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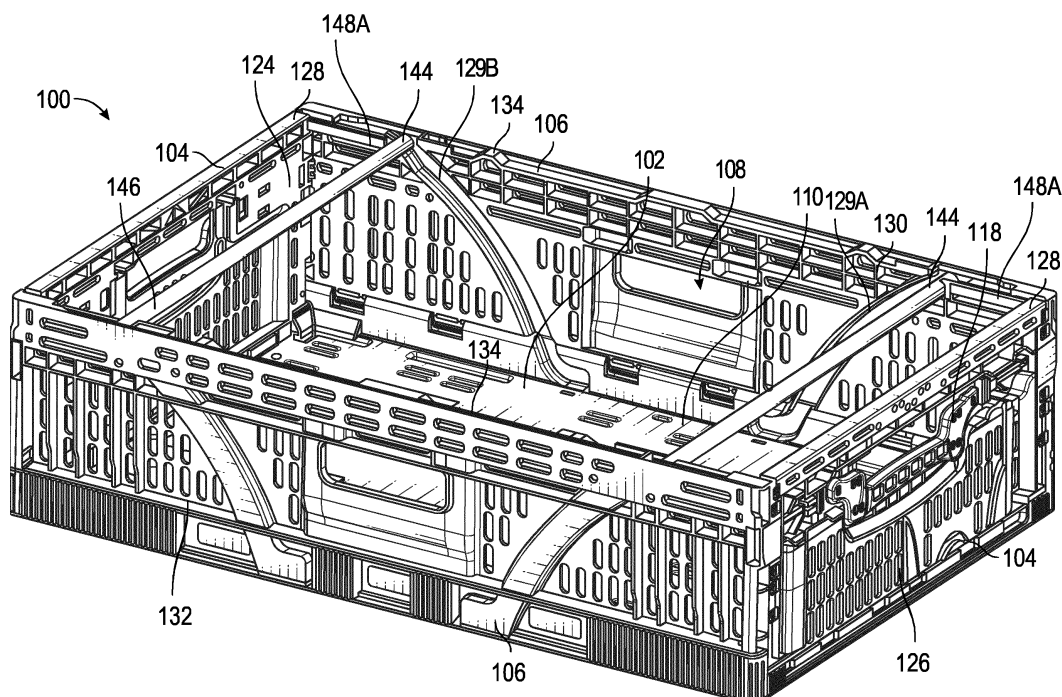
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(54) COLLAPSIBLE CRATE WITH SWING BAR ASSEMBLY

(57) A collapsible crate includes a base, at least one side wall, at least one end wall, and at least one swing bar assembly. The side wall extends in a longitudinal direction and is hingedly attached to the base such that the side wall is movable between an erected configuration and a collapsed configuration. The top wall includes a top edge and an inner face and may include at least one of a guide channel, a stopper, and/or a locking feature.

The end wall extends in a transverse direction and is hingedly attached to the base adjacent to the side wall and movable between an erected configuration and a collapsed configuration, wherein the end wall is adjacent to the side wall. The swing bar assembly is pivotably supported on the end wall and includes a swing bar that is engaged with the side wall.

**FIG. 1****EP 4 063 286 A1**

Description

FIELD OF THE INVENTION

[0001] This application relates to crates, and, more particularly, to crates with walls that are collapsible relative to a base.

BACKGROUND

[0002] Various types of containers may be used for transporting produce, manufactured articles, raw materials, and the like from one location to another. Such containers may be stackable and/or may be configured to be lifted by various vehicles or pieces of equipment such as a forklift. These structures are commonly known as "containers," "bins," "box-pallets," "crates," or "totes," among others, and will be referred to generically herein as "crates."

[0003] Traditionally, to realize the maximum strength of materials forming the crates, crates may be molded or otherwise formed as a singled piece. However, such crates occupy the same volume when transported empty on a return journey as when full on an outbound journey. This extremely inefficient use of space is very costly. Alternatively, some disassembling or collapsible crates have been developed in an attempt to reduce the transport volume requirements when the crates are empty. While offering more efficient use of volume, these collapsible crates generally suffer from a number of disadvantages. Specifically with respect to crates that disassemble into separate elements, the base and the sides once separated are generally much less convenient to handle. Furthermore, the number of individual elements that must be handled is greatly increased, and considerable extra labor may be required for packing individual bases and sides compactly for volume-efficient transportation to the next point of use.

SUMMARY

[0004] The terms "invention," "the invention," "this invention" and "the present invention" used in this patent are intended to refer broadly to all of the subject matter of this patent and the patent claims below. Statements containing these terms should be understood not to limit the subject matter described herein or to limit the meaning or scope of the patent claims below. Embodiments of the invention covered by this patent are defined by the claims below, not this summary. This summary is a high-level overview of various embodiments of the invention and introduces some of the concepts that are further described in the Detailed Description section below. This summary is not intended to identify key or essential features of the claimed subject matter, nor is it intended to be used in isolation to determine the scope of the claimed subject matter. The subject matter should be understood by reference to appropriate portions of the entire speci-

fication of this patent, any or all drawings, and each claim.

[0005] According to certain embodiments, a collapsible crate includes a base, a side wall, an end wall, and a swing bar assembly. The side wall extends in a longitudinal direction and is hingedly attached to the base such that the side wall is movable between an erected configuration and a collapsed configuration. The side wall may include a top edge and an inner face, and the inner face may include a guide channel extending from the top edge towards the base. The guide channel includes a first channel edge and a second channel edge opposite from the first channel edge, and a distance between the first channel edge and the second channel edge is a width of the guide channel. In some embodiments, the guide channel includes a foot portion opposite from the top edge, and the width of the foot portion of the guide channel may be greater than the width of the guide channel between the top edge and the foot portion. The end wall of the collapsible crate extends in a transverse direction and is hingedly attached to the base such that the end wall is movable between an erected configuration and a collapsed configuration. The swing bar assembly is pivotably supported on the end wall and includes a swing bar that is at least partially received within the guide channel.

[0006] According to some embodiments, a collapsible crate includes a base, a side wall, an end wall, and a swing bar assembly. The side wall extends in a longitudinal direction and is hingedly attached to the base such that the side wall is movable between an erected configuration and a collapsed configuration. The side wall includes a top edge and an inner face, and the inner face includes a guide channel having a first channel edge and a second channel edge opposite from the first channel edge. In certain embodiments, at least one of the first channel edge or the second channel edge includes a resting groove proximate to the top edge of the side wall. The end wall extends in a transverse direction and is hingedly attached to the base adjacent to the side wall such that the end wall is movable between an erected configuration and a collapsed configuration. The swing bar assembly is pivotably supported on the end wall and includes a swing bar that is at least partially received within the guide channel. In certain embodiments, when the end wall is in the erected configuration, the swing bar is at least partially positioned in the resting groove.

[0007] According to various embodiments, a collapsible crate includes a base, a side wall, an end wall, and a swing bar assembly. The side wall extends in a longitudinal direction and is hingedly attached to the base such that the side wall is movable between an erected configuration and a collapsed configuration. In certain embodiments, the side wall includes a top edge and an inner face, and the top edge of the side wall includes a stopper extending in a transverse direction. The end wall extends in the transverse direction and is hingedly attached to the base such that the end wall is movable between an erected configuration and a collapsed configuration. The

swing bar assembly is pivotably supported on the end wall and includes a swing bar and a first connecting arm extending from the swing bar. In various embodiments, the first connecting arm is pivotably attached to the end wall. In some embodiments, when the end wall is in the erected configuration, the stopper vertically overlaps at least a portion of the first connecting arm.

[0008] According to certain embodiments, a collapsible crate includes a base, a side wall, an end wall, and a swing bar assembly. The side wall extends in a longitudinal direction and is hingedly attached to the base such that the side wall is movable between an erected configuration and a collapsed configuration. In certain embodiments, the side wall includes a top edge, an inner face, and a locking feature proximate to the top edge. The end wall extends in a transverse direction and is hingedly attached to the base such that the end wall is movable between an erected configuration and a collapsed configuration. The swing bar assembly is pivotably supported on the end wall and includes a swing bar, a first connecting arm and a key. The swing bar includes a first end and a second end. The first connecting arm extends from the swing bar and defines a first end extension on the swing bar between the first connection arm and the first end. The key extends outwards from the first end extension, and when the end wall is in the erected configuration, the locking feature overlaps the key in the transverse direction and such that the locking feature of the side wall is between the key and the first connecting arm in the transverse direction.

[0009] Various implementations described in the present disclosure can include additional systems, methods, features, and advantages, which cannot necessarily be expressly disclosed herein but will be apparent to one of ordinary skill in the art upon examination of the following detailed description and accompanying drawings. It is intended that all such systems, methods, features, and advantages be included within the present disclosure and protected by the accompanying claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] The features and components of the following figures are illustrated to emphasize the general principles of the present disclosure. Corresponding features and components throughout the figures can be designated by matching reference characters for the sake of consistency and clarity.

FIG. 1 is a perspective view of a collapsible crate in an erected configuration according to various embodiments.

FIG. 2 is an end view of the collapsible crate of FIG. 1.

FIG. 3 is a side view of the collapsible crate of FIG. 1.

FIG. 4 is an internal side view of the collapsible crate

of FIG. 1.

FIG. 5 is a top view of the collapsible crate of FIG. 1.

FIG. 6 is a bottom view of the collapsible crate of FIG. 1.

FIG. 7 illustrates a portion of the collapsible crate of FIG. 1 taken from box 7 in FIG. 5.

FIG. 8 is a bottom view of a portion of the collapsible crate of FIG. 1.

FIG. 9 is a perspective view of a collapsible according to various embodiments.

FIG. 10 is an end view of the collapsible crate of FIG. 9.

FIG. 11 is a perspective view of the collapsible crate of FIG. 9 with a side wall removed.

FIG. 12 is a side view of a portion of the collapsible crate of FIG. 9.

FIG. 13 is a perspective view of another portion of the collapsible crate of FIG. 9.

FIG. 14 is a perspective view of another portion of the collapsible crate of FIG. 9.

FIG. 15 is a perspective view of another portion of the collapsible crate of FIG. 9.

FIG. 16 is a side view of another portion of the collapsible crate of FIG. 9.

FIG. 17 is a perspective view of another portion of the collapsible crate of FIG. 9.

FIG. 18 is a perspective view of the collapsible crate of FIG. 9 with the end walls in a collapsed configuration.

FIG. 19 illustrates a stacked assembly with two collapsible crates of FIG. 9.

FIG. 20 illustrates another stacked assembly with the collapsible crate of FIG. 9 and another crate.

DETAILED DESCRIPTION

[0011] The subject matter of embodiments of the present invention is described here with specificity to meet statutory requirements, but this description is not necessarily intended to limit the scope of the claims. The claimed subject matter may be embodied in other ways, may include different elements or steps, and may be used

in conjunction with other existing or future technologies. This description should not be interpreted as implying any particular order or arrangement among or between various steps or elements except when the order of individual steps or arrangement of elements is explicitly described. Directional references such as "up," "down," "top," "bottom," "left," "right," "front," and "back," among others are intended to refer to the orientation as illustrated and described in the figure (or figures) to which the components and directions are referencing but are not intended to imply any particular configuration.

[0012] Described herein are collapsible crates that may be used to transport various materials as desired, including but not limited to produce, manufactured articles, consumer goods, raw materials, and the like. The collapsible crates described herein may include various features that may improve the performance and usability of the crates when the crates are in an erected configuration and when in a collapsed configuration. In certain embodiments, movement from the collapsed configuration to the erected configuration may automatically put the crate in an operating condition without further input, meaning that the crate is ready to be stacked (with a similar foldable crate, a nestable crate, or other crates), receive a product, and/or otherwise used without requiring a further action such as additional manual or other input.

[0013] As one example, a collapsible crate may include a swing bar that is pivotably connected to an end wall of the crate and is also engaged with side walls of the crate. The swing bar may provide improved control of movement of the end wall between the collapsed configuration and the erected configuration. In various embodiments, in the collapsed configuration, the swing bar may be positioned proximate to a base of the crate, and in the erected configuration, the swing bar may be positioned proximate to a top of the crate opposite from the base. The swing bar may also be engaged with the side walls at various stages of movement of the end wall to provide improved stability and/or support to the crate. As one example, the swing bar may minimize or prevent the side walls from bowing inwards towards a center of the crate by engaging opposing side walls. As another example, the swing bar may optionally include a key feature that engages a corresponding locking feature on the side walls to minimize or prevent the side walls from bowing outwards. In certain embodiments, the side walls and/or the end walls of the crate may include various stoppers or other features that selectively engage the swing bar at various positions to at least temporarily hold the swing bar at various positions. As one example, the side walls may include a stopper that at least partially overlaps the swing bar when the end wall is in the erected configuration to minimize or prevent the swing bar from folding out when the crate is flipped. The swing bar may optionally include a stopper or other suitable feature that may facilitate stacking of another crate on the crate with the swing bar by engaging the other crate to position the

other crate relative to the crate with the swing bar. The particular locations of the stoppers and the number of stoppers should not be considered limiting on the disclosure. For example, one or more stoppers may be on the side wall, the end wall, and/or the swing bar assembly as desired.

[0014] As another example, the side walls of the crate may include guide channels that the swing bar engages when the crate is assembled. The guide channels may include a foot portion that optionally allows for the swing bar to be substantially parallel to the end wall when the end wall is in the collapsed configuration and optionally allows for the end wall to be substantially parallel to a plane of a base of the crate. In certain embodiments, the foot portion receiving the swing bar may provide improved stability to the crate in the collapsed configuration, and may improve the stackability of the crate with other crates or items as desired while in the collapsed configuration. In some embodiments, the guide channels may be continuous and extend towards the base from top edges of the side walls, and the guide channels may optionally be non-linear to provide improved control of the movement of the swing bar (and thus the end wall) between the collapsed configuration and the erected configuration.

