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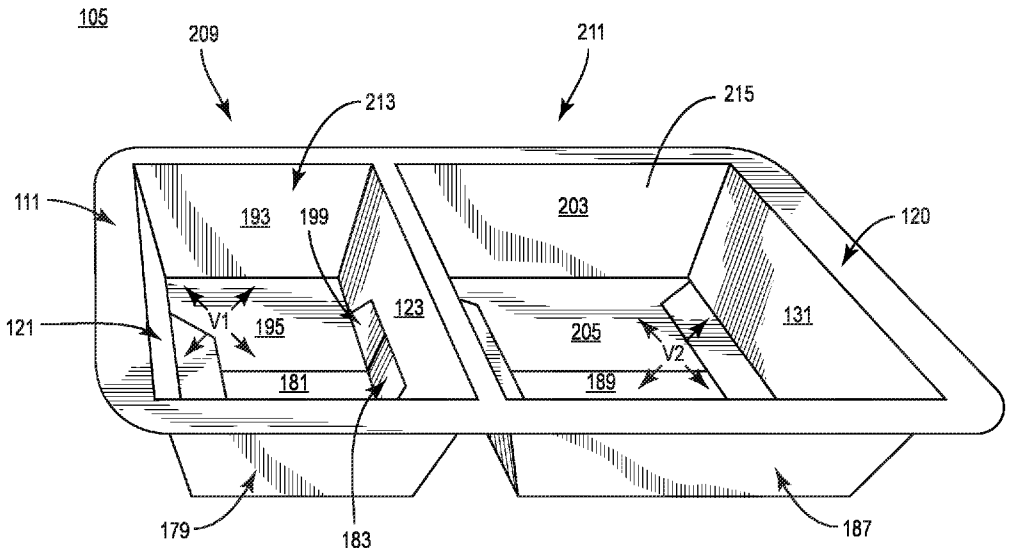


FIG. 2

(57) Abstract: A tray for holding one or more food products includes a plurality of panels including a central panel, a plurality of compartment flaps foldably connected to a respective panel of the plurality of panels, and a plurality of end flaps foldably connected to a respective panel of the plurality of panels, the plurality of compartment flaps and the plurality of end flaps are overlapped to form a plurality of compartments of the tray.

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TRAY WITH COMPARTMENTS

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefit of U.S. Provisional Patent Application No. 63/159,015, filed on March 10, 2021.

INCORPORATION BY REFERENCE

[0002] The disclosures of U.S. Provisional Patent Application No. 63/159,015, filed on March 10, 2021, U.S. Patent Application No. 16/532,819, filed on August 6, 2019, U.S. Provisional Patent Application No. 62/851,932, filed May 23, 2019, U.S. Provisional Patent Application No. 62/796,716, filed January 25, 2019, U.S. Provisional Patent Application No. 62/715,520, filed August 7, 2018, U.S. Patent Application No. 16/037,425, filed July 17, 2018, U.S. Provisional Patent Application No. 62/649,159, filed March 28, 2018, U.S. Provisional Patent Application No. 62/643,914, filed March 16, 2018, U.S. Patent Application No. 15/654,814, filed July 20, 2017, U.S. Provisional Patent Application No. 62/365,635, filed July 22, 2016, and U.S. Patent Application No. 12/992,131, filed February 11, 2011, PCT Patent Application No. PCT/GB/09/50506, filed May 13, 2009, are hereby incorporated by reference for all purposes as if presented herein in their entirety.

BACKGROUND OF THE DISCLOSURE

[0003] The present disclosure relates to blanks, containers, trays, constructs, and various features and methods for forming a container from a blank. More specifically, the disclosure is generally directed to a container with multiple compartments.

SUMMARY OF THE DISCLOSURE

[0004] According to one aspect, the disclosure is generally directed to a tray for holding one or more food products, the tray comprising a plurality of panels comprising a central panel, a plurality of compartment flaps foldably connected to a respective panel of the plurality of panels, and a plurality of end flaps foldably connected to a respective panel of the plurality of panels, the plurality of compartment flaps and the plurality of end flaps are overlapped to form a plurality of compartments of the tray.

[0005] According to another aspect, the disclosure is generally directed to a blank for forming a tray for holding one or more food products, the blank comprising a plurality of panels comprising a central panel, a plurality of compartment flaps foldably connected to a respective panel of the plurality of panels, and a plurality of end flaps foldably connected to a respective panel of the

plurality of panels, the plurality of compartment flaps and the plurality of end flaps are for being overlapped to form a plurality of compartments of the tray formed from the blank.

[0006] According to another aspect, the disclosure is generally directed to a method of forming a tray for holding one or more food products, the method comprising obtaining a blank comprising a plurality of panels comprising a central panel, a plurality of compartment flaps foldably connected to a respective panel of the plurality of panels, and a plurality of end flaps foldably connected to a respective panel of the plurality of panels. The method further comprises overlapping the plurality of compartment flaps and the plurality of end flaps to form a plurality of compartments of the tray.

[0007] Those skilled in the art will appreciate the above stated advantages and other advantages and benefits of various additional embodiments reading the following detailed description of the embodiments with reference to the below-listed drawing figures.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] According to common practice, the various features of the drawings discussed below are not necessarily drawn to scale. Dimensions of various features and elements in the drawings may be expanded or reduced to more clearly illustrate the embodiments of the disclosure.

[0009] Fig. 1 is a plan view of a blank used for forming a tray according to a first exemplary embodiment of the disclosure.

[0010] Fig. 2 is a top perspective views of a tray formed from the blank of Fig. 1 according to the first exemplary embodiment of the disclosure.

[0011] Fig. 3 is a bottom perspective view of the tray of Fig. 2.

[0012] Fig. 4 is a schematic of an apparatus for forming a container in an exemplary embodiment of the disclosure.

[0013] Fig. 5 is a plan view of a blank used for forming a tray according to a second exemplary embodiment of the disclosure.

[0014] Fig. 6 is a top perspective views of a tray formed from the blank of Fig. 5 according to the second exemplary embodiment of the disclosure.

[0015] Fig. 7 is a bottom perspective view of the tray of Fig. 6.

[0016] Corresponding parts are designated by corresponding reference numbers throughout the drawings.

DETAILED DESCRIPTION OF THE EXEMPLARY EMBODIMENTS

[0017] The present disclosure relates generally to various aspects of containers, constructs, trays, materials, packages, elements, and articles, and methods of making such containers, constructs, trays, materials, packages, elements, and articles. Although several different aspects, implementations, and embodiments are disclosed, numerous interrelationships between, combinations thereof, and modifications of the various aspects, implementations, and embodiments are contemplated hereby. In one illustrated embodiment, the present disclosure relates to forming a container or tray for holding food items or various other articles. However, in other embodiments, the container or tray can be used to form other non-food containing articles or may be used for heating or cooking.

[0018] Fig. 1 illustrates an exterior surface 101 of a blank 103 for forming a tray 105 (Fig. 2) or other container according to an exemplary embodiment of the disclosure. In one embodiment, the blank 103 comprises paperboard (e.g., solid bleached sulphate folding boxboard), or other suitable material that can be recyclable and/or suitable for use in an oven (not shown). The blank 103 can be provided with a liner L that comprises a plastic layer such as polyethylene, a polyethylene terephthalate (PET) material, or any other thermoplastic material, or a bioplastic, such as vegetable oil or starch based plastics. In one embodiment, such liner can comprise polyethylene that can be softened and fused to the blank 103. In an alternative embodiment, a liner for being attached to the blank 103 can comprise PET or a similar material that is at least partially attached to the blank 103 by a heat seal layer (e.g., a thermoformable sealant grade transparent polyester packaging film, such as Mylar® XMPOL12 available from DuPont Teijin Films U.S. Limited Partnership of Hopewell, Virginia, or any suitable thermoformable sealant or adhesive, any suitable heat or pressure activated adhesive, or any other suitable material), wherein a PET liner can be more suitable for uses that require heating of the container in an oven. Such a liner can be at least partially attached to the blank 103 for being positioned in contact with one or more food products held in the container 105 (e.g., during heating). In one embodiment, after heating the food product, the blank 103 and an accompanying liner L can be separated to allow both the blank 103 and the liner to be recycled separately.

[0019] The blank 103 can be formed from a single ply of material, such as but not limited to paperboard, cardboard, paper, a polymeric sheet, and/or a laminate that includes more than one layer. In one embodiment, the blank 103 can include a microwave interactive layer (not shown) such as is common in MicroRite® containers available from Graphic Packaging International of Atlanta, GA.

The microwave interactive layer can be commonly referred to as, or can have as one of its components, a susceptor, a foil, a microwave shield, or any other term or component that refers to a layer of material suitable for shielding microwave energy and/or causing heating in a microwave oven.

