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(54) **METHODS AND SYSTEMS FOR PACKAGING A PRODUCT**

VERFAHREN UND SYSTEM ZUR VERPACKUNG EINES PRODUKTS

PROCEDES ET SYSTEMES DE CONDITIONNEMENT D'UN PRODUIT

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(73) Proprietor: **Graphic Packaging International, Inc.**
Marietta, GA 30067 (US)

(72) Inventor: **LEARN, Angela E.**
Gilbertsville, Pennsylvania 19525 (US)

(74) Representative: **Gill, Stephen Charles et al**
Mewburn Ellis LLP
33 Gutter Lane
London
EC2V 8AS (GB)

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Description

BACKGROUND OF THE INVENTION

[0001] This invention relates generally to packaging and, more particularly, to a packaging carton and a method for making a packaging assembly with the carton.

[0002] At least some known cartons used for packaging a product include markings, indicia, and/or a shape that communicates the product, a manufacturer of the product, and/or a seller of the product to consumers. For example, such cartons may include printed text that indicates a product's name and briefly describes the product, logos and trademarks that indicate a manufacturer and/or seller of the product, and/or designs that attract a consumer's attention. Other cartons, for example, may have a shape that corresponds to a product packaged within the carton and/or a shape that indicates a manufacture and/or seller of the product. Still further, and for example, some known cartons may include a shape that provides functionality, such as a shape that promotes the display of the carton, a shape that facilitates stacking and/or arrangement of a plurality of cartons, and/or a shape that facilitates carrying the carton. However, cartons having shapes that are more complex than conventional rectangular cartons may be difficult and costly to manufacture. Additionally, such cartons may be less likely to maintain their shape during transport and/or display thereof.

[0003] Some known cartons that package a product are also sealed to protect the product from tampering and to generally seal the joints of the carton for containing the product within the carton as well as protecting the product from contamination. For example, some known cartons include a band around a joint between portions of the carton, such as a lid and a base, to seal the carton. Other known cartons may include a bag or a liner that is sealed within the interior cavity of the carton for storing the product in a sealed environment. Moreover, there are at least some other known cartons, for example, that completely wrap the carton in shrink-wrap that is thereafter heated to shrink it tightly around the carton. However, when a carton is completely sealed with shrink-wrap portions of the carton may not be accessible without breaking the seal, thereby possibly making display and/or transport of the carton more difficult.

[0004] Document US 2003/0206997 A1 discloses a shrink-wrapped carton with deformable side walls.

BRIEF SUMMARY OF THE INVENTION

[0005] In one aspect, the present invention provides a method for applying a heat-shrink patch to a carton for forming a shape of the carton. The carton includes a top panel, a bottom panel, at least one side panel extending between the top panel and the bottom panel and a movable section that is movable between a first position and a second position. The method includes providing a heat-shrink patch in a pre-shrunk configuration. The heat-shrink patch is coupled in the pre-shrunk configuration to at least a portion of an interior surface of a blank of sheet material including at least a portion of the movable section. The carton is formed from the blank of sheet material. The movable section is moved from the first position to the second position to form the shape of the carton by heating the heat-shrink patch to shrink the heat-shrink patch to a shrunk configuration.

[0006] In another aspect, the present invention provides a method for forming a packaging assembly including a carton having a shape. The carton includes a top panel, a bottom panel, at least one side panel extending between the top panel and the bottom panel and a movable section that is movable between a first position and a second position. The method includes providing a blank sheet of material having a first movable section coupled to a second movable section at a fold line. The first movable section and the second movable section define a void positioned on the fold line. An adhesive is applied in a registered pattern to an interior surface of the blank and substantially surrounds the void. The heat-shrink patch is coupled in a pre-shrunk configuration to each of the first movable section and the second movable section within the registered pattern to cover the void. The first movable section is moved towards the second movable section to at least partially close the void to form the shape of the carton by applying heat to the heat-shrink: patch to shrink the heat-shrink patch to a shrunk configuration.

[0007] In another aspect, the present invention provides a system for applying a heat-shrink patch to a carton for forming a shape of the carton. The system includes a blank of sheet material comprising a top panel, a bottom panel, at least one side panel extending between the top panel and the bottom panel and a movable section that is movable between a first position and a second position. A coupling device is configured to couple the heat-shrink patch in the pre-shrunk configuration to an interior surface of a blank of sheet material. The system further includes a forming device configured to form the carton from the blank of sheet material. A heating device is configured to heat at least a portion of the heat-shrink patch to shrink the heat-shrink patch to a shrunk configuration to move the movable section from the first position to the second position to form the shape of the carton.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008]

Figure 1 is a top plan view of a blank of sheet material for forming a carton, according to one embodiment of this invention.

Figure 2 is a perspective view of the carton formed from the blank shown in Figure 1.

Figure 3 is a perspective view of a packaging as-

sembly including the carton shown in Figure 2.

Figure 4 is a top plan view of a blank of sheet material for forming a carton, according to one embodiment of this invention.

Figure 5 is a perspective view of the carton formed from the blank shown in Figure 4.

Figure 6 is a perspective view of a packaging assembly including the carton shown in Figure 5.

Figure 7 is a perspective view of an alternative embodiment of the packaging assembly shown in Figure 6.

Figure 8 is a top plan view of a blank of sheet material for forming a carton, according to one embodiment of this invention.

Figure 9 is a perspective view of the carton formed from the blank shown in Figure 8.

Figure 10 is a perspective view of a packaging assembly including the carton shown in Figure 9.

Figure 11 is a perspective view of an alternative embodiment of the packaging assembly shown in Figure 10.

Figure 12 is a top plan view of a blank of sheet material for forming a carton, according to one embodiment of this invention.

Figure 13 is a perspective view of the carton formed from the blank shown in Figure 12.

Figure 14 is a perspective view of a packaging assembly including the carton shown in Figure 13.

Figure 15 is a perspective view of an alternative embodiment of the packaging assembly shown in Figure 14.

Figure 16 is a top plan view of a blank of sheet material for forming a carton, according to one embodiment of this invention.

Figure 17 is a perspective view of the carton formed from the blank shown in Figure 16.

Figure 18 is a perspective view of a packaging assembly including the carton shown in Figure 17.

Figure 19 is a perspective view of an alternative embodiment of the packaging assembly shown in Figure 18.

Figure 20 is a top plan view of a blank of sheet material for forming a carton, according to one embodiment of this invention.

Figure 21 is a perspective view of the carton formed from the blank shown in Figure 20.

Figure 22 is a perspective view of a packaging assembly including the carton shown in Figure 21.

Figure 23 is a perspective view of an alternative embodiment of the packaging assembly shown in Figure 22.

Figure 24 is a top plan view of a blank of sheet material for forming a carton, according to one embodiment of this invention.

Figure 25 is a perspective view of the carton formed from the blank shown in Figure 24.

Figure 26 is a perspective view of a packaging assembly including the carton shown in Figure 25.

Figure 27 is a top plan view of a blank of sheet material for forming a carton, according to one embodiment of this invention.

Figure 28 is a perspective view of the carton formed from the blank shown in Figure 27.

Figure 29 is a perspective view of a packaging assembly including the carton shown in Figure 28.

Figure 30 is a top plan view of a blank of sheet material for forming a carton, according to one embodiment of this invention.

Figure 31 is a perspective view of the carton formed from the blank shown in Figure 30.

Figure 32 is a perspective view of a packaging assembly including the carton shown in Figure 31.

Figure 33 is a top plan view of a blank of sheet material for forming a carton, according to one embodiment of this invention.

Figure 34 is a perspective view of the carton formed from the blank shown in Figure 33.

Figure 35 is a perspective view of a packaging assembly including the carton shown in Figure 34.

Figure 36 is a top plan view of a blank of sheet material for forming a carton, according to one embodiment of this invention.

Figure 37 is a perspective view of the carton formed from the blank shown in Figure 36.

Figure 38 is a perspective view of a packaging assembly including the carton shown in Figure 37.

Figure 39 is a top plan view of a blank of sheet material for forming a carton, according to one embodiment of this invention.

Figure 40 is a perspective view of the carton formed from the blank shown in Figure 39.

Figure 41 is a perspective view of a packaging assembly including the carton shown in Figure 40.

Figure 42 is a flowchart illustrating a method for applying a heat-shrink patch to a carton for forming a shape of the carton.

Corresponding reference characters indicate corresponding parts throughout the several views of the drawings.

DETAILED DESCRIPTION OF THE INVENTION

[0009] Generally, packaging assemblies are described herein that may be formed from a carton having a heat-shrunk layer (sometimes referred to as, for example, "shrink-wrap") coupled to a portion thereof or from a carton having a heat-shrink layer in the form of a heat-shrink patch overlapping a portion of the carton. The heat-shrink patch may be attached to the carton on the inside of the carton or on the outside of the carton. In the exemplary embodiment, the carton is made from a paperboard material. The carton, however, could be made from other materials, and therefore is not limited to a specific type of material. In some embodiments, a packaging assembly may include a movable section that is movable from a first position to a second position to form a shape of the packaging assembly. The movable section may be moved by, for example, wrapping a heat-shrinkable layer around at least a portion of the movable section such that the layer overlaps at least a portion of the movable section, and heating the heat-shrinkable layer to shrink the heat-shrinkable layer into contact with at least a portion of the movable section to move the movable section from the first position to the second position as the layer shrinks under the heat.

[0010] Alternatively, the movable section may be moved by attaching a heat-shrink patch to at least a portion of the movable section, and heating the heat-shrink patch such that shrinking of the patch causes the movable section to move from the first position to the second position. In one embodiment, a heat-shrink patch is coupled to an interior surface of the blank of sheet material. The heat-shrink patch is connected to at least a portion of the movable section. The movable section is moved by heating the heat-shrink patch to shrink the heat-shrinkable patch and urge the movable section from the first position towards the second position. The movable section may be any portion of the carton and may be movable in any suitable motion and/or direction, whether such portion, motion, and/or direction is described and/or illustrated herein.

[0011] In some embodiments, a carton and/or a heat-shrinkable/shrunk layer may include a marking thereon, such as, but not limited to, indicia that communicates the product, a manufacturer of the product, and/or a seller of the product. For example, printed text that indicates a product's name and briefly describes the product, logos and/or trademarks that indicate a manufacturer and/or seller of the product, and/or designs and/or ornamentation that attract attention. Moreover, in some embodiments a packaging assembly may include a handle for carrying the assembly.

[0012] The cartons, heat-shrinkable/shrunk layers, and packaging assemblies generally may each have any suitable size, shape, and/or configuration (e.g., number of sides), whether such sizes, shapes, and/or configurations are described and/or illustrated herein. For example, in one embodiment a packaging assembly includes a shape that corresponds to a product packaged within the carton and/or a shape that indicates a manufacture and/or seller of the product. Moreover, and for example, in one embodiment a packaging assembly includes a shape that provides functionality, such as a shape that promotes the display of the carton, a shape that facilitates stacking and/or arrangement of a plurality of cartons, and/or a shape that facilitates carrying the carton. Similarly, the cartons, heat-shrinkable/shrunk layers, and packaging assemblies generally may be formed from any suitable material, whether such materials are described herein. For example, in one embodiment a carton includes cardboard, corrugated board, and/or plastic. Additionally, in one embodiment, a heat-shrinkable/shrunk layer includes a sheet, a sleeve or a patch of shrinkable material that includes polyethylene, polypropylene, polyvinyl chloride, polyester, polyester glycol, nylon and/or oriented polystyrene. In an alternative embodiment, any suitable shrinkable material known to those skilled in the art and guided by the teachings herein provided is used to fabricate heat-shrink patch.

[0013] Referring now to the drawings, and more specifically to Figures 1-3, although as described above a packaging assembly may have any suitable size, shape, and/or configuration (e.g., number of sides), Figures 1-3 illustrate the formation of one embodiment of a packaging assembly. Specifically, Figure 1 is a top plan view of one embodiment of a blank of sheet material (designated in its entirety by reference numeral 20). Figure 2 is a perspective view of one embodiment of a carton (designated in its entirety by 100) formed from blank 20 shown in Figure 1. Figure 3 is a perspective view of one embodiment of a packaging assembly (designated in its entirety by 154) including carton 100 shown in Figure 2.

[0014] Referring to Figure 1, blank 20 includes a succession of six side panels 22, 24, 26, 28, 30, and 32 that are connected together by a plurality of preformed, generally parallel, fold lines 36, 38, 40, 42, and 44, respectively. Specifically, each side panel 22, 24, 26, 28, 30, and 32 extends from an adjacent side panel along respective fold lines 36, 38, 40, 42, and 44. A side panel flap 46 extends from an end portion (generally designated by 48) of side panel 32, or alternatively from an end portion (generally designated by 50) of side panel 22, along a fold line 49 for facilitating securing end portions 48 and 50 together to form carton 100 (shown in Figure 2). Each side panel 22, 24, 26, 28, 30, and 32 extends a height measured between a bottom end 52 and a top end 54. Side panel 22 or, alternatively, side panel 24, 26, 28, 30 and/or 32, includes a top support panel 56 extending from top end 54 thereof along a fold line 58 and a bottom support panel 60 extending from bottom end 52 thereof along a fold line 62. Additionally, side panel 28 (or alternatively any other of side panels 22, 24, 26, 30, and/or 32) includes a top panel 64 extending from top end 54 thereof along a fold line 66 and a bottom panel 68 extending from bottom end 52 thereof along a fold line 70. Top panel 64 and bottom panel 68 each include two securement tabs 72 and 74 extending therefrom along respective fold lines 76 and 78 for facilitating securing top panel 64 and bottom panel 68 to side panels 22, 24, 26, 28, 30, and 32 to form a top 114 (shown in Figure 2) and a bottom 116 (shown in Figure 2) of carton 100. Moreover, top ends 54 and bottom ends 52 of each side panel 26 and 30 include a securement flap 80 extending therefrom along a fold line 82 for mating with securement tabs 72 and 74 to form carton 100. In alternative embodiments, top panel 64 and bottom panel 68 may include any suitable interconnection means in addition to, or alternatively to, the tab /flap arrangement described above. Accordingly, the top, bottom, and side panels 64, 68, 26, and 30, respectively, are not limited to interconnection using a tab/flap arrangement. For example, in one embodiment, adhesive is applied to portions of the top, bottom, and/or side panels 64, 68, 26, and 30, respectively.

[0015] The side panels 22, 24, 26, 28, 30, and 32 each include an upper panel portion 84 and a lower panel portion 86. Upper panel portions 84 each include an upper panel extension 88 extending therefrom along a fold line 90, and lower panel portions 86 each include a lower panel extension 92 extending therefrom along a fold line 94. Upper panel extensions 88 are each joined to a corresponding lower panel extension 92 along a central fold line 96. As can be seen in Figure 1, an opening 98 is defined between adjacent pairs of joined upper and lower panel extensions 88 and 92 to accommodate changing a cross-sectional area of carton 100 as will be described below.

[0016] As shown in Figure 2, a carton 100 can be formed from blank 20 (shown in Figure 1) by folding blank 20 about fold lines 36, 38, 40, 42, 44, 49, 58, 62, 66, 70, 76, 78, and 82 (shown in Figure 1). In one embodiment, an adhesive may be applied to portions of blank 20 to secure carton 100 together. Generally, side panels 22, 24, 26, 28, 30, and 32 (shown in Figure 1) form six successive sides (generally designated by 102, 104, 106, 108, 110, and 112) of carton 100, top panel 64 (shown in Figure 1) forms a top (generally designated by 114) of carton 100, and bottom panel 68 (shown in Figure 1) forms a bottom (generally designated by 116) of carton 100. Carton 100 extends a height 118 measured between top 114 and bottom 116 of carton 100 along a central longitudinal axis 120 extending through carton 100. As can be seen in Figure 2, in one embodiment, carton 100 includes a generally hexagonal cross-sectional shape, for example, a cross section taken along the plane 2-2 extending generally perpendicularly to central longitudinal axis 120. As can also be seen in Figure 2, each side 102, 104, 106, 108, 110, and 112 extends between top 114 and bottom 116 of carton 100. More specifically, in one embodiment, each side 102, 104, 106, 108, 110, and 112 extends from top 114 to bottom 116. Any side 102, 104, 106, 108, 110, or 112 may be referred to herein as a first, a second, a third, a fourth, a fifth, and/or a sixth side.

[0017] Upper panel portions 84 and lower panel portions 86 (shown in Figure 1) form upper portions 122 and lower portions 124, respectively, of each side 102, 104, 106, 108, 110, and 112. Upper panel extensions 88 and lower panel extensions 92 form upper extensions 126 and lower extensions 128, respectively, of each side 102, 104, 106, 108, 110, and 112. A corner 130 is defined at an intersection between top 114 and each side 102, 104, 106, 108, 110, and 112. Similarly, a corner 132 is defined at an intersection between bottom 116 and each side 102, 104, 106, 108, 110, and 112. Moreover, a corner 134 is defined at an intersection between each adjacent side of sides 102, 104, 106, 108, 110, and 112.

[0018] The upper and lower extensions 126 and 128 each form a movable section (generally designated by 136, 138, 140, 142, 144, and 146) of carton 100. As can be seen in Figure 2, in one embodiment, each movable section 136, 138, 140, 142, 144, and 146 are located along central longitudinal axis 120 at a generally equal distance from top 114. More specifically, each central fold line 96 is located along central longitudinal axis 120 at a generally equal distance from top 114. Any movable section 136, 138, 140, 142, 144, or 146 may be referred to herein as a first, a second, a third, a fourth, a fifth, and/or a sixth movable section.

[0019] The movable sections 136, 138, 140, 142, 144, and 146 are each movable between a first position shown in Figure 2 (and generally designated by 148) and a second position shown in Figure 3 (and generally designated by 150). In one embodiment, movable sections 136, 138, 140, 142, 144, and 146 are movable from first position 148 to second position 150 by bending upper and lower extensions 126 and 128 along fold lines 90, fold lines 94, and central fold lines 96 to generally radially move central fold lines 96 with respect to central longitudinal axis 120

of carton 100. Accordingly, and as can be seen in Figures 2 and 3, movement between first and second positions 148 and 150, respectively, varies, or changes, a cross-sectional width of carton 100 defined between two opposite sides of sides 102, 104, 106, 108, 110, and 112 along the height of carton 100. In one embodiment, a cross-sectional width defined between two opposite sides of sides 102, 104, 106, 108, 110, and 112 and taken through movable sections 136, 138, 140, 142, 144, and 146 (e.g., a cross section taken along plane 3-3 in Figure 2) is generally greater in first position 148 than in second position 150. More specifically, as can be seen in Figures 2 and 3, each central fold line 96 is spaced a greater radial distance from central longitudinal axis 120 in first position 148 than in second position 150. In one embodiment, at least one of movable sections 136, 138, 140, 142, 144, and 146 is biased in first position 148. Although movable sections 136, 138, 140, 142, 144, and/or 146 may be biased in first position 148 using any suitable mechanism, in one embodiment, a structure of carton 100 biases movable sections 136, 138, 140, 142, 144, and/or 146.

[0020] Once carton 100 has been formed, and either before, simultaneously with, or after a product is placed within carton 100, a heat-shrinkable layer (generally designated by 152) can be wrapped around at least a portion of carton 100 and heat-shrunk to form a packaging assembly, one embodiment of which is shown in Figure 3 and generally designated by 154. Specifically, in the embodiment shown in Figure 3 heat-shrinkable layer 152 is wrapped around sides 102, 104, 106, 108, 110, and 112, a portion of which extends beyond top 114 and another portion of which extends beyond bottom 116. Layer 152 is then heated to shrink heat-shrinkable layer 152 into contact with carton 100. Layer 152 shrinks to fit snuggly around carton 100. Although heat-shrinkable layer 152 can overlap any portion of carton 100, in the embodiment shown in Figure 3 heat-shrunk layer 152 substantially overlaps sides 102, 104, 106, 108, 110, and 112 and corners 130, 132, and 134, and overlaps a portion of top 114 and at least a portion of bottom 116. Although other types of heat-shrinkable layers may be used, in one embodiment heat-shrinkable layer 152 is a sheet of material or a sleeve of material. Additionally, although other materials may be used for layer 152, in one embodiment layer 152 includes polyethylene, polypropylene, and/or polyvinyl chloride.

[0021] The heat-shrunk layer 152 may facilitate sealing carton 100 to protect a product contained within carton 100 from tampering and to generally seal the corners/joints of carton 100 for containing the product within carton 100 as well as protecting the product from contamination. Heat-shrunk layer 152 can be used, for example, to replace bags or liners sometimes used within a container for sealing a product. The tight fit of heat-shrunk layer 152 may also facilitate maintaining a shape of carton 100 for example, to facilitate displaying, stacking and/or arranging carton 100 or a plurality thereof of cartons, and/or maintaining a shape that facilitates other functionality such as carrying carton 100.

[0022] In one embodiment, top 114 (and/or one or more sides 102, 104, 106, 108, 110, and 112) includes a handle 156 extending outwardly therefrom for carrying the assembly. Heat-shrunk layer 152 includes an opening 158 therein adjacent handle 156 such that handle 156 extends through opening 158 allowing access to handle 156 when heat-shrunk layer 152 overlaps a portion of carton 100.

[0023] In one embodiment, carton 100 and/or layer 152 includes a marking thereon, such as, but not limited to, indicia that communicates the product, a manufacturer of the product, and/or a seller of the product. For example, printed text that indicates a product's name and briefly describes the product, logos and trademarks that indicate a manufacturer and/or seller of the product, and/or designs and/or ornamentation that attracts attention.

[0024] Heat-shrinkable layer 152 may also facilitate forming of the carton, and more specifically moving moveable sections 136, 138, 140, 142, 144, and 146 from first position 148 to second position 150 to form packaging assembly 154. As described above, cartons having shapes that are more complex than conventional rectangular cartons may be difficult and therefore costly to manufacture.

[0025] However, in one embodiment heat-shrinkable layer 152 is wrapped around carton 100 such that heat-shrinkable layer 152 overlaps at least a portion of one or more of movable sections 136, 138, 140, 142, 144, and 146. As layer 152 is heated and shrinks into contact with movable sections 136, 138, 140, 142, 144, and 146, layer 152 moves movable sections 136, 138, 140, 142, 144, and 146 from first position 148 (shown in Figure 2) to second position 150 to form a shape of packaging assembly 154. Heat-shrunk layer 152 then holds movable sections 136, 138, 140, 142, 144, and 146 in second position 150 as long as layer 152 remains substantially wrapped around carton 100. In one embodiment wherein movable sections 136, 138, 140, 142, 144, and 146 are biased to first position 148, layer 152 moves the movable sections to, and holds the movable section in, second position 150 against the bias. By moving and holding movable sections 136, 138, 140, 142, 144, and 146 into second position 150, layer 152 facilitates forming a shape of packaging assembly 154, and more specifically carton 100, that may be otherwise difficult and costly to form.

[0026] Although as described above a packaging assembly may have any suitable size, shape, and/or configuration (e.g., number of sides), Figures 4-7 illustrate the formation of one embodiment of a packaging assembly. Specifically, Figure 4 is a top plan view of one embodiment of a blank of sheet material (designated in its entirety by reference numeral 200). Figure 5 is a perspective view of one embodiment of a carton (designated in its entirety by 266) formed from blank 200 shown in Figure 4. Figure 6 is a perspective view of one embodiment of a packaging assembly (designated in its entirety by 312) including carton 266 shown in Figure 5. Figure

7 is a perspective view of an alternative embodiment of packaging assembly 312 shown in Figure 6.

[0027] Referring to Figure 4, blank 200 includes a succession of four side panels 202, 204, 206, and 208 that are connected together by a plurality of preformed, generally parallel, fold lines 210, 212, and 214, respectively. Specifically, each side panel 202, 204, 206, and 208 extends from an adjacent side panel along respective fold lines 210, 212, and 214. A side panel flap 216 extends from an end portion (generally designated by 218) of side panel 208, or alternatively from an end portion (generally designated by 220) of side panel 202, along a fold line 222 for facilitating securing end portions 218 and 220 together to form carton 266 (shown in Figure 5). Each side panel 202, 204, 206, and 208 extends a height measured between a bottom end 224 and a top end 226.

[0028] Side panel 202 and side panel 206 each include a top support panel 228 extending from top end 226 thereof along a fold line 230 and a bottom support panel 232 extending from bottom end 224 thereof along a fold line 234. Additionally, side panel 204 and side panel 208 each include a top panel 236 extending from top end 226 thereof along a fold line 238 and a bottom panel 240 extending from bottom end 224 thereof along a fold line 242. In one embodiment, at least one of top panels 236 includes an extension 244 extending therefrom for interconnection with a slot 246 within the other top panel 236 for facilitating securing top panels 236 together to form a top 276 (shown in Figure 5) of carton 266 (shown in Figure 5). Similarly, in one embodiment (not shown), at least one bottom panel 240 includes an extension extending therefrom for interconnection with a slot within the other bottom panel 240 for facilitating securing bottom panels 240 together to form a bottom 278 (shown in Figure 5) of carton 266 (shown in Figure 5). Of course, top panels 236 and bottom panels 240 may include any suitable interconnection means in addition to, or alternatively to, the extension/slot arrangement described above. Accordingly, top panels 236 and bottom panels 240 are not limited to interconnection using an extension/slot arrangement. For example, in one embodiment, adhesive is applied to portions of top panels 236 and/or bottom panels 240. In another embodiment, top panels 236 and/or bottom panels 240 interconnect using hook-and-loop fasteners 248.

[0029] Side panels 202, 204, 206, and 208 each include an upper panel portion 250 and a lower panel portion 252. Upper panel portions 250 each include an upper panel extension 254 extending therefrom along a fold line 256, and lower panel portions 252 each include a lower panel extension 258 extending therefrom along a fold line 260. Upper panel extensions 254 are each joined to a corresponding lower panel extension 258 along a central fold line 262. As can be seen in Figure 4, an opening 264 is defined between adjacent pairs of joined upper and lower panel extensions 254 and 258 to accommodate changing a cross-sectional area of carton 266 as will be described below.

[0030] As shown in Figure 5, a carton 266 can be formed from blank 200 (shown in Figure 4) by folding blank 200 about fold lines 210, 212, 214, 222, 230, 234, 238, and 242 (shown in Figure 4). In one embodiment, an adhesive may be applied to portions of blank 200 to secure carton 266 together. Generally, side panels 202, 204, 206, and 208 (shown in Figure 4) form four successive sides (generally designated by 268, 270, 272, and 274) of carton 266, top panels 236 (shown in Figure 4) form a top (generally designated by 276) of carton 266, and bottom panels 240 (shown in Figure 4) form a bottom (generally designated by 278) of carton 266. Carton 266 extends a height 280 measured between top 276 and bottom 278 of carton 266 along a central longitudinal axis 282 extending through carton 266. As can be seen in Figure 5, in one embodiment, carton 266 includes a generally rectangular cross-sectional shape, for example, a cross section taken along the plane 4-4 extending generally perpendicularly to central longitudinal axis 282. As can also be seen in Figure 5, each side 268, 270, 272, and 274 extends between top 276 and bottom 278 of carton 266. More specifically, in one embodiment, each side 268, 270, 272, and 274 extends from top 276 to bottom 278. Any side 268, 270, 272, or 274 may be referred to herein as a first, a second, a third, and/or a fourth side.

[0031] Upper panel portions 250 and lower panel portions 252 (shown in Figure 4) form upper portions 284 and lower portions 286, respectively, of each side 268, 270, 272, and 274. Upper panel extensions 254 and lower panel extensions 258 form upper extensions 288 and lower extensions 290, respectively, of each side 268, 270, 272, and 274. A corner 292 is defined at an intersection between top 276 and each side 268, 270, 272, and 274. Similarly, a corner 294 is defined at an intersection between bottom 278 and each side 268, 270, 272, and 274. Moreover, a corner 296 is defined at an intersection between each adjacent side of sides 268, 270, 272, and 274.

[0032] Upper and lower extensions 288 and 290 each form a movable section (generally designated by 298, 300, 302, and 304) of carton 266. As can be seen in Figure 5, in one embodiment, each movable section 298, 300, 302, and 304 are located along central longitudinal axis 282 at a generally equal distance from top 276. More specifically, each central fold line 262 (shown in Figure 4) is located along central longitudinal axis 282 at a generally equal distance from top 276. Any movable section 298, 300, 302, or 304 may be referred to herein as a first, a second, a third, and/or a fourth movable section.

[0033] Movable sections 298, 300, 302, and 304 are each movable between a first position shown in Figure 5 (and generally designated by 306) and a second position shown in Figure 6 (and generally designated by 308). In one embodiment, movable sections 298, 300, 302, and 304 are movable from first position 306 to second position 308 by bending upper and lower extensions 288 and 290, respectively, along fold lines 256, fold lines 260,

and central fold lines 262 to generally radially move central fold lines 262 with respect to central longitudinal axis 282 of carton 266. Accordingly, and as can be seen in Figures 5 and 6, movement between first and second positions 306 and 308, respectively, varies, or changes, a cross-sectional width of carton 266 defined between two opposite sides of sides 268, 270, 272, and 274 along the height of carton 266. In one embodiment, a cross-sectional width defined between two opposite sides of sides 268, 270, 272, and 274 and taken through movable sections 298, 300, 302, and 304 (e.g., a cross section taken along plane 5-5 in Figure 5) is generally greater in first position 306 than in second position 308. More specifically, as can be seen in Figures 5 and 6, each central fold line 262 is spaced a greater radial distance from central longitudinal axis 282 in first position 306 than in second position 308. In one embodiment, at least one of movable sections 298, 300, 302, and 304 is biased in first position 306. Although movable sections 298, 300, 302, and 304 may be biased in first position 306 using any suitable mechanism, in one embodiment, a structure of carton 266 biases movable sections 298, 300, 302, and 304.

[0034] Once carton 266 has been formed, and either before, simultaneously with, or after a product is placed within carton 266, a heat-shrinkable layer (generally designated by 310) can be wrapped around at least a portion of carton 266 and heat-shrunk to form a packaging assembly, one embodiment of which is shown in Figure 6 and generally designated by 312. Specifically, in the embodiment shown in Figure 6 heat-shrinkable layer 310 is wrapped around sides 268, 270, 272, and 274, a portion of which extends beyond top 276 and another portion of which extends beyond bottom 278. Layer 310 is then heated to shrink heat-shrinkable layer 310 into contact with carton 266. Layer 310 shrinks to fit snuggly around carton 266. Although heat-shrinkable layer 310 can overlap any portion of carton 266, in the embodiment shown in Figure 6 heat-shrunk layer 310 substantially overlaps sides 268, 270, 272, and 274 and corners 292, 294, and 296, and overlaps a portion of top 276 and at least a portion of bottom 278. Figure 7 illustrates an alternative embodiment of packaging assembly 312 wherein layer 310 does not overlap any portion of top 276 or bottom 278 of carton 266. Although other types of heat-shrinkable layers may be used, in one embodiment heat-shrinkable layer 310 is a sheet of material or a sleeve of material. Additionally, although other materials may be used for layer 310, in one embodiment layer 310 includes polyethylene, polypropylene, and/or polyvinyl chloride.

[0035] Heat-shrunk layer 310 may facilitate sealing carton 266 to protect a product contained within carton 266 from tampering and to generally seal the comers/joints of carton 266 for containing the product within carton 266 as well as protecting the product from contamination. Heat-shrunk layer 310 can be used, for example, to replace bags or liners sometimes used within a container for sealing a product. The tight fit of heat-shrunk layer 310 may also facilitate maintaining a shape of carton 266 for example, to facilitate displaying, stacking and/or arranging carton 266 or a plurality thereof of cartons, and/or maintaining a shape that facilitates other functionality such as carrying the carton 266.

[0036] In one embodiment, top 276 (and/or one or more of sides 268, 270, 272, and 274) includes a handle 314 extending outwardly therefrom for carrying the assembly. Heat-shrunk layer 310 includes an opening 316 therein adjacent handle 314 such that handle 314 extends through opening 316 allowing access to handle 314 when heat-shrunk layer 310 overlaps a portion of carton 266.

[0037] In one embodiment, carton 266 and/or layer 310 includes a marking thereon, such as, but not limited to, indicia that communicates the product, a manufacturer of the product, and/or a seller of the product. For example, printed text that indicates a product's name and briefly describes the product, logos and trademarks that indicate a manufacturer and/or seller of the product, and/or designs and/or ornamentation that attracts attention.

[0038] Heat-shrinkable layer 310 may also facilitate forming of the carton, and more specifically moving moveable sections 298, 300, 302, and 304 from first position 306 to second position 308 to form packaging assembly 312. As described above, cartons having shapes that are more complex than conventional rectangular cartons may be difficult and therefore costly to manufacturer.

[0039] However, in one embodiment heat-shrinkable layer 310 is wrapped around carton 266 such that heat-shrinkable layer 310 overlaps at least a portion of one or more of movable sections 298, 300, 302, and 304. As layer 310 is heated and shrinks into contact with movable sections 298, 300, 302, and 304, layer moves movable sections 295, 300, 302, and 304 from first position 306 (shown in Figure 5) to second position 308 to form a shape of packaging assembly 312. Heat-shrunk layer 310 then holds movable sections 298, 300, 302, and 304 in second position 308 as long as layer 310 remains substantially wrapped around carton 266. In one embodiment wherein movable sections 298, 300, 302, and 304 are biased to the first position, layer 310 moves the movable sections to, and holds the movable section in, second position 308 against the bias. By moving and holding movable sections 298, 300, 302, and 304 into second position 308, layer 310 facilitates forming a shape of packaging assembly 312, and more specifically carton 266, that may be otherwise difficult and costly to form.

[0040] Although as described above a packaging assembly may have any suitable size, shape, and/or configuration (e.g., number of sides), Figures 8-11 illustrate the formation of one embodiment of a packaging assembly. Specifically, Figure 8 is a top plan view of one embodiment of a blank of sheet material (designated in its entirety by reference numeral 318). Figure 9 is a perspective view of one embodiment of a carton (designated in its entirety by 380) formed from blank 318 shown in Figure 8. Figure 10 is a perspective view of one embod-

iment of a packaging assembly (designated in its entirety by 422) including carton 380 shown in Figure 9. Figure 11 is a perspective view of an alternative embodiment of packaging assembly 422 shown in Figure 10.

[0041] Referring to Figure 8, blank 318 includes a succession of four side panels 320, 322, 324, and 326 that are connected together by a plurality of preformed, generally parallel, fold lines 328, 330, and 332, respectively. Specifically, each side panel 320, 322, 324, and 326 extends from an adjacent one of the side panels along respective fold lines 328, 330, and 332. A side panel flap 334 extends from an end portion (generally designated by 336) of side panel 320, or alternatively from an end portion (generally designated by 338) of side panel 326, along a fold line 339 for facilitating securing end portions 336 and 338 together to form carton 380 (shown in Figure 9). Each side panel 320, 322, 324, and 326 extends a height measured between a bottom end 340 and a top end 342.

[0042] Side panel 322 and side panel 326 each include a top support panel 344 extending from top end 342 thereof along a fold line 346 and a bottom support panel 348 extending from bottom end 340 thereof along a fold line 350. Additionally, side panel 320 and side panel 324 each include a top panel 352 extending from top end 342 thereof along a fold line 354 and a bottom panel 356 extending from bottom end 340 thereof along a fold line 358. In one embodiment, at least one of top panels 352 includes an extension 360 extending therefrom for interconnection with a slot 362 within other top panel 352 for facilitating securing top panels 352 together to form a top 390 (shown in Figure 9) of carton 380 (shown in Figure 9). Similarly, in one embodiment (not shown), at least one of bottom panels 356 includes an extension extending therefrom for interconnection with a slot within the other bottom panel 356 for facilitating securing bottom panels 356 together to form a bottom 392 (shown in Figure 9) of carton 380 (shown in Figure 9). Of course, top panels 352 and bottom panels 356 may include any suitable interconnection means in addition to, or alternatively to, the extension/slot arrangement described above. Accordingly, top and bottom panels 352 and 356, respectively, are not limited to interconnection using an extension/slot arrangement. For example, in one embodiment, adhesive is applied to portions of top and bottom panels 352 and 356, respectively. In another embodiment, at least one of top panels 352 and bottom panels 356 interconnect using hook-and-loop fasteners 364.

[0043] Side panels 322 and 326 each include an upper panel portion 366, a lower panel portion 368, and an intermediate panel portion 370. Upper panel portions 366 each include an upper panel extension 372 extending therefrom along a fold line 374, and lower panel portions 368 each include a lower panel extension 376 extending therefrom along a fold line 378.

[0044] As shown in Figure 9, a carton 380 can be formed from blank 318 (shown in Figure 8) by folding blank 318 about fold lines 328, 330, 332, 339 350, 346, 350, 354, and 358 (shown in Figure 8). In one embodiment, an adhesive may be applied to portions of blank 318 to secure carton 380 together. Generally, side panels 320, 322, 324, and 326 (shown in Figure 8) form four successive sides (generally designated by 382, 384, 386, and 388) of carton 380, top panels 352 (shown in Figure 8) form a top (generally designated by 390) of carton 380, and bottom panels 356 (shown in Figure 8) form a bottom (generally designated by 392) of carton 380. Carton 380 extends a height 394 measured between top 390 and bottom 392 of carton 380 along a central longitudinal axis 396 extending through carton 380. As can be seen in Figure 9, in one embodiment, carton 380 includes a generally rectangular cross-sectional shape, for example, a cross section taken along the plane 6-6 extending generally perpendicularly to central longitudinal axis 396. As can also be seen in Figure 9, each side 382, 384, 386, and 388 extends between top 390 and bottom 392 of carton 380. More specifically, in one embodiment, each side 382, 384, 386, and 388 extends from top 390 to bottom 392. Any side 382, 384, 386, or 388 may be referred to herein as a first, a second, a third, and/or a fourth side.

[0045] Upper panel portions 366 and lower panel portions 368 (shown in Figure 8) form upper portions 398 and lower portions 400, respectively, of each side 388 and 384. Upper panel extensions 372 and lower panel extensions 376 form upper extensions 402 and lower extensions 404, respectively, of each side 388 and 384. A corner 406 is defined at an intersection between top 390 and each side 382, 384, 386, and 388. Similarly, a corner 408 is defined at an intersection between bottom 392 and each side 382, 384, 386, and 388. Moreover, a corner 410 is defined at an intersection between each adjacent side of sides 382, 384, 386, and 388.

[0046] Upper and lower extensions 402 and 404 each form a movable section (generally designated by 412 and 414) of carton 380. Any movable section 412 or 414 may be referred to herein as a first, a second, a third, and/or a fourth movable section. Movable sections 412 and 414 are each movable between a first position shown in Figure 9 (and generally designated by 416) and a second position shown in Figure 10 (and generally designated by 418). In one embodiment, movable sections 412 and 414 are movable from first position 416 to second position 418 by bending upper and lower extensions 402 and 404, respectively, along fold lines 374 and fold lines 378 generally toward central longitudinal axis 396 of carton 380 and such that extensions 402 and 404 are obliquely angled with respect to corresponding side 384, 388. Accordingly, and as can be seen in Figures 9 and 10, movement between first and second positions 416 and 418, respectively, varies, or changes, a cross-sectional width of carton 380 defined between two opposite sides of sides 384 and 388 along the height of carton 380. In one embodiment, a cross-sectional width defined between two opposite sides 384 and 388 and generally adjacent movable sections 412 and 414 (e.g., a cross section taken

along plane 7-7 in Figure 9) is generally greater in first position 416 than in second position 418. In one embodiment, at least one of movable sections 412 and 414 is biased in first position 416. Although movable sections 412 and 414 may be biased in first position 416 using any suitable mechanism, in one embodiment, a structure of carton 380 biases movable sections 412 and 414.

[0047] Once carton 380 has been formed, and either before, simultaneously with, or after a product is placed within carton 380, a heat-shrinkable layer (generally designated by 420) can be wrapped around at least a portion of carton 380 and heat-shrunk to form a packaging assembly, one embodiment of which is shown in Figure 10 and generally designated by 422. Specifically, in the embodiment shown in Figure 10 heat-shrinkable layer 420 is wrapped around sides 382, 384, 386, and 388, a portion of which extends beyond top 390 and another portion of which extends beyond bottom 392. Layer 420 is then heated to shrink the heat-shrinkable layer into contact with carton 380. Layer 420 shrinks to fit snuggly around carton 380. Although heat-shrinkable layer 420 can overlap any portion of carton 380, in the embodiment shown in Figure 10 heat-shrunk layer 420 substantially overlaps sides 382, 384, 386, and 388 and corners 406, 408, and 410, and overlaps a portion of top 390 and at least a portion of bottom 392. Figure 11 illustrates an alternative embodiment of packaging assembly 422 wherein layer 420 does not overlap any portion of top 390 or bottom 392 of carton 380. Although other types of heat-shrinkable layers may be used, in one embodiment heat-shrinkable layer 420 is a sheet of material or a sleeve of material. Additionally, although other materials may be used for layer 420, in one embodiment layer 420 includes polyethylene, polypropylene, and/or polyvinyl chloride.

[0048] Heat-shrunk layer 420 may facilitate sealing carton 380 to protect a product contained within the carton from tampering and to generally seal the comers/joints of carton 380 for containing the product within carton 380 as well as protecting the product from contamination. Heat-shrunk layer 420 can be used, for example, to replace bags or liners sometimes used within a container for sealing a product. The tight fit of heat-shrunk layer 420 may also facilitate maintaining a shape of carton 380 for example, to facilitate displaying, stacking and/or arranging carton 380 or a plurality thereof of cartons, and/or maintaining a shape that facilitates other functionality such as carrying the carton.

[0049] In one embodiment, top 390 (and/or one or more of sides 382, 384, 386, and 388) includes a handle 424 extending outwardly therefrom for carrying assembly. Heat-shrunk layer 420 includes an opening 426 therein adjacent handle 424 such that handle 424 extends through opening 426 allowing access to handle 424 when heat-shrunk layer 420 overlaps a portion of carton 380.

[0050] In one embodiment, carton 380 and/or layer 420 includes a marking thereon, such as, but not limited to, indicia that communicates the product, a manufacturer of the product, and/or a seller of the product. For example, printed text that indicates a product's name and briefly describes the product, logos and trademarks that indicate a manufacturer and/or seller of the product, and/or designs and/or ornamentation that attracts attention.

[0051] Heat-shrinkable layer 420 may also facilitate forming of the carton, and more specifically moving moveable sections 412 and 414 from first position 416 to second position 418 to form packaging' assembly 422. As described above, cartons having shapes that are more complex than conventional rectangular cartons may be difficult and therefore costly to manufacture.

[0052] However, in one embodiment heat-shrinkable layer 420 is wrapped around carton 380 such that heat-shrinkable layer 420 overlaps at least a portion of one or more of movable sections 412 and 414. As layer 420 is heated and shrinks into contact with movable sections 412 and 414, layer moves movable sections 412 and 414 from first position 416 (shown in Figure 9) to second position 418 to form a shape of packaging assembly 422. Heat-shrunk layer 420 then holds movable sections 412 and 414 in second position 418 as long as layer 420 remains substantially wrapped around carton 380. In one embodiment wherein movable sections 412 and 414 are biased to the first position, layer 420 moves the movable sections to, and holds the movable section in, second position 418 against the bias. By moving and holding movable sections 412 and 414 into second position 418, layer 420 facilitates forming a shape of packaging assembly 422, and more specifically carton 380, that may be otherwise difficult and costly to form.

[0053] Although as described above a packaging assembly may have any suitable size, shape, and/or configuration (e.g., number of sides), Figures 12-15 illustrate the formation of one embodiment of a packaging assembly. Specifically, Figure 12 is a top plan view of one embodiment of a blank of sheet material (designated in its entirety by reference numeral 428). Figure 13 is a perspective view of one embodiment of a carton (designated in its entirety by 490) formed from blank 428 shown in Figure 12. Figure 14 is a perspective view of one embodiment of a packaging assembly (designated in its entirety by 534) including carton 490 shown in Figure 13. Figure 15 is a perspective view of an alternative embodiment of packaging assembly 534 shown in Figure 14.

[0054] Referring to Figure 12, blank 428 includes a succession of four side panels 430, 432, 434, and 436 that are connected together by a plurality of preformed, generally parallel, fold lines 438, 440, and 442, respectively. Specifically, each side panel 430, 432, 434, and 436 extends from an adjacent one of side panels along respective fold lines 438, 440, and 442. A side panel flap 444 extends from an end portion (generally designated by 446) of side panel 430, or alternatively from an end portion (generally designated by 448) of side panel 436, along a fold line 450 for facilitating securing end portions 446 and 448 together to form carton 490 (shown in Figure 13). Each side panel 430, 432, 434, and 436 extends a

height measured between a bottom end 452 and a top end 454.

[0055] Side panel 432 and side panel 436 each include a top support panel 456 extending from top end 454 thereof along a fold line 458 and a bottom support panel 460 extending from bottom end 452 thereof along a fold line 462. Additionally, side panel 430 and side panel 434 each include a top panel 464 extending from top end 454 thereof along a fold line 466 and a bottom panel 468 extending from bottom end 452 thereof along a fold line 470. In one embodiment, at least one of top panels 464 includes an extension 472 extending therefrom for interconnection with a slot 474 within the other top panel 464 for facilitating securing top panels 464 together to form a top 500 (shown in Figure 13) of carton 490 (shown in Figure 13). Similarly, in one embodiment (not shown), at least one of bottom panels 468 includes an extension extending therefrom for interconnection with a slot within the other bottom panel 468 for facilitating securing bottom panels 468 together to form a bottom 502 (shown in Figure 13) of carton 490 (shown in Figure 13). Of course, top panels 464 and bottom panels 468 may include any suitable interconnection means in addition to, or alternatively to, extension/slot arrangement described above. Accordingly, top and bottom panels 464 and 468, respectively, are not limited to interconnection using an extension/slot arrangement. For example, in one embodiment, adhesive is applied to portions of top and bottom panels 464 and 468, respectively. In another embodiment, at least one of top panels 464 and bottom panels 468 interconnect using hook-and-loop fasteners 476.

[0056] Side panels 432 and 436 each include an upper panel portion 478 and a lower panel portion 480. Upper panel portions 478 each include an upper panel extension 482 extending therefrom along a fold line 484, and lower panel portions 480 each include a lower panel extension 486 extending therefrom along a fold line 488.

[0057] As shown in Figure 13, a carton 490 can be formed from blank 428 (shown in Figure 12) by folding blank 428 about fold lines 438, 440, 442, 462, 458, 462, 466, and 470 (shown in Figure 12). In one embodiment, an adhesive may be applied to portions of blank 428 to secure carton 490 together. Generally, side panels 430, 432, 434, and 436 (shown in Figure 12) form four successive sides (generally designated by 492, 494, 496, and 498) of carton 490, top panels 464 (shown in Figure 12) form a top (generally designated by 500) of carton 490, and bottom panels 468 (shown in Figure 12) form a bottom (generally designated by 502) of carton 490. Carton 490 extends a height 504 measured between top 500 and bottom 502 of carton 490 along a central longitudinal axis 506 extending through carton 490. As can be seen in Figure 13, in one embodiment, carton 490 includes a generally rectangular cross-sectional shape, for example, a cross section taken along the plane 8-8 extending generally perpendicularly to central longitudinal axis 506. As can also be seen in Figure 13, each side 492, 494, 496, and 498 extends between top 500 and bottom 502 of carton 490. More specifically, in one embodiment, each side 492, 494, 496, and 498 extends from top 500 to bottom 502. Any side 492, 494, 496, or 498 may be referred to herein as a first, a second, a third, and/or a fourth side.

[0058] Upper panel portions 478 and lower panel portions 480 (shown in Figure 12) form upper portions 508 and lower portions 510, respectively, of each side 498 and 494. Upper panel extensions 482 and lower panel extensions 486 form upper extensions 512 and lower extensions 514, respectively, of each side 498 and 494. A corner 516 is defined at an intersection between top 500 and each side 492, 494, 496, and 498. Similarly, a corner 518 is defined at an intersection between bottom 502 and each side 492, 494, 496, and 498. Moreover, a corner 520 is defined at an intersection between each adjacent side of sides 492, 494, 496, and 498.

[0059] Upper and lower extensions 512 and 514 each form a movable section (generally designated by 522 and 524) of carton 490. Any movable section 522 or 524 may be referred to herein as a first, a second, a third, and/or a fourth movable section. Movable sections 522 and 524 are each movable between a first position shown in Figure 13 (and generally designated by 526) and a second position shown in Figure 14 (and generally designated by 528). In one embodiment, movable sections 522 and 524 are movable from first position 526 to second position 528 by bending upper and lower extensions 512 and 514, respectively, along fold lines 484 and fold lines 488 generally toward central longitudinal axis 506 of carton 490 such that extensions 512 and 514 are obliquely angled with respect to corresponding side 494, 498. Accordingly, and as can be seen in Figures 13 and 14, movement between first and second positions 526 and 528, respectively, varies, or changes, a cross-sectional width of carton 490 defined between two opposite sides of sides 494 and 498 along the height of carton 490. In one embodiment, opposite sides 494 and 498 each include a curved edge 530 to accommodate the changing cross-sectional width. Curved edge 530 extends only a portion of height 504 of carton 490, although alternatively it may extend from top 500 to bottom 502. In one embodiment, a cross-sectional width defined between two opposite sides 494 and 498 and generally adjacent movable sections 522 and 524 (e.g., a cross section taken along plane 9-9 in Figure 13) is generally greater in first position 526 than in second position 528. In one embodiment, at least one of movable sections 522 and 524 is biased in first position 526. Although movable sections 522 and 524 may be biased in first position 526 using any suitable mechanism, in one embodiment, a structure of carton 490 biases movable sections 522 and 524.

