 56, and 80. Glue or other adhesive is provided onto glue flaps 28 and 86 and the carton is formed. During construction of the carton, the flat blank 10 is fed into the glue, the bottom portion is folded upwardly, the diagonals are folded, the glue is applied, and the scores 14, 18, 22, 26, 52, 56, 80, 84 generally will be folded over, with glue being applied to glue flaps 28 and 86 to complete the formation of the carton.

[0052] The resultant formed carton shown in FIG. 4 further can be folded into several closure configurations. Examples of four such potential closure configurations are shown in FIGS. 5-8. FIG. 5 shows the carton of FIG. 4 formed with a traditional gable top formation with exposed handles. FIG. 6 shows the carton of FIG. 4 with a handle flap inserted into an opposing flap for easy stacking. FIG. 7 shows an enclosed carton with the ends tucked into the end walls and a handle exposed for easy carrying. FIG. 8 shows the carton of FIG. 7 with the handle flap folded for easy stacking.

[0053] To form the closure shown in FIG. 5, the top folding panels 30, 34, 38, 42, 46, 48, 58, 62, 66, 70, 74, and 78 are folded inwardly, with handles 88 and 92 meeting to form a two part handle portion. To arrange the carton in an easy stacking arrangement as shown in FIG. 6 and with the top folding panels folded inwardly, one section of the handle, 88 or 92, is inserted into an opposing flap. The handle is inserted into the internal carton cavity below the opposing handle flap.

[0054] To form the closure shown in FIG. 7, the top folding panels 30, 34, 38, 42, 46, and 48 are folded outwardly and tucked into lock 114 and top folding panels 58, 62, 66, 70, 74, and 78 are folded outwardly and tucked into lock 116 shown. The handle portions 88 and 92 meet to form a part handle. To arrange the carton in an easy stacking arrangement as shown in FIG. 8 and with the top folding panels folded outwardly, one section of the handle, 88 or 92, is inserted into an opposing flap. In FIG. 8, the end flaps are folded outward and tucked into end walls with the handles exposed for easy carrying.

[0055] FIG. 9 is a plan view of the blank of FIG. 1 with example dimensions. FIG. 10 is a plan view of the blank of
FIG. 2 with example dimensions. FIG. 11 is a plan view of the blank of FIG. 3 with example dimensions.

[0056] While the invention has been disclosed in its preferred forms, it will be apparent to those skilled in the art that many modifications, additions, and deletions can be made therein without departing from the spirit and scope of the invention and equivalents as set forth in the following claims.

What is claimed is:

1. A blank for forming a carton with multiple closure formations, the blank comprising:
   a first side panel connected to a second side panel at a first fold line;
   the second side panel connected to a third side panel at a second fold line;
   the third side panel connected to a fourth side panel at a third fold line;
   the fourth side panel connected to an adhesive flap at a fourth fold line;
   the first and third side panels having locking means disposed in a portion thereof;
   a plurality of top folding panels capable of being articulated about top folding panel fold lines into a multiplicity of closure configurations;
   four end flaps each respectively attached to one of the side panels;
   wherein the four end flaps are foldable to create a bottom portion; and
   wherein at least a portion of at least one top folding panel can be received in the locking means in at least one of the multiplicity of closure configurations.

11. The carton of claim 10, wherein three triangular top folding panels are disposed adjacent the first side panel and wherein three triangular top folding panels are disposed adjacent the third side panel.

12. The carton of claim 11, wherein portions of each of the three triangular top folding panels disposed adjacent the first side panel and portion of each of the three triangular top folding panels disposed adjacent the third side panel are foldable about second top panel fold lines.

13. The carton of claim 10, wherein a second top folding panel is disposed adjacent and above the second side panel and a fourth top folding panel is disposed adjacent and above the fourth side panel.

14. The blank of claim 13, further including a first handle means disposed adjacent and above the second top folding panel and a second handle means disposed adjacent and above the fourth top folding panel.

15. The blank of claim 14, wherein the first and second handle means include handholds formed therein.

16. The blank of claim 10, wherein the second top folding panel and the fourth top folding panel include vent holes formed therein.