[0020] As shown in Fig. 1, the blank 103 has a longitudinal direction L1 and a lateral direction L2. In the illustrated embodiment, the blank 103 has a central panel 111, a first side attachment panel 113 foldably connected to the central panel 111 at a lateral fold line 115, and a second side attachment panel 117 foldably connected to the central panel 111 at a lateral fold line 119.

[0021] As shown, a peripheral region of the central panel 111 can form a flange 120 of the blank 103/container 105.

[0022] A first compartment flap 121 and a second compartment flap 123 can be foldably connected to the central panel 111 at respective longitudinal fold lines 125, 127 (broadly, respective "first fold line") and positioned within the outer edges of the central panel 111 for at least partially forming a first compartment of the tray 105, and a first compartment flap 129 (broadly, "third compartment flap") and a second compartment flap 131 (broadly, "fourth compartment flap") can be foldably connected to the central panel 111 at respective longitudinal fold lines 133, 135 (broadly, respective "first fold line") and positioned within the outer edges of the central panel 111 for forming a second compartment of the tray 105.

[0023] An attachment tab 137 can be foldably connected to the first compartment flap 121 at a longitudinal fold line 139. The attachment tab 137 can be separable from the second compartment flap 123 at a cut 141 having one or more angled, oblique, and/or curved portions, and the compartment flaps 121, 123 can be separable at a longitudinal cut 143 interrupted by the fold line 139. As also shown, a pair of generally triangular cutouts 145, 147 can be provided in the central panel 111 on opposing sides of the compartment flaps 121, 123, and can define respective free edges of the respective compartment flaps 121, 123.

[0024] Similarly, an attachment tab 149 can be foldably connected to the first compartment flap 129 at a longitudinal fold line 151 and an attachment tab 153 can be foldably connected to the second compartment flap 131 at a longitudinal fold line 155, the attachment tabs 149, 153 separable at a longitudinal cut 157. A pair of generally triangular cutouts 159, 161 can be provided in the central panel 111 on opposing sides of the compartment flaps 129, 131 and can define respective free edges of the respective compartment flaps 129, 131.

[0025] In this regard, the fold lines 125, 127, 133, 135 can be positioned along and/or intersecting with a portion of the respective cutouts 145, 147, 159, 161 and/or respective openings in the central panel 111 formed by the respective compartment flaps 121, 123, 129, 131.

[0026] A plurality of end flaps are attached to respective panels of the plurality of panels of the blank 103, and can include a first side end flap 163 (broadly, "first end flap") foldably connected to the first side attachment panel 113 at a lateral fold line 165 (broadly, "second fold line"), a second side end flap 167 (broadly, "first end flap" or "third end flap") foldably connected to the first side attachment panel 113 at a lateral fold line 169 (broadly, "second fold line"), a first side end flap 171 (broadly, "second end flap") foldably connected to the second side attachment panel 117 at a lateral fold line 173 (broadly, "second fold line"), and a second side end flap 175 (broadly, "second end flap" or "fourth end flap") foldably connected to the second side attachment panel 117 at a lateral fold line 177 (broadly, "second fold line"). In this regard, the fold lines 165, 169, 173, 177 can be positioned spaced apart from the cutouts 145, 147, 159, 161 and/or an opening in the central panel 111 formed by the compartment flaps 121, 123, 129, 131.

[0027] The first side end flap 163, as shown, can include a base/side portion 179 foldably connected to the first side attachment panel 113 at the lateral fold line 165, and a distal/bottom portion 181 foldably connected to the base portion 179 at a lateral fold line 182. An attachment tab 183 can be foldably connected to the distal portion 181 of the end flap 163 at a longitudinal fold line 185.

[0028] The second side end flap 167 can include a base/side portion 187 foldably connected to the first side attachment panel 113 at the lateral fold line 169, and a distal/bottom portion 189 foldably connected to the base portion 187 at a lateral fold line 191.

[0029] Similarly, the first side end flap 171, as shown, can include a base/side portion 193 foldably connected to the second side attachment panel 117 at the lateral fold line 173, and a distal/bottom portion 195 foldably connected to the base portion 193 at a lateral fold line 197. An attachment tab 199 can be foldably connected to the distal portion 195 of the end flap 171 at a longitudinal fold line 201. The second side end flap 175 can include a base/side portion 203 foldably connected to the second side attachment panel 117 at the lateral fold line 117, and a distal/bottom portion 205 foldably connected to the base portion 203 at a lateral fold line 207.

[0030] With additional reference to Figs. 2 and 3, according to one embodiment, the attachment panels 113, 117 can be folded at the respective fold lines 115, 119 into at least partial face-to-face contact with respective portions of the central panel 111. In addition, the compartment flap 121/attachment tab 137 and compartment flap 123 can be separated at the respective cuts 141, 143

and folded downwardly at the respective fold lines 125, 127 away from the central panel 111. Similarly, the compartment flap 129/attachment tab 149 and the compartment flap 131/attachment tab 153 can be separated at the cut 157 and folded downwardly at the respective fold lines 133, 135 away from the central panel 111.

[0031] The end flaps 163, 171 can be folded inwardly at the respective fold lines 165, 173 so as to extend away from the central panel 111 toward an engagement with the downwardly-depending compartment flaps 121, 123. In this regard, an edge or surface of each of the base portions 179, 193 can intersect an edge or surface of the respective compartment flaps 121, 123.

[0032] Furthermore, the distal portions 181, 195 can be folded at the respective fold lines 182, 197 into a generally spaced and parallel arrangement with the central panel 111, with an edge or surface of each of the distal portions 181, 195 intersecting an edge or surface of the respective compartment flaps 121, 123. In such an arrangement, the attachment tabs 183, 199 associated with the end flaps 163, 171 can be folded at the respective fold lines 185, 201 into at least partial face-to-face contact with the compartment flap 123 to overlie a space formed by the separation of the attachment tab 137 from the compartment flap 123, and the attachment tab 137 associated with the compartment flap 121 can be folded into at least partial face-to-face contact with the respective distal portions 181, 195 of the end flaps 163, 171.

[0033] In the foregoing arrangement, the end flaps 163, 171 and the compartment flaps 121, 123 and associated attachment tab 137 cooperate for form a first compartment 209, with the base portions 179, 193 of the respective end flaps 163, 171 and the compartment flaps 121, 123 forming sides of the compartment 209 that are obliquely arranged relative to the central panel 111, and with the base portions 181, 195 of the respective end flaps 163, 171 forming the bottom of the compartment 209. The aforementioned arrangement of the first compartment 209 can be maintained via the attachment of the tabs 137, 183, 199 to respective panels and flaps, and which can be at least partially maintained with an adhesive such as glue.

[0034] Similarly, the end flaps 167, 175 can be folded inwardly at the respective fold lines 169, 177 so as to extend from the central panel 111 toward an engagement with the downwardly-depending compartment flaps 129, 131, and the distal portions 189, 205 thereof can be folded at the respective fold lines 191, 207 into a generally spaced and parallel arrangement with the central panel 111, with an edge or surface of each of the distal portions 181, 195 intersecting an edge or surface of the respective compartment flaps 129, 131. In such an arrangement, the attachment tabs 149, 153 associated with the compartment flaps 129, 131 can be folded at the respective fold lines 151, 155

into at least partial face-to-face contact with the respective portions of the end flaps 167, 175, e.g., the distal portions 189, 205 of the respective end flaps 167, 175.

[0035] The end flaps 167, 175 and the compartment flaps 129, 131 and associated attachment tabs can thus cooperate for form a second compartment 211, with the base portions 187, 203 of the respective end flaps 167, 175 and the compartment flaps 129, 131 forming sides of the compartment 211 that are obliquely arranged relative to the central panel 111, and with the base portions 189, 205 of the respective end flaps 167, 175 forming the bottom of the compartment 211. The aforementioned arrangement of the compartment 211 can be maintained via the attachment of the tabs 149, 153 to the respective end flaps, and which can be at least partially maintained with an adhesive.

[0036] The aforementioned arrangement of the tray 105 provides a plurality of compartments, e.g., compartments 209, 211, that allow for separation of food products, e.g., for serving to one or more person, to prevent commingling thereof, to provide a main dish and a side dish, to utilize one or more of the compartments 209, 211 to hold a condiment, etc. Furthermore, the overlapping arrangement of the compartment flaps 121, 123 and end flaps 163, 171 provides the compartment 209 with a robust construction that resists deformation, bending, crushing etc. The overlapping arrangement of the compartment flaps 129, 131 and end flaps 167, 175 provides a similarly robust construction to the second compartment 211. In this regard, the end flaps 167, 175 can be considered reinforcing features of the respective compartments 209, 211/tray 105.

[0037] In this regard, a first interior volume V1 of the first compartment 209 can be defined between the end flaps 163, 171 and the compartment flaps 121, 123, and a second interior volume V2 of the second compartment 211 can be defined between the end flaps 167, 175 and the compartment flaps 129, 131.