[0060] Once carton 490 has been formed, and either before, simultaneously with, or after a product is placed within carton 490, a heat-shrinkable layer (generally designated by 532) can be wrapped around at least a portion of carton 490 and heat-shrunk to form a packaging assembly, one embodiment of which is shown in Figure 14

and generally designated by 534. Specifically, in the embodiment shown in Figure 14 heat-shrinkable layer 532 is wrapped around sides 492, 494, 496, and 498, a portion of which extends beyond top 500 and another portion of which extends beyond bottom 502. Layer 532 is then heated to shrink the heat-shrinkable layer into contact with carton 490. Layer 532 shrinks to fit snuggly around carton 490. Although heat-shrinkable layer 532 can overlap any portion of carton 490, in the embodiment shown in Figure 14 heat-shrunk layer 532 substantially overlaps sides 492, 494, 496, and 498 and corners 516, 518, and 520, and overlaps a portion of top 500 and at least a portion of bottom 502. Figure 15 illustrates an alternative embodiment of packaging assembly 534 wherein layer 532 does not overlap any portion of top 500 or bottom 502 of carton 490. Although other types of heat-shrinkable layers may be used, in one embodiment heat-shrinkable layer 532 is a sheet of material or a sleeve of material. Additionally, although other materials may be used for layer 532, in one embodiment layer 532 includes polyethylene, polypropylene, and/or polyvinyl chloride.

[0061] Heat-shrunk layer 532 may facilitate sealing carton 490 to protect a product contained within the carton from tampering and to generally seal the comers/joints of carton 490 for containing the product within carton 490 as well as protecting the product from contamination. Heat-shrunk layer 532 can be used, for example, to replace bags or liners sometimes used within a container for sealing a product. The tight fit of heat-shrunk layer 532 may also facilitate maintaining a shape of carton 490 for example, to facilitate displaying, stacking and/or arranging carton 490 or a plurality thereof of cartons, and/or maintaining a shape that facilitates other functionality such as carrying the carton.

[0062] In one embodiment, top 500 (and/or one or more of sides 492, 494, 496, and 498) includes a handle 536 extending outwardly therefrom for carrying the assembly. Heat-shrunk layer 532 includes an opening 538 therein adjacent handle 536 such that handle 536 extends through opening 538 allowing access to the handle when heat-shrunk layer 532 overlaps a portion of carton 490.

[0063] In one embodiment, carton 490 and/or layer 532 includes a marking thereon, such as, but not limited to, indicia that communicates the product, a manufacturer of the product, and/or a seller of the product. For example, printed text that indicates a product's name and briefly describes the product, logos and trademarks that indicate a manufacturer and/or seller of the product, and/or designs and/or ornamentation that attracts attention.

[0064] Heat-shrinkable layer 532 may also facilitate forming of the carton, and more specifically moving moveable sections 522 and 524 from first position 526 to second position 528 to form packaging assembly 534. As described above, cartons having shapes that are more complex than conventional rectangular cartons may be difficult and therefore costly to manufacture.

[0065] However, in one embodiment heat-shrinkable layer 532 is wrapped around carton 490 such that heat-shrinkable layer 532 overlaps at least a portion of one or more of movable sections 522 and 524. As layer 532 is heated and shrinks into contact with movable sections 522 and 524, layer moves movable sections 522 and 524 from first position 526 (shown in Figure 13) to second position 528 to form a shape of packaging assembly 534. Heat-shrunk layer 532 then holds movable sections 522 and 524 in second position 528 as long as layer 532 remains substantially wrapped around carton 490. In one embodiment wherein movable sections 522 and 524 are biased to the first position, layer 532 moves the movable sections to, and holds the movable section in, second position 528 against the bias. By moving and holding movable sections 522 and 524 into second position 528, layer 532 facilitates forming a shape of packaging assembly 534, and more specifically carton 490, that may be otherwise difficult and costly to form.

[0066] Although as described above a packaging assembly may have any suitable size, shape, and/or configuration (e.g., number of sides), Figures 16-19 illustrate the formation of one embodiment of a packaging assembly. Specifically, Figure 16 is a top plan view of one embodiment of a blank of sheet material (designated in its entirety by reference numeral 540). Figure 17 is a perspective view of one embodiment of a carton (designated in its entirety by 600) formed from blank 540 shown in Figure 16. Figure 18 is a perspective view of one embodiment of a packaging assembly (designated in its entirety by 644) including carton 600 shown in Figure 17. Figure 19 is a perspective view of an alternative embodiment of packaging assembly 644 shown in Figure 18.

[0067] Referring to Figure 16, blank 540 includes a succession of four side panels 542, 544, 546, and 548 that are connected together by a plurality of preformed, generally parallel, fold lines 550, 552, and 554, respectively. Specifically, each side panel 542, 544, 546, and 548 extends from an adjacent one of the side panels along respective fold lines 550, 552, and 554. A side panel flap 556 extends from an end portion (generally designated by 558) of side panel 542, or alternatively from an end portion (generally designated by 560) of side panel 548, along a fold line 562 for facilitating securing end portions 558 and 560 together to form carton 600 (shown in Figure 17). Each side panel 542, 544, 546, and 548 extends a height measured between a bottom end 564 and a top end 566.

[0068] Side panel 544 and side panel 548 each include a top support panel 568 extending from top end 566 thereof along a fold line 570 and a bottom support panel 572 extending from bottom end 564 thereof along a fold line 574. Additionally, side panel 542 and side panel 546 each include a top panel 576 extending from top end 566 thereof along a fold line 578 and a bottom panel 580 extending from bottom end 564 thereof along a fold line 582. In one embodiment, at least one of top panels 576 includes an extension 584 extending therefrom for interconnection with a slot 586 within other top panel 576 for

facilitating securing top panels 576 together to form a top 610 (shown in Figure 17) of carton 600 (shown in Figure 17). Similarly, in one embodiment (not shown), at least one of bottom panels 580 includes an extension extending therefrom for interconnection with a slot within the other bottom panel 580 for facilitating securing bottom panels 580 together to form a bottom 612 (shown in Figure 17) of carton 600 (shown in Figure 17). Of course, top panels 576 and bottom panels 580 may include any suitable interconnection means in addition to, or alternatively to, extension/slot arrangement described above. Accordingly, top and bottom panels 576 and 580, respectively, are not limited to interconnection using an extension/slot arrangement. For example, in one embodiment, adhesive is applied to portions of top and bottom panels 576 and 580, respectively. In another embodiment, at least one of top panels 576 and bottom panels 580 interconnect using hook-and-loop fasteners 588.

[0069] Side panels 542, 544, 546, and 548 each include an upper panel portion 590, a lower panel portion 592, and an intermediate panel portion 594. Intermediate panel portions 594 each extend from upper panel portions 590 along a fold line 596 to lower panel portions 592 along a fold line 598. Side panels 542, 544, 546, and 548 also each includes curved edges 597.

[0070] As shown in Figure 17, a carton 600 can be formed from blank 540 (shown in Figure 16) by folding blank 540 about fold lines 550, 552, 554, 562, 570, 574, 578, and 582 (shown in Figure 16). In one embodiment, an adhesive may be applied to portions of blank 540 to secure carton 600 together. Generally, side panels 542, 544, 546, and 548 (shown in Figure 16) form four successive sides (generally designated by 602, 604, 606, and 608) of carton 600, top panels 576 (shown in Figure 16) form a top (generally designated by 610) of carton 600, and bottom panels 580 (shown in Figure 16) form a bottom (generally designated by 612) of carton 600. Carton 600 extends a height 614 measured between top 610 and bottom 612 of carton 600 along a central longitudinal axis 616 extending through carton 600. As can be seen in Figure 17, in one embodiment, carton 600 includes a generally rectangular cross-sectional shape, for example, a cross section taken along the plane 10-10 extending generally perpendicularly to central longitudinal axis 616. As can also be seen in Figure 17, each side 602, 604, 606, and 608 extends between top 610 and bottom 612 of carton 600. More specifically, in one embodiment, each side 602, 604, 606, and 608 extends from top 610 to bottom 612. Any side 602, 604, 606, or 608 may be referred to herein as a first, a second, a third, and/or a fourth side.

[0071] Upper panel portions 590, lower panel portions 592, and intermediate panel portions 594 (shown in Figure 12) form upper portions 618, lower portions 620, and intermediate portions 622, respectively, of each side 602, 604, 606, and 608. A corner 624 is defined at an intersection between top 610 and each side 602, 604, 606, and 608. Similarly, a corner 626 is defined at an intersection between bottom 612 and each side 602, 604, 606, and 608. Moreover, a corner 628 is defined at an intersection between each adjacent side of sides 602, 604, 606, and 608. Additionally, as discussed above, sides 602, 604, 606, and 608 each include curved edges 597. In one embodiment, curved edges 597 extend only a portion of the height of carton 600, although alternatively curved edges 597 extend from top 610 to bottom 612 of carton 600.

[0072] Sides 602, 604, 606, and 608 each form a movable section (generally designated by 630, 632, 634, and 636, respectively) of carton 600. Any movable sections 630, 632, 634, or 636 may be referred to herein as a first, a second, a third, and/or a fourth movable section. Movable sections 630, 632, 634, and 636 are each movable between a first position shown in Figure 17 (and generally designated by 638) and a second position shown in Figure 18 (and generally designated by 640). In one embodiment, movable sections 630, 632, 634, and 636 are movable from first position 638 to second position 640 by bending them along fold lines 596 and 598 (shown in Figure 16). Accordingly, and as can be seen in Figures 17 and 18, movement between first and second positions 638 and 640, respectively, varies, or changes, a cross-sectional width of carton 600 defined between two opposite sides of sides 604 and 608 along the height of carton 600. Additionally, because of curved edges 597, movement from first position 638 to second position 640 curves (or increases a curvature of) sides 602, 604, 606, and/or 608 such that sides 602, 604, 606, and 608 each include a curved surface. In one embodiment, only a portion of sides 602, 604, 606, and/or 608 are curved in second position 640 as shown in Figure 18. Alternatively, in another embodiment, sides 602, 604, 606, and/or 608 are curved from top 610 to bottom 612 of carton 600.

[0073] In one embodiment, a cross-sectional width defined between two opposite sides of sides 602, 604, 606, and 608 and generally adjacent movable sections 630, 632, 634, and 636 (e.g., a cross section taken along plane 11-11 in Figure 17) is generally greater in first position 638 than in second position 640. In one embodiment, at least one of movable sections 630, 632, 634, and 636 is biased in first position 638. Although movable sections 630, 632, 634, and 636 may be biased in first position 638 using any suitable mechanism, in one embodiment, a structure of carton 600 biases movable sections 630, 632, 634, and 636.

[0074] Once carton 600 has been formed, and either before, simultaneously with, or after a product is placed within carton 600, a heat-shrinkable layer (generally designated by 642) can be wrapped around at least a portion of carton 600 and heat-shrunk to form a packaging assembly, one embodiment of which is shown in Figure 18 and generally designated by 644. Specifically, in the embodiment shown in Figure 18 heat-shrinkable layer 642 is wrapped around sides 602, 604, 606, and 608, a portion of which extends beyond top 610 and another portion of which extends beyond bottom 612. Layer 642 is then

heated to shrink the heat-shrinkable layer into contact with carton 600. Layer 642 shrinks to fit snuggly around carton 600. Although heat-shrinkable layer 642 can overlap any portion of carton 600, in the embodiment shown in Figure 18 heat-shrunk layer 642 substantially overlaps sides 602, 604, 606, and 608 and corners 624, 626, and 628, and overlaps a portion of top 610 and at least a portion of bottom 612. Figure 19 illustrates an alternative embodiment of packaging assembly 644 wherein layer 642 does not overlap any portion of top 610 or bottom 612 of carton 600. Although other types of heat-shrinkable layers may be used, in one embodiment heat-shrinkable layer 642 is a sheet of material or a sleeve of material. Additionally, although other materials may be used for layer 642, in one embodiment layer 642 includes polyethylene, polypropylene, and/or polyvinyl chloride.

[0075] Heat-shrunk layer 642 may facilitate sealing carton 600 to protect a product contained within the carton from tampering and to generally seal the comers/joints of carton 600 for containing the product within carton 600 as well as protecting the product from contamination. Heat-shrunk layer 642 can be used, for example, to replace bags or liners sometimes used within a container for sealing a product. The tight fit of heat-shrunk layer 642 may also facilitate maintaining a shape of carton 600 for example, to facilitate displaying, stacking and/or arranging carton 600 or a plurality thereof of cartons, and/or maintaining a shape that facilitates other functionality such as carrying the carton.

[0076] In one embodiment, top 610 (and/or one or more sides 602, 604, 606, and 608) includes a handle 646 extending outwardly therefrom for carrying the assembly. Heat-shrunk layer 642 includes an opening 648 therein adjacent handle 646 such that handle 646 extends through opening 648 allowing access to handle 646 when heat-shrunk layer 642 overlaps a portion of carton 600.

[0077] In one embodiment, carton 600 and/or layer 642 includes a marking thereon, such as, but not limited to, indicia that communicates the product, a manufacturer of the product, and/or a seller of the product. For example, printed text that indicates a product's name and briefly describes the product, logos and trademarks that indicate a manufacturer and/or seller of the product, and/or designs and/or ornamentation that attracts attention.

[0078] Heat-shrinkable layer 642 may also facilitate forming of the carton, and more specifically moving moveable sections 630, 632, 634, and 636 from first position 638 to second position 640 to form packaging assembly 644. As described above, cartons having shapes that are more complex than conventional rectangular cartons may be difficult and therefore costly to manufacture.

[0079] However, in one embodiment heat-shrinkable layer 642 is wrapped around carton 600 such that heat-shrinkable layer 642 overlaps at least a portion of one or more of movable sections 630, 632, 634, and 636. As layer 642 is heated and shrinks into contact with movable sections 630, 632, 634, and 636, layer 642 moves movable sections 630, 632, 634, and 636 from first position 638 (shown in Figure 17) to second position 640 to form a shape of packaging assembly 644. Heat-shrunk layer 642 then holds movable sections 630, 632, 634, and 636 in second position 640 as long as layer 642 remains substantially wrapped around carton 600. In one embodiment wherein movable sections 630, 632, 634, and 636 are biased to the first position, layer 642 moves the movable sections to, and holds the movable section in, second position 640 against the bias. By moving and holding movable sections 630, 632, 634, and 636 into second position 640, layer 642 facilitates forming a shape of packaging assembly 644, and more specifically carton 600, that may be otherwise difficult and costly to form.

[0080] Although as described above a packaging assembly may have any suitable size, shape, and/or configuration (e.g., number of sides), Figures 20-23 illustrate the formation of one embodiment of a packaging assembly. Specifically, Figure 20 is a top plan view of one embodiment of a blank of sheet material (designated in its entirety by reference numeral 670). Figure 21 is a perspective view of one embodiment of a carton (designated in its entirety by 740) formed from blank 670 shown in Figure 20. Figure 22 is a perspective view of one embodiment of a packaging assembly (designated in its entirety by 790) including carton 740 shown in Figure 21. Figure 23 is a perspective view of an alternative embodiment of packaging assembly 790 shown in Figure 22.

[0081] Referring to Figure 20, blank 670 includes a succession of four side panels 672, 674, 676, and 678 that are connected together by a plurality of preformed, generally parallel, fold lines 680, 682, and 684, respectively. Specifically, each side panel 672, 674, 676, and 678 extends from an adjacent one of the side panels along respective fold lines 680, 682, and 684. A side panel flap 686 extends from an end portion (generally designated by 688) of side panel 672, or alternatively from an end portion (generally designated by 690) of side panel 678, along a fold line 692 for facilitating securing end portions 688 and 690 together to form carton 740 (shown in Figure 21). Each side panel 672, 674, 676, and 678 extends a height measured between a bottom end 694 and a top end 696.

[0082] Side panel 674 and side panel 678 each include a top support panel 698 extending from top end 696 thereof along a fold line 700 and a bottom support panel 702 extending from bottom end 694 thereof along a fold line 704. Additionally, side panel 672 and side panel 676 each include a top panel 706 extending from top end 696 thereof along a fold line 708 and a bottom panel 710 extending from bottom end 694 thereof along a fold line 712. In one embodiment, at least one of top panels 706 includes an extension 714 extending therefrom for interconnection with a slot 716 within the other top panel 706 for facilitating securing top panels 706 together to form a top 750 (shown in Figure 21) of carton 740 (shown in Figure 21). Similarly, in one embodiment (not shown), at least one of bottom panels 710 includes an extension

extending therefrom for interconnection with a slot within the other bottom panel 710 for facilitating securing bottom panels 710 together to form a bottom 752 (shown in Figure 21) of carton 740 (shown in Figure 21). Of course, top panels 706 and bottom panels 710 may include any suitable interconnection means in addition to, or alternatively to, extension/slot arrangement described above. Accordingly, top and bottom panels 706 and 710, respectively, are not limited to interconnection using an extension/slot arrangement. For example, in one embodiment, adhesive is applied to portions of top and bottom panels 706 and 710, respectively. In another embodiment, at least one of top panels 706 and bottom panels 710 interconnect using hook-and-loop fasteners 718.

[0083] Side panels 674 and 678 each include an extension panel 720 and 722, respectively, extending therefrom along a fold line 724, 726, respectively. Side panel 676 also includes an extension panel 728 extending therefrom along a fold line 730 and an opposite extension panel 732 extending along a fold line 734. In one embodiment, fold lines 724, 726, 730, and/or 734 are curved. Moreover, in one embodiment extension panel 720, 722, 728, and/or 732 includes a curved edge 736. Any extension panel 720, 722, 728, or 732 may be referred to herein as a first, second, third, and/or fourth extension. Additionally, as can be seen in Figure 20, a plurality of openings 738 are formed between adjacent panels of extension panels 720, 722, 728, and 732.

[0084] As shown in Figure 21, a carton 740 can be formed from blank 670 (shown in Figure 20) by folding blank 670 about fold lines 680, 682, 684, 692, 700, 704, 708, and 712 (shown in Figure 20). In one embodiment, an adhesive may be applied to portions of blank 670 to secure carton 740 together. Generally, side panels 672, 674, 676, and 678 (shown in Figure 20) form four successive sides (generally designated by 742, 744, 746, and 748) of carton 740, top panels 706 (shown in Figure 20) form a top (generally designated by 750) of carton 740, and bottom panels 710 (shown in Figure 20) form a bottom (generally designated by 752) of carton 740. Extension panels 720, 722, 728, and 732 each form a respective extension 754, 756, 758, and 760. Carton 740 extends a height 762 measured between top 750 and bottom 752 of carton 740 along a central longitudinal axis 764 extending through carton 740. As can also be seen in Figure 21, each side 742, 744, 746, and 748 extends between top 750 and bottom 752 of carton 740. More specifically, in one embodiment, each side 742, 744, 746, and 748 extends from top 750 to bottom 752. Any side 742, 744, 746, or 748 may be referred to herein as a first, a second, a third, and/or a fourth side.

[0085] A corner 766 is defined at an intersection between top 750 and each side 742, 744, 746, and 748. Similarly, a corner 768 is defined at an intersection between bottom 752 and each side 742, 744, 746, and 748. Moreover, a corner 770 is defined at an intersection between each adjacent side of sides 742, 744, 746, and 748. Additionally, as discussed above, extensions 754, 756, 758, and 760 each include curved edges 736.

[0086] Extensions 754, 756, 758, and 760 each form a movable section (generally designated by 772, 774, 776, and 778, respectively) of carton 740. Any movable section 772, 774, 776, or 778 may be referred to herein as a first, a second, a third, and/or a fourth movable section. Movable sections 772, 774, 776, and 778 are each movable between a first position shown in Figure 21 (and generally designated by 780) and a second position shown in Figure 22 (and generally designated by 782). In one embodiment, movable sections 772, 774, 776, and 778 are movable from first position 780 to second position 782 by bending them along the fold lines corresponding fold lines 724, 726, 730, and 734 (shown in Figure 20). Accordingly, and as can be seen in Figures 21 and 22, movement between first and second positions 780 and 782, respectively, creates a side (generally designated by 784) defined between side 744 and side 746 and a side (generally designated by 786) defined between side 746 and side 748. In one embodiment, side 784 is obliquely angled with respect to side 744 and side 786 is obliquely angled with respect to side 746. Any side 742, 744, 746, 748, 784, or 786 may be referred to herein as a first, a second, a third, a fourth, a fifth, and/or a sixth side. In one embodiment, sides 784 and/or 786 extend only partially between top 750 and bottom 752 of carton 740. Alternatively, sides 784 and/or 786 extend from top 750 to bottom 752 of carton 740.

[0087] Specifically, movable section 772 (extension 754) is bended along fold line 724 towards an interior of carton 781 such that section 772 is obliquely angled with respect to side 744. Similarly, movable section 776 (extension 758) is bended along fold line 730 towards an interior of carton 781 such that section 776 is obliquely angled with respect to side 746 and such that section 776 at least partially overlaps section 772. Movable section 774 (extension 756) is also bended along fold line 726 towards an interior of carton 781 such that section 774 is obliquely angled with respect to side 748. Similarly, movable section 778 (extension 760) is bended along fold line 734 towards an interior of carton 781 such that section 778 is obliquely angled with respect to side 746 and such that section 778 at least partially overlaps section 774. As can be seen in Figure 22, in one embodiment movement from first position 780 to second position 782 at least partially closes openings 738 (shown in Figure 20). Additionally, because of curved edges 736, movement from first position 780 to second position 782 curves (or increases a curvature of) side 746 such that side 746 includes a curved surface. In one embodiment, only a portion of side 746 is curved in second position 782 as shown in Figure 22. Alternatively, in another embodiment side 746 is curved from top 750 to bottom 752 of carton 740. In one embodiment, at least one of movable sections 772, 774, 776, and 778 is biased in first position 780. Although movable sections 772, 774, 776, and 778 may be biased in first position 780 using any suitable mechanism, in one embodiment, a structure of carton 740 bi-

ases movable sections 772, 774, 776, and 778.

[0088] Once carton 740 has been formed, and either before, simultaneously with, or after a product is placed within carton 740, a heat-shrinkable layer (generally designated by 788) can be wrapped around at least a portion of carton 740 and heat-shrunk to form a packaging assembly, one embodiment of which is shown in Figure 22 and generally designated by 790. Specifically, in the embodiment shown in Figure 22 heat-shrinkable layer 788 is wrapped around sides 742, 744, 746, 748, 784, and 786, a portion of which extends beyond top 750 and another portion of which extends beyond bottom 752. Layer 788 is then heated to shrink the heat-shrinkable layer into contact with carton 740. Layer 788 shrinks to fit snuggly around carton 740. Although heat-shrinkable layer 788 can overlap any portion of carton 740, in the embodiment shown in Figure 22 heat-shrunk layer 788 substantially overlaps sides 742, 744, 746, 748, 784, and 786 and corners 766, 768, and 770, and overlaps a portion of top 750 and at least a portion of bottom 752. Figure 23 illustrates an alternative embodiment of packaging assembly 790 wherein layer 788 does not overlap any portion of top 750 or bottom 752 of carton 740. Although other types of heat-shrinkable layers may be used, in one embodiment heat-shrinkable layer 788 is a sheet of material or a sleeve of material. Additionally, although other materials may be used for layer 788, in one embodiment layer 788 includes polyethylene, polypropylene, and/or polyvinyl chloride.

[0089] Heat-shrunk layer 788 may facilitate sealing carton 740 to protect a product contained within the carton from tampering and to generally seal the comers/joints of carton 740 for containing the product within carton 740 as well as protecting the product from contamination. Heat-shrunk layer 788 can be used, for example, to replace bags or liners sometimes used within a container for sealing a product. The tight fit of heat-shrunk layer 788 may also facilitate maintaining a shape of carton 740 for example, to facilitate displaying, stacking and/or arranging carton 740 or a plurality thereof of cartons, and/or maintaining a shape that facilitates other functionality such as carrying the carton.

[0090] In one embodiment, top 750 (and/or one or more of sides 742, 744, 746, and 748) includes a handle 792 extending outwardly therefrom for carrying the assembly. Heat-shrunk layer 788 includes an opening 794 therein adjacent handle 792 such that handle 792 extends through opening 794 allowing access to handle 792 when heat-shrunk layer 788 overlaps a portion of carton 740.

[0091] In one embodiment, carton 740 and/or layer 788 includes a marking thereon, such as, but not limited to, indicia that communicates the product, a manufacturer of the product, and/or a seller of the product. For example, printed text that indicates a product's name and briefly describes the product, logos and trademarks that indicate a manufacturer and/or seller of the product, and/or designs and/or ornamentation that attracts attention.

[0092] Heat-shrinkable layer 788 may also facilitate forming of the carton, and more specifically moving moveable sections 772, 774, 776, and 778 from first position 780 to second position 782 to form packaging assembly 790. As described above, cartons having shapes that are more complex than conventional rectangular cartons may be difficult and therefore costly to manufacture.

[0093] However, in one embodiment heat-shrinkable layer 788 is wrapped around carton 740 such that heat-shrinkable layer 788 overlaps at least a portion of one or more of movable sections 772, 774, 776, and 778. As layer 788 is heated and shrinks into contact with movable sections 772, 774, 776, and 778, layer moves movable sections 772, 774, 776, and 778 from first position 780 (shown in Figure 21) to second position 782 to form a shape of packaging assembly 790. Heat-shrunk layer 788 then holds movable sections 772, 774, 776, and 778 in second position 782 as long as layer 788 remains substantially wrapped around carton 740. In one embodiment wherein movable sections 772, 774, 776, and 778 are biased to the first position, layer 788 moves the movable sections to, and holds the movable section in, second position 782 against the bias. By moving and holding movable sections 772, 774, 776, and 778 into second position 782, layer 788 facilitates forming a shape of packaging assembly 790, and more specifically carton 740, that may be otherwise difficult and costly to form.

[0094] In one embodiment, carton 854 and/or layer 880 includes a marking thereon, such as, but not limited to, indicia that communicates the product, a manufacturer of the product, and/or a seller of the product. For example, printed text that indicates a product's name and briefly describes the product, logos and trademarks that indicate a manufacturer and/or seller of the product, and/or designs and/or ornamentation that attracts attention.

[0095] Referring to Figures 24-41, a packaging assembly of the present invention may have any suitable size, shape and/or configuration, e.g., number of sides. The present invention is described below in reference to its application in connection with several embodiments. However, it will be obvious to those skilled in the art and guided by the teachings herein provided that the invention is likewise applicable to any suitable packaging assembly having any suitable number of top panels, bottom panels and/or side panels, and forming any suitable packaging assembly shape.

[0096] Figures 24-26 show a packaging assembly according to one embodiment. Specifically, Figure 24 is a top plan view of a blank of sheet material 1020. Figure 25 is a perspective view of a carton 1100 formed from blank 1020. Figure 26 is a perspective view of a packaging assembly 1150 including carton 1100 formed from blank 1020.

[0097] Referring to Figure 24, in one embodiment, blank 1020 has an interior surface 1021 and an opposing exterior surface. Blank 1020 includes a succession of side panels 1022, 1024, 1026 and 1028 that are connected together by a plurality of preformed, generally parallel,

fold lines 1036, 1038 and 1040, respectively. Side panels 1022, 1024, 1026 and 1028 extend from an adjacent side panel along respective fold lines 1036, 1038 and 1040. A side panel flap 1046 extends from side panel 1022 along an end fold line 1048 to secure side panel flap 1046 to side panel 1028 to form carton 1100. In an alternative embodiment, a side panel flap (not shown) extends from side panel 1028 along an end fold line (not shown) formed along an edge 1050 of side panel 1028 to secure the side panel flap to side panel 1022 to form carton 1100.

[0098] Each side panel 1022, 1024, 1026 and 1028 extends a height measured between a bottom end 1052 and a top end 1054. As shown in Figure 24, a top support panel 1056 extends from side panel 1022 at top end 1054 along a fold line 1058 and a bottom support panel 1060 extends from side panel 1022 at bottom end 1052 along a fold line 1062. Additionally, a top support panel 1064 extends from side panel 1026 at top end 1054 along a fold line 1066 and a bottom support panel 1068 extends from side panel 1026 at bottom end 1052 along a fold line 1070. Top support panel 1064 is connected to top support panel 1056 to form a top 1114, shown in Figure 25, of carton 1100. In one embodiment, top support panel 1064 includes at least one tab 1072 extending therefrom, which engages with a cooperating slit 1074 formed in top support panel 1056 to secure top support panel 1064 to top support panel 1056 to form top 1114. Bottom support panel 1068 is connected to bottom support panel 1060 to from a bottom 1116, shown in Figure 25, of carton 1100. As shown in Figure 24, in one embodiment, bottom support panel 1068 includes at least one hook component 1075 of a hook-and-loop fastener, such as a VELCRO fastener (VELCRO is a registered trademark of VELCRO Industries B.V., Curacao, Netherlands), that cooperates with a loop component (not shown) of the hook-and-loop fastener positioned on bottom support panel 1060 to secure bottom support panel 1068 to bottom support panel 1060. In one embodiment, a top flap 1080 is connected to side panel 1024 and/or side panel 1028 along fold line 1082 at top end 1054 for cooperating with top support panels 1056, 1064 to form top 1114. Similarly, a bottom flap 1084 is connected to side panel 1024 and/or side panel 1026 along a fold line 1086 at bottom end 1052 for cooperating with bottom support panels 1060, 1068 to form bottom 1116. It is apparent to those skilled in the art and guided by the teachings herein provided that any suitable connecting mechanism can be used to connect top support panel 1056 to top support panel 1064 and/or bottom support panel 1060 to bottom support panel 1068. For example, in one embodiment, adhesive is applied to top support panels 1056, 1064, bottom support panels 1060, 1068, top flaps 1080 and/or bottom flaps 1084 to connect the respective panels.

[0099] Referring to Figures 24-26, in one embodiment, at least one of side panel 1022, 1024, 1026 and/or 1028 is movable between an initially biased first position and a second position having a curved or arcuate surface. Referring further to Figure 24, in a particular embodiment, blank 1020 includes two movable side panels, namely side panel 1024 and adjacent side panel 1026. Movable side panel 1024 partially defines a void 1088 and movable side panel 1026, connected to movable side panel 1024 along fold line 1038, defines a remaining portion of void 1088. It is apparent to those skilled in the art and guided by the teachings herein provided that any suitable number of voids 1088 may be formed in blank 1020 to form carton 1100 in a desired shape, as discussed below.

[0100] A heat-shrink patch 1090 is applied to interior surface 1021 of blank 1020 and connected to at least a portion of movable side panel 1024 and movable side panel 1026 defining void 1088 to cover void 1088. In one embodiment, heat-shrink patch 1090 is a sheet or patch of shrinkable material that includes polyethylene, polypropylene, polyvinyl chloride, polyester, polyester glycol, nylon and/or oriented polystyrene. In an alternative embodiment, any suitable shrinkable material known to those skilled in the art and guided by the teachings herein provided is used to fabricate heat-shrink patch 1090. Further, in one embodiment, heat-shrink patch 1090 is transparent. Heat-shrink patch 1090 is movable from an initial, first or pre-shrunk configuration to a second or shrunk configuration having a shorter width and/or shorter length than in the pre-shrunk configuration. For example, heat-shrink patch 1090 is shrinkable to move from the pre-shrunk configuration to the shrunk configuration to move or urge movable side panel 1024 and/or 1026 to the second position. As heat-shrink patch 1090 shrinks, such as by applying suitable heat, void 1088 at least partially closes to move or urge movable side panels 1024 and 1026 with respect to adjacent side panels 1022, 1024, 1026 and/or 1028.

[0101] In one embodiment, heat-shrink patch 1090 includes at least one layer of a flexible, heat-shrinkable plastic film having an activated shrink temperature of at least about 140°F, and suitably about 150°F to about 195°F. The film has a gauge thickness of about 50 gauge to about 150 gauge. In one embodiment, the film is formulated with a balanced shrink ratio, or balanced orientation, such that the film shrinks an equal amount in a machine direction or orientation of the film and a cross-machine or transverse direction or orientation of the film. The balanced shrink ratio facilitates a uniform and consistent shrink profile and will not distort printed indicia and/or decorative patterns printed on the film upon the application of heat. Further, the film has a shrink factor of about 10% to about 50% such that the film will shrink in the machine direction and the transverse direction by about 10% to about 50%. In alternative embodiments, the film is formulated with an unbalanced shrink ratio such that the film shrinks to a greater degree in one of the machine direction and the transverse direction. In a particular alternative embodiment, the film has a shrink factor in the machine direction different than a shrink factor in the transverse direction such that the film will shrink in opposite directions by a different percentage of an initial length. In another alternative embodiment, heat-shrink

patch 1090 includes a stretched film coupled to interior surface 1021 in a stretched configuration.

[0102] In a particular embodiment, heat-shrink patch 1090 is coupled to movable side panel 1024 and movable side panel 1026 along a boundary line or area, generally shown by phantom line 1092 in Figure 24, which substantially surrounds and/or defines void 1088. Heat-shrink patch 1090 is coupled to interior surface 1021 of blank 1020 at movable side panel 1024 and movable side panel 1026 using any suitable coupling process, such as by applying an adhesive material or an adhesive layer to interior surface 1021 and/or a portion of heat-shrink patch 1090, and applying a suitable pressure to couple heat-shrink patch 1090 to interior surface 1021.

[0103] As shown in Figure 25, carton 1100 is formed from blank 1020 by folding blank 1020 about fold lines 1036, 1038, 1040, 1048, 1058, 1062, 1066, 1070, 1082 and 1086. In one embodiment, an adhesive is applied to portions of blank 1020 to secure carton 1100 together. Top support panels 1056, 1064, and top flaps 1080 form top 1114. Bottom support panels 1060, 1068, and bottom flaps 1084 form bottom 1116. Carton 1100 extends a height 1118 measured between top 1114 and bottom 1116 of carton 1100 along a central longitudinal axis 1120 extending through carton 1100. Once carton 1100 has been formed, and either before, simultaneously with, or after a product is placed within carton 1100, heat-shrink patch 1090 is heat-shrunk to form packaging assembly 1150, as shown in Figure 26.

[0104] Carton 1100 formed from blank 1020 is subjected to a suitable heating process, as described above, to melt heat-shrink patch 1090 causing heat-shrink patch 1090 to shrink without adversely affecting the coupling of heat-shrink patch 1090 to interior surface 1021 of blank 1020. As heat-shrink patch 1090 melts and shrinks, movable side panel 1024 and movable side panel 1026 are moved or urged together to at least partially close void 1088. After the heating process, heat-shrink patch 1090 cools and remains in the shrunk configuration to hold or retain carton 1100 in a substantially fixed second position. In this embodiment, with heat-shrink patch 1090 in the shrunk position, heat-shrink patch 1090 retains movable side panel 1024 and/or movable side panel 1026 in the second position. As shown in Figure 26, movable side panel 1024 and/or movable side panel 1026 has an arcuate or curved surface in the second position.

[0105] In this embodiment, side panel 1024 and/or side panel 1026 is movable between a first position, as shown in Figure 25, and a second position, as shown in Figure 26. Accordingly, movement between the first position and the second position varies or changes a cross-sectional area of carton 1100 defined between side panels 1022, 1024, 1026 and 1028 along height 1118 of carton 1100. In a particular embodiment, movable side panel 1024 and/or movable side panel 1026 is biased in the first position, as shown in Figure 25 using any suitable mechanism, such as a structure of carton 1100. In alternative embodiments, only a portion or section of side panel 1022, 1024, 1026 and/or 1028 is movable between the first position and the second position.

[0106] In one embodiment, heat-shrink patch 1090 at least partially seals carton 1100 to protect a product contained within the carton from tampering, as well as protecting the product from contamination. Heat-shrink patch 1090 can be used, for example, to replace bags or liners sometimes used within a container for sealing a product. Further, heat-shrink patch 1090 maintains a shape of carton 1100 for example, to facilitate displaying, stacking and/or arranging carton 1100 or a plurality of cartons, and/or maintaining the carton shape.

[0107] Further, heat-shrink patch 1090 facilitates forming of carton 1100, and more specifically moving or urging moveable side panels 1024, 1026 from the first position, as shown in Figure 25, to the second position to form packaging assembly 1150, as shown in Figure 26. As described above, cartons having shapes that are more complex than conventional rectangular cartons may be difficult and therefore costly to manufacture. As heat-shrink patch 1090 is heated and shrinks, heat-shrink patch 1090 moves, draws or urges movable side panels 1024, 1026 to the second position to form a shape of packaging assembly 1150. Heat-shrink patch 1090 holds side panels 1024, 1026 in the second position. In one embodiment wherein movable side panels 1024, 1026 are biased to the first position, heat-shrink patch 1090 moves the movable side panels to, and holds the movable side panels in, the second position against the bias. By moving and holding movable side panels 1024 and 1026 in the second position, heat-shrink patch 1090 forms a shape of packaging assembly 1150, and more specifically carton 1100, that may be otherwise difficult and costly to form.

[0108] Figures 27-29 show a packaging assembly according to an alternative embodiment. Specifically, Figure 27 is a top plan view of blank of sheet material 1021. Figure 28 is a perspective view of carton 1101 formed from blank 1021. Figure 29 is a perspective view of packaging assembly 1151 including carton 1101 formed from blank 1021. Several element reference numbers shown in Figures 27-29 are used to indicate an element or a component that is identical to the corresponding element or component described above and shown in Figures 24-26. In this embodiment, an additional void is defined by blank 1021, as described below.

[0109] Referring to Figure 27, in this embodiment, blank 1021 has an interior surface 1022 and an opposing exterior surface. Blank 1021 includes a succession of side panels 1023, 1025, 1027 and 1029 that are connected together by a plurality of preformed, generally parallel, fold lines 1036, 1038 and 1040, respectively. Side panels 1023, 1025, 1027 and 1029 extend from an adjacent side panel along respective fold lines 1036, 1038 and 1040. Side panel 1023, 1025, 1027 and/or 1029 is movable between a first position and a second position. Each movable side panel 1023, 1025, 1027 and/or 1029 defines at least a portion of a void at a first fold line and at least

a portion of a void at a second fold line opposing the first fold line. As shown in Figures 27-29, blank 1021 includes three movable side panels, namely side panel 1025, side panel 1027 and side panel 1029. Movable side panel 1025 defines a portion of void 1088 along fold line 1038. Movable side panel 1027 defines a remaining portion of void 1088 on a first side edge of movable side panel 1027 along fold line 1038. Further, an opposing second side edge of movable side panel 1027 defines a portion of a second void 1094 along fold line 1040. Movable side panel 1029 defines a remaining portion of void 1094 along fold line 1040.

[0110] Heat-shrink patch 1091 covers void 1088 and void 1094. Heat-shrink patch 1091 is coupled to movable side panel 1025 and movable side panel 1027 along boundary line or area, generally shown by phantom line 1092 in Figure 27, which substantially surrounds and/or defines void 1088. Further, heat-shrink patch 1091 is coupled to movable side panel 1027 and movable side panel 1029 along a boundary line or area, generally shown by phantom line 1096 in Figure 27, which substantially surrounds and/or defines void 1094. In an alternative embodiment, heat-shrink patch 1091 is coupled to movable side panel 1025 and movable side panel 1027 along boundary area 1092 to cover first void 1088 and a second heat-shrink patch (not shown) is coupled to movable side panel 1027 and movable side panel 1029 along boundary area 1096 to cover second void 1094. Heat-shrink patch 1091 is coupled to interior surface 1022 of blank 1021 at movable side panel 1025, movable side panel 1027 and movable side panel 1029 using any suitable coupling process.

[0111] In this embodiment, carton 1101 formed from blank 1021, as shown in Figure 28, is subjected to a suitable heating process to initiating melting and shrinkage of heat-shrink patch 1091 without adversely affecting the coupling of heat-shrink patch 1091 to interior surface 1022 of blank 1021. As heat-shrink patch 1091 melts and shrinks, movable side panel 1025 and movable side panel 1027 are moved or urged together to at least partially close void 1088, and movable side panel 1027 and movable side panel 1029 are moved or urged together to at least partially close void 1094. After the heating process, heat-shrink patch 1091 cools and remains in the shrunk configuration to hold or retain carton 1101 in a substantially fixed second position. With heat-shrink patch 1091 in the shrunk position, heat-shrink patch 1091 retains movable side panel 1025, movable side panel 1027 and/or movable side panel 1029 in the second position. As shown in Figure 29, movable side panel 1025, movable side panel 1027 and/or movable side panel 1029 has an arcuate or curved surface in the second position.

[0112] Figures 30-32 show a packaging assembly according to one embodiment. Specifically, Figure 30 is a top plan view of a blank of sheet material 1200. Figure 31 is a perspective view of a carton 1266 formed from blank 1200 shown in Figure 30. Figure 32 is a perspective view of a packaging assembly 1299 including carton 1266 shown in Figure 31.

[0113] As shown in Figure 30, in one embodiment, blank 1200 has an interior surface 1201 and an opposing exterior surface. Blank 1200 includes a succession of four side panels 1202, 1204, 1206 and 1208 that are connected together by a plurality of preformed, generally parallel, fold lines 1210, 1212 and 1214, respectively. Each side panel 1202, 1204, 1206 and 1208 extends from an adjacent side panel along respective fold lines 1210, 1212 and 1214. A side panel flap 1216 extends from an end portion of side panel 1202 along fold line 1218 to secure side panel flap 1216 to side panel 1208 to form carton 1266, as shown in Figure 31. In an alternative embodiment, a side panel flap (not shown) extends from an end portion 1220 of side panel 1208 to secure the side panel flap to side panel 1202 to form carton 1266. Each side panel 1202, 1204, 1206 and 1208 extends a height measured between a bottom end 1224 and a top end 1226.

[0114] A top support panel 1228 extends from side panel 1202 and/or side panel 1206 at top end 1226 along a fold line 1230. Similarly, a bottom support panel 1232 extends from side panel 1202 and/or side panel 1206 at bottom end 1224 along a fold line 1234. In one embodiment, a top flap 1236 extends from side panel 1204 and/or side panel 1208 along a fold line 1238 and/or a bottom flap 1240 extends from side panel 1204 and/or side panel 1208 at bottom end 1224 along a fold line 1242. In one embodiment, adhesive is applied to top support panels 1228, bottom support panels 1232, top flaps 1236 and/or bottom flaps 1240 to connect the respective panels. In an alternative embodiment, one top support panel 1228 includes an extension or tab (not shown) that extends therefrom for engagement with a slot (not shown) formed within the other top support panel 1228 to secure top support panels 1228 together to form a top 1286 of carton 1266, as shown in Figure 31. Similarly, one bottom support panels 1232 includes an extension or tab (not shown) that extends therefrom for engagement with a slot (not shown) within the other bottom support panel 1232 to secure bottom support panels 1232 together to form a bottom 1288 of carton 1266, as shown in Figure 31. In another alternative embodiment, top support panels 1228 and bottom support panels 1232 are connected together using hook-and-loop fasteners (not shown), as described above. It is apparent to those skilled in the art and guided by the teachings herein provided that any suitable connecting mechanism can be used to connected top support panels 1228 together and/or bottom support panels 1232 together.

[0115] Referring to Figures 30-32, side panel 1202, 1204, 1206 and/or 1208, or at least a portion thereof, is movable between an initially biased first position and a second position having an arcuate or curved surface. As shown in Figure 30, in one embodiment, each side panel 1202, 1204, 1206 and 1208 includes an upper panel portion 1250, a lower panel portion 1252 and an intermediate panel portion 1254 extending between and connecting

upper panel portion 1250 and lower panel portion 1252. Intermediate panel portion 1254 is connected to upper panel portion 1250 along a fold line 1256 and to lower panel portion 1252 along a fold line 1260. In this embodiment, intermediate panel portion 1254 is movable from the initially biased first position to the second position having an arcuate or curved surface. As shown in Figure 30, a void is defined between adjacent intermediate panel portions 1254 to accommodate changing a cross-sectional area of carton 1266, as described below.

[0116] As shown in Figure 30, movable side panel 1202 partially defines a first void 1264 along a first side edge corresponding to fold line 1218 and partially defines a second void 1266 along a second side edge corresponding to fold line 1210. Side panel flap 1216, connected to movable side panel 1202 along fold line 1218, defines a remaining portion of first void 1264. Movable side panel 1204, connected to movable side panel 1202 along fold line 1210, defines a remaining portion of second void 1266 and partially defines a third void 1268 along a second side edge corresponding to fold line 1212. Movable side panel 1206, connected to movable side panel 1204 along fold line 1212, defines a remaining portion of third void 1268 and partially defines a fourth void 1270 along a second side edge corresponding to fold line 1214. Movable side panel 1208, connected to movable side panel 1206 along fold line 1214, defines a remaining portion of fourth void 1270. In one embodiment, moveable side panel 1208 further defines an arcuate portion that generally corresponds to the remaining portion of first void 1264 defined by side panel flap 1216 when carton 1266 is assembled.

[0117] A heat-shrink patch 1272 is coupled to interior surface 1201 of blank 1200 to cover each void 1264, 1266, 1268 and 1270. In a particular embodiment, heat-shrink patch 1272 is coupled to side panel flap 1216, movable side panel 1202, movable side panel 1204, movable side panel 1206 and movable side panel 1208 along a boundary line or area, generally shown by phantom line 1276, which substantially surrounds and/or define voids 1264, 1266, 1268 and 1270. Heat-shrink patch 1272 is coupled to interior surface 1201 of blank 1200 at side panel flap 1216 and movable intermediate panel portions 1254 of side panels 1202, 1204, 1206 and 1208, using any suitable coupling process, such as by applying an adhesive material or an adhesive layer to interior surface 1201 within boundary area 1276 and/or a portion of heat-shrink patch 1272, and applying a suitable pressure to couple heat-shrink patch 1272 to interior surface 1201. In an alternative embodiment, a heat-shrink layer, generally shown by phantom line 1277 in Figure 30, is applied to the exterior surface of blank 1200, opposing interior surface 1201.

[0118] As shown in Figure 31, carton 1266 is formed from blank 1200 by folding blank 1200 about fold lines 1210, 1212, 1214, 1218, 1230, 1234, 1238 and 1242. In one embodiment, an adhesive may be applied to portions of blank 1200 to secure carton 1266 together. Top support panels 1228 and top flaps 1236 form top 1286 of carton 1266, and bottom support panels 1232 and bottom flaps 1240 form bottom 1288 of carton 1266. Carton 1266 extends a height 1290 measured between top 1286 and bottom 1288 of carton 1266 along a central longitudinal axis 1292 extending through carton 1266. As shown in Figure 31, in a first or pre-shrunk configuration, carton 1266 has a generally rectangular cross-sectional shape. Once carton 1266 has been formed, and either before, simultaneously with, or after a product is placed within carton 1266, heat-shrink patch 1272 is heat-shrunk to form packaging assembly 1299, as shown in Figure 32.

[0119] In one embodiment, carton 1266 formed from blank 1200 is subjected to a suitable heating process, as described above, to melt heat-shrink patch 1272 causing heat-shrink patch 1272 to shrink without adversely affecting the coupling of heat-shrink patch 1272 to interior surface 1201. As heat-shrink patch 1272 melts and shrinks, intermediate panel portion 1254 of side panel flap 1216 and intermediate panel portion 1254 of movable side panels 1202, 1204, 1206 and 1208 are moved or urged to the second position to at least partially close corresponding voids 1264, 1266, 1268 and 1270. After the heating process, heat-shrink patch 1272 cools and remains in the shrunk configuration to hold or retain carton 1266 in a substantially fixed second position. In this embodiment, with heat-shrink patch 1272 in the shrunk position, heat-shrink patch 1272 retains intermediate panel portion 1254 of movable side panel 1202, 1204, 1206 and/or 1208 in the second position. As shown in Figure 32, intermediate panel portion 1254 has an arcuate or curved surface in the second position.

[0120] Accordingly, movement between the first position and the second position varies or changes a cross-sectional area of carton 1266 defined between side panels 1202, 1204, 1206 and 1208 along height 1290 of carton 1266. In a particular embodiment, each movable side panel 1202, 1204, 1206 and 1208 is biased in the first position, as shown in Figure 31. In this embodiment, movable side panel 1202, 1204, 1206 and/or 1208 may be biased in the first position using any suitable mechanism, such as a structure of carton 1266 biasing movable side panels 1202, 1204, 1206 and/or 1208. In alternative embodiments, only a portion or section of side panel 1202, 1204, 1206 and/or 1208 is movable between the first position and the second position, such as intermediate panel portions 1254.

[0121] Figures 33-35 show a packaging assembly according to one embodiment. Specifically, Figure 33 is a top plan view of a blank of sheet material 1300. Figure 34 is a perspective view a carton 1400 formed from blank 1300 shown in Figure 33. Figure 35 is a perspective view of a packaging assembly 1450 including carton 1400 shown in Figure 34.

