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(54) **A LUGGAGE ARTICLE COMPRISING BOTTOM STRUCTURE**

(57) A bottom structure for a luggage article (100) is provided. The luggage article may include first and second halves (150, 152) hingedly connected together at a split line (160), a closure mechanism (210) releasably securing the first and second halves together, and a split bottom pan assembly (270) including first and second pan members (280, 282) supporting respective bottom panel portions (330, 332) of the first and second halves. The closure mechanism may releasably secure the first and second halves together in a closed configuration along at least a portion of the split line. Each of the first and second pan members may include a connecting edge (340, 341). The connecting edges of the first and second pan members may engage and interlock together at the split line when the luggage article is in the closed configuration to form a solid bottom structure.

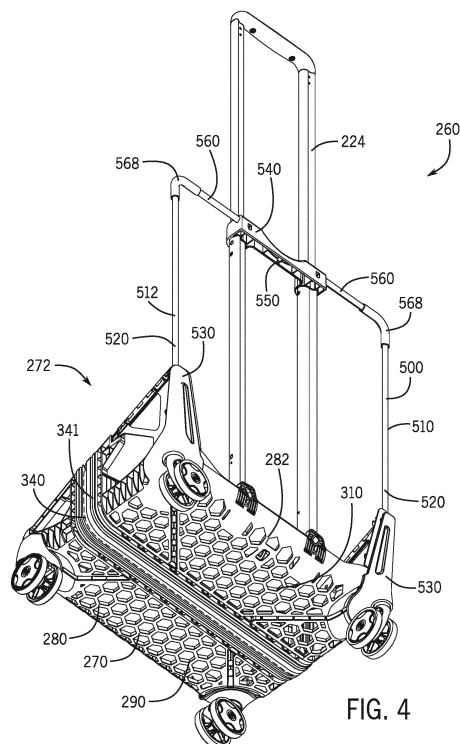


FIG. 4

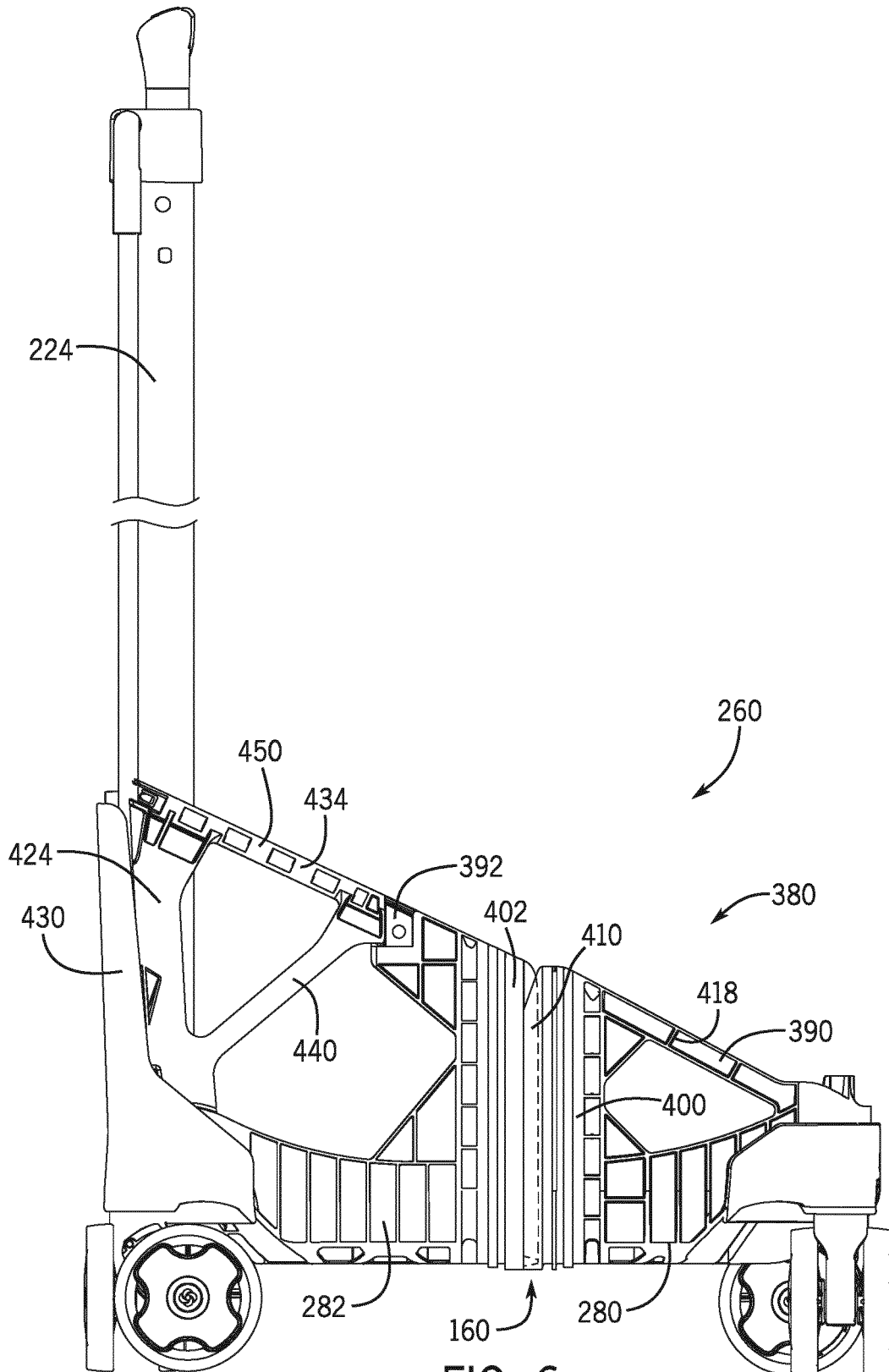


FIG. 6

## Description

### TECHNICAL FIELD

**[0001]** The present disclosure relates generally to luggage articles, and more specifically to a bottom frame structure for a luggage article.

### BACKGROUND

**[0002]** Some softside luggage cases include a frame structure or arrangement to support a luggage case. Traditional frame configurations, however, often include a one-piece bottom pan assembly, which may add unnecessary weight to the luggage case, and may limit design options. Traditional frame configurations may also include frame structures providing insufficient rigidity to the luggage case. For example, some frame structures may allow undesirable deformation of the luggage case when a user tows the luggage case from a tow handle.

**[0003]** It is therefore desirable to provide an improved luggage case, and more specifically an improved frame structure that addresses one or all of the above described problems and/or which more generally offers improvements or an alternative to existing arrangements.

**[0004]** Documents that may be related to the present disclosure include EP2787857B1, US3447648A, US5197580A, US5522487A, US6550592B1, US7063212B2, US20140311844A1, US20150327640A1, US20160345694A1, US20170000232A1, and US20170042301A1.

### SUMMARY

**[0005]** The present disclosure provides a bottom frame structure for a luggage article, as described below and defined in the accompanying claims. The frame structure may include a split bottom pan assembly with first and second pan members selectively connected together. Edges of the first and second pan members may interlock together at or near the split line of the case, such as in a tongue and groove manner, to provide a substantially vertically rigid or solid bottom pan. The interlocking edges of the first and second pan members may be held together using a closure mechanism. The closure mechanism may be a zip closure and may open to allow access to the interior of the luggage case. The frame structure may further include one or more bracing assemblies spanning the split line of the case. Each bracing assembly may include first and second portions selectively engaged at the split line. The bracing assembly may disengage along the split line to allow selective opening of the case.

**[0006]** Embodiments of the present disclosure may include a luggage article. The luggage article may include first and second halves hingedly connected together at a split line, a closure mechanism releasably securing the first and second halves together, and a split bottom pan assembly including first and second pan members sup-

porting respective bottom panel portions of the first and second halves. The first and second halves may be defined by front, rear, top, bottom, left, and right panels. The first and second halves may be movable between a closed configuration in which the first and second halves abut each other to define a substantially enclosed space, and an open configuration in which the first half is pivoted away from the second half to allow user access to the enclosed space. The closure mechanism may releasably secure the first and second halves together in the closed configuration along at least a portion of the split line. Each of the first and second pan members may include a connecting edge. The connecting edges of the first and second pan members may engage and interlock together at the split line when the luggage article is in the closed configuration to form a solid bottom structure.

**[0007]** In some examples, each of the first and second pan members may include one or more sidewalls extending from a periphery of a base plate. The connecting edge of each pan member may extend along at least a portion of the frontal edge of the base plate. The sidewalls of the first and second pan members may extend partially up the sides of the first and second halves, respectively, such that the pan members include a substantially U-shaped cross-section. The first and second pan members may interlock together at the split line along a first plane and a second plane angularly spaced from the first plane. The one or more sidewalls of the first pan member may interlock with the one or more sidewalls of the second pan member. Each of the first and second pan members may include first and second sidewalls on opposing side edges of the base plate. The sidewalls of the first and second pan members may interlock together in a direction perpendicular to the interlocking direction of the base plates.

**[0008]** In some examples, the luggage article may include a bracing assembly limiting deflection of the rear panel towards the front panel. The bracing assembly may span the split line when in the closed configuration and may allow movement of the first and second halves to the open configuration. The bracing assembly may include a first post extending from the first pan member adjacent to the split line. The bracing assembly may include a second post extending from the second pan member adjacent to the split line. The first and second posts may abut each other along the split line on the left or right panel when the luggage article is in the closed configuration. The bracing assembly may include a third post extending from the second pan member adjacent to the rear panel. The bracing assembly may include a first brace connected to and extending between a distal portion of the first post and a portion of the first pan member adjacent to the front panel. The bracing assembly may include a second brace connected to and extending between a distal portion of the second post and a distal portion of the third post. The bracing assembly may include a third brace connected to and extending between the distal portion of the second post and a portion of the

second pan member adjacent to the rear panel. The luggage article may include a first bracing assembly and a second bracing assembly. The first bracing assembly may span the split line along the left panel. The second bracing assembly spanning the split line along the right panel.

**[0009]** In some examples, the first half may be foldable into the second half when the closure mechanism is disengaged. The first pan member may fold into the second half and overlie the second pan member to fold the luggage article.

**[0010]** In some examples, the connecting edges of the first and second pan members may interlock together along the entire width of the bottom of the luggage article between the left and right panels. In some examples, the connecting edges of the first and second pan members may extend parallel to the split line. In some examples, the connecting edges of the first and second pan members interlock by a tongue and groove structure. In some examples, the connecting edges of the first and second pan members may interlock along a centerline of the bottom pan assembly.

**[0011]** In some examples, the luggage article may include a tow handle along the rear panel. The tow handle may include one or more tubes attached to the second pan member.

**[0012]** In some examples, the luggage article may include a side panel frame supporting the rear panel. The side panel frame may be connected to and extend from the bottom pan assembly. In another example, the side panel frame may include a plurality of pulltrusions connected together.

**[0013]** In some examples, the luggage article may include a fabric cover covering the first and second pan members. The fabric cover may cover the side panel frame.

**[0014]** In some examples, the luggage article may include a pair of spinner wheel assemblies connected to the second pan member. The luggage article may include a pair of spinner wheel assemblies connected to the first pan member. The luggage article may include four spinner wheel assemblies connected to the bottom pan assembly with two spinner wheel assemblies connected to the first pan member and two spinner wheel assemblies connected to the second pan member. The spinner wheel assemblies may be mounted on the exterior corners of the bottom pan assembly away from the interlocking engagement between the first and second pan members.

**[0015]** Additional embodiments and features are set forth in part in the description that follows, and will become apparent to those skilled in the art upon examination of the specification or may be learned by the practice of the disclosed subject matter. A further understanding of the nature and advantages of the present disclosure may be realized by reference to the remaining portions of the specification and the drawings, which forms a part of this disclosure. One of skill in the art will understand that each of the various aspects and features of the dis-

closure may advantageously be used separately in some instances, or in combination with other aspects and features of the disclosure in other instances.

