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(71) Applicant: **Techtronic Cordless GP**  
**Anderson, SC 29621 (US)**

(72) Inventor: **YEOMANS, Kyle B.**  
**Anderson, 29621 (US)**

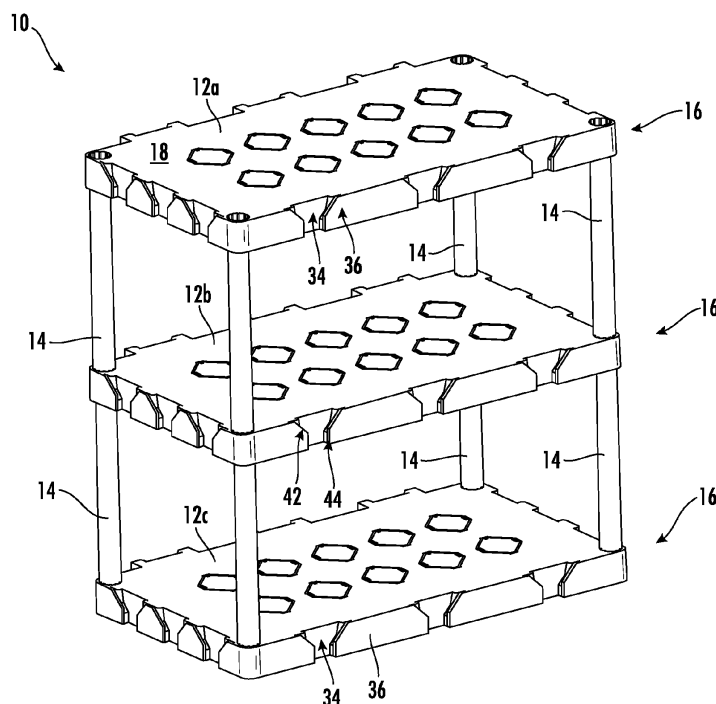
(74) Representative: **Meissner Bolte Partnerschaft**  
**mbB**  
**Widenmayerstrasse 47**  
**80538 München (DE)**

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### (54) MODULAR SHELVING UNIT

(57) A modular shelving unit and system are provided. A modular shelving unit includes a first shelf having a top surface, a plurality of sides surrounding the top surface, each side having a side surface perpendicular to the top surface. The modular shelving unit includes a

plurality of frame members coupled to the first shelf. The first shelf includes at least one first mount interface on one of the plurality of sides, wherein the first mount interface is recessed from the side surface.



**FIG. 1**

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## Description

### CROSS-REFERENCE TO RELATED APPLICATIONS

**[0001]** The present application claims priority to U.S. Provisional Patent Application No. 63/348,676 filed on June 3, 2022, the disclosure of which is incorporated by reference herein in its entirety

### FIELD

**[0002]** The present disclosure relates generally to a shelving unit, and more particularly to a modular shelving unit.

### BACKGROUND

**[0003]** Modular storage systems and accessories thereof allow users to create customized solutions for organizing their homes, garages, and other spaces. For example, users can install modular storage systems including customized arrangements of shelves, hooks, bins, and/or the like to create an organized space that fits the user's specific needs.

**[0004]** Shelves and shelving systems are an important aspect of storage systems, as they enable utilization of vertical space by providing tiers of storages (i.e., on each shelf). However, existing shelves are often not modular and do not provide adequate accessibility or customizability for a user. One aspect of accessibility is a user's ability to quickly store an object and remove the object from storage. Another aspect of accessibility is the storage system's ability to engage many objects with a standardized connection mechanism between the system and the object. This may also permit an object to engage the storage system at a plurality of locations. Storage systems may also be accessible for extension or expansion. Moreover, shelves present safety hazards such as tipping of the shelf unit and/or fall risk of items falling from the shelves.

**[0005]** Accordingly, improved modular shelf storage systems are desired in the art. In particular, modular shelf systems which provide an interface on internal and/or external surfaces of shelves to inhibit tipping and prevent stored items from falling from a shelf would be advantageous.

### BRIEF DESCRIPTION

**[0006]** Aspects and advantages of the invention in accordance with the present disclosure will be set forth in part in the following description, or may be obvious from the description, or may be learned through practice of the technology.

**[0007]** In accordance with one embodiment, a modular shelving unit is provided. The modular shelving unit includes: a first shelf comprising a top surface, a plurality of sides surrounding the top surface, each side having a

side surface perpendicular to the top surface, and a plurality of frame members coupled to the first shelf. The first shelf comprises at least one first mount interface on one of the plurality of sides. The first mount interface is recessed from the side surface.