[0122] Referring to Figure 33, in one embodiment, blank 1300 has an interior surface 1301 and an opposing exterior surface. Blank 1300 includes a succession of six side panels 1302, 1304, 1306, 1308, 1310 and 1312 that

are connected together by a plurality of preformed, generally parallel, fold lines 1314, 1316, 1318, 1320 and 1322, respectively. Each side panel 1302, 1304, 1306, 1308, 1310 and 1312 extends from an adjacent side panel along respective fold lines 1314, 1316, 1318, 1320 and 1322. A side panel flap 1324 extends from an end portion of side panel 1312 along fold line 1326 to secure side panel flap 1324 to side panel 1302 to form carton 1400, as shown in Figure 34. In an alternative embodiment, a side panel flap (not shown) extends from edge 1328 of side panel 1302 to secure the side panel flap to side panel 1312 to form carton 1400. Each side panel 1302, 1304, 1306, 1308, 1310 and 1312 extends a height measured between a bottom end 1330 and a top end 1332 of blank 1300.

[0123] A top support panel 1334 extends from side panel 1302 at top end 1332 along a fold line 1336 and a bottom support panel 1338 extends from side panel 1302 at bottom end 1330 along a fold line 1340. Additionally, a top support panel 1342 extends from side panel 1308 at top end 1332 along a fold line 1344 and a bottom panel 1346 extends from side panel 1308 at bottom end 1330 along a fold line 1348. Top support panel 1342 and bottom support panel 1346 include two securement tabs 1350 and 1352 extending therefrom along respective fold lines 1354 and 1356 for facilitating securing top support panel 1342 and bottom support panel 1346 to side panels 1302, 1304, 1306, 1308, 1310 and 1312 to form a top 1414 and a bottom 1416 of carton 1400, respectively, as shown in Figure 34. In one embodiment, a tab 1358 extends from side panel 1306 and/or side panel 1310 at top end 1332 and/or bottom end 1330 along a fold line 1359 for mating with securement tabs 1350 or 1352 to form carton 1400. In an alternative embodiment, any suitable connecting mechanism is used to secure top support panels 1334, 1342 and/or bottom support panels 1338 and/or 1346 to side panels 1302, 1304, 1306, 1308, 1310 and/or 1312 to form carton 1400.

[0124] Referring to Figures 33-35, side panel 1302, 1304, 1306, 1308, 1310 and/or 1312, or at least a portion thereof, is movable between an initially biased first position and a second position having an arcuate or curved surface. As shown in Figure 33, each side panel 1302, 1304, 1306, 1308, 1310 and 1312 includes an upper panel portion 1360, a lower panel portion 1362 and an intermediate panel portion 1364 extending between and connecting upper panel portion 1360 and lower panel portion 1362. Intermediate panel portion 1364 is connected to upper panel portion 1360 along a fold line 1366 and to lower panel portion 1362 along a fold line 1368. In this embodiment, intermediate panel portion 1364 is movable from the initially biased first position to the second position having an arcuate or curved surface. As shown in Figure 33, a void is defined between adjacent intermediate panel portions 1364 to accommodate changing a cross-sectional area of carton 1400, as described below.

[0125] Referring further to Figure 33, in one embodiment, intermediate panel portions 1364 of side panels 1302, 1304, 1306, 1308, 1310 and 1312 are movable between the initially biased first position and the second position. In this embodiment, movable side panel 1302 defines an arcuate portion along edge 1328 that generally corresponds to a portion of void 1380 when carton 1400 is assembled. Movable side panel 1302 partially defines a first void 1370 along a second side edge corresponding to fold line 1314. Movable side panel 1304, connected to movable side panel 1302 along fold line 1314, defines a remaining portion of first void 1370 and partially defines a second void 1372 along a second side edge corresponding to fold line 1316. Movable side panel 1306, connected to movable side panel 1304 along fold line 1316, defines a remaining portion of second void 1372 and partially defines a third void 1374 along a second side edge corresponding to fold line 1318. Movable side panel 1308, connected to movable side panel 1306 along fold line 1318, defines a remaining portion of third void 1374 and partially defines a fourth void 1376 along a second side edge corresponding to fold line 1320. Movable side panel 1310, connected to movable side panel 1308 along fold line 1320, defines a remaining portion of fourth void 1376 and partially defines a fifth void 1378 along a second side edge corresponding to fold line 1322. Movable side panel 1312, connected to movable side panel 1310 along fold line 1322, defines a remaining portion of fifth void 1378 and partially defines a sixth void 1380 along a second side edge corresponding to fold line 1326. Side panel flap 1324, connected to movable side panel 1312 along fold line 1326, defines a remaining portion of sixth void 1380.

[0126] A heat-shrink patch 1382 is coupled to interior surface 1301 of blank 1300 to cover each void 1370, 1372, 1374, 1376, 1378 and 1380. In a particular embodiment, heat-shrink patch 1382 is coupled to each movable side panel 1302, 1304, 1306, 1308, 1310 and 1312, and movable side panel flap 1324, along a boundary line or area, generally shown by phantom line 1384, which substantially surrounds and/or defines voids 1370, 1372, 1374, 1376, 1378 and 1380. Heat-shrink patch 1382 is coupled to interior surface 1301 of blank 1300 at each movable side panel 1302, 1304, 1306, 1308, 1310 and 1312, and movable side panel flap 1324, using any suitable coupling process, such as by applying an adhesive material or an adhesive layer to interior surface 1301 and/or a portion of heat-shrink patch 1382, and applying a suitable pressure to couple heat-shrink patch 1382 to interior surface 1301.

[0127] As shown in Figure 34, carton 1400 is formed from blank 1300 by folding blank 1300 about fold lines 1314, 1316, 1318, 1320, 1322, 1326, 1336, 1340, 1344, 1348, 1354, 1356 and 1359. In one embodiment, an adhesive is applied to portions of blank 1300 to secure carton 1300 together. Top support panels 1334, 1342 form a top 1414 of carton 1400, and bottom support panels 1338, 1346 form a bottom 1416 of carton 1400. Carton 1400 extends a height 1418 measured between top 1414 and bottom 1416 of carton 1400 along a central longitu-

dinal axis 1420 extending through carton 1400. As shown in Figure 34, in a first or pre-shrunk configuration, carton 1400 includes a generally hexagonal cross-sectional shape extending generally perpendicularly to central longitudinal axis 1420. Once carton 1400 has been formed, and either before, simultaneously with, or after a product is placed within carton 1400, heat-shrink patch 1382 is heat-shrunk to form packaging assembly 1450, as shown in Figure 35.

[0128] In one embodiment, carton 1400 is subjected to a suitable heating process, as described above, to melt heat-shrink patch 1382 causing heat-shrink patch 1382 to shrink without adversely affecting the coupling of heat-shrink patch 1382 to interior surface 1301. As heat-shrink patch 1382 melts and shrinks, movable intermediate panel portion 1364 of side panel 1302, 1304, 1306, 1308, 1310 and/or 1312, and movable side panel flap 1324, are moved or urged to the second position to at least partially close corresponding void 1370, 1372, 1374, 1376, 1378, and/or 1380. After the heating process, heat-shrink patch 1382 cools and remains in the shrunk configuration to hold or retain carton 1400 in a substantially fixed second position. In this embodiment, with heat-shrink patch 1382 in the shrunk position, heat-shrink patch 1382 retains movable intermediate panel portion 1364 of side panel 1302, 1304, 1306, 1308, 1310 and/or 1312 in the second position. As shown in Figure 35, movable intermediate panel portion 1364 an arcuate or curved surface in the second position.

[0129] Referring further to Figures 34 and 35, at least a portion of intermediate panel portion 1364 extends between fold line 1366 and fold line 1368 such that intermediate portion 1364 is movable between the first position and the second position. Accordingly, movement between the first position and the second position varies or changes a cross-sectional area of carton 1400 defined between side panels 1302, 1304, 1306, 1308, 1310 and 1312 along height 1418 of carton 1400. In a particular embodiment, each movable side panel 1302, 1304, 1306, 1308, 1310 and 1312 including movable intermediate panel portion 1364 is biased in the first position, as shown in Figure 34. Movable side panel 1302, 1304, 1306, 1308, 1310 and/or 1312 is biased in the first position using any suitable mechanism, such as a structure of carton 1400 biasing movable side panels 1302, 1304, 1306, 1308, 1310 and/or 1312. In this embodiment, a portion of upper panel portion 1360 and/or a portion of lower panel portion 1362 may also move with intermediate portion 1364, depending upon whether the corresponding void extends past fold line 1366 towards top end 1332 and/or past fold line 1368 towards bottom end 1330.

[0130] Figures 36-38 show a packaging assembly according to one embodiment. Specifically, Figure 36 is a top plan view of a blank of sheet material 1500. Figure 37 is a perspective view a carton 1600 formed from blank 1500 shown in Figure 36. Figure 38 is a perspective view of a packaging assembly 1650 including carton 1600 shown in Figure 37.

[0131] Referring to Figure 36, in one embodiment, blank 1500 has an interior surface 1501 and an opposing exterior surface. Blank 1500 include a first series 1502 of three successive side panels 1504, 1506, 1508, and a second series 1510 of three successive side panels 1512, 1514 and 1516. Side panels 1504, 1506 and 1508 are connected together by preformed fold lines 1518 and 1520, and side panels 1512, 1514 and 1516 are similarly connected together by preformed fold lines 1522 and 1524, respectively. First series 1502 is coupled to second series 1510 by a bottom support panel 1526. In this embodiment, side panel 1506 is connected to bottom support panel 1526 along a fold line 1528 and side panel 1514 is connected to bottom support panel 1526 along a fold line 1529, generally opposing fold line 1528. Further, a fold line 1530 and a generally opposing and parallel fold line 1531 are also formed in bottom panel 1526, as shown in Figure 36. Each side panel 1504, 1506 and 1508 extends a height measured between a bottom end 1552 and a top end 1554 and each side panel 1512, 1514 and 1516 extends a height measured between a bottom end 1556 and a top end 1558. Side panel 1504 is coupled to side panel 1512, and side panel 1508 is coupled to side panel 1516 to form carton 1600, as shown in Figure 37.

[0132] Blank 1500 also includes a first top support panel 1532 connected to side panel 1514 along fold line 1534 and extends outwardly therefrom. First top support panel 1532 includes a tab 1536. An opposing second top support panel 1538 is connected to side panel 1506 along fold line 1540 and extends outwardly therefore. Second top support panel 1538 forms or defines a slot 1542. With first top support panel 1532 folded with respect to side panel 1514 and second top support panel 1538 folded with respect to side panel 1506, tab 1536 engages with slot 1542 to secure first top support panel 1532 to second top support panel 1538 to form carton 1600, as shown in Figure 37. In an alternative embodiment, top support panel 1532 and top support panel 1538 are connected using any suitable connecting mechanism. For example, an adhesive is applied to portions of top support panel 1532 and/or top support panel 1538. As shown in Figure 36, in one embodiment, a first top panel 1544 is connected to side panel 1504 along a fold line 1546 and a second top panel 1548 is connected to side panel 1508 along a fold line 1550 to provide additional support to the top of carton 1600.

[0133] As shown in Figure 36, in one embodiment, at least a portion of each side panel 1504, 1506, 1508, 1512, 1514 and 1516 is movable between an initially biased first position and a second position. As shown in Figure 36, a void is at least partially defined between adjacent side panels to accommodate changing a cross-sectional area of carton 1600. In this embodiment, movable side panel 1504 defines an arcuate portion along edge 1568 and partially defines a first void 1560 along a second side edge generally corresponding to fold line 1518. Movable

side panel 1506, connected to movable side panel 1504 along fold line 1518, defines a remaining portion of first void 1560 and partially defines a second void 1562 along a second side edge generally corresponding to fold line 1520. Movable side panel 1508, connected to movable side panel 1506 along fold line 1520, defines a remaining portion of second void 1562 and defines an arcuate portion along edge 1570.

[0134] Similarly, movable side panel 1512 defines an arcuate portion along edge 1572 that generally corresponds with the portion of first void 1560 defined by movable side panel 1504 with carton 1600 in the assembly configuration and partially defines third void 1564 along a second side edge generally corresponding to fold line 1522. Movable side panel 1514, connected to movable side panel 1512 along fold line 1522, defines a remaining portion of third void 1564 and partially defines fourth void 1566 along a second side edge generally corresponding to fold line 1524. Movable side panel 1516, connected to movable side panel 1514 along fold line 1524, defines a remaining portion of fourth void 1566 and defines an arcuate portion along edge 1574 that generally corresponds with the portion of second void 1562 defined by movable side panel 1508 with carton 1600 in assembly configuration.

[0135] A first heat-shrink patch 1576 is coupled to interior surface 1501 of blank 1500 to cover each void 1560 and 1562. In a particular embodiment, heat-shrink patch 1576 is coupled to each movable side panel 1504, 1506 and 1508 at least along a boundary line or area, generally shown as phantom line 1578, which substantially surrounds and/or defines voids 1560 and 1562. Heat-shrink patch 1576 is coupled to interior surface 1501 at each movable side panel 1504, 1506 and 1508 using any suitable coupling process, such as by applying an adhesive material or an adhesive layer to interior surface 1501 and/or a portion of heat-shrink patch 1576, and applying a suitable pressure to couple heat-shrink patch 1576 to interior surface 1501.

[0136] A second heat-shrink patch 1580 is coupled to interior surface 1501 of blank 1500 to cover each void 1564 and 1566. In a particular embodiment, heat-shrink patch 1580 is coupled to each movable side panel 1512, 1514 and 1516 at least along a boundary line or area, generally shown by phantom line 1582, which substantially surrounds and/or defines voids 1564 and 1566. Heat-shrink patch 1580 is coupled to interior surface 1501 at each movable side panel 1512, 1514 and 1516 using any suitable coupling process, such as by applying an adhesive material or an adhesive layer to interior surface 1501 and/or a portion of heat-shrink patch 1580, and applying a suitable pressure to couple heat-shrink patch 1580 to interior surface 1501.

[0137] As shown in Figure 37, carton 1600 can be formed from blank 1500 by folding bank 1500 about fold lines 1518, 1520, 1522, 1524, 1528, 1529, 1530, 1531, 1534, 1540, 1546 and 1550. In one embodiment, an adhesive may be applied to portions of blank 1500 to secure carton 1600 together. Side panel 1504 is connected to side panel 1512 to form side 1602, and side panel 1508 is connected to side panel 1516 to form side 1606. Side panel 1506 forms side 1604 and side panel 1514 forms side 1608 of carton 1600, as shown in Figure 37. Bottom support panel 1526 forms bottom 1614 of carton 1600. Top support panel 1532 connected to top support panel 1538, and top panels 1544 and 1548, form top 1616 of carton 1600. Carton 1600 extends a height 1618 measured between bottom 1614 and top 1616 of carton 1600 along a central longitudinal axis 1620 extending through carton 1600. In a first or pre-shrunk configuration, carton 1600 includes sides 1602, 1604, 1606 and 1608 in a pre-shrunk, first position. In one embodiment, the structure of carton 1600 biases sides 1602, 1604, 1606 and 1608 in the first position. Once carton 1600 has been formed, and either before, simultaneously with, or after a product is placed within carton 1600, heat-shrink patches 1576 and 1580 are heat-shrunk to form a packaging assembly 1650, as shown in Figure 38.

[0138] In this embodiment, carton 1600 formed from blank 1500 is subjected to a suitable heating process, as described above, to melt heat-shrink patches 1576 and 1580 causing heat-shrink patches 1576 and 1580 to shrink without adversely affecting the coupling of heat-shrink patches 1576 and 1580 to interior surface 1501. As heat-shrink patches 1576 and 1580 melt and shrink, movable side panels 1504, 1506 and 1508, and movable side panels 1512, 1514 and 1516, respectively, are moved or urged together to at least partially close corresponding void 1560, 1562, 1564 and 1566. After the heating process, heat-shrink patches 1576 and 1580 cool and remain in the shrunk configuration to hold or retain carton 1600 in a substantially fixed second position. In this embodiment, with heat-shrink patches 1576 and 1580 in the shrunk position, heat-shrink patches 1576 and 1580 retain movable side panels 1504, 1506, 1508, 1512, 1514 and/or 1516 in the second position.

[0139] Accordingly, movement between the first position and the second position varies or changes a cross-sectional area of carton 1600 defined between sides 1602, 1604, 1606 and 1608 along the height of carton 1600. In alternative embodiments, only a portion or section of side 1602, 1604, 1606 and/or 1608 is movable between the first position and the second position.

[0140] Figures 39-41 show a packaging assembly according to one embodiment. Specifically, Figure 39 is a top plan view of a blank of sheet material 1700. Figure 40 is a perspective view a carton 1800 formed from blank 1700 shown in Figure 39. Figure 41 is a perspective view of a packaging assembly 1850 including carton 1800 shown in Figure 40.

[0141] Referring to Figure 39, in one embodiment, blank 1700 has an interior surface 1701 and an opposing exterior surface. Blank 1700 includes a succession of four side panels 1702, 1704, 1706 and 1708 that are connected together by a plurality of preformed, generally parallel, fold lines 1710, 1712 and 1714, respectively.

Side panels 1702, 1704, 1706 and 1708 extend from an adjacent side panel along respective fold lines 1710, 1712 and 1714. A side panel flap 1716 extends from side panel 1702 along an end fold line 1718 to secure side panel flap 1716 to side panel 1708 to form carton 1800. In an alternative embodiment, a side panel flap (not shown) extends from side panel 1708 along an end fold line (not shown) formed along an edge 1720 to secure the side panel flap to side panel 1702 to form carton 1800.

[0142] Each side panel 1702, 1704, 1706 and 1708 extends a height measured between a bottom end 1722 and a top end 1724. As shown in Figure 39, a top support panel 1726 extends from side panel 1702 at top end 1724 along a fold line 1728. A bottom support panel 1730 extends from side panel 1702 at bottom end 1722 along a fold line 1732. Additionally, a top support panel 1734 extends from side panel 1706 at top end 1724 along a fold line 1736 and a bottom support panel 1738 extends from side panel 1706 at bottom end 1722 along a fold line 1740. Top support panel 1726 is connected to top support panel 1734 to form a top 1814 of carton 1800. Bottom support panel 1730 is connected to bottom support panel 1738 to form a bottom 1816 of carton 1800. It is apparent to those skilled in the art and guided by the teachings herein provided that top support panels 1726, 1734 and/or bottom support panels 1730, 1738 can be connected using any suitable confection mechanism. For example, in one embodiment, adhesive is applied to top support panels 1726, 1734 and/or bottom support panels 1730, 1738.

[0143] In one embodiment, a top panel 1742 is connected to side panel 1704 along a fold line 1744 and a top panel 1746 is connected to side panel 1708 along a fold line 1748 to provide additional support to top 1814 of carton 1800. Further, a bottom panel 1750 is connected to side panel 1704 along a fold line 1752 and a bottom panel 1754 is connected to side panel 1708 along a fold line 1756 to provide additional support to the bottom of carton 1800.

[0144] As shown in Figure 39, at least a portion of side panel 1702, 1704, 1706 and/or 1708, at least a portion of top support panels 1726 and/or 1734, and/or at least a portion of bottom support panels 1730 and/or 1738, is movable between an initially biased first position and a second position. In one embodiment, side panels 1702 and 1706, top support panels 1726 and 1734 and bottom support panels 1730 and 1738 are movable. In this embodiment, movable side panel 1702 partially defines a first void 1760 along fold line 1728 and partially defines a second void 1762 along fold line 1732. Movable top support panel 1726, connected to movable side panel 1702 along fold line 1728, defines a remaining portion of first void 1760 and movable bottom support panel 1730, connected to movable side panel 1702 along fold line 1732, defines a remaining portion of second void 1762. Movable side panel 1706 partially defines a third void 1764 along fold line 1736 and partially defines a fourth void 1766 along fold line 1740. Movable top support panel 1734, connected to movable side panel 1706 along fold line 1736, defines a remaining portion of third void 1764 and movable bottom support panel 1738, connected to movable side panel 1704 along fold line 1740, defines a remaining portion of fourth void 1766.

[0145] A first heat-shrink patch 1770 is coupled to interior surface 1701 of blank 1700 to cover void 1760 and void 1762. In a particular embodiment, heat-shrink patch 1770 is coupled to movable side panel 1702, movable top support panel 1726 and movable bottom support panel 1730 at least along a boundary line or area, generally shown by phantom line 1772, which substantially surrounds and/or defines voids 1760 and 1762. Heat-shrink patch 1770 is coupled to interior surface 1701 at movable top support panel 1726 and movable bottom support panel 1730 using any suitable coupling process, such as by applying an adhesive material or an adhesive layer to interior surface 1701 and/or a portion of heat-shrink patch 1770, and applying a suitable pressure to couple heat-shrink patch 1770 to interior surface 1701.

[0146] A second heat-shrink patch 1774 is coupled to interior surface 1701 of blank 1700 to cover void 1764 and void 1766. In a particular embodiment, heat-shrink patch 1774 is coupled to movable side panel 1706, movable top support panel 1734 and movable bottom support panel 1738 at least along a boundary line or area, generally shown by phantom line 1776, which substantially surrounds and/or defines voids 1764 and 1766. Heat-shrink patch 1774 is coupled to interior surface 1701 at movable side panel 1706, movable top support panel 1734 and movable bottom support panel 1738 using any suitable coupling process, such as by applying an adhesive material or an adhesive layer to interior surface 1701 and/or a portion of heat-shrink patch 1770, and applying a suitable pressure to couple heat-shrink patch 1770 to interior surface 1701.

[0147] As shown in Figure 40, carton 1800 is formed from blank 1700 by folding blank 1700 about fold lines 1710, 1712, 1714, 1718, 1728, 1732, 1736, 1740, 1744, 1748, 1752 and 1756. In one embodiment, an adhesive may be applied to portions of blank 1700 to secure carton 1800 together. Top support panel 1726 is connected to top support panel 1734 to form top 1814 of carton 1800. Bottom support panel 1730 is connected to bottom support panel 1738 to form bottom 1816 of carton 1800. Carton 1800 extends a height 1818 measured between top 1814 and bottom 1816 of carton 1800 along a central longitudinal axis 1820 extending through carton 1800. As shown in Figure 40, in a first or pre-shrunk configuration, carton 1800 includes side panels 1702, 1704, 1706 and 1708 in a pre-shrunk, first position. In one embodiment, the structure of carton 1800 biases side panels 1702, 1704, 1706 and 1708 in first position. Once carton 1800 has been formed, and either before, simultaneously with, or after a product is placed within carton 1800, heat-shrink patches 1770 and 1774 are heat-shrunk to form packaging assembly 1850, as shown in Figure 41.

[0148] Carton 1800 formed from blank 1700 is subject-

ed to a suitable heating process, as described above, to melt heat-shrink patches 1770 and 1774 causing heat-shrink patches 1770 and 1774 to shrink without adversely affecting the coupling of heat-shrink patches 1770 and 1774 to interior surface 1701. As heat-shrink patch 1770 melts and shrinks, movable side panel 1702, movable top support panel 1726 and movable bottom support panel 1730 are moved or urged together to at least partially close corresponding voids 1760 and 1762. Similarly, as heat-shrink patch 1774 melts and shrinks, movable side panel 1706, movable top support panel 1734 and movable bottom support panel 1738 are moved or urged together to at least partially close corresponding voids 1764 and 1766. After the heating process, heat-shrink patches 1770 and 1774 cool and remain in the shrunk configuration to hold or retain carton 1800 in a substantially fixed second position.

[0149] In this embodiment, with heat-shrink patches 1770 and 1774 in the shrunk position, heat-shrink patch 1770 retains movable side panel 1702, movable top support panel 1726 and movable bottom support panel 1730 in the second position, and heat-shrink patch 1774 retains movable side panel 1706, movable top support panel 1734 and movable bottom support panel 1738 in the second position. As shown in Figure 41, at least a portion of movable side panels 1702 and/or 1706, at least a portion of movable top support panel 1726 and/or 1734, and/or at least a portion of movable bottom support panels 1730 and/or 1738 have an arcuate or curved surface in the second position.

[0150] Referring further to Figures 40 and 41, at least a portion of side panel 1702, 1704, 1706 and 1708 is movable between a first position, as shown in Figure 40, and a second position, as shown in Figure 41. Accordingly, movement between the first position and the second position varies or changes a cross-sectional area of carton 1800 defined between sides 1802, 1804, 1806 and 1808 along height 1818 of carton 1800. In a particular embodiment, each movable side panel 1702, 1704, 1706 and/or 1708 is biased in the first position, as shown in Figure 40. In this embodiment, movable side panels 1702, 1704, 1706 and/or 1708 are biased in the first position using any suitable mechanism, such as a structure of carton 1800 biasing movable side panels 1702, 1704, 1706 and/or 1708.

[0151] As shown in Figure 42, in one embodiment, a method 1900 for applying a heat-shrink patch to a carton for forming a shape of the carton is applied to any suitable carton including, without limitation, the cartons described above. It is apparent to those skilled in the art and guided by the teachings herein provided that method 1900 is suitable for applying a heat-shrink patch to any suitable carton that includes a top panel, a bottom panel, at least one side panel extending between the top panel and the bottom panel and at least one movable section that is movable between a first position and a second position for forming a shape of the carton. Method 1900 includes the steps of providing 1902 a heat-shrink patch in a pre-shrunk configuration, coupling 1904 the heat-shrink patch in the pre-shrunk configuration to at least a portion of an interior surface of a blank of sheet material including at least a portion of the movable section, forming 1906 the carton from the blank of sheet material and moving 1908 the movable section from the first position to the second position to form the shape of the carton. The shape of the carton is formed by heating the heat-shrink patch to shrink the heat-shrink patch to a shrunk configuration. In one embodiment, the method includes filling the carton with contents before moving the movable section. In an alternative embodiment, the carton is filled with contents after moving the movable section.

[0152] In an alternative embodiment, a preformed heat-shrink film tube is coupled to at least a portion of the interior surface of the blank of sheet material, in addition to or as an alternative to the heat-shrink patch. In this embodiment, the heat-shrink film tube is coupled to the interior surface using any suitable coupling mechanism, such as an adhesive, heat and/or sonic welding. In a particular embodiment, moist or wet products and/or products requiring a high barrier protection are loaded into the heat-shrink film tube. The heat-shrink film tube and/or the carton are sealed to contain the products within the heat-shrink film tube. The carton is subjected to a suitable heating process, for example by directing or focusing heat at a portion of the heat-shrink film tube covering the voids formed in the carton. The movable sections of the carton move to at least partially close the voids during the controlled heating process to shape the carton, as desired. In this embodiment, the heat-shrink film tube provides a sealed, liquid-tight moisture barrier carton. In another alternative embodiment, a heat-shrink film laminate material is coupled to at least a portion of the interior surface of the blank of sheet material. The heat-slink film laminate covers the voids formed in the blank of sheet material and is exposed to an exterior of the carton through the voids. The carton is subjected to a suitable heating process, for example by directing or focusing heat at the portion of the heat-shrink film laminate covering the voids formed in the carton, to shape the carton, as desired. The movable sections of the carton move to at least partially close the voids during the controlled heating process. In this embodiment, the heat-shrink film laminate provides an additional barrier protection to the carton.

[0153] In one embodiment, the method includes filling the carton with contents before moving the movable section. In an alternative embodiment, the carton is filled with contents after moving the movable section. Depending upon the product type and/or configuration, the carton is formed and shaped prior to filling the carton with product, e.g., while the carton is empty. Alternatively, the carton is formed, the product is loaded into the carton and the carton is sealed, prior to shaping the carton. In this embodiment, the loaded packaging assembly is subjected to a controlled heating process in which the heat-shrink patch is shrunk to shape the carton.

[0154] In one embodiment, providing step 1902 further includes providing a heat-shrink patch in a pre-shrunk configuration having a marking thereon including graphics for the carton. The marking may include graphics for the carton or graphics to coordinate with additional graphics printed on the carton. In one embodiment, the markings are applied using an opaque ink. Alternatively, the markings may be applied using a translucent ink such that the markings coordinate with the additional graphics printed on the carton. The heat-shrink patch includes polyethylene, polypropylene, polyvinyl chloride, polyester, polyester glycol, nylon and/or oriented polystyrene. In alternative embodiments, the heat-shrink patch includes any suitable material or combination of materials known to those skilled in the art and guided by the teachings herein provided.

[0155] In one embodiment, coupling step 1904 further includes applying an adhesive in a registered pattern to at least a portion of the interior surface of the blank of sheet material including at least a portion of the movable section. The heat-shrink patch is cut to correspond to the registered pattern and adhered to the interior surface of the blank within the registered pattern. In one embodiment, the adhesive is applied such that the adhesive extends about a void at least partially defined by the movable section to substantially surround the void. With the adhesive substantially surrounding the void, the heat-shrink patch is adhered to the interior surface to cover the void and provide a seal preventing air and/or contaminants from entering the carton through the void. In alternative embodiments, coupling step 1904 includes employing any suitable coupling mechanism including, without limitation, a heating method and/or a sonic welding method, with or without the application of an adhesive.

[0156] In one embodiment, a first movable section and a second movable section are coupled together along a fold line and define the void along a portion of the fold line. Adhesive is applied in a registered pattern to the interior surface of the blank of sheet material including at least a portion of the first movable section and at least a portion of the second movable section. For example, the adhesive is applied within a boundary area that substantially surrounds and/or defines the void. The heat-shrink patch is cut to correspond to the registered pattern. The heat-shrink patch is adhered to the interior surface of the blank including at least a portion of the first movable section and at least a portion of the second movable section within the registered pattern to cover the void. In this embodiment, during the moving step the first movable section is moved or urged towards the second movable section to at least partially close the void defined along the fold line.

[0157] In an alternative embodiment, a second heat-shrink patch is coupled to the second movable section of the carton. The second movable section is moved from a first position to a second position to form a shape of the carton by heating the second heat-shrink patch to a shrunk configuration. In a particular alternative embodiment, the second heat-shrink patch is adhered to the interior surface of the blank to cover a second void at least partially defined by the second movable section. In addition to the use of different shrink film materials and/or controlled temperature applications, a controlled and/or specifically directed heat, time and/or temperature application to at least one area of the carton, such as to at least one panel or movable section, is utilized in particular embodiments to achieve a lesser or greater degree of shaping in the selected area or areas, as desired.

[0158] In one embodiment, moving step 1908 includes heating the heat-shrink patch to shrink the heat-shrink patch to a shrunk configuration and move or urge the moveable section to the second position to form the shape of the carton. The movable section may include at least one panel and/or at least one section of at least one panel. In this embodiment, the cross-sectional area of the carton is changed when the moveable section is moved from the first position to the second position. After the heating process, the heat-shrink patch is cooled to remain in the shrunk configuration to hold or retain the carton in a substantially fixed second position. In one embodiment, with the heat-shrink patch in the shrunk position, heat-shrink patch retains the movable panel or at least a movable section of the panel in the second position.

[0159] In one embodiment, heat is focused at the heat-shrink patch to shrink the heat-shrink patch to a shrunk configuration and move the movable section to the second position to form the shape of the carton. In a particular embodiment, heat is applied to selected portions of the heat-shrink patch at different intensities to differentially shrink the heat-shrink patch. Additionally, or alternatively, an intensity and/or temperature of the heat can be varied to create differential shrinkage of the heat-shrink patch. In one embodiment, a plurality of different heating temperatures can be applied to at least a portion of the heat-shrink patch for controlling a degree of shrinkage of the heat-shrink patch. For example, heat is applied to a first portion of the heat-shrink patch (or to a first heat-shrink patch) at a first temperature and heat is applied to a second portion of the heat-shrink patch (or to a second heat-shrink patch) at a second temperature different from the first temperature.

[0160] In an alternative embodiment, moving step 1908 includes providing a plurality of heat-shrink patches in a pre-shrunk configuration having different shrink orientations and percentages. The moveable section is moved from the first position to the second position by heating the heat-shrink patches to shrink the heat-shrink patches. Upon heating the different heat-shrink patches, each heat-shrink patch shrinks to a different degree allowing the heat-shrink patches to form a shape of the carton.

[0161] In another embodiment, the movable section of the carton is moved by applying at least one heat-shrink patch to the blank and heating the at least one heat-shrink patch at different temperatures to control the degree of

shrinkage. As such, the heat-shrink patch forms the shape of the carton. It is further possible to control the degree of heat-shrink patch shrinkage by combining any of the hereinabove described methods. As such, the degree of heat-shrink patch shrinkage can be controlled by any combination of using a specific heat-shrink patch film type, controlling the temperature of heating and/or targeting or focusing the heat applied to the heat-shrink patch. Any or a combination of these methods will facilitate moving the movable section of the carton from a first position to a second position to form a shape of the carton. This shape may further include a cut-out in the carton to allow visibility of the product within the carton. In one embodiment, the moveable section includes at least a portion of a cut-out formed in the carton which allows for the movement of the carton. By heating the different heat-shrink patches, the moveable section can be moved such that the cut-out is closed by the panels of the carton or the cut-out is only partially closed to allow the product included within the carton to be visible to a consumer.

[0162] In one embodiment, a packaging assembly is formed that includes a carton having a shape. The carton includes a top panel, a bottom panel, at least one side panel extending between the top panel and the bottom panel and a movable section that is movable between a first position and a second position. A blank of sheet material is provided. The blank includes a first movable section coupled to a second movable section at a fold line. The first movable section and the second movable section define a void positioned on the fold line. An adhesive is applied in a registered pattern to an interior surface of the blank to substantially surround the void. The heat-shrink patch is coupled in a pre-shrunk configuration to the first movable section and the second movable section within the registered pattern to cover the void. The first movable section is moved or urged towards the second movable section to at least partially close the void to form the shape of the carton. Heat is applied to at least a portion of the heat-shrink patch to shrink the heat-shrink patch to a shrunk configuration. In one embodiment, heat is applied at a plurality of temperatures across a dimension of the heat-shrink patch, e.g., along a length and/or a width of the heat-shrink patch.

[0163] The methods described hereinabove is performed by a system or machine configured to carry out the steps shown in Figure 42. In one embodiment, the system includes a carton having a top panel, a bottom panel, at least one side panel and at least one moveable section configured to move from a first position to a second position. The system further includes a coupling device configured to couple the heat-shrink patch in the pre-shrunk configuration to an interior surface of a blank of sheet material. In one embodiment, the coupling device is configured to apply an adhesive in a registered pattern to at least a portion of the movable section and adhere the heat-shrink patch to the interior surface of the carton within the registered pattern. A forming device is configured to form the carton from the blank of sheet material.

[0164] A heating device is configured to heat at least a portion of the heat-shrink patch to shrink the heat-shrink patch to a shrunk configuration to move the movable section from the first position to the second position to form the shape of the carton. The heat-shrinkable film is movable from an initial, first or pre-shrunk configuration to a second or shrunk configuration having a shorter width and/or shorter length than in the pre-shrunk configuration. In one embodiment, the heating device is configured to shrink the heat-shrink patch to the shrunk configuration to move the movable section to at least partially close a void at least partially defined by the movable section. The heat-shrink film is shrinkable to move from the pre-shrunk configuration to the shrunk configuration to move or urge the moveable section of the carton to the second position. In a particular embodiment, as the heat-shrinkable film shrinks, such as by applying suitable heat, at least one void defined at least partially by or within the moveable section at least partially closes to move or urge adjacent movable sections together. After the heating process, the heat-shrink patch cools and remains in the shrunk configuration to hold or retain the carton in a substantially fixed second position. In one embodiment, with the heat-shrink patch in the shrunk position, heat-shrink patch retains the movable panel or at least a movable section of the panel in the second position.

[0165] The packaging assembly of the present invention including the heat-shrink patch at least partially seals the carton to protect a product contained within the carton from tampering and to generally seal the edges, corners and/or joints of the carton for containing the product within the carton, as well as protecting the product from contamination. The heat-shrink patch can be used, for example, to replace bags or liners sometimes used within a container for sealing a product. Further, the heat-shrink patch maintains a shape of the carton for example, to facilitate displaying, stacking and/or arranging the carton or a plurality of cartons, and/or maintaining a shape that facilitates other functionality such as carrying the carton.

[0166] The heat-shrink patch facilitates forming of the carton, and more specifically moving the moveable sections of the carton from an initially biased first position to a second position having an arcuate or curved surface to form the packaging assembly. Cartons having shapes that are more complex than conventional rectangular cartons may be difficult and therefore costly to manufacture. As the heat-shrink patch is heated and shrinks the heat-shrink patch moves, draws or urges the movable sections to the second position to form a shape of the packaging assembly. The heat-shrink patch holds the moved sections in the second position. By moving and holding the movable sections in second position, the heat-shrink patch forms a shape of the packaging assembly, and more specifically the carton, that may be otherwise difficult and costly to form.

[0167] While the invention has been described in terms of various specific embodiments, those skilled in the art

will recognize that the invention can be practiced with modification within the scope of the claims.

Claims

1. A method for applying a heat-shrink patch to a carton (1100; 1101; 1266; 1400; 1600; 1800) for forming a shape of the carton, the carton including a top panel (1056; 1228; 1334; 1532, 1538; 1726), a bottom panel (1060; 1232; 1338; 1526; 1730), at least one side panel (1022, 1024, 1026, 1028; 1023, 1025, 1027, 1029; 1202, 1204, 1206, 1208; 1302, 1304, 1306, 1308, 1310, 1312; 1504, 1506, 1508, 1512, 1514, 1516; 1702, 1704, 1706, 1708) extending between the top panel and the bottom panel and a movable section (1024, 1026; 1025, 1027, 1029; 1202, 1204, 1206, 1208; 1302, 1304, 1306, 1308, 1310, 1312; 1504, 1506, 1508, 1512, 1514, 1516; 1702, 1704, 1706, 1708, 1726, 1730, 1734, 1738) that is movable between a first position and a second position, the method comprising:

   providing a heat-shrink patch (1090; 1091; 1272; 1382; 1576, 1580; 1770, 1774) in a pre-shrunk configuration;
   coupling the heat-shrink patch in the pre-shrunk configuration to at least a portion of an interior surface (1021; 1022; 1201; 1301; 1501; 1701) of a blank of sheet material (1020; 1021; 1200; 1300; 1500; 1700) including at least a portion of the movable section;
   forming the carton from the blank of sheet material, wherein the heat-shrink patch in the pre-shrunk configuration is coupled to the interior surface of the formed carton; and
   moving the movable section from the first position to the second position to form the shape of the carton by heating the heat-shrink patch to shrink the heat-shrink patch to a shrunk configuration.

2. The method of claim 1, wherein coupling the heat-shrink patch further comprises:

   applying an adhesive in a registered pattern to at least a portion of the movable section;
   cutting the heat-shrink patch to correspond to the registered pattern; and
   adhering the heat-shrink patch to the interior surface within the registered pattern.

3. The method of claim 2, wherein applying an adhesive in a registered pattern further comprises applying the adhesive to substantially surround a void (1088; 1094; 1264, 1266, 1268, 1270; 1370, 1372, 1374, 1376, 1378, 1380; 1560, 1562; 1760, 1762, 1764, 1766) at least partially defined by the movable section.

4. The method of claim 2, wherein adhering the heat-shrink patch to the interior surface further comprises adhering the heat-shrink patch to at least a portion of the movable section.

5. The method of claim 1, further comprising filling the carton with contents before moving the movable section.

6. The method of claim 1, further comprising filling the carton with contents after moving the movable section.

7. The method of claim 1, wherein moving the movable section further comprises focusing heat at the heat-shrink patch.

8. The method of claim 1, wherein moving the movable section further comprises applying heat to portions of the heat-shrink patch at different intensities to differentially shrink the heat-shrink patch.

9. The method of claim 1, wherein moving the movable section further comprises varying an intensity of heat applied to the movable section.

10. The method of claim 1, wherein the carton comprises a first movable section connected to a second movable section, and moving the movable section further comprises drawing the first movable section towards the second movable section to at least partially close a void (1088; 1094; 1264, 1266, 1268, 1270; 1370, 1372, 1374, 1376, 1378, 1380; 1560, 1562; 1760, 1762, 1764, 1766) defined between the first movable section and the second movable section.

11. The method of claim 1, wherein the heat-shrink patch comprises at least one of polyethylene, polypropylene, polyvinyl chloride, polyester, polyester glycol, nylon and/or oriented polystyrene.

12. The method of claim 1, wherein moving the movable section further comprises:

   providing a plurality of heat-shrink patches in a pre-shrunk configuration having different shrink orientations and percentages;
   coupling each heat-shrink patch to a corresponding movable section of a plurality of movable sections; and
   moving each movable section from the first position to the second position to form the shape of the carton by heating each heat-shrink patch to shrink each heat-shrink patch.

13. The method of claim 1, wherein moving the movable

section further comprises applying a plurality of different heating temperatures to at least a portion of the heat-shrink patch for controlling a degree of shrinkage of the heat-shrink patch.

14. The method of claim 1, further comprising:

controlling a degree of shrinkage of the heat-shrink patch by at least one of using a specific type of film material, controlling a temperature of the heating, and focusing the heating on the heat-shrink patch; and
moving the movable section from the first position to the second position to form the shape that includes at least one cut-out in the carton such that a product included within the carton is visible.

15. The method of claim 1, wherein moving the movable section further comprises changing a cross-sectional area of at least a portion of the carton.

16. The method of claim 1, wherein the carton comprises a first movable section and a second movable section, the method further comprising:

coupling a second heat-shrink patch to a second movable section of the carton; and
moving the second movable section from a first position to a second position to form a shape of the carton by heating the second heat-shrink patch to shrink the second heat-shrink patch to a shrunk configuration.

17. The method of claim 16, wherein moving the second movable section further comprises moving the first movable section towards the second movable section to close a void (1088; 1094; 1264, 1266, 1268, 1270; 1370, 1372, 1374, 1376, 1378, 1380; 1560, 1562; 1760, 1762, 1764, 1766) defined along a fold line coupling the first movable section to the second movable section.

18. A method for forming a packaging assembly (1150, 1151; 1299; 1450; 1650; 1850) including a carton (1100; 1101; 1266; 1400; 1600; 1800) having a shape, the carton including a top panel (1056; 1228; 1334; 1532, 1538; 1726), a bottom panel (1060; 1232; 1338; 1526; 1730), at least one side panel (1022, 1024, 1026, 1028; 1023, 1025, 1027, 1029; 1202, 1204, 1206, 1208; 1302, 1304, 1306, 1308, 1310, 1312; 1504, 1506, 1508, 1512, 1514, 1516; 1702, 1704, 1706, 1708) extending between the top panel and the bottom panel and a movable section (1024, 1026; 1025, 1027, 1029; 1202, 1204, 1206, 1208; 1302, 1304, 1306, 1308, 1310, 1312; 1504, 1506, 1508, 1512, 1514, 1516; 1702, 1704, 1706, 1708, 1726, 1730, 1734, 1738) that is movable between a first position and a second position, the method comprising:

providing a blank sheet of material (1020; 1021; 1200; 1300; 1500; 1700) having a first movable section coupled to a second movable section at a fold line, the first movable section and the second movable section defining a void (1088; 1094; 1264, 1266, 1268, 1270; 1370, 1372, 1374, 1376, 1378, 1380; 1560, 1562; 1760, 1762, 1764, 1766) positioned on the fold line;
applying an adhesive in a registered pattern to an interior surface (1021; 1022; 1201; 1301; 1501; 1701) of the blank and substantially surrounding the void;
coupling a heat-shrink patch (1090; 1091; 1272; 1382; 1576, 1580; 1770, 1774) in a pre-shrunk configuration to each of the first movable section and the second movable section within the registered pattern to cover the void;
forming the carton from the blank wherein the heat-shrink patch in the pre-shrunk configuration is coupled to the interior surface of the formed carton; and
moving the first movable section towards the second movable section to at least partially close the void to form the shape of the carton by applying heat to the heat-shrink patch to shrink the heat-shrink patch to a shrunk configuration.

19. The method of claim 18, wherein heat is applied to at least a portion of the heat-shrink patch.

20. The method of claim 18, wherein heat is applied to a first portion of the heat-shrink patch at a first temperature and heat is applied to a second portion of the heat-shrink patch at a second temperature different from the first temperature.

21. The method of claim 18, wherein heat is applied at a plurality of temperatures across a dimension of the heat-shrink patch.

22. A system for applying a heat-shrink patch (1090; 1091; 1272; 1382; 1576, 1580; 1770, 1774) to a carton (1100; 1101; 1266; 1400; 1600; 1800) for forming a shape of the carton, the system comprising:

a blank of sheet material (1020; 1021; 1200; 1300; 1500; 1700) comprising a top panel (1056; 1228; 1334; 1532, 1538; 1726), a bottom panel (1060; 1232; 1338; 1526; 1730), at least one side panel (1022, 1024, 1026, 1028; 1023, 1025, 1027, 1029; 1202, 1204, 1206, 1208; 1302, 1304, 1306, 1308, 1310, 1312; 1504, 1506, 1508, 1512, 1514, 1516; 1702, 1704, 1706, 1708) extending between the top panel and the

bottom panel and a movable section (1024, 1026; 1025, 1027, 1029; 1202, 1204, 1206, 1208; 1302, 1304, 1306, 1308, 1310, 1312; 1504, 1506, 1508, 1512, 1514, 1516; 1702, 1704, 1706, 1708, 1726, 1730, 1734, 1738) that is movable between a first position and a second position;

a coupling device configured to couple the heat-shrink patch in the pre-shrunk configuration to an interior surface (1021; 1022; 1201; 1301; 1501; 1701) of the blank of sheet material;

a forming device configured to form the carton from the blank of sheet material wherein the heat-shrink patch in the pre-shrunk configuration is coupled to the interior surface of the formed carton; and

a heating device configured to heat at least a portion of the heat-shrink patch to shrink the heat-shrink patch to a shrunk configuration to move the movable section from the first position to the second position to form the shape of the carton.

23. The system of claim 22, wherein the coupling device is further configured to apply an adhesive in a registered pattern to at least a portion of the movable section and adhere the heat-shrink patch to the interior surface of the blank within the registered pattern.

24. The system of claim 22, wherein the heating device is further configured to shrink the heat-shrink patch to the shrunk configuration to move the movable section to at least partially close a void (1088; 1094; 1264, 1266, 1268, 1270; 1370, 1372, 1374, 1376, 1378, 1380; 1560, 1562; 1760, 1762, 1764, 1766) at least partially defined by the movable section.

25. An assembly (154; 312) for packaging a product, the assembly comprising:

a carton (100; 266) having a top (114; 276), a bottom (116; 278), and a side (102, 104, 106, 108, 110, 112; 268, 270, 272, 274) extending between the top and the bottom, wherein at least one of the top, the bottom, and the side comprises a movable section (136, 138, 140, 142, 144, 146; 298, 300, 302, 304) that is movable between a first position and a second position, the movable section being biased to the first position, the carton extends a height (118; 280) measured between the top and bottom of the carton, the side comprises a plurality of sides, the movable section comprises a movable section on each of the plurality of sides, each of the movable sections comprises an upper extension (126; 288) extending from an upper portion (122; 284) of the respective side along an upper fold line (90; 256), and a lower extension (128; 290) extending from a lower portion (124; 286) of the respective side along a lower fold line (94; 260) and joined to the upper extension of the respective side along a central fold line (96; 262), and each of the movable section central fold lines are located along a central longitudinal axis (120; 282) of the carton at a generally equal distance from the top of the carton, the central fold lines of the movable sections being spaced a greater radial distance from the central longitudinal axis of the carton in the first position than in the second position, wherein the movable sections are movable from the first position to the second position by bending the upper and lower extensions along the upper, lower, and central fold lines to move the central fold lines generally radially toward the central longitudinal axis of the carton to reduce a cross-sectional area of the carton defined between the movable sections; and

a heat-shrinkable layer (152; 310) overlapping at least a portion of the carton for forming the carton, the heat-shrinkable layer moves the movable section from the first position to the second position when the heat-shrinkable layer is heated to come into contact with the portion of the carton.

26. The assembly of claim 25, wherein the plurality of sides comprises six sides and the carton comprises a generally hexagonal cross section.

27. The assembly of claim 25, wherein the plurality of sides comprises four sides and the carton comprises a generally rectangular cross section.

28. An assembly (790) for packaging a product, the assembly comprising:

a carton (740) having a top (750), a bottom (752), and a side (742, 744, 746, 748, 784, 786) extending between the top and the bottom, wherein at least one of the top, the bottom, and the side comprises a movable section (772, 774, 776, 778) that is movable between a first position and a second position, the movable section being biased to the first position,

wherein the side is a first side, the carton further comprises a second side, a third side, and a fourth side, each of the first, second, third, and fourth sides extending from the bottom to the top of the carton, and the movable section comprises a first extension (754, 756, 758, 760) extending from the first side along a first fold line (726) and a second extension (754, 756, 758, 760) extending from the second side along a second fold line (734), wherein the movable sec-

tion is movable from the first position to the second position by bending the first and second extensions along the first and second fold lines to move the first extension over the second extension such that the first extension at least partially overlaps the second extension, wherein in the first position an opening (730) is defined between the first and second extensions and in the second position the first and second extensions form a fifth side of the carton defined between the first and second sides and obliquely angled with respect to the first and second sides; and
a heat-shrinkable layer (788) overlapping at least a portion of the carton for forming the carton, the heat-shrinkable layer moves the movable section from the first position to the second position when the heat-shrinkable layer is heated to come into contact with the portion of the carton.