## 5 BRIEF DESCRIPTION OF THE DRAWINGS

**[0016]** The description will be more fully understood with reference to the following figures in which components are not drawn to scale, which are presented as various examples of the present disclosure and should not be construed as a complete recitation of the scope of the disclosure, characterized in that:

15 FIG. 1 is an isometric view of a luggage article in a closed configuration according to some examples of the present disclosure;

FIG. 2 is an isometric view of the luggage article of FIG. 1 in an open configuration according to some examples of the present disclosure;

20 FIG. 3 is a top, front isometric view of a frame structure of the luggage article of FIG. 1 according to some examples of the present disclosure;

FIG. 4 is a bottom, rear isometric view of the frame structure of FIG. 3;

25 FIG. 5 is a top isometric view of the frame structure and showing first and second pan members separated along a line of connection;

FIG. 6 is a fragmentary side elevation view of the frame structure of FIG. 3;

30 FIG. 7 is an enlarged, fragmentary cross-sectional view taken along line 7-7 of FIG. 3 and showing an interlocking engagement between first and second pan elements of the frame structure according to some examples of the present disclosure;

35 FIG. 8 is an enlarged, fragmentary cross-sectional view taken along line 8-8 of FIG. 3 and showing an interlocking engagement along sidewall portions of the first and second pan elements according to some examples of the present disclosure;

40 FIG. 9 is an isometric view of the luggage article of FIG. 1 in a folded configuration; and

FIG. 10 is a cross-sectional view of the luggage article of FIG. 1 in an additional folded configuration.

## 45 DETAILED DESCRIPTION

**[0017]** According to the present disclosure, a frame structure is provided that is configured to support an outer fabric cover of a luggage article. The frame structure includes a bottom pan assembly and at least one side panel frame extending from the bottom pan assembly. The bottom pan assembly may be a split bottom pan assembly including first and second pan members selectively connected together at the split line of the luggage article. Edges of the first and second pan members may interlock together at or near the split line to provide a substantially vertically rigid bottom pan. The interlocking edges may be held together using a closure mechanism, such as a

zip closure.

**[0018]** FIGS. 1 and 2 illustrate an exemplary luggage article 100 according to some examples of the present disclosure. The luggage article 100 includes a split luggage case 102 formed from a plurality of walls or panels (hereinafter "panels" for the sake of convenience without intent to limit) defining an internal storage volume 104 in which to carry a user's belongings. In one example, the luggage case 102 may be formed from opposing front and rear panels 110, 112 and a plurality of side panels extending between the front and rear panels 110, 112. For instance, the luggage article 100 may include opposing top and bottom panels 120, 122 and opposing left and right side panels 124, 126 extending between the front and rear panels 110, 112. Corner regions 132 may be defined by the intersection of any two or three adjacent panels. For example, corners formed by the intersection of any three adjacent panels may be considered a "corner region." Edges formed by the intersection of any two adjacent panels may also be considered a "corner region."

**[0019]** The various panels may be configured or arranged to provide a desired size and shape of the luggage case 102. As shown in FIG. 1, the various panels may be sized and shaped to provide a height H, width W, and depth D of the luggage case 102. The height H of the luggage case 102 may be defined as the distance between the top and bottom panels 120, 122. The width W of the luggage case 102 may be defined as the distance between the left and right side panels 124, 126. Similarly, the depth D of the luggage case 102 may be defined as the distance between the front and rear panels 110, 112. The panels may be sized and shaped such that the luggage article 100 is taller than it is wide and wider than it is deep, such as that shown in at least FIG. 1. Other sizes and shapes of the luggage case 102 are contemplated, and the examples shown and described are for illustration purposes only.

**[0020]** The luggage article 100 illustrated in FIGS. 1 and 2 is an upright spinner soft side case but may be many types of luggage, including a hard side spinner case, a hybrid spinner case, a container, a backpack, a duffel bag, or the like. As shown, the luggage article 100 includes a first half 150 and a second half 152 defined by a split line 160. The first and second halves 150, 152 may be sized similarly to each other, or one of the halves may be sized to include a larger or smaller internal volume. For example, the first half 150 may be sized smaller than the second half 152, such as to allow selective positioning of the first half 150 within the second half 152 for storage. The first and second halves 150, 152 may be complementary portions of the luggage article 100. For example, the first half 150 may be a front half, a left half, a first luggage portion or section, or a lid of the luggage article 100. In such examples, the second half 152 may be a rear half, a right half, a second luggage portion or section, or a base of the luggage article 100. As explained below, each half includes a bottom frame structure that interlock together to form a bottom of the luggage

case 102. Though the first and second halves 150, 152 may be referred to as a lid and base, respectively, the first and second halves 150, 152 in some examples do not form a luggage case with a box and a front planar lid.

**[0021]** The first half 150 may be defined by one or more panels of the luggage case 102. For example, the first half 150 may be defined by the front panel 110, either entirely or in part. In some examples, the first half 150 may be defined by the front panel 110 and at least portions of the top, bottom, left side, and/or right side panels 120, 122, 124, 126 such that the first half 150 includes sidewall portions 170. Like the first half 150, the second half 152 may be defined by one or more panels of the luggage case 102. For instance, the second half 152 may be defined by the rear panel 112, either entirely or in part. In some examples, the second half 152 may be defined by the rear panel 112 and at least portions of the top, bottom, left side, and/or right side panels 120, 122, 124, 126 such that the second half 152 includes sidewall portions 172. In such examples, the sidewall portions 170 of the first half 150 may define the top, bottom, left side, and right side panels 120, 122, 124, 126 of the luggage case 102 in combination with the sidewall portions 172 of the second half 152. Depending on the particular application, the first half 150 may include a depth greater than the depth of the second half 152, or vice versa. In such examples, the sidewall portions 170 of the first half 150 may define more or less of the top, bottom, left side, and right side panels 120, 122, 124, 126 of the luggage case 102 than the second half 152. In some examples, the first and second halves 150, 152 may be sized similarly to each other such that the split line 160 extends along a centerline between the front and rear panels 110, 112 of the luggage case 102. In alternative examples, the split line 160 may extend closer to the front panel 110 or to the rear panel 112.

**[0022]** As shown, the first and second halves 150, 152 may each include a perimeter edge 180, 181, respectively, at the split line 160. The perimeter edges 180, 181 may abut or extend closely adjacent to each other when the luggage article 100 is closed. In some examples, each of the first and second halves 150, 152 may include a trim piece along its respective perimeter edge 180 or 181. The trim pieces may provide a desired aesthetic and/or functional characteristic of the luggage article 100. For instance, the trim pieces may conceal sewing lines and/or any imperfections and provide a clean appearance to, and/or a clean interface between, the first and second halves 150, 152. In some examples, the trim pieces may be shaped to fit together and form corresponding overlapping or interlocking structures when the luggage article 100 is closed. The corresponding shapes, or trim pieces, may extend along the entire lengths of the perimeter edges 180, 181, or along a portion of the lengths of the perimeter edges 180, 181, or along a single portion of each perimeter edge 180, 181, or along more than one portion of each perimeter edge 180, 181.

**[0023]** The luggage article 100 is illustrated as a soft

side luggage case, but may be formed from many combinations of hard side and soft side material. For example, the luggage case 102 may be molded from hard side material, or formed from a combination of hard side material and soft side material (known as "hybrid" construction). In some examples, the luggage case 102 may be formed entirely from soft side material. The hard side material may be a thermoplastic material (self-reinforced or fiber-reinforced), ABS, polycarbonate, polypropylene, polystyrene, PVC, polyamide, PE, or biaxially oriented polypropylene, among others. The soft side material may be nylon, canvas, polyester, leather, PVC, polypropylene, polyethylene, and/or PE, among others.

**[0024]** The luggage article 100 may be moved between a closed configuration (see FIG. 1) and an open configuration (see FIG. 2). In the closed configuration, the first and second halves 150, 152 may be positioned adjacent to each other, and in one example with at least a portion of the respective perimeter edges 180, 181 in engagement, to enclose a user's belongings within the internal storage volume 104 of the luggage article 100. In one example, the respective perimeter edges 180, 181 may each, along at least a portion of the perimeter, have a shape to fit together and form corresponding overlapping or interlocking structures, such as a tongue and groove structure, to enhance the structural performance of the engaged edges when closed.

**[0025]** In the open configuration, the first and second halves 150, 152 may be reoriented relative to each other, such as in one example towards and away from each other, to allow user access to the interior of the luggage article 100. In one example, reorientation of the first and second halves 150, 152 positions the respective opening formed by each perimeter edge 180, 181 facing upwardly (in FIG. 2), which allows a user easy access to the internal storage volume 104 of each half. To allow selective movement of the first and second halves 150, 152 between the open and closed configurations, the first and second halves 150, 152 may be pivotably attached together by a hinge 190 or similar mechanism.

**[0026]** The hinge 190 may include many configurations arranged to allow selective positioning, such as in one example by rotation about an axis of the hinge 190, of the first half 150 relative to the second half 152 from fully closed to fully open. For example, the hinge 190 may include any number or combination of a fabric strip, a strip of rubber, a piano hinge, a living hinge, spaced-apart discrete hinges, a zipper structure, an articulating joint made of elastomeric material, or other suitable structures that allow relative movement between the first and second halves 150, 152.

**[0027]** With continued reference to FIGS. 1 and 2, the luggage article 100 may include one or more support members 200 to support the luggage article 100 against a support surface (e.g., against the ground). The support members 200, which may be a foot, a fixed wheel assembly, a spinner wheel assembly, or any combination thereof, may be associated with any suitable panel of the

luggage case 102, such as in at least one example connected to at least the bottom panel 122. As shown, the luggage article 100 may include four support members 200. In such examples, the luggage article 100 may include two support members 200 connected to each of the first half 150 and the second half 152. The support members 200 may be connected to any suitable portion of the luggage case 102, such as at or near the corner regions 132 along the bottom panel 122.

**[0028]** The luggage article 100 may include a closure mechanism 210 to releasably secure the first and second halves 150, 152 together in the closed configuration. The closure mechanism 210 may be positioned along or adjacent to the split line 160 between the first half 150 and the second half 152 to engage each of the first and second halves 150, 152 and allow selective actuation for opening and closing of the luggage article 100. The closure mechanism 210 may be a discrete mechanism, such as a latch, or may be a continuous closure mechanism positioned along at least a part of the length of the split line 160, such as a zipper closure.

**[0029]** In some examples, the luggage article 100 may include one or more carry handles and/or a retractable tow handle 224. For example, as shown in FIG. 1, the luggage article 100 may include a top carry handle 230 coupled to the top panel 120 and/or a side carry handle 232 coupled to one of the left and right side panels 124, 126 (e.g., to the left side panel 124). The retractable tow handle 224 may be extendable from the top panel 120 and/or the rear panel 112 of the luggage article 100. For example, the retractable tow handle 224 may be extendable from adjacent the intersection between the top and rear panels 120, 112. The tow handle 224 may include many configurations allowing select positioning of the tow handle 224 for pulling the luggage article 100 across a support surface. For instance, the tow handle 224 may include one or more tubes 240 and a grip 242 at a distal portion of the tube(s) 240. Depending on the particular application, the tow handle 224 may include a dual tube configuration, such as shown in FIGS. 1 and 2, or may include a single pole configuration. As shown in FIG. 3, each tube 240 of the tow handle 224 may include a plurality of poles 246 telescopically engaged to each other to allow select extension of the tow handle grip 242 away from the luggage case 102.

**[0030]** FIGS. 3-5 are isometric views of the luggage article 100 with the luggage case 102 removed for clarity. Referring to FIGS. 2-5, the luggage article 100 includes a frame structure 260 supporting the luggage case 102 and/or providing shape to the luggage article 100. For example, the frame structure 260 may be operable to maintain a degree of rigidity of one or more panels of the luggage case 102 to the extent needed for holding a shape of the luggage case 102 and supporting a load therein when in use. The frame structure 260, which may be positioned at least partially internal to the luggage case 102, may include various elements, either interconnected together, positioned separately from one another,

or a combination of both. For example, the frame structure 260 may include one or more pan assemblies and/or one or more frame assemblies connected together to define a skeletal framework of the luggage article 100, as explained below.