**[0008]** In accordance with another embodiment, a modular shelving system is provided. The modular shelving system includes: a modular shelving unit, a bracket, and a storage rail. The modular shelving unit comprises a first shelf comprising a top surface, a plurality of sides surrounding the top surface, each side having a side surface perpendicular to the top surface, and a plurality of frame members coupled to the first shelf. The first shelf comprises at least one first mount interface on one of the plurality of sides, wherein the first mount interface is recessed from the side surface. The bracket is configured to be received at the first mount interface. The storage rail comprises a plurality of cleats. The bracket is configured to couple with a mounting surface of the storage rail defined between two of the cleats.

**[0009]** These and other features, aspects and advantages of the present invention will become better understood with reference to the following description and appended claims. The accompanying drawings, which are incorporated in and constitute a part of this specification, illustrate embodiments of the technology and, together with the description, serve to explain the principles of the technology.

### BRIEF DESCRIPTION OF THE DRAWINGS

**[0010]** A full and enabling disclosure of the present invention, including the best mode of making and using the present systems and methods, directed to one of ordinary skill in the art, is set forth in the specification, which makes reference to the appended figures, in which:

FIG. 1 is a perspective view of a modular shelving unit in accordance with embodiments of the present disclosure;

FIG. 2 is a top view of a shelf in accordance with embodiments of the present disclosure;

FIG. 3 is a side view of a modular shelving unit adjacent to a wall in accordance with embodiments of the present disclosure;

FIG. 4 is a perspective view of a modular shelving system including a modular shelving unit and a wall rail in accordance with embodiments of the present disclosure;

FIG. 5A is a perspective view of a bracket in accordance with embodiments of the present disclosure; FIG. 5B is an exploded perspective view of the bracket of FIG. 5A;

FIG. 6 is a partial perspective view of a modular shelving unit having a plurality of columns in accordance with embodiments of the present disclosure;

FIG. 7 is a bottom perspective view of a puck in accordance with embodiments of the present disclosure.

sure;

FIGS. 8A-8C are perspective views of the puck of FIG. 7 being coupled with a shelf in accordance with embodiments of the present disclosure;

FIG. 9 is a perspective view of a modular shelving unit having accessory storage features in accordance with embodiments of the present disclosure; FIG. 10 is a bottom perspective view of a shelf in accordance with embodiments of the present disclosure;

FIGS. 11A-11B are perspective views of a cabinet in accordance with embodiments of the present disclosure in an open configuration and a closed configuration;

FIGS. 12A-12B are perspective views of another cabinet in accordance with embodiments of the present disclosure in an open configuration and a closed configuration;

FIGS. 13A-13B are perspective views of a cabinet in accordance with embodiments of the present disclosure in an open configuration and a closed configuration.

#### DETAILED DESCRIPTION

**[0011]** Reference now will be made in detail to embodiments of the present invention, one or more examples of which are illustrated in the drawings. The word "exemplary" is used herein to mean "serving as an example, instance, or illustration." Any implementation described herein as "exemplary" is not necessarily to be construed as preferred or advantageous over other implementations. Moreover, each example is provided by way of explanation, rather than limitation of, the technology. In fact, it will be apparent to those skilled in the art that modifications and variations can be made in the present technology without departing from the scope or spirit of the claimed technology. For instance, features illustrated or described as part of one embodiment can be used with another embodiment to yield a still further embodiment. Thus, it is intended that the present disclosure covers such modifications and variations as come within the scope of the appended claims and their equivalents. The detailed description uses numerical and letter designations to refer to features in the drawings. Like or similar designations in the drawings and description have been used to refer to like or similar parts of the invention.

**[0012]** As used herein, the terms "first", "second", and "third" may be used interchangeably to distinguish one component from another and are not intended to signify location or importance of the individual components. The singular forms "a," "an," and "the" include plural references unless the context clearly dictates otherwise. The terms "coupled," "fixed," "attached to," and the like refer to both direct coupling, fixing, or attaching, as well as indirect coupling, fixing, or attaching through one or more intermediate components or features, unless otherwise specified herein. As used herein, the terms "comprises,"

"comprising," "includes," "including," "has," "having" or any other variation thereof, are intended to cover a non-exclusive inclusion. For example, a process, method, article, or apparatus that comprises a list of features is not necessarily limited only to those features but may include other features not expressly listed or inherent to such process, method, article, or apparatus. Further, unless expressly stated to the contrary, "or" refers to an inclusive- or and not to an exclusive- or. For example, a condition A or B is satisfied by any one of the following: A is true (or present) and B is false (or not present), A is false (or not present) and B is true (or present), and both A and B are true (or present).