[0038] While the first compartment 209 is illustrated as defining an interior 213 with an interior volume V1 that is different, e.g., larger, than the interior volume V2 of an interior 215 of the second compartment 211, it will be understood that one or both of the compartments 209, 211 can have a different configuration or interior volume than that illustrated, or can have the same configuration or volume.

[0039] Furthermore, the aforementioned configuration of the tray 105 allows for nesting or stacking or multiple trays 105 upon one another. For example, an upper tray 105 can be seated or nested into a lower tray below by at least partially positioning the end flaps and compartment flaps defining the

respective compartments 209, 211 in the respective interiors 213, 215 of the respective compartments 209, 211 of the lower tray 105.

[0040] It will be understood that, in embodiments, a liner such as liner L (Fig. 1) can be applied to at least the interiors 213, 215 of the respective compartments 209, 211, and can overlie seams/points of intersection between the respective compartment flaps and end flaps, e.g., such that the compartments 209, 211 have leak-resistant properties.

[0041] In one embodiment, the container 105 can be formed similarly to the formation of the containers as shown and described in the incorporated-by-reference applications (e.g., the '425 Application, the '814 Application, and/or the '131 Application). In an exemplary embodiment shown schematically in Fig. 4, the blank 103/container 105 or a folded configuration thereof can be placed on a lower die 215 of a system 217 and a liner material or film sheet 219 (e.g., a polyethylene or PET web) can be fed from a supply roller 221 above the blank 103/folded blank 103. An upper die 223 has a heater plate surface 225 having a PTFE coating, for example a Teflon® coating. Alternatively, the heater plate surface 225 could have a coating of any suitable material or the coating could be omitted. As schematically shown in Fig. 4, the upper die 223 can include a plurality of holes or ducts 227 in the heater plate surface 225 for applying a vacuum and/or air pressure on the sheet 219. The lower die 215 and/or the upper die 223, including the ducts 227 and/or the heater plate 225, could be otherwise shaped, arranged, positioned, and/or configured without departing from the disclosure. For example, the heater plate 225 could be omitted and the heat could be alternatively applied to the sheet 219 (e.g., with a flow of hot air).

[0042] In the illustrated embodiment, the lower die 215 can hold the blank 103/folded blank 103 over a cavity 214 in the lower die 215 while supporting the blank 103/container 105 at the central panel 111 and/or the attachment panels 113, 117 (e.g., so that the central panel 111 is facing upwardly). An initial vacuum can be applied to ducts 227 to draw the film sheet 219 toward the upper die 223, the upper die 223 can be heated to a suitable temperature to soften the film sheet 219 and/or to activate a heat seal layer. Instead of, or in addition to, the initial vacuum, air pressure under the film sheet 219 can be employed with similar or equal effect. Subsequently, the film sheet 219 can be forced downwardly (e.g., by air pressure applied by the ducts 227 and/or a vacuum applied from below the blank 103/container 105). The air pressure can move the film sheet 219 toward the blank 103/folded blank 103 and the lower die 215 can support the blank 103/container 105 as the film sheet 219 is applied to portions of one or more of the flange 120, the compartment flaps 121, 123, 129, 131, and the end flaps 163, 167, 171, 175 to form the liner L. In one embodiment, the liner L can help retain the container 105 in its tray shape after the liner L is applied to the blank 103/folded blank

103/container 105. In one embodiment, the container 105 can be ejected from the lower die 215 and transported away from the forming tool on a conveyor, for example.

[0043] In one embodiment, the container 105 can be formed from the blank 103 and have the liner L applied thereto at a much higher rate than systems that separately form the container 105 from the blank 103 blank and then place that formed container 105 into the lower die 215. In one example, the container 105 of the present embodiment can be formed from the blank 103 together with the liner L at a rate of approximately 200 trays per minute. The container 105 could be otherwise formed without departing from the disclosure. For example, the container 105 could be formed from the blank 103 prior to applying the liner L (e.g., prior to engaging the lower die 215).

[0044] Referring to Fig. 5, an exterior surface 301 of a blank for forming a tray 305 (Fig. 6) according to a second exemplary embodiment of the disclosure is generally designated 393. The blank 303 and tray 305 can have one or more features that are substantially similar to those described above with regard to the blank 103 and tray 105, and like or similar features are designated with like or similar reference numerals.

[0045] The blank 303 can have generally the same configuration as the blank 103 described above, except that the end flaps foldably attached to the side attachment panels 113, 117 are respective end flaps 363, 371.

[0046] As shown, the end flap 363 can have a base portion 379 foldably connected to the side attachment panel 113 at a lateral fold line 365 (broadly, "second fold line"), with the distal portions 181, 189 (broadly, "first distal portion" and "second distal portion") foldably connected to the base portion 379 at the respective fold lines 182, 191, and with the attachment tab 183 foldably connected to the distal portion 181 at the fold line 185.

[0047] Similarly, the end flap 371 can have a base portion 393 foldably connected to the side attachment panel 117 at a lateral fold line 373 (broadly, "second fold line"), with the distal portions 195, 205 (broadly, "first base portion" and "second base portion") foldably connected to the base portion 393 at the respective fold lines 197, 207, and with the attachment tab 199 foldably connected to the distal portion 195 at the fold line 201. In this regard, the distal portions 181, 189 of the end flap 363 share the common base portion 379, and the distal portions 195, 205 of the end flap 371 share the common base portion 393.

[0048] With additional reference to Figs. 6 and 7, the tray 305 can be formed in a manner similar to that described above with regard to the tray 105, except that the base portions 379, 393 of the respective end flaps 363, 373 form the side portions of each of the compartments 309, 311 such that

the base portions 379, 393 span each of the compartments 309, 311, and is provided with similar advantages to those described above with regard to the tray 105. The aforementioned arrangement of the tray 305 can be at least partially maintained with one or more applications of an adhesive such as glue.

[0049] It will be understood that, in embodiments, a liner such as liner L (Fig. 1) can be applied to at least the interiors 413, 415 of the respective compartments 409, 411, and can overlie seams/points of intersection between the respective compartment flaps and end flaps. Such application of the liner L to the container 305 can be accomplished in the manner described above with regard to the container 105, for example.

[0050] In one embodiment, a lid (not shown) can comprise packaging film that is a thin plastic layer used to preserve and protect a food item contained in the trays 105, 305 and can be removably attached to a flange of the trays 105, 305, e.g., defined by a portion of the central panel 111. Any plastic film, such as polyethylene, polypropylene, polyethylene terephthalate, polyvinylchloride, polyamide, and ethylene vinyl alcohol, or other suitable material, can be used for forming the lid that is sealed against the sealing surface of the flange/central panel 111. Further, adhesives can be used between the lid and the sealing surface of the flange/central panel without departing from the disclosure. In one embodiment, the sealing surface of the flange comprises an upper surface of the central panel 111 that is generally free from joints, creases, folds, pleats, edges, and other features that can make sealing a lidding film to the flange more difficult (e.g., that can reduce the smoothness of the flange). Accordingly, the upper surface of the central panel 111 in the trays 105, 305 of the illustrated embodiment can provide a superior sealing surface than a container that has features such as pleats or joints on its upper flange surface.

[0051] Any of the features of the various embodiments of the disclosure can be combined with, replaced by, or otherwise configured with other features of other embodiments of the disclosure without departing from the scope of this disclosure.

[0052] Optionally, one or more portions of the blank or other constructs described herein or contemplated hereby may be coated with varnish, clay, or other materials, either alone or in combination. The coating may then be printed over with product advertising or other information or images. The blanks or other constructs also may be selectively coated and/or printed so that less than the entire surface area of the blank or substantially the entire surface area of the blank may be coated and/or printed.

[0053] Any of the blanks, trays, or other constructs of this disclosure may optionally include one or more features that alter the effect of microwave energy during the heating or cooking of a food item that is associated with the tray or other construct. For example, the blank, tray, container, or other construct may be formed at least partially from one or more microwave energy interactive elements (hereinafter sometimes referred to as "microwave interactive elements") that promote heating, browning and/or crisping of a particular area of the food item, shield a particular area of the food item from microwave energy to prevent overcooking thereof, or transmit microwave energy towards or away from a particular area of the food item. Each microwave interactive element comprises one or more microwave energy interactive materials or segments arranged in a particular configuration to absorb microwave energy, transmit microwave energy, reflect microwave energy, or direct microwave energy, as needed or desired for a particular construct and food item.

[0054] In the case of a susceptor or shield, the microwave energy interactive material may comprise an electroconductive or semiconductive material, for example, a vacuum deposited metal or metal alloy, or a metallic ink, an organic ink, an inorganic ink, a metallic paste, an organic paste, an inorganic paste, or any combination thereof. Examples of metals and metal alloys that may be suitable include, but are not limited to, aluminum, chromium, copper, inconel alloys (nickel-chromium-molybdenum alloy with niobium), iron, magnesium, nickel, stainless steel, tin, titanium, tungsten, and any combination or alloy thereof.