**[0031]** The frame structure 260 may be associated with only select portions of the luggage case 102. For instance, the frame structure 260 may be associated with only the rear panel 112 and the bottom panel 122. The frame structure 260 may be operable to maintain a degree of rigidity of at least the rear panel 112 and the bottom panel 122 to the extent needed for holding a shape of the luggage case 102 and supporting a load therein when in use. In some examples, the frame structure 260 may be associated with the rear panel 112, the bottom panel 122, and select portions of the left and right side panels 124, 126, as described below. In such examples, the frame structure 260 may not be associated with the front panel 110, the top panel 120, and the remaining portions of the left and right side panels 124, 126.

**[0032]** In this manner, the frame structure 260 may provide sufficient strength and/or rigidity to the luggage case 102 to allow the luggage article 100 to be rolled, carried, lifted, etc. while also allowing portions of the luggage case 102 to collapse, bend, compress, etc., such as for storing of the luggage article 100. For example, the frame structure 260 may be arranged such that at least one, or portions, of the front panel 110, the top panel 120, the left side panel 124, and the right side panel 126 is movable and/or deformable relative to the frame structure 260 to open, close, expand, or collapse the luggage case 102 depending on the particular application. Such configurations may also reduce the weight of the luggage article 100 compared to traditional case constructions with a full skeletal framework along each panel of the case. The examples shown and described herein are for illustrative purposes only, and the frame structure 260 may include additional frameworks and/or structural members. For instance, depending on the particular application, the frame structure 260 may include a top framework or pan assembly, a front framework, and/or additional rods or wire loops to structure the first and second halves 150, 152.

**[0033]** Referring to FIGS. 3-5, the frame structure 260 includes a bottom pan assembly 270 and at least one side panel frame 272 connected thereto. As described herein, the bottom pan assembly 270 includes a split pan configuration. In particular, as shown in FIGS. 3-5, the bottom pan assembly 270 includes first and second pan members 280, 282. The first and second pan members 280, 282 may selectively engage each other to provide a degree of rigidity to the bottom panel 122 of the luggage case 102. For example, once connected together, the first and second pan members 280, 282 may provide a vertical rigidity to the bottom panel 122 of the luggage case 102. This vertical rigidity may help limit vertical deflection of the first pan member 280 relative to the second pan member 282 along the split line 160, or together or

separately may also help limit the vertical deflection of the combined bottom pans when secured together. As also described below, the side panel frame 272 may include a plurality of structural elements coupled together, such as elongate rods, pulltrusions, or pan structures connected together. As shown in FIG. 3, the one or more tubes 240 of the tow handle 224 may be attached to the bottom pan assembly 270, such as to the second pan member 282.

**[0034]** Referring to FIG. 2, the luggage case 102 may cover at least a portion of the frame structure 260. For example, at least portions of the bottom pan assembly 270 and/or the side panel frame 272 may be positioned within the luggage case 102 of the luggage article 100. In this manner, the frame structure 260 may be covered by the material of the luggage case 102, such as covered by softside material. In one example, the luggage case 102 may be defined by a fabric cover covering at least portions of the frame structure 260. The frame structure 260 may be secured to the luggage case 102, such as by one or more panels, hems, pockets, loops, sleeves, etc., secured (e.g., stitched) to the luggage case 102. In examples having a hybrid case construction, the frame structure 260 may be coupled to the hardside material and/or to the softside material. For example, portions of the bottom pan assembly 270 and/or the side panel frame 272 may be formed integrally with the hardside material defining a portion of at least one panel of the luggage case 102. In some examples, the frame structure 260 may be coupled to the hardside material via fasteners, corresponding retention features, adhesive, or the like.

**[0035]** As shown in FIGS. 3-5, the first pan member 280 may include a base plate 290 with opposing front and rear edges 292, 294 and opposing side edges 296. The front and rear edges 292, 294 may extend between the left and right side panels 124, 126 of the luggage case 102. The front edge 292 may extend along or adjacent to at least a portion of the split line 160 between the first and second halves 150, 152. The rear edge 294 may extend along or adjacent to the intersection between the front panel 110 and the bottom panel 122 of the luggage case 102. In such examples, the side edges 296 may each extend between the split line 160 and the front panel 110 of the luggage case 102. In some examples, the side edges 296 may each extend along or adjacent to the intersection between the bottom panel 122 and the left or right side panel 124 or 126 of the luggage case 102.

**[0036]** In one example, the first pan member 280 may include one or more sidewalls extending from a periphery of the base plate 290. For instance, the first pan member 280 may include a first sidewall 300 extending generally upwardly from one side edge 296 of the base plate 290. The first pan member 280 may also include a second sidewall 302 extending generally upwardly from the other side edge 296 of the base plate 290. In such examples, the first and second sidewalls 300, 302 of the first pan member 280 may extend partially up the sides of the first half 150 such that the first pan member 280 includes a

generally U-shaped cross-section.

**[0037]** The base plate 290 of the first pan member 280 may include many configurations. For instance, the front, rear, and opposing side edges 292, 294, 296 of the base plate 290 may be linear or curve along their respective lengths. In some examples, the front and rear edges 292, 294 may extend parallel to the split line 160 of the luggage case 102. Additionally or alternatively, the side edges 296 may extend perpendicularly to the split line 160. In some examples, the side edges 296 may extend parallel to the intersections between the bottom panel 122 and the left or right side panel 124 or 126 of the luggage case 102. The side edges 296 may extend perpendicularly to at least one of the front and rear edges 292, 294 of the base plate 290. In some examples, the first pan member 280 may include a smooth transition between the base plate 290 and the first and second sidewalls 300, 302. For instance, the transition between the base plate 290 and the first and second sidewalls 300, 302 may provide a radiused intersection between the bottom panel 122 and the left and right side panels 124, 126 of the luggage case 102. As shown, the base plate 290 includes a structural framework providing a lightweight and relatively rigid structural characteristic to the first pan member 280. Though shown as a honeycomb structure, the structural framework of the base plate 290 may include other interconnected closed cell shapes and configurations, such as a plurality of interconnected elements, PP board, or the like. The first and second sidewalls 300, 302 may include many combination of a solid structure, a web structure, or a framework, among others.

**[0038]** The second pan member 282 may be configured similarly to the first pan member 280. For example, the second pan member 282 may include a base plate 310 with opposing front and rear edges 312, 314 and opposing side edges 316. The front and rear edges 312, 314 may extend between the left and right side panels 124, 126 of the luggage case 102. The front edge 312 may extend along or adjacent to at least a portion of the split line 160 between the first and second halves 150, 152, such as across the split line 160 from the front edge 292 of the first pan member 280. The rear edge 314 may extend along or adjacent to the intersection between the rear panel 112 and the bottom panel 122 of the luggage case 102. In such examples, the side edges 316 may extend between the split line 160 and the rear panel 112 of the luggage case 102. In some examples, the side edges 316 may extend along or adjacent to the intersection between the bottom panel 122 and the left or right side panel 124 or 126 of the luggage case 102.

**[0039]** Like the first pan member 280, the second pan member 282 may include one or more sidewalls extending from a periphery of the base plate 310. For instance, the second pan member 282 may include a first sidewall 320 extending generally upwardly from one side edge 316 of the base plate 310. The second pan member 282 may also include a second sidewall 322 extending generally upwardly from the other side edge 316 of the base

plate 310. In such examples, the first and second sidewalls 320, 322 of the second pan member 282 may extend partially up the sides of the second half 152 such that the second pan member 282 includes a generally U-shaped cross-section.

**[0040]** The base plate 310 of the second pan member 282 may include many configurations. For instance, the front, rear, and opposing side edges 312, 314, 316 of the base plate 310 may be linear or curve along their respective lengths. In some examples, the front and rear edges 312, 314 may extend parallel to the split line 160 of the luggage case 102. Additionally or alternatively, the side edges 316 may extend perpendicularly to the split line 160. In some examples, the side edges 316 may extend parallel to the intersections between the bottom panel 122 and the left or right side panel 124 or 126 of the luggage case 102. The side edges 316 may extend perpendicularly to at least one of the front and rear edges 312, 314 of the base plate 310. In some examples, the second pan member 282 may include a smooth transition between the base plate 310 and the first and second sidewalls 320, 322. For instance, the transition between the base plate 310 and the first and second sidewalls 320, 322 may provide a radiused intersection between the bottom panel 122 and the left and right side panels 124, 126 of the luggage case 102. The base plate 310 of the second pan member 282 may also include a structural framework providing a lightweight and relatively rigid structural characteristic to the second pan member 282, such as interconnected closed cell shapes, a plurality of interconnected elements, PP board, or the like.

**[0041]** Referring to FIG. 2, the first and second pan members 280, 282 may support respective portions of the bottom panel 122 of the luggage case 102. For instance, the first pan member 280 may support a bottom panel portion 330 of the first half 150 of the luggage case 102. Similarly, the second pan member 282 may support a bottom panel portion 332 of the second half 152 of the luggage case 102. In such examples, the first and second pan members 280, 282 may interlock together to provide a degree of rigidity to the bottom panel 122 of the luggage case 102. For example, the first and second pan members 280, 282 may interlock together at the split line 160 to limit relative movement between the bottom panel portion 330 of the first half 150 and the bottom panel portion 332 of the second half 152 of luggage case 102, as detailed below.

**[0042]** FIG. 7 is an enlarged, fragmentary cross-sectional view showing an interlocking engagement between the first and second pan members 280, 282 of the frame structure 260. Referring to FIG. 7, each of the first and second pan members 280, 282 may include connecting edges 340, 341 that abut one another when the luggage article 100 is in a closed configuration. In one example, the connecting edge 340, 341 of each of the first and second pan members 280, 282 may extend along a frontal edge of the pan members' base plate 290 or 310. For example, the connecting edge 340 of the first pan mem-



ber 280 may extend along or define the front edge 292 of the first pan member's base plate 290. The connecting edge 340 of the first pan member 280 may extend along the entire length of the front edge 292, along a single portion of the front edge 292, or along more than one portion of the front edge 292 of the base plate 290. In one example, the connecting edge 340 of the first pan member 280 may extend parallel to the split line 160. In some examples, the connecting edge 340 of the first pan member 280 may extend at least partially along a frontal edge of each of the first and second sidewalls 300, 302 of the first pan member 280.

**[0043]** The connecting edge 341 of the second pan member 282 may be configured similarly to the connecting edge 340 of the first pan member 280. For example, the connecting edge 341 of the second pan member 282 may extend along or define the front edge 312 of the second pan member's base plate 310, such as along the entire length of the front edge 312, along a single portion of the front edge 312, or along more than one portion of the front edge 312. In some examples, the connecting edge 340 of the first pan member 280 may extend along a frontal edge of the first and second sidewalls 300, 302 of the first pan member 280. In like manner, the connecting edge 341 of the second pan member 282 may extend along a frontal edge of the first and second sidewalls 320, 322 of the second pan member 282. In one example, the connecting edge 341 of the second pan member 282 may extend parallel to the split line 160. In some examples, the connecting edge 341 of the second pan member 282 may extend at least partially along a frontal edge of each of the first and second sidewalls 320, 322 of the second pan member 282.

**[0044]** With continued reference to FIG. 7, the connecting edge 340 of the first pan member 280 may abut and interlock with the connecting edge 341 of the second pan member 282. Depending on the particular application, the connecting edges 340, 341 may abut and interlock along the entire lengths of the front edges 292, 312, along a single portion of the front edges 292, 312, or along more than one portion of the front edges 292, 312 of the first and second pan members 280, 282. For example, the connecting edges 340, 341 of the first and second pan members 280, 282 may interlock together along the entire distance between the left and right side panels 124, 126 of the luggage case 102.