**[0013]** Terms of approximation, such as "about," "generally," "approximately," or "substantially," include values within ten percent greater or less than the stated value. When used in the context of an angle or direction, such terms include within ten degrees greater or less than the stated angle or direction. For example, "generally vertical" includes directions within ten degrees of vertical in any direction, e.g., clockwise or counter-clockwise.

**[0014]** When used to describe a shape, the term "generally" is used to describe an object having the overall appearance of a shape and may include slight deviations from the exact shape, such as including one or more protrusions or indentations in the outline of the shape. For example, the term "generally rectangular" may be used to describe an object having the overall appearance of a rectangle having two sets of parallel sides and four right angles, but may include one or more indentations and/or protrusions along the parallel sides and/or slight variations in the right angles at the corners. For instance, a rectangular shape having slightly rounded corners may be described as "generally rectangular" as used herein. As a further example, a "generally rhomboid" or "generally diamond" shape may have the characteristics of a rhomboid or diamond (a quadrilateral of which only the opposite sides and angles are equal) but may have additional minor (e.g., shorter) sides interposed between the equal opposite angles and sides.

**[0015]** Benefits, other advantages, and solutions to problems are described below with regard to specific embodiments. However, the benefits, advantages, solutions to problems, and any feature(s) that may cause any benefit, advantage, or solution to occur or become more pronounced are not to be construed as a critical, required, or essential feature of any or all the claims.

**[0016]** In general, the modular shelving unit of the present invention includes at least a first shelf having at least one first mount interface on one of a plurality of sides of the shelf. The mount interface may be recessed or protruded outward from the sides of the shelf to customize a distance between the shelf and a vertical support surface such as a wall or a wall rail. The shelf can be provided with brackets that couple with the mount interface(s) to mount the shelf to a vertical support surface, e.g., to inhibit tipping. The shelf may include one or more mounting pucks on a surface of the shelf. The mounting

pucks may be complementary to a bottom of a secondary storage item to secure the bottom of a secondary storage item to the shelf to prevent from falling off the shelf. A modular shelving system includes: a modular shelving unit, a bracket, and a storage rail. The storage rail may include a plurality of cleats, and the bracket is configured to couple with a mounting surface of the storage rail defined between two of the cleats. The modular shelving system may be included in a dynamic setting, e.g., a vehicle or trailer, to prevent the shelves from tipping and to prevent items stored on the shelves from falling off the shelves..

**[0017]** Referring now to the drawings, FIG. 1 illustrates a perspective view of a modular shelving unit 10 according to an embodiment of the present invention. The modular shelving unit 10 includes one or more shelves 12, e.g., a first shelf 12a, a second shelf 12b, and a third shelf 12c. The shelves 12 are coupled to each other by frame members 14. As illustrated in FIG. 1, each shelf 12a, 12b, 12c may be coupled vertically above one another by the frame members 14 to each form a tier 16 of the modular shelving unit 10. In the embodiment shown in FIG. 1, the modular shelving unit includes three tiers 16; however, it is to be understood that the present invention contemplates any number of shelves 12 and tiers 16 as desired or suitable for a desired storage solution.

**[0018]** As shown in FIGS. 1 and 2, the shelves 12 may have a generally rectangular shape defined by a first side 20, second side 22, third side 24, and fourth side 26. The shelves 12 each have a top surface 18 defined between the first side 20, second side 22, third side 24 and fourth side 26. As shown in FIG. 2, the first side 20 and third side 24 may be generally parallel and the second side 22 and fourth side 26 may be generally parallel. Corners 28 formed between each of the sides 20, 22, 24, 26 may be formed at right angles and/or may be rounded, i.e., so as to provide a less sharp edge. Each of the shelves 12 may include apertures 30 configured to receive the frame members 14. For instance, there may be an aperture 30 disposed adjacent to each corner 28. The apertures 30 may each receive one or two frame members 14 therein. For instance, as illustrated in FIG. 1, the apertures 30 of second shelf 12b each receive a frame member 14 through the top surface 18 extending upwardly toward the first shelf 12a and a frame member 14 beneath the top surface 18 extending downwardly from the second shelf 12b toward the third shelf 12c. Additionally or alternatively, a frame member 14 may extend through an aperture 30 above and below the top surface 18 of a shelf 12.