29. The assembly of claim 28, wherein at least one of the first fold line and the second fold line is at least partially curved.

30. The assembly of claim 28, wherein the first side comprises a curved surface when the movable section is in the second position.

31. The assembly of claim 28, wherein the fifth side extends only a portion of a height of the carton measured between the top and bottom of the carton.

32. The assembly of claim 28, wherein the first extension substantially overlaps the second extension when the movable section is in the second position.

33. An assembly (422; 534) for packaging a product, the assembly comprising;

a carton (380; 490) having a top (390; 500), a bottom (392; 502), and a side (382, 384, 386, 388; 492, 494, 496, 498) extending between the top and the bottom, wherein at least one of the top, the bottom, and the side comprises a movable section (412, 414; 522, 524) that is movable between a first position and a second position, the movable section being biased to the first position, wherein the side is a first side, the carton further comprises a second side, a third side, and a fourth side, each of the first, second, third, and fourth sides extending from the bottom to the top of the carton, the movable section comprises a movable section on any two opposite sides of the first, second, third, and fourth sides, and each of the movable sections comprises an upper extension (402; 512) extending from an upper portion (398; 508) of the respective side along an upper fold line (374; 484), and a lower extension (404; 514) extending from a lower portion (400; 510) of the respective side along a lower fold line (378; 488), wherein the movable sections are movable from the first position to the second position by bending the upper and lower extensions along the upper and lower fold lines to obliquely angle the upper and lower extensions with respect to the respective side and thereby vary a cross-sectional area of the carton along a height (394; 504) of the carton measured between the top and the bottom; and
a heat-shrinkable layer (420; 532) overlapping at least a portion of the carton for forming the carton, the heat-shrinkable layer moves the movable section from the first position to the second position when the heat-shrinkable layer is heated to come into contact with the portion of the carton.

34. The assembly of claim 33, wherein the two opposite sides of the first, second, third, and fourth sides each comprise an intermediate portion between the upper and lower extensions of the respective side.

35. The assembly of claim 33, wherein the carton comprises a generally rectangular cross section.

36. The assembly of claim 33, wherein at least one of the first, second, third, and fourth sides comprises a curved edge.

37. The assembly of claim 36, wherein the curved edge extends only a portion of the height of the carton.

38. An assembly (422; 644) for packaging a product, the assembly comprising:

a carton (380; 600) having a top (390; 610), a bottom (392; 612), and a side (382, 384, 386, 388; 602, 604, 606, 608) extending between the top and the bottom, wherein at least one of the top, the bottom, and the side comprises a movable section that is movable between a first position and a second position, the movable section (412, 414; 630, 632, 634, 636) being biased to the first position, wherein the side is a plurality of sides extending from the bottom to the top of the carton, the movable section comprises a movable section on each of the plurality of sides, and each of the movable sections comprises an intermediate portion (370; 622) of the respective side extending from an upper portion (398; 618) of the respective side along an upper fold line (374; 596) and extending from a lower portion (400; 620) of the respective side along a lower fold line (378; 598), wherein the movable sections are movable from the first position to the second position by bending along the upper and

lower fold lines to obliquely angle the intermediate portions with respect to the respective sides and thereby vary a cross-sectional area of the carton along a height (394; 614) of the carton measured between the top and the bottom; and

a heat-shrinkable layer (420; 642) overlapping at least a portion of the carton for forming the carton, the heat-shrinkable layer moves the movable section from the first position to the second position when the heat-shrinkable layer is heated to come into contact with the portion of the carton.

39. The assembly of claim 38, wherein the plurality of sides comprises four sides and the carton comprises a generally rectangular cross section.

40. The assembly of claim 38, wherein at least one of the plurality of sides comprises a curved edge.

41. The assembly of claim 40, wherein the curved edge extends only a portion of the height of the carton.

42. The assembly of claim 38, wherein at least one of the plurality of sides comprises a curved surface.

43. The assembly of claim 42, wherein the curved surface extends only a portion of the height of the carton.

44. A method for packaging a product, the method comprising:

forming a carton (100; 266) having a top (114; 276), a bottom (116; 278), and a side (102, 104, 106, 108, 110, 112; 268, 270, 272, 274) extending between the top and the bottom, and a movable section (136, 138, 140, 142, 144, 146; 298, 300, 302, 304) that is movable between a first position and a second position, the movable section being biased to the first position, the carton extending a height (118; 280) measured between the top and bottom of the carton, the side comprises a plurality of sides, the movable section comprises a movable section on each of the plurality of sides, each of the movable sections comprises an upper extension (126; 288) extending from an upper portion (122; 284) of the respective side along an upper fold line (90; 256), and a lower extension (128; 290) extending from a lower portion (124; 286) of the respective side along a lower fold line (94; 260) and joined to the upper extension of the respective side along a central fold line (96; 262), and each of the movable section central fold lines are located along a central longitudinal axis (120; 282) of the carton at a generally equal distance from the top of the carton, the central fold lines of the movable sections being spaced a greater radial distance from the central longitudinal axis of the carton in the first position than in the second position, wherein the movable sections are movable from the first position to the second position by bending the upper and lower extensions along the upper, lower, and central fold lines to move the central fold lines generally radially toward the central longitudinal axis of the carton to reduce a cross-sectional area of the carton defined between the movable sections;

wrapping a heat-shrinkable layer (152; 310) around at least a portion of the carton including at least a portion of the movable section of the carton; and

moving the movable section from the first position to the second position to form a shaped package assembly by heating the heat-shrinkable layer to shrink the heat-shrinkable layer into contact with at least a portion of the movable section.

45. The method of claim 44, wherein forming a carton further comprises forming a carton having six sides and a generally hexagonal cross section.

46. The method of claim 44, wherein forming a carton further comprises forming a carton having four sides and a generally rectangular cross section.

47. A method for packaging a product, the method comprising:

forming a carton (740) having a top (750), a bottom (752), and a side 742, 744, 746, 748, 784, 786) extending between the top and the bottom, and a movable section (772, 774, 776, 778) that is moveable between a first position and a second position, the movable section being biased to the first position, wherein the side is a first side, the carton further comprises a second side, a third side, and a fourth side, each of the first, second, third, and fourth sides extending from the bottom to the top of the carton, and the movable section comprises a first extension (754, 756, 758, 760) extending from the first side along a first fold line (726) and a second extension (754, 756, 758, 760) extending from the second side along a second fold line (734), wherein the movable section is movable from the first position to the second position by bending the first and second extensions along the first and second fold lines to move the first extension over the second extension such that the first extension at least partially overlaps the second extension, wherein in the first position an opening (730) is defined between the first and second extensions and in the second position the first

and second extensions form a fifth side of the carton defined between the first and second sides and obliquely angled with respect to the first and second sides;

wrapping a heat-shrinkable layer (788) around at least a portion of the carton including at least a portion of a movable section of the carton; and moving the movable section from the first position to the second position to form a shaped package assembly (790) by heating the heat-shrinkable layer to shrink the heat-shrinkable layer into contact with at least a portion of the movable section.

48. The method of claim 47, wherein forming a carton comprises forming a carton wherein at least one of the first fold line and the second fold line is at least partially curved.

49. The method of claim 47, wherein forming a carton comprises forming a carton wherein the first side has a curved surface when the movable section is in the second position.

50. The method of claim 47, wherein forming a carton comprises forming a carton wherein the fifth side extends only a portio of a height of the carton measured between the top and bottom of the carton.

51. The method of claim 47, wherein forming a carton comprises forming a carton wherein the first extension substantially overlaps the second extension when the movable section is in the second position.

52. A method for packaging a product, the method comprising:

forming a carton (380; 490) having a top (390; 500), a bottom (392; 502), and a side (382, 384, 386, 388; 492, 494, 496, 498) extending between the top and the bottom, and a movable section (412, 414; 522, 524) that is movable between a first position and a second position, the movable section being biased to the first position, wherein the side is a first side, the carton further comprises a second side, a third side, and a fourth side, each of the first, second, third, and fourth sides extending from the bottom to the top of the carton, the movable section comprises a movable section on any two opposite sides of the first, second, third, and fourth sides, and each of the movable sections comprises an upper extension (402; 512) extending from an upper portion (398; 508) of the respective side along an upper fold line (374; 484), and a lower extension (404; 514) extending from a lower portion (400; 510) of the respective side along a lower fold line (378; 488), wherein the movable sections are movable from the first position to the second position by bending the upper and lower extensions along the upper and lower fold lines to obliquely angle the upper and lower extensions with respect to the respective side and thereby vary a cross-sectional area of the carton along a height (394; 504) of the carton measured between the top and the bottom;

wrapping a heat-shrinkable layer (420; 532) around at least a portion of the carton including at least a portion of a movable section of the carton; and

moving the movable section from the first position to the second position to form a shaped package assembly (422; 534) by heating the heat-shrinkable layer to shrink the heat-shrinkable layer into contact with at least a portion of the movable section.

53. The method of claim 52, wherein forming a carton comprises forming a carton wherein the two opposite sides of the first, second, third, and fourth sides each comprise an intermediate portion between the upper and lower extensions of the respective side.

54. The method of claim 52, wherein forming a carton comprises forming a carton having a generally rectangular cross section.

55. The method of claim 52, wherein forming a carton comprises forming the carton wherein at least one of the first, second, third, and fourth sides comprises a curved edge.

56. The method of claim 55, wherein forming a carton comprises forming the carton such that the curved edge extends only a portion of the height of the carton.

57. A method for packaging a product, the method comprising:

forming a carton (380; 600) having a top (390; 610), a bottom (392; 612), and a side (382, 384, 386, 388; 602, 604, 606, 608) extending between the top and the bottom, and a movable section (412, 414; 630, 632, 634, 636) that is movable between a first position and a second position, the movable section being biased to the first position, wherein the side is a plurality of sides extending from the bottom to the top of the carton, the movable section comprises a movable section on each of the plurality of sides, and each of the movable sections comprises an intermediate portion (370; 622) of the respective side extending from an upper portion (398; 618) of the respective side along an upper fold line (374; 596) and extending from a lower portion

(400; 620) of the respective side along a lower fold line (378; 598), wherein the movable sections are movable from the first position to the second position by bending along the upper and lower fold lines to obliquely angle the intermediate portions with respect to the respective sides and thereby vary a cross-sectional area of the carton along a height (394; 614) of the carton measured between the top and the bottom;

wrapping a heat-shrinkable layer (420; 642) around at least a portion of the carton including at least a portion of a movable section of the carton; and

moving the movable section from the first position to the second position to form a shaped package assembly (422; 644) by heating the heat-shrinkable layer to shrink the heat-shrinkable layer into contact with at least a portion of the movable section.

58. The method of claim 57, wherein forming a carton comprises forming a carton having four sides and a generally rectangular cross section.

59. The method of claim 57, wherein forming a carton comprises forming a carton such that at least one of the plurality of sides comprises a curved edge.

60. The method of claim 59, wherein forming a carton comprises forming a carton such that the curved edge extends only a portion of the height of the carton.

61. The method of claim 57, wherein forming a carton comprises forming a carton such that at least one of the plurality of sides comprises a curved surface.

62. The method of claim 61, wherein forming a carton comprises forming a carton such that the curved surface extends only a portion of the height of the carton.

63. A method for applying a heat shrinkable film (152; 310; 642; 788) to a carton (100; 266; 380; 600; 740) for forming a shape of the carton, the carton including a top panel (114; 276; 610; 750), a bottom panel (116; 278; 612; 752), a plurality of side panels (102, 104, 106, 108, 110, 112; 268, 270, 272, 274; 602, 604, 606, 608; 742, 744, 746, 748) extending between the top panel and the bottom panel, and a movable section (136, 138, 140, 142, 144, 146; 298, 300 302, 304; 630, 632, 634, 636; 772, 774, 776, 778) that is movable between a first position and a second position, the method comprising:

providing a heat-shrinkable but unshrunken film;

wrapping the film in an unheated condition around at least a portion of the carton including at least a portion of the movable section of the carton, wherein the movable section including at least one opening (98; 264) having a size and at least one movable panel, wherein the at least one opening is a cut-out defined within at least one of the plurality of side panels; and

moving the movable section from the first position to the second position to form the shape of the carton by heating the heat-shrinkable film to shrink the heat-shrinkable film into contact with at least a portion of the movable section, wherein moving the movable section includes moving the at least one movable panel and reducing the size of the at least one opening of the movable section.

64. The method of claim 63, wherein providing a heat-shrinkable but unshrunken film further comprises:

providing a heat-shrinkable but unshrunken film having a leading end and a trailing end unattached to the leading end;

bonding the leading end of the film to the carton;

wrapping the film in an unheated condition around at least a portion of the carton including at least a portion of the movable section of the carton; and

bonding the trailing end of the film to at least one of the carton and the film itself.

65. The method of claim 64, wherein the carton further includes at least one seam wherein the at least one seam is formed when at least two panels are adhered to one another, and wherein bonding the leading end of the film to the carton further comprises bonding the leading end of the film within a seam of the carton such that the leading end is not visible.

66. The method of claim 63, wherein providing a heat-shrinkable but unshrunken film further comprises providing a heat-shrinkable but unshrunken film in the form of a pre-formed sleeve, the sleeve having an opening sized to receive the carton.

67. The method of claim 66, wherein providing a heat-shrinkable but unshrunken film in the form of a pre-formed sleeve further comprises:

inserting the carton into the sleeve opening; and

moving the movable section from the first position to the second position to form a shape of the carton by heating the heat-shrinkable sleeve to shrink the heat-shrinkable sleeve into contact with at least a portion of the movable section.

68. The method of claim 63, wherein providing a heat-shrinkable but unshrunken film further comprises providing a heat-shrinkable but unshrunken film that

includes a marking thereon.

69. The method of claim 63, wherein providing a heat-shrinkable but unshrunken film further comprises providing a heat-shrinkable but unshrunken film having a marking thereon including graphics for the carton, wherein the graphics are applied using an opaque ink.

70. The method of claim 63, wherein providing a heat-shrinkable but unshrunken film further comprises providing a heat-shrinkable but unshrunken film having a marking thereon including graphics for the carton, wherein the graphics are applied using a translucent ink such that the film graphics coordinate with additional graphics printed on the carton.

71. The method of claim 63, wherein providing a heat-shrinkable but unshrunken film further comprises providing a heat-shrinkable but unshrunken film manufactured from at least one of polyethylene, polypropylene, polyvinyl chloride, polyester, polyester glycol, nylon, and/or oriented polystyrene.

72. The method of claim 63, wherein the carton extends a height measured between the top and the bottom of the carton, and the film extends a height greater than the carton height, and wherein wrapping the film further comprises:

wrapping the film in an unheated condition around the carton including the movable section of the carton wherein the film extends a distance outwardly from at least one of the top and the bottom of the carton; and
heating the heat-shrinkable film to shrink the heat-shrinkable film into contact with at least a portion of the at least one of the top and the bottom of the carton for providing at least one of a tamper resistance measure, a moisture barrier, and a sifting barrier.

73. The method of claim 63, wherein the carton extends a height measured between the top and the bottom of the carton, and the film extends a height less than the carton height, and wherein wrapping the film further comprises wrapping the film in an unheated condition around a portion of the carton including at least a portion of the movable section of the carton.

74. The method of claim 63, wherein moving the movable section further comprises:

providing a plurality of heat-shrinkable film types including heat-shrinkable films having different shrink orientations and percentages; and
moving the movable section from the first position to the second position using the plurality of the heat-shrinkable film types to form a shape of the carton by heating the heat-shrinkable film to shrink the heat-shrinkable film into contact with at least a portion of the movable section.

75. The method of claim 63, wherein moving the movable section further comprises applying a plurality of different heating temperatures to at least a portion of the heat-shrinkable film for controlling a degree of shrinkage of the film.

76. The method of claim 63, further comprising:

controlling a degree of shrinkage of the film by at least one of using a specific type of film, controlling a temperature of the heating, and targeting the heating on the film; and
moving the movable section from the first position to the second position to form a shape that includes at least one cut-out in the carton such that a product included within the carton is visible.

77. The method of claim 63, wherein the moving the movable section further comprises changing a cross sectional area of at least a portion of the carton.

78. The method of claim 63, wherein the movable section comprises a first movable section and a second movable section, and moving the movable section further comprises overlapping the second movable section with the first movable section.

79. A system for applying a heat shrinkable film (152; 310; 642; 788) to a carton (100; 266; 380; 600; 740) for forming a shape of the carton, the system comprising:

a carton comprising a top panel (114; 276; 610; 750), a bottom panel (116; 278; 612; 752), a plurality of side panels (102, 104, 106, 108, 110, 112; 268, 270, 272, 274; 602, 604, 606, 608; 742, 744, 746, 748) extending between the top panel and the bottom panel, and a movable section (136, 138, 140, 142, 144, 146; 298, 300 302, 304; 630, 632, 634, 636; 772, 774, 776, 778) that is movable between a first position and a second position;
a wrapping device configured to wrap a heat-shrinkable but unshrunken film in an unheated condition around at least a portion of the carton including at least a portion of the movable section of the carton, wherein the movable section including at least one opening (98; 264) having a size and at least one movable panel, wherein the at least one opening is a cut-out defined within at least one of the plurality of side panels; and
a heating device configured to heat at least a

portion of the heat-shrinkable film into contact with at least a portion of the movable section to move the movable section from the first position to the second position to form a shape of the carton, wherein moving the movable section includes moving the at least one movable panel and reducing the size of the at least one opening of the movable section.

80. The system of claim 79, wherein the heat-shrinkable but unshrunken film includes a leading end and a trailing end unattached to the leading end, and wherein the wrapping device is further configured to:

bond the leading end of the film to the carton;
wrap the film in an unheated condition around at least a portion of the carton including at least a portion of the movable section of the carton; and
bond the trailing end of the film to at least one of the carton and the film itself.

81. The system of claim 80, wherein the carton further includes at least one seam wherein the at least one seam is formed when at least two panels are adhered to one another, and wherein the wrapping device is further configured to bond the leading end of the film within a seam of the carton such that the leading end is not visible.

82. The system of claim 79, wherein the wrapping device is further configured to insert the carton into a heat-shrinkable but unshrunken film in the form of a preformed sleeve, the sleeve having an opening sized to receive the carton.

Patentansprüche

1. Verfahren zum Aufbringen eines Wärmeschrumpfelements auf einen Karton (1100; 1101; 1266; 1400; 1600; 1800), um eine Gestalt des Kartons auszubilden, wobei der Karton eine obere Fläche (1056; 1228; 1334; 1532, 1538; 1726), eine untere Fläche (1060; 1232; 1338; 1526; 1730), zumindest eine Seitenfläche (1022, 1024, 1026, 1028; 1023, 1025, 1027, 1029; 1202, 1204, 1206, 1208; 1302, 1304, 1306, 1308, 1310, 1312; 1504,1506, 1508, 1512, 1514, 1516; 1702, 1704, 1706, 708), die sich zwischen der oberen und der unteren Fläche erstreckt, und einen bewegbaren Abschnitt (1024, 1026; 1025, 1027, 1029; 1202,1204, 1206,1208; 1302, 1304, 1306, 1308, 1310, 1312; 1504, 1506, 1508, 1512, 1514, 1516; 1702, 1704, 1706, 1708, 1726, 1730, 1734, 1738) umfasst, der zwischen einer ersten Position und einer zweiten Position bewegbar ist, wobei das Verfahren Folgendes umfasst:

Bereitstellen eines Wärmeschrumpfelements (1090; 1091; 1272; 1382; 1576, 1580; 1770, 1774) in einer vorgeschrumpften Konfiguration;
Verbinden des Wärmeschrumpfelements in der vorgeschrumpften Konfiguration mit zumindest einem Abschnitt einer Innenfläche (1021; 1022; 1201; 1301; 1501; 1701) eines Zuschnitts von Plattenmaterial (1020; 1021; 1200; 1300; 1500; 1700), der zumindest einen Teil des bewegbaren Abschnitts umfasst;
Ausbilden des Kartons vom Zuschnitt von Plattenmaterial, wobei das Wärmeschrumpfelement in der vorgeschrumpften Konfiguration mit der Innenfläche des ausgebildeten Karton verbunden wird; und
Bewegen des bewegbaren Abschnitts von der ersten Position in die zweite Position, um die Gestalt des Kartons auszubilden, indem das Wärmeschrumpfelement erhitzt wird, um das Wärmeschrumpfelement zu einer geschrumpften Konfiguration schrumpfen zu lassen.

2. Verfahren nach Anspruch 1, wobei das Verbinden des Wärmeschrumpfelements ferner Folgendes umfasst:

Aufbringen eines Haftmittels in einem registerhaltigen Muster auf zumindest einen Teil des bewegbaren Abschnitts;
Zuschneiden des Wärmeschrumpfelements, sodass es mit dem registerhaltigen Muster übereinstimmt; und
Anhaften des Wärmeschrumpfelements auf der Innenfläche im registerhaltigen Muster.

3. Verfahren nach Anspruch 2, wobei das Aufbringen eines Haftmittels in einem registerhaltigen Muster ferner das Aufbringen des Haftmittels umfasst, um im Wesentlichen einer Leerstelle (1088; 1094; 1264, 1266, 1268, 1270; 1370,1372,1374,1376, 1378, 1380; 1560, 1562; 1760, 1762, 1764, 1766) zu umgeben, die zumindest teilweise durch den bewegbaren Abschnitt definiert ist.

4. Verfahren nach Anspruch 2, wobei das Anhaften des Wärmeschrumpfelements auf der Innenfläche ferner das Anhaften des Wärmeschrumpfelements auf zumindest einen Teil des bewegbaren Abschnitts umfasst.

5. Verfahren nach Anspruch 1, ferner umfassend das Befüllen des Kartons mit Inhalt, bevor der bewegbare Abschnitt bewegt wird.

6. Verfahren nach Anspruch 1, ferner umfassend das Befüllen des Kartons mit Inhalt, nachdem der bewegbare Abschnitt bewegt wurde.

7. Verfahren nach Anspruch 1, wobei das Bewegen des bewegbaren Abschnitts ferner das Konzentrieren von Wärme im Wärmeschrumpfelement umfasst.

8. Verfahren nach Anspruch 1, wobei das Bewegen des bewegbaren Abschnitts ferner das Aufbringen von Wärme auf Teilen des Wärmeschrumpfelements in verschiedener Intensität umfasst, um das Wärmeschrumpfelement unterschiedlich schrumpfen zu lassen.

9. Verfahren nach Anspruch 1, wobei das Bewegen des bewegbaren Abschnitts ferner das Variieren der Intensität der auf den bewegbaren Abschnitt beaufschlagten Wärme umfasst.

10. Verfahren nach Anspruch 1, wobei der Karton einen ersten bewegbaren Abschnitt umfasst, der mit einem zweiten bewegbaren Abschnitt verbunden ist, und wobei das Bewegen des bewegbaren Abschnitts ferner das Ziehen des ersten bewegbaren Abschnitts hin zum zweiten bewegbaren Abschnitt umfasst, um eine Leerstelle (1088; 1094; 1264, 1266, 1268, 1270; 1370, 1372, 1374, 1376, 1378, 1380; 1560, 1562; 1760, 1762, 1764, 1766), die zwischen dem ersten und dem zweiten bewegbaren Abschnitt zumindest teilweise definiert ist, zu schließen.

11. Verfahren nach Anspruch 1, wobei das Wärmeschrumpfelement zumindest eines von Polyethylen, Polypropylen, Polyvinylchlorid, Polyester, Polyesterglycol, Nylon und/oder orientiertem Polystyrol umfasst.

12. Verfahren nach Anspruch 1, wobei das Bewegen des bewegbaren Abschnitts ferner Folgendes umfasst:

    Bereitstellen einer Vielzahl an Wärmeschrumpfelementen in einer vorgeschrumpften Konfiguration mit unterschiedlichen Schrumpfausrichtungen und -prozentsätzen;
    Verbinden jedes Wärmeschrumpfelements mit einem dazugehörigen bewegbaren Abschnitt einer Vielzahl an bewegbaren Abschnitten; und
    Bewegen jedes bewegbaren Abschnitts von der ersten Position in die zweite Position, um die Gestalt des Kartons auszubilden, indem jedes Wärmeschrumpfelement erhitzt wird, um jedes Wärmeschrumpfelement schrumpfen zu lassen.

13. Verfahren nach Anspruch 1, wobei das Bewegen des bewegbaren Abschnitts ferner das Beaufschlagen einer Vielzahl an verschiedenen Erwärmungstemperaturen auf zumindest einen Teil des Wärmeschrumpfelements umfasst, um das Schrumpfungsausmaß des Wärmeschrumpfelements zu steuern.

14. Verfahren nach Anspruch 1, ferner umfassend:

    Steuern des Schrumpfungsausmaßes des Wärmeschrumpfelements durch zumindest eines von Verwenden einer speziellen Art von Filmmaterial, Steuern der Erwärmungstemperatur und Konzentrieren des Erwärmens auf das Wärmeschrumpfelement; und
    Bewegen des bewegbaren Abschnitts von der ersten Position in die zweite Position, um die Gestalt auszubilden, die zumindest einen Ausschnitt im Karton umfasst, sodass ein im Karton enthaltenes Produkt sichtbar ist.

15. Verfahren nach Anspruch 1, wobei das Bewegen des bewegbaren Abschnitts ferner das Verändern einer Querschnittsfläche von zumindest einem Teil des Kartons umfasst.

16. Verfahren nach Anspruch 1, wobei der Karton einen ersten bewegbaren Bereich und einen zweiten bewegbaren Bereich umfasst, wobei das Verfahren ferner Folgendes umfasst:

    Verbinden eines zweiten Wärmeschrumpfelements mit einem zweiten bewegbaren Abschnitt des Kartons; und
    Bewegen des zweiten bewegbaren Abschnitts von einer ersten Position in eine zweite Position, um eine Gestalt des Kartons auszubilden, indem das zweite Wärmeschrumpfelement erhitzt wird, um das zweite Wärmeschrumpfelement zu einer geschrumpften Konfiguration schrumpfen zu lassen.

17. Verfahren nach Anspruch 16, wobei das Bewegen des zweiten bewegbaren Abschnitts ferner das Bewegen des ersten bewegbaren Abschnitts hin zum zweiten bewegbaren Abschnitts, um eine Leerstelle (1088; 1094; 1264, 1266, 1268, 1270; 1370, 1372, 1374, 1376, 1378, 1380; 1560,1562; 1760, 1762, 1764, 1766) zu schließen, die entlang einer Faltlinie definiert ist, die den ersten bewegbaren Abschnitt mit dem zweiten bewegbaren Abschnitt verbindet.

18. Verfahren zum Ausbilden einer Verpackungsanordnung (1150, 1151; 1299; 1450; 1650; 1850), umfassend einen Karton (1100; 1101; 1266; 1400; 1600; 1800) mit einer Gestalt, wobei der Karton eine obere Fläche (1056; 1228; 1334; 1532, 1538; 1726), eine untere Fläche (1060; 1232; 1338; 1526; 1730), zumindest eine Seitenfläche (1022, 1024, 1026, 1028; 1023, 1025, 1027, 1029; 1202, 1204, 1206, 1208; 1302, 1304, 306, 1308, 1310, 1312; 1504,1506, 1508, 1512, 1514, 1516; 1702, 1704, 1706, 1708), die sich zwischen der oberen und der unteren Fläche

erstreckt, und einen bewegbaren Abschnitt (1024, 1026; 1025, 1027, 1029; 1202,1204, 1206,1208; 1302, 1304, 1306, 1308, 1310, 1312; 1504, 1506, 1508, 1512, 1514, 1516; 1702, 1704, 1706, 1708, 1726, 1730, 1734, 1738) umfasst, der zwischen einer ersten Position und einer zweiten Position bewegbar ist, wobei das Verfahren Folgendes umfasst:

Bereitstellen eines zugeschnittenen Plattenmaterials (1020; 1021; 1200; 1300; 1500; 1700) mit einem ersten bewegbaren Abschnitt, das an einer Faltlinie mit einem zweiten bewegbaren Abschnitt verbunden ist, wobei der erste bewegbare Abschnitt und der zweite bewegbare Abschnitt eine Leerstelle (1088; 1094; 1264, 1266, 1268, 1270; 1370, 1372, 1374, 1376, 1378, 1380; 1560, 1562; 1760, 1762, 1764, 1766) definieren, die auf der Faltlinie positioniert ist;

Aufbringen eines Haftmittels in einem registerhaltigen Muster auf eine Innenfläche (1021; 1022; 1201; 1301; 1501; 1701) des Zuschnitts und im Wesentlichen Umgeben der Leerstelle;

Verbinden eines Wärmeschrumpfelements (1090; 1091; 1272; 1382; 1576, 1580; 1770, 1774) in einer vorgeschrumpften Konfiguration mit jeweils dem ersten bewegbaren Abschnitt und dem zweiten bewegbaren Abschnitt im registerhaltigen Muster, um die Leerstelle abzudecken;

Ausbilden des Kartons vom Zuschnitt, wobei das Wärmeschrumpfelement in der vorgeschrumpften Konfiguration mit der Innenfläche des ausgebildeten Kartons verbunden ist; und

Bewegen des ersten bewegbaren Abschnitts hin zum zweiten bewegbaren Abschnitt, um zumindest teilweise die Leerstelle zu schließen, um die Gestalt des Kartons auszubilden, indem das Wärmeschrumpfelement mit Wärme beaufschlagt wird, um das Wärmeschrumpfelement zu einer geschrumpften Konfiguration schrumpfen zu lassen.

19. Verfahren nach Anspruch 18, wobei zumindest ein Teil des Wärmeschrumpfelements mit Wärme beaufschlagt wird.

20. Verfahren nach Anspruch 18, wobei zumindest ein erster Teil des Wärmeschrumpfelements mit Wärme bei einer ersten Temperatur beaufschlagt wird und ein zweiter Teil des Wärmeschrumpfelements mit Wärme bei einer zweiten Temperatur, die sich von der ersten Temperatur unterscheidet, beaufschlagt wird.

21. Verfahren nach Anspruch 18, wobei Wärme bei einer Vielzahl an Temperaturen über eine Dimension des Wärmschrumpfelements beaufschlagt wird.

22. System zum Aufbringen eines Wärmeschrumpfelements (1090; 1091; 1272; 1382; 1576, 1580; 1770, 1774) auf einen Karton (1100; 1101; 1266; 1400; 1600; 1800) zum Ausbilden einer Gestalt des Kartons, wobei das System Folgendes umfasst:

einen Zuschnitt von Plattenmaterial (1020; 1021; 1200; 1300; 1500; 1700), umfassend eine obere Fläche (1056; 1228; 1334; 1532, 1538; 1726), eine untere Fläche (1060; 1232; 1338; 1526; 1730), zumindest eine Seitenfläche (1022, 1024, 1026, 1028; 1023, 1025, 1027, 1029; 1202, 1204, 1206, 1208;1302, 1304, 1306, 1308, 1310, 1312; 1504, 1506, 1508, 1512, 1514, 1516; 1702, 1704, 1706, 1708), die sich zwischen der oberen Fläche und der unteren Fläche erstreckt, und einen bewegbaren Abschnitt (1024, 1026; 1025, 1027, 1029; 1202, 1204, 1206, 1208; 1302, 1304, 1306, 1308, 1310, 1312; 1504, 1506, 1508, 1512, 1514, 1516; 1702, 1704, 1706, 1708, 1726, 1730, 1734, 1738), der zwischen einer ersten Position und einer zweiten Position bewegbar ist;

eine Verbindungsvorrichtung, die konfiguriert ist, um das Wärmeschrumpfelement in der vorgeschrumpften Konfiguration mit einer Innenfläche (1021; 1022; 1201; 1301; 1501; 1701) des Zuschnitts von Plattenmaterial zu verbinden;

eine Ausbildungsvorrichtung, die konfiguriert ist, um den Karton vom Zuschnitt von Plattenmaterial auszubilden, wobei das Wärmeschrumpfelement in der vorgeschrumpften Konfiguration mit der Innenfläche des ausgebildeten Kartons verbunden wird; und

eine Heizvorrichtung, die konfiguriert ist, um zumindest einen Teil des Wärmeschrumpfelements zu erhitzen, um das Wärmeschrumpfelement zu einer geschrumpften Konfiguration schrumpfen zu lassen, um den bewegbaren Bereich von der ersten Position in die zweite Position zu bewegen, um die Gestalt des Kartons auszubilden.

23. System nach Anspruch 22, wobei die Verbindungsvorrichtung ferner konfiguriert ist, um ein Haftmittel in einem registerhaltigen Muster auf zumindest einen Teil des bewegbaren Abschnitts aufzubringen und das Wärmeschrumpfelement auf der Innenfläche des Zuschnitts im registerhaltigen Muster anzubringen.

24. System nach Anspruch 22, wobei die Heizvorrichtung ferner konfiguriert ist, um das Wärmeschrumpfelement zur geschrumpften Konfiguration schrumpfen zu lassen, um den bewegbaren Abschnitt zu bewegen, um eine Leerstelle (1088; 1094; 1264, 1266, 1268, 1270; 1370, 1372, 1374, 1376, 1378, 1380; 1560, 1562; 1760, 1762, 1764, 1766), die zumindest

teilweise durch den bewegbaren Abschnitt definiert ist, zumindest teilweise zu schließen.

25. Anordnung (154; 312) zum Verpacken eines Produkts, wobei die Anordnung Folgendes umfasst:

einen Karton (100, 266) mit einer Oberseite (114; 276), einer Unterseite (116; 278) und einer Seite (102, 104, 106, 108, 110, 112; 268, 270, 272, 274), die sich zwischen der Oberseite und der Unterseite erstreckt, wobei zumindest eines von Oberseite, Unterseite und Seite einen bewegbaren Abschnitt (136, 138, 140, 142, 144, 146; 298, 300, 302, 304) umfasst, die zwischen einer ersten Position und einer zweiten Position bewegbar ist, wobei der bewegbare Abschnitt in die erste Position vorgespannt ist, der Karton sich über eine Höhe (118; 280) erstreckt, die zwischen der Oberseite und der Unterseite der Kartons gemessen ist, die Seite eine Vielzahl an Seiten umfasst, der bewegbare Abschnitt einen bewegbaren Abschnitt an jeder der Vielzahl an Seiten umfasst, jeder der bewegbaren Abschnitte eine obere Erweiterung (126; 288), die sich von einem Oberteil (122; 284) der entsprechenden Seite entlang einer oberen Faltlinie (90; 256) erstreckt, und eine untere Erweiterung (128; 290) aufweist, die sich von einem Unterteil (124; 286) der entsprechenden Seite entlang einer unteren Faltlinie (94; 260) erstreckt und mit der oberen Erweiterung der entsprechenden Seite entlang einer mittleren Faltlinie (96; 262) verbunden ist, und jede der mittleren Faltlinien der bewegbaren Abschnitte entlang einer Längsmittelachse (120; 282) des Kartons in einem im Allgemeinen gleichen Abstand von der Oberseite des Kartons angeordnet ist, wobei die mittleren Faltlinien der bewegbaren Abschnitte in der ersten Position in einem größeren Radialabstand von der mittleren Längsmittelachse des Kartons beabstandet sind als in der zweiten Position, wobei die bewegbaren Abschnitte von der ersten Position in die zweite Position bewegbar sind, indem die oberen und die unteren Erweiterungen entlang der oberen, der unteren und der mittleren Faltlinie umgeknickt werden, um die mittleren Faltlinien im allgemeinen radial zur Längsmittelachse des Kartons hin zu bewegen, um die zwischen den bewegbaren Abschnitten definierte Querschnittsfläche des Kartons zu verringern;
eine durch Wärme schrumpfbare Schicht (152; 310), die zumindest einen Teil des Kartons zum Ausbilden des Kartons überlappt, wobei die durch Wärme schrumpfbare Schicht den bewegbaren Abschnitt von der ersten Position in die zweite Position bewegt, wenn die durch Wärme schrumpfbare Schicht erhitzt wird, um mit dem Teil des Kartons in Kontakt zu gelangen.

26. Anordnung nach Anspruch 25, wobei die Vielzahl an Seiten sechs Seiten und der Karton einen im Allgemeinen hexagonalen Querschnitt umfasst.

27. Anordnung nach Anspruch 25, wobei die Anzahl an Seiten vier Seiten und der Karton einen im Allgemeinen rechteckigen Querschnitt umfasst.

28. Anordnung (790) zum Verpacken eines Produkts, wobei das Verfahren Folgendes umfasst:

einen Karton (740) mit einer Oberseite (750), einer Unterseite (752) und einer Seite (742, 744, 746, 748, 784, 786), die sich zwischen der Oberseite und der Unterseite erstreckt, wobei zumindest eine von Oberseite, Unterseite und Seite einen bewegbaren Abschnitt (772, 774, 776, 778) umfasst, der zwischen einer ersten Position und einer zweiten Position bewegbar ist, wobei der bewegbare Abschnitt in die erste Position vorgespannt ist,
wobei die Seite eine erste Seite ist, der Karton ferner eine zweite Seite, eine dritte Seite und eine vierte Seite umfasst, wobei jede der ersten, zweiten, dritten und vierten Seite sich von der Unterseite bis zur Oberseite des Kartons erstreckt und der bewegbare Abschnitt eine erste Erweiterung (754, 756, 758, 760), die sich von der ersten Seite entlang einer ersten Faltlinie (726) erstreckt, und eine zweite Erweiterung (754, 756, 758, 760) umfasst, die sich von der zweiten Seite entlang einer zweiten Faltlinie (734) erstreckt, wobei der bewegbare Abschnitt von der ersten Position in die zweite Position bewegbar ist, indem die erste und die zweite Erweiterung entlang der ersten und der zweiten Faltlinie umgeknickt werden, um die erste Erweiterung über die zweite Erweiterung zu bewegen, sodass die erste Erweiterung die zweite Erweiterung zumindest teilweise überlappt, wobei in der ersten Position eine Öffnung (730) zwischen der ersten und der zweiten Erweiterung definiert ist und in der zweiten Position die erste und die zweite Erweiterung eine fünfte Seite des Kartons ausbilden, die zwischen der ersten und der zweiten Seite definiert ist und in Bezug auf die erste und die zweite Seite schräg abgewinkelt ist; und
eine durch Wärme schrumpfbare Schicht (788), die zumindest einen Teil des Kartons zum Ausbilden des Kartons überlappt, wobei die durch Wärme schrumpfbare Schicht den bewegbaren Abschnitt von der ersten Position in die zweite Position bewegt, wenn die durch Wärme schrumpfbare Schicht erhitzt wird, um mit dem Teil des Kartons in Kontakt zu gelangen.

29. Anordnung nach Anspruch 28, wobei zumindest eine der ersten Faltlinie und der zweiten Faltlinie zumindest teilweise gekrümmt ist.

30. Anordnung nach Anspruch 28, wobei die erste Seite eine gekrümmte Oberfläche umfasst, wenn der bewegbare Abschnitt sich in der zweiten Position befindet.

31. Anordnung nach Anspruch 28, wobei die fünfte Seite sich nur über einen Teil der Höhe des Kartons erstreckt, die zwischen der Oberseite und der Unterseite des Kartons gemessen ist.

32. Anordnung nach Anspruch 28, wobei die erste Erweiterung im Wesentlichen die zweite Erweiterung überlappt, wenn der bewegbare Abschnitt sich in der zweiten Position befindet.

33. Anordnung (422; 534) zum Verpacken eines Produkts, wobei die Anordnung Folgendes umfasst:

einen Karton (380; 490) mit einer Oberseite (390; 500), einer Unterseite (392; 502) und einer Seite (382, 384, 386, 388; 492, 494, 496, 498), die sich zwischen der Oberseite und der Unterseite erstreckt, wobei zumindest eine von Oberseite, Unterseite und Seite einen bewegbaren Abschnitt (412, 414; 522, 524) umfasst, die zwischen einer ersten Position und einer zweiten Position bewegbar ist, wobei der bewegbare Abschnitt in die erste Position vorgespannt ist, wobei die Seite eine erste Seite ist, der Karton ferner eine zweite Seite, eine dritte Seite und eine vierte Seite umfasst, wobei jede der ersten, zweiten, dritten und vierten Seite sich von der Unterseite bis zur Oberseite des Kartons erstreckt und der bewegbare Abschnitt einen bewegbaren Abschnitt auf zwei gegenüberliegenden Seiten der ersten, der zweiten, der dritten und der vierten Seite umfasst und wobei jeder der bewegbaren Abschnitte eine obere Erweiterung (402, 512), die sich von einem Oberteil (398; 508) der entsprechenden Seite entlang einer oberen Faltlinie (374; 484) erstreckt, und eine untere Erweiterung (404; 514) aufweist, die sich von einem Unterteil (400; 510) der entsprechenden Seite entlang einer unteren Faltlinie (378; 488) erstreckt, wobei die bewegbaren Abschnitte von der ersten Position in die zweite Position bewegbar sind, indem die erste und die zweite Erweiterung entlang der oberen und der unteren Faltlinie umgeknickt werden, um die obere und die untere Erweiterung in Bezug auf die entsprechende Seite schräg abzuwinkeln und dadurch die Querschnittsfläche des Kartons entlang der Höhe (394; 504) des Kartons zu variieren, die zwischen der Oberseite und der Unterseite gemessen ist; und

eine durch Wärme schrumpfbare Schicht (420; 532), die zumindest einen Teil des Kartons zum Ausbilden des Kartons überlappt, wobei die durch Wärme schrumpfbare Schicht den bewegbaren Abschnitt von der ersten Position in die zweite Position bewegt, wenn die durch Wärme schrumpfbare Schicht erhitzt wird, um mit dem Teil des Kartons in Kontakt zu gelangen.

34. Anordnung nach Anspruch 33, wobei die zwei gegenüberliegenden Seiten der ersten, der zweiten, der dritten und der vierten Seite jeweils einen Zwischenabschnitt zwischen der oberen und der unteren Erweiterung der jeweiligen Seite umfassen.

35. Anordnung nach Anspruch 33, wobei der Karton einen im Allgemeinen rechteckigen Querschnitt aufweist.

36. Anordnung nach Anspruch 33, wobei zumindest eine der ersten, der zweiten, der dritten und der vierten Seite eine gekrümmte Kante aufweist.

37. Anordnung nach Anspruch 36, wobei die gekrümmte Kante sich nur über einen Teil der Höhe des Kartons erstreckt.

38. Anordnung (422; 644) zum Verpacken eines Produkts, wobei die Anordnung Folgendes umfasst:

einen Karton (380; 600) mit einer Oberseite (390; 610), einer Unterseite (392; 502) und einer Seite (382, 384, 386, 388; 602, 604, 606, 608), die sich zwischen der Oberseite und der Unterseite erstreckt, wobei zumindest eine von Oberseite, Unterseite und Seite einen bewegbaren Abschnitt umfasst, die zwischen einer ersten Position und einer zweiten Position bewegbar ist, wobei der bewegbare Abschnitt (412, 414; 630, 632, 634, 636) in die erste Position vorgespannt ist, wobei die Seite eine Vielzahl an Seiten ist, die sich von der Unterseite bis zur Oberseite des Kartons erstrecken, wobei der bewegbare Abschnitt einen bewegbaren Abschnitt auf jeder der Vielzahl an Seiten umfasst und jeder der bewegbaren Abschnitte einen Zwischenteil (370; 622) der entsprechenden Seite umfasst, die sich von einem Oberteil (398; 618) der entsprechenden Seite entlang einer oberen Faltlinie (374; 596) und von einem Unterteil (400; 620) der entsprechenden Seite einer unteren Faltlinie (378; 598) erstreckt, wobei die bewegbaren Abschnitte durch Umknicken entlang der oberen und der unteren Faltlinie von der ersten Position in die zweite Position bewegbar sind, um die Zwischenabschnitte in Bezug auf die entsprechenden Seiten schräg abzuwinkeln und

dadurch die Querschnittsfläche des Kartons entlang der Höhe (394; 614) des Kartons zu variieren, die zwischen der Oberseite und der Unterseite gemessen ist; und
eine durch Wärme schrumpfbare Schicht (420; 642), die zumindest einen Teil des Kartons zum Ausbilden des Kartons überlappt, wobei die durch Wärme schrumpfbare Schicht den bewegbaren Abschnitt von der ersten Position in die zweite Position bewegt, wenn die durch Wärme schrumpfbare Schicht erhitzt wird, um mit dem Teil des Kartons in Kontakt zu gelangen.

39. Anordnung nach Anspruch 38, wobei die Vielzahl an Seiten vier Seiten und der Karton einen im Allgemeinen rechteckigen Querschnitt aufweist.

40. Anordnung nach Anspruch 38, wobei zumindest eine der Vielzahl an Seiten eine gekrümmte Kante aufweist.

41. Anordnung nach Anspruch 40, wobei die gekrümmte Kante sich nur über einen Teil der Höhe des Kartons erstreckt.

42. Anordnung nach Anspruch 38, wobei zumindest eine der Vielzahl an Seiten eine gekrümmte Oberfläche aufweist.

43. Anordnung nach Anspruch 42, wobei die gekrümmte Oberfläche sich nur über einen Teil der Höhe des Kartons erstreckt.

44. Verfahren zum Verpacken eines Produkts, wobei das Verfahren Folgendes umfasst:

Ausbilden eines Kartons (100; 266) mit einer Oberseite (114; 276), einer Unterseite (116; 278) und einer Seite (102, 104, 106, 108, 110, 112; 268, 270, 272, 274), die sich zwischen der Oberseite und der Unterseite erstreckt, und einem bewegbaren Abschnitt (136, 138, 140, 142, 144, 146; 298, 300, 302, 304), der zwischen einer ersten Position und einer zweiten Position bewegbar ist, wobei der bewegbare Abschnitt (412, 414; 630, 632, 634, 636) in die erste Position vorgespannt ist, wobei die Seite eine Vielzahl an Seiten ist, der Karton sich über eine Höhe (118; 280) erstreckt, die zwischen der Oberseite und der Unterseite des Kartons gemessen ist, die Seite eine Vielzahl an Seiten umfasst, der bewegbare Abschnitt einen bewegbaren Abschnitt an jeder der Vielzahl an Seiten umfasst, jeder der bewegbaren Abschnitte eine obere Erweiterung (126; 288), die sich von einem Oberteil (122; 284) der entsprechenden Seite entlang einer oberen Faltlinie (90; 256) erstreckt, und eine untere Erweiterung (128; 290) aufweist, die sich von einem Unterteil (124; 286) der entsprechenden Seite entlang einer unteren Faltlinie (94; 260) erstreckt und mit der oberen Erweiterung der entsprechenden Seite entlang einer mittleren Faltlinie (96; 262) verbunden ist, und jede der mittleren Faltlinien der bewegbaren Abschnitte entlang einer Längsmittelachse (120; 282) des Kartons in einem im Allgemeinen gleichen Abstand von der Oberseite des Kartons angeordnet ist, wobei die mittleren Faltlinien der bewegbaren Abschnitte in der ersten Position in einem größeren Radialabstand von der Längsmittelachse des Kartons beabstandet sind als in der zweiten Position, wobei die bewegbaren Abschnitte von der ersten Position in die zweite Position bewegbar sind, indem die oberen und die unteren Erweiterungen entlang der oberen, der unteren und der mittleren Faltlinien umgeknickt werden, um die mittleren Faltlinien im allgemeinen radial zur Längsmittelachse des Kartons hin zu bewegen, um die zwischen den bewegbaren Abschnitten definierte Querschnittsfläche des Kartons zu verringern;
Wickeln einer durch Wärme schrumpfbaren Schicht (152; 310) um zumindest einen Teil des Kartons, der zumindest einen Teil des bewegbaren Abschnitts des Kartons umfasst; und
Bewegen des bewegbaren Abschnitts von der ersten Position in die zweite Position, um eine geformte Verpackungsanordnung auszubilden, indem die durch Wärme schrumpfbare Schicht erhitzt wird, um die durch Wärme schrumpfbare Schicht mit zumindest einem Teil des bewegbaren Abschnitts in Kontakt zu schrumpfen.

45. Verfahren nach Anspruch 44, wobei das Ausbilden eines Kartons ferner das Ausbilden eines Kartons mit sechs Seiten und einem im Allgemeinen hexagonalen Querschnitt umfasst.

46. Verfahren nach Anspruch 44, wobei das Ausbilden eines Kartons ferner das Ausbilden eines Kartons mit vier Seiten und einem im Allgemeinen rechteckigen Querschnitt umfasst.