**[0045]** In some examples, the connecting edges 340, 341 may also abut and interlock along the first and second sidewalls 300, 302, 320, 322 of the first and second pan members 280, 282. For instance, one or more sidewalls of the first pan member 280 may interlock with one or more sidewalls of the second pan member 282, such as the first sidewall 300 of the first pan member 280 abutting to interlock with the first sidewall 320 of the second pan member 282 and/or the second sidewall 302 of the first pan member 280 abutting to interlock with the second sidewall 322 of the second pan member 282. In such examples, the first and second pan members 280, 282

may interlock together along first and second planes angularly spaced from each other. More particularly, the base plates 290, 310 of the first and second pan members 280, 282 may define the first plane. The interlocking sidewall portions of the first and second pan members 280, 282 may define the second plane. In such examples, the second plane may be spaced angularly from the first plane, such as generally 90 degrees, greater than 90 degrees, or less than 90 degrees relative to each other. In one example, the sidewall portions of the first and second pan members 280, 282 may interlock together in a direction perpendicular to the interlocking direction of the base plates 290, 310. The examples given above are for illustration purposes only, and other configurations are contemplated, including examples where the first and second pan members 280, 282 interlock at least partly along the left and right side panels 124, 126 of the luggage case 102, as explained below.

**[0046]** As shown, the connecting edges 340, 341 of the first and second pan members 280, 282 may interlock together at the split line 160 when the luggage article 100 is in the closed configuration. In some examples, the connecting edges 340, 341 of the first and second pan members 280, 282 may interlock along a centerline of the bottom pan assembly 270. The interlocking engagement between the connecting edges 340, 341 may provide a substantially vertically rigid bottom structure to the luggage article 100 when the luggage article 100 is closed. For instance, the interlocking engagement between the connecting edges 340, 341 of the first and second pan members 280, 282 may limit lateral movement of the first pan member 280 along a plane parallel to the split line 160 and relative to the second pan member 282. More particularly, the interlocking engagement between the connecting edges 340, 341 may limit movement of the first pan member 280 towards or away from the top panel 120 of the luggage case 102 relative to the second pan member 282, or vice versa, as explained below. Additionally or alternatively, the interlocking engagement between the connecting edges 340, 341 may limit movement of the first pan member 280 towards or away from the side panels of the luggage case 102 relative to the second pan member 282, or vice versa. The interlocking structure between the connecting edges 340, 341 may structurally support the split line in the vertical direction that the pan members may act as an integral bottom pan (when the luggage article 100 is closed), as opposed to the separate pan members that they are.

**[0047]** Continuing to refer to FIG. 7, the connecting edges 340, 341 of the first and second pan members 280, 282 may be shaped to fit together and form corresponding overlapping or interlocking structures when the luggage article 100 is closed. In one example, the connecting edges 340, 341 interlock in a tongue and groove structure. In such examples, the connecting edge 340 of the first pan member 280 may define a tongue 350 with a tip 352. The connecting edge 341 of the second pan member 282 may define a groove 360 in which the tongue

350 of the first pan member 280 is at least partially received. For example, at least a portion of the tip 352 may be received in the groove 360 to interlock the connecting edges 340, 341 of the first and second pan members 280, 282.

**[0048]** As shown, the groove 360 may be defined between a pair of sidewalls 362 extending from or forming the front edge 312 of the second pan member's base plate 310. In such examples, the tongue 350 may be moved along an engagement direction to position the tip 352 within the groove 360 and at least partially between the sidewalls 362. As shown in FIG. 7, when the connecting edges 340, 341 are fully engaged, the tip 352, and specifically the opposing sidewalls, may engage the sidewalls 362. In one example, the groove 360 has a depth dimension longer than the length of the tongue 350 such that the tip 352 of the tongue 350 does not engage the bottom of the groove 360 when engaged. In one example, terminal ends of the sidewalls 362 may abut respective end surfaces of the tongue 350. In some examples, the tongue 350 may interlock with at least one of the sidewalls 362 to releasably secure the connecting edges 340, 341 together. For instance, at least one of the sidewalls 362 may define a catch in which a portion of the tip 352 is received to releasably interlock the connecting edges 340, 341 together. In some examples, the catch may be defined by a combination of both sidewalls 362.

**[0049]** In some examples, the engagement structure between the connecting edges 340, 341 may include other features for convenience. For instance, as shown in FIGS. 3, 5, and 7, the engagement structure may include a pair of flanges 370 extending from the connecting edge 340 of the first pan member 280. The flanges 370 may be positioned at the corners of the base plate 290 and the first and second sidewalls 300, 302. In one example, the flanges 370 may overlap the connecting edge 341 of the second pan member 282 when the first and second pan members 280, 282 are connected together. For instance, the flanges 370 may extend over a portion of the connecting edge 341 on the interior of the luggage article 100. The flanges 370 may limit movement of the first pan member 280 relative to the second pan member 282. In some examples, the flanges 370 may act as alignment features to properly align the first and second pan members 280, 282 so the first pan member 280 can be moved towards the second pan member 282 in the engagement direction to abut and interlock the connecting edge 340, 341 together.

**[0050]** Engagement between the tongue 350 and the sidewalls 362 may limit movement of the first pan member 280 relative to the second pan member 282 along a direction perpendicular to the engagement direction. For instance, engagement along the base plates 290, 310 of the tongue 350 within the groove 360 may limit movement of the first pan member 280 relative to the second member towards or away from the top panel 120 of the luggage case 102. Additionally or alternatively, engagement

along portions of the first sidewalls 300, 320 and/or the second sidewalls 302, 322 of the tongue 350 within the groove 360 may limit movement of the first pan member 280 relative to the second pan member 282 towards or away from the side panels of the luggage case 102.

**[0051]** Depending on the particular application, the engagement direction may be substantially parallel to the bottom panel 122 of the luggage case 102. In such examples, the engagement between the connecting edges 340, 341 of the first and second pan members 280, 282 may limit movement of the first pan member 280 relative to the second pan member 282 in a direction perpendicular to the bottom panel 122 of the luggage case 102. The tongue and groove structure shown in FIG. 7 is by way of illustration only, and the connecting edges 340, 341 may include other complementary shapes and structures forming corresponding overlapping or interlocking structures when the luggage article 100 is closed. The connecting edges 340, 341 may abut and interlock in many configurations limiting vertical and lateral movement of the first pan member 280 relative to the second pan member 282. For example, the connecting edges 340, 341 may abut and interlock along the base panels 290, 310, along the first and second sidewalls 300, 302, 320, 322, and along the corners between the base panels and sidewalls. In some examples, the connecting edges 340, 341 may abut and interlock only along the base panels 290, 310 and the first and second sidewalls 300, 302, 320, 322. Alternatively, the connecting edges 340, 341 may abut and interlock along at least a portion of the base panels 290, 310 only.

**[0052]** With continued reference to FIG. 7, the connecting edges 340, 341 of the first and second pan members 280, 282 may be held together in engagement using the closure mechanism 210. For example, engagement of the closure mechanism 210 may limit disengagement of the connecting edges 340, 341, such as limiting movement of the connecting edges 340, 341 away from each other. In some examples, engagement of the closure mechanism 210 may pull and/or seat the connecting edges 340, 341 together, for instance by applying a compression force across the engagement structure. For instance, the closure mechanism 210 may be arranged, such as sized and shaped, such that engagement of the closure mechanism 210 compresses or otherwise moves the connecting edges 340, 341 of the first and second pan members 280, 282 into tight engagement. The connecting edges 340, 341 may remain engaged and interlocked until the closure mechanism 210 is released or disengaged. For instance, once the closure mechanism 210 is released, the connecting edges 340, 341 may be disengaged by selective movement of the first pan member 280 away from the second pan member 282.

**[0053]** FIG. 6 is a fragmentary side elevation view of the frame structure 260 and showing a bracing assembly. FIG. 8 is an enlarged, fragmentary cross-sectional view showing an interlocking engagement between opposing members of the bracing assembly. Referring to FIGS. 6

and 8, the frame structure 260 may include a bracing assembly 380 limiting deflection of the rear panel 112 of the luggage case 102 towards or away from the bottom panel 122 of the luggage case 102. As shown in FIG. 3, the frame structure 260 may include a pair of bracing assemblies, such as a first bracing assembly 382 adjacent to the left side panel 124 of the luggage case 102 and a second bracing assembly 384 adjacent to the right side panel 126 of the luggage case 102. In such embodiments, the first bracing assembly 382 may span the split line 160 along the left side panel 124. The second bracing assembly 384 may span the split line 160 along the right side panel 126. Though shown as including a pair of bracing assemblies, the luggage article 100 may include more or less than two bracing assemblies depending on the particular application. For ease of reference, the description below refers to a single bracing assembly. Each bracing assembly 382, 384 may be configured similarly or differently.

**[0054]** Referring to FIGS. 6 and 8, the bracing assembly 380 may span the split line 160 when the luggage article is in a closed configuration and allow movement of the first and second halves 150, 152 of the luggage case 102 to the open configuration. For instance, the bracing assembly 380 may include a first portion 390 with one or more elements positioned on one side of the split line 160 and a second portion 392 with one or more elements positioned on the other side of the split line 160. As explained more fully below, when the luggage article 100 is closed, the first and second portions 390, 392 on the opposing sides of the split line 160 may engage each other at or across the split line 160. When the luggage article 100 is opened, the first and second portions 390, 392 may disengage to allow the selective movement of the first half 150 away from the second half 152. As shown, the first portion 390 of the bracing assembly 380 may be connected to the first pan member 280, such as to one of the sidewalls of the base plate 290. In like manner, the second portion 392 of the bracing assembly 380 may be connected to the second pan member 282, such as to one of the sidewalls of the base plate 310. In some examples, the bracing assembly 380 may define the first and second sidewalls 300, 302, 320, 322 of the first and second pan members 280, 282. For instance, the sidewalls of the first and second pan members 280, 282 may provide the bracing characteristics of the bracing assembly 380 described herein.

**[0055]** As shown in FIG. 6, the bracing assembly 380 may include a first post 400 extending from the first pan member 280 adjacent to the split line 160 and a second post 402 extending from the second pan member 282 adjacent to the split line 160. For example, the first and second posts 400, 402 may extend upwardly from the first and second pan members 280, 282, respectively, and towards the top panel 120 of the luggage case 102. The first and second posts 400, 402 may abut each other along the split line 160 when the luggage article 100 is in the closed configuration. Depending on the particular

application, the first and second posts 400, 402 may abut each other along the split line 160 along the left side panel 124 and/or the right side panel 126 of the luggage case 102. In some examples, the first and second posts 400, 402 may abut each other across the split line 160 along other panels of the luggage case 102, such as along at least a portion of the bottom panel 122 of the luggage case 102.

**[0056]** The first and second posts 400, 402 may abut each other in many arrangements. For example, as shown in FIG. 8, the first and second posts 400, 402 may interlock together in a manner similar to the connecting edges 340, 341 of the first and second pan members 280, 282. For instance, the first and second posts 400, 402 may include abutting edges 410, 411 having a shape to fit together and form corresponding overlapping or interlocking structures, such as a tongue and groove structure. Depending on the particular application, the abutting edges 410, 411 of the first and second posts 400, 402 may interlock along the entire lengths of the first and second posts 400, 402, along a single portion of the first and second posts 400, 402, or along more than one portion of the abutting edges 410, 411 of the first and second posts 400, 402. In this manner, the connecting edges 340, 341 of the first and second pan members 280, 282 may be considered to extend along the abutting edges 410, 411 of the first and second posts 400, 402.

**[0057]** Referring to FIG. 6, the bracing assembly 380 may include other elements providing rigidity to the first and second posts 400, 402. For instance, the bracing assembly 380 may include a first brace 418 connected to, and extending between, the first post 400 and the first pan member 280. As shown, the first brace 418 may connect to and extend between a distal portion of the first post 400 and a portion of the first pan member 280 adjacent to the front panel 110. Depending on the particular application, the first brace 418 may be formed integrally with or coupled to the first pan member 280 and/or the first post 400.