[0015] The collapsible crates described herein may provide other benefits and advantages, and the aforementioned listing should not be considered limiting.

[0016] FIGS. 1-8 illustrate a collapsible crate 100 according to various embodiments. The crate 100 includes a base 102, a pair of end walls 104, a pair of side walls 106, and at least one swing bar assembly 144. The crate 100 may be constructed from various materials as desired, and in certain embodiments, the crate 100 may optionally be constructed from polymer materials. In various embodiments, the base 102, the end walls 104, and/or the side walls 106 may be solid, may include apertures or openings as desired, and/or may have other constructions as desired. When included, the apertures or openings may reduce the weight of the crate 100 and/or may allow for materials (e.g., air, water, etc.) to pass through the crate 100. Apertures or openings may also provide one or more gripping locations that a user may utilize to grip or otherwise handle the crate 100.

[0017] As illustrated in FIGS. 1, 5, and 6, for example, the base 102 includes an inner face 110 and an outer face 112. Optionally, the inner face 110 may include various features for positioning or otherwise locating an item on the base 102 including but not limited to grooves, visual patterns, or other features as desired. Optionally, and as illustrated in FIGS. 6 and 8, the outer face 112 may include one or more pockets 114 defined in the outer face 112. In certain embodiments, the pockets 114 may accommodate various devices or components that may be used with the crate 100, including but not limited to various sensors, communication circuits or devices, cameras, speakers, cellular devices, other information of things devices, or other components as desired. Optionally, and

as best illustrated in FIG. 8, at least one pocket 114 may include stoppers 116 that at least partially overlap the pocket 114 to at least temporarily contain the device within the pocket 114.

[0018] Each end wall 104 includes an inner face 124, an outer face 126, and a top edge 128. Each side wall 106 may similarly include an inner face 130, an outer face 132, and a top edge 134. Similar to the base 102, the end walls 104 and/or the side walls 106 may include pockets defined in their faces for accommodating various devices or components that may be used with the crate 100. The end walls 104 and the side walls 106 are each hingedly attached to the base 102 such that the end walls 104 and the side walls 106 may be in an erected configuration or a collapsed configuration.

[0019] In the collapsed configuration, the end walls 104 and/or the side walls 106 may at least partially overlap the base 102. In some cases, in the collapsed configuration, at least a portion of the inner face 124 of at least one of the end walls 104 and/or the inner face 130 of at least one of the side walls 106 may face (and optionally contact) the inner face 110 of the base 102. In certain embodiments, in the collapsed configuration, one of the end walls 104 and one of the side walls 106 may optionally be in an overlapping arrangement. In the collapsed configuration, the end walls 104 and/or the side walls 106 may be substantially parallel to the base plane, meaning that the walls are offset by no more than 15 degrees relative to the base plane. FIG. 16 illustrates another embodiment of a crate 900 that is substantially similar to the crate 100 and illustrates the end walls 104 in the collapsed configuration. Optionally, the end walls 104 and/or the side walls 106 may optionally include intermediate hinges such that the walls may further be folded as desired.

[0020] FIGS. 1-8 illustrate the end walls 104 and the side walls 106 in the erected configuration. In the erected configuration, the end walls 104 and the side walls 106 are substantially perpendicular to a base plane of the base 102, meaning that the walls are offset by no more than 15 degrees relative to a direction perpendicular to the base plane. As illustrated in FIG. 1 for example, in the erected configuration, the top edges 128, 134 are spaced apart from the inner face 110 of the base 102. In the erected configuration, and as illustrated in FIG. 1, for example, the base 102, the end walls 104, and the side walls 106 together define a receiving area 108. When used, materials or items to be stored or transported by the crate 100 may be received within the receiving area 108.

[0021] In certain embodiments, the side walls 106 may extend in a longitudinal direction of the crate 100, and the end walls 104 may extend in a transverse direction of the crate 100. In some embodiments, a length of the end walls 104 may be less than a length of the side walls 106, although they need not be in other embodiments. In various embodiments, and as best illustrated in FIGS. 1 and 5, the side walls 106 may at least partially overlap

the end walls 104 in the transverse direction when the crate 100 is in the erected configuration. In various embodiments, in the erected configuration, the top edges 128, 134 may be coplanar, although they need not be in other embodiments.

[0022] In some embodiments, and as best illustrated in FIGS. 1 and 2, the crate 100 may include a fastening mechanism 118 associated with each end wall 104 that selectively locks the end walls 104 with the adjacent side walls 106. The fastening mechanism 118 may include an actuator 120 and a pair of catch elements 122 that are selectively actuated by the actuator 120 to engage or disengage the side walls 106. In some cases, the actuator 120 may be a handle that is manually operated to cause the catch elements 122 to engage or disengage the side walls 106. In some embodiments, the actuator 120 may be selectively actuated in the vertical direction to selectively actuate the catch elements 122 in the horizontal direction. In certain embodiments, the actuator 120 may be displaced from an initial position in either of an upward vertical motion or a downward vertical motion, and mechanical linkages may displace the catch elements 122 in the horizontal direction from an engagement position to release the engagement. In some embodiments, the bidirectional actuation to release locking of the crate walls provides added versatility and convenience in the day-to-day usage of the crates described herein.

[0023] Referring to FIGS. 1 and 4, in certain embodiments, the inner face 130 of each side wall 106 includes at least one guide channel. In the embodiment of FIGS. 1-8, the inner face 130 of each side wall 106 includes two guide channels 129A-B. In embodiments with two guide channels 129A-B, the guide channels 129A-B may be mirrored about the vertical axis; however, in other embodiments, the guide channels 129A-B need not be mirrored, and one guide channel 129A may have a shape, configuration, and/or other features that are different from the other guide channel 129B.

[0024] The following description will refer to the guide channel 129A, but the description is equally applicable to the guide channel 129B. As best illustrated in FIG. 4, the guide channel 129A extends from the top edge 134 of the side wall 106 towards the base 102. In some embodiments, the guide channel 129A includes a foot portion 140 that is proximate to the base 102, and the guide channel 129A may extend and be defined continuously on the inner face 130 from the top edge 134 to the foot portion 140. In certain embodiments, and as best illustrated in FIGS. 1 and 4, the guide channel 129A has a non-linear profile between the top edge 134 and the foot portion 140 in the longitudinal direction. In the embodiment of FIGS. 1-8, the guide channel 129A has an arcuate profile. In some cases, the guide channel 129A with the non-linear profile, such as the arcuate profile, may provide improved control and movement of a swing bar 146 received within the guide channel 129A by controlling the rate and direction of movement of the swing bar 146 from the erected configuration to the collapsed configuration.

ration. In other embodiments, and as illustrated in FIGS. 9-20, a guide channel may have a generally linear profile.

[0025] The guide channel 129A includes a first channel edge 136 and a second channel edge 138 opposite from the first channel edge 136, and a distance between the first channel edge 136 and the second channel edge 138 is a width of the guide channel 129A. In various embodiments, the first channel edge 136 may be the edge of the guide channel 129A that is more proximate to the end wall 104 compared to the second channel edge 138. In certain embodiments, the width of the guide channel 129A at the top edge 134 may be greater than, less than, or equal to the width of the guide channel 129A between the top edge 134 and the foot portion 140. Likewise, the width of the guide channel 129A at the top edge 134 may be greater than, less than, or equal to the width of the guide channel 129A at the foot portion 140. Optionally, and as best illustrated in FIG. 4, the width of the guide channel 129A at the foot portion 140 is greater than the width of the guide channel 129A between the top edge 134 and the foot portion 140. In some cases, the width of the guide channel 129A at the foot portion 140 may be a greatest width of the guide channel 129A, although it need not be in other embodiments. When included, the foot portion 140 with the increased width may allow for the swing bar 146 to be substantially flat when the end wall 104 is in the collapsed configuration and/or may allow for the swing bar 146 to be positioned at a maximum distance away from the top edge 128 of the end wall 104 when the end wall 104 is in the collapsed configuration. In certain embodiments, the foot portion 140 with the increased width may facilitate positioning of the end wall 104 in the collapsed configuration such that the end wall 104 is substantially parallel to the base plane of the base 102.

[0026] In some optional embodiments, and as best illustrated in FIGS. 1 and 4, the first channel edge 136 of the guide channel 129A includes a resting groove 142. The resting groove 142 may selectively receive at least a portion of the swing bar 146 when the end wall 104 is in the erected configuration. The resting groove 142 may provide improved support to the swing bar 146 when the end wall 104 is in the erected configuration. In particular, the resting groove 142 may provide improved support to the swing bar 146 for vertical loads that may act on the swing bar 146 (e.g., due to stacking of multiple crates) and may minimize inadvertent movement of the swing bar 146 along the guide channel 129A towards the foot portion 140. In other words, some amount of force may be required to dislodge the swing bar 146 from the resting groove 142 such that the swing bar 146 may move within the guide channel 129A towards the foot portion 140.

[0027] As previously mentioned, the crate 100 includes at least one swing bar assembly 144 for at least one of the end walls 104. In certain embodiments, each end wall 104 may include a swing bar assembly 144. In such examples, one swing bar assembly 144 may be selectively engaged with the guide channel 129A, and the other

swing bar assembly 144 may be selectively engaged with the guide channel 129B. In some cases, each swing bar assembly 144 may be a separate component that is connected to the corresponding end wall 104; however, in other embodiments, a swing bar assembly 144 and end wall 104 may be integrally or monolithically formed as a single component. In some embodiments where the swing bar assembly 144 and end wall 104 are integrally formed, the swing bar assembly 144 may be movable relative to the end wall via various suitable mechanisms as desired, including but not limited to a living hinge.

[0028] As best illustrated in FIGS. 1, 5, and 7, the swing bar assemblies 144 may each include the swing bar 146 and a pair of connecting arms 148A-B. In some cases, the swing bar 146 and the connecting arms 148A-B are separate components that are attached together via various suitable joining or fastening mechanisms as desired. In other embodiments, the swing bar 146 and the connecting arms 148A-B are integrally or monolithically formed as a single component. In addition, the particular structures illustrated as the connecting arms 148A-B should not be considered limiting, as the connecting arms 148A-B may be various structures or devices as desired, including but not limited to flaps, shelves, rods, pins, combinations thereof, or other devices or structures as desired. Moreover, the number of connecting arms 148A-B should not be considered limiting on the disclosure, and each swing bar assembly 144 may include a single connecting arm or more than two connecting arms as desired. In certain embodiments, the number and/or type of connecting arms of one swing bar assembly 144 need not be the same as the number and/or type of connecting arms of the other swing bar assembly 144.

[0029] The swing bar 146 includes a first end 150 and a second end 152 opposite from the first end 150. In certain aspects, a first connecting arm 148A extends from the swing bar 146 proximate to the first end 150 and a second connecting arm 148B extends from the swing bar 146 proximate to the second end 152. A portion of the swing bar 146 between the first connecting arm 148A and the first end 150 may be a first end extension 154 of the swing bar 146, and a portion of the swing bar 146 between the second connecting arm 148B and the second end 152 may be a second end extension 156 of the swing bar 146. In certain embodiments, the end extensions 154, 156 of the swing bar 146 are received within the guide channels 129A-B of the side walls 106.

[0030] Optionally, the swing bar 146 may include a key 158 proximate to each of the first end 150 and the second end 152. FIG. 7 illustrates the key 158 associated with the first end 150. The key 158 extends outwards from the swing bar 146. In certain embodiments, the key 158 optionally extends outwards from the swing bar 146 in a same direction as the connecting arms 148A-B (see FIG. 4). In other embodiments, the key 158 need not extend in the same direction as the connecting arms 148A-B (see FIGS. 9-20). When the key 158 is included, the side walls 106 may include a corresponding locking feature

160 that selectively engages the key 158 at various locations along the side wall 106. In the embodiment illustrated in FIG. 7, the locking feature 160 is a locking slot 162 that selectively receives the key 158 when the swing bar 146 is in the guide channel 129 proximate to the top edge 134 of the side wall 106. As illustrated in FIG. 7, the locking feature 160 at least partially overlaps the key 158 in the transverse direction such that a portion of the side wall 106 (e.g., the locking feature 160) is between the key 158 and another portion of the swing bar 146 such as the opposing end, the adjacent connecting arm, etc. In other embodiments, the locking feature 160 may be at other locations as desired and may be other features suitable for engaging the key 158 as desired. As an example, FIGS. 9-20 illustrate a locking aperture 972 as the locking feature 160. The key 158 and locking feature 160 may provide improved support to the side walls 106 and may minimize or prevent the side walls 106 from bowing outwards.

[0031] In some optional embodiments, the swing bar 146 may include a stopper 164 extending outwards from the swing bar 146. In certain embodiments, another crate may be stacked on top of the crate 100, and the stopper 164 may selectively engage the other crate to position the other crate relative to the crate 100. The engagement between the stopper 164 and the crate stacked on top of the crate 100 may improve the stability of the stack of crates. FIGS. 19 and 20 illustrate the stopper 164 engaged with various crates.

[0032] The connecting arms 148A-B extend from the swing bar 146 and are pivotably attached to the end wall 104 such that the swing bar 146 is rotatable or pivotable relative to the end wall 104. The connecting arms 148A-B pivotably attached to the end wall 104 may allow for the swing bar 146 to be at various angular positions relative to the end wall 104 while the end wall 104 is moved from the erected configuration to the collapsed configuration (or vice versa) and may allow for the swing bar 146 to move along the guide channels 129A-B of the side walls 106. In various aspects, the locations at which the connecting arms 148A-B are pivotably attached to the end wall 104 are fixed while allowing for pivoting and rotation of the swing bar 146 relative to the end wall 104. In certain embodiments, the connecting arms 148A-B have a fixed length, although the length need not be fixed in other embodiments.