17. In combination, a substantially parallelepiped carton formed from the blank of claim 10 and at least one article enclosed within the carton.

18. A method of erecting a carton from a blank that includes a first side panel connected to a second side panel at a first fold line, the second side panel connected to a third side panel at a second fold line, the third side panel connected to a fourth side panel at a third fold line, the fourth side panel connected to an adhesive flap at a fourth fold line, a plurality of top folding panels capable of being articulated about top folding panel fold lines into a multiplicity of closure configurations, four end flaps each respectively attached to one of the side panels, wherein a second top folding panel is disposed adjacent and above the second side panel and a fourth top folding panel is disposed adjacent and above the fourth side panel, a first handle means disposed adjacent and above the second top folding panel, and a
folding the four end flaps into a bottom portion;
adhering the adhesive flap to the first side panel; and,
folding the top folding panels inwardly with the first handle means and the second handle means meeting to form a two part handle portion.

19. A method of erecting a carton from a blank that includes a first side panel connected to a second side panel at a first fold line, the second side panel connected to a third side panel at a second fold line, the third side panel connected to a fourth side panel at a third fold line, the fourth side panel connected to an adhesive flap at a fourth fold line, a plurality of top folding panels capable of being articulated about top folding panel fold lines into a multiplicity of closure configurations, four end flaps each respectively attached to one of the side panels, wherein a second top folding panel is disposed adjacent and above the second side panel and a fourth top folding panel is disposed adjacent and above the fourth side panel, a first handle means disposed adjacent and above the second top folding panel, and a second handle means disposed adjacent and above the fourth top folding panel, the method comprising:

folding the four end flaps into a bottom portion;
adhering the adhesive flap to the first side panel; and,
folding the top folding panels inwardly and inserting one of the first handle means or second handle means into an internal cavity below the opposing handle flap.

20. A method of erecting a carton from a blank that includes a first side panel connected to a second side panel at a first fold line, the second side panel connected to a third side panel at a second fold line, the third side panel connected to a fourth side panel at a third fold line, the fourth side panel connected to an adhesive flap at a fourth fold line, the first and third side panels having locking means disposed in a central portion thereof, a plurality of top folding panels capable of being articulated about top folding panel fold lines into a multiplicity of closure configurations, four end flaps each respectively attached to one of the side panels, wherein a second top folding panel is disposed adjacent and above the second side panel and a fourth top folding panel is disposed adjacent and above the fourth side panel, a first handle means disposed adjacent and above the second top folding panel, and a second handle means disposed adjacent and above the fourth top folding panel, the method comprising:

folding the four end flaps into a bottom portion;
adhering the adhesive flap to the first side panel; and,
folding the top folding panels outwardly and tucking at least a portion of the top folding panels into the first locking means.

21. The method of claim 20, further comprising tucking at least a portion of the top folding panels into the second locking means.

22. A method of erecting a carton from a blank that includes a first side panel connected to a second side panel at a first fold line, the second side panel connected to a third side panel at a second fold line, the third side panel connected to a fourth side panel at a third fold line, the fourth side panel connected to an adhesive flap at a fourth fold line, the first and third side panels having locking means disposed in a central portion thereof, a plurality of top folding panels capable of being articulated about top folding panel fold lines into a multiplicity of closure configurations, four end flaps each respectively attached to one of the side panels, wherein a second top folding panel is disposed adjacent and above the second side panel and a fourth top folding panel is disposed adjacent and above the fourth side panel, a first handle means disposed adjacent and above the second top folding panel, and a second handle means disposed adjacent and above the fourth top folding panel, the method comprising:

folding the four end flaps into a bottom portion;
adhering the adhesive flap to the first side panel; and,
folding the top folding panels outwardly and inserting one of the first handle means or second handle means into an internal cavity below the opposing handle flap.

23. A blank for forming a carton with multiple closure formations, the blank comprising:

a plurality of side panels connected at fold lines;
locking means disposed in at least one side panel;
a plurality of top folding panels capable of being articulated about fold lines into one of a multiplicity of closure configurations;
at least one end flap attached to at least one of the side panels.

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