**[0058]** In some examples, the bracing assembly 380 may include a third post 424 extending from the second pan member 282 adjacent to the rear panel 112. As shown, the third post 424 may be defined as part of a housing 430 for the spinner wheel assembly positioned at the rear corner of the bottom pan assembly 270. Like the second post 402, the third post 424 may extend upwardly from the second pan member 282 and towards the top panel 120 of the luggage case 102. The bracing assembly 380 may also include a second brace 434 connected to, and extending between, the second and third posts 402, 424. For instance, the second brace 434 may connect to and extend between the distal portion of the second post 402 and a distal portion of the third post 424, though other configurations are contemplated. The second brace 434 may be a separate element coupled to the second and third posts 402, 424 or may be formed integrally with at least one of the second and third posts

402, 424.

**[0059]** The bracing assembly 380 may include any number of braces to provide a desired rigidity to the bracing assembly 380. For example, in addition to or as an alternative to the first brace 418 and/or the second brace 434, the bracing assembly 380 may include a third brace 440 connected to, and extending between, the second post 402 and the second pan member 282. As shown, the third brace 440 may connect to and extend between the distal portion of the second post 402 and a portion of the second pan member 282 adjacent to the rear panel 112. In some examples, the third brace 440 may be connected to the housing 430 of the spinner wheel assembly positioned at the rear corner of the bottom pan assembly 270. The third brace 440 may be a separate element from or may be formed integrally with at least one of the second post 402, the second pan member 282, and/or the housing 430 of the spinner wheel assembly.

**[0060]** With continued reference to FIG. 6, the bracing assembly 380 may provide a rigid structure between the first pan member 280 and the rear panel 112 of the luggage case 102. For instance, when the luggage article 100 is closed, the first and second braces 418, 434 may jointly define a rigid strut structure 450 between the first pan member 280 and the rear panel 112 of the luggage case 102. In this manner, the bracing assembly 380 may limit movement of the rear panel 112 towards or away from the first pan member 280, such as folding of the rear panel 112 towards or away from the bottom panel 122, thereby providing a torsional rigidity to the luggage article 100 along an axis extending along the intersection between the rear panel 112 and the bottom panel 122 of the luggage case 102. The strut structure 450 may be linear or curved along its length. In one example, such as shown in FIG. 6, the strut structure 450 may extend at an angle to the bottom panel 122 of the luggage case 102. For instance, the strut structure 450 may be angled towards the bottom panel 122 from adjacent to the rear panel 112 to adjacent to the front panel 110. More specifically, the bracing assembly 380 may taper from the rear panel 112 to the front panel 110 across the split line 160.

**[0061]** Referring to FIGS. 3-5, the frame structure 260 may include a rear frame 500 attached to and extending from the bottom pan assembly 270. In one example, the rear frame 500, which may be considered the side panel frame 272, extends vertically from the bottom pan assembly 270, though other positional configurations are contemplated as described below. The rear frame 500 may extend from a rear portion of the bottom pan assembly 270. For instance, the rear frame 500 may extend from a position adjacent to one or more rear corners of the bottom pan assembly 270. In one example, the rear frame 500 may be attached to and extend away from the second pan member 282. In such examples, the rear frame 500 may be positioned along at least a portion of the periphery of the rear panel 112, such as including one or more elements extending along at least a portion

of a perimeter of the rear panel 112. In some examples, the rear frame 500 may be positioned adjacent to the periphery of the rear panel 112, such as at, or at a position spaced away (e.g., inwardly) from, the edges of the rear panel 112. In such examples, the rear frame 500 may bias the top panel 120 away from the bottom panel 122 by outwardly tensioning the rear panel 112 and creating a tension force in the rear panel 112.

**[0062]** In one example, the rear frame 500 may include a pair of spaced apart elongate elements (e.g., a first elongate element 510 and a second elongate element 512) connected to and extending from the bottom pan assembly 270. The first and second elongate elements 510, 512 may be linear or curved along their respective lengths, such as to provide a desired shape to the luggage case 102. As shown, the first and second elongate elements 510, 512 may extend away from the bottom pan assembly 270 to define an angle between the elongate elements and the bottom pan assembly 270. For example, the first and second elongate elements 510, 512 may extend (e.g., vertically) from the bottom pan assembly 270 to define a 90 degree angle between the bottom pan assembly 270 and the first and second elongate elements 510, 512, though other angular arrangements between the bottom pan assembly 270 and the first and second elongate elements 510, 512 are contemplated, including less than 90 degrees or greater than 90 degrees, depending on the particular application.

**[0063]** To couple the rear frame 500 to the bottom pan assembly 270, proximate ends 520 of the first and second elongate elements 510, 512 may be coupled to the bottom pan assembly 270 and/or to a respective support member 200. The proximate ends 520 of the first and second elongate elements 510, 512 may be secured to the bottom pan assembly 270 in many configurations. For example, the proximate ends 520 may be secured to the bottom pan assembly 270 by adhesive, fasteners, heat or sonic welding, corresponding retention features, or the like. In one example, the proximate ends 520 of the first and second elongate elements 510, 512 may be interference fit within portions of the bottom pan assembly 270. Specifically, the proximate ends 520 of the first and second elongate elements 510, 512 may be received within corresponding slots or cavities defined in the bottom pan assembly 270. In such examples, the proximate ends 520 of the first and second elongate elements 510, 512 may be sized annularly larger than the slots in which the elongate elements are received to frictionally engage the first and second elongate elements 510, 512 within the bottom pan assembly 270. In some examples, the first and second elongate elements 510, 512 may be formed integrally with at least a portion of the bottom pan assembly 270, such as with at least a portion of the second pan member 282.

**[0064]** In some examples, the first and second elongate elements 510, 512 may be coupled to respective spinner wheel assemblies, such as in the same manner as described above. For instance, the first and second

elongate elements 510, 512 may be coupled to one or more housing portions 530 of respective spinner wheel assemblies. The first and second elongate elements 510, 512 may be separate elements secured to the housing portions 530, such as by adhesive, fasteners, heat or sonic welding, corresponding retention features, or the like. In some examples, the first and second elongate elements 510, 512 may be formed integrally with the housing portions 530. The housing portions 530 may be coupled to the bottom pan assembly 270 in a similar manner, such as by adhesive, fasteners, heat or sonic welding, corresponding retention features, or the like. The housing portions 530 may also be formed integrally with at least a portion of the bottom pan assembly 270.

**[0065]** With continued reference to FIGS. 3-5, the rear frame 500 may include a cross frame member 540 coupling distal ends of the first and second elongate elements 510, 512 together. The cross frame member 540 may be defined as one element or more than one element. In some embodiments, the cross frame member 540 may be defined as one or more elements in combination with other structure(s) of the luggage article 100, such as with at least a portion of the tow handle 224, a bezel structure, the luggage case 102, or any combination thereof. For example, the tow handle 224 may include a top support 550 positioned distally from the bottom pan assembly 270. The top support 550, which may form a bezel connected to the luggage case 102, may be positioned on a distal end of one or more tubes 240, such as spanning between a pair of tubes 240 of the tow handle 224. In such examples, the cross frame member 540 may include a pair of frame elements 560 connecting the distal ends of the first and second elongate elements 510, 512 to the top support 550 of the tow handle 224. As shown, the rear panel 112 may include corner pieces 568 connecting the frame elements 560 to the distal ends of the first and second elongate elements 510, 512. Each corner piece 568 may be curved and may be formed integrally with the elongate elements and/or the frame elements 560.

**[0066]** The rear frame 500 may be formed from a variety of materials and means. For example, the first elongate element 510, the second elongate element 512, and the frame elements 560 of the cross frame member 540 may be a pulltrusion to provide a lightweight characteristic to the frame structure 260. In addition, the pulltrusion molding process may provide a composite structure of the rear frame 500 that is relatively strong for its weight. The first elongate element 510, the second elongate element 512, and the frame elements 560 of the cross frame member 540 may include a diameter ranging between about 5mm to about 10mm (preferably between about 6mm to about 8mm), though other dimensions are contemplated depending on the size, weight, and/or strength requirements of the frame structure 260.

**[0067]** FIG. 9 is an isometric view showing the luggage article 100 in a folded configuration. FIG. 10 is a schematic cross-sectional view showing the luggage article

100 in an additional folded configuration. As shown in FIGS. 9 and 10, the first half 150 may be received at least partially in the second half 152 to reduce an overall dimension of the luggage article 100 for storage. For example, once the closure mechanism 210 is sufficiently disengaged, the connecting edges 340, 341 of the first and second pan members 280, 282 may be disengaged and the first pan member 280 moved away from the second pan member 282 (see FIG. 5). Once the first pan member 280 is disengaged from the second pan member 282, the first half 150 of the luggage case 102 may be positioned at least partially within the second half 152. For instance, the first pan member 280 may be positioned at least partially within the second half 152. In one example, such as shown in FIG. 10, the first pan member 280 may fold into the second half 152 and overlie the second pan member 282 to fold the luggage article 100. As shown in FIG. 10, the first pan member 280 may be folded towards the top panel 120 and positioned at least partially within the second half 152, such as the first half 150 folding along or adjacent to the intersection between the front and bottom panels 110, 122. Depending on the particular application, the first pan member 280 may be tucked or rolled into the second half 152 such that the spinner wheel assemblies connected to the first pan member 280 and the spinner wheel assemblies connected to the second pan member 282 extend in generally opposite directions, though other positional arrangements are contemplated. Additionally or alternatively, the fabric material of the first half 150, such as the fabric material of at least the front panel 110, may be folded, bunched, rolled, or otherwise compressed and positioned at least partially within the second half 152. In such examples, the first pan member 280 may be tucked or rolled under the front cover material and positioned within the second half 152. The compression of the fabric material of the first half 150 may occur generally in a top portion of the first half 150 due to the frame structure 260 within the first half 150 being positioned within only a bottom portion of the first half 150.

**[0068]** The luggage article 100 may be formed from a variety of materials and means. For example, the frame structure 260 may be formed from a thermoplastic material (self-reinforced or fiber reinforced), ABS, polycarbonate, polypropylene, polystyrene, PVC, polyamide, and/or PE, among others. In some examples, the first and second elongate elements 510, 512, the frame elements 560, and/or the one or more tubes 240 of the tow handle 224, among others, may be extruded from aluminum or other similar metal. In addition, the first and second elongate elements 510, 512 and/or the frame elements 560 may be formed from fiber reinforced epoxy, resin, or other similar material. The frame structure 260 may be formed or molded in any suitable manner, such as by plug molding, blow molding, injection molding, extrusion, casting, or the like. As noted above, the luggage article 100 may be formed from softside material and/or hardside material. The softside material may be nylon,

canvas, polyester, leather, PVC, polypropylene, polyethylene, and/or PE, among others. The hardside material may be a thermoplastic material (self-reinforced or fiber reinforced), ABS, polycarbonate, polypropylene, polystyrene, PVC, polyamide, and/or PE, among others.

**[0069]** All relative and directional references (including: upper, lower, upward, downward, left, right, leftward, rightward, top, bottom, side, above, below, front, middle, back, vertical, horizontal, and so forth) are given by way of example to aid the reader's understanding of the particular examples described herein. They should not be read to be requirements or limitations, particularly as to the position, orientation, or use unless specifically set forth in the claims. Connection references (e.g., attached, coupled, connected, joined, and the like) are to be construed broadly and may include intermediate members between a connection of elements and relative movement between elements. As such, connection references do not necessarily infer that two elements are directly connected and in fixed relation to each other, unless specifically set forth in the claims.

**[0070]** Those skilled in the art will appreciate that the presently disclosed examples teach by way of example and not by limitation. Therefore, the matter contained in the above description or shown in the accompanying drawings should be interpreted as illustrative and not in a limiting sense. The following claims are intended to cover all generic and specific features described herein, as well as all statements of the scope of the present method and system, which, as a matter of language, might be said to fall there between.