[0055] Alternatively, the microwave energy interactive material may comprise a metal oxide, for example, oxides of aluminum, iron, and tin, optionally used in conjunction with an electrically conductive material. Another metal oxide that may be suitable is indium tin oxide (ITO). ITO has a more uniform crystal structure and, therefore, is clear at most coating thicknesses.

[0056] Alternatively still, the microwave energy interactive material may comprise a suitable electroconductive, semiconductive, or non-conductive artificial dielectric or ferroelectric. Artificial dielectrics comprise conductive, subdivided material in a polymeric or other suitable matrix or binder, and may include flakes of an electroconductive metal, for example, aluminum.

[0057] In other embodiments, the microwave energy interactive material may be carbon-based, for example, as disclosed in U.S. Patent Nos. 4,943,456, 5,002,826, 5,118,747, and 5,410,135.

[0058] In still other embodiments, the microwave energy interactive material may interact with the magnetic portion of the electromagnetic energy in the microwave oven. Correctly chosen materials of this type can self-limit based on the loss of interaction when the Curie temperature of the material is reached. An example of such an interactive coating is described in U.S. Patent No. 4,283,427.

[0059] The use of other microwave energy interactive elements is also contemplated. In one example, the microwave energy interactive element may comprise a foil or high optical density evaporated material having a thickness sufficient to reflect a substantial portion of impinging microwave energy. Such elements typically are formed from a conductive, reflective metal or metal alloy, for example, aluminum, copper, or stainless steel, in the form of a solid "patch" generally having a thickness of from about 0.000285 inches to about 0.005 inches, for example, from about 0.0003 inches to about 0.003 inches. Other such elements may have a thickness of from about 0.00035 inches to about 0.002 inches, for example, 0.0016 inches.

[0060] In some cases, microwave energy reflecting (or reflective) elements may be used as shielding elements where the food item is prone to scorching or drying out during heating. In other cases, smaller microwave energy reflecting elements may be used to diffuse or lessen the intensity of microwave energy. One example of a material utilizing such microwave energy reflecting elements is commercially available from Graphic Packaging International, Inc. (Atlanta, GA) under the trade name MicroRite® packaging material. In other examples, a plurality of microwave energy reflecting elements may be arranged to form a microwave energy distributing element to direct microwave energy to specific areas of the food item. If desired, the loops may be of a length that causes microwave energy to resonate, thereby enhancing the distribution effect. Microwave energy distributing elements are described in U.S. Patent Nos. 6,204,492, 6,433,322, 6,552,315, and 6,677,563, each of which is incorporated by reference in its entirety.

[0061] If desired, any of the numerous microwave energy interactive elements described herein or contemplated hereby may be substantially continuous, that is, without substantial breaks or interruptions, or may be discontinuous, for example, by including one or more breaks or apertures that transmit microwave energy. The breaks or apertures may extend through the entire structure, or only through one or more layers. The number, shape, size, and positioning of such breaks or apertures may vary for a particular application depending on the type of construct being formed, the food item to be heated therein or thereon, the desired degree of heating, browning, and/or crisping, whether direct exposure to microwave energy is needed or desired to attain uniform heating of the food item, the need for regulating the change in temperature of the food item through direct heating, and whether and to what extent there is a need for venting.

[0062] By way of illustration, a microwave energy interactive element may include one or more transparent areas to effect dielectric heating of the food item. However, where the microwave energy interactive element comprises a susceptor, such apertures decrease the total microwave energy interactive area, and therefore, decrease the amount of microwave energy interactive material available for heating, browning, and/or crisping the surface of the food item. Thus, the relative

amounts of microwave energy interactive areas and microwave energy transparent areas may be balanced to attain the desired overall heating characteristics for the particular food item.

[0063] As another example, one or more portions of a susceptor may be designed to be microwave energy inactive to ensure that the microwave energy is focused efficiently on the areas to be heated, browned, and/or crisped, rather than being lost to portions of the food item not intended to be browned and/or crisped or to the heating environment. Additionally or alternatively, it may be beneficial to create one or more discontinuities or inactive regions to prevent overheating or charring of the food item and/or the construct including the susceptor.

[0064] As still another example, a susceptor may incorporate one or more "fuse" elements that limit the propagation of cracks in the susceptor, and thereby control overheating, in areas of the susceptor where heat transfer to the food is low and the susceptor might tend to become too hot. The size and shape of the fuses may be varied as needed. Examples of susceptors including such fuses are provided, for example, in U.S. Patent No. 5,412,187, U.S. Patent No. 5,530,231, U.S. Patent Application Publication No. US 2008/0035634A1, published February 14, 2008, and PCT Application Publication No. WO 2007/127371, published November 8, 2007, each of which is incorporated by reference herein in its entirety.

[0065] All dimensional information presented herein is intended to be illustrative of certain aspects, features, etc., of various embodiments of the disclosure, and is not intended to limit the scope of the disclosure. The dimensions of the blanks, containers, forming tools, features, or any other dimension, can be more or less than what is shown and described in this disclosure without departing from the scope of this disclosure and can be within the listed ranges of dimensions for each feature or outside the listed ranges of dimensions for each feature without departing from the scope of this disclosure.

[0066] The blanks according to the present invention can be, for example, formed from coated paperboard and similar materials. For example, the interior and/or exterior sides of the blanks can be coated with a clay coating. The clay coating may then be printed over with product, advertising, price coding, and other information or images. The blanks may then be coated with a varnish to protect any information printed on the blanks. The blanks may also be coated with, for example, a moisture barrier layer, on either or both sides of the blanks.

[0067] In accordance with the exemplary embodiments, the blanks may be constructed of paperboard of a caliper such that it is heavier and more rigid than ordinary paper. The blanks can also be constructed of other materials, such as cardboard, hard paper, or any other material having properties suitable for enabling the carton package to function at least generally as described above.

[0068] The foregoing description illustrates and describes various embodiments of the present disclosure. As various changes could be made in the above construction without departing from the scope of the disclosure, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense. Furthermore, the scope of the present disclosure covers various modifications, combinations, and alterations, etc., of the above-described embodiments. Additionally, the disclosure shows and describes only selected embodiments, but various other combinations, modifications, and environments are contemplated and are within the scope of the inventive concept as expressed herein, commensurate with the above teachings, and/or within the skill or knowledge of the relevant art. Furthermore, certain features and characteristics of each embodiment may be selectively interchanged and applied to other illustrated and non-illustrated embodiments without departing from the scope of the disclosure.

WHAT IS CLAIMED IS:

1. A tray for holding one or more food products, the tray comprising:

a plurality of panels comprising a central panel;

a plurality of compartment flaps foldably connected to a respective panel of the plurality of panels; and

a plurality of end flaps foldably connected to a respective panel of the plurality of panels,

the plurality of compartment flaps and the plurality of end flaps are overlapped to form a plurality of compartments of the tray.

2. The tray of claim 1, wherein the plurality of compartment flaps comprises a first compartment flap foldably connected to the central panel and a second compartment flap foldably connected to the central panel.

3. The tray of claim 2, wherein the plurality of end flaps comprises a first end flap extending away from the central panel and engaging a portion of each of the first compartment flap and the second compartment flap to at least partially form a first compartment of the plurality of compartments of the tray.

4. The tray of claim 3, wherein the central panel defines a flange for at least partially receiving a liner.

5. The tray of claim 4, further in combination with the liner, the liner disposed on a portion of the flange, at least one compartment flap of the plurality of compartment flaps, and at least one end flap of the plurality of end flaps.

6. The tray of claim 3, wherein one of the first compartment flap and the second compartment flap is foldably connected to the central panel at a fold line intersecting a cutout adjacent the first compartment flap and the second compartment flap, the first end flap is foldably connected to a respective panel of the plurality of panels at a second fold line, and the second fold line is spaced apart from the cutout.

7. The tray of claim 3, wherein the first end flap comprises a base portion extending away from the central panel and a distal portion foldably connected to the base portion.

8. The tray of claim 7, wherein the distal portion is obliquely arranged relative to the base portion and the distal portion is arranged generally parallel to the central panel.

9. The tray of claim 8, wherein an attachment tab is foldably connected to one of the first compartment flap and the second compartment flap and positioned in at least partial face-to-face contact with distal portion of the first end flap.

10. The tray of claim 9, wherein an attachment tab is foldably connected to the distal portion of the first end flap and positioned in at least partial face-to-face contact with the other of the compartment flap and the second compartment flap.

11. The tray of claim 8, wherein the plurality of end flaps further comprises a second end flap extending away from the central panel and engaging a portion of each of the first compartment flap and the second compartment flap to at least partially form the first compartment.

12. The tray of claim 11, wherein an interior volume of the first compartment is defined between the first compartment flap, the second compartment flap, the first end flap, and the second end flap.