[0033] Optionally, and as best illustrated in FIG. 7, the side wall 106 may include a stopper 168 at the top edge 134 that at least partially overlaps the adjacent connecting arms 148A-B in the vertical direction. In some embodiments, the stopper 168 may minimize or prevent inadvertent rotation of the swing bar assembly 144 beyond the top edge 134. As a non-limiting example, the stopper 168 may minimize or prevent rotation of the swing bar assembly 144 beyond the top edge 134 when the crate 100 is in an upside down configuration. In some cases, a force may be applied to the swing bar assembly 144 such that the swing bar assembly 144 can rotate beyond

the top edge 134 (see, e.g., FIG. 16). Optionally, the side wall 106 may include an end stopper 170 that selectively engages the swing bar assembly 144 when the swing bar assembly 144 is rotated beyond the top edge 134. In certain aspects, the end stopper 170 may limit or prevent the swing bar assembly 144 from rotating beyond the ends of the crate 100 in the longitudinal direction when the crate 100 is in the erected configuration.

[0034] FIGS. 9-20 illustrate another crate 900 according to various embodiments. In certain embodiments, the crate 900 may be substantially similar to the crate 100 except as noted below.

[0035] As best illustrated in FIGS. 9, 11, and 18, for example, compared to the guide channels 129A-B of the crate 100, guide channels 929A-B of the crate 900 have a more linear profile. In addition, a foot portion 940 of the guide channels 929A-B does not have an increased width compared to the foot portion 140 of the guide channels 129A-B, and a width of the guide channels 929A-B at the top edge 134 is a greatest width of the guide channels 929A-B.

[0036] Similar to the crate 100, the swing bar assembly 144 of the crate 900 includes the keys 158 and the side walls 106 include the locking features 160. However, compared to the crate 100 and as best illustrated in FIGS. 14 and 15, the keys 158 of the crate 900 extend outwards from the swing bar 146 in a direction that is different from the direction of the connecting arms 148A-B. Compared to the crate 100 and as best illustrated in FIG. 15, the locking features 160 of the crate 900 are locking apertures 972 defined in the first channel edge 136.

[0037] Compared to the crate 100 and as best illustrated in FIGS. 14 and 15, the crate 900 also includes locating features 974, 976 on the swing bar 146 and side walls 106, respectively. When included, the locating features 974, 976 may at least temporarily position the swing bar 146 relative to the side walls 106, and some amount of force may be required to disengage the locating features 974, 976 such that the swing bar 146 can be moved. In the embodiment illustrated in FIGS. 14 and 15, the locating feature 974 is a pin 978 and the locating feature 976 is detent 980. In other embodiments, the pin 978 and the detent 980 may be switched (e.g., the locating feature 974 may be the detent 980), and in further embodiments various other suitable features may be used as the locating features 974, 976 as desired.

[0038] The crates described herein may allow for various stacking configurations as desired and may allow for dissimilar crates to be stacked. FIG. 19 illustrates an example of a stack 1901 with two crates 900, and FIG. 20 illustrates an example of a stack 2001 that includes the crate 900 with another type of crate 2003 stacked on the crate 900. In certain aspects, the stopper 164 may be used to position the top crates relative to the bottom crates.

[0039] A method of assembling the crates described herein may include moving the side walls from the collapsed configuration to the erected configuration and/or

moving the end walls from the collapsed configuration to the erected configuration. In certain aspects, moving the end walls may move the swing bar within the guide channels of the side walls from the foot portions of the guide channels to proximate the top edges of the side walls. In some embodiments, moving the end walls to the erected configuration may include moving the swing bar within the guide channels and positioning the swing bar in the resting groove and/or engaging the key with the locking feature of the side wall. Optionally, moving the end walls to the erected configuration may include contacting the connecting arms of the swing bar assemblies with the stoppers at the top edges of the side walls. Optionally, moving the end walls and/or the side walls to the erected configuration may include moving the end walls and/or the side walls such that they are substantially perpendicular to the base plane of the base of the crate and/or such that the crate defines the receiving area.

[0040] A method of disassembling the crates described herein may optionally include disengaging the key of the swing bar assembly from the locking feature of the side wall and/or disengaging the swing bar from the resting groove. The method may include moving the end walls from the erected configuration to the collapsed configuration and/or moving the side walls from the erected configuration to the collapsed configuration. Moving the end walls to the collapsed configuration may include moving the swing bar within the guide channels and positioning the swing bar in the foot portions the guide channels. Optionally, moving the end walls and/or the side walls to the collapsed configuration may include moving the end walls and/or the side walls such that they are substantially parallel to the base plane of the base of the crate and/or such that the base of the crate is overlapped (and optionally contacted) by the end walls and/or the side walls.

Illustrations

[0041] A collection of exemplary embodiments are provided below, including at least some explicitly enumerated as "Illustrations" providing additional description of a variety of example embodiments in accordance with the concepts described herein. These illustrations are not meant to be mutually exclusive, exhaustive, or restrictive; and the disclosure not limited to these example illustrations but rather encompasses all possible modifications and variations within the scope of the issued claims and their equivalents.

Illustration 1. A collapsible crate comprising: a base; a side wall extending in a longitudinal direction and hinged to the base such that the side wall is movable between an erected configuration and a collapsed configuration, wherein the side wall comprises a top edge and an inner face, wherein the inner face comprises a guide channel extending from the top edge towards the base and comprising a first

channel edge and a second channel edge opposite from the first channel edge, wherein a distance between the first channel edge and the second channel edge is a width of the guide channel, wherein the guide channel comprises a foot portion opposite from the top edge, and wherein the width of the foot portion of the guide channel is greater than the width of the guide channel between the top edge and the foot portion; an end wall extending in a transverse direction and hinged to the base such that the end wall is movable between an erected configuration and a collapsed configuration, wherein the end wall is adjacent to the side wall; and a swing bar assembly pivotably supported on the end wall, wherein the swing bar assembly comprises a swing bar that is at least partially received within the guide channel.

Illustration 2. The collapsible crate of any preceding or subsequent illustrations or combination of illustrations, wherein the width of the guide channel at the top edge is greater than the width of the guide channel between the top edge and the foot portion or the width of the guide channel at the top edge is less than the width of the guide channel between the top edge and the foot portion.

Illustration 3. The collapsible crate of any preceding or subsequent illustrations or combination of illustrations, wherein the guide channel is non-linear between the top edge and the foot portion.

Illustration 4. The collapsible crate of any preceding or subsequent illustrations or combination of illustrations, wherein at least one of the first channel edge or the second channel edge of the guide channel further comprises a resting groove configured to receive at least a portion of the swing bar when the end wall is in the erected configuration.

Illustration 5. The collapsible crate of any preceding or subsequent illustrations or combination of illustrations, wherein the first channel edge of the guide channel is more proximate to the end wall than the second channel edge of the guide channel, and wherein the first channel edge defines a resting groove configured to selectively receive at least a portion of the swing bar.

Illustration 6. The collapsible crate of any preceding or subsequent illustrations or combination of illustrations, wherein a length of the end wall is less than a length of the side wall.

Illustration 7. The collapsible crate of any preceding or subsequent illustrations or combination of illustrations, wherein the swing bar comprises a first end and a second end, and wherein the swing bar as-

sembly further comprises: a first connecting arm; and a second connecting arm, wherein the first connecting arm and the second connecting arm are each pivotably attached to the end wall, and wherein the first connecting arm and the second connecting arm each extend from the swing bar such that a first end extension is defined on the swing bar between the first connecting arm and the first end and a second end extension is defined between the second connecting arm and the second end, and wherein at least one of the first end extension or the second end extension is received within the guide channel.

Illustration 8. The collapsible crate of any preceding or subsequent illustrations or combination of illustrations, wherein the first connecting arm and the second connecting arm are each pivotably attached to the end wall at a fixed location.

Illustration 9. The collapsible crate of any preceding or subsequent illustrations or combination of illustrations, wherein the first end extension is received within the guide channel, wherein the swing bar further comprises a key extending outwards from the first end extension, and wherein the side wall further comprises a locking feature that is configured to overlap the key in the transverse direction when the end wall is in the erected configuration and such that the locking feature of the side wall is between the key and the first connecting arm in the transverse direction.

Illustration 10. The collapsible crate of any preceding or subsequent illustrations or combination of illustrations, wherein the top edge of the side wall further comprises a stopper extending in the transverse direction, and wherein, when the end wall is in the erected configuration, the stopper vertically overlaps at least a portion of the first connecting arm or at least a portion of the second connecting arm.

Illustration 11. The collapsible crate of any preceding or subsequent illustrations or combination of illustrations, wherein, in the erected configuration, the end wall is substantially perpendicular to a plane of the base, and wherein, in the collapsed configuration, the end wall is substantially parallel to the plane of the base.

Illustration 11.a. The collapsible crate of any preceding or subsequent illustrations or combination of illustrations, wherein the swing bar assembly is monolithically formed with the end wall.

Illustration 11.b. The collapsible crate of any preceding or subsequent illustrations or combination of illustrations, wherein the swing bar assembly further comprises a stopper extending outwards from the

swing bar, wherein the stopper is configured to selectively engage and position another crate relative to the swing bar.

Illustration 11.c. The collapsible crate of any preceding or subsequent illustrations or combination of illustrations, wherein the swing bar assembly comprises at least one connecting arm connecting the swing bar with the end wall.

Illustration 11.d. The collapsible crate of any preceding or subsequent illustrations or combination of illustrations, wherein the at least one connecting arm and the swing bar are monolithically formed.

Illustration 12. A collapsible crate comprising: a base; a side wall extending in a longitudinal direction and hingedly attached to the base such that the side wall is movable between an erected configuration and a collapsed configuration, wherein the side wall comprises a top edge and an inner face, wherein the inner face comprises a guide channel comprising a first channel edge and a second channel edge opposite from the first channel edge, and wherein at least one of the first channel edge or the second channel edge comprises a resting groove proximate to the top edge of the side wall; an end wall extending in a transverse direction and hingedly attached to the base such that the end wall is movable between an erected configuration and a collapsed configuration, wherein the end wall is adjacent to the side wall; and a swing bar assembly pivotably supported on the end wall, wherein the swing bar assembly comprises a swing bar that is at least partially received within the guide channel, and wherein, when the end wall is in the erected configuration, the swing bar is at least partially positioned in the resting groove.

Illustration 13. The collapsible crate of any preceding or subsequent illustrations or combination of illustrations, wherein the guide channel extends from the top edge towards the base, wherein a distance between the first channel edge and the second channel edge is a width of the guide channel, wherein the guide channel comprises a foot portion opposite from the top edge, and wherein the width of the foot portion of the guide channel is greater than the width of the guide channel between the top edge and the foot portion.

Illustration 14. The collapsible crate of any preceding or subsequent illustrations or combination of illustrations, wherein the swing bar comprises a first end and a second end, and wherein the swing bar assembly further comprises: a first connecting arm; and a second connecting arm, wherein the first connecting arm and the second connecting arm are each

pivotably attached to the end wall, and wherein the first connecting arm and the second connecting arm each extend from the swing bar such that a first end extension is defined on the swing bar between the first connecting arm and the first end and a second end extension is defined between the second connecting arm and the second end, and wherein at least one of the first end extension or the second end extension is received within the guide channel.

Illustration 15. The collapsible crate of any preceding or subsequent illustrations or combination of illustrations, wherein the first connecting arm and the second connecting arm are each pivotably attached to the end wall at a fixed location.

Illustration 16. The collapsible crate of any preceding or subsequent illustrations or combination of illustrations, wherein the first end extension is received within the guide channel, wherein the swing bar further comprises a key extending outwards from the first end extension, and wherein the side wall further comprises a locking feature that is configured to overlap the key in the transverse direction when the end wall is in the erected configuration and such that the locking feature of the side wall is between the key and the first connecting arm in the transverse direction.

Illustration 17. The collapsible crate of any preceding or subsequent illustrations or combination of illustrations, wherein the top edge of the side wall further comprises a stopper extending in the transverse direction, and wherein, when the end wall is in the erected configuration, the stopper vertically overlaps at least a portion of the first connecting arm or at least a portion of the second connecting arm.

Illustration 18. A collapsible crate comprising: a base; a side wall extending in a longitudinal direction and hingedly attached to the base such that the side wall is movable between an erected configuration and a collapsed configuration, wherein the side wall comprises a top edge and an inner face, and wherein the top edge of the side wall further comprises a stopper extending in a transverse direction; an end wall extending in the transverse direction and hingedly attached to the base such that the end wall is movable between an erected configuration and a collapsed configuration, wherein the end wall is adjacent to the side wall; and a swing bar assembly pivotably supported on the end wall, wherein the swing bar assembly comprises: a swing bar engaged with the side wall; and a first connecting arm extending from the swing bar, wherein the first connecting arm is each pivotably attached to the end wall, and wherein, when the end wall is in the erected configuration, the stopper vertically overlaps at least a portion of

the first connecting arm.

Illustration 19. The collapsible crate of any preceding or subsequent illustrations or combination of illustrations, wherein the inner face of the side wall comprises a guide channel comprising a first channel edge and a second channel edge opposite from the first channel edge, and wherein the swing bar is at least partially received within the guide channel.