## Claims

### 1. A luggage article (100) comprising:

first and second halves (150, 152) defined by front, rear, top, bottom, left, and right panels (110, 112, 120, 122, 124, 126), the first and second halves hingedly connected together at a split line (160), the first and second halves movable between a closed configuration in which the first and second halves abut each other to define a substantially enclosed space (104), and an open configuration in which the first half is pivoted away from the second half to allow user access to the enclosed space;  
 a closure mechanism (210) releasably securing the first and second halves together in the closed configuration along at least a portion of the split line (160);  
 a split bottom pan assembly (270) including first and second pan members (280, 282), the first pan member supporting a bottom panel portion (330) of the first half, the second pan member supporting a bottom panel portion (332) of the second half, each of the first and second pan

members including a connecting edge (340, 341);

wherein the connecting edges of the first and second pan members engage and interlock together at the split line when the luggage article is in the closed configuration to form a solid bottom structure; and

wherein the connecting edges of the first and second pan members are held in engagement using the closure mechanism.

### 2. The luggage article of claim 1, wherein:

each of the first and second pan members includes one or more sidewalls (300, 302, 320, 322) extending from a periphery of a base plate (290, 310), the connecting edge of each pan member extending along at least a portion of the frontal edge (292, 312) of the base plate; and the sidewalls of the first and second pan members extend partially up the sides of the first and second halves, respectively, such that the pan members include a substantially U-shaped cross-section.

### 3. The luggage article of claim 2, wherein the first and second pan members interlock together at the split line along a first plane and a second plane angularly spaced from the first plane.

### 4. The luggage article of claim 2 or 3, wherein the one or more sidewalls of the first pan member interlock with the one or more sidewalls of the second pan member.

### 5. The luggage article of any of claims 2-4, wherein each of the first and second pan members includes first and second sidewalls (300, 302, 320, 322) on opposing side edges (296, 316) of the base plate.

### 6. The luggage article of any preceding claim, further comprising a bracing assembly (380) limiting deflection of the rear panel towards the front panel, the bracing assembly spanning the split line when in the closed configuration and allowing movement of the first and second halves to the open configuration.

### 7. The luggage article of claim 6, wherein the bracing assembly comprises:

a first post (400) extending from the first pan member adjacent to the split line; and  
 a second post (402) extending from the second pan member adjacent to the split line;  
 wherein the first and second posts abut each other along the split line on the left or right panel when the luggage article is in the closed configuration.

8. The luggage article of claim 7, further comprising:
- a third post (424) extending from the second pan member adjacent to the rear panel; and  
 a first brace (418) connected to and extending between a distal portion of the first post and a portion of the first pan member adjacent to the front panel.
- 5
9. The luggage article of claim 8, further comprising a second brace (434) connected to and extending between a distal portion of the second post and a distal portion of the third post.
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10. The luggage article of any of claims 7-9, wherein the bracing assembly further comprises a third brace (440) connected to and extending between the distal portion of the second post and a portion of the second pan member adjacent to the rear panel.
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11. The luggage article of any preceding claim, further comprising:
- a first bracing assembly according to any of claims 6-10, the first bracing assembly spanning the split line along the left panel; and  
 a second bracing assembly according to any of claims 6-10, the second bracing assembly spanning the split line along the right panel.
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12. The luggage article of any preceding claim, wherein the first half is foldable into the second half when the closure mechanism is disengaged.
13. The luggage article of any preceding claim, wherein the connecting edges of the first and second pan members interlock together along the entire width of the bottom of the luggage article between the left and right panels.
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14. The luggage article of any preceding claim, wherein the connecting edges of the first and second pan members interlock by a tongue and groove structure.
15. The luggage article of any preceding claim, further comprising a tow handle (224) along the rear panel, the tow handle including one or more tubes attached to the second pan member.
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FIG. 1

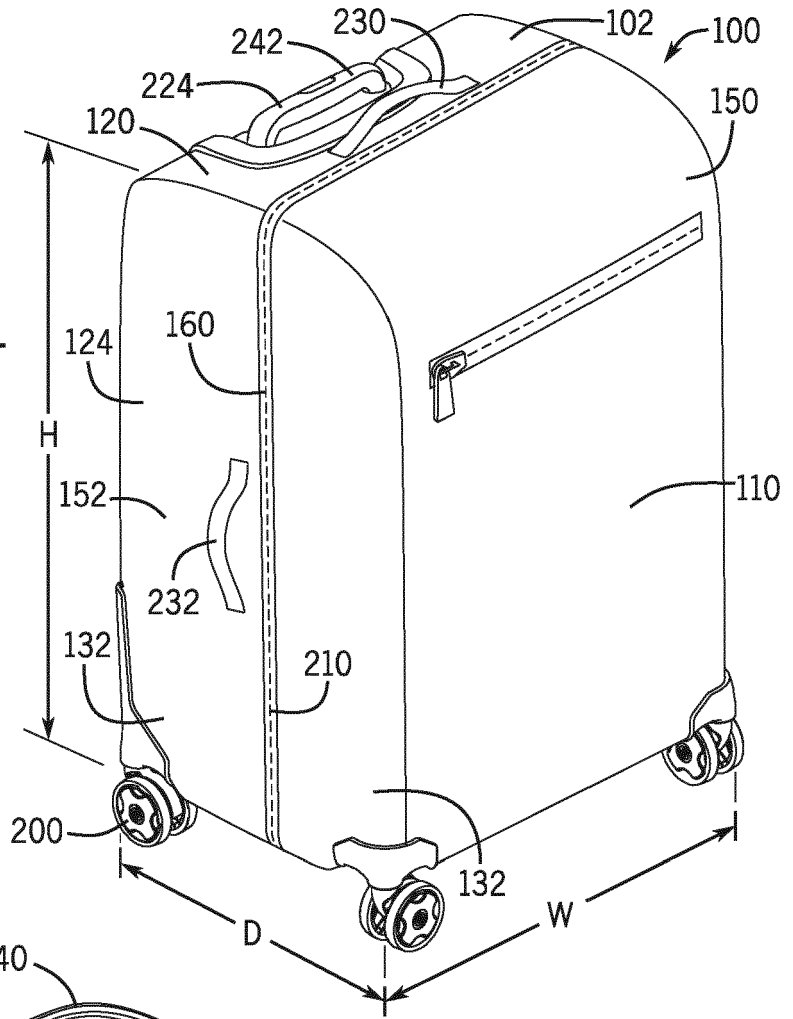
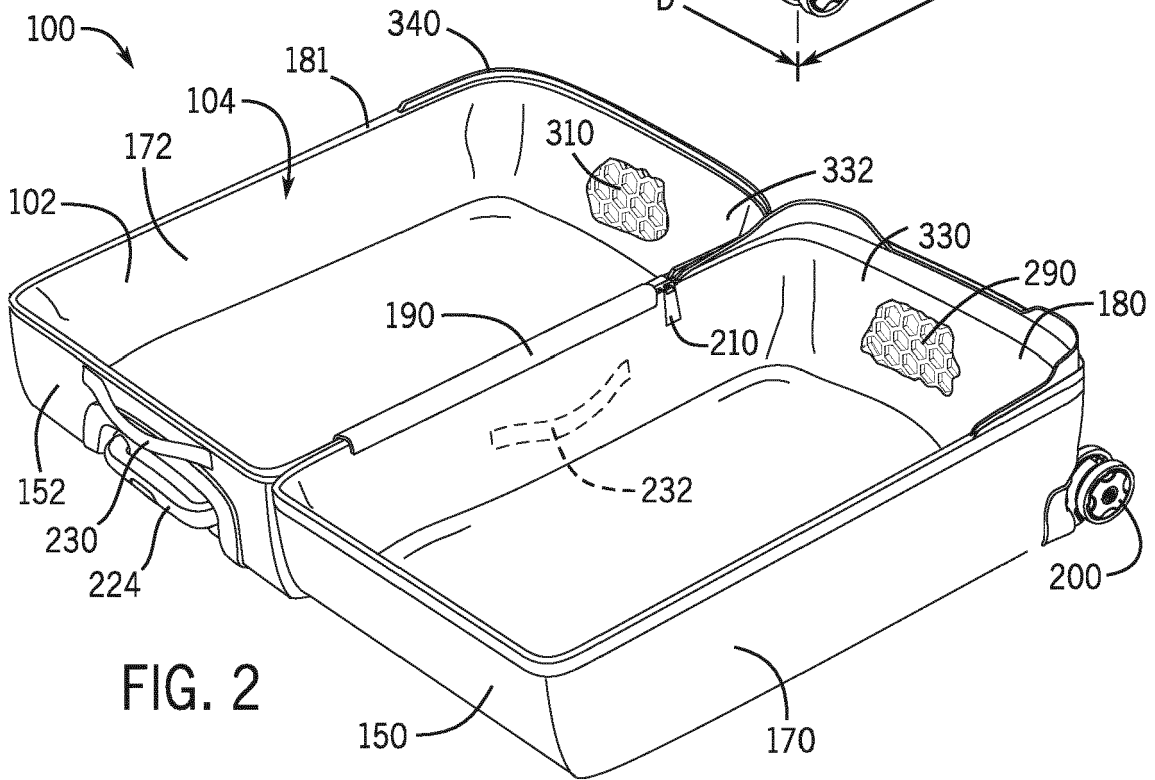