**[0019]** The frame members 14 may be tubular frame members. Stated differently, each frame member 14 may be tube shaped, i.e., hollow. Nevertheless, one or more of the frame members 14 may alternatively be formed from solid construction. The frame members 14 may have any suitable outer perimeter shape such as a generally circular shape or generally polygonal shape. As illustrated in FIG. 1 and will be described in further detail

below, each of the shelves 12 may be configured to receive one of the frame members 14 at a corner thereof.

**[0020]** As illustrated in FIG. 1, each of the sides 20, 22, 24, 26 has a side surface 32 extending generally perpendicular to the top surface 18 of the shelf 12. Each of the sides 20, 22, 24, 26 includes at least one mount interface 34. Each mount interface 34 is defined by adjacent protrusions 36. Each protrusion 36 has a side wall 38 extending perpendicularly relative to the side surface 32. The side wall 38 may be undercut relative to an overhanging portion 40, sometimes referred to as a lip or edge, of the protrusion 36 that extend parallel to the side surface 32 and extends inward relative to the undercut side surface 38 toward the mount interface 34 to form a lip to engage and retain a bracket against the mount interface. Each side wall 38 may have an angled portion 42 and a vertical portion 44. As illustrated in FIG. 1, the angled portion 42 may be disposed nearer to the top surface 18 than the vertical portion 44. The angled portions 42 of adjacent protrusions 36 may be angled away from each other such that each mount interface 34 may have a triangular, trapezoidal, or Y-shaped profile or shape. However, any suitable shaped mounting interface is contemplated by the present invention.

**[0021]** In some aspects of the present invention, the mount interface(s) 34 may be recessed relative to the side surface 32 of a respective one of the sides 20, 22, 24, 26. For instance, the mount interfaces 34 disposed along the first side 20, second side 22, and third side 24 may be recessed relative to the side surfaces 32 of each side, as best seen in FIG. 2. Additionally or alternatively, one or more mount interface(s) 34 may be formed in a mounting block 50 that protrudes outward from the side surface 32 of a respective side. For instance, as illustrated in FIGS. 1-2, the fourth side 26 of the shelf 12 may include mounting block(s) 50 extending outward therefrom.

**[0022]** As shown in FIG. 3, the modular shelving unit 10 may be positioned adjacent to a wall or other vertical support surface 2. For instance, the modular shelving unit 10 may be mounted or secured to the vertical support surface 2 to inhibit the shelving unit 10 from tipping over. By providing at least one side of each shelf 12 with mounting block(s) 50 extending outward from a side surface 32, and an opposite side of the shelf 12 having mount interface(s) 34 recessed relative to a side surface 32, the spacing between the modular shelving unit 10, in particular, the top surface 18 of each shelf 12, and the vertical support surface 2 can be selected.

**[0023]** FIG. 3 illustrates the modular shelving unit disposed along and adjacent to a vertical wall 2 that has a footing or foundation portion that extends outward from or laterally relative to a vertical plane of the wall. The foundation can be made of bricks or concrete or other material, such as is common in many residential or commercial garage or storage spaces. As shown in FIG. 3, the modular shelving unit 10 may be arranged such that the first shelf 12a and second shelf 12b are formed with

the fourth side 26 having mounting blocks 50 disposed thereon facing the wall, while the third shelf 12c has the fourth side 26 having mounting blocks 50 on a side opposite the side adjacent the wall so that the shelving unit 10 maybe placed closer to the wall. In embodiments where the wall does not have a protruding foundation, all shelves 12 may have the mounting blocks 50 on a same side of the shelving unit 10, e.g., all adjacent to the wall or all facing away from the wall.

**[0024]** In some aspects of the present invention, the modular shelving unit 10 may be removably attached to the vertical support surface 2. For instance, as shown in FIG. 4, a wall rail 4 (storage rail) may be mounted to the wall 2 and the modular shelving unit 10 may be removably coupled to the wall rail 4. The wall rail 4 may have mounting structures 6 (also referred to as cleats) that form wall rail mount surface(s) 8 recessed therebetween having a similar or same size and shape as the mount interface(s) 34 of the shelves 12. For instance, the recessed or wall rail mount surface(s) 8 may be configured to be engaged by Y-shaped, triangular, or trapezoidal brackets. One or more brackets 60 may be provided to facilitate the coupling between the modular shelving unit 10 and the wall rail 4. For instance, a bracket 60 may be received at a mount interface 34 of a shelf 12 and may be received by a wall rail mount surface 8. Stated differently, the bracket 60 may be configured to couple with a shelf 12 and may be configured to mount the shelf 12 to a vertical support surface 2.