47. Verfahren zum Verpacken eines Produkts, wobei das Verfahren Folgendes umfasst:

Ausbilden eines Kartons (740) mit einer Oberseite (750), einer Unterseite (752) und einer Seite (742, 744, 746, 748, 784, 786), die sich zwischen der Oberseite und der Unterseite erstreckt, und eines bewegbaren Abschnitts (772, 774, 776, 778), der zwischen einer ersten Position und einer zweiten Position bewegbar ist, wobei der bewegbare Abschnitt in die erste Position vorgespannt ist, wobei die Seite eine erste Seite ist, der Karton ferner eine zweite Seite,

eine dritte Seite und eine vierte Seite umfasst, wobei jede der ersten, zweiten, dritten und vierten Seite sich von der Unterseite bis zur Oberseite des Kartons erstreckt und der bewegbare Abschnitt eine erste Erweiterung (754, 756, 758, 760), die sich von der ersten Seite entlang einer ersten Faltlinie (726) erstreckt, und eine zweite Erweiterung (754, 756, 758, 760) umfasst, die sich von der zweiten Seite entlang einer zweiten Faltlinie (734) erstreckt, wobei der bewegbare Abschnitt von der ersten Position in die zweite Position bewegbar ist, indem die erste und die zweite Erweiterung entlang der ersten und der zweiten Faltlinie umgeknickt werden, um die erste Erweiterung über die zweite Erweiterung zu bewegen, sodass die erste Erweiterung die zweite Erweiterung zumindest teilweise überlappt, wobei in der ersten Position eine Öffnung (730) zwischen der ersten und der zweiten Erweiterung definiert ist und in der zweiten Position die erste und die zweite Erweiterung eine fünfte Seite des Kartons ausbilden, die zwischen der ersten und der zweiten Seite definiert ist und in Bezug auf die erste und die zweite Seite schräg abgewinkelt ist;

Wickeln einer durch Wärme schrumpfbaren Schicht (788) um zumindest einen Teil des Kartons, der zumindest einen Teil eines bewegbaren Abschnitts des Kartons umfasst; und

Bewegen des bewegbaren Abschnitts von der ersten Position in die zweite Position, um eine geformte Verpackungsanordnung (790) auszubilden, indem die durch Wärme schrumpfbare Schicht erhitzt wird, um die durch Wärme schrumpfbare Schicht mit zumindest einem Teil des bewegbaren Abschnitts in Kontakt zu schrumpfen.

48. Verfahren nach Anspruch 47, wobei das Ausbilden eines Kartons das Ausbilden eines Kartons umfasst, wobei zumindest eine der ersten und der zweiten Faltlinie zumindest teilweise gekrümmt ist.

49. Verfahren nach Anspruch 47, wobei das Ausbilden eines Kartons das Ausbilden eines Kartons umfasst, wobei die erste Seite eine gekrümmte Oberfläche aufweist, wenn der bewegbare Abschnitt sich in der zweiten Position befindet.

50. Verfahren nach Anspruch 47, wobei das Ausbilden eines Kartons das Ausbilden eines Kartons umfasst, wobei die fünfte Seite sich nur über einen Teil der Höhe des Kartons erstreckt, der zwischen der Oberseite und der Unterseite des Kartons gemessen ist.

51. Verfahren nach Anspruch 47, wobei das Ausbilden eines Kartons das Ausbilden eines Kartons umfasst, wobei die erste Erweiterung im Wesentlichen die zweite Erweiterung überlappt, wenn der bewegbare Abschnitt sich in der zweiten Position befindet.

52. Verfahren zum Verpacken eines Produkts, wobei das Verfahren Folgendes umfasst:

Ausbilden eines Kartons (380; 490) mit einer Oberseite (390; 500), einer Unterseite (392; 502) und einer Seite (382, 384, 386, 388; 492, 494, 496, 498), die sich zwischen der Oberseite und der Unterseite erstreckt, wobei zumindest eine von Oberseite, Unterseite und Seite einen bewegbaren Abschnitt (412, 414; 522, 524) umfasst, der zwischen einer ersten Position und einer zweiten Position bewegbar ist, wobei der bewegbare Abschnitt in die erste Position vorgespannt ist, wobei die Seite eine erste Seite ist, der Karton ferner eine zweite Seite, eine dritte Seite und eine vierte Seite umfasst, wobei jede der ersten, zweiten, dritten und vierten Seite sich von der Unterseite bis zur Oberseite des Kartons erstreckt und der bewegbare Abschnitt einen bewegbaren Abschnitt auf zwei gegenüberliegenden Seiten der ersten, der zweiten, der dritten und der vierten Seite umfasst und wobei jeder der bewegbaren Abschnitte eine obere Erweiterung (402, 512), die sich von einem Oberteil (398; 508) der entsprechenden Seite entlang einer oberen Faltlinie (374; 484) erstreckt, und eine untere Erweiterung (404; 514) aufweist, die sich von einem Unterteil (400; 510) der entsprechenden Seite entlang einer unteren Faltlinie (378; 488) erstreckt, wobei die bewegbaren Abschnitte von der ersten Position in die zweite Position bewegbar sind, indem die obere und die untere Erweiterung entlang der oberen und der unteren Faltlinie umgeknickt werden, um die obere und die untere Erweiterung in Bezug auf die entsprechende Seite schräg abzuwinkeln und dadurch die Querschnittsfläche des Kartons entlang der Höhe (394; 504) des Kartons zu variieren, die zwischen der Oberseite und der Unterseite gemessen ist;

Wickeln einer durch Wärme schrumpfbaren Schicht (420; 532) um zumindest einen Teil des Kartons, der zumindest einen Teil eines bewegbaren Abschnitts des Kartons umfasst; und

Bewegen des bewegbaren Abschnitts von der ersten Position in die zweite Position, um eine geformte Verpackungsanordnung (422; 534) auszubilden, indem die durch Wärme schrumpfbare Schicht erhitzt wird, um die durch Wärme schrumpfbare Schicht mit zumindest einem Teil des bewegbaren Abschnitts in Kontakt zu schrumpfen.

53. Verfahren nach Anspruch 52, wobei das Ausbilden eines Kartons das Ausbilden eines Kartons umfasst,

wobei die zwei gegenüberliegenden Seiten der ersten, der zweiten, der dritten und der vierten Seite jeweils einen Zwischenteil zwischen der oberen und der unteren Erweiterung der entsprechenden Seite umfassen.

54. Verfahren nach Anspruch 52, wobei das Ausbilden eines Kartons das Ausbilden eines Kartons mit einem im Allgemeinen rechteckigen Querschnitt umfasst.

55. Verfahren nach Anspruch 52, wobei das Ausbilden eines Kartons das Ausbilden eines Kartons umfasst, wobei zumindest eine der ersten, der zweiten, der dritten und der vierten Seite eine gekrümmte Kante umfasst.

56. Verfahren nach Anspruch 55, wobei das Ausbilden eines Kartons das Ausbilden eines Kartons umfasst, sodass die gekrümmte Kante sich nur über einen Teil der Höhe des Kartons erstreckt.

57. Verfahren zum Verpacken eines Produkts, wobei das Verfahren Folgendes umfasst:

Ausbilden eines Kartons (380; 600) mit einer Oberseite (390; 610), einer Unterseite (392; 612) und einer Seite (382, 384, 386, 388; 602, 604, 606, 608), die sich zwischen der Oberseite und der Unterseite erstreckt, und einem bewegbaren Abschnitt (412, 414; 630, 632, 634, 636), der zwischen einer ersten Position und einer zweiten Position bewegbar ist, wobei der bewegbare Abschnitt in die erste Position vorgespannt ist, wobei die Seite eine Vielzahl an Seiten ist, die sich von der Unterseite bis zur Oberseite des Kartons erstrecken, wobei der bewegbare Abschnitt einen bewegbaren Abschnitt auf jeder der Vielzahl an Seiten umfasst und jeder der bewegbaren Abschnitte einen Zwischenteil (370; 622) der entsprechenden Seite umfasst, die sich von einem Oberteil (398; 618) der entsprechenden Seite entlang einer oberen Faltlinie (374; 596) und von einem Unterteil (400; 620) der entsprechenden Seite einer unteren Faltlinie (378; 598) erstreckt, wobei die bewegbaren Abschnitte durch Umknicken entlang der oberen und der unteren Faltlinie von der ersten Position in die zweite Position bewegbar sind, um die Zwischenabschnitte in Bezug auf die entsprechenden Seiten schräg abzuwinkeln und dadurch die Querschnittsfläche des Kartons entlang der Höhe (394; 614) des Kartons zu variieren, die zwischen der Oberseite und der Unterseite gemessen ist;
Wickeln einer durch Wärme schrumpfbaren Schicht (420; 642) um zumindest einen Teil des Kartons, der zumindest einen Teil eines bewegbaren Abschnitts des Kartons umfasst; und
Bewegen des bewegbaren Abschnitts von der ersten Position in die zweite Position, um eine geformte Verpackungsanordnung (422; 644) auszubilden, indem die durch Wärme schrumpfbare Schicht erhitzt wird, um die durch Wärme schrumpfbare Schicht mit zumindest einem Teil des bewegbaren Abschnitts in Kontakt zu schrumpfen.

58. Verfahren nach Anspruch 57, wobei das Ausbilden eines Kartons das Ausbilden eines Kartons mit vier Seiten und einem im Allgemeinen rechteckigen Querschnitt umfasst.

59. Verfahren nach Anspruch 57, wobei das Ausbilden eines Kartons das Ausbilden eines Kartons umfasst, sodass zumindest eine der Vielzahl an Seiten eine gekrü m mte Kante umfasst.

60. Verfahren nach Anspruch 59, wobei das Ausbilden eines Kartons das Ausbilden eines Kartons umfasst, sodass die gekrümmte Kante sich nur über einen Teil der Höhe des Kartons erstreckt.

61. Verfahren nach Anspruch 57, wobei das Ausbilden eines Kartons das Ausbilden eines Kartons umfasst, sodass zumindest eine der Vielzahl an Seiten eine gekrümmte Oberfläche umfasst.

62. Verfahren nach Anspruch 61, wobei das Ausbilden eines Kartons das Ausbilden eines Kartons umfasst, sodass die gekrümmte Oberfläche sich nur über einen Teil der Höhe des Kartons erstreckt.

63. Verfahren zum Aufbringen eines durch Wärme schrumpfbaren Films (152; 310; 642; 788) auf einen Karton (100; 266; 380; 600; 740) zum Ausbilden einer Gestalt des Kartons, wobei der Karton eine obere Fläche (114; 276; 610; 750), eine untere Fläche (116; 278; 612; 752), eine Vielzahl an Seitenflächen (102, 104, 106, 108, 110, 112; 268, 270, 272, 274; 602, 604, 606, 608; 742, 744, 746, 748), die sich zwischen der oberen und der unteren Fläche erstreckt, und einen bewegbaren Abschnitt (136, 138, 140, 142, 144, 146; 298, 300 302, 304; 630, 632, 634, 636; 772, 774, 776, 778) umfasst, der zwischen einer ersten Position und einer zweiten Position bewegbar ist, wobei das Verfahren Folgendes umfasst:

Bereitstellen eines durch Wärme schrumpfbaren, aber nicht geschrumpften Films;
Wickeln des Films in nicht erhitztem Zustand um zumindest einen Teil des Kartons, der zumindest einen Teil des bewegbaren Abschnitts des Kartons umfasst, wobei der bewegbare Abschnitt zumindest eine Öffnung (98; 264) mit einer Größe und zumindest eine bewegbare Flä-

che umfasst, wobei die zumindest eine Öffnung ein Ausschnitt ist, der in zumindest einer der Vielzahl an Seitenflächen definiert ist; und
Bewegen des bewegbaren Abschnitts von der ersten Position in die zweite Position, indem der durch Wärme schrumpfbare Film erhitzt wird, um den durch Wärme schrumpfbaren Film mit zumindest einem Teil des bewegbaren Abschnitts in Kontakt zu schrumpfen, wobei das Bewegen des bewegbaren Abschnitts das Bewegen der zumindest einen bewegbaren Fläche und das Verringern der Größe der zumindest einen Öffnung des bewegbaren Abschnitts umfasst.

64. Verfahren nach Anspruch 63, wobei das Bereitstellen eines durch Wärme schrumpfbaren, aber nicht geschrumpften Films Folgendes umfasst:

Bereitstellen eines durch Wärme schrumpfbaren, aber nicht geschrumpften Films mit einem Vorderende und einem Bandende, das vom Vorderende getrennt ist;
haftschlüssiges Verbinden des Vorderendes des Films mit dem Karton;
Wickeln des Films in nicht erhitztem Zustand um zumindest einen Teil des Kartons, der zumindest einen Teil des bewegbaren Abschnitts des Kartons umfasst, und
Haftschlüssiges Verbinden des Bandendes des Films mit zumindest einem des Kartons und des Films selbst.

65. Verfahren nach Anspruch 64, wobei der Karton ferner eine Fuge umfasst, wobei die zumindest eine Fuge ausgebildet wird, wenn zumindest zwei Flächen aufeinander angehaftet werden, und wobei das haftschlüssige Verbinden des Vorderendes des Films mit dem Karton ferner das haftschlüssige Verbinden des Vorderendes des Films innerhalb einer Fuge des Kartons umfasst, sodass das Vorderende nicht sichtbar ist.

66. Verfahren nach Anspruch 63, wobei das Bereitstellen eines durch Wärme schrumpfbaren, aber nicht geschrumpften Films ferner das Bereitstellen eines durch Wärme schrumpfbaren, aber nicht geschrumpften Films in Form einer vor-ausgebildeten Hülle umfasst, wobei die Hülle eine Öffnung aufweist, die bemessen ist, sodass sie den Karton aufnehmen kann.

67. Verfahren nach Anspruch 66, wobei das Bereitstellen eines durch Wärme schrumpfbaren, aber nicht geschrumpften Films in Form einer vor-ausgebildeten Hülle ferner Folgendes umfasst:

Einbringen des Kartons in die Hüllenöffnung; und
Bewegen des bewegbaren Abschnitts von der ersten Position in die zweite Position, um eine Gestalt des Kartons auszubilden, indem die durch Wärme schrumpfbare Hülle erhitzt wird, um die durch Wärme schrumpfbare Hülle mit zumindest einem Teil des bewegbaren Abschnitts in Kontakt zu schrumpfen.

68. Verfahren nach Anspruch 63, wobei das Bereitstellen eines durch Wärme schrumpfbaren, aber nicht geschrumpften Films ferner das Bereitstellen eines durch Wärme schrumpfbaren, aber nicht geschrumpften Films umfasst, der darauf eine Markierung umfasst.

69. Verfahren nach Anspruch 63, wobei das Bereitstellen eines durch Wärme schrumpfbaren, aber nicht geschrumpften Films ferner das Bereitstellen eines durch Wärme schrumpfbaren, aber nicht geschrumpften Films umfasst, der darauf eine Markierung umfasst, die Grafiken für den Karton umfasst, wobei die Grafiken unter Verwendung einer deckenden Tinte aufgebracht werden.

70. Verfahren nach Anspruch 63, wobei das Bereitstellen eines durch Wärme schrumpfbaren, aber nicht geschrumpften Films ferner das Bereitstellen eines durch Wärme schrumpfbaren, aber nicht geschrumpften Films umfasst, der darauf eine Markierung umfasst, die Grafiken für den Karton umfasst, wobei die Grafiken unter Verwendung einer durchscheinenden Tinte aufgebracht werden, sodass die Filmgrafiken mit zusätzlichen, auf dem Karton aufgedruckten Grafiken abgestimmt sind.

71. Verfahren nach Anspruch 63, wobei das Bereitstellen eines durch Wärme schrumpfbaren, aber nicht geschrumpften Films ferner das Bereitstellen eines durch Wärme schrumpfbaren, aber nicht geschrumpften Films umfasst, der aus zumindest einem von Polyethylen, Polypropylen, Polyvinylchlorid, Polyester, Polyesterglycol, Nylon und/oder orientiertem Polystyrol hergestellt ist.

72. Verfahren nach Anspruch 63, wobei der Karton sich über eine Höhe erstreckt, die zwischen der Oberseite und der Unterseite des Kartons gemessen ist, und der Film sich über eine Höhe erstreckt, die größer als die Kartonhöhe ist, und wobei das Wickeln des Films ferner Folgendes umfasst:

Wickeln des Films in nicht erhitztem Zustand um den Karton, der den bewegbaren Abschnitt des Kartons umfasst, wobei der Film sich von zumindest einem der Oberseite und der Unterseite des Kartons weg über einen Abstand nach Außen hin erstreckt; und

Erhitzen des durch Wärme schrumpfbaren Films, um den durch Wärme schrumpfbaren Film in Kontakt mit zumindest einem Teil von zumindest einer der Oberseite und der Unterseite des Kartons zu schrumpfen, um zumindest eines von einer Zugriffsabwehrmaßnahme, einer Feuchtigkeitsbarriere und einer Durchrieselbarriere bereitzustellen.

73. Verfahren nach Anspruch 63, wobei der Karton sich über eine Höhe erstreckt, die zwischen der Oberseite und der Unterseite des Kartons gemessen ist, und der Film sich über eine Höhe erstreckt, die kleiner als die Kartonhöhe ist, und wobei das Wickeln des Films ferner das Wickeln des Films in einem nicht erhitzten Zustand um einen Abschnitt des Kartons umfasst, der zumindest einen Teil des bewegbaren Abschnitts des Kartons umfasst.

74. Verfahren nach Anspruch 63, wobei das Bewegen des bewegbaren Abschnitts ferner Folgendes umfasst:

Bereitstellen einer Vielzahl an Arten von durch Wärme schrumpfbaren Filmen, die durch Wärme schrumpfbare Filme mit unterschiedlichen Schrumpfausrichtungen und -prozentsätzen umfassen; und
Bewegen des bewegbaren Abschnitts von der ersten Position in die zweite Position unter Verwendung der Vielzahl an Arten von durch Wärme schrumpfbaren Filmen, um eine Gestalt des Kartons auszubilden, indem der durch Wärme schrumpfbare Film erhitzt wird, um den durch Wärme schrumpfbaren Film in Kontakt mit zumindest einem Teil des bewegbaren Abschnitts zu schrumpfen.

75. Verfahren nach Anspruch 63, wobei das Bewegen des bewegbaren Abschnitts ferner das Beaufschlagen einer Vielzahl an verschiedenen Erwärmungstemperaturen auf zumindest einen Teil des durch Wärme schrumpfbaren Films umfasst, um das Schrumpfungsausmaß des Films zu steuern.

76. Verfahren nach Anspruch 63, ferner umfassend:

Steuern des Schrumpfungsausmaßes des Films durch zumindest eines von Verwenden einer speziellen Art von Film, Steuern der Erwärmungstemperatur und Ausrichten des Erwärmens auf den Film; und
Bewegen des bewegbaren Abschnitts von der ersten Position in die zweite Position, um die Gestalt auszubilden, die zumindest einen Ausschnitt im Karton umfasst, sodass ein im Karton enthaltenes Produkt sichtbar ist.

77. Verfahren nach Anspruch 63, wobei das Bewegen des bewegbaren Abschnitts ferner das Verändern einer Querschnittsfläche von zumindest einem Teil des Kartons umfasst.

78. Verfahren nach Anspruch 63, wobei der bewegbare Abschnitt einen ersten bewegbaren Abschnitt und einen zweiten bewegbaren Abschnitt umfasst und das Bewegen des bewegbaren Abschnitts ferner das Überlappen des ersten bewegbaren Abschnitts über dem zweiten bewegbaren Abschnitt umfasst.

79. System zum Aufbringen eines durch Wärme schrumpfbaren Films (152; 310; 642; 788) auf einen Karton (100; 266; 380; 600; 740) zum Ausbilden einer Gestalt des Kartons, wobei das System Folgendes umfasst:

einen Karton mit einer oberen Fläche (114; 276; 610; 750), einer unteren Fläche (116; 278; 612; 752), einer Vielzahl an Seitenflächen (102, 104, 106, 108, 110, 112; 268, 270, 272, 274; 602, 604, 606, 608; 742, 744, 746, 748), die sich zwischen der oberen und der unteren Fläche erstreckt, und einem bewegbaren Abschnitt (136, 138, 140, 142, 144, 146; 298, 300, 302, 304; 630, 632, 634, 636; 772, 774, 776, 778), der zwischen einer ersten Position und einer zweiten Position bewegbar ist,
eine Wickelvorrichtung, die konfiguriert ist, um den durch Wärme schrumpfbaren, aber nicht geschrumpften Film in nicht erhitztem Zustand um zumindest einen Teil des Kartons zu wickeln, der zumindest einen Teil des bewegbaren Abschnitts des Kartons umfasst, wobei der bewegbare Abschnitt zumindest eine Öffnung (98; 264) mit einer Größe und zumindest eine bewegbare Fläche umfasst, wobei die zumindest eine Öffnung ein Ausschnitt ist, der in zumindest einer der Vielzahl an Seitenflächen definiert ist; und
eine Heizvorrichtung, die konfiguriert ist, um zumindest einen Teil des durch Wärme schrumpfbaren Films in Kontakt mit zumindest einem Teil des bewegbaren Abschnitts zu erhitzen, um den bewegbaren Bereich von der ersten Position in die zweite Position zu bewegen, um die Gestalt des Kartons auszubilden, wobei das Bewegen des bewegbaren Abschnitts das Bewegen der zumindest einen bewegbaren Fläche und das Verringern der Größe der zumindest einen Öffnung des bewegbaren Abschnitts umfasst.

80. System nach Anspruch 79, wobei der schrumpfbare, aber nicht geschrumpfte Film ein Vorderende und ein Bandende umfasst, das vom Vorderende getrennt ist, und wobei die Wickelvorrichtung ferner konfiguriert ist, um:

das Vorderende des Films mit dem Karton haftschlüssig zu verbinden;
den Film in nicht erhitztem Zustand um zumindest einen Teil des Kartons zu wickeln, der zumindest einen Teil des bewegbaren Abschnitts des Kartons umfasst, und
das Bandende des Films mit zumindest einem des Kartons und des Films selbst haftschlüssig zu verbinden.

81. System nach Anspruch 80, wobei der Karton ferner eine Fuge umfasst, wobei die zumindest eine Fuge ausgebildet wird, wenn zumindest zwei Flächen aufeinander angebracht werden, und wobei die Wickelvorrichtung ferner konfiguriert ist, um das Vorderende des Films in einer Fuge des Kartons haftschlüssig zu verbinden, sodass das Vorderende nicht sichtbar ist.

82. System nach Anspruch 79, wobei die Wickelvorrichtung ferner konfiguriert ist, um den Karton in einen durch Wärme schrumpfbaren, aber nicht geschrumpften Film in Form einer vor-ausgebildeten Hülle einzubringen, wobei die Hülle eine Öffnung aufweist, die bemessen ist, sodass sie den Karton aufnehmen kann.

Revendications

1. Procédé pour appliquer une pièce thermorétractable à un carton (1100 ; 1101 ; 1266 ; 1400 ; 1600 ; 1800) pour obtenir une forme du carton, le carton comprenant un panneau supérieur (1056 ; 1228 ; 1334 ; 1532, 1538 ; 1726), un panneau inférieur (1060 ; 1232 ; 1338 ; 1526 ; 1730), au moins un panneau latéral (1022, 1024, 1026, 1028 ; 1023, 1025, 1027, 1029 ; 1202, 1204, 1206, 1208 ; 1302, 1304, 1306, 1308, 1310, 1312 ; 1504, 1506, 1508, 1512, 1514, 1516 ; 1702, 1704, 1706, 1708) s'étendant entre le panneau supérieur et le panneau inférieur et une section mobile (1024, 1026 ; 1025, 1027, 1029 ; 1202, 1204, 1206, 1208 ; 1302, 1304, 1306, 1308, 1310, 1312 ; 1504, 1506, 1508, 1512, 1514, 1516 ; 1702, 1704, 1706, 1708, 1726, 1730, 1734, 1738) qui peut être déplacée entre une première position et une deuxième position, le procédé comprenant :

la fourniture d'une pièce thermorétractable (1090 ; 1091 ; 1272 ; 1382 ; 1576, 1580 ; 1770, 1774) dans une configuration prérétractée ;
l'accouplement de la pièce thermorétractable dans la configuration prérétractée à au moins une partie d'une surface intérieure (1021 ; 1022 ; 1201 ; 1301 ; 1501 ; 1701) d'une découpe de matériau en feuille (1020 ; 1021 ; 1200 ; 1300 ; 1500 ; 1700) comprenant au moins une partie de la section mobile ;
la formation du carton à partir de la découpe de matériau en feuille, dans lequel la pièce thermorétractable dans la configuration prérétractée est accouplée à la surface intérieure du carton formé ; et
le déplacement de la section mobile de la première position à la deuxième position pour obtenir la forme du carton en chauffant la pièce thermorétractable pour rétracter la pièce thermorétractable dans une configuration rétractée.

2. Procédé selon la revendication 1, dans lequel l'accouplement de la pièce thermorétractable comprend en outre :

l'application d'un adhésif en un motif déposé à au moins une partie de la section mobile ;
la découpe de la pièce thermorétractable pour qu'elle corresponde au motif déposé ; et
le collage de la pièce thermorétractable à la surface intérieure dans le motif déposé.

3. Procédé selon la revendication 2, dans lequel l'application d'un adhésif en un motif déposé comprend en outre l'application de l'adhésif de manière à entourer sensiblement un vide (1088 ; 1094 ; 1264, 1266, 1268, 1270 ; 1370, 1372, 1374, 1376, 1378, 1380 ; 1560, 1562 ; 1760, 1762, 1764, 1766) défini au moins partiellement par la section mobile.

4. Procédé selon la revendication 2, dans lequel le collage de la pièce thermorétractable à la surface intérieure comprend en outre le collage de la pièce thermorétractable à au moins une partie de la section mobile.

5. Procédé selon la revendication 1, comprenant en outre le remplissage du carton avec un contenu avant le déplacement de la section mobile.

6. Procédé selon la revendication 1, comprenant en outre le remplissage du carton avec un contenu après le déplacement de la section mobile.

7. Procédé selon la revendication 1, dans lequel le déplacement de la section mobile comprend en outre la concentration de chaleur au niveau de la pièce thermorétractable.

8. Procédé selon la revendication 1, dans lequel le déplacement de la section mobile comprend en outre l'application de chaleur aux parties de la pièce thermorétractable avec différentes intensités pour rétracter de manière différentielle la pièce thermorétractable.

9. Procédé selon la revendication 1, dans lequel le déplacement de la section mobile comprend en outre

la modification d'une intensité de la chaleur appliquée à la section mobile.

10. Procédé selon la revendication 1, dans lequel le carton comprend une première section mobile reliée à une deuxième section mobile, et le déplacement de la section mobile comprend en outre la traction de la première section mobile vers la deuxième section mobile pour fermer au moins partiellement un vide (1088 ; 1094 ; 1264, 1266, 1268, 1270 ; 1370, 1372, 1374, 1376, 1378, 1380 ; 1560, 1562 ; 1760, 1762, 1764, 1766) défini entre la première section mobile et la deuxième section mobile.

11. Procédé selon la revendication 1, dans lequel la pièce thermorétractable comprend au moins l'un du polyéthylène, du polypropylène, du polychlorure de vinyle, du polyester, du polyester glycol, du nylon et/ou du polystyrène orienté.

12. Procédé selon la revendication 1, dans lequel le déplacement de la section mobile comprend en outre :

la fourniture d'une pluralité de pièces thermorétractables dans une configuration prérétractée ayant différentes orientations et différents pourcentages de rétraction ;
l'accouplement de chaque pièce thermorétractable à une section mobile correspondante d'une pluralité de sections mobiles ; et
le déplacement de chaque section mobile de la première position à la deuxième position pour obtenir la forme du carton en chauffant chaque pièce thermorétractable pour rétracter chaque pièce thermorétractable.

13. Procédé selon la revendication 1, dans lequel le déplacement de la section mobile comprend en outre l'application d'une pluralité de températures de chauffage différentes à au moins une partie de la pièce thermorétractable pour commander un degré de rétraction de la pièce thermorétractable.

14. Procédé selon la revendication 1, comprenant en outre :

la commande d'un degré de rétraction de la pièce thermorétractable par au moins l'une de l'utilisation d'un type spécifique de matériau en film, de la commande d'une température du chauffage et de la concentration du chauffage sur la pièce thermorétractable ; et
le déplacement de la section mobile de la première position à la deuxième position pour obtenir la forme qui comprend au moins une découpe dans le carton de sorte qu'un produit inclus dans le carton soit visible.

15. Procédé selon la revendication 1, dans lequel le déplacement de la section mobile comprend en outre la modification d'une section transversale d'au moins une partie du carton.

16. Procédé selon la revendication 1, dans lequel le carton comprend une première section mobile et une deuxième section mobile, le procédé comprenant en outre :

l'accouplement d'une deuxième pièce thermorétractable à une deuxième section mobile du carton ; et
le déplacement de la deuxième section mobile d'une première position à une deuxième position pour obtenir une forme du carton en chauffant la deuxième pièce thermorétractable pour rétracter la deuxième pièce thermorétractable dans une configuration rétractée.

17. Procédé selon la revendication 16, dans lequel le déplacement de la deuxième section mobile comprend en outre le déplacement de la première section mobile vers la deuxième section mobile pour fermer un vide (1088 ; 1094 ; 1264, 1266, 1268, 1270 ; 1370, 1372, 1374, 1376, 1378, 1380 ; 1560, 1562 ; 1760, 1762, 1764, 1766) défini le long d'une ligne de pliage accouplant la première section mobile à la deuxième section mobile.

18. Procédé pour former un ensemble d'emballage (1150, 1151 ; 1299 ; 1450 ; 1650 ; 1850) comprenant un carton (1100 ; 1101 ; 1266 ; 1400 ; 1600 ; 1800) présentant une forme, le carton comprenant un panneau supérieur (1056 ; 1228 ; 1334 ; 1532, 1538 ; 1726), un panneau inférieur (1060 ; 1232 ; 1338 ; 1526 ; 1730), au moins un panneau latéral (1022, 1024, 1026, 1028 ; 1023, 1025, 1027, 1029 ; 1202, 1204, 1206, 1208 ; 1302, 1304, 1306, 1308, 1310, 1312 ; 1504, 1506, 1508, 1512, 1514, 1516 ; 1702, 1704, 1706, 1708) s'étendant entre le panneau supérieur et le panneau inférieur et une section mobile (1024, 1026 ; 1025, 1027, 1029 ; 1202, 1204, 1206, 1208 ; 1302, 1304, 1306, 1308, 1310, 1312 ; 1504, 1506, 1508, 1512, 1514, 1516 ; 1702, 1704, 1706, 1708, 1726, 1730, 1734, 1738) qui peut être déplacée entre une première position et une deuxième position, le procédé comprenant :

la fourniture d'une découpe de matériau en feuille (1020 ; 1021 ; 1200 ; 1300 ; 1500 ; 1700) ayant une première section mobile accouplée à une deuxième section mobile au niveau d'une ligne de pliage, la première section mobile et la deuxième section mobile définissant un vide (1088 ; 1094 ; 1264, 1266, 1268, 1270 ; 1370, 1372, 1374, 1376, 1378, 1380 ; 1560, 1562 ; 1760, 1762, 1764, 1766) positionné sur la ligne

de pliage ;
l'application d'un adhésif en un motif déposé à une surface intérieure (1021 ; 1022 ; 1201 ; 1301 ; 1501 ; 1701) de la découpe et entourant sensiblement le vide ;
l'accouplement d'une pièce thermorétractable (1090 ; 1091 ; 1272 ; 1382 ; 1576, 1580 ; 1770, 1774) dans une configuration prérétractée à chacune de la première section mobile et de la deuxième section mobile dans le motif déposé de manière à recouvrir le vide ;
la formation du carton à partir de la découpe dans lequel la pièce thermorétractable dans la configuration prérétractée est accouplée à la surface intérieure du carton formé ; et
le déplacement de la première section mobile vers la deuxième section mobile pour au moins partiellement fermer le vide pour obtenir la forme du carton en appliquant de la chaleur à la pièce thermorétractable pour rétracter la pièce thermorétractable dans une configuration rétractée.

19. Procédé selon la revendication 18, dans lequel de la chaleur est appliquée à au moins une partie de la pièce thermorétractable.

20. Procédé selon la revendication 18, dans lequel la chaleur est appliquée à une première partie de la pièce thermorétractable à une première température et la chaleur est appliquée à une deuxième partie de la pièce thermorétractable à une deuxième température différente de la première température.

21. Procédé selon la revendication 18, dans lequel la chaleur est appliquée à une pluralité de températures sur une dimension de la pièce thermorétractable.

22. Système pour appliquer une pièce thermorétractable (1090 ; 1091 ; 1272 ; 1382 ; 1576, 1580 ; 1770, 1774) à un carton (1100 ; 1101 ; 1266 ; 1400 ; 1600 ; 1800) pour obtenir une forme du carton, le système comprenant :

une découpe de matériau en feuille (1020 ; 1021 ; 1200 ; 1300 ; 1500 ; 1700) comprenant un panneau supérieur (1056 ; 1228 ; 1334 ; 1532, 1538 ; 1726), un panneau inférieur (1060 ; 1232 ; 1338 ; 1526 ; 1730), au moins un panneau latéral (1022, 1024, 1026, 1028 ; 1023, 1025, 1027, 1029 ; 1202, 1204, 1206, 1208 ; 1302, 1304, 1306, 1308, 1310, 1312 ; 1504, 1506, 1508, 1512, 1514, 1516 ; 1702, 1704, 1706, 1708) s'étendant entre le panneau supérieur et le panneau inférieur et une section mobile (1024, 1026 ; 1025, 1027, 1029 ; 1202, 1204, 1206, 1208 ; 1302, 1304, 1306, 1308, 1310, 1312 ; 1504, 1506, 1508, 1512, 1514, 1516 ; 1702, 1704, 1706, 1708, 1726, 1730, 1734, 1738) qui peut être déplacée entre une première position et une deuxième position ;
un dispositif d'accouplement configuré pour accoupler la pièce thermorétractable dans la configuration prérétractée à une surface intérieure (1021 ; 1022 ; 1201 ; 1301 ; 1501 ; 1701) de la découpe de matériau en feuille ;
un dispositif de formation configuré pour former le carton à partir de la découpe de matériau en feuille dans lequel la pièce thermorétractable dans la configuration prérétractée est accouplée à la surface intérieure du carton formé ; et
un dispositif de chauffage configuré pour chauffer au moins une partie de la pièce thermorétractable pour rétracter la pièce thermorétractable en une configuration rétractée afin de déplacer la section mobile de la première position à la deuxième position pour obtenir la forme du carton.

23. Système selon la revendication 22, dans lequel le dispositif d'accouplement est en outre configuré pour appliquer un adhésif en un motif déposé à au moins une partie de la section mobile et pour coller la pièce thermorétractable à la surface intérieure de la découpe dans le motif déposé.

24. Système selon la revendication 22, dans lequel le dispositif de chauffage est en outre configuré pour rétracter la pièce thermorétractable en la configuration rétractée afin de déplacer la section mobile pour fermer au moins partiellement un vide (1088 ; 1094 ; 1264, 1266, 1268, 1270 ; 1370, 1372, 1374, 1376, 1378, 1380 ; 1560, 1562 ; 1760, 1762, 1764, 1766) au moins partiellement défini par la section mobile.

25. Ensemble (154 ; 312) pour emballer un produit, l'ensemble comprenant :

un carton (100 ; 266) comportant un dessus (114 ; 276), un fond (116 ; 278), et un côté (102, 104, 106, 108, 110, 112 ; 268, 270, 272, 274) s'étendant entre le dessus et le fond, dans lequel au moins l'un du dessus, du fond et du côté comprend une section mobile (136, 138, 140, 142, 144, 146 ; 298, 300, 302, 304) qui peut être déplacée entre une première position et une deuxième position, la section mobile étant sollicitée vers la première position, le carton s'étend sur une hauteur (118 ; 280) mesurée entre le dessus et le fond du carton, le côté comprend une pluralité de côtés, la section mobile comprend une section mobile sur chacun de la pluralité de côtés, chacune des sections mobiles comprend une extension supérieure (126 ; 288) s'étendant d'une partie supérieure (122 ; 284) du côté respectif le long d'une ligne de pliage supérieure (90 ; 256), et une extension inférieu-

re (128 ; 290) s'étendant d'une partie inférieure (124 ; 286) du côté respectif le long d'une ligne de pliage inférieure (94 ; 260) et jointe à l'extension supérieure du côté respectif le long d'une ligne de pliage centrale (96 ; 262), et chacune des lignes de pliage centrales de section mobile est située le long d'un axe longitudinal central (120 ; 282) du carton à une distance généralement égale du dessus du carton, les lignes de pliage centrales des sections mobiles étant espacées d'une distance radiale par rapport à l'axe longitudinal central du carton dans la première position plus grande que dans la deuxième position, dans lequel les sections mobiles peuvent être déplacées de la première position à la deuxième position en pliant les extensions supérieure et inférieure le long des lignes de pliage supérieure, inférieure et centrales pour déplacer les lignes de pliage centrales généralement radialement vers l'axe longitudinal central du carton afin de réduire une section transversale du carton définie entre les sections mobiles ; et

une couche thermorétractable (152 ; 310) recouvrant au moins une partie du carton pour former le carton, la couche thermorétractable déplaçant la section mobile de la première position à la deuxième position lorsque la couche thermorétractable est chauffée de manière à venir en contact avec la partie du carton.

26. Ensemble selon la revendication 25, dans lequel la pluralité de côtés comprend six côtés et le carton a une section transversale généralement hexagonale.

27. Ensemble selon la revendication 25, dans lequel la pluralité de côtés comprend quatre côtés et le carton a une section transversale généralement rectangulaire.

28. Ensemble (790) pour emballer un produit, l'ensemble comprenant :

un carton (740) comportant un dessus (750), un fond (752), et un côté (742, 744, 746, 748, 784, 786) s'étendant entre le dessus et le fond, dans lequel au moins l'un du dessus, du fond et du côté comprend une section mobile (772, 774, 776, 778) qui peut être déplacée entre une première position et une deuxième position, la section mobile étant sollicitée vers la première position,

dans lequel le côté est un premier côté, le carton comprend en outre un deuxième côté, un troisième côté et un quatrième côté, chacun des premier, deuxième, troisième et quatrième côtés s'étendant du fond jusqu'au dessus du carton, et la section mobile comprend une première extension (754, 756, 758, 760) s'étendant du premier côté le long d'une première ligne de pliage (726) et une deuxième extension (754, 756, 758, 760) s'étendant du deuxième côté le long d'une deuxième ligne de pliage (734), dans lequel la section mobile peut être déplacée de la première position à la deuxième position en pliant les première et deuxième extensions le long des première et deuxième lignes de pliage pour déplacer la première extension sur la deuxième extension de sorte que la première extension recouvre au moins partiellement la deuxième extension, dans lequel, dans la première position, une ouverture (730) est définie entre les première et deuxième extensions et, dans la deuxième position, les première et deuxième extensions forment un cinquième côté du carton défini entre les premier et deuxième côtés et incliné en oblique par rapport aux premier et deuxième côtés ; et

une couche thermorétractable (788) recouvrant au moins une partie du carton pour former le carton, la couche thermorétractable déplaçant la section mobile de la première position à la deuxième position lorsque la couche thermorétractable est chauffée de manière à venir en contact avec la partie du carton.

29. Ensemble selon la revendication 28, dans lequel au moins l'une de la première ligne de pliage et de la deuxième ligne de pliage est au moins partiellement incurvée.

30. Ensemble selon la revendication 28, dans lequel le premier côté comprend une surface incurvée lorsque la section mobile est dans la deuxième position.

31. Ensemble selon la revendication 28, dans lequel le cinquième côté ne s'étend que sur une partie d'une hauteur du carton mesurée entre le dessus et le fond du carton.

32. Ensemble selon la revendication 28, dans lequel la première extension recouvre sensiblement la deuxième extension lorsque la section mobile est dans la deuxième position.

33. Ensemble (422 ; 534) pour emballer un produit, l'ensemble comprenant :

un carton (380 ; 490) comportant un dessus (390 ; 500), un fond (392 ; 502), et un côté (382, 384, 386, 388 ; 492, 494, 496, 498) s'étendant entre le dessus et le fond, dans lequel au moins l'un du dessus, du fond et du côté comprend une section mobile (412, 414 ; 522, 524) qui peut être déplacée entre une première position et une deuxième position, la section mobile étant sollicitée vers la première position, dans lequel le

côté est un premier côté, le carton comprend en outre un deuxième côté, un troisième côté et un quatrième côté, chacun des premier, deuxième, troisième et quatrième côtés s'étendant du fond jusqu'au dessus du carton, la section mobile comprend une section mobile sur l'un quelconque de deux côtés opposés parmi les premier, deuxième, troisième et quatrième côtés, et chacune des sections mobiles comprend une extension supérieure (402 ; 512) s'étendant d'une partie supérieure (398 ; 508) du côté respectif le long d'une ligne de pliage supérieure (374 ; 484), et une extension inférieure (404 ; 514) s'étendant d'une partie inférieure (400 ; 510) du côté respectif le long d'une ligne de pliage inférieure (378 ; 488), dans lequel les sections mobiles peuvent être déplacées de la première position à la deuxième position en pliant les extensions supérieure et inférieure le long des lignes de pliage supérieure et inférieure pour incliner en oblique les extensions supérieure et inférieure par rapport au côté respectif et modifier de ce fait une section transversale du carton le long d'une hauteur (394 ; 504) du carton mesurée entre le dessus et le fond ; et
une couche thermorétractable (420 ; 532) recouvrant au moins une partie du carton pour former le carton, la couche thermorétractable déplaçant la section mobile de la première position à la deuxième position lorsque la couche thermorétractable est chauffée de manière à venir en contact avec la partie du carton.

34. Ensemble selon la revendication 33, dans lequel les deux côtés opposés parmi les premier, deuxième, troisième et quatrième côtés comprennent chacun une partie intermédiaire entre les extensions supérieure et inférieure du côté respectif.

35. Ensemble selon la revendication 33, dans lequel le carton a une section transversale généralement rectangulaire.

36. Ensemble selon la revendication 33, dans lequel au moins l'un des premier, deuxième, troisième et quatrième côtés comprend un bord incurvé.

37. Ensemble selon la revendication 36, dans lequel le bord incurvé ne s'étend que sur une partie de la hauteur du carton.

38. Ensemble (422 ; 644) pour emballer un produit, l'ensemble comprenant :

un carton (380 ; 600) comportant un dessus (390 ; 610), un fond (392 ; 612), et un côté (382, 384, 386, 388 ; 602, 604, 606, 608) s'étendant entre le dessus et le fond, dans lequel au moins l'un du dessus, du fond et du côté comprend une section mobile qui peut être déplacée entre une première position et une deuxième position, la section mobile (412, 414 ; 630, 632, 634, 636) étant sollicitée vers la première position, dans lequel le côté consiste en une pluralité de côtés s'étendant du fond jusqu'au dessus du carton, la section mobile comprend une section mobile sur chacun de la pluralité de côtés, et chacune des sections mobiles comprend une partie intermédiaire (370 ; 622) du côté respectif s'étendant d'une partie supérieure (398 ; 618) du côté respectif le long d'une ligne de pliage supérieure (374 ; 596) et s'étendant d'une partie inférieure (400 ; 620) du côté respectif le long d'une ligne de pliage inférieure (378 ; 598), dans lequel les sections mobiles peuvent être déplacées de la première position à la deuxième position par pliage le long des lignes de pliage supérieure et inférieure pour incliner en oblique les parties intermédiaires par rapport aux côtés respectifs et modifier de ce fait une section transversale du carton le long d'une hauteur (394 ; 614) du carton mesurée entre le dessus et le fond ; et
une couche thermorétractable (420 ; 642) recouvrant au moins une partie du carton pour former le carton, la couche thermorétractable déplaçant la section mobile de la première position à la deuxième position lorsque la couche thermorétractable est chauffée de manière à venir en contact avec la partie du carton.

39. Ensemble selon la revendication 38, dans lequel la pluralité de côtés comprend quatre côtés et le carton a une section transversale généralement rectangulaire.

40. Ensemble selon la revendication 38, dans lequel au moins l'un de la pluralité de côtés comprend un bord incurvé.

41. Ensemble selon la revendication 40, dans lequel le bord incurvé ne s'étend que sur une partie de la hauteur du carton.

42. Ensemble selon la revendication 38, dans lequel au moins l'un de la pluralité de côtés comprend une surface incurvée.

43. Ensemble selon la revendication 42, dans lequel la surface incurvée ne s'étend que sur une partie de la hauteur du carton.

44. Procédé pour emballer un produit, le procédé comprenant :

la formation d'un carton (100 ; 266) comportant un dessus (114 ; 276), un fond (116 ; 278), et

un côté (102, 104, 106, 108, 110, 112 ; 268, 270, 272, 274) s'étendant entre le dessus et le fond, et une section mobile (136, 138, 140, 142, 144, 146 ; 298, 300, 302, 304) qui peut être déplacée entre une première position et une deuxième position, la section mobile étant sollicitée vers la première position, le carton s'étendant sur une hauteur (118 ; 280) mesurée entre le dessus et le fond du carton, le côté comprend une pluralité de côtés, la section mobile comprend une section mobile sur chacun de la pluralité de côtés, chacune des sections mobiles comprend une extension supérieure (126 ; 288) s'étendant d'une partie supérieure (122 ; 284) du côté respectif le long d'une ligne de pliage supérieure (90 ; 256), et une extension inférieure (128 ; 290) s'étendant d'une partie inférieure (124 ; 286) du côté respectif le long d'une ligne de pliage inférieure (94 ; 260) et jointe à l'extension supérieure du côté respectif le long d'une ligne de pliage centrale (96 ; 262), et chacune des lignes de pliage centrales de section mobile est située le long d'un axe longitudinal central (120 ; 282) du carton à une distance généralement égale par rapport au dessus du carton, les lignes de pliage centrales des sections mobiles étant espacées d'une distance radiale par rapport à l'axe longitudinal central du carton dans la première position plus grande que dans la deuxième position, dans lequel les sections mobiles peuvent être déplacées de la première position à la deuxième position par pliage des extensions supérieure et inférieure le long des lignes de pliage supérieure, inférieure et centrales pour déplacer les lignes de pliage centrales généralement radialement vers l'axe longitudinal central du carton afin de réduire une section transversale du carton définie entre les sections mobiles ;

l'enroulement d'une couche thermorétractable (152 ; 310) autour d'au moins une partie du carton comprenant au moins une partie de la section mobile du carton ; et

le déplacement de la section mobile de la première position à la deuxième position pour former un ensemble d'emballage formé en chauffant la couche thermorétractable de manière à rétracter la couche thermorétractable en contact avec au moins une partie de la section mobile.

45. Procédé selon la revendication 44, dans lequel la formation d'un carton comprend en outre la formation d'un carton comportant six côtés et une section transversale généralement hexagonale.

46. Procédé selon la revendication 44, dans lequel la formation d'un carton comprend en outre la formation d'un carton comportant quatre côtés et une section transversale généralement rectangulaire.

47. Procédé pour emballer un produit, le procédé comprenant :

la formation d'un carton (740) comportant un dessus (750), un fond (752), et un côté 742, 744, 746, 748, 784, 786) s'étendant entre le dessus et le fond, et une section mobile (772, 774, 776, 778) qui peut être déplacée entre une première position et une deuxième position, la section mobile étant sollicitée vers la première position, dans lequel le côté est un premier côté, le carton comprend en outre un deuxième côté, un troisième côté et un quatrième côté, chacun des premier, deuxième, troisième et quatrième côtés s'étendant du fond jusqu'au dessus du carton, et la section mobile comprend une première extension (754, 756, 758, 760) s'étendant du premier côté le long d'une première ligne de pliage (726) et une deuxième extension (754, 756, 758, 760) s'étendant du deuxième côté le long d'une deuxième ligne de pliage (734), dans lequel la section mobile peut être déplacée de la première position à la deuxième position par pliage des première et deuxième extensions le long des première et deuxième lignes de pliage de manière à déplacer la première extension sur la deuxième extension de sorte que la première extension recouvre au moins partiellement la deuxième extension, dans lequel, dans la première position, une ouverture (730) est définie entre les première et deuxième extensions et, dans la deuxième position, les première et deuxième extensions forment un cinquième côté du carton défini entre les premier et deuxième côtés et incliné en oblique par rapport aux premier et deuxième côtés ;

l'enroulement d'une couche thermorétractable (788) autour d'au moins une partie du carton comprenant au moins une partie d'une section mobile du carton ; et

le déplacement de la section mobile de la première position à la deuxième position pour former un ensemble d'emballage formé (790) en chauffant la couche thermorétractable de manière à rétracter la couche thermorétractable en contact avec au moins une partie de la section mobile.

48. Procédé selon la revendication 47, dans lequel la formation d'un carton comprend la formation d'un carton dans lequel au moins l'une de la première ligne de pliage et de la deuxième ligne de pliage est au moins partiellement incurvée.

49. Procédé selon la revendication 47, dans lequel la formation d'un carton comprend la formation d'un

carton dans lequel le premier côté a une surface incurvée lorsque la section mobile est dans la deuxième position.

50. Procédé selon la revendication 47, dans lequel la formation d'un carton comprend la formation d'un carton dans lequel le cinquième côté ne s'étend que sur une partie d'une hauteur du carton mesurée entre le dessus et le fond du carton.

51. Procédé selon la revendication 47, dans lequel la formation d'un carton comprend la formation d'un carton dans lequel la première extension recouvre sensiblement la deuxième extension lorsque la section mobile est dans la deuxième position.