FIG. 2





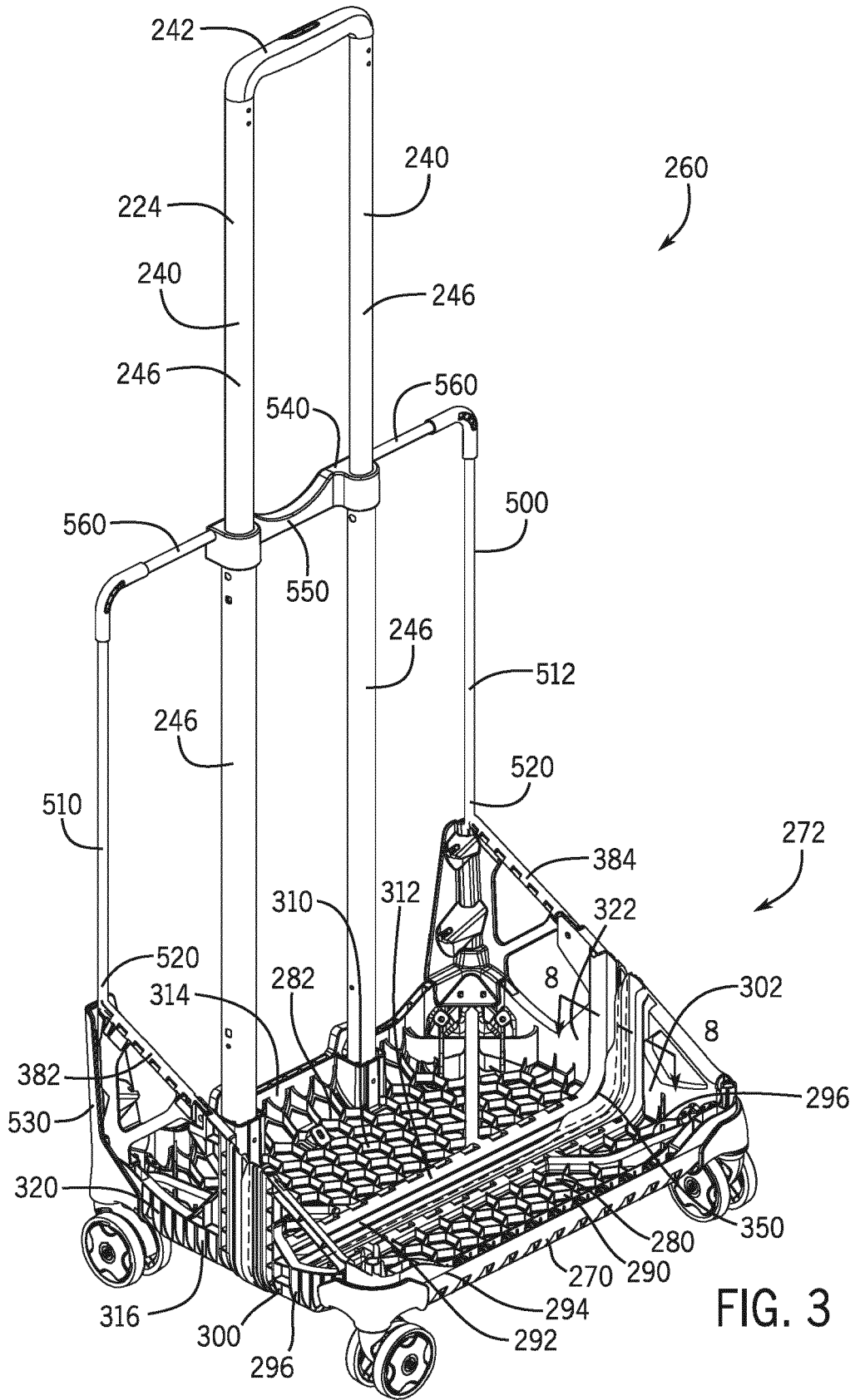


FIG. 3

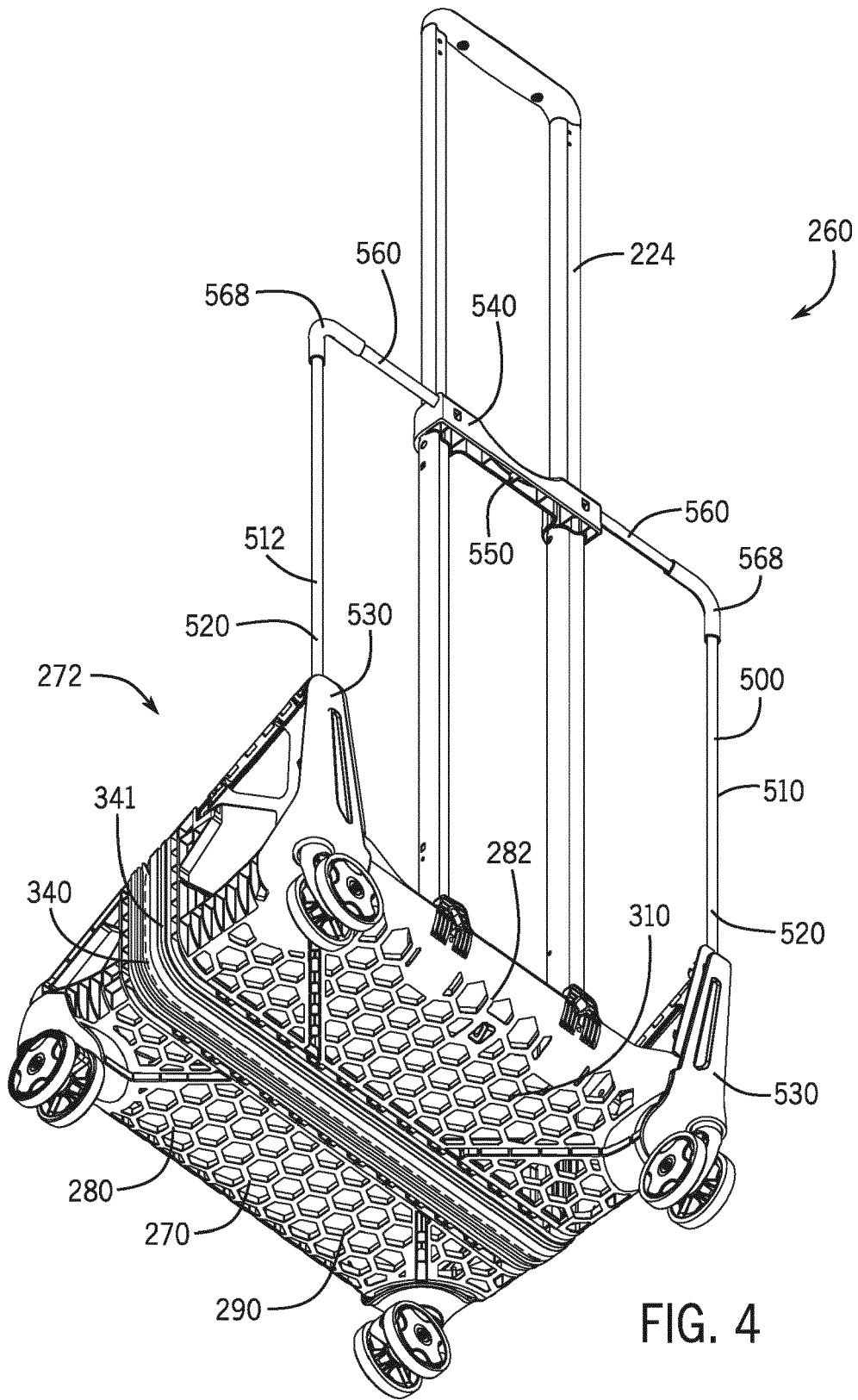
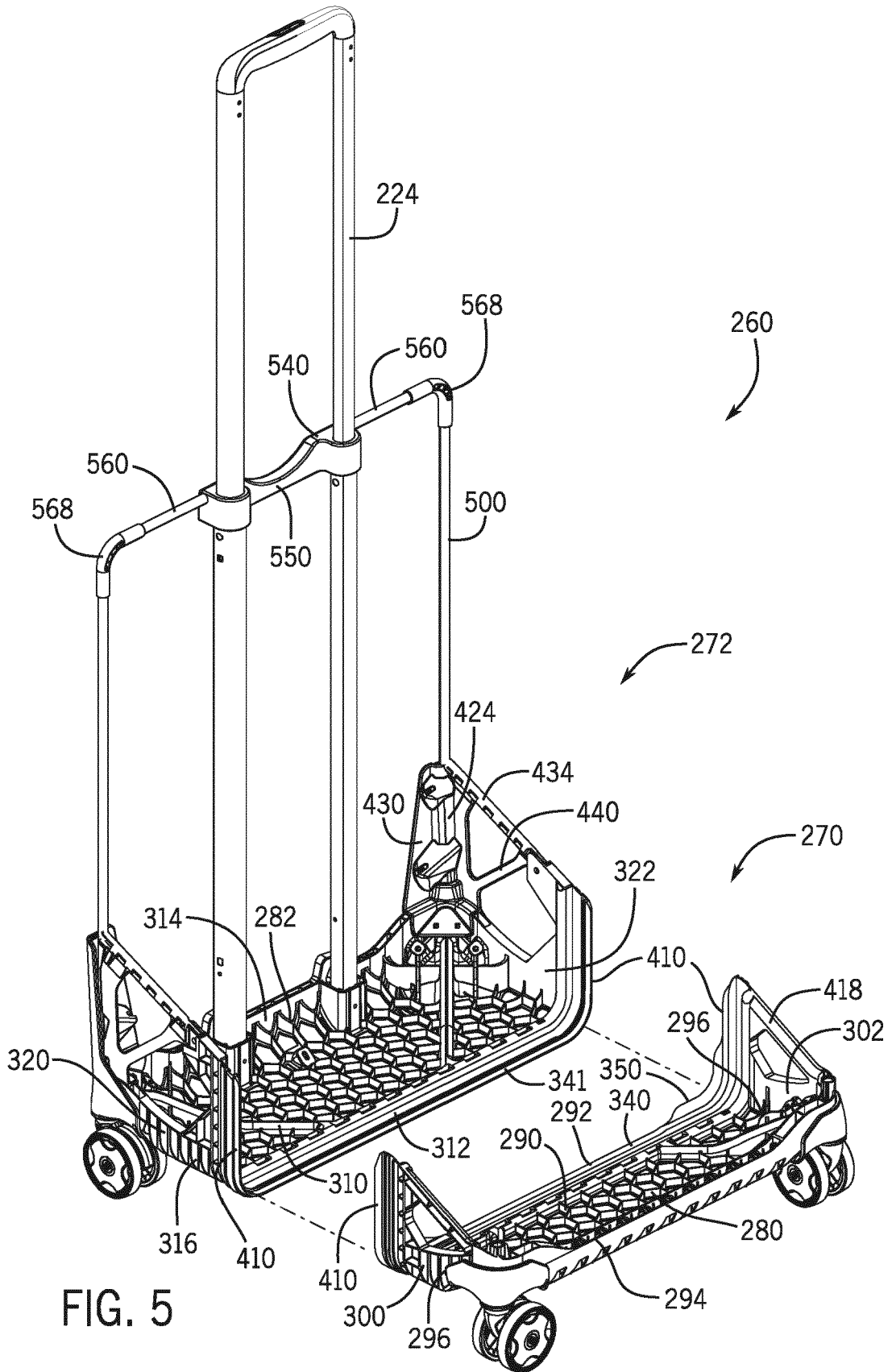