**[0025]** FIGS. 5A-5B illustrate a bracket 60 configured to be received at a mount interface 34 of any of the shelves 12. The bracket 60 comprises a body 62 that may have a Y-shaped profile as shown in FIGS. 4 and 5A-5B, a triangular or trapezoidal shaped profile configured to fit with the mount interface 34. The body 62 has sides 64 each having an angled upper portion 66 and a vertical lower portion 68. The angled upper portion 66 may extend outward in a width direction from the vertical lower portion 68. In this manner, the sides 64 of the bracket body 62 may be complementary to the shape of the mount interface 34 and the angled portions 42 of the side walls 38 of the protrusions 36 that define the mount interface 34. The bracket body 62 further includes a front side 70 and a back side 72 that extend parallel to each other between the sides 64. A distance between the front and back sides 70, 72 may define a width W of the bracket body 62.

**[0026]** Along the angled upper portion 66 of each side there may be a first mounting rib 74 and a second mounting rib 76. In some aspects, the first mounting rib 74 may be provided adjacent to the front side 70 and the second mounting rib 76 may be provided adjacent to the back sides 72. Each of the first mounting rib 74 and the second mounting rib 76 may have a width configured to extend between the mount interface and the overhanging portion of either a shelf 12 or the wall rail 4. An indented portion 78 may be formed along the angled upper portion 66 between the first mounting rib 74 and the second mount-

ing rib 76.

**[0027]** As shown in FIGS. 5A-B, the body 62 of the bracket 60 may be formed from a plurality of pieces, such as three pieces. A front body segment 80 may include the front side 70 of the bracket 60, a back body segment 82 may include the back side 72 of the bracket 60, and a middle body segment 84 may be disposed between the front body segment 80 and the back body segment 82. In some aspects, as shown in FIG. 5B, the middle body segment 84 may be removably coupled between the front body segment 80 and the back body segment 82. For example, one of the front body segment 80 or the back body segment 82 may include one or more male coupling features 86, the other of the front body segment 80 or the back body segment 82 may include complementary female coupling features 88, and the middle body segment 84 may include one or more male coupling features 86 on one side and one or more female coupling features 88 on the opposite side so that it can complementarily mate in between the front body segment 80 and the back body segment 82. However, any other suitable coupling structure between the front body segment 80, the back body segment 82, and the middle body segment 84 therebetween may be provided. By including a removable middle body segment 84 in the body 62 of the bracket 60, the width W of the bracket 60 may be adjusted, thereby enabling the spacing between the modular shelving unit 10 and the wall rail 4 to be adapted or adjusted.

**[0028]** When the bracket 60 has all three parts, the bracket 60 has an extended configuration. When the middle segment 84 is removed, the first part and the second part are engageable with and connected to each other by the corresponding female connectors 88 and male connectors 86 such that the bracket has a collapsed or shortened configuration so that adjacent shelves can be spaced closer together when compared to attachment of adjacent shelves with the extended configuration of the bracket 60. The extended configuration may be desired when the modular shelving unit 10 needs to be spaced farther from the wall 2 or farther from another modular shelving unit. The shortened configuration can be used when it is desired to have the modular shelving unit 10 closer to the wall 2 or to another modular shelving unit.

**[0029]** In some aspects of the invention, the bracket 60 may have one or more apertures 90 configured to receive a fastener (not shown) therethrough. For instance, one or more apertures 90 may be provided through the front side 70 and/or the back side 72 of the body 62. A fastener may secure the bracket 60 directly to a vertical support surface 2, e.g., a wall, to secure the modular shelving unit 10 and inhibit tipping without requiring a wall rail 4.

**[0030]** In addition to coupling a shelf 12 to a wall rail 4, the bracket 60 may be used to couple a shelf 12 to an adjacent shelf 12, e.g., as shown in FIG. 6. Thus, the modular shelving unit 10 may include two or more columns 92 of shelves 12 connected together. One side,

e.g., the front side 70, of a bracket 60 may be inserted into or coupled to one of the mount interfaces 34 on a short side of a shelf 12 of a first column 92a and the second side, e.g., the back side 72, of the bracket 60 may be inserted into or coupled to one of the mount interfaces 34 on a short side of a shelf 12 of a second column 92b. The brackets 60 allow the first column 92a to be removably secured to the second column 92b. Thus, the modular shelving unit 10 may have a plurality of tiers 16 and a plurality of columns 92.