13. The tray of claim 12, wherein the plurality of panels further comprises a first attachment panel foldably connected to the central panel and a second attachment panel foldably connected to the central panel, the first end flap is foldably connected to the first attachment panel and the second end flap is foldably connected to the second attachment panel.

14. The tray of claim 13, wherein each of the first attachment panel and the second attachment panel is in at least partial face-to-face contact with the central panel.

15. The tray of claim 12, wherein the plurality of compartment flaps further comprises a third compartment flap foldably connected to the central panel and a fourth compartment flap foldably connected to the central panel.

16. The tray of claim 15, wherein the plurality of end flaps further comprises a third end flap extending away from the central panel and engaging a portion of each of the third compartment flap and the fourth compartment flap to form a second compartment of the plurality of compartments of the tray.

17. The tray of claim 16, wherein the third end flap comprises a base portion extending away from the central panel and a distal portion foldably connected to the base portion of the third end flap.

18. The tray of claim 17, wherein the plurality of end flaps further comprises a fourth end flap extending away from the central panel and engaging a portion of each of the third compartment flap and the fourth compartment flap to at least partially form the second compartment of the plurality of compartments of the tray.

19. The tray of claim 18, wherein a second interior volume of the second compartment is defined between the third compartment flap, the fourth compartment flap, the third end flap, and fourth second end flap, the second interior volume being different than the first interior volume.

20. The tray of claim 15, wherein the distal portion of the first end flap is a first distal portion foldably connected to the base portion, and the first end flap further comprises a second distal portion foldably connected to the base portion, the second distal portion of the first end flap engaging a portion of each of the third compartment flap and the fourth compartment flap to at least partially form a second compartment of the plurality of compartments of the tray.

21. The tray of claim 20, wherein a portion of the second end flap engages a portion of each of the third compartment flap and the fourth compartment flap to at least partially form the second compartment of the plurality of compartments of the tray.

22. A blank for forming a tray for holding one or more food products, the blank comprising:

a plurality of panels comprising a central panel;

a plurality of compartment flaps foldably connected to a respective panel of the plurality of panels; and

a plurality of end flaps foldably connected to a respective panel of the plurality of panels,

the plurality of compartment flaps and the plurality of end flaps are for being overlapped to form a plurality of compartments of the tray formed from the blank.

23. The blank of claim 22, wherein the plurality of compartment flaps comprises a first compartment flap foldably connected to the central panel and a second compartment flap foldably connected to the central panel.

24. The blank of claim 23, wherein the plurality of end flaps comprises a first end flap for being positioned extending away from the central panel and engaging a portion of each of the first compartment flap and the second compartment flap to at least partially form a first compartment of the plurality of compartments of the tray formed from the blank.

25. The blank of claim 24, wherein the central panel defines a flange for at least partially receiving a liner.

26. The blank of claim 25, further in combination with the liner, the liner disposed on a portion of the flange, at least one compartment flap of the plurality of compartment flaps, and at least one end flap of the plurality of end flaps.

27. The blank of claim 24, wherein one of the first compartment flap and the second compartment flap is foldably connected to the central panel at a fold line intersecting a cutout adjacent the first compartment flap and the second compartment flap, the first end flap is foldably connected to a respective panel of the plurality of panels at a second fold line, and the second fold line is spaced apart from the cutout.

28. The blank of claim 24, wherein the first end flap comprises a base portion extending away from the central panel and a distal portion foldably connected to the base portion.

29. The blank of claim 28, wherein the distal portion is obliquely arranged relative to the base portion and the distal portion is arranged generally parallel to the central panel.

30. The blank of claim 29, wherein an attachment tab is foldably connected to one of the first compartment flap and the second compartment flap and for being positioned in at least partial face-to-face contact with distal portion of the first end flap when the tray is formed from the blank.

31. The blank of claim 30, wherein an attachment tab is foldably connected to the distal portion of the first end flap and for being positioned in at least partial face-to-face contact with the other of the compartment flap and the second compartment flap when the tray is formed from the blank.

32. The blank of claim 29, wherein the plurality of end flaps further comprises a second end flap for being positioned extending away from the central panel and engaging a portion of each of the first compartment flap and the second compartment flap to at least partially form the first compartment when the tray is formed from the blank.

33. The blank of claim 32, wherein the plurality of panels further comprises a first attachment panel foldably connected to the central panel and a second attachment panel foldably connected to the central panel, the first end flap is foldably connected to the first attachment panel and the second end flap is foldably connected to the second attachment panel.

34. The blank of claim 33, wherein each of the first attachment panel and the second attachment panel is for being positioned in at least partial face-to-face contact with the central panel when the tray is formed from the blank.

35. The blank of claim 32, wherein the plurality of compartment flaps further comprises a third compartment flap foldably connected to the central panel and a fourth compartment flap foldably connected to the central panel.

36. The blank of claim 35, wherein the plurality of end flaps further comprises a third end flap for being positioned extending away from the central panel and engaging a portion of each of the third compartment flap and the fourth compartment flap to form a second compartment of the plurality of compartments of the tray formed from the blank.

37. The blank of claim 36, wherein the third end flap comprises a base portion and a distal portion foldably connected to the base portion of the third end flap.

38. The blank of claim 37, wherein the plurality of end flaps further comprises a fourth end flap for being positioned extending away from the central panel and engaging a portion of each of the third compartment flap and the fourth compartment flap to at least partially form the second compartment of the plurality of compartments of the tray formed from the blank.

39. The blank of claim 35, wherein the distal portion of the first end flap is a first distal portion foldably connected to the base portion, and the first end flap further comprises a second distal portion foldably connected to the base portion, the second distal portion of the first end flap for being positioned engaging a portion of each of the third compartment flap and the fourth compartment flap to at least partially form a second compartment of the plurality of compartments of the tray formed from the blank.

40. The blank of claim 39, wherein a portion of the second end flap is for being positioned to engage a portion of each of the third compartment flap and the fourth compartment flap to at least partially form the second compartment of the plurality of compartments of the tray formed from the blank.

41. A method of forming a tray for holding one or more food products, the method comprising:

obtaining a blank comprising a plurality of panels comprising a central panel, a plurality of compartment flaps foldably connected to a respective panel of the plurality of panels, and a plurality of end flaps foldably connected to a respective panel of the plurality of panels; and

overlapping the plurality of compartment flaps and the plurality of end flaps to form a plurality of compartments of the tray.

42. The method of claim 41, wherein the plurality of compartment flaps comprises a first compartment flap foldably connected to the central panel and a second compartment flap foldably connected to the central panel.

43. The method of claim 42, wherein the plurality of end flaps comprises a first end flap and the method comprises positioning the first end flap extending away from the central panel and engaging a portion of each of the first compartment flap and the second compartment flap to at least partially form a first compartment of the plurality of compartments of the tray.

44. The method of claim 43, wherein the central panel defines a flange for at least partially receiving a liner.

45. The method of claim 44, further comprising disposing a liner on a portion of the flange, at least one compartment flap of the plurality of compartment flaps, and at least one end flap of the plurality of end flaps.

46. The method of claim 43, wherein one of the first compartment flap and the second compartment flap is foldably connected to the central panel at a fold line intersecting a cutout adjacent the first compartment flap and the second compartment flap, the first end flap is foldably connected to a respective panel of the plurality of panels at a second fold line, and the second fold line is spaced apart from the cutout.

47. The method of claim 43, wherein the first end flap comprises a base portion extending away from the central panel and a distal portion foldably connected to the base portion.

48. The method of claim 47, wherein the method comprises obliquely arranging the distal portion relative to the base portion and arranging the distal portion generally parallel to the central panel.

49. The method of claim 48, wherein an attachment tab is foldably connected to one of the first compartment flap and the second compartment flap and the method comprises positioning the attachment tab in at least partial face-to-face contact with distal portion of the first end flap.

50. The method of claim 49, wherein an attachment tab is foldably connected to the distal portion of the first end flap and the method comprises positioning the attachment tab in at least partial face-to-face contact with the other of the compartment flap and the second compartment flap.

51. The method of claim 48, wherein the plurality of end flaps further comprises a second end flap and the method comprises positioning the second end flap extending away from the central panel and engaging a portion of each of the first compartment flap and the second compartment flap to at least partially form the first compartment.

52. The method of claim 51, wherein an interior volume of the first compartment is defined between the first compartment flap, the second compartment flap, the first end flap, and the second end flap.

53. The method of claim 52, wherein the plurality of panels further comprises a first attachment panel foldably connected to the central panel and a second attachment panel foldably connected to the central panel, the first end flap is foldably connected to the first attachment panel and the second end flap is foldably connected to the second attachment panel.

54. The method of claim 53, wherein the method comprises positioning each of the first attachment panel and the second attachment panel in at least partial face-to-face contact with the central panel.

55. The method of claim 52, wherein the plurality of compartment flaps further comprises a third compartment flap foldably connected to the central panel and a fourth compartment flap foldably connected to the central panel.