52. Procédé pour emballer un produit, le procédé comprenant :

la formation d'un carton (380 ; 490) comportant un dessus (390 ; 500), un fond (392 ; 502), et un côté (382, 384, 386, 388 ; 492, 494, 496, 498) s'étendant entre le dessus et le fond, et une section mobile (412, 414 ; 522, 524) qui peut être déplacée entre une première position et une deuxième position, la section mobile étant sollicitée vers la première position, dans lequel le côté est un premier côté, le carton comprend en outre un deuxième côté, un troisième côté et un quatrième côté, chacun des premier, deuxième, troisième et quatrième côtés s'étendant du fond jusqu'au dessus du carton, la section mobile comprend une section mobile sur l'un quelconque de deux côtés opposés parmi les premier, deuxième, troisième et quatrième côtés, et chacune des sections mobiles comprend une extension supérieure (402 ; 512) s'étendant d'une partie supérieure (398 ; 508) du côté respectif le long d'une ligne de pliage supérieure (374 ; 484), et une extension inférieure (404 ; 514) s'étendant d'une partie inférieure (400 ; 510) du côté respectif le long d'une ligne de pliage inférieure (378 ; 488), dans lequel les sections mobiles peuvent être déplacées de la première position à la deuxième position par pliage des extensions supérieure et inférieure le long des lignes de pliage supérieure et inférieure pour incliner en oblique les extensions supérieure et inférieure par rapport au côté respectif et modifier de ce fait une section transversale du carton le long d'une hauteur (394 ; 504) du carton mesurée entre le dessus et le fond ;
l'enroulement d'une couche thermorétractable (420 ; 532) autour d'au moins une partie du carton comprenant au moins une partie d'une section mobile du carton ; et
le déplacement de la section mobile de la première position à la deuxième position pour former un ensemble d'emballage formé (422 ; 534) en chauffant la couche thermorétractable de manière à rétracter la couche thermorétractable en contact avec au moins une partie de la section mobile.

53. Procédé selon la revendication 52, dans lequel la formation d'un carton comprend la formation d'un carton dans lequel les deux côtés opposés parmi les premier, deuxième, troisième et quatrième côtés comprennent chacun une partie intermédiaire entre les extensions supérieure et inférieure du côté respectif.

54. Procédé selon la revendication 52, dans lequel la formation d'un carton comprend la formation d'un carton ayant une section transversale généralement rectangulaire.

55. Procédé selon la revendication 52, dans lequel la formation d'un carton comprend la formation du carton dans lequel au moins l'un des premier, deuxième, troisième et quatrième côtés comprend un bord incurvé.

56. Procédé selon la revendication 55, dans lequel la formation d'un carton comprend la formation du carton de sorte que le bord incurvé ne s'étende que sur une partie de la hauteur du carton.

57. Procédé pour emballer un produit, le procédé comprenant :

la formation d'un carton (380 ; 600) comportant un dessus (390 ; 610), un fond (392 ; 612), et un côté (382, 384, 386, 388 ; 602, 604, 606, 608) s'étendant entre le dessus et le fond, et une section mobile (412, 414 ; 630, 632, 634, 636) qui peut être déplacée entre une première position et une deuxième position, la section mobile étant sollicitée vers la première position, dans lequel le côté consiste en une pluralité de côtés s'étendant du fond jusqu'au dessus du carton, la section mobile comprend une section mobile sur chacun de la pluralité de côtés, et chacune des sections mobiles comprend une partie intermédiaire (370 ; 622) du côté respectif s'étendant d'une partie supérieure (398 ; 618) du côté respectif le long d'une ligne de pliage supérieure (374 ; 596) et s'étendant d'une partie inférieure (400 ; 620) du côté respectif le long d'une ligne de pliage inférieure (378 ; 598), dans lequel les sections mobiles peuvent être déplacées de la première position à la deuxième position par pliage le long des lignes de pliage supérieure et inférieure pour incliner en oblique les parties intermédiaires par rapport aux côtés respectifs et modifier de ce fait une section transversale du

carton le long d'une hauteur (394 ; 614) du carton mesurée entre le dessus et le fond ;
l'enroulement d'une couche thermorétractable (420 ; 642) autour d'au moins une partie du carton comprenant au moins une partie d'une section mobile du carton ; et
le déplacement de la section mobile de la première position à la deuxième position pour former un ensemble d'emballage formé (422 ; 644) en chauffant la couche thermorétractable de manière à rétracter la couche thermorétractable en contact avec au moins une partie de la section mobile.

58. Procédé selon la revendication 57, dans lequel la formation d'un carton comprend la formation d'un carton comportant quatre côtés et une section transversale généralement rectangulaire.

59. Procédé selon la revendication 57, dans lequel la formation d'un carton comprend la formation d'un carton de sorte qu'au moins l'un de la pluralité de côtés comprenne un bord incurvé.

60. Procédé selon la revendication 59, dans lequel la formation d'un carton comprend la formation d'un carton de sorte que le bord incurvé ne s'étende que sur une partie de la hauteur du carton.

61. Procédé selon la revendication 57, dans lequel la formation d'un carton comprend la formation d'un carton de sorte qu'au moins l'un de la pluralité de côtés comprenne une surface incurvée.

62. Procédé selon la revendication 61, dans lequel la formation d'un carton comprend la formation d'un carton de sorte que la surface incurvée ne s'étende que sur une partie de la hauteur du carton.

63. Procédé pour appliquer un film thermorétractable (152 ; 310 ; 642 ; 788) à un carton (100 ; 266 ; 380 ; 600 ; 740) pour obtenir une forme du carton, le carton comprenant un panneau supérieur (114 ; 276 ; 610 ; 750), un panneau inférieur (116 ; 278 ; 612 ; 752), une pluralité de panneaux latéraux (102, 104, 106, 108, 110, 112 ; 268, 270, 272, 274 ; 602, 604, 606, 608 ; 742, 744, 746, 748) s'étendant entre le panneau supérieur et le panneau inférieur, et une section mobile (136, 138, 140, 142, 144, 146 ; 298, 300 302, 304 ; 630, 632, 634, 636 ; 772, 774, 776, 778) qui peut être déplacée entre une première position et une deuxième position, le procédé comprenant :

la fourniture d'un film thermorétractable mais non rétracté ;
l'enroulement du film dans une condition non chauffée autour d'au moins une partie du carton comprenant au moins une partie de la section mobile du carton, dans lequel la section mobile comprend au moins une ouverture (98 ; 264) ayant une taille et au moins un panneau mobile, dans lequel ladite au moins une ouverture est une découpe définie dans au moins l'un de la pluralité de panneaux latéraux ; et
le déplacement de la section mobile de la première position à la deuxième position pour obtenir la forme du carton en chauffant le film thermorétractable de manière à rétracter le film thermorétractable en contact avec au moins une partie de la section mobile, dans lequel le déplacement de la section mobile comprend le déplacement dudit au moins un panneau mobile et la réduction de la taille de ladite au moins une ouverture de la section mobile.

64. Procédé selon la revendication 63, dans lequel la fourniture d'un film thermorétractable mais non rétracté comprend en outre :

la fourniture d'un film thermorétractable mais non rétracté comportant une extrémité avant et une extrémité arrière non attachée à l'extrémité avant ;
la liaison de l'extrémité avant du film au carton ;
l'enroulement du film dans une condition non chauffée autour d'au moins une partie du carton comprenant au moins une partie de la section mobile du carton ; et
la liaison de l'extrémité arrière du film à au moins l'un du carton et du film lui-même.

65. Procédé selon la revendication 64, dans lequel le carton comprend en outre au moins un raccord, dans lequel ledit au moins un raccord est formé lorsqu'au moins deux panneaux sont collés l'un à l'autre, et dans lequel la liaison de l'extrémité avant du film au carton comprend en outre la liaison de l'extrémité avant du film dans un raccord du carton de sorte que l'extrémité avant ne soit pas visible.

66. Procédé selon la revendication 63, dans lequel la fourniture d'un film thermorétractable mais non rétracté comprend en outre la fourniture d'un film thermorétractable mais non rétracté sous la forme d'un manchon préformé, le manchon comportant une ouverture dimensionnée pour recevoir le carton.

67. Procédé selon la revendication 66, dans lequel la fourniture d'un film thermorétractable mais non rétracté sous la forme d'un manchon préformé comprend en outre :

l'insertion du carton dans l'ouverture du manchon ; et
le déplacement de la section mobile de la première position à la deuxième position pour ob-

tenir une forme du carton en chauffant le manchon thermorétractable de manière à rétracter le manchon thermorétractable en contact avec au moins une partie de la section mobile.

68. Procédé selon la revendication 63, dans lequel la fourniture d'un film thermorétractable mais non rétracté comprend en outre la fourniture d'un film thermorétractable mais non rétracté qui comprend un marquage sur celui-ci.

69. Procédé selon la revendication 63, dans lequel la fourniture d'un film thermorétractable mais non rétracté comprend en outre la fourniture d'un film thermorétractable mais non rétracté comportant un marquage sur celui-ci comprenant des graphiques pour le carton, dans lequel les graphiques sont appliqués en utilisant une encre opaque.

70. Procédé selon la revendication 63, dans lequel la fourniture d'un film thermorétractable mais non rétracté comprend en outre la fourniture d'un film thermorétractable mais non rétracté comportant un marquage sur celui-ci comprenant des graphiques pour le carton, dans lequel les graphiques sont appliqués en utilisant une encre translucide de sorte que les graphiques du film soient coordonnés avec des graphiques supplémentaires imprimés sur le carton.

71. Procédé selon la revendication 63, dans lequel la fourniture d'un film thermorétractable mais non rétracté comprend en outre la fourniture d'un film thermorétractable mais non rétracté fabriqué à partir d'au moins l'un du polyéthylène, du polypropylène, du polychlorure de vinyle, du polyester, du polyester glycol, du nylon, et/ou du polystyrène orienté.

72. Procédé selon la revendication 63, dans lequel le carton s'étend sur une hauteur mesurée entre le dessus et le fond du carton, et le film s'étend sur une hauteur supérieure à la hauteur du carton, et dans lequel l'enroulement du film comprend en outre :

l'enroulement du film dans une condition non chauffée autour du carton comprenant la section mobile du carton, dans lequel le film s'étend sur une distance à l'extérieur d'au moins l'un du dessus et du fond du carton ; et
le chauffage du film thermorétractable de manière à rétracter le film thermorétractable en contact avec au moins une partie d'au moins l'un du dessus et du fond du carton pour la réalisation d'au moins l'une d'une mesure d'inviolabilité, d'une barrière à l'humidité et d'une barrière au tamisage.

73. Procédé selon la revendication 63, dans lequel le carton s'étend sur une hauteur mesurée entre le dessus et le fond du carton, et le film s'étend sur une hauteur inférieure à la hauteur du carton, et dans lequel l'enroulement du film comprend en outre l'enroulement du film dans une condition non chauffée autour d'une partie du carton comprenant au moins une partie de la section mobile du carton.

74. Procédé selon la revendication 63, dans lequel le déplacement de la section mobile comprend en outre :

la fourniture d'une pluralité de types de films thermorétractables comprenant des films thermorétractables ayant différentes orientations et différents pourcentages de rétraction ; et
le déplacement de la section mobile de la première position à la deuxième position en utilisant la pluralité de types de films thermorétractables pour obtenir une forme du carton en chauffant le film thermorétractable de manière à rétracter le film thermorétractable en contact avec au moins une partie de la section mobile.

75. Procédé selon la revendication 63, dans lequel le déplacement de la section mobile comprend en outre l'application d'une pluralité de températures de chauffage différentes à au moins une partie du film thermorétractable pour commander un degré de rétraction du film.

76. Procédé selon la revendication 63, comprenant en outre :

la commande d'un degré de rétraction du film par au moins l'une de l'utilisation d'un type spécifique de film, de la commande d'une température du chauffage, et de la concentration du chauffage sur le film ; et
le déplacement de la section mobile de la première position à la deuxième position pour obtenir la forme qui comprend au moins une découpe dans le carton de sorte qu'un produit inclus dans le carton soit visible.

77. Procédé selon la revendication 63, dans lequel le déplacement de la section mobile comprend en outre la modification d'une section transversale d'au moins une partie du carton.

78. Procédé selon la revendication 63, dans lequel la section mobile comprend une première section mobile et une deuxième section mobile, et le déplacement de la section mobile comprend en outre le recouvrement de la deuxième section mobile par la première section mobile.

79. Système pour appliquer un film thermorétractable (152 ; 310 ; 642 ; 788) à un carton (100 ; 266 ; 380 ;

600 ; 740) pour obtenir une forme du carton, le système comprenant :

un carton comprenant un panneau supérieur (114 ; 276 ; 610 ; 750), un panneau inférieur (116 ; 278 ; 612 ; 752), une pluralité de panneaux latéraux (102, 104, 106, 108, 110, 112 ; 268, 270, 272, 274 ; 602, 604, 606, 608 ; 742, 744, 746, 748) s'étendant entre le panneau supérieur et le panneau inférieur, et une section mobile (136, 138, 140, 142, 144, 146 ; 298, 300 302, 304 ; 630, 632, 634, 636 ; 772, 774, 776, 778) qui peut être déplacée entre une première position et une deuxième position ;
un dispositif d'enroulement configuré pour enrouler un film thermorétractable mais non rétracté dans une condition non chauffée autour d'au moins une partie du carton comprenant au moins une partie de la section mobile du carton, dans lequel la section mobile comprend au moins une ouverture (98 ; 264) ayant une taille et au moins un panneau mobile, dans lequel ladite au moins une ouverture est une découpe définie dans au moins l'un de la pluralité de panneaux latéraux ; et
un dispositif de chauffage configuré pour chauffer au moins une partie du film thermorétractable en contact avec au moins une partie de la section mobile pour déplacer la section mobile de la première position à la deuxième position pour obtenir une forme du carton, dans lequel le déplacement de la section mobile comprend le déplacement dudit au moins un panneau mobile et la réduction de la taille de ladite au moins une ouverture de la section mobile.

80. Système selon la revendication 79, dans lequel le film thermorétractable mais non rétracté comprend une extrémité avant et une extrémité arrière non attachée à l'extrémité avant, et dans lequel le dispositif d'enroulement est en outre configuré pour :

lier l'extrémité avant du film au carton ;
enrouler le film dans une condition non chauffée autour d'au moins une partie du carton comprenant au moins une partie de la section mobile du carton ; et
lier l'extrémité arrière du film à au moins l'un du carton et du film lui-même.

81. Système selon la revendication 80, dans lequel le carton comprend en outre au moins un raccord, dans lequel ledit au moins un raccord est formé lorsqu'au moins deux panneaux sont collés l'un à l'autre, et dans lequel le dispositif d'enroulement est en outre configuré pour lier l'extrémité avant du film dans un raccord du carton de sorte que l'extrémité avant ne soit pas visible.

82. Système selon la revendication 79, dans lequel le dispositif d'enroulement est en outre configuré pour insérer le carton dans un film thermorétractable mais non rétracté sous la forme d'un manchon préformé, le manchon comportant une ouverture dimensionnée pour recevoir le carton.