**[0031]** Turning now to FIG. 7, the modular shelving unit 10 may include one or more projections configured to facilitate coupling engagement with one or more complementary storage items. For instance, each projection may be in the form of a puck 100 that is attachable, e.g., removably attachable, to the shelves 12 (e.g., on the top 18 of a shelf). Each shelf 12 has one or more recesses in the top 18 thereof that are shaped to be engaged by one of the pucks 100. The pucks 100 can be removably coupled to the shelf without tools. The pucks 100 can each function as a locking bracket to retain one or more complementary storage items on the shelf 12. For instance, the pucks 100 may be shaped and configured to engage a bottom of other a secondary storage item or storage systems (e.g., containers, tool boxes, power tool attachments, etc.) and to hold these storage systems on the shelf 12.

**[0032]** As illustrated in FIGS. 7 and 8, each puck 100 may have a generally polygonal shaped profile when viewed from the top. For example, each puck 100 may have a generally diamond shape. For instance, the major (i.e., longest) sides of the puck 100 may have a generally diamond shape, while the points of the diamond may be cut off or squared off so the puck 100 forms an octagon. In other embodiments, the puck 100 may have a rectangular shape, a pentagon shape, a hexagon shape, an octagon shape, or any other suitable shape. In some aspects, the puck 100 may have a shape that matches the sides 38 of the protrusions 36 of the shelves 12 and/or the mounting structures 6 of the wall rail 4 so that complementary storage features may be coupled with either a wall rail 4 or the pucks 100 on the top 18 of the shelves 12.

**[0033]** In some aspects of the present invention, the pucks 100 may have an identical shape and size as the mounting structures 6 of the wall rail 4. For instance, both the puck 100 and the mounting structure 6 may include an outer portion 102 forming an outer face, and a base 104 formed from a plurality of angled portions 106 (e.g., two upper angled sides, two lower angled sides, and/or the like), two or more vertical sides 108 joining upper and lower angled portions 106, and two or more substantially horizontal sides 110. The upper angled sides may each define a lip, a ledge, or an overhang portion 112 that is part of the outer portion 102 and extends outward from a base portion 104. An undercut 114 may be defined between the overhang portion 112 and a parallel surface, e.g., the top 18 of a shelf 12. As persons having skill in

the art will appreciate, pucks 100 may include any other suitable geometric shape (i.e., a different shape than an octagon) without deviating from the instant disclosure.

**[0034]** The puck 100 may include one or more locking tabs 120 configured to facilitate coupling with the shelf 12. The locking tabs 120 may each extend parallel and/or in a same plane as one or more of the angled portions 106, horizontal sides 110 or vertical sides 108. The locking tabs 120 may each have a locking surface 122 configured to engage and lock the puck 100 in place relative to a shelf 12.

**[0035]** With reference to FIG. 7 and 8 as an example, each shelf 12 includes at least one recess 130 that defines a pocket 132 configured to receive a locking tab 120 of the puck 100. The locking tab 120 is insertable into the pocket 132. As shown in FIG. 7, the locking tab 120 is insertable into the recess 130 axially and may snap-fit with the pocket 132 within the recess 130. In some embodiments, the pucks 100 may be attached to the shelf 12 in a combination of axial movement and rotational movement, e.g., as shown in FIG. 8.

**[0036]** As illustrated in FIG. 7, each puck 100 may include a plurality of locking tabs 120. The shelf 12 may have a plurality of recesses 130 arranged in the same shape as the locking tabs 120. For instance, a puck 100 may have a locking tab 120 extending from each vertical side 108 and/or in a parallel plane to each vertical side 108, and a locking tab 120 extending from one of the horizontal sides 110 and/or in a parallel plane to one of the horizontal sides 110. For instance, the locking tabs 120 may extend from an underside 124 of the puck 100. In this arrangement, the locking tabs 120 extending from each vertical side 108 may be perpendicular to the locking tab 120 extending from the horizontal side 110. The shelf 12 may have three corresponding recesses 130, e.g., as shown in FIG. 7.

**[0037]** The puck 100 may further include one or more positioning ribs 126 extending from an underside 124 of the puck 100. The positioning rib(s) 126 may be configured to align with a positioning feature 134 in the top 18 of the shelf 12. The positioning rib(s) 126 form alignment features that assist with aligning each puck 100 with respective recesses 130 of a shelf 12. For instance, as illustrated in FIGS. 7-8, the positioning rib 126 may have a circular shape extending downward on the underside 124 of the puck 100 and having a diameter smaller than a distance between any of the sides 108, 110 of the puck 100. The shelf 12 may have a corresponding circular shaped positioning feature 134, such as a channel or recess configured to receive the positioning rib 126 therein.