56. The method of claim 55, wherein the plurality of end flaps further comprises a third end flap and the method comprises positioning the third end flap extending away from the central panel and engaging a portion of each of the third compartment flap and the fourth compartment flap to form a second compartment of the plurality of compartments of the tray.

57. The method of claim 56, wherein the third end flap comprises a base portion extending away from the central panel and a distal portion foldably connected to the base portion of the third end flap.

58. The method of claim 57, wherein the plurality of end flaps further comprises a fourth end flap and the method comprises positioning the fourth end flap extending away from the central panel and engaging a portion of each of the third compartment flap and the fourth compartment flap to at least partially form the second compartment of the plurality of compartments of the tray.

59. The method of claim 58, wherein a second interior volume of the second compartment is defined between the third compartment flap, the fourth compartment flap, the third end flap, and fourth second end flap, the second interior volume being different than the first interior volume.

60. The method of claim 55, wherein the distal portion of the first end flap is a first distal portion foldably connected to the base portion, and the first end flap further comprises a second distal portion foldably connected to the base portion, the method comprising positioning the second distal portion of the first end flap engaging a portion of each of the third compartment flap and the fourth compartment flap to at least partially form a second compartment of the plurality of compartments of the tray.

61. The method of claim 60, wherein the method comprises positioning a portion of the second end flap engaging a portion of each of the third compartment flap and the fourth compartment flap to at least partially form the second compartment of the plurality of compartments of the tray.