Illustration 20. The collapsible crate of any preceding or subsequent illustrations or combination of illustrations, wherein the swing bar comprises a first end and a second end, wherein the swing bar assembly comprises a second connecting arm, wherein the first connecting arm and the second connecting arm each extend from the swing bar such that a first end extension is defined on the swing bar between the first connecting arm and the first end and a second end extension is defined between the second connecting arm and the second end, and wherein at least one of the first end extension or the second end extension is received within the guide channel.

Illustration 21. The collapsible crate of any preceding or subsequent illustrations or combination of illustrations, wherein the guide channel comprises a foot portion opposite from the top edge of the side wall, wherein the guide channel is continuous from the top edge of the side wall to the foot portion.

Illustration 22. The collapsible crate of any preceding or subsequent illustrations or combination of illustrations, wherein a distance between the first channel edge and the second channel edge is a width of the guide channel, and wherein the width of the guide channel at the foot portion is greater than the width of the guide channel between the top edge and the foot portion.

Illustration 23. The collapsible crate of any preceding or subsequent illustrations or combination of illustrations, wherein: the swing bar comprises a first end and a second end; the first connecting arm and the second connecting arm each extend from the swing bar such that a first end extension is defined on the swing bar between the first connecting arm and the first end and a second end extension is defined between the second connecting arm and the second end; the swing bar further comprises a key extending outwards from the first end extension; and the side wall further comprises a locking feature that is configured to overlap the key in the transverse direction when the end wall is in the erected configuration and such that the locking feature of the side wall is between the key and the first connecting arm in the transverse direction.

Illustration 24. A collapsible crate comprising: a base; a side wall extending in a longitudinal direction and hingedly attached to the base such that the side wall is movable between an erected configuration and a collapsed configuration, wherein the side wall comprises a top edge, an inner face, and a locking feature proximate to the top edge; an end wall extending in a transverse direction and hingedly attached to the base such that the end wall is movable between an erected configuration and a collapsed configuration, wherein the end wall is adjacent to the side wall; and a swing bar assembly pivotably supported on the end wall, wherein the swing bar assembly comprises: a swing bar comprising a first end and a second end, wherein the swing bar is engaged with the side wall; a first connecting arm extending from the swing bar and defining a first end extension on the swing bar between the first connection arm and the first end; and a key extending outwards from the first end extension, wherein the first connecting arm is pivotably attached to the end wall, and wherein, when the end wall is in the erected configuration, the locking feature overlaps the key in the transverse direction and such that the locking feature of the side wall is between the key and the first connecting arm in the transverse direction.

Illustration 25. The collapsible crate of any preceding or subsequent illustrations or combination of illustrations, wherein the swing bar assembly further comprises a second connecting arm, wherein the top edge of the side wall further comprises a stopper extending in a transverse direction, and wherein, when the end wall is in the erected configuration, the stopper vertically overlaps at least a portion of the first connecting arm or at least a portion of the second connecting arm.

Illustration 26. The collapsible crate of any preceding or subsequent illustrations or combination of illustrations, wherein the inner face of the side wall comprises a guide channel comprising a first channel edge and a second channel edge opposite from the first channel edge, and wherein the swing bar is at least partially received within the guide channel.

Illustration 27. The collapsible crate of any preceding or subsequent illustrations or combination of illustrations, wherein the swing bar assembly further comprises a second connecting arm, wherein the first connecting arm and the second connecting arm each extend from the swing bar such that a first end extension is defined on the swing bar between the first connecting arm and the first end and a second end extension is defined between the second connecting arm and the second end, and wherein at least one of the first end extension or the second end extension is received within the guide channel.

Illustration 28. The collapsible crate of any preceding or subsequent illustrations or combination of illustrations, wherein the guide channel comprises a foot portion opposite from the top edge of the side wall and proximate to the base, wherein the guide channel is continuous from the top edge of the side wall to the foot portion.

Illustration 29. The collapsible crate of any preceding or subsequent illustrations or combination of illustrations, wherein a distance between the first channel edge and the second channel edge is a width of the guide channel, and wherein the width of the foot portion of the guide channel is greater than the width of the guide channel between the top edge and the foot portion.

Illustration 30. The collapsible crate of any preceding or subsequent illustrations or combination of illustrations, wherein, in the erected configuration, the end wall is substantially perpendicular to a plane of the base, and wherein, in the collapsed configuration, the end wall is substantially parallel to the plane of the base.

Illustration 31. The collapsible crate of any preceding or subsequent illustrations or combination of illustrations, wherein the end wall is adjacent to the side wall.

[0042] The above-described aspects are merely possible examples of implementations, merely set forth for a clear understanding of the principles of the present disclosure. Many variations and modifications can be made to the above-described example(s) without departing substantially from the spirit and principles of the present disclosure. All such modifications and variations are intended to be included herein within the scope of the present disclosure, and all possible claims to individual aspects or combinations of elements or steps are intended to be supported by the present disclosure. Moreover, although specific terms are employed herein, as well as in the claims that follow, they are used only in a generic and descriptive sense, and not for the purposes of limiting the described invention, nor the claims that follow.

[0043] A collapsible crate includes a base, at least one side wall, at least one end wall, and at least one swing bar assembly. The side wall extends in a longitudinal direction and is hingedly attached to the base such that the side wall is movable between an erected configuration and a collapsed configuration. The top wall includes a top edge and an inner face and may include at least one of a guide channel, a stopper, and/or a locking feature. The end wall extends in a transverse direction and is hingedly attached to the base adjacent to the side wall and movable between an erected configuration and a collapsed configuration, wherein the end wall is adjacent to the side wall. The swing bar assembly is pivotably sup-

ported on the end wall and includes a swing bar that is engaged with the side wall.

Claims

1. A collapsible crate comprising:

a base;
 a side wall extending in a longitudinal direction and hingedly attached to the base such that the side wall is movable between an erected configuration and a collapsed configuration, wherein the side wall comprises a top edge and an inner face, wherein the inner face comprises a guide channel extending from the top edge towards the base and comprising a first channel edge and a second channel edge opposite from the first channel edge, wherein a distance between the first channel edge and the second channel edge is a width of the guide channel, wherein the guide channel comprises a foot portion opposite from the top edge, and wherein the width of the foot portion of the guide channel is greater than the width of the guide channel between the top edge and the foot portion;
 an end wall extending in a transverse direction and hingedly attached to the base such that the end wall is movable between an erected configuration and a collapsed configuration, wherein the end wall is adjacent to the side wall; and
 a swing bar assembly pivotably supported on the end wall, wherein the swing bar assembly comprises a swing bar that is at least partially received within the guide channel.

2. The collapsible crate of claim 1, wherein the width of the guide channel at the top edge is greater than the width of the guide channel between the top edge and the foot portion or less than the width of the guide channel between the top edge and the foot portion.

3. The collapsible crate of claim 1 or claim 2, wherein the guide channel is non-linear between the top edge and the foot portion.

4. The collapsible crate of at least one of the preceding claims, wherein at least one of the first channel edge or the second channel edge of the guide channel further comprises a resting groove configured to receive at least a portion of the swing bar when the end wall is in the erected configuration.

5. The collapsible crate of at least one of the preceding claims, wherein the first channel edge of the guide channel is more proximate to the end wall than the second channel edge of the guide channel, and wherein the first channel edge defines a resting

groove configured to selectively receive at least a portion of the swing bar.

6. The collapsible crate of at least one of the preceding claims, wherein a length of the end wall is less than a length of the side wall.

7. The collapsible crate of at least one of the preceding claims, wherein the swing bar comprises a first end and a second end, and wherein the swing bar assembly further comprises:

a first connecting arm; and
 a second connecting arm,
 wherein the first connecting arm and the second connecting arm are each pivotably attached to the end wall, and
 wherein the first connecting arm and the second connecting arm each extend from the swing bar such that a first end extension is defined on the swing bar between the first connecting arm and the first end and a second end extension is defined between the second connecting arm and the second end, and
 wherein at least one of the first end extension or the second end extension is received within the guide channel.

8. The collapsible crate of claim 7, wherein the first connecting arm and the second connecting arm are each pivotably attached to the end wall at a fixed location.

9. The collapsible crate of claim 7 or claim 8, wherein the first end extension is received within the guide channel, wherein the swing bar further comprises a key extending outwards from the first end extension, and wherein the side wall further comprises a locking feature that is configured to overlap the key in the transverse direction when the end wall is in the erected configuration and such that the locking feature of the side wall is between the key and the first connecting arm in the transverse direction.

10. The collapsible crate of at least one of the claims 7 to 9, wherein the top edge of the side wall further comprises a stopper extending in the transverse direction, and wherein, when the end wall is in the erected configuration, the stopper vertically overlaps at least a portion of the first connecting arm or at least a portion of the second connecting arm.

11. The collapsible crate of at least one of the preceding claims, wherein, in the erected configuration, the end wall is substantially perpendicular to a plane of the base, and wherein, in the collapsed configuration, the end wall is substantially parallel to the plane of the base.

12. The collapsible crate of at least one of the preceeding claims, wherein the swing bar assembly is monolithically formed with the end wall.
13. The collapsible crate of at least one of the preceeding claims, wherein the swing bar assebmly further comprises a stopper extending outwards from the swing bar, wherein the stopper is configured to selectively engage and position another crate relative to the swing bar. 5
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14. The collapsible crate of at least one of the preceeding claims, wherein the swing bar assembly comprises at least one connecting arm connecting the swing bar with the end wall. 15
15. The collapsible crate of claim 14, wherein the at least one connecting arm and the swing bar are monolithically formed. 20
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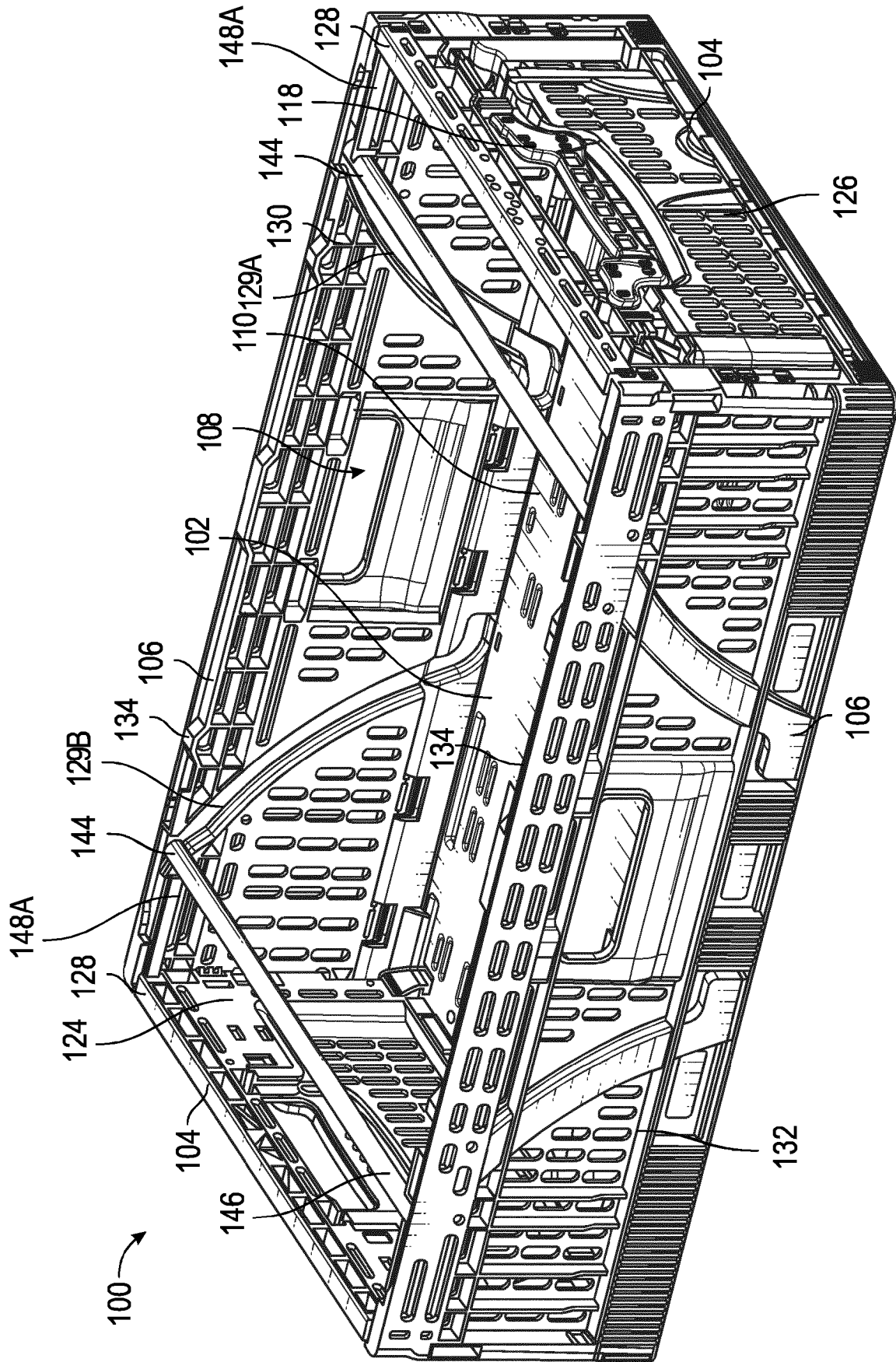