FIG. 4



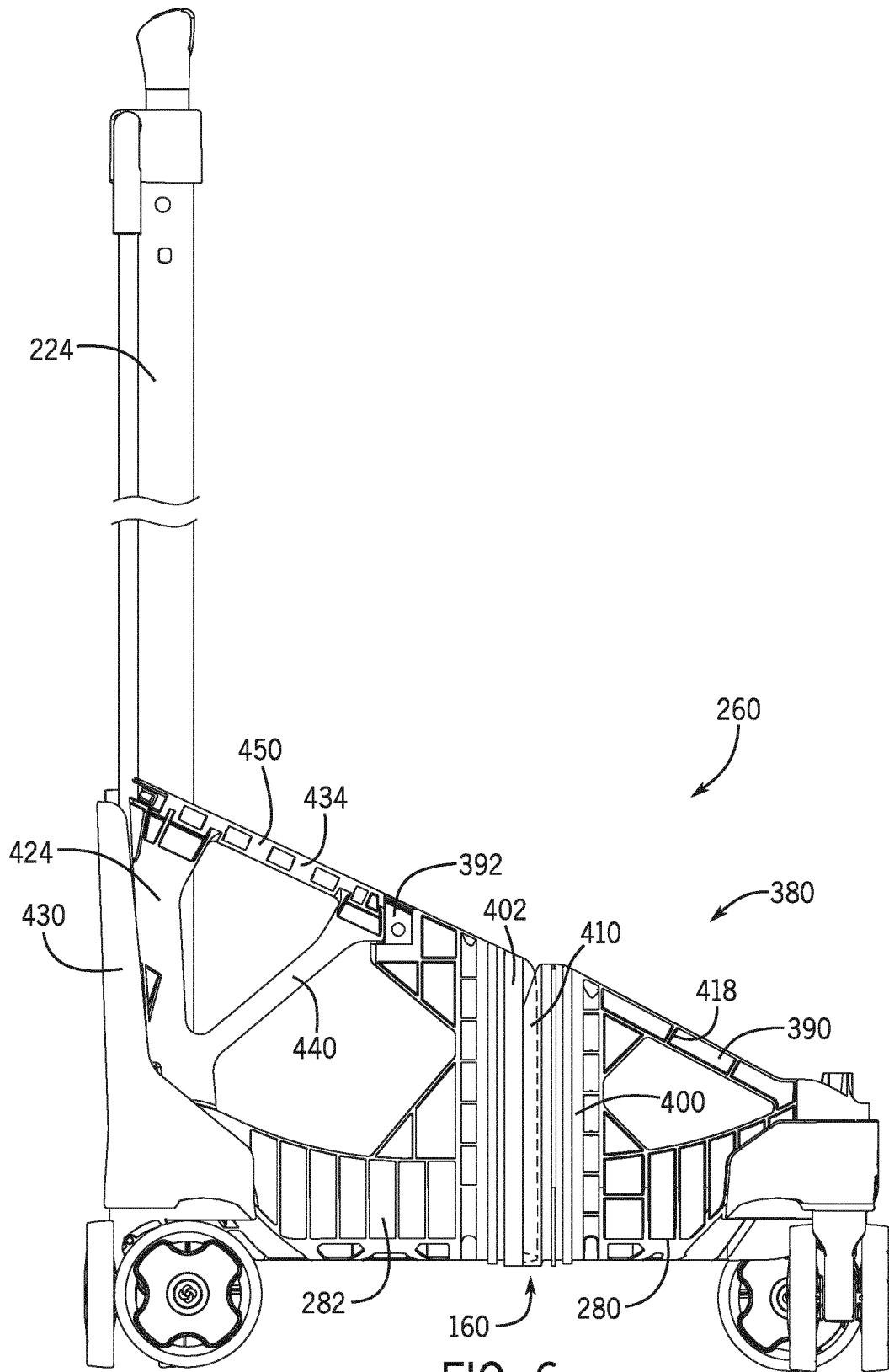


FIG. 6

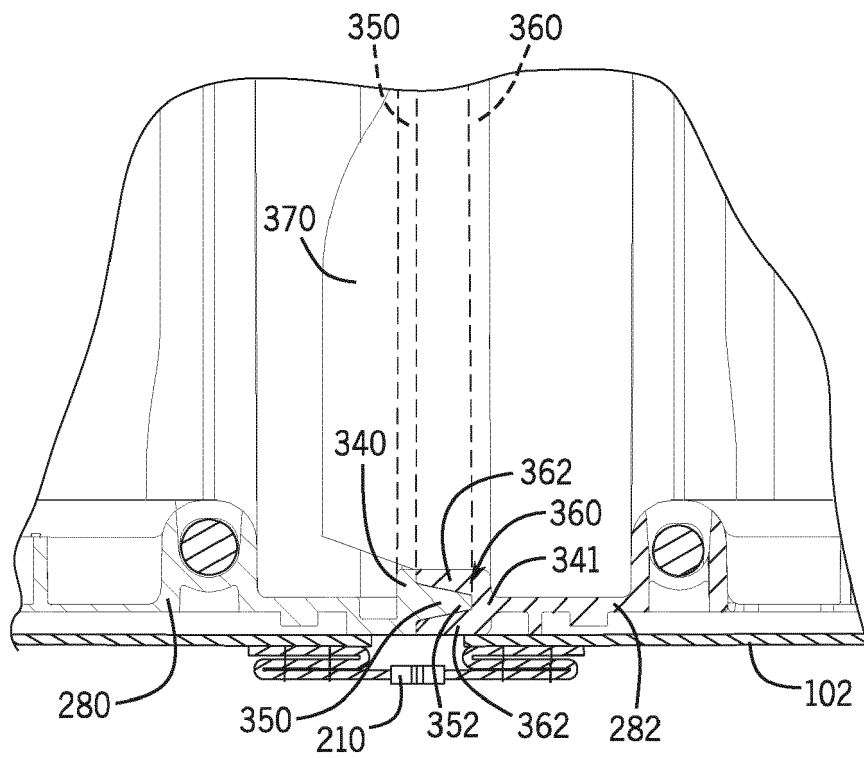


FIG. 7

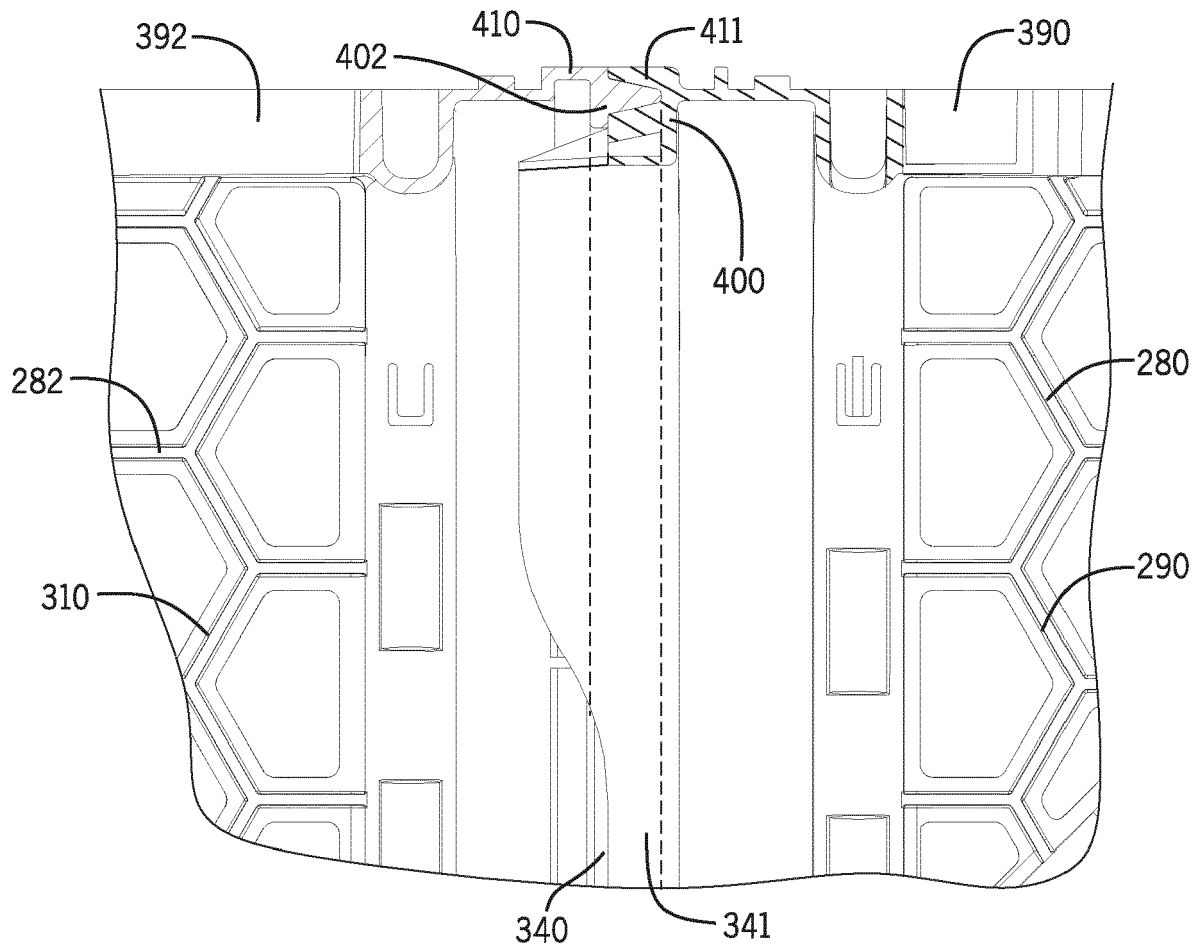


FIG. 8

FIG. 9

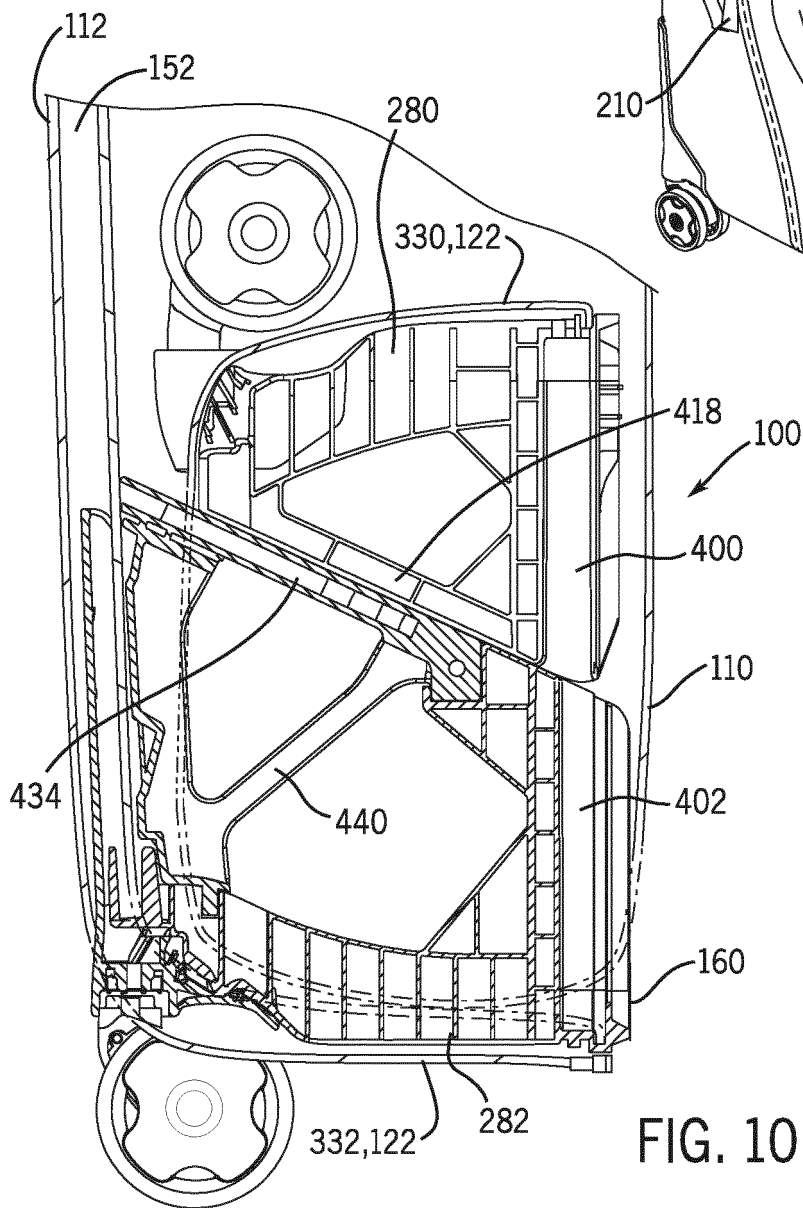
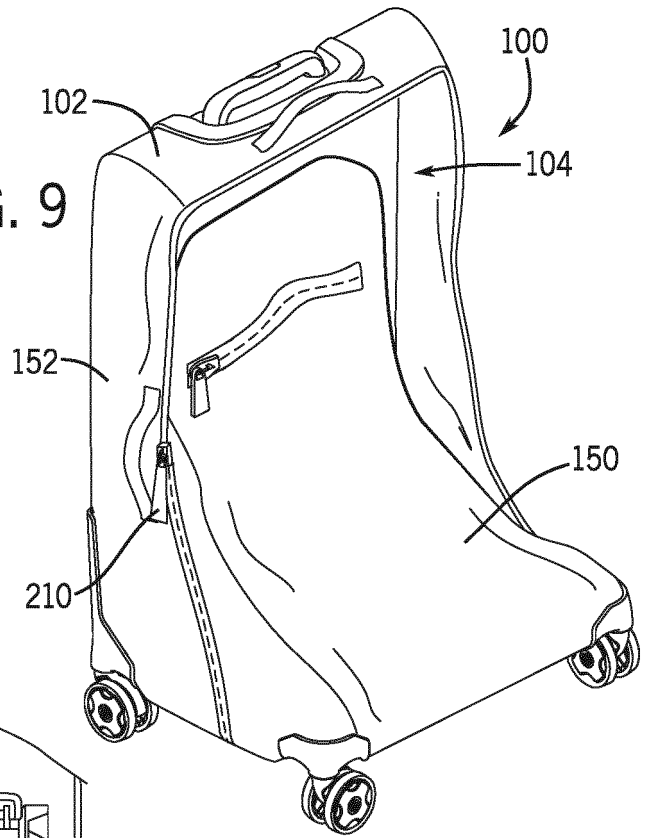


FIG. 10



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Application Number  
EP 18 18 2059

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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 8 January 2019	Examiner van Overbeek, Kajsa
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