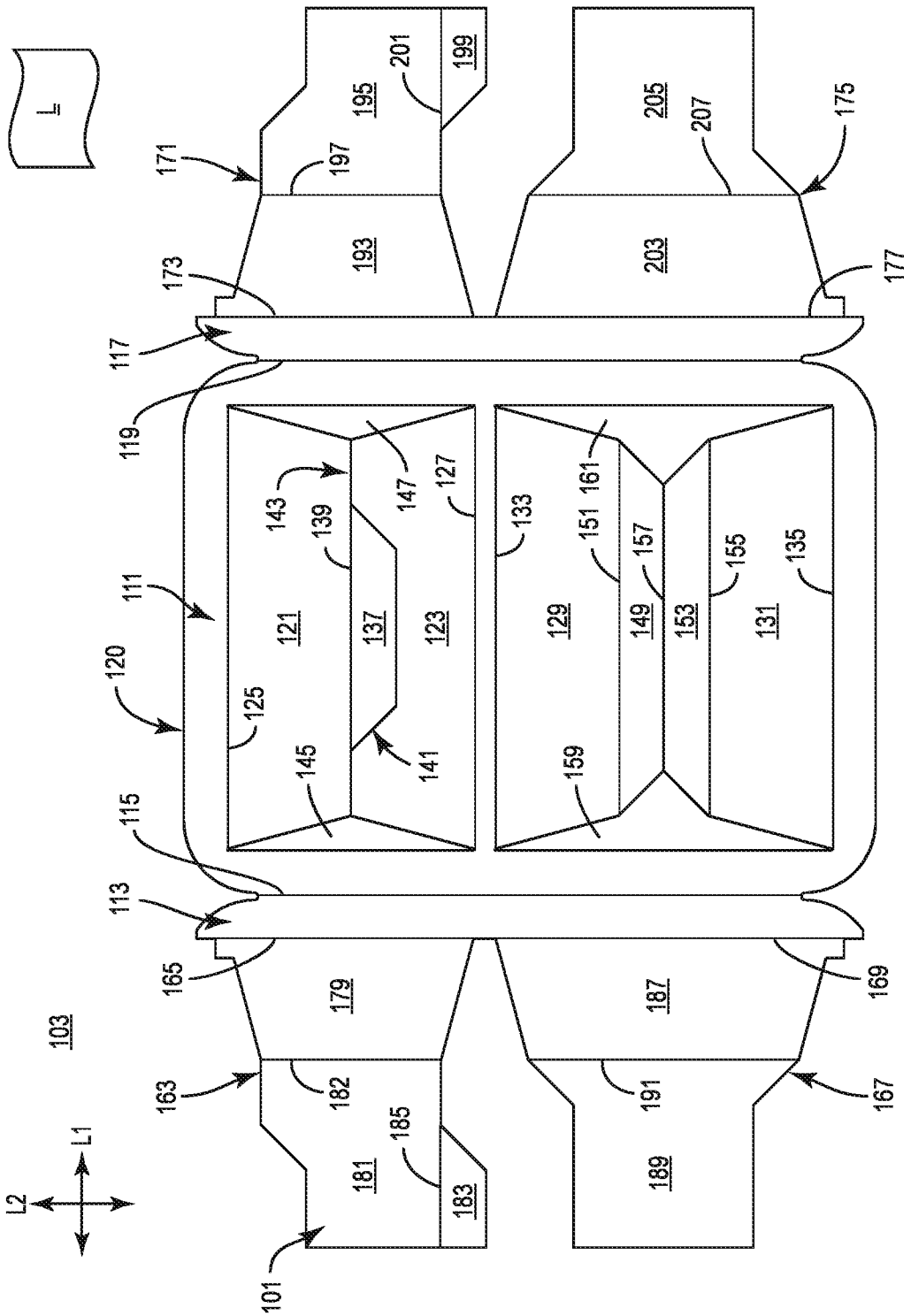

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FIG. 1

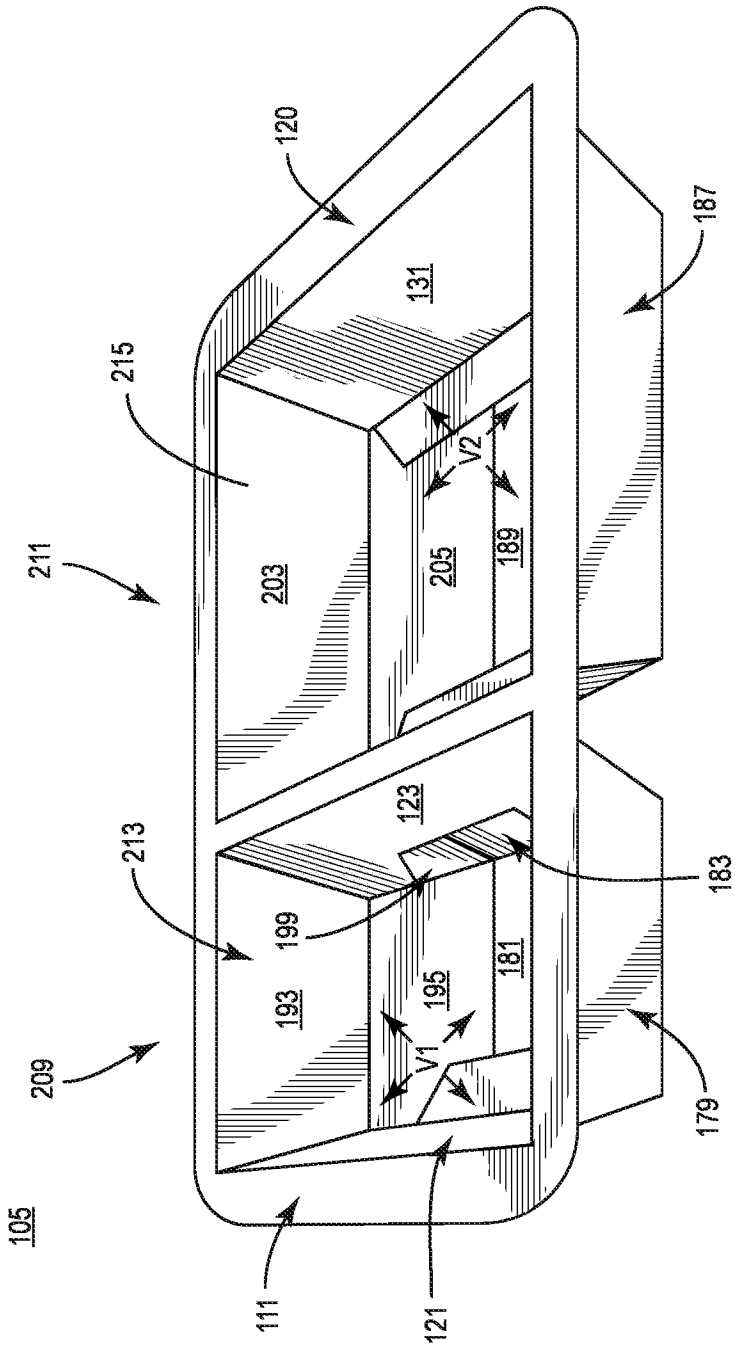

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FIG. 2

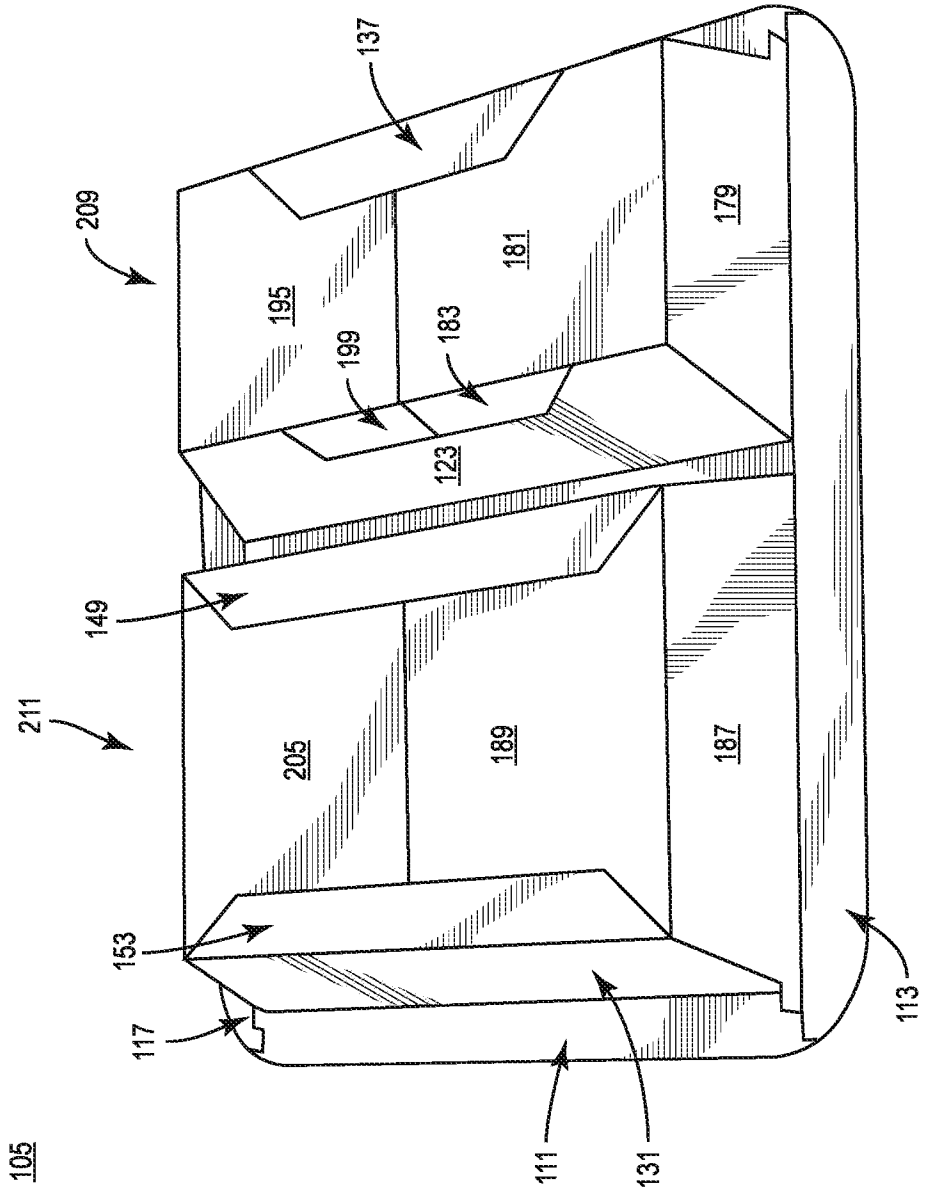

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FIG. 3

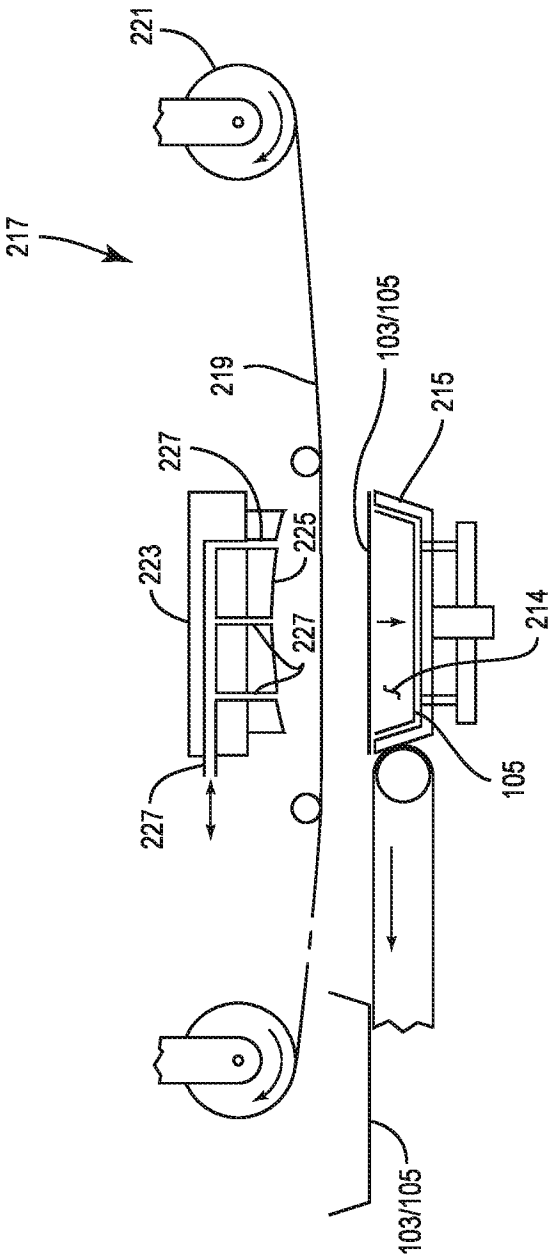


FIG. 4

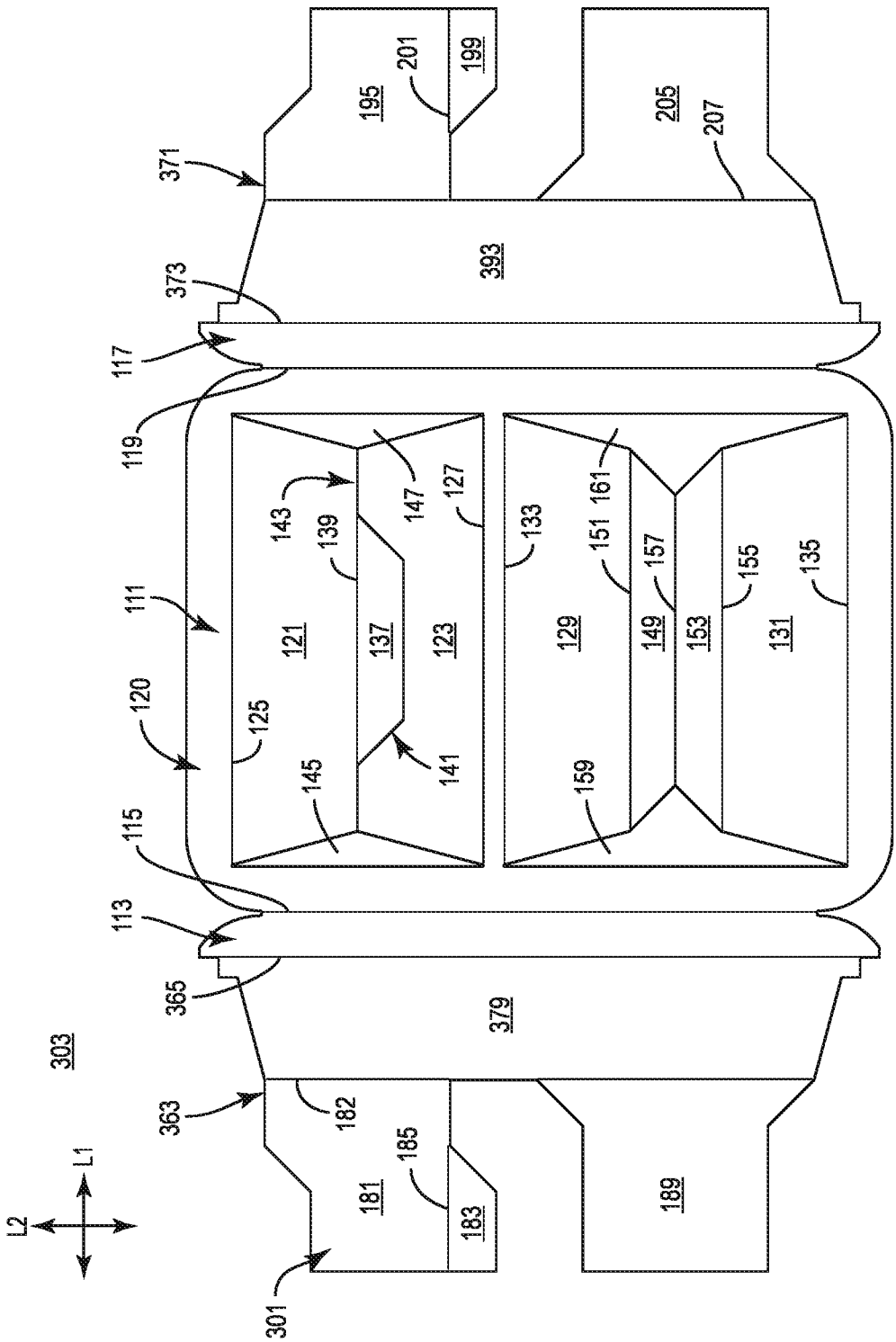

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FIG. 5

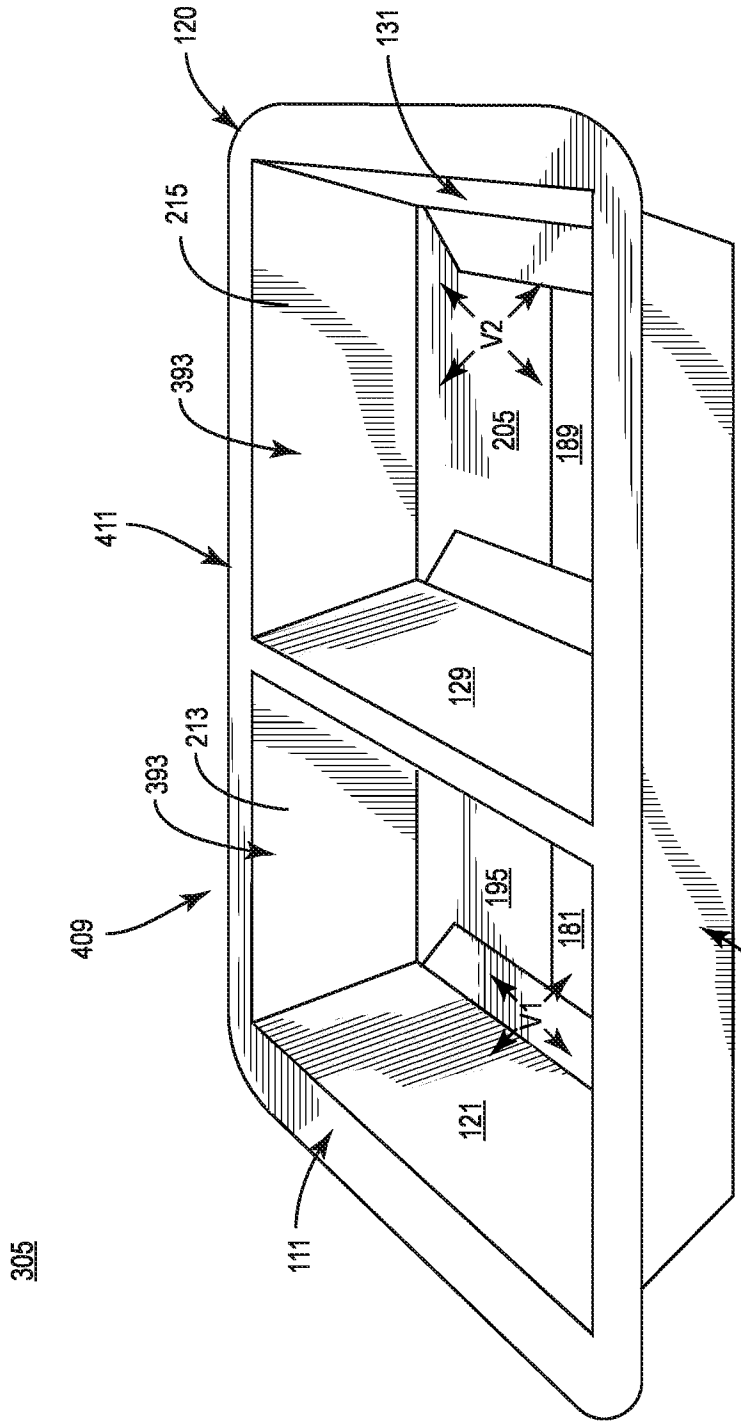

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FIG. 6

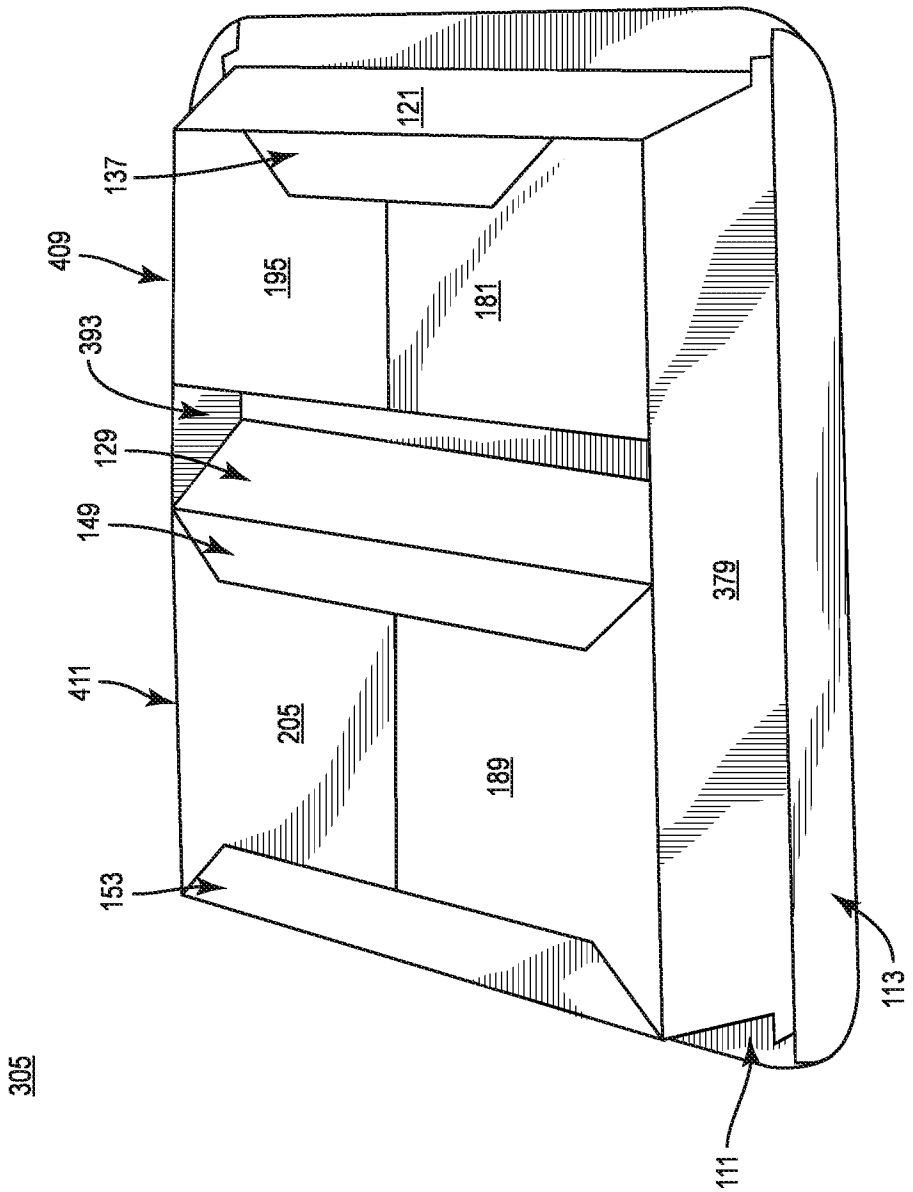


FIG. 7

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2022/019439

A. CLASSIFICATION OF SUBJECT MATTER

B65D 1/24(2006.01)i; **B65D 1/28**(2006.01)i; **B65D 1/36**(2006.01)i; **B65D 5/20**(2006.01)i; **B65D 6/34**(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B65D 1/24(2006.01); B31B 49/02(2006.01); B65D 5/32(2006.01); B65D 5/56(2006.01); B65D 81/34(2006.01)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords: tray, food product, compartment flap, end flap, overlap, flange

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 2006-298395 A (TOPPAN PRINTING CO., LTD.) 02 November 2006 (2006-11-02) paragraphs [0001], [0072]-[0093] and figures 1-5	1-61
Y	US 2020-0047975 A1 (GRAPHIC PACKAGING INTERNATIONAL, LLC) 13 February 2020 (2020-02-13) paragraphs [0041], [0046]-[0051], [0053] and figures 4-5, 7-10B	1-61
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A	JP 2001-233322 A (DAINIPPON PRINTING CO., LTD.) 28 August 2001 (2001-08-28) paragraphs [0013]-[0015] and figures 1-4	1-61

☐ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"D" document cited by the applicant in the international application
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
27 June 2022	**30 June 2022**

Name and mailing address of the ISA/KR	Authorized officer
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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/US2022/019439

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