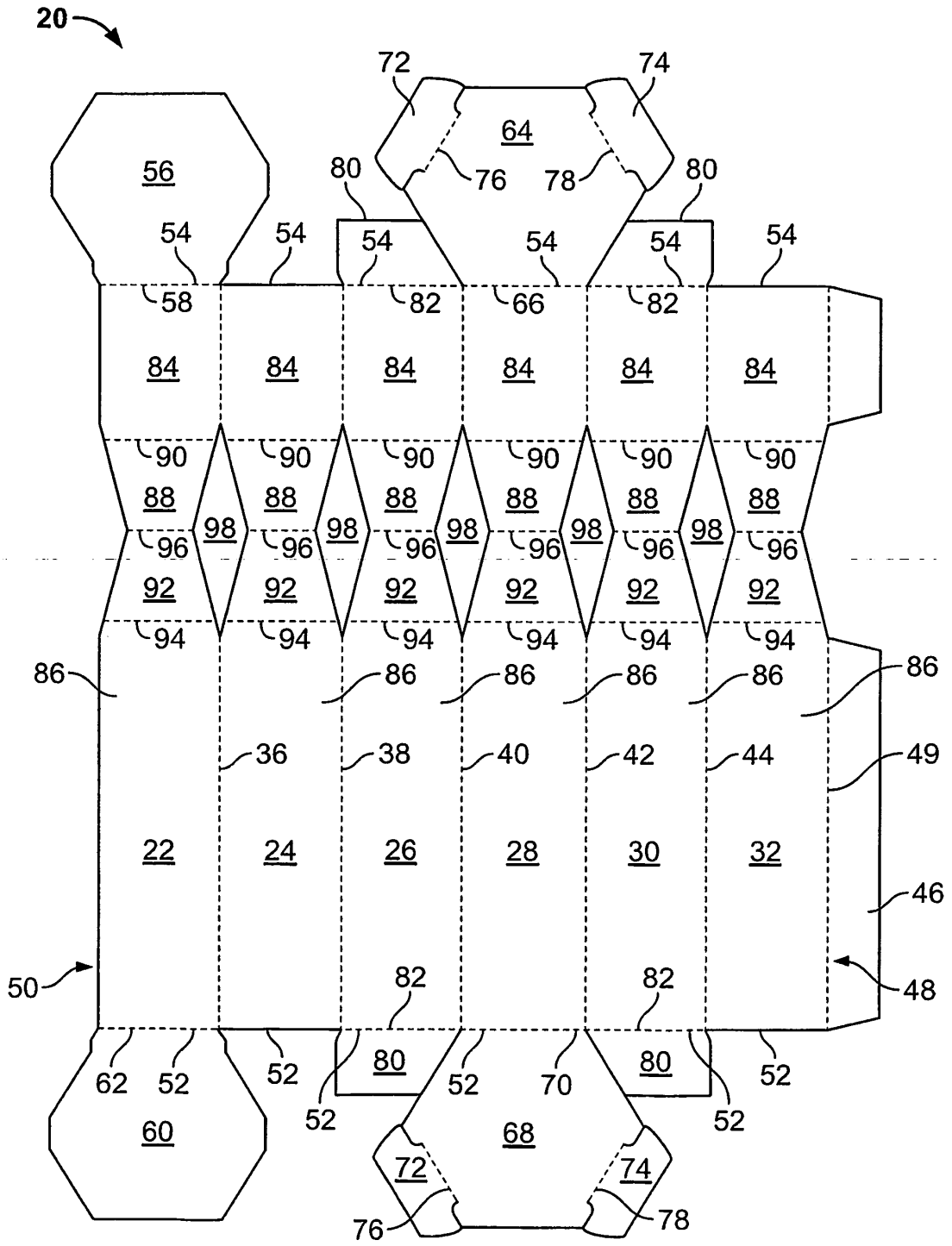

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FIG. 1

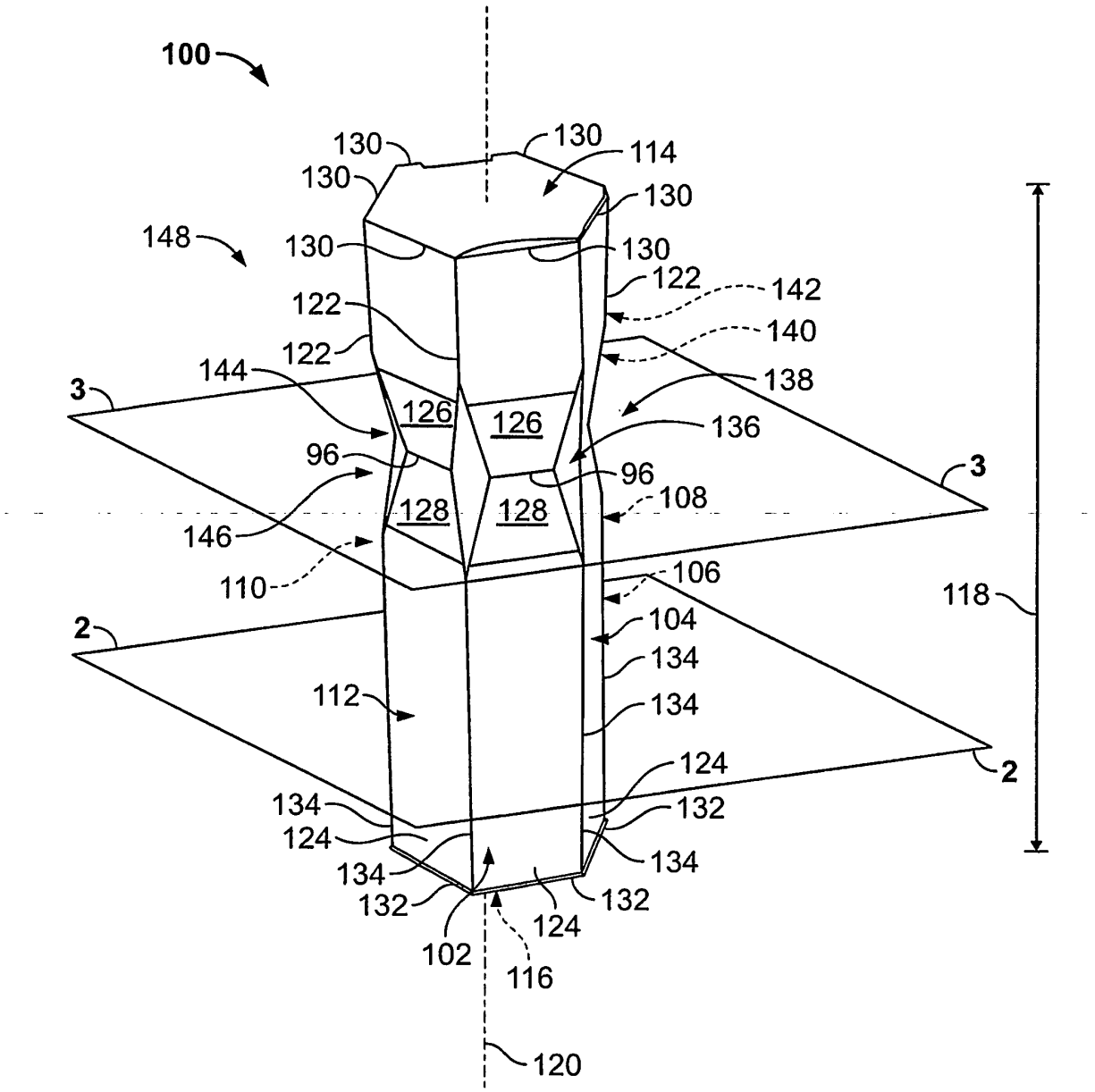

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FIG. 2

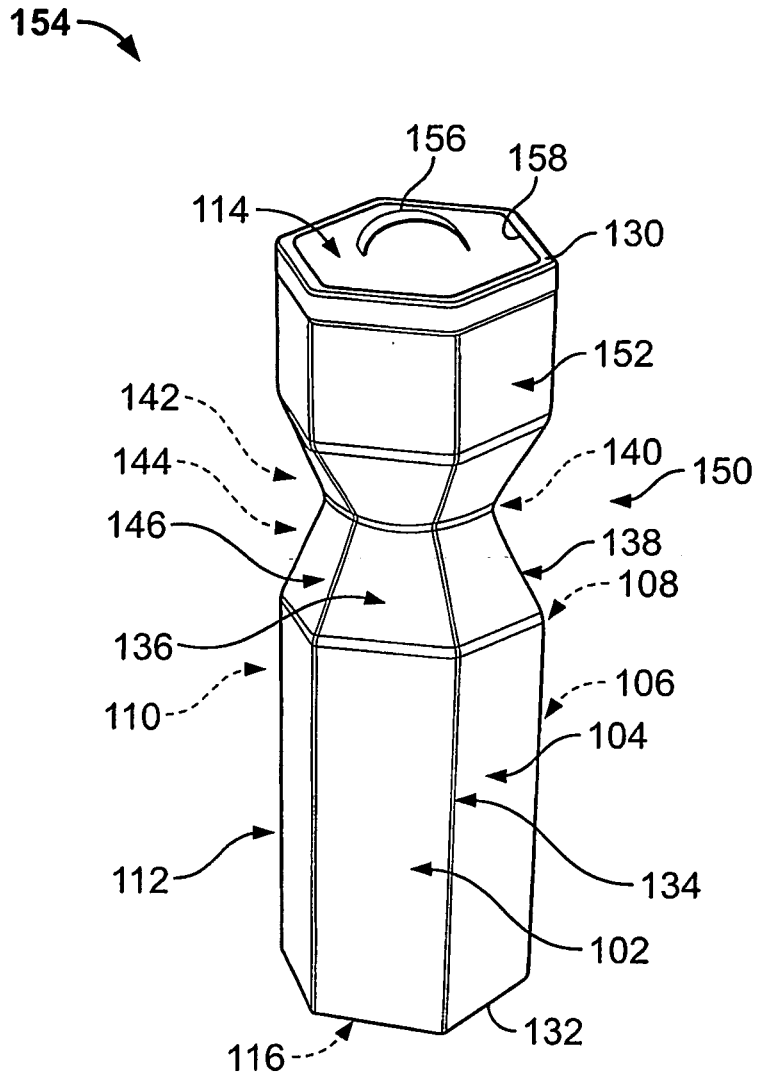

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FIG. 3

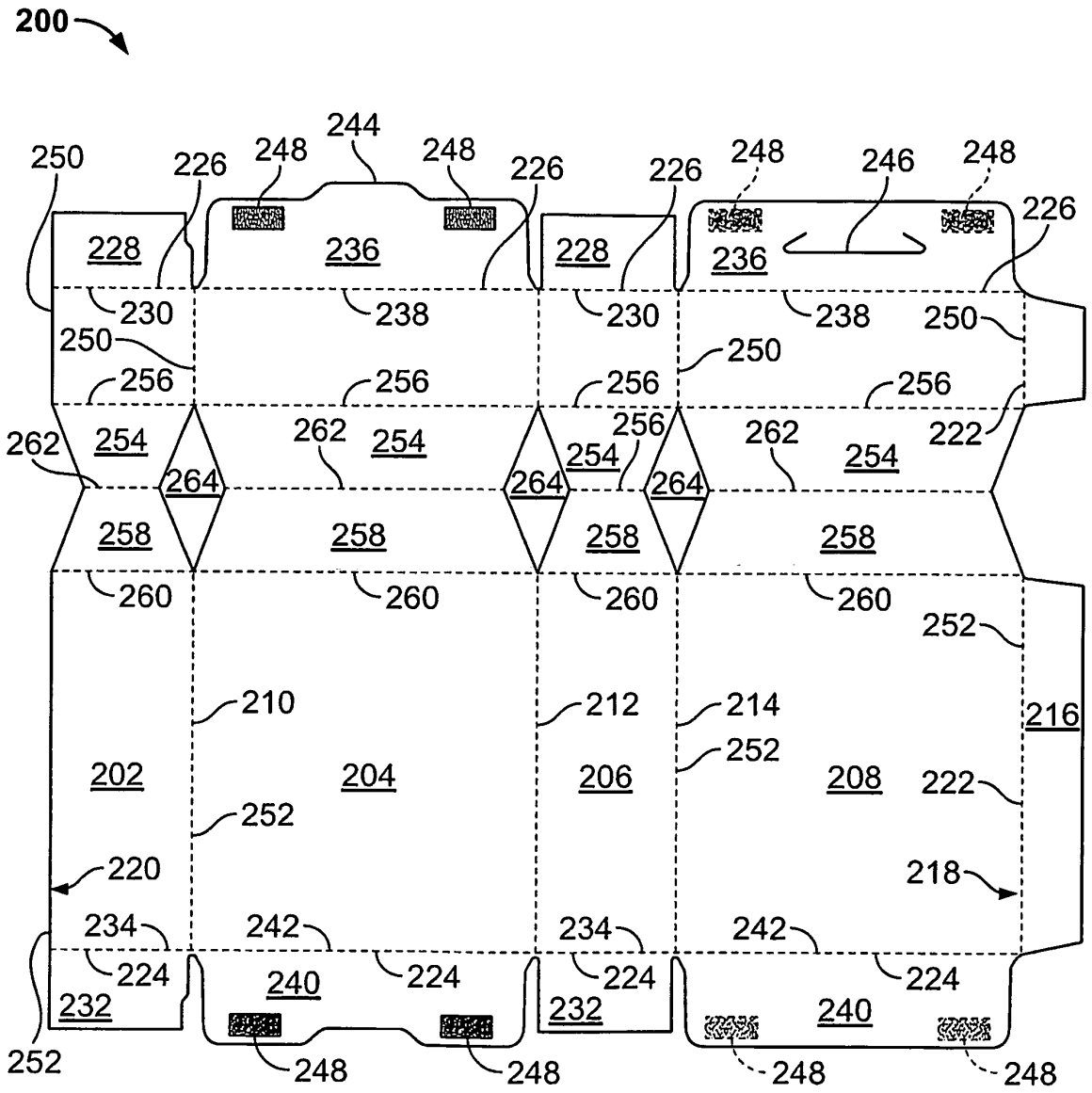

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FIG. 4

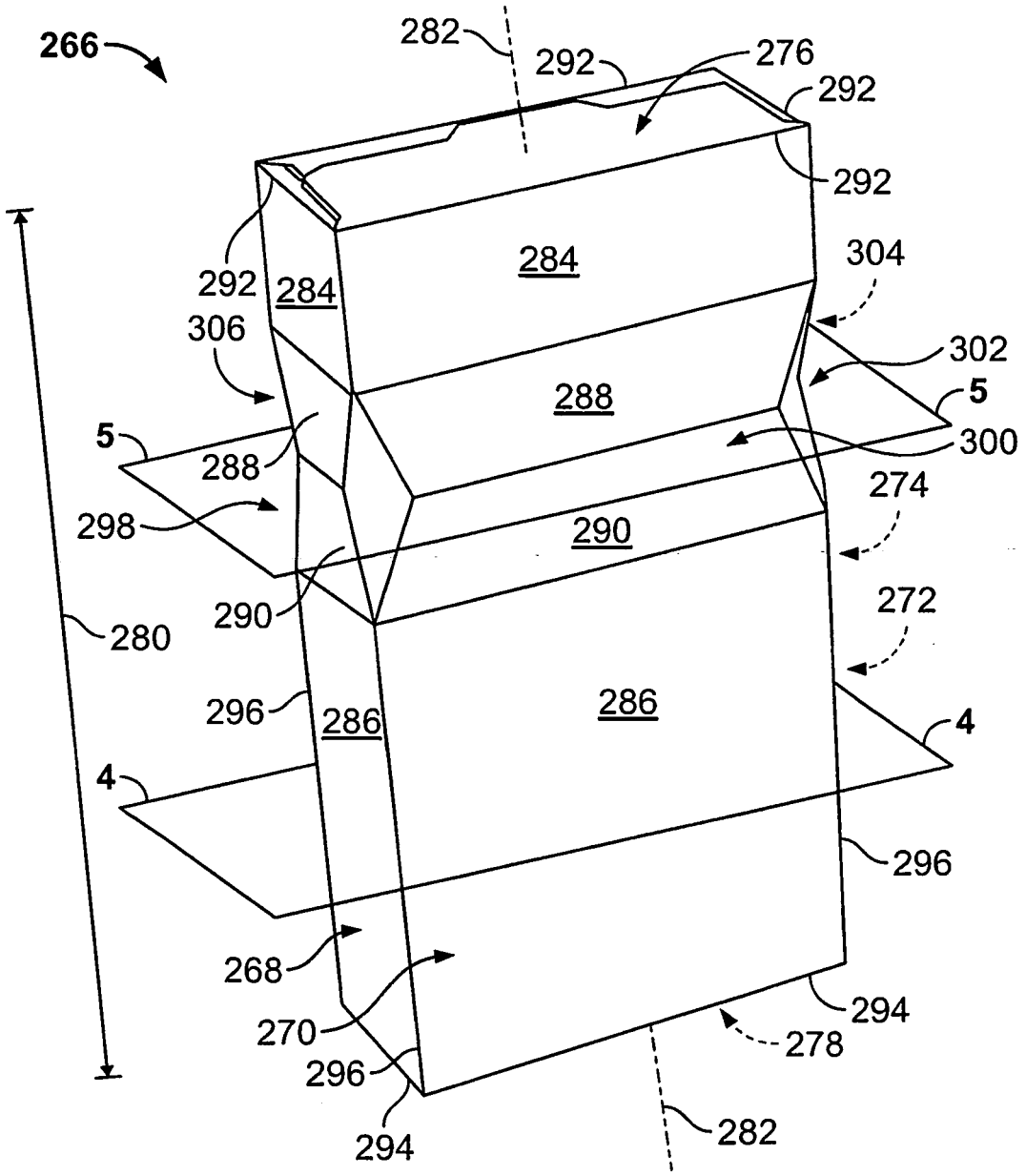

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FIG. 5

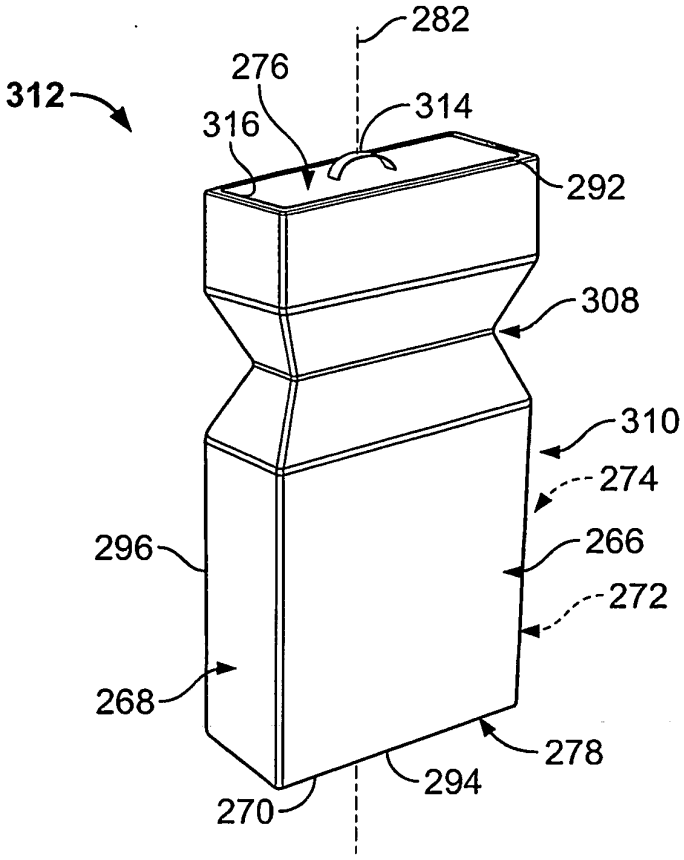

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FIG. 6

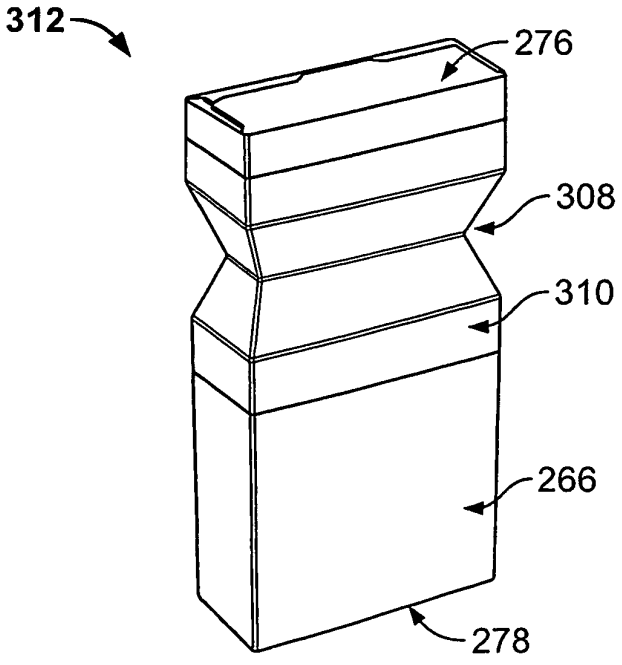

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FIG. 7

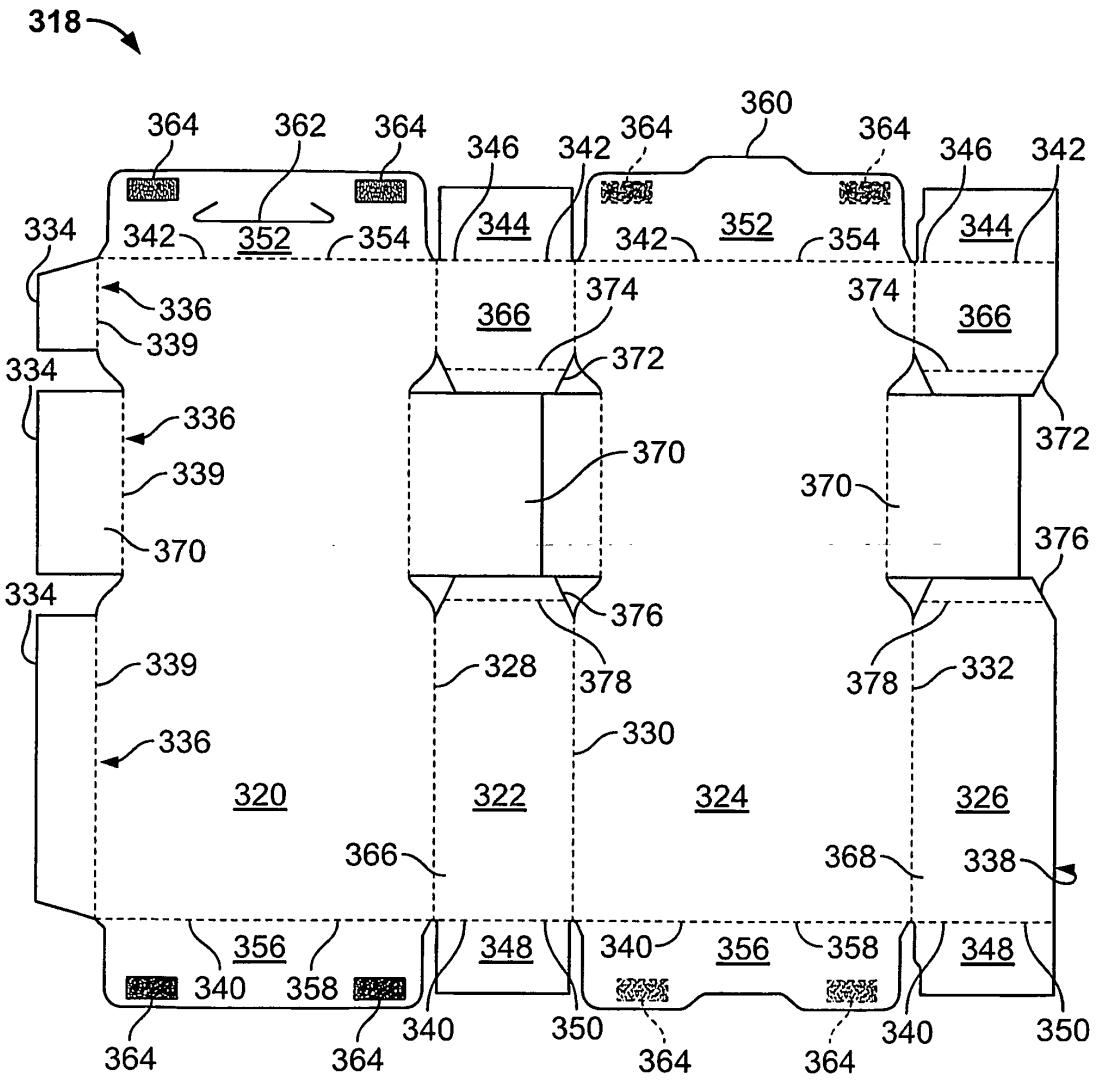

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FIG. 8

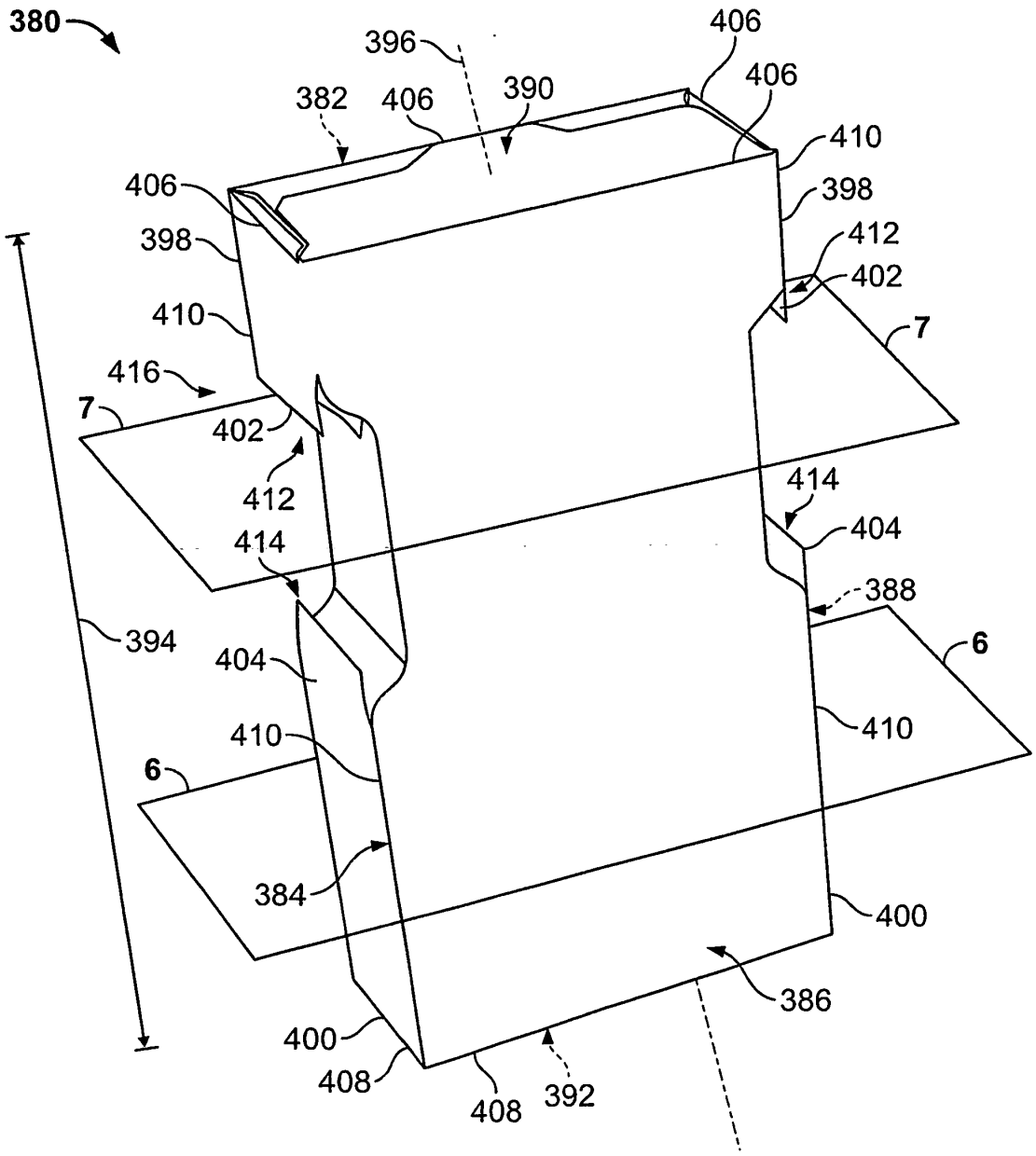

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FIG. 9

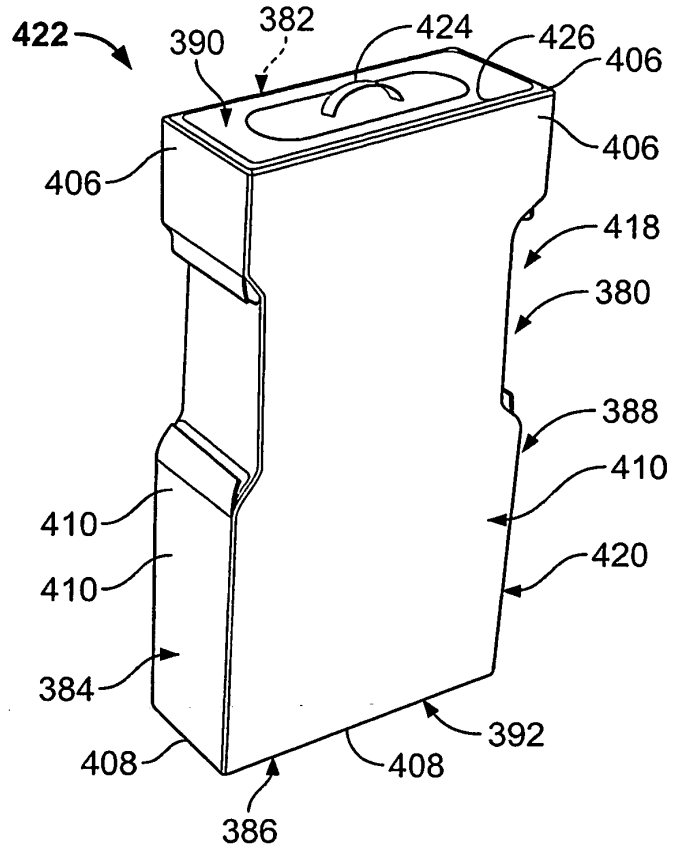

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FIG. 10

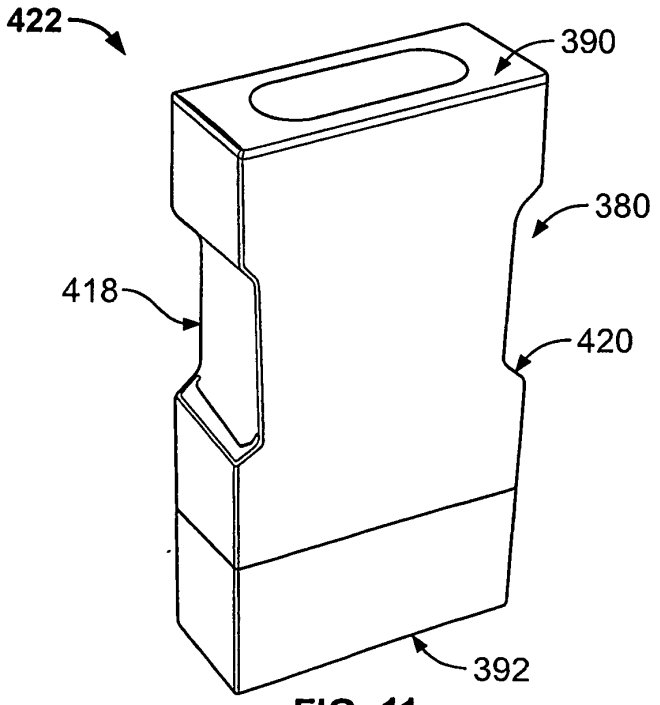

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FIG. 11

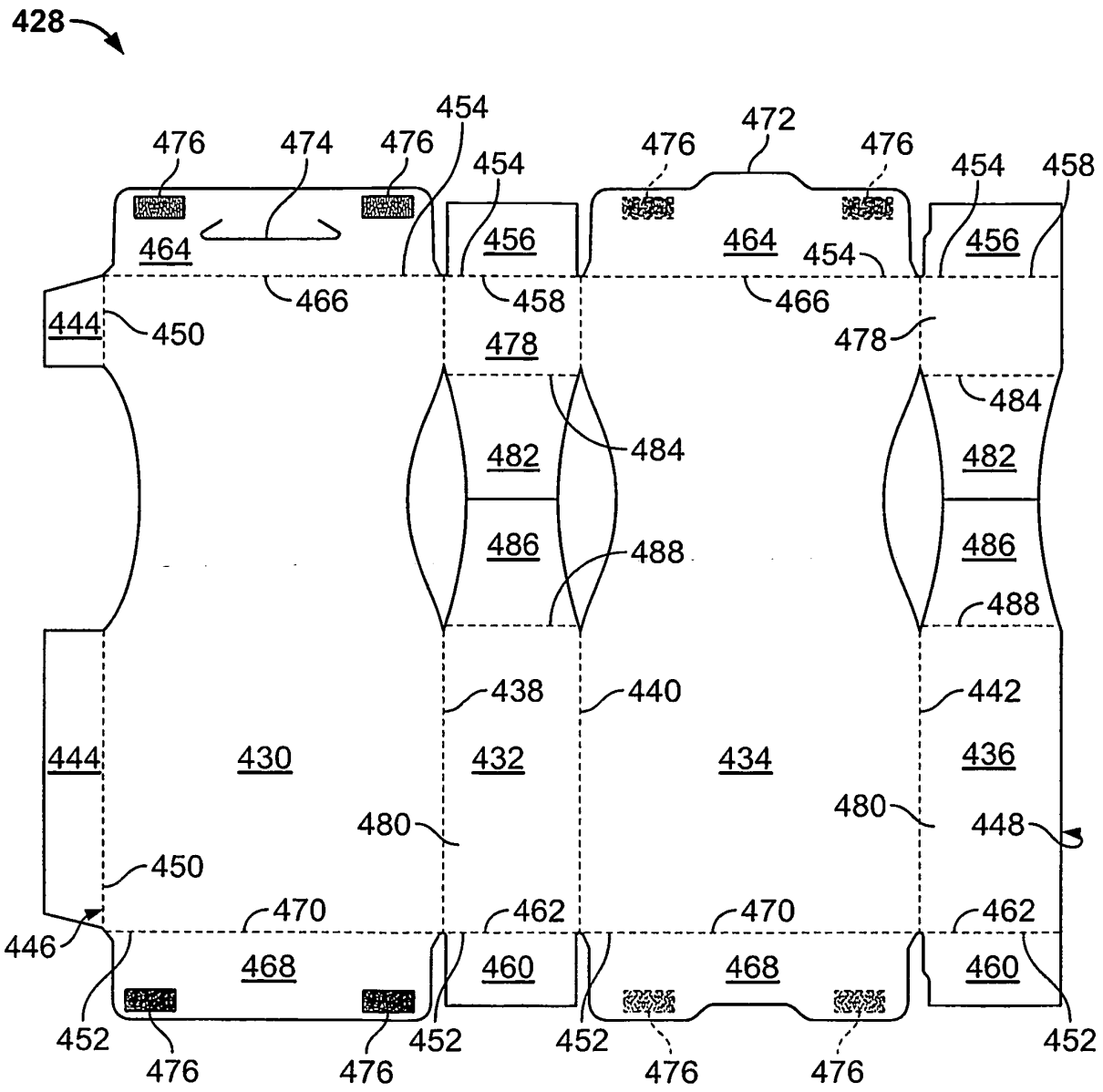

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FIG. 12

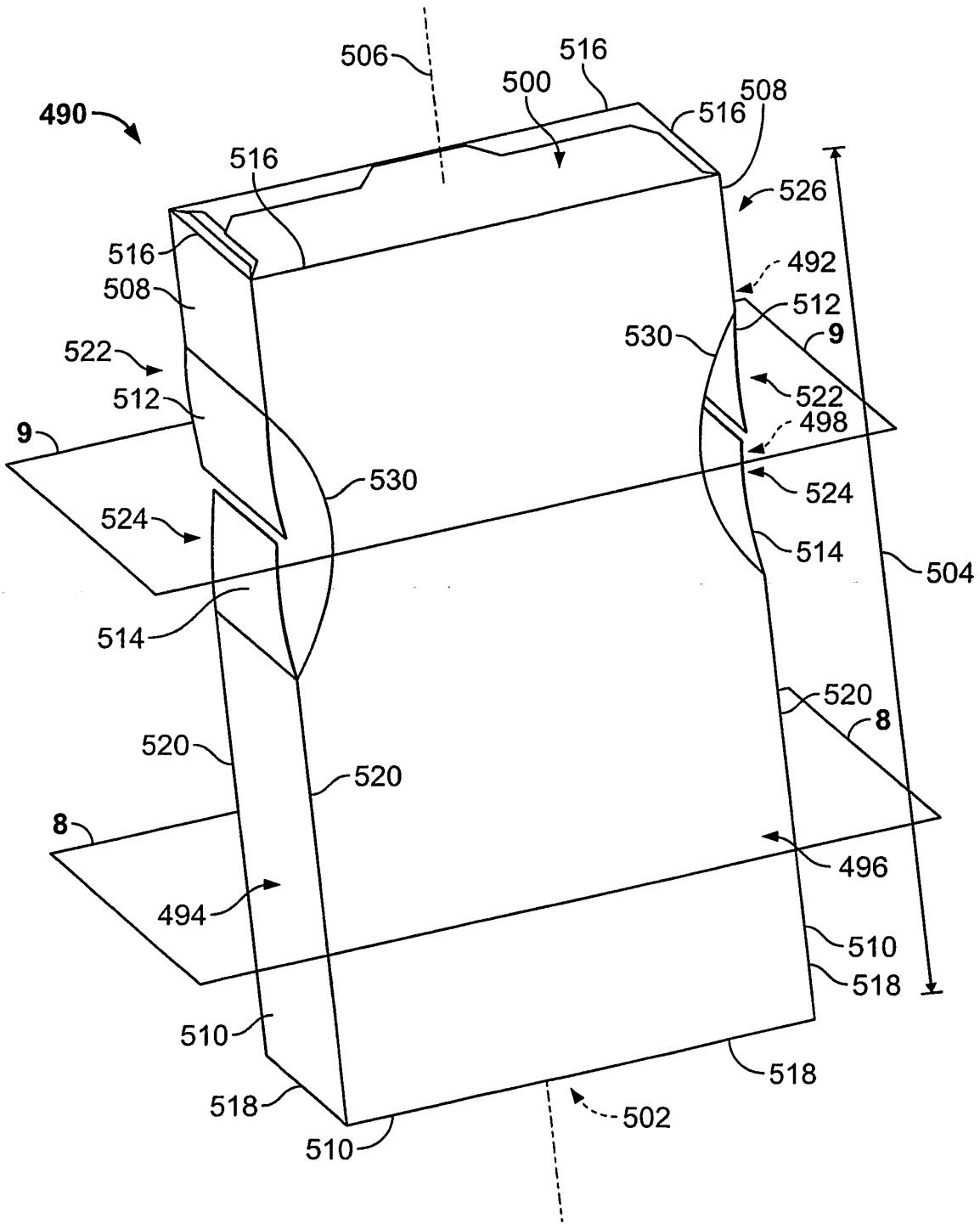

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FIG. 13

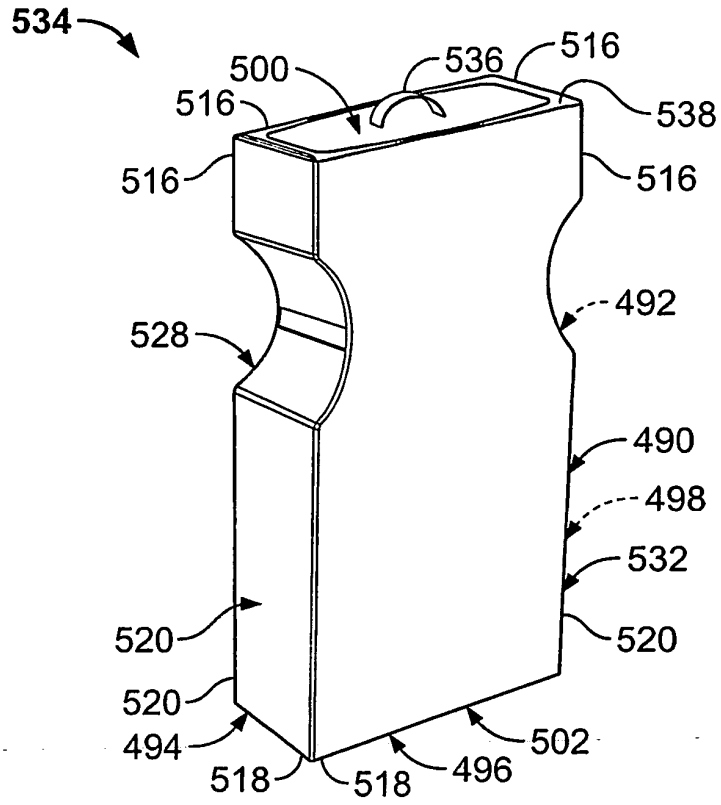

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FIG. 14

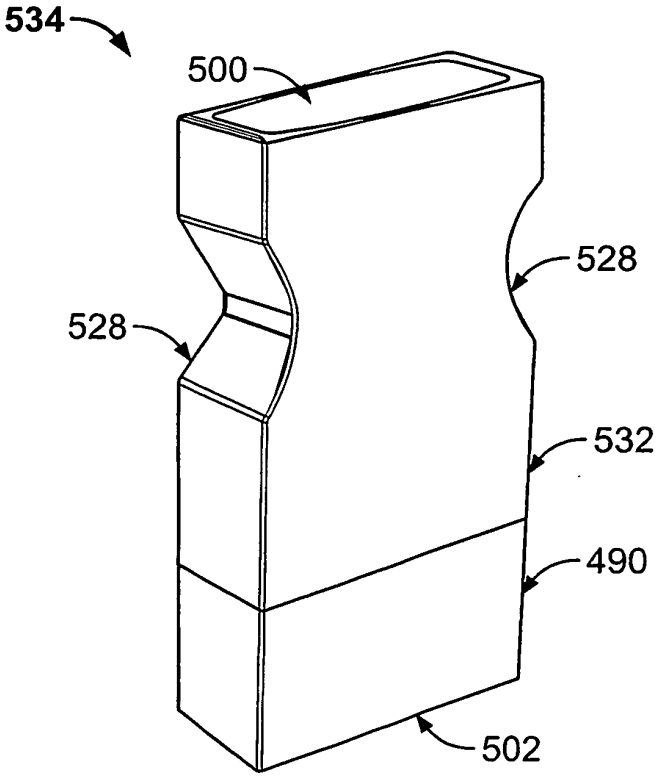

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FIG. 15

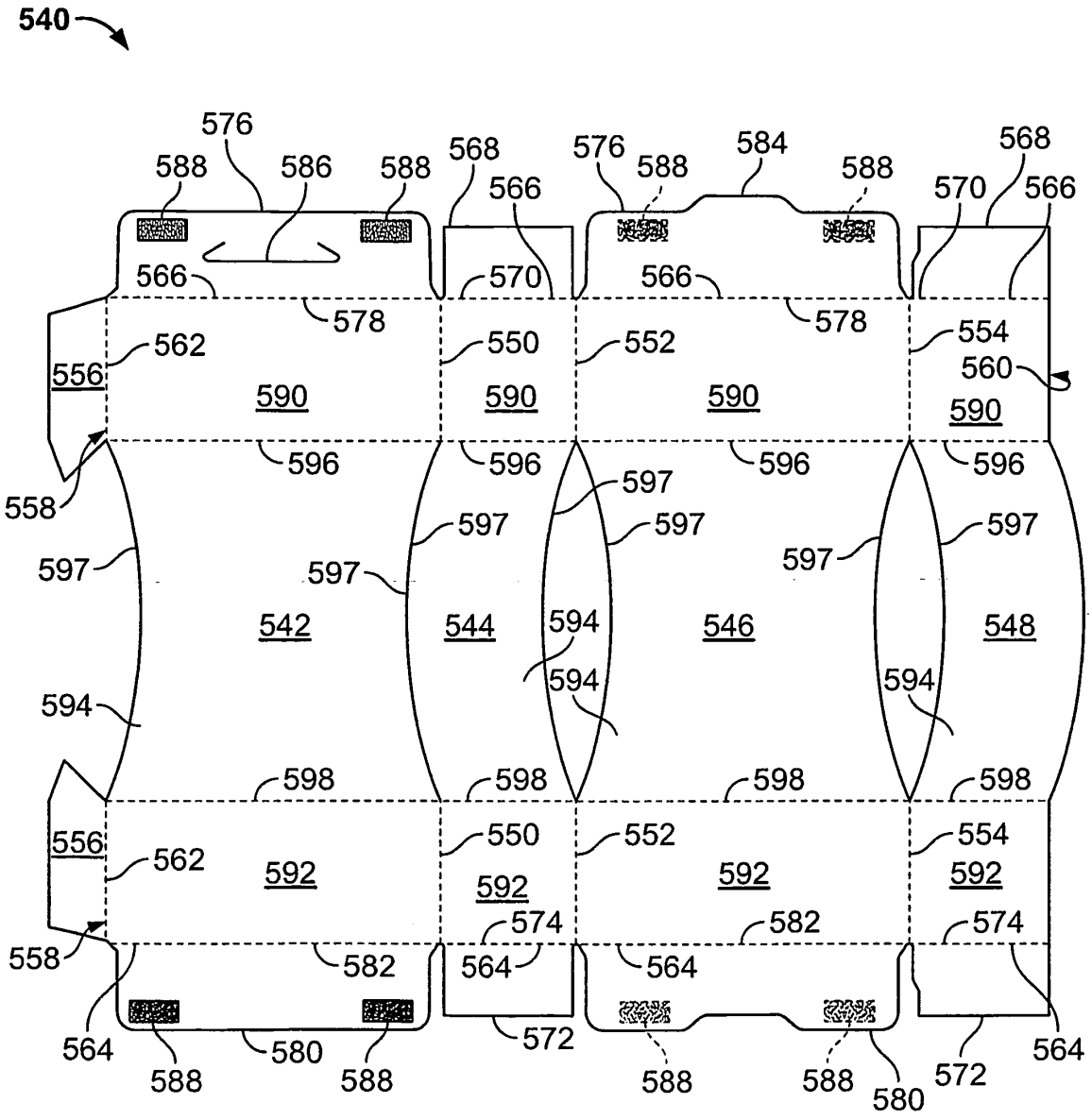

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FIG. 16

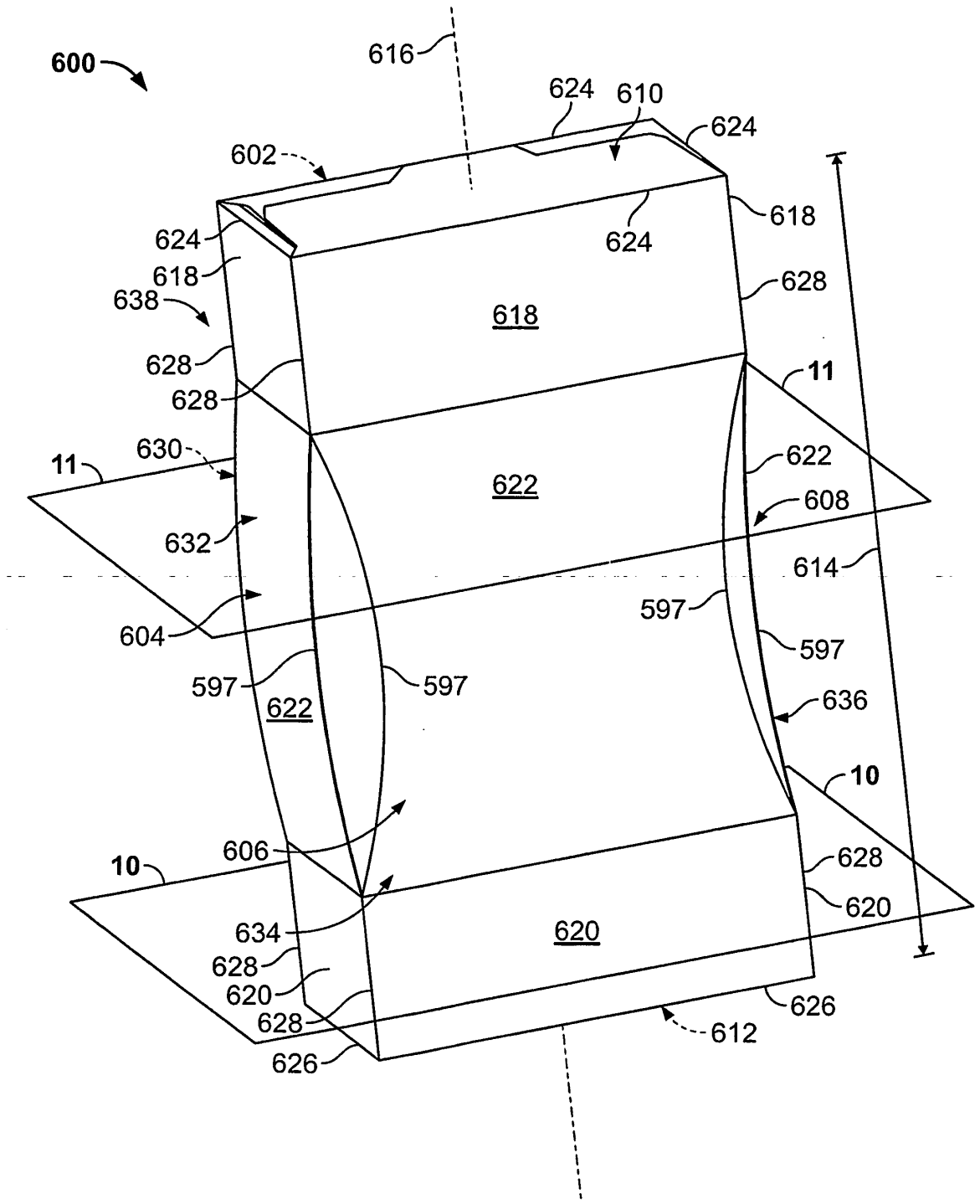

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FIG. 17

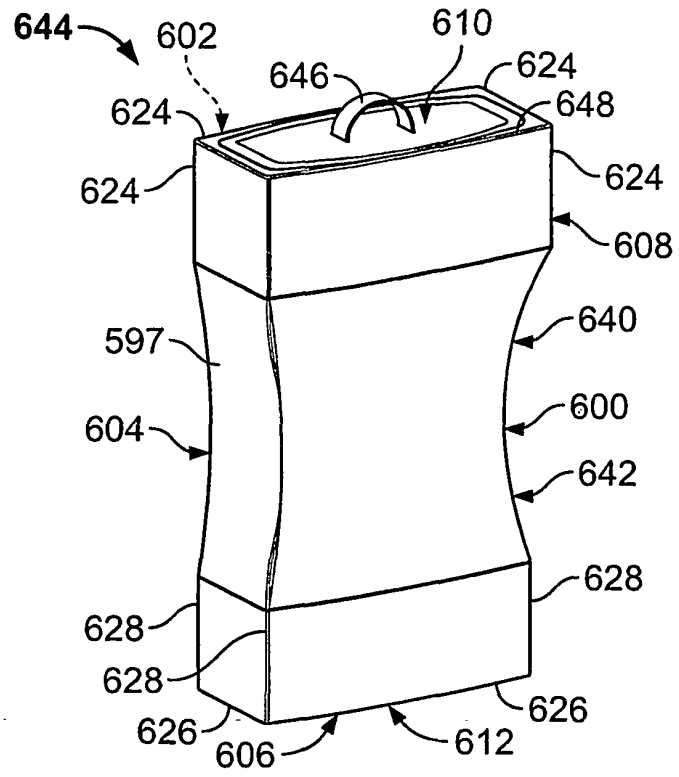

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FIG. 18

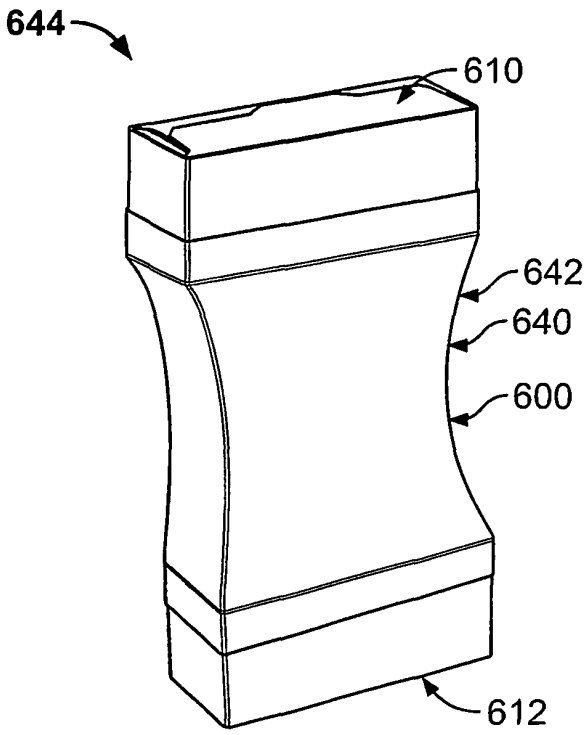

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FIG. 19

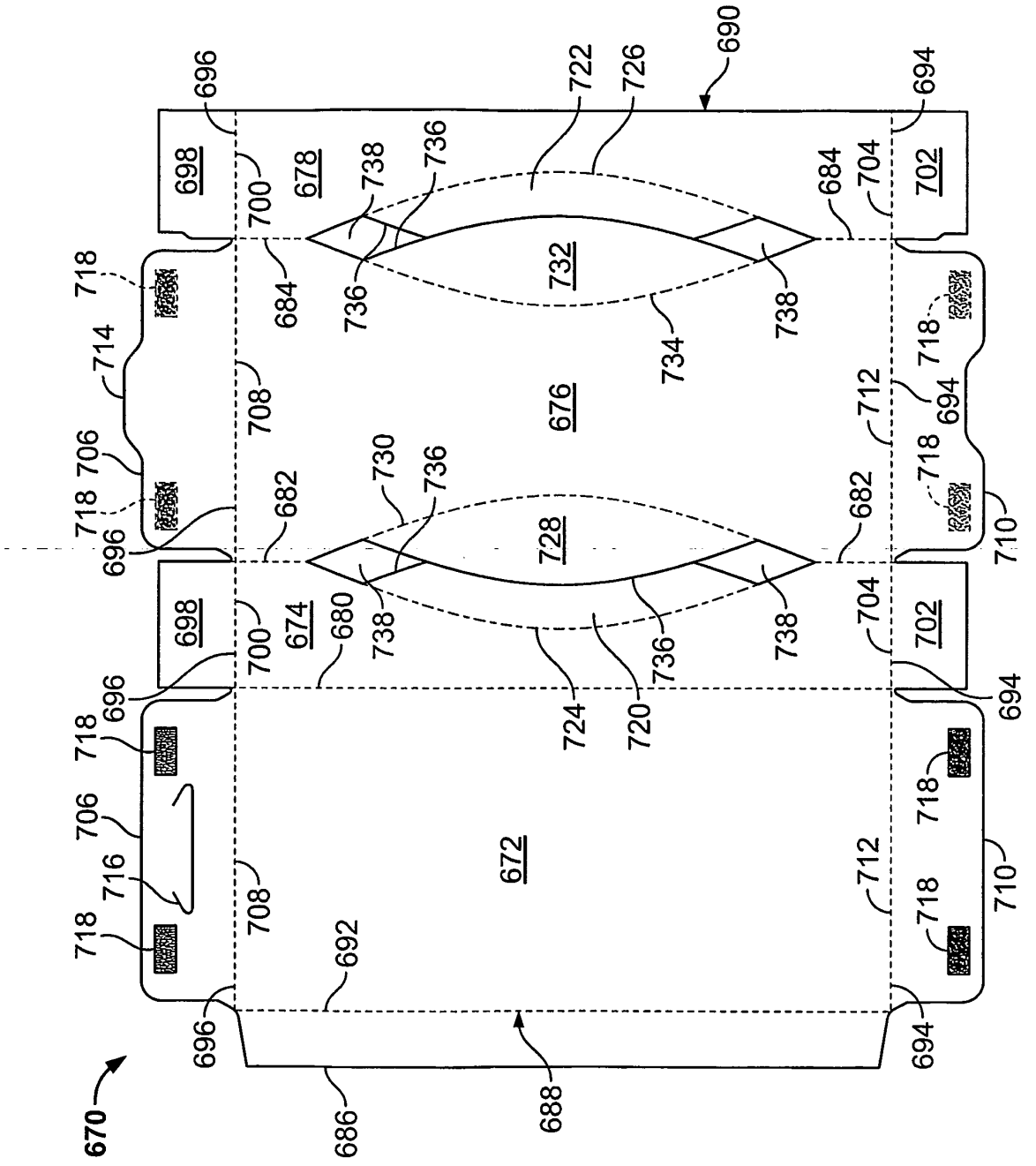

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FIG. 20

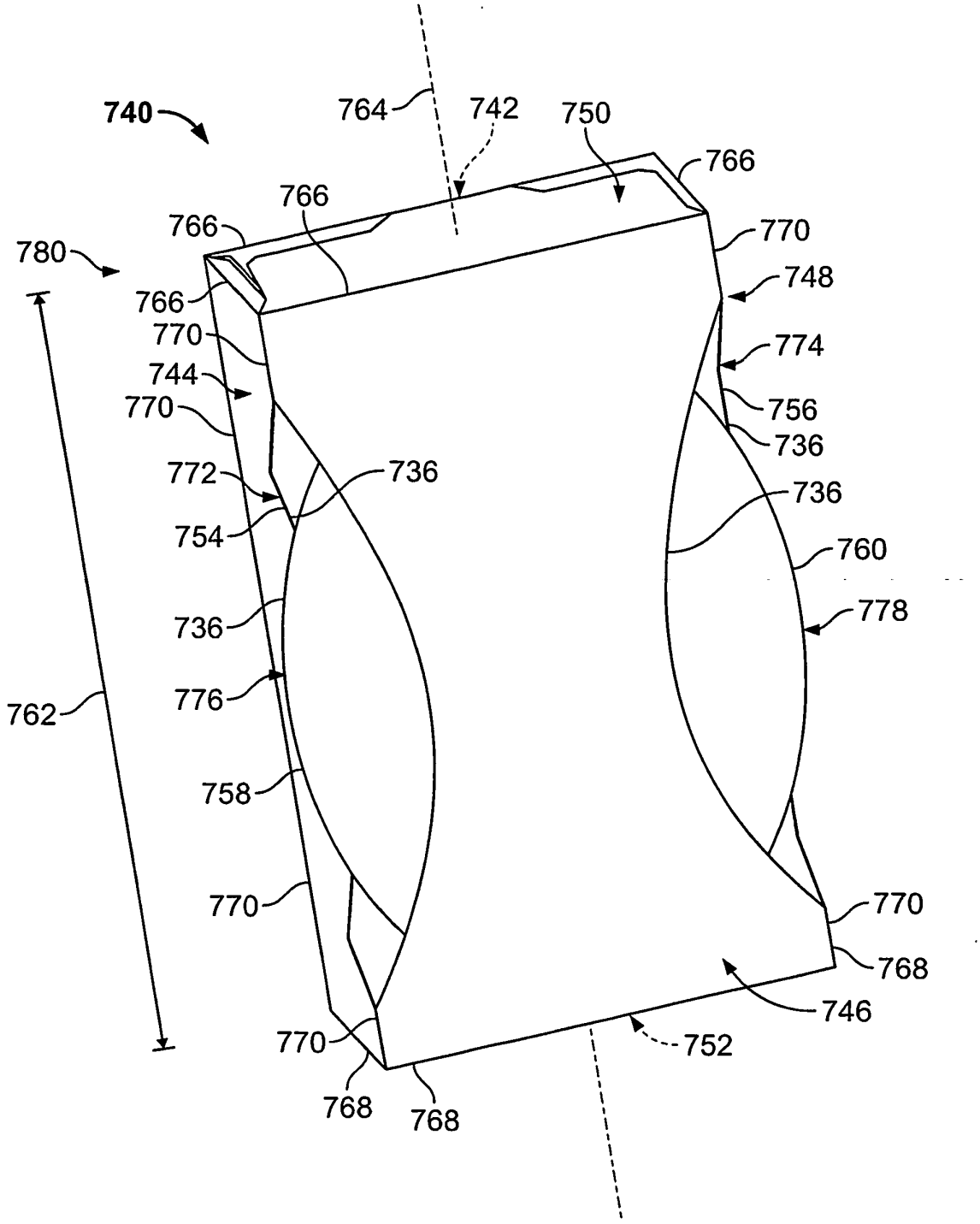

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FIG. 21

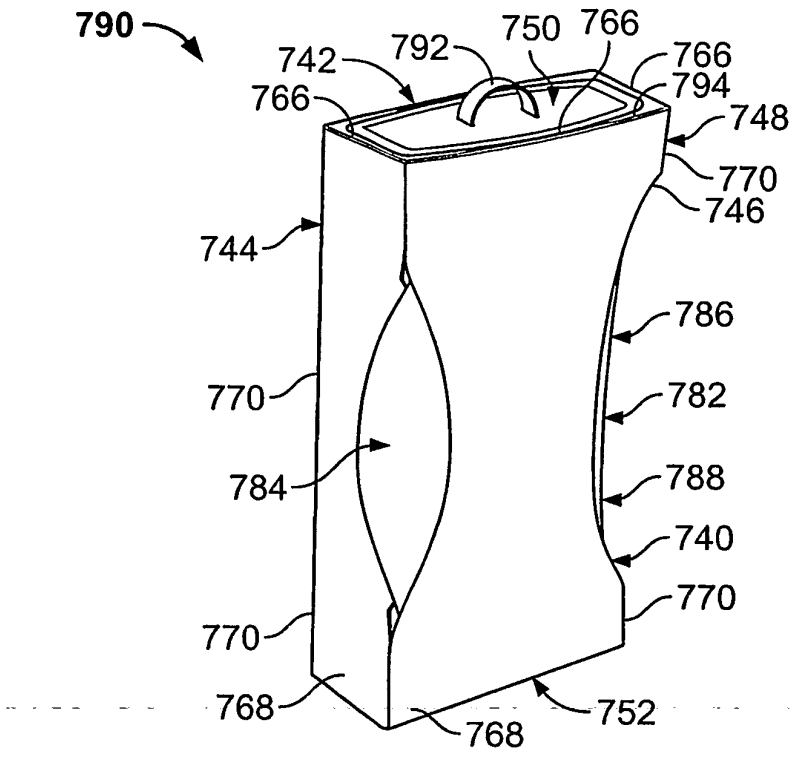