**[0038]** FIGS. 8A-8B illustrate another embodiment of pucks 100 that can be coupled to the shelf 12 via a twist-lock motion as shown in FIG. 8B. The locking tabs 120 of the pucks 100 are inserted into the shelf 12 by pushing the base 104 axially toward the top 18 of the shelf 12 (e.g., aligning the positioning rib 126 with the positioning feature 134) and the locking tabs 120 into the recesses

130 and rotating the puck 100, e.g., clockwise, to lock it into place. The puck 100 may be removed by rotating in the opposite, e.g., counterclockwise, direction, and then pulling the puck 100 upward away from the top 18 of the shelf 12. This allows the user to change the quantity and location of the puck(s) 100, or to add or remove pucks 100, as desired.

**[0039]** As best seen in FIGS. 6 and 8, the shelf 12 may be configured to receive a plurality of pucks 100. For instance, an array 136 of recesses 130 may be arranged on the top 18 of the shelf 12 configured to receive a plurality of pucks 100. If pucks 100 are coupled to each of the recesses 130, one or more rows and/or columns of pucks 100 on the shelf 12 may be arranged. However, it is to be understood that the array is configured to enable a user to selectably position the pucks 100 on the shelf 12 to be able to receive and couple with a bottom of other storage systems (e.g., containers, tool boxes, power tool attachments, etc.) and to hold these storage systems on the shelf 12, while leaving other portions of the shelf 12 free of any pucks 100 to be able to store items on the shelf 12 without being held in place by the pucks 100.

**[0040]** FIG. 9 shows that the shelves 12 may include accessory storage features. For example, the top 18 may contain a plurality of through holes 150 that may support small hand-held tools (e.g., screw drivers, tweezers, etc.).

**[0041]** FIG. 9 further illustrates a modular shelving unit 10 that may include one or more recessed features 152 recessed into a shelf 12 to provide integrated storage below the top 18 of the shelf 12. The recessed feature(s) 152 accept and retain small parts bins, receive small storage boxes, or other removable storage containers which can be stowed and removed from the shelf 12. By including one or more recessed features 152, the modular shelving unit 10 may have enhanced storage density, packing efficiency, modularity, etc. as compared to a shelf 12 shown in FIG. 1. In some arrangements, a recessed storage feature 152 may be a drawer as shown in FIG. 9. The drawer may be integrated into the shelf 12, as illustrated, or may be coupled to an underside 160 of the shelf 12. The height of the drawer may be shorter than the height of the shelf 12 or taller than the height of the shelf 12. The drawer may have a plurality of partitions that create segmented sections in the drawer for organization of accessories in the drawer. The front edge of the drawer may be flat against the side 32 of the shelf, or the drawer may contain a handle that protrudes from the shelf.

**[0042]** FIG. 10 illustrates additional storage features incorporated into the underside 160 of a shelf 12. For instance, the underside 160 of one or more shelves 12 may include storage recesses 162 that receive and store the frame members 14 and/or storage recesses 164 to facilitate storage of a wall rail 4. When the tubular frame members 14 and/or the wall rail 4 are received in the underside 160 of the shelf 12 in a storage configuration, the shelf 12 still has a generally flat shape. That is, the

stored frame members 14 and wall rail 4 do not protrude, at least not in a significant way, from the underside profile of the shelf 12. The storage recesses 162, 164 can allow for compact shipping and storage because the frame members 14 and wall rail 4 may be stored in the shelves 12. Moreover, if a user configures the modular storage unit 10 to have fewer tiers 16, e.g., only two tiers 16, compared to the number of shelves 12 and/or frame members 14 present, the storage of the frame members 14 beneath one of the shelves allows for more efficient storage of spare parts of the modular storage unit 10 without sacrificing any storage space between the tiers 16 of the unit 10.

**[0043]** In some aspects of the present invention, the modular shelving unit 10 may include lateral shelf walls 202 that couple with one or more of the frame members 14 to form an enclosed storage area, e.g., a cabinet 200, between tiers 16 of the unit 10.

**[0044]** FIGS. 11A-11B illustrate a cabinet 200 having lateral shelf walls 202 enclosing three sides and a pair of doors 204 on a fourth side. FIG. 11A shows the doors 204 in a closed position and FIG. 11B shows the doors 204 in an open position. The doors 204 may be coupled with frame members 14 and rotate about respective frame members 14 in a direction outward away from each other (such as saloon doors) to provide access within the cabinet 200. The lateral shelf walls 202 and the doors 204 may have apertures 208 formed in corners thereof (not shown) configured to receive the frame members 14 therethrough. The cabinet may be installed during the formation of the modular shelving unit 10 by snapping the side walls 202 and doors 204 together to form a cabinet-wall assembly. The apertures 208 in the side walls 202 are sized to fit the frame members 14. Thereafter, the cabinet-wall assembly may be slid onto the frame members 14 of the modular shelving unit 10 until the assembly is flush with the bottom shelf 12c. Another shelf 12b may be placed on top of the assembly. The upper shelf 12b fully encloses the first cabinet 200.