FIG. 1

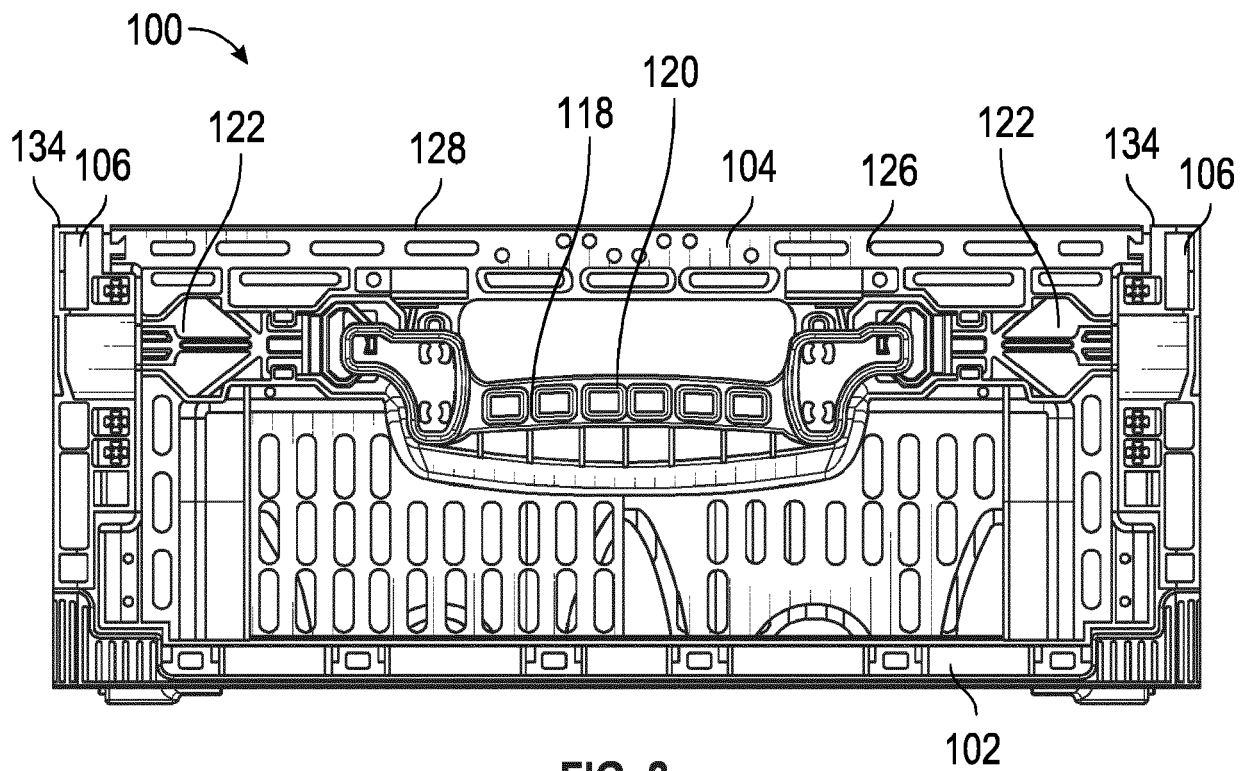


FIG. 2

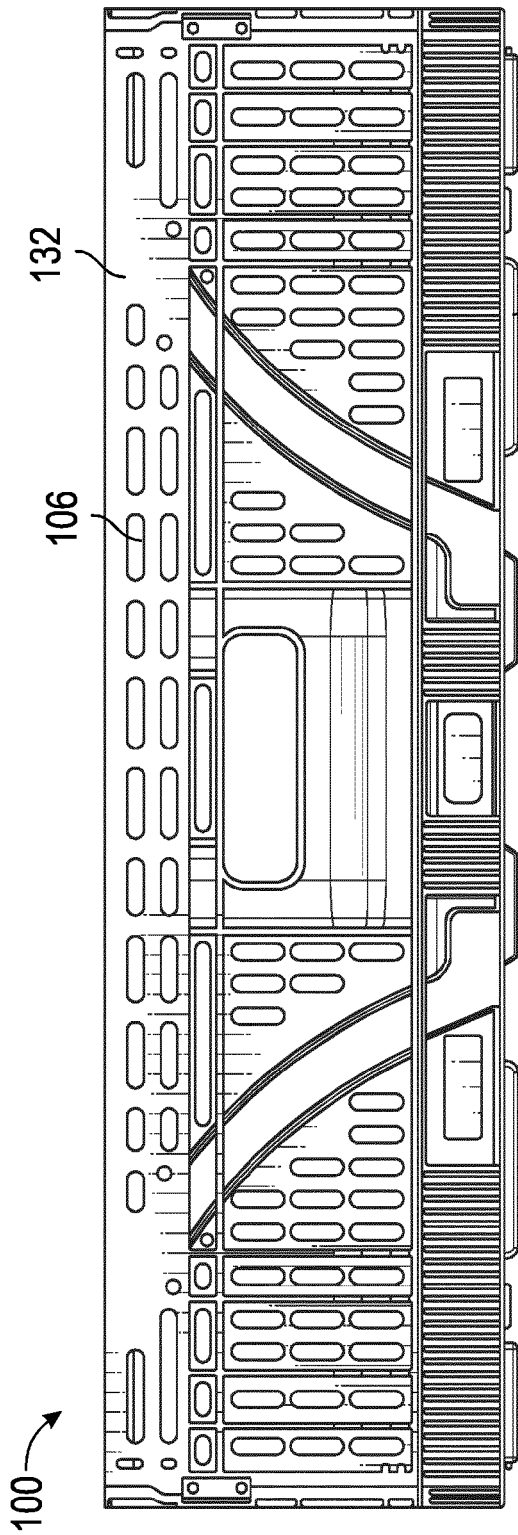


FIG. 3

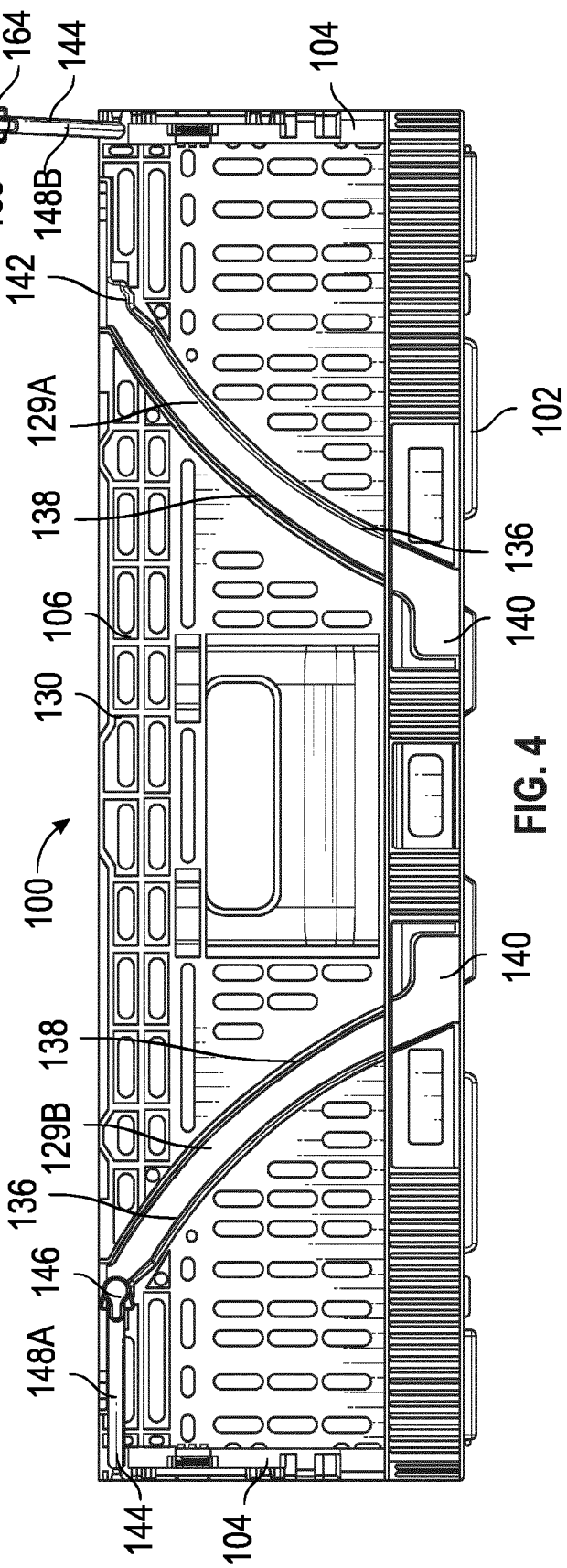


FIG. 4

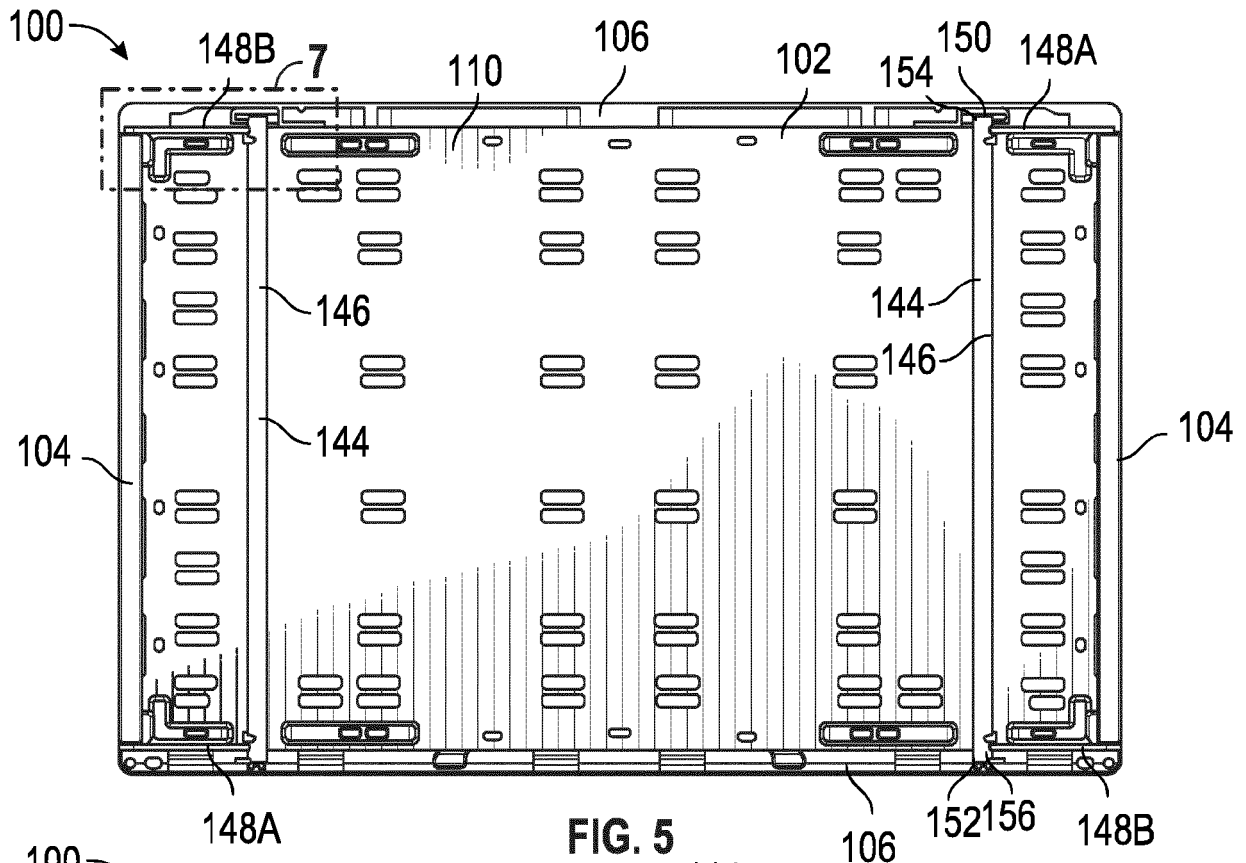


FIG. 5

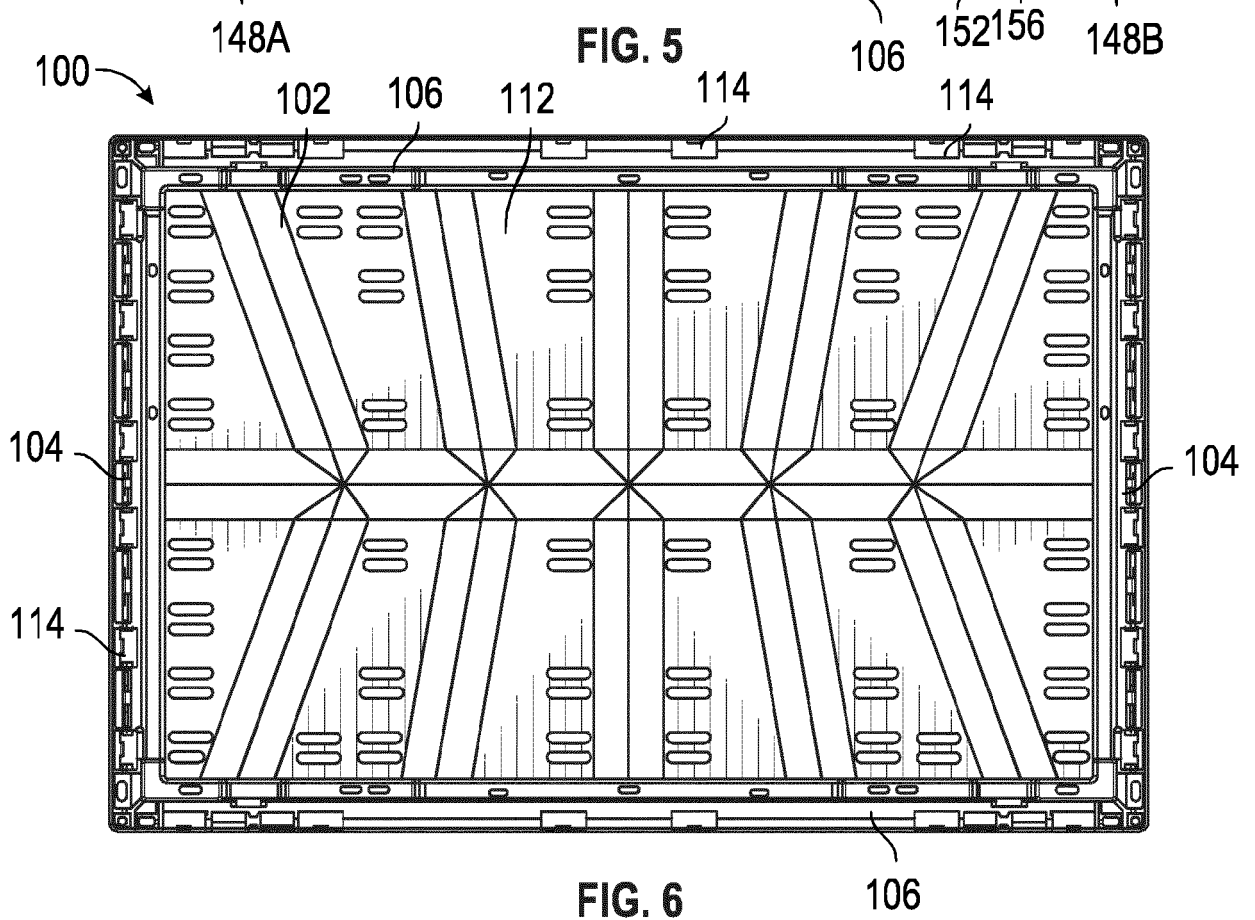


FIG. 6

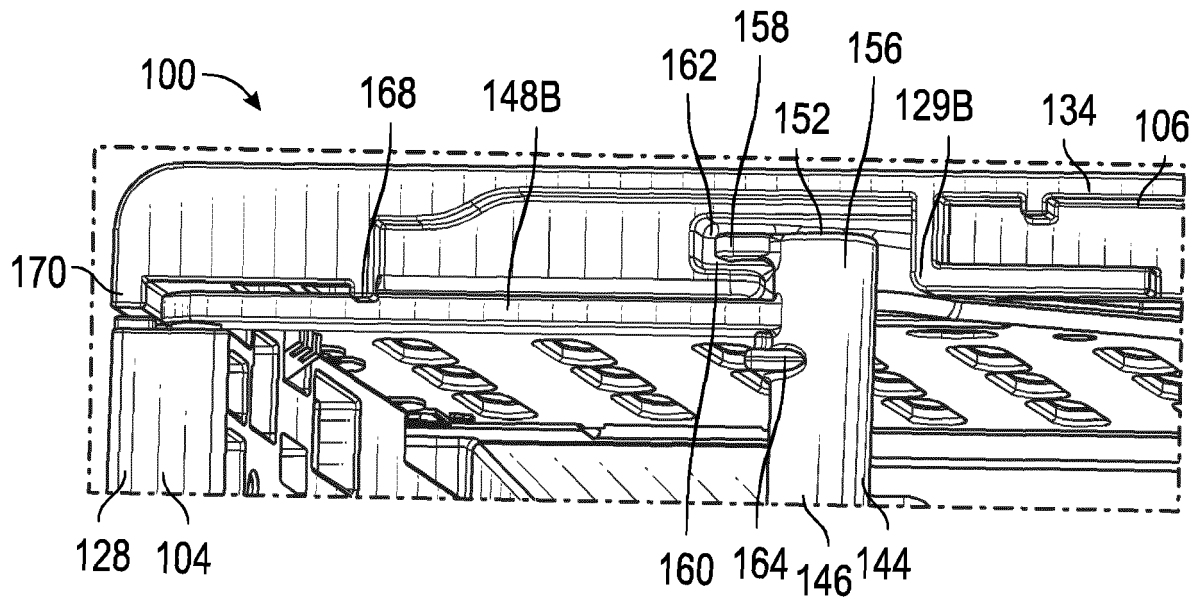


FIG. 7

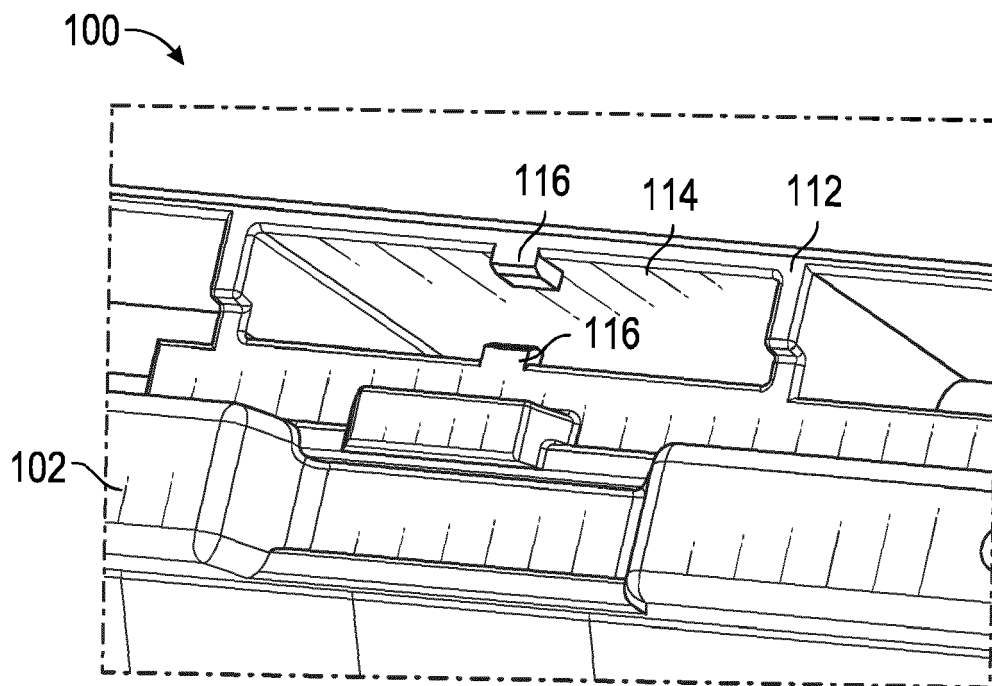


FIG. 8

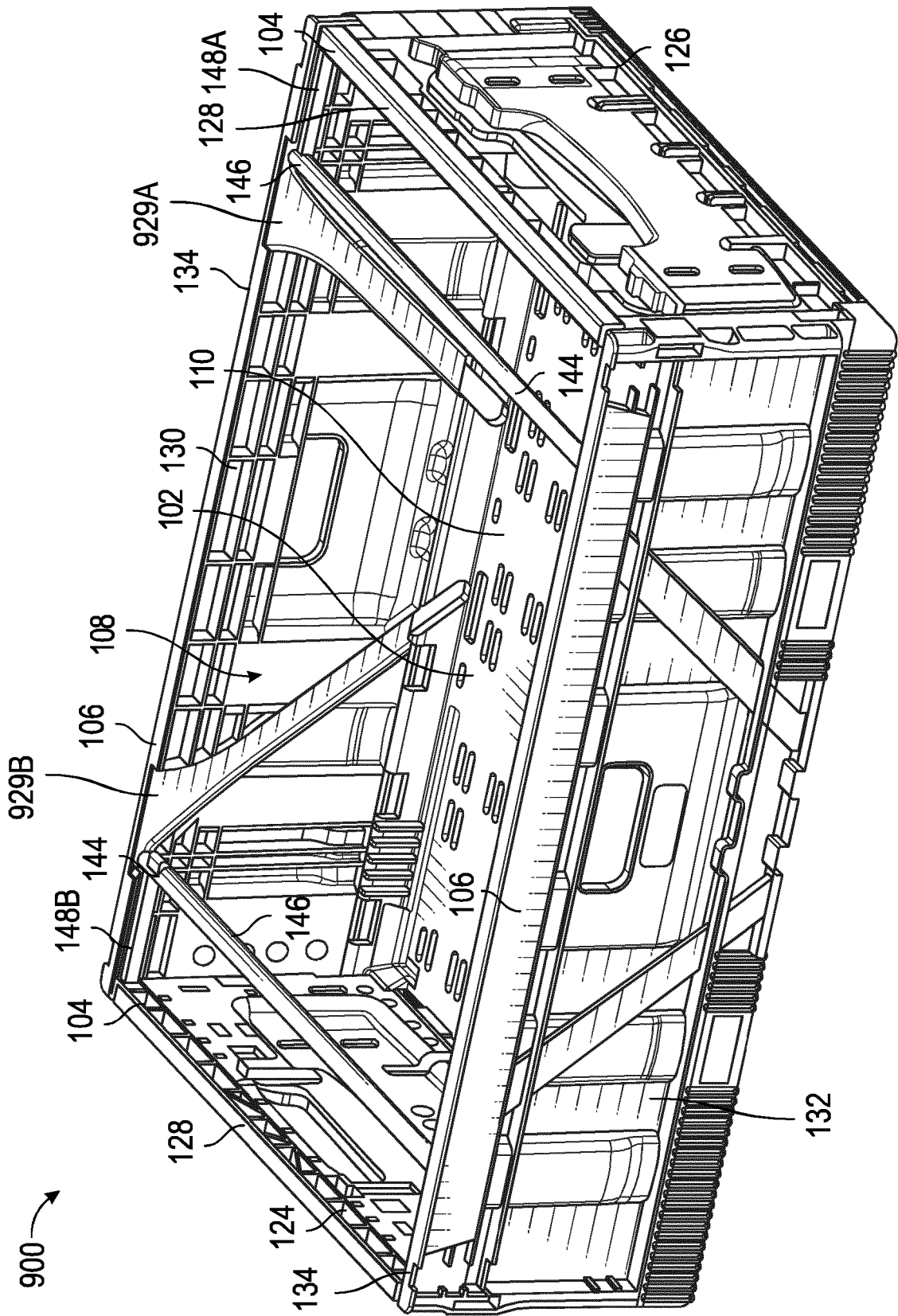


FIG. 9

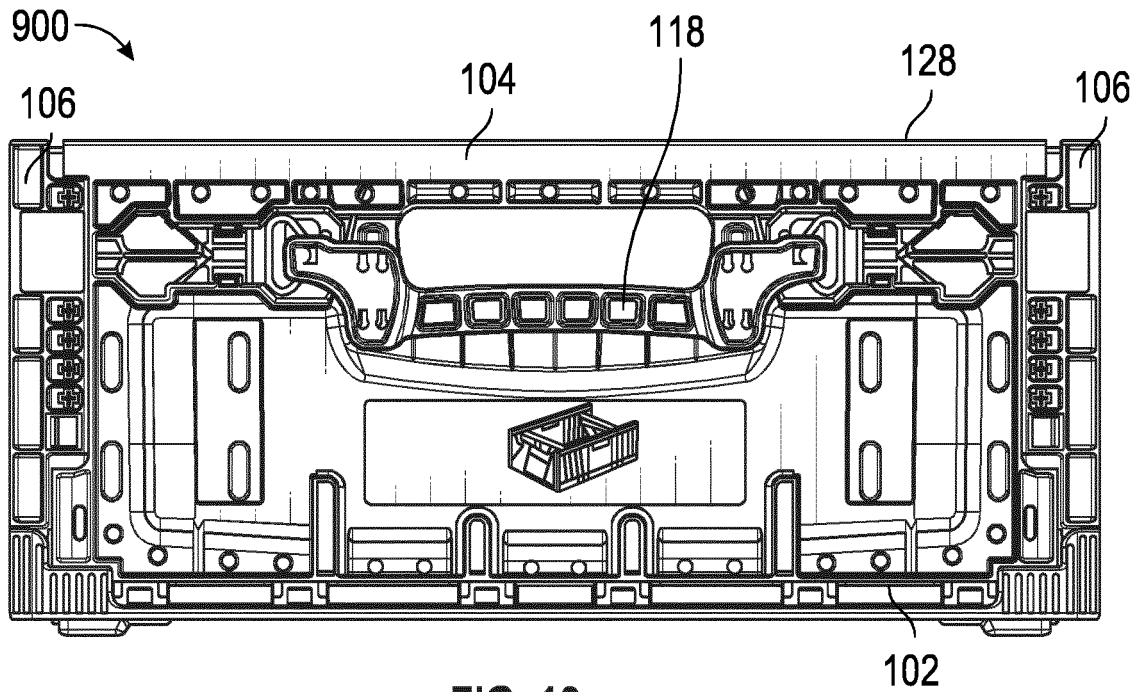


FIG. 10

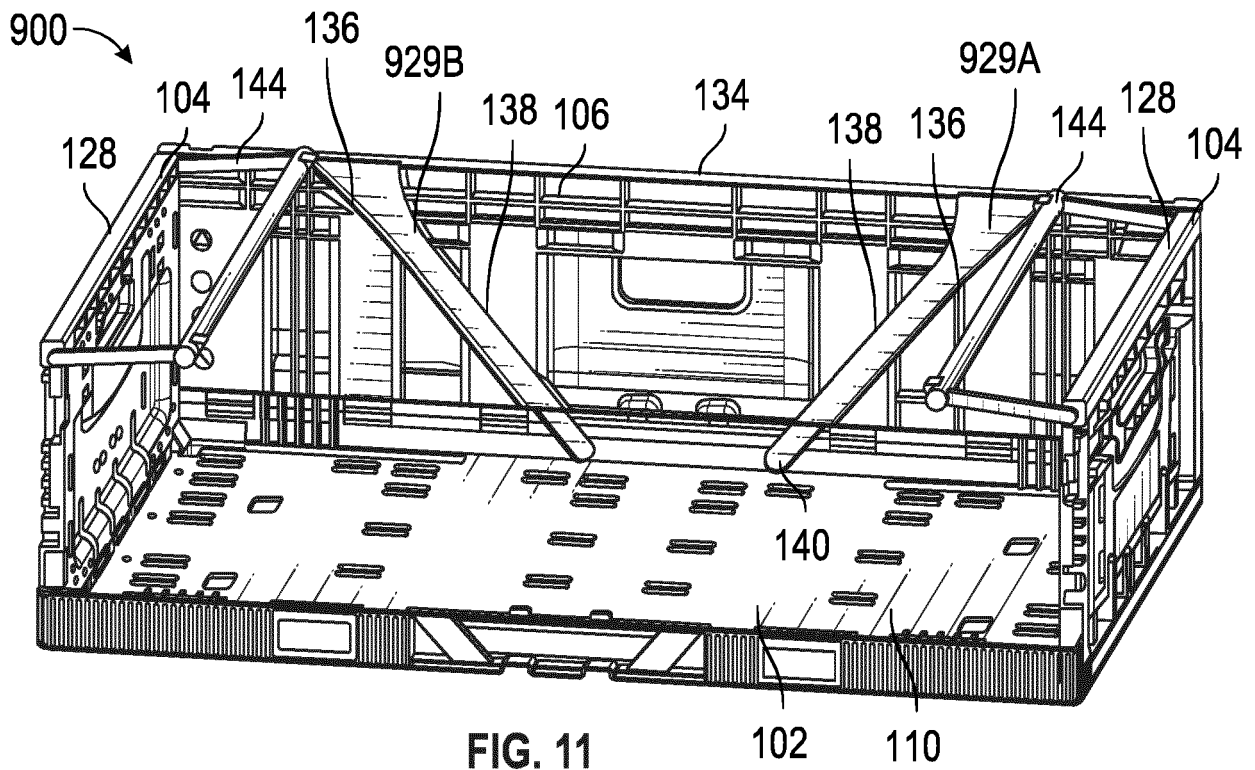