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FIG. 22

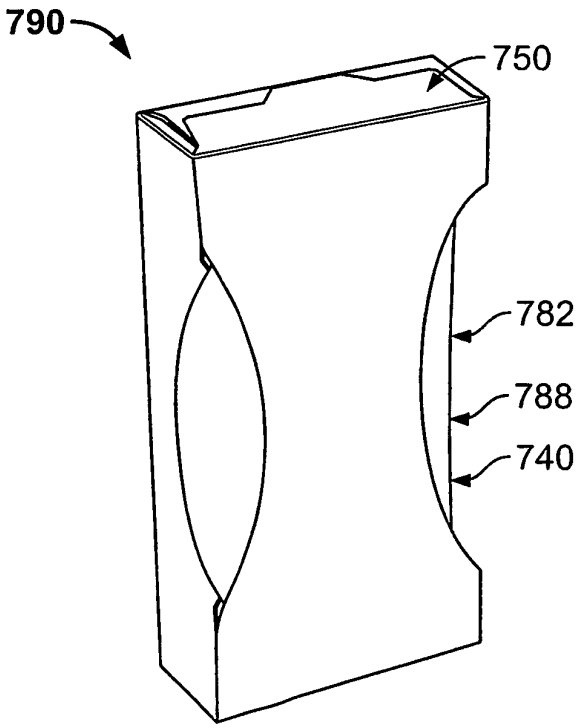

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FIG. 23

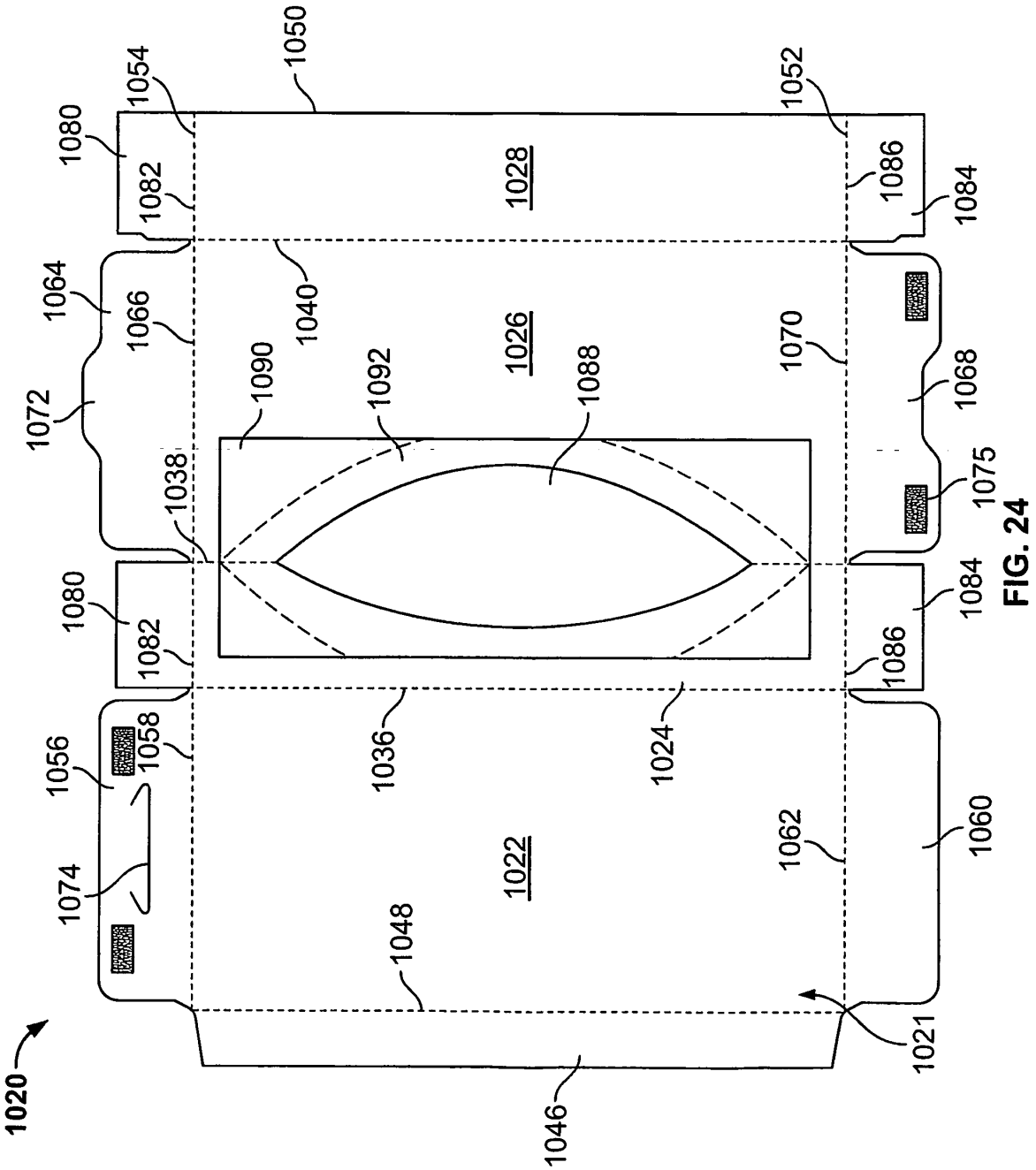

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FIG. 24

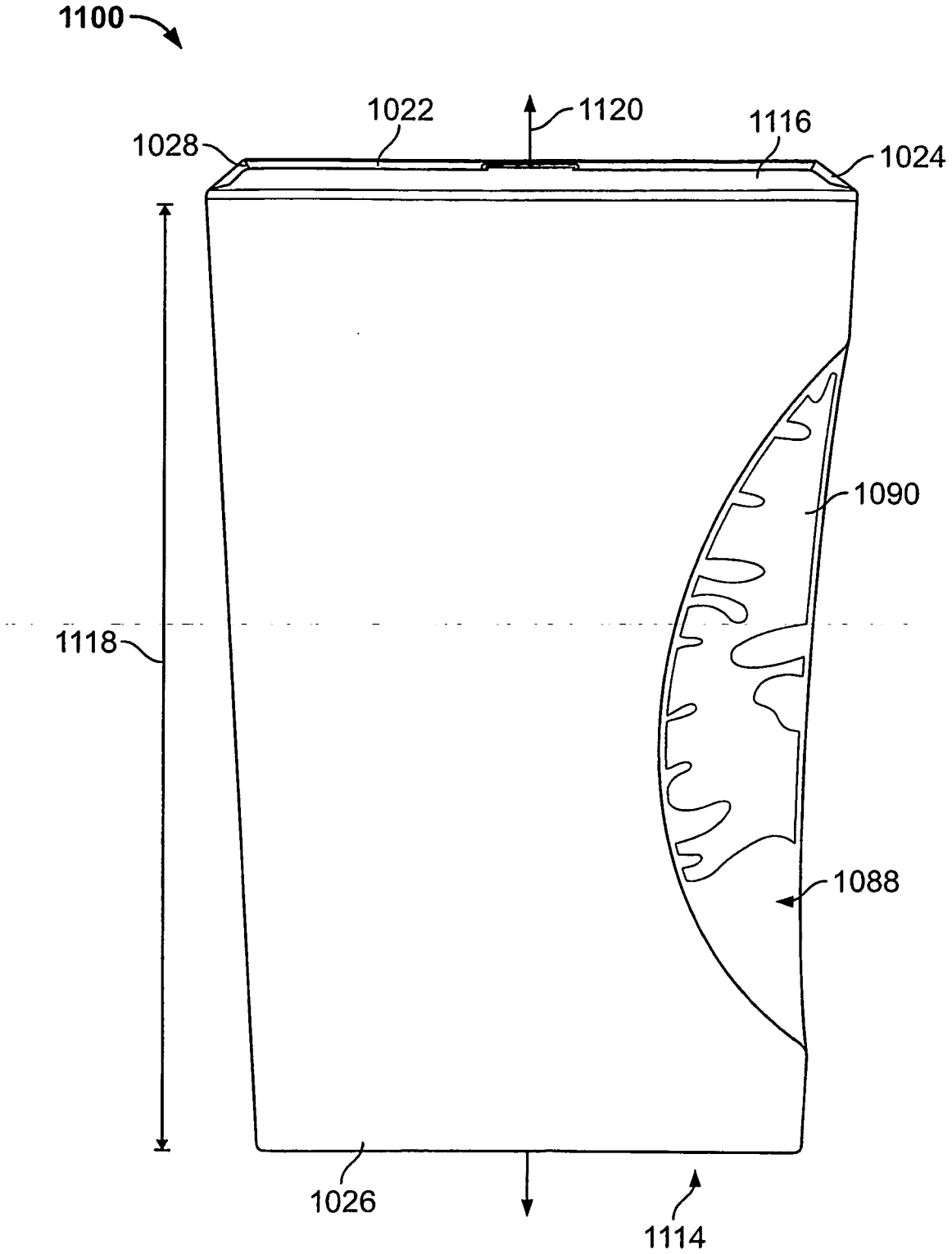


FIG. 25

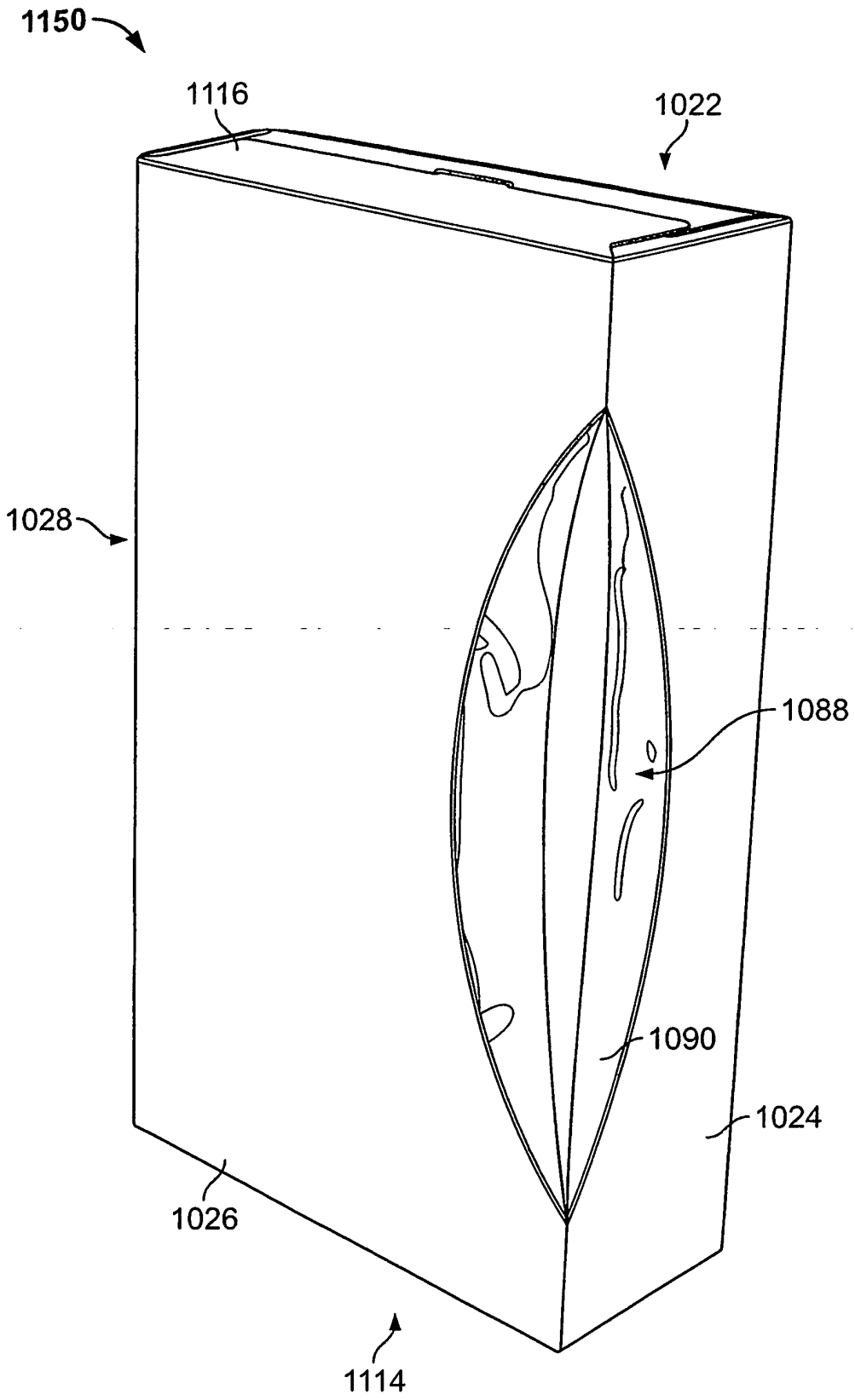


FIG. 26

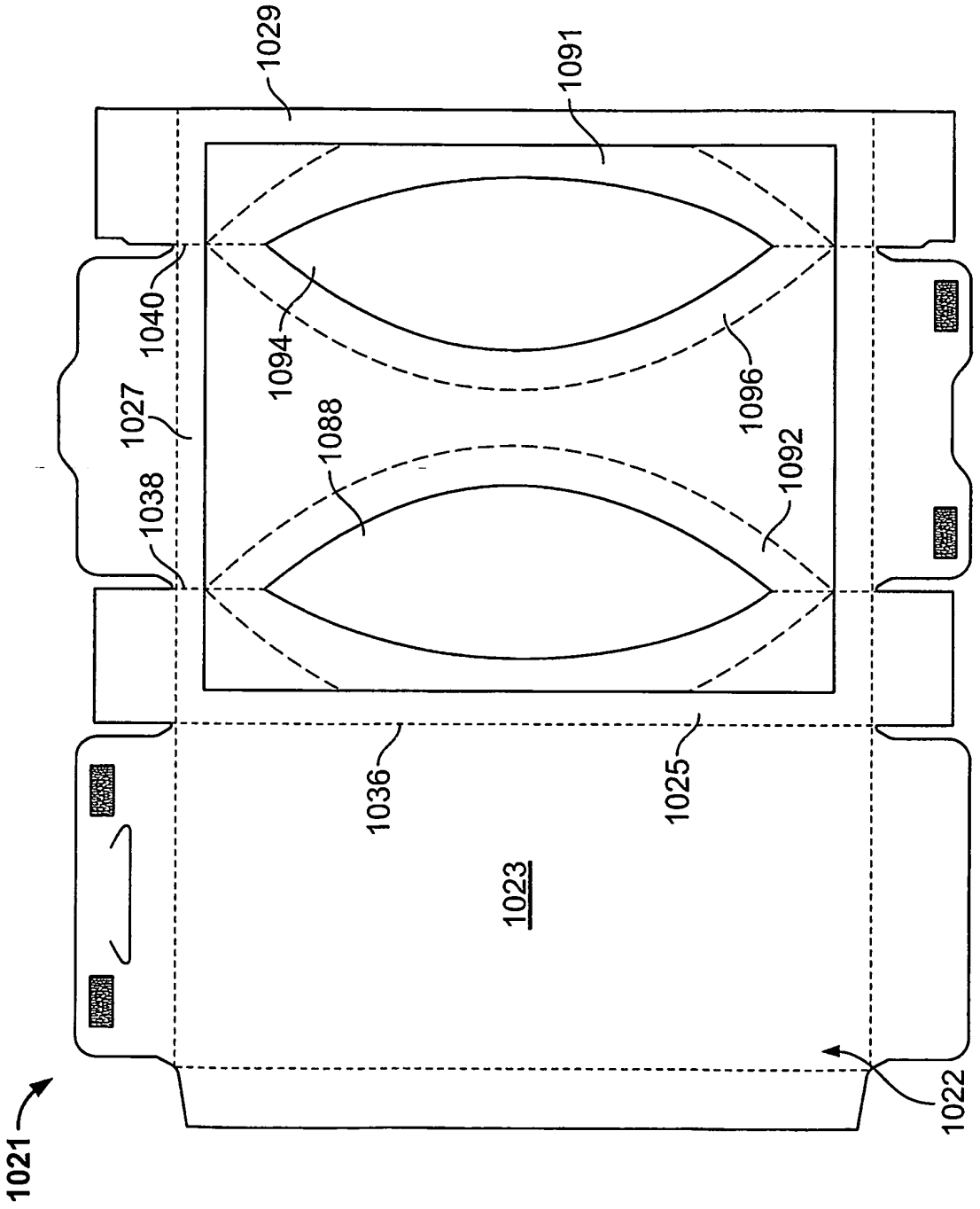

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FIG. 27

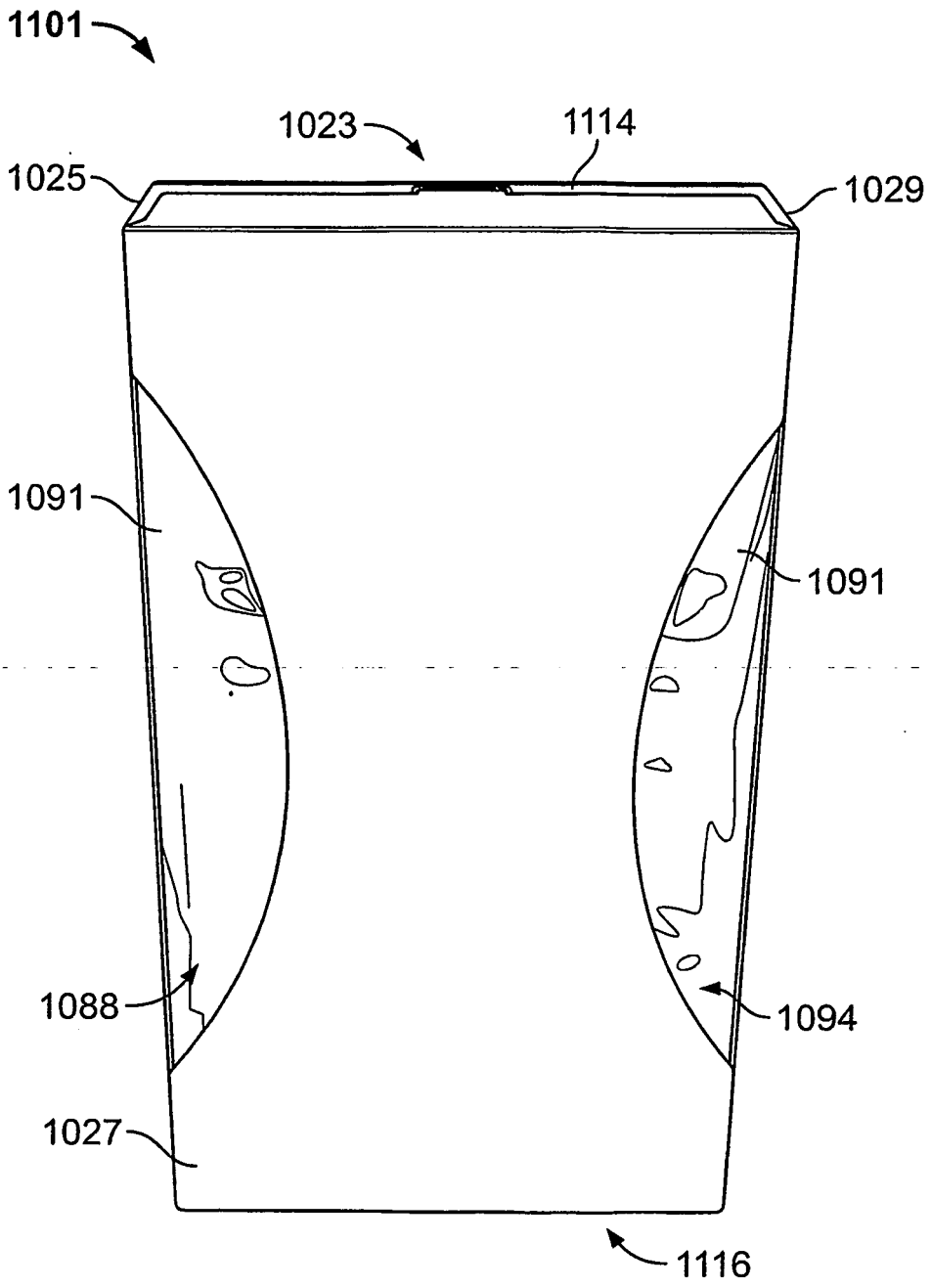


FIG. 28

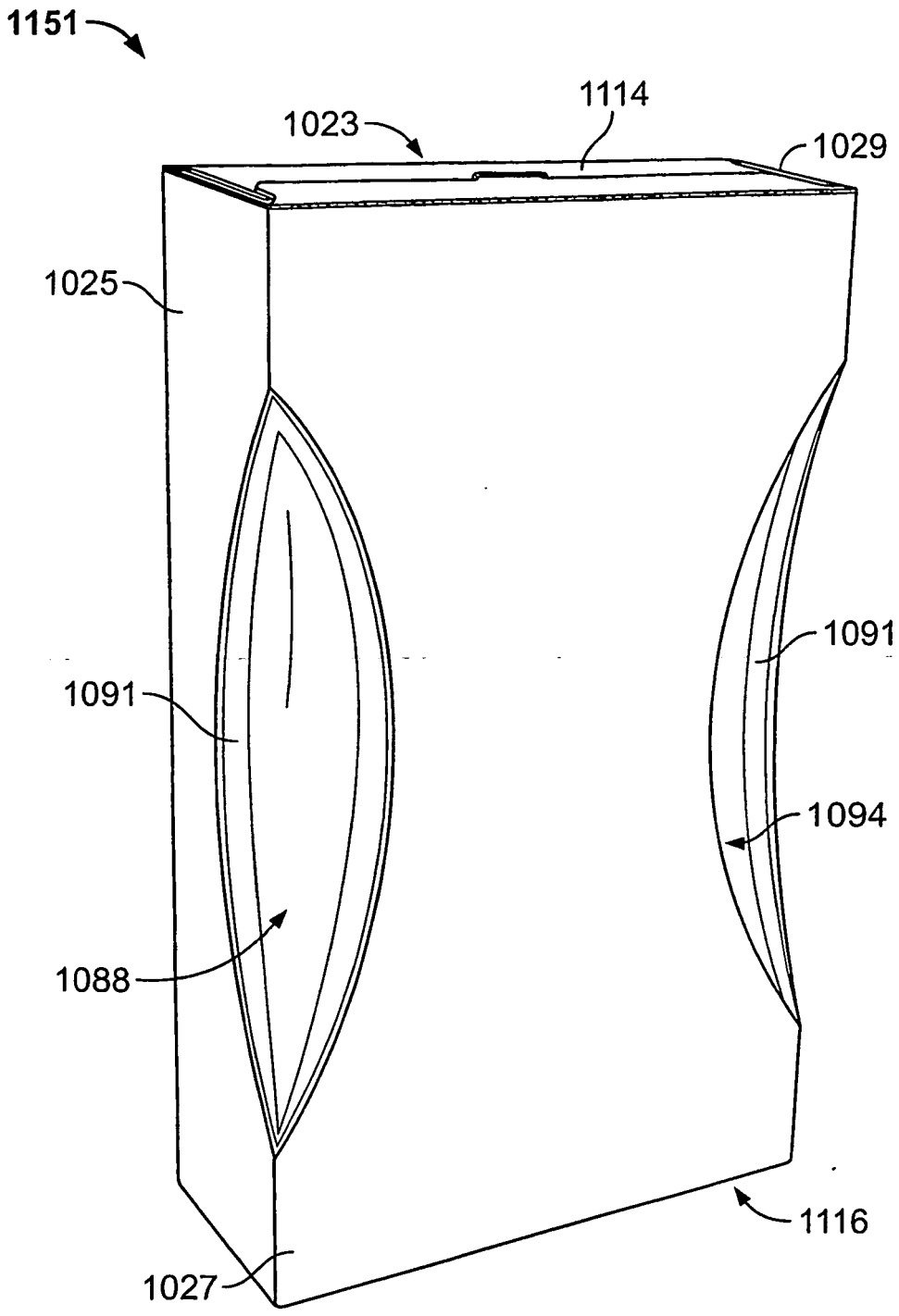


FIG. 29

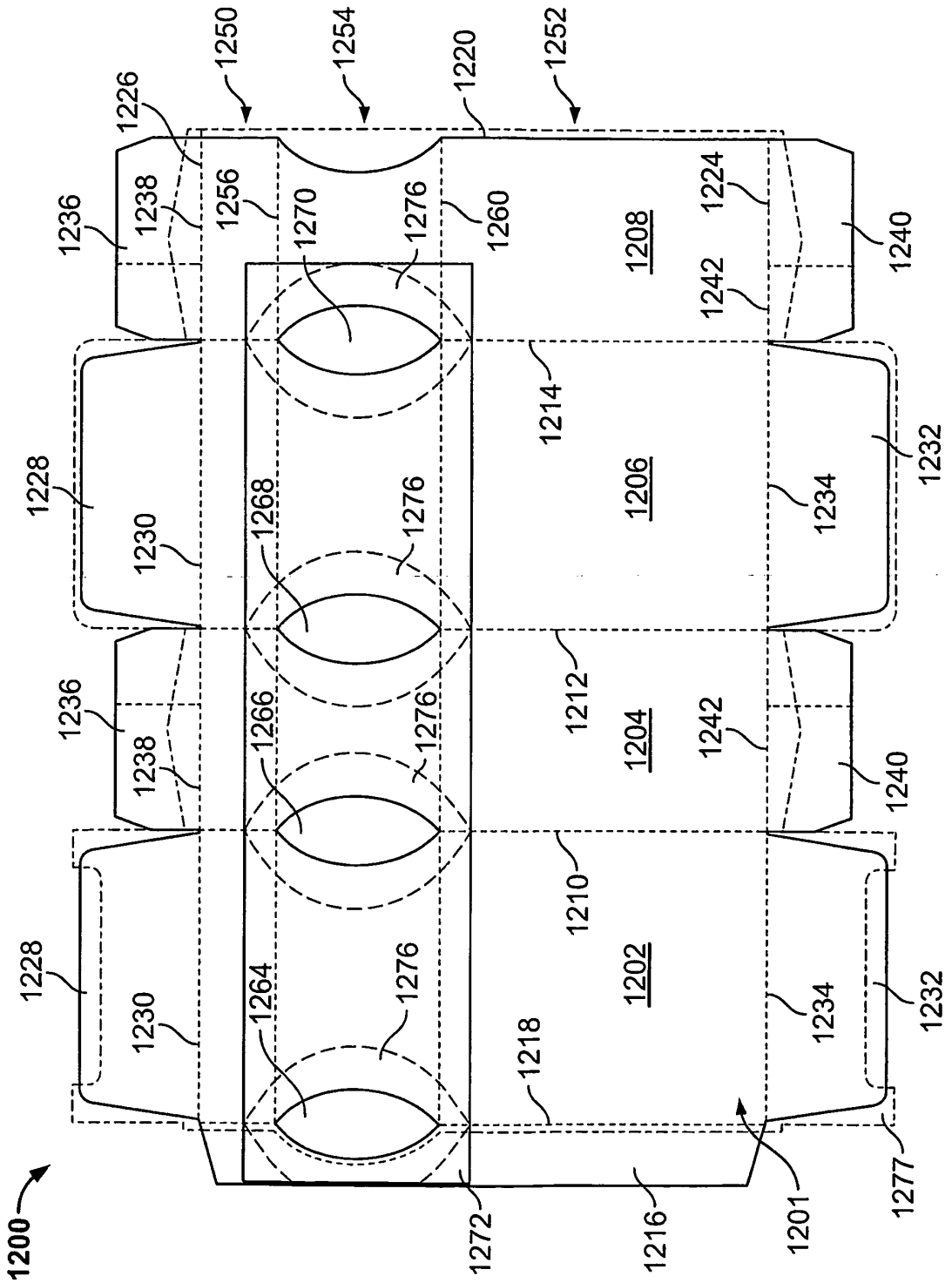

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FIG. 30

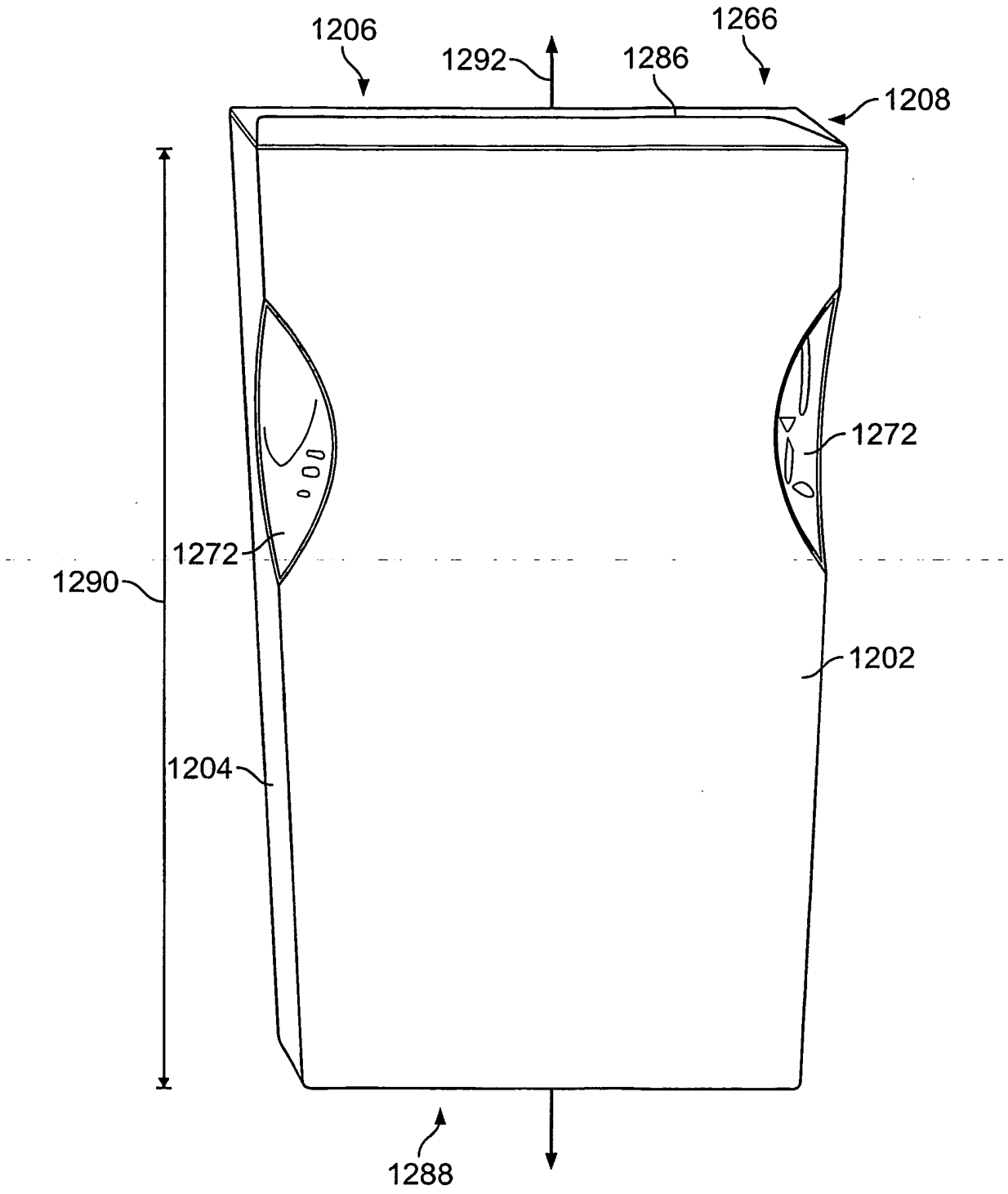


FIG. 31

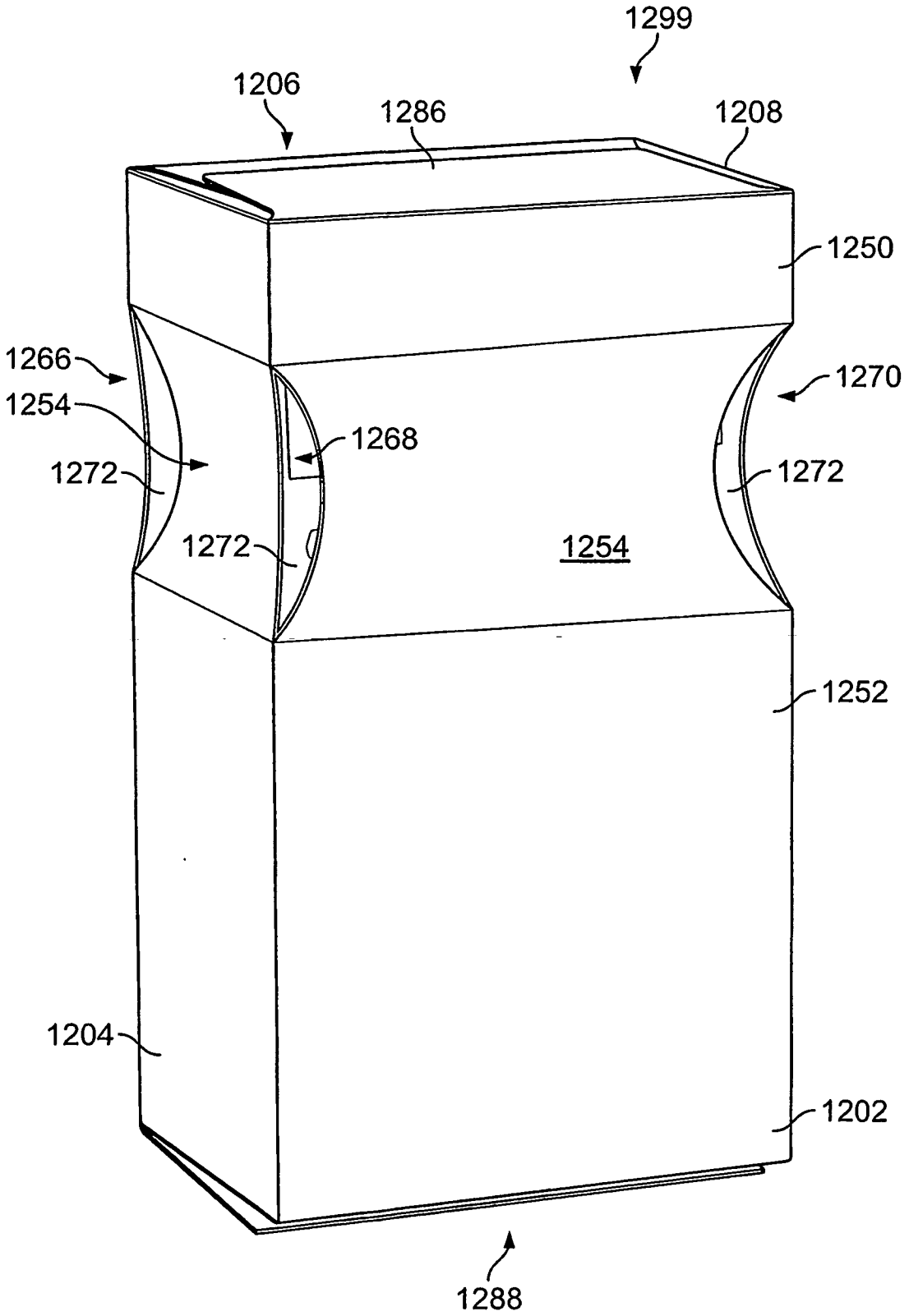

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FIG. 32

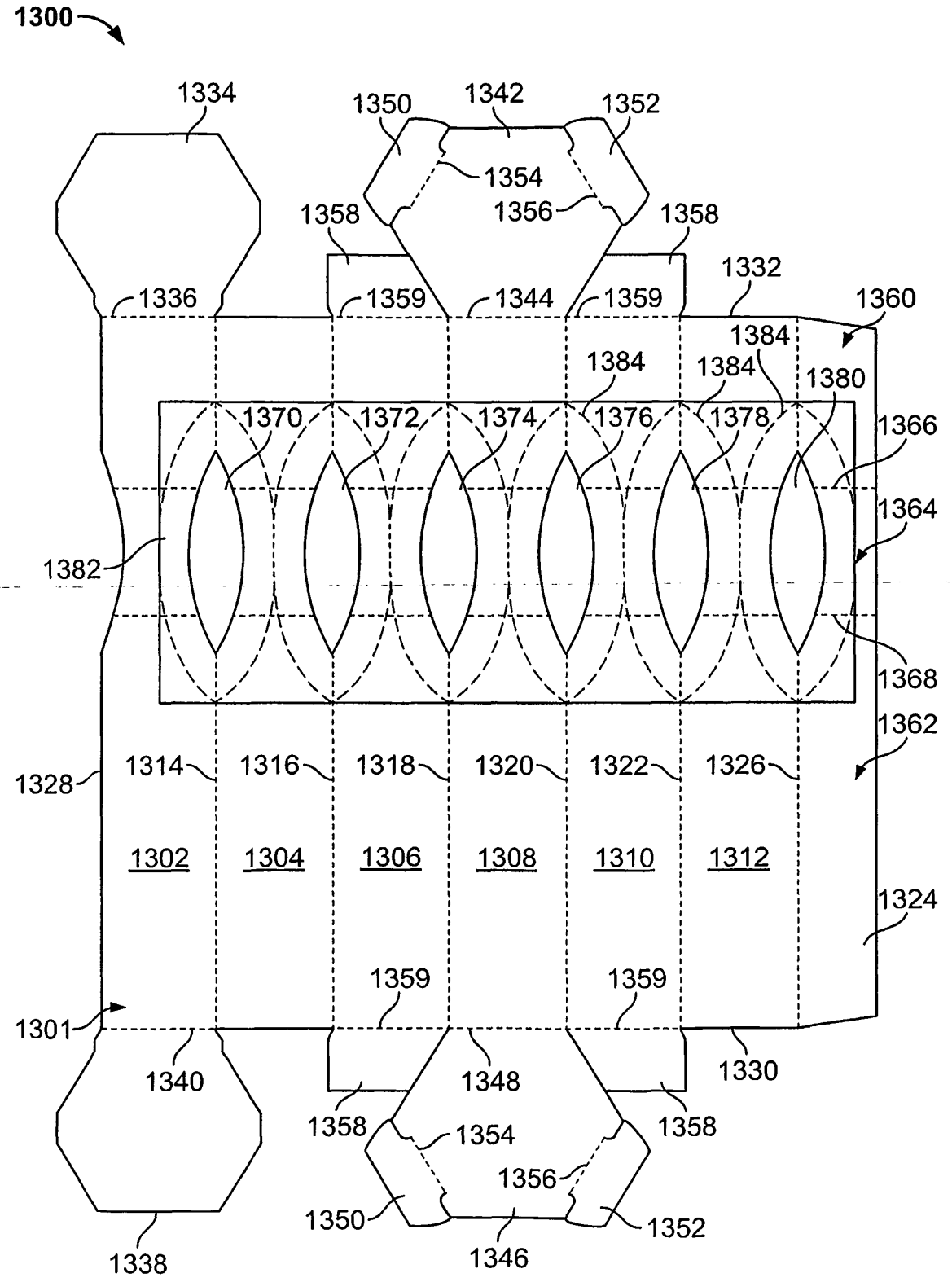

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FIG. 33

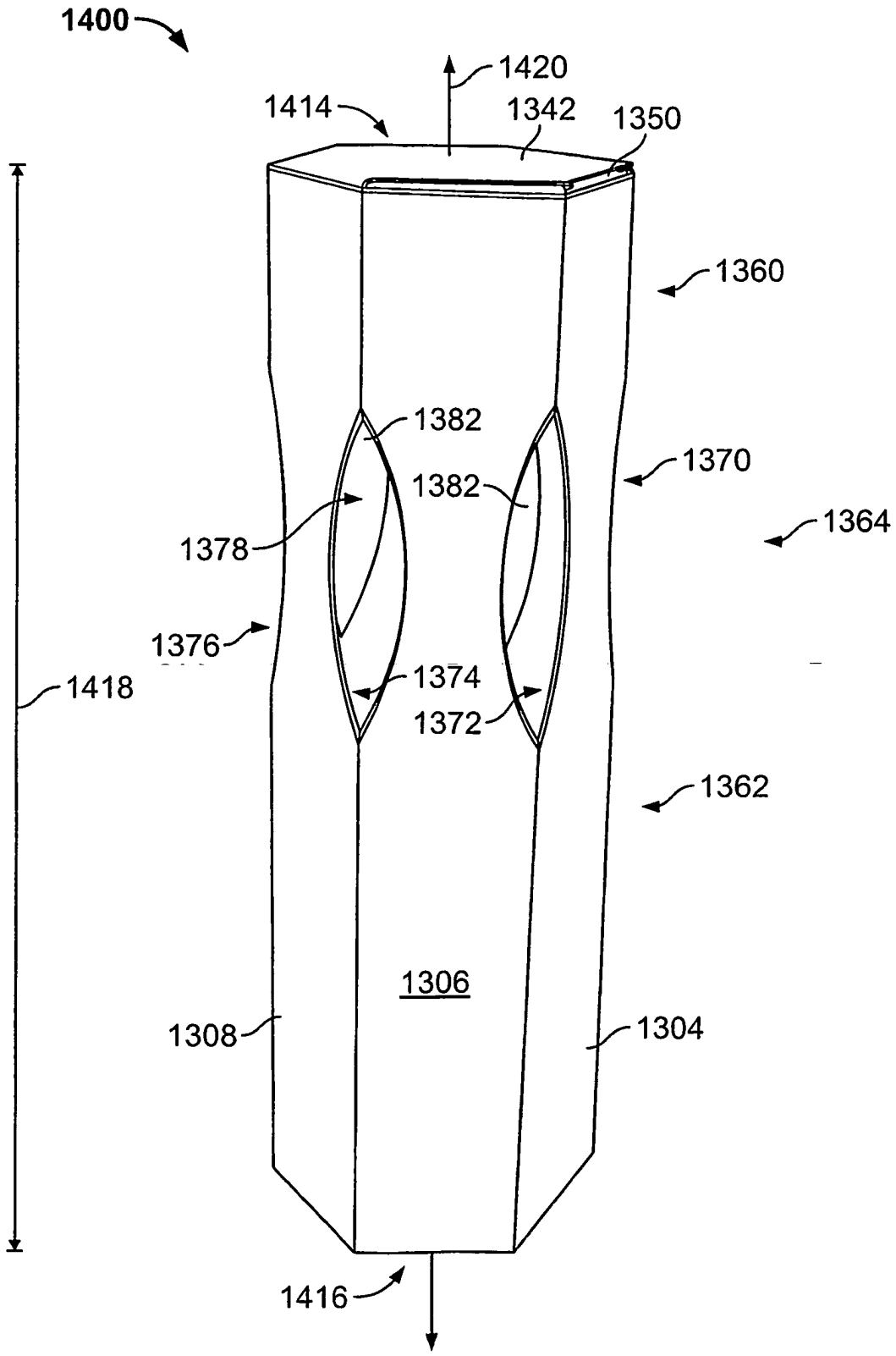

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FIG. 34

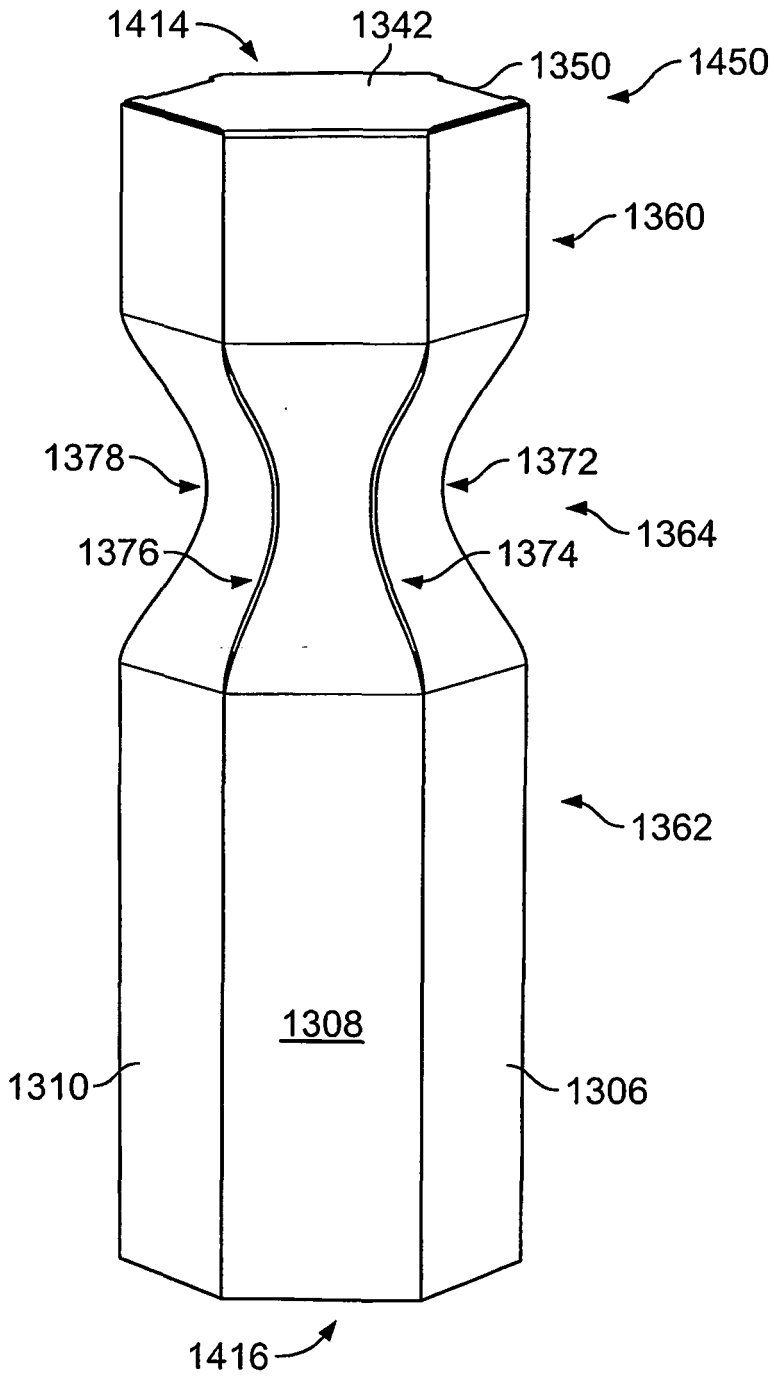

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FIG. 35

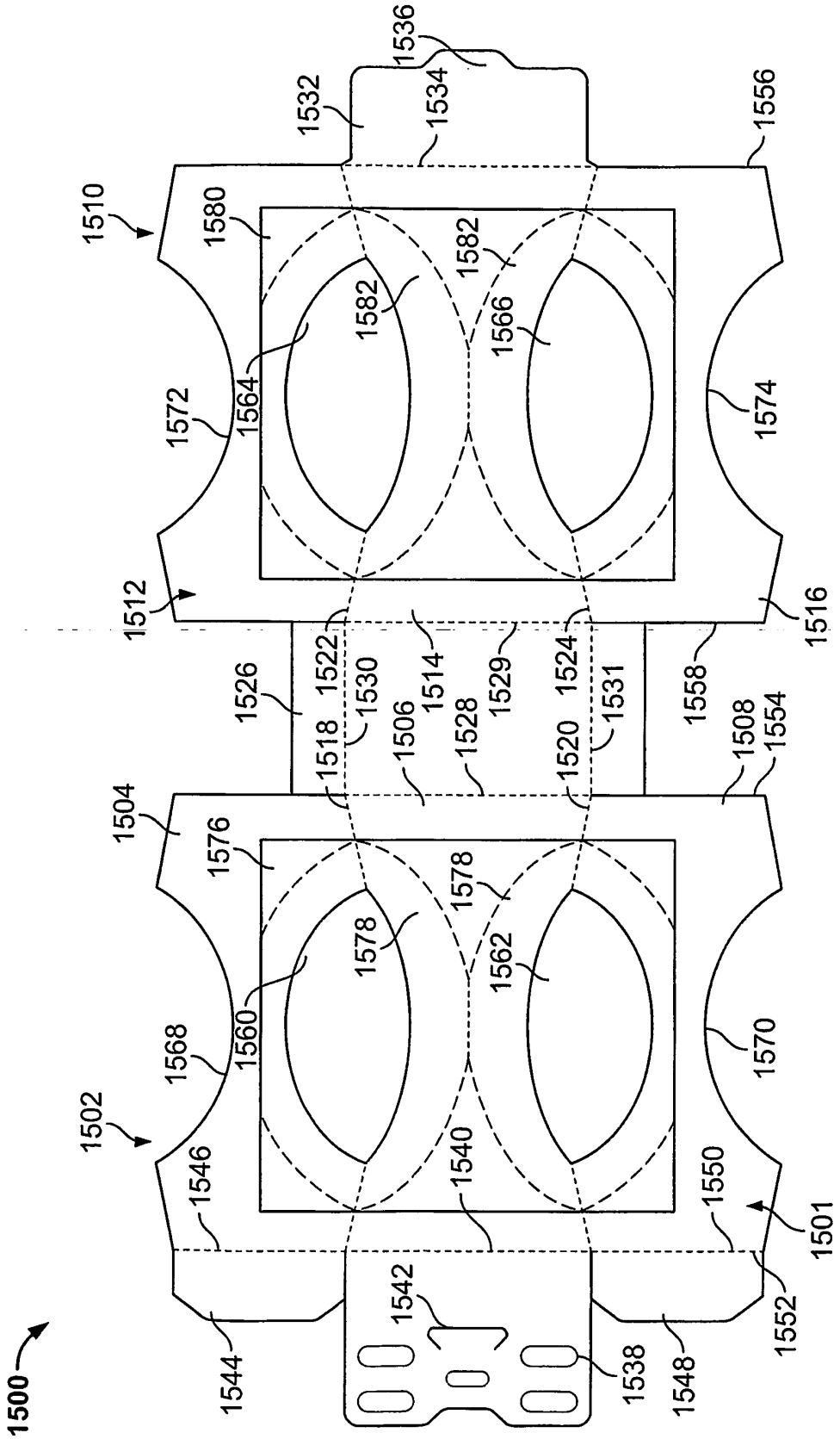

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FIG. 36

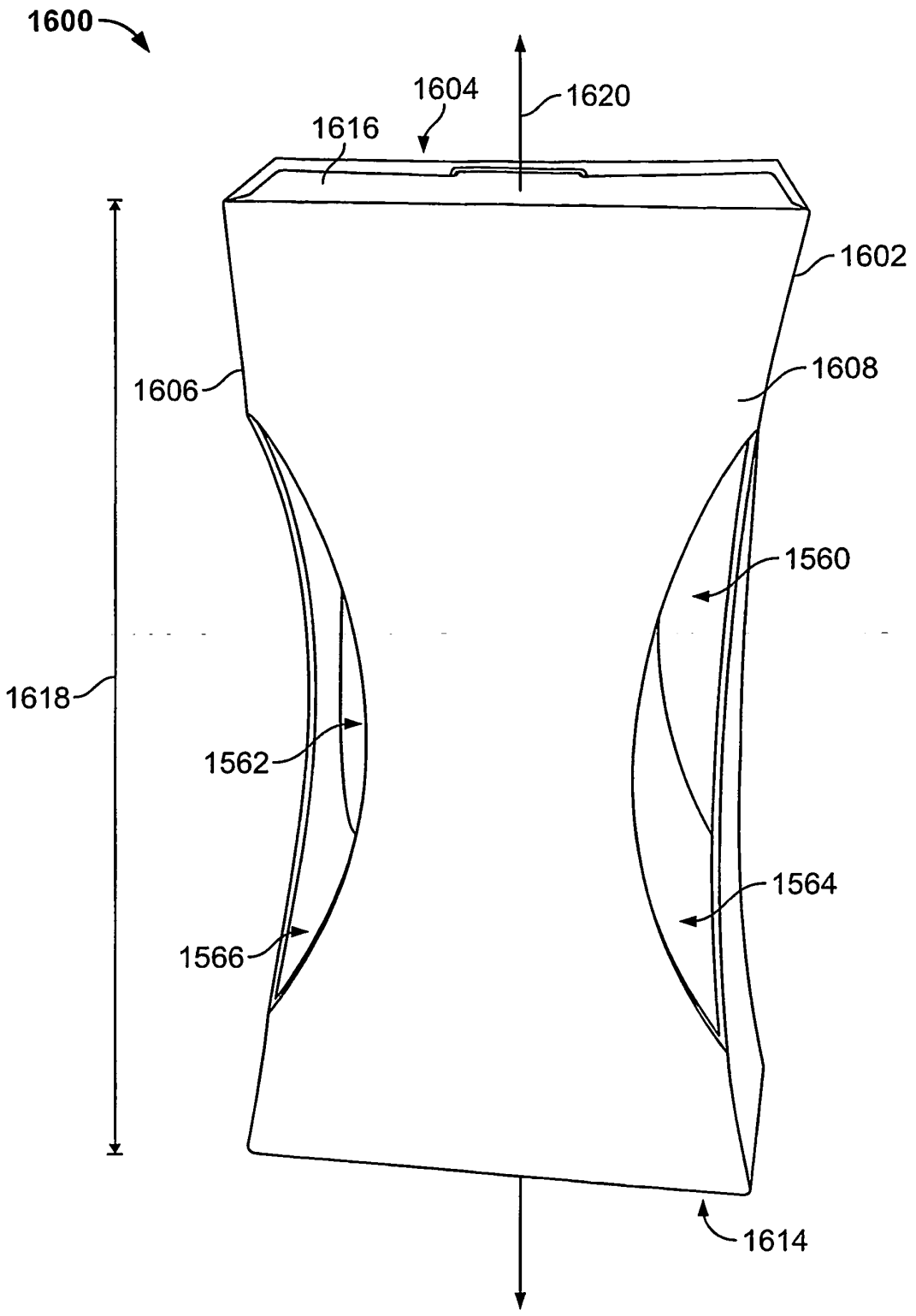

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FIG. 37

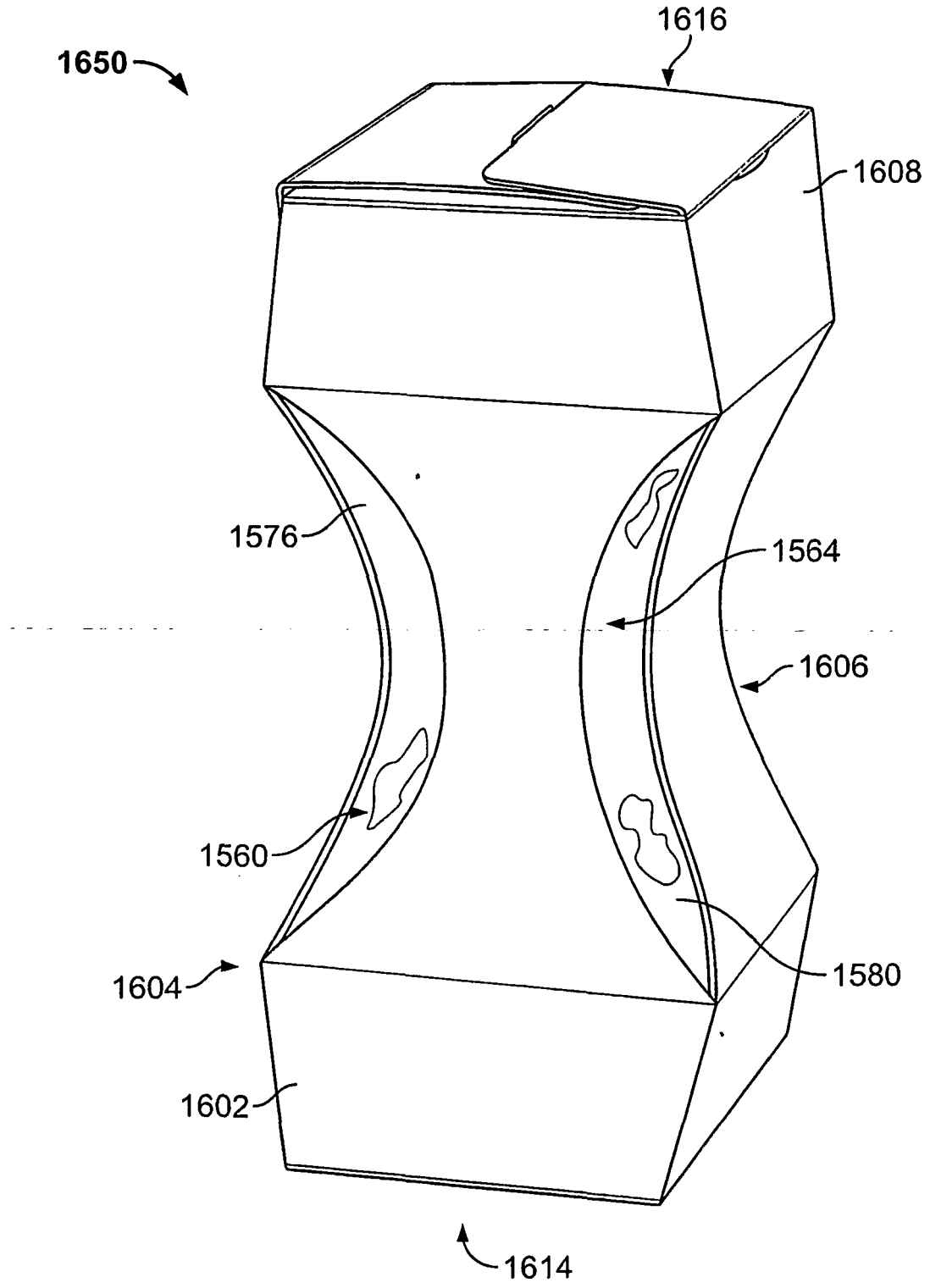


FIG. 38

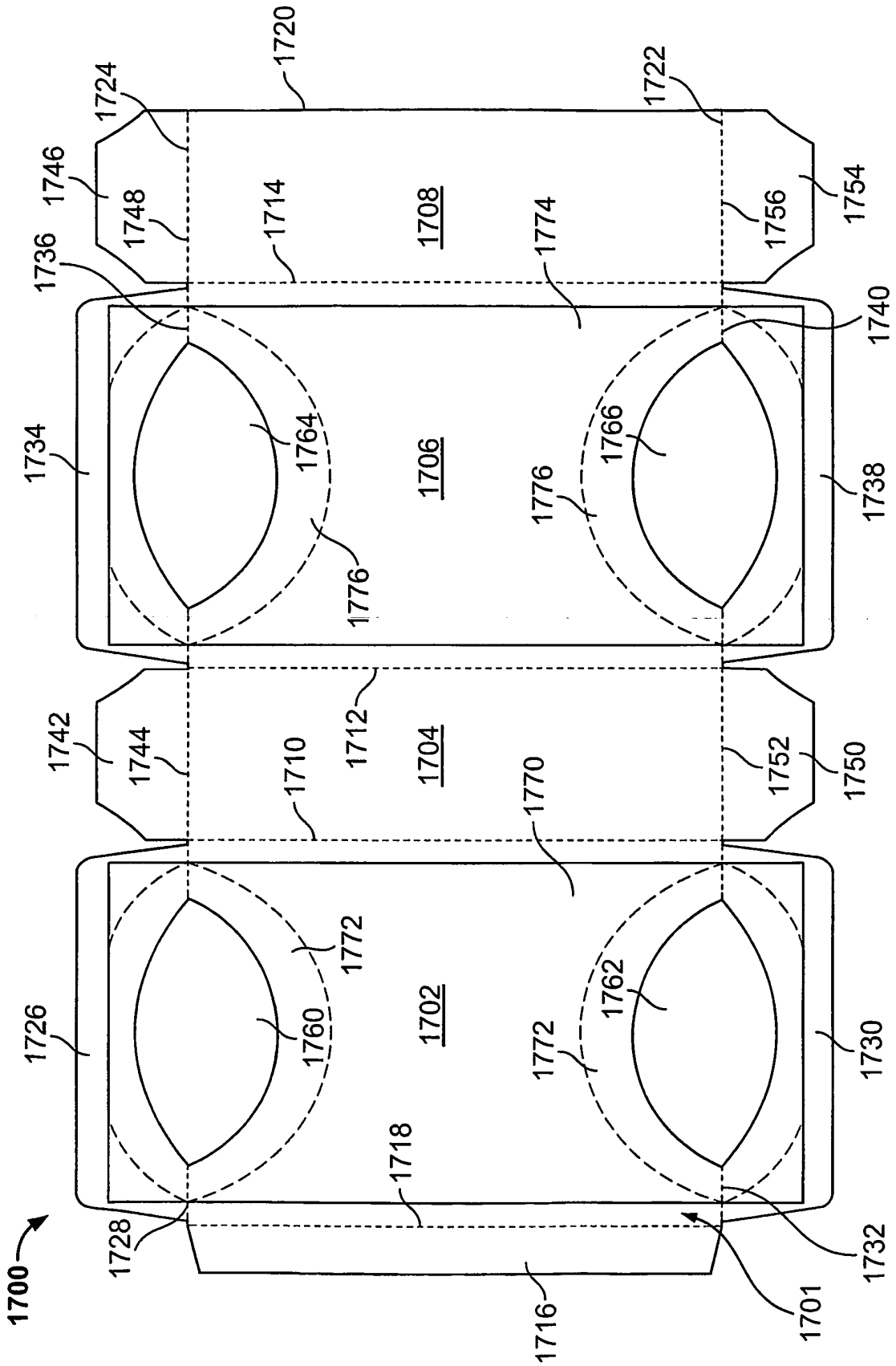

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FIG. 39

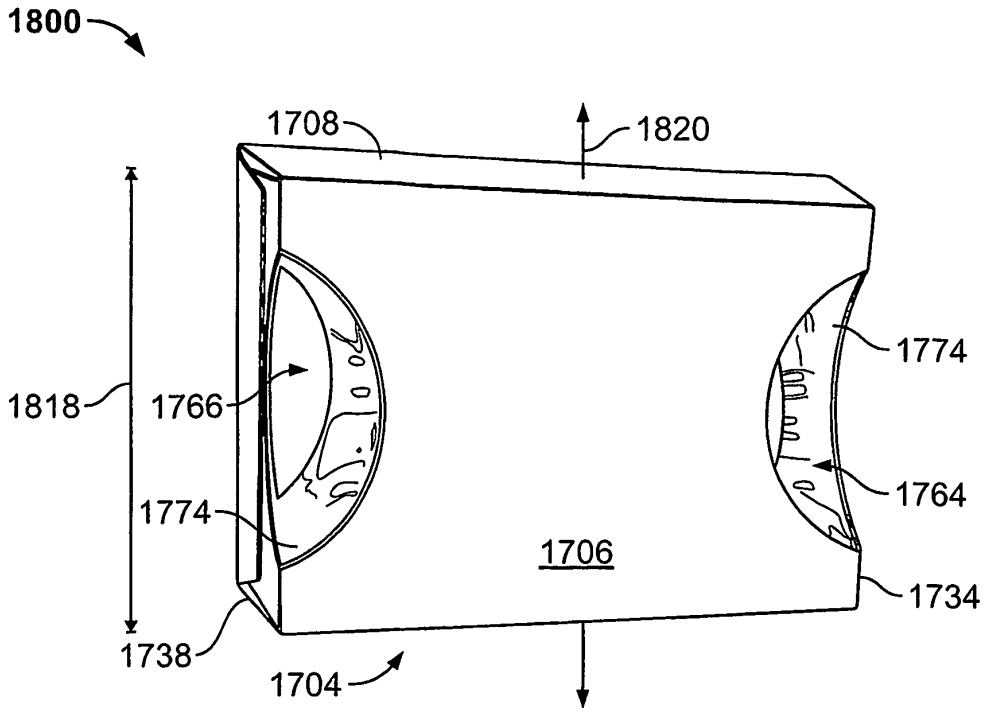

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FIG. 40

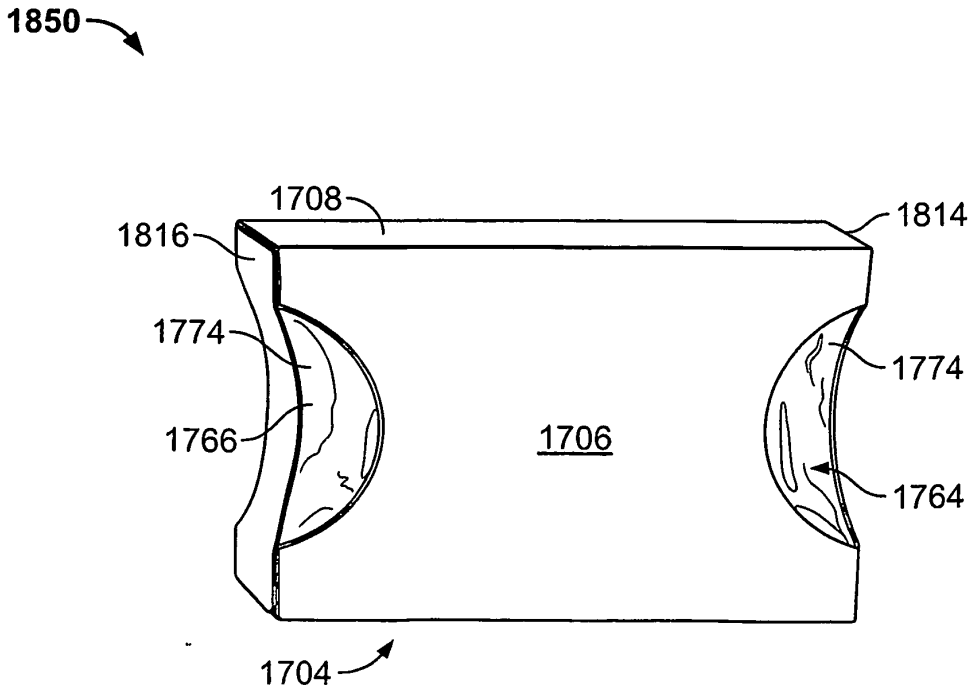

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FIG. 41

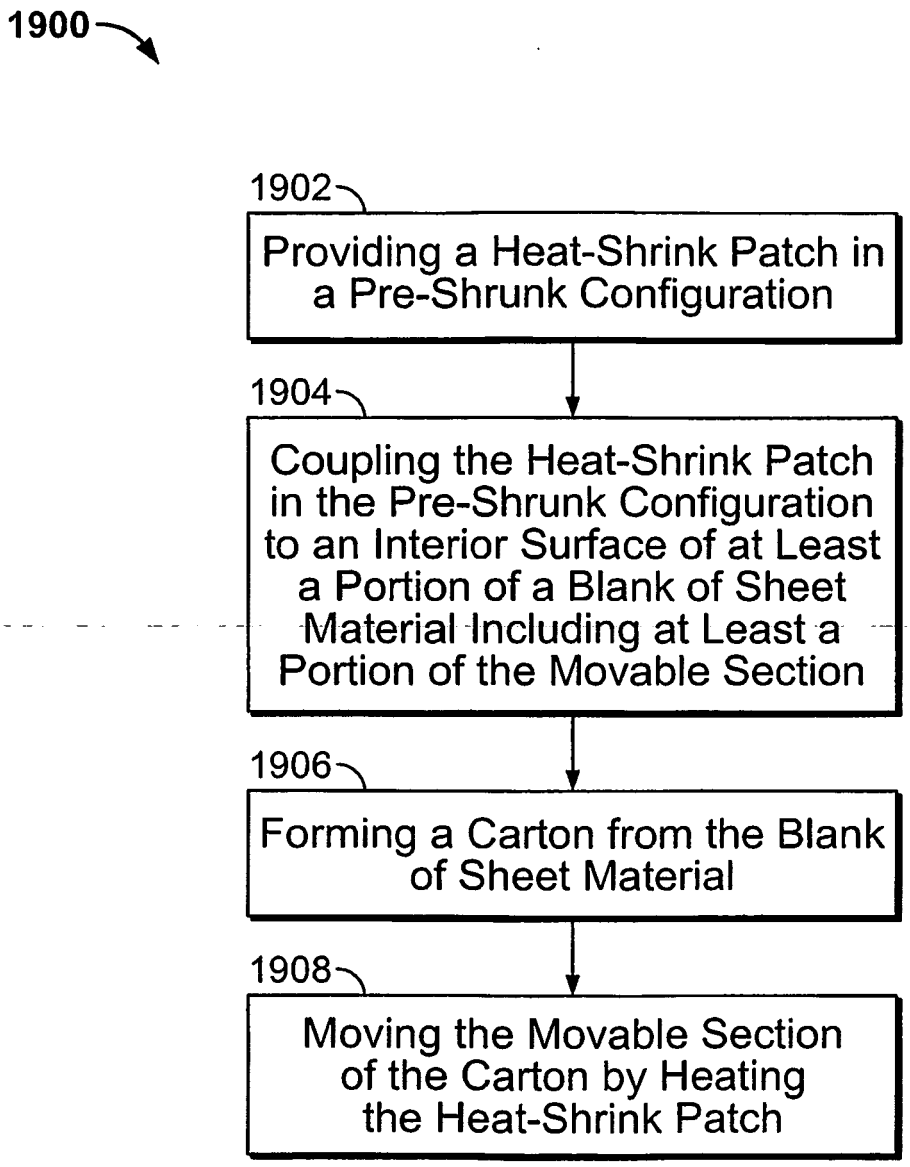

1900
1902
Providing a Heat-Shrink Patch in a Pre-Shrunk Configuration
1904
Coupling the Heat-Shrink Patch in the Pre-Shrunk Configuration to an Interior Surface of at Least a Portion of a Blank of Sheet Material Including at Least a Portion of the Movable Section
1906
Forming a Carton from the Blank of Sheet Material
1908
Moving the Movable Section of the Carton by Heating the Heat-Shrink Patch

FIG. 42

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 20030206997 A1 **[0004]**