FIG. 11

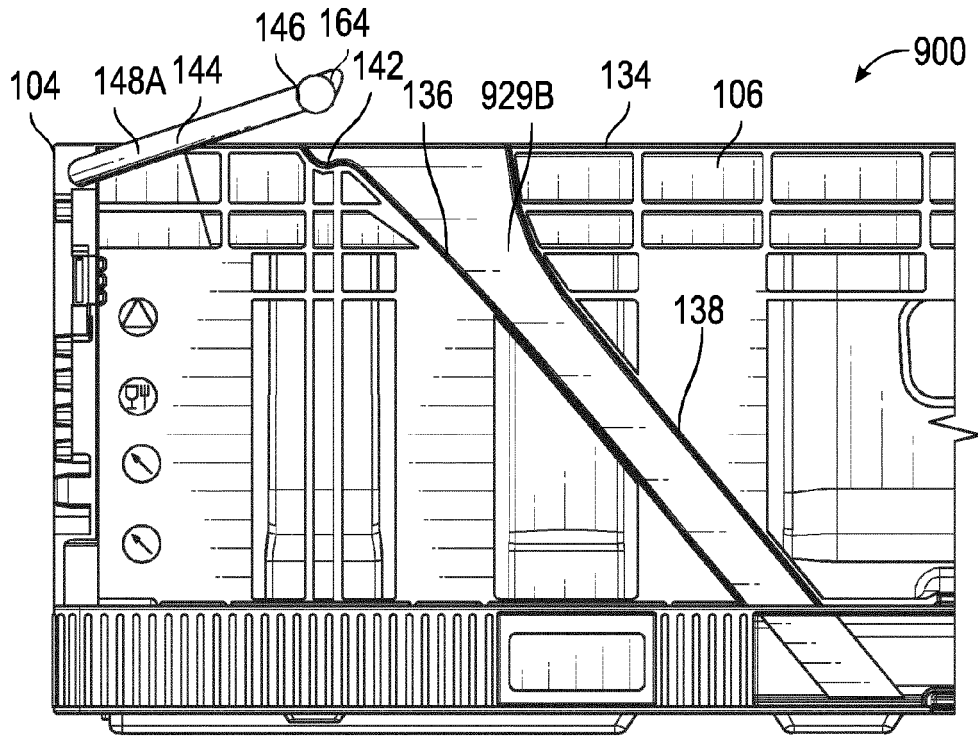


FIG. 12

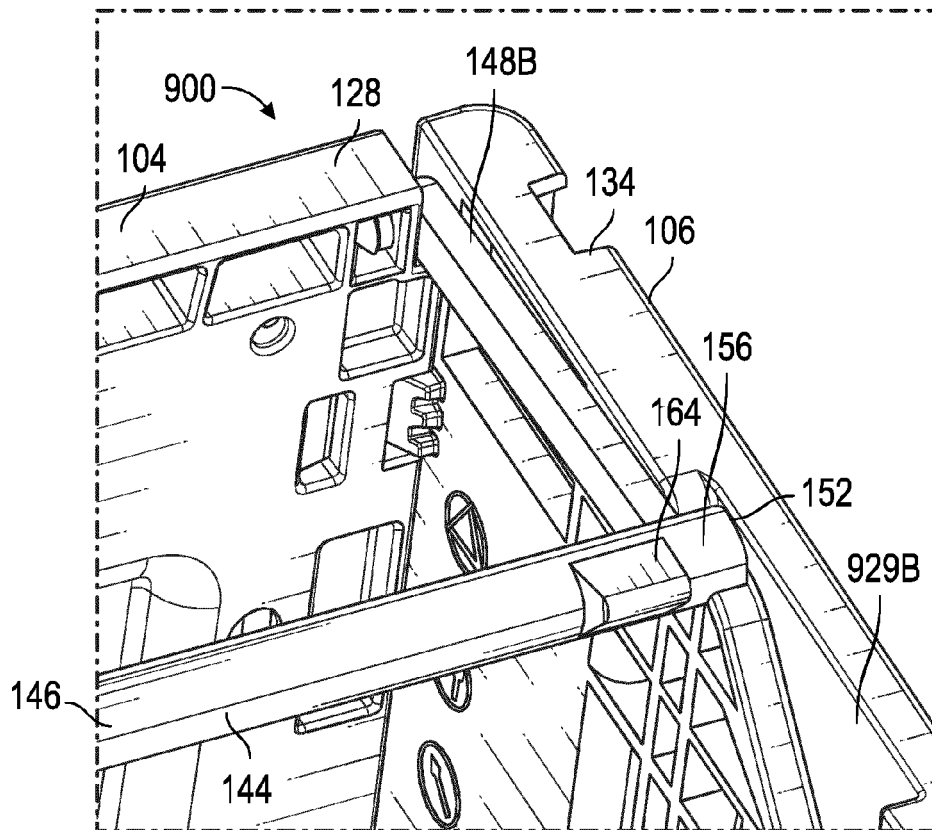


FIG. 13

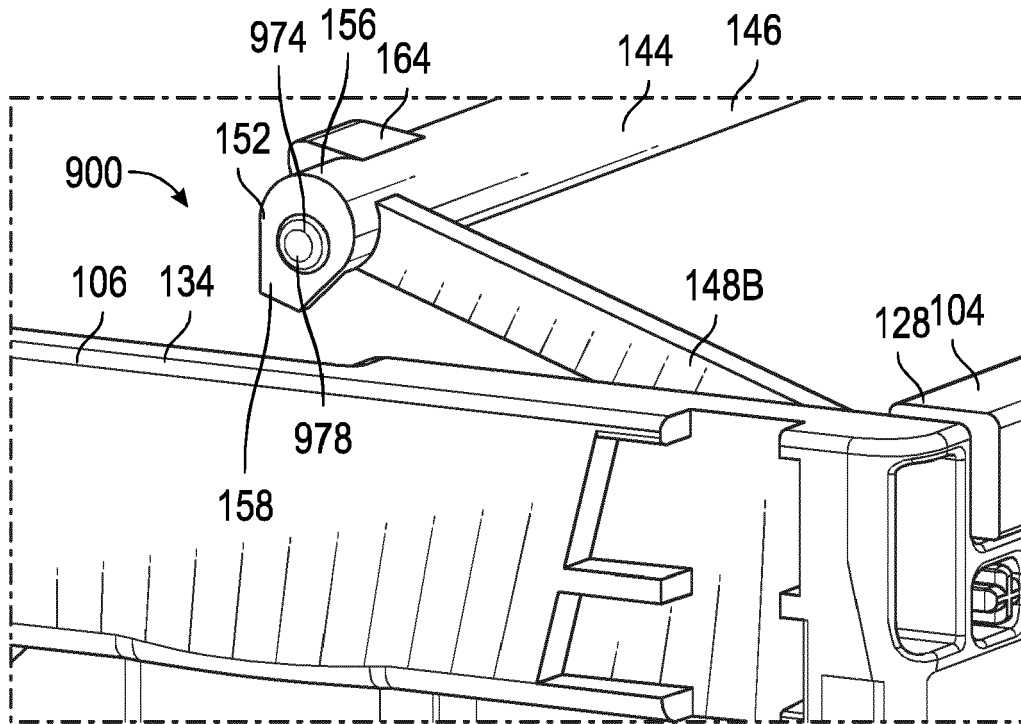


FIG. 14

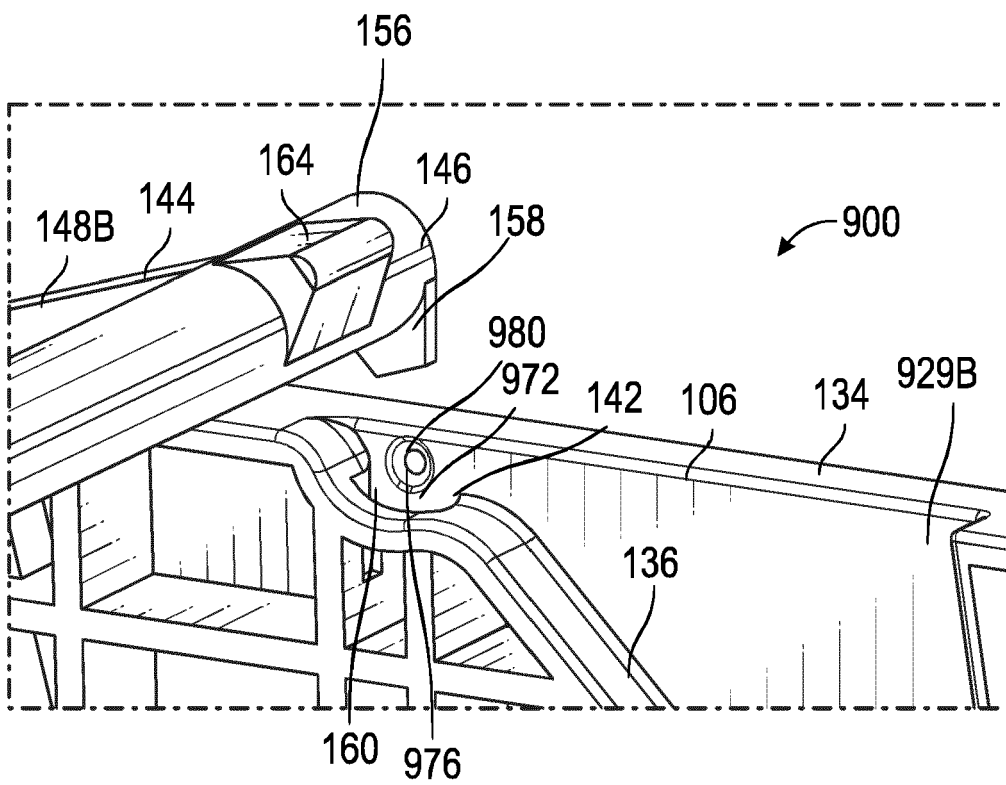


FIG. 15

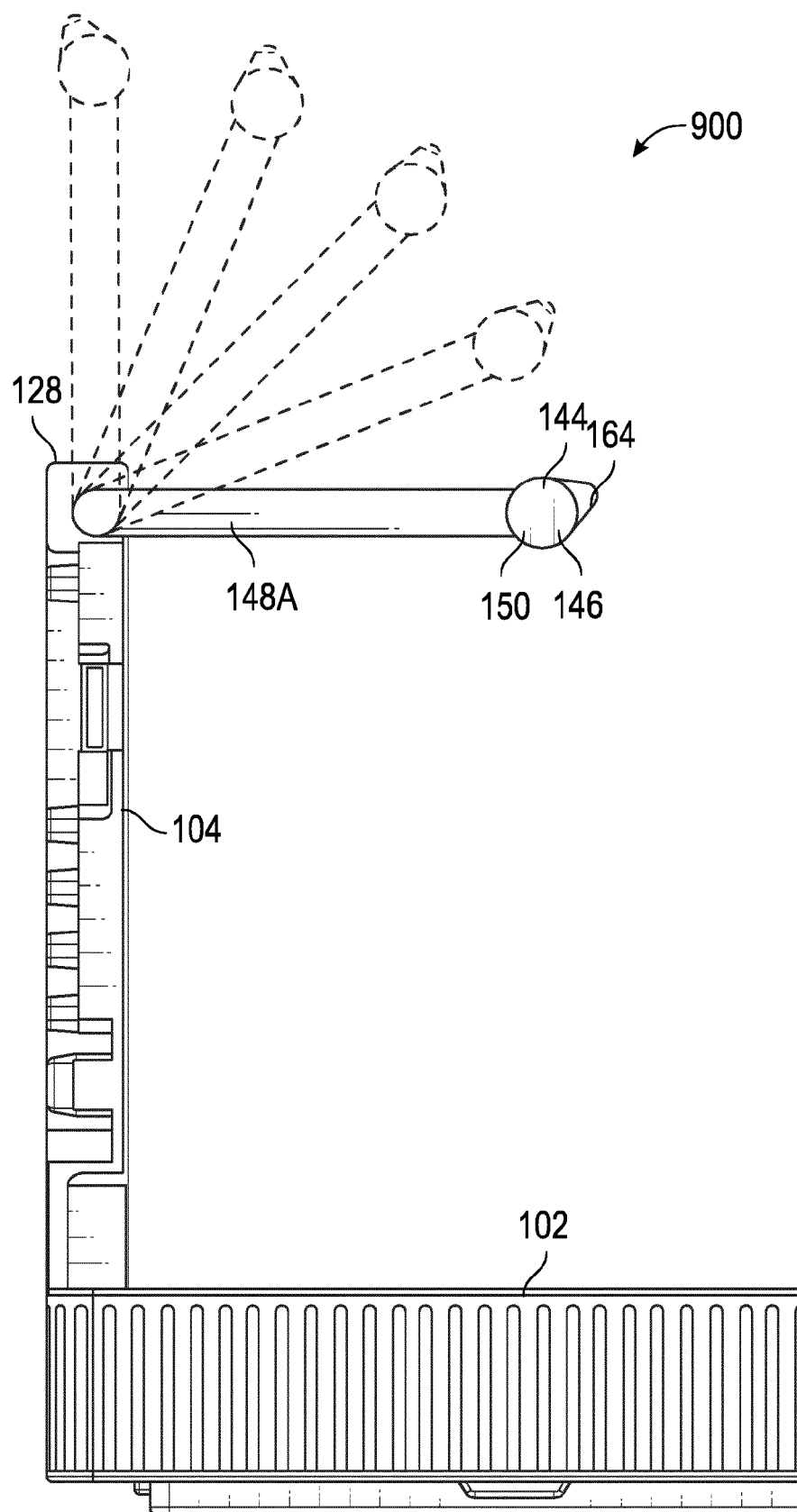


FIG. 16

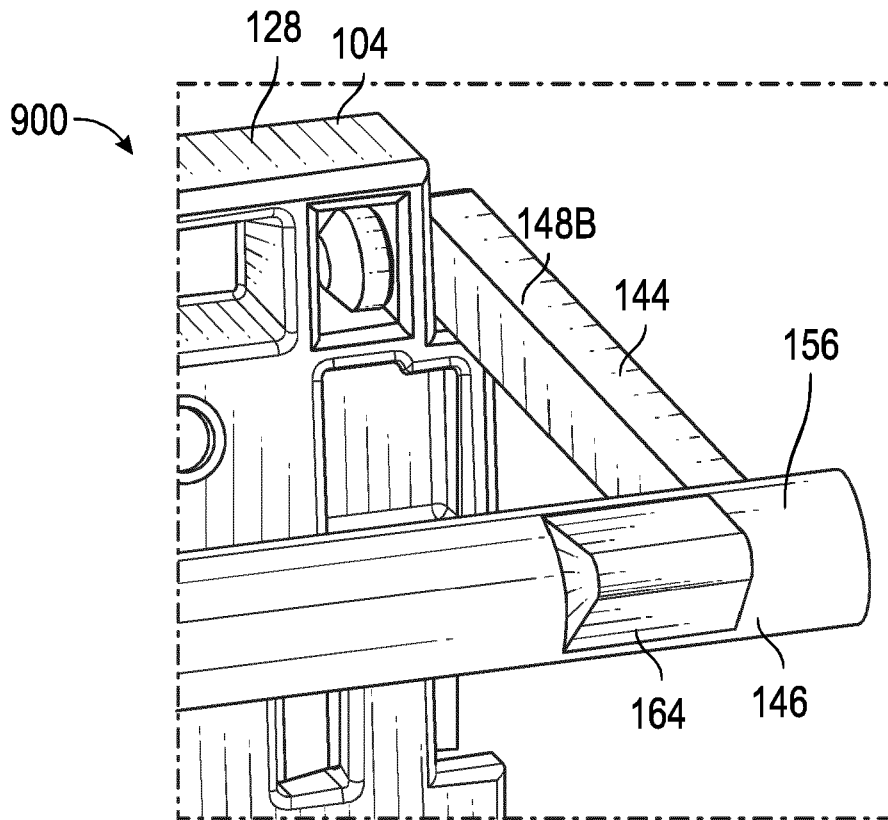


FIG. 17

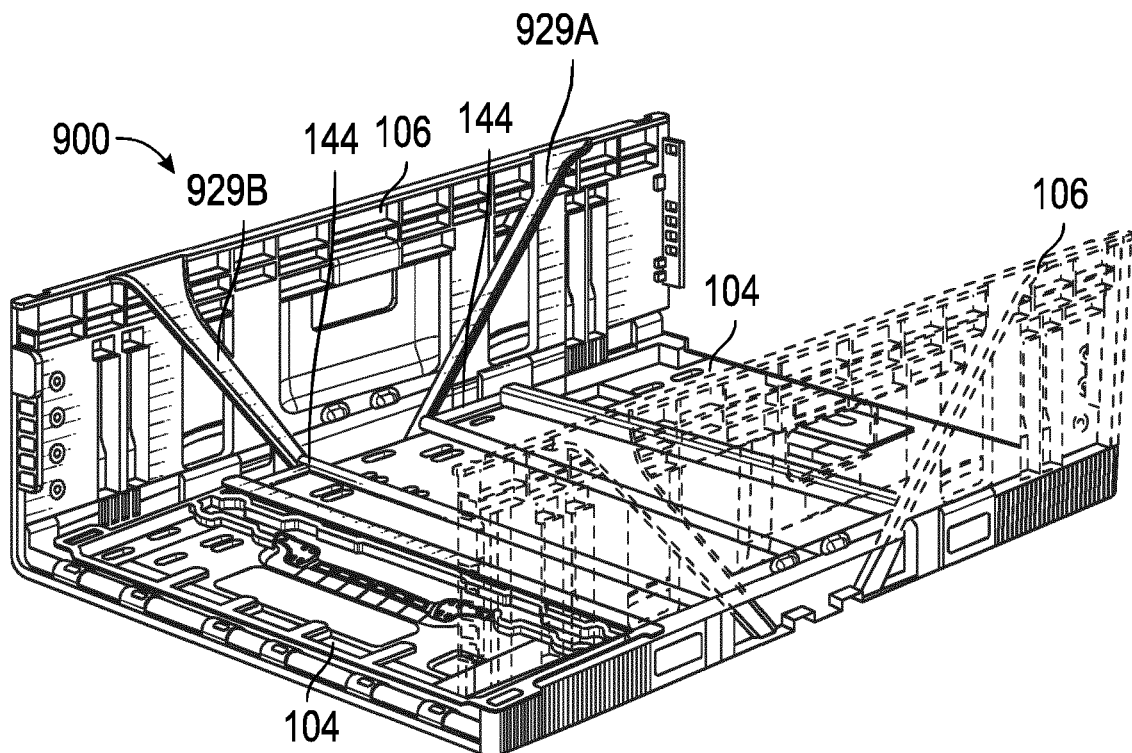
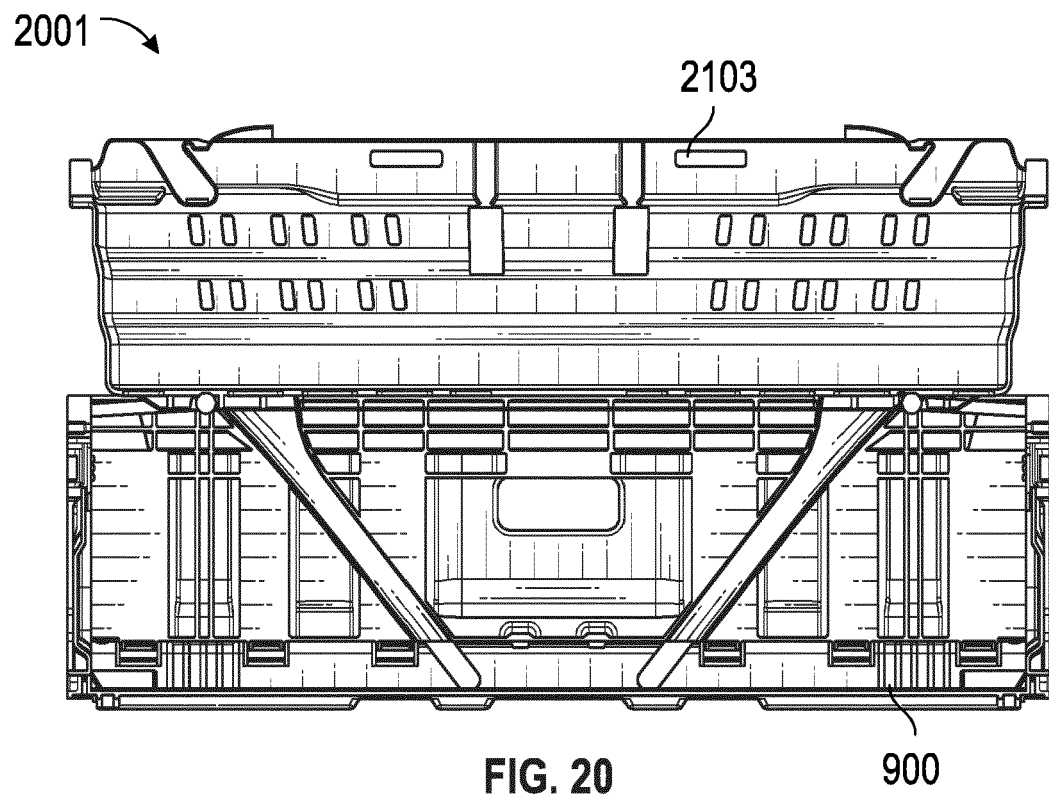
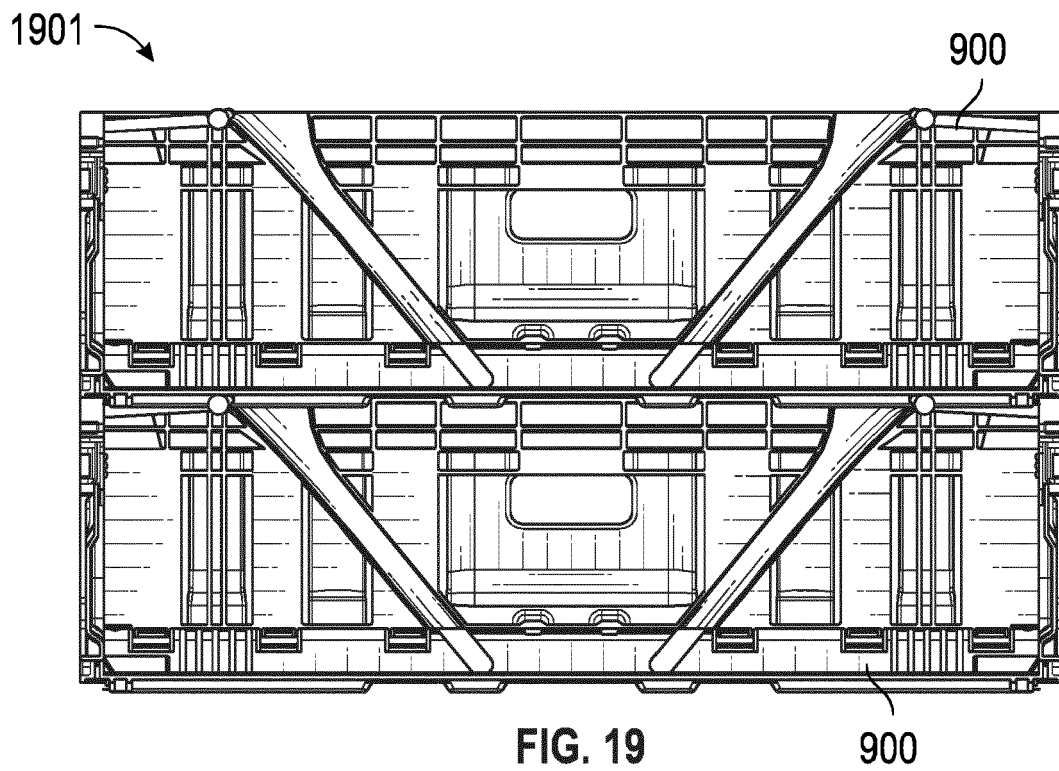


FIG. 18





EUROPEAN SEARCH REPORT

Application Number
EP 21 16 4118

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 2 145 829 A1 (REHRIG PACIFIC CO [US]) 20 January 2010 (2010-01-20)	1-8, 11-15	INV. B65D6/18 B65D21/06
Y	* paragraphs [0015] - [0020]; figures 1-22 *	9	
Y	----- WO 2011/071786 A2 (PLASGAD PLASTIC PRODUCTS ACS LTD [IL]; KANTOR ISAAK [IL] ET AL.) 16 June 2011 (2011-06-16) * page 5, last paragraph - page 6, paragraph 1; figures 1-7G *	9	
A	----- US 2007/095692 A1 (APPS WILLIAM P [US]) 3 May 2007 (2007-05-03) * paragraphs [0022] - [0025]; figures 1-11 *	1-15	
A	----- GB 2 463 374 A (REHRIG PACIFIC CO [US]) 17 March 2010 (2010-03-17) * page 4, line 25 - page 5, line 23; figures 1-22 *	1-15	
			TECHNICAL FIELDS SEARCHED (IPC)
			B65D
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 6 September 2021	Examiner Grondin, David
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 21 16 4118

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

06-09-2021

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