**[0045]** FIGS. 12A-12B illustrate a cabinet 200 having a similar arrangement as FIGS. 11A-11B including saloon-style doors 204. However, the lateral shelf walls 202 may be snap-fit in place the shelves 12. For instance, the shelves 12 may each include a groove 156 on the top 18 and underside 160 thereof, and the lateral shelf walls 202 may be slid or otherwise engages into the grooves. Additionally or alternatively, the lateral shelf walls 202 may have an open-sided channel 210 that snap fit to the frame members 14. Similarly, the doors 204 may have an open-sided channel 210 configured to snap fit to the frame members 14. The cabinet of FIGS. 12A-12B may be built or added to the modular shelving unit 10 after the tiers 16 of the modular shelving unit 10 have been built or assembled. In the illustrated embodiment, the shelves 12 include grooves 168 that engage with protrusions (not shown) on the walls. The shelf walls 202 are then able to slide into the shelves 12 to be installed. In some embodiments, the walls 202 can be installed by

attachment to the frame members 14. The cabinet may be formed by installing a rear wall, installing the doors 204, and then installing the side walls. The shelf walls 202 may have tabs on the upper or lower side to engage the corresponding shelf 12, and latches or panel locks on the opposite side to secure the shelf walls to the upper or lower shelf. Latches may be coupled to the doors 204 to hold the doors closed on the cabinet 200.

**[0046]** FIGS. 13A-13B illustrate a cabinet with a garage-style door 214 that is opened by pivoting the door 214 upward and pulling the door outward. The cabinet design may include the shelf wall latches and panel locks of the cabinet illustrated in FIGS. 12A-12B. The cabinet of FIGS. 13A-13B may be installed in a manner that is consistent with assembly of the cabinets of FIGS. 11A-11B and 12A-12B as described above. FIG. 13A shows the cabinet in a closed position, and FIG. 13 shows the cabinet in an open position.

**[0047]** Further, as illustrated in FIGS. 11A-11B, 12A-12B, and 13A-13B, the lateral side walls 202 and/or the doors 204 of a cabinet 200 may further include recesses 220 configured to receive one or more pucks 100. For instance, one or more pucks 100 may be mounted to the side walls 202 and/or the doors 204 of a cabinet to provide additional mounting interfaces for mounting additional storage accessories, tools, etc to the cabinet 200. Moreover, one or more brackets 60 may be mounted to the exterior of the cabinet 200 using the pucks 100. Using the bracket(s) 60 coupled to the pucks 100 on the cabinet 200 may permit attachment of tools or tool accessories, or other storage systems (e.g., other cabinets), to the cabinet 200. Further, the bracket(s) 60 may couple the cabinet to a vertical support surface 2 such as a wall rail 4, enhancing the stability and security of the modular storage unit 10 to prevent or inhibit tipping.

**[0048]** The modular shelving unit 10 of the present invention may be a static or a dynamic modular shelving unit. The modular shelving unit can be a 'static' system that can be used in garages. In the static system, the modular shelving unit may or may not be mounted to a wall or may not include locking features (e.g., pucks 100, brackets 60, etc.) to secure the modular shelving unit.

**[0049]** In some embodiments, the modular shelving unit may be a 'dynamic' system which can be used in trailers and vehicles or other movable objects. Using the wall rails 4, or the brackets 60 with through holes for fasteners, the modular shelving unit 10 can be secured to a trailer wall or a vehicle wall. The pucks 100 can secure boxes, containers, or other storage items to the shelves 12. Cabinets 200 with latches can prevent the cabinet doors 204 from opening during transport. The dynamic modular shelving unit is secure, and has all of its elements secured, such that when the vehicle or trailer moves, the modular shelving unit 10 remains secured and anchored, thereby enhancing safety of the mobile transport storage system.

**[0050]** Nevertheless, the present inventors further contemplate providing the stability and anchoring features

of the modular shelving unit 10 of the 'dynamic' system described above for static, e.g., stationary, use, such as in a garage or storage area, e.g., as illustrated in FIG. 3. The anti-tipping, stability, and anchoring capabilities of the modular shelving unit 10 provide advantages. For instance, to improve accessibility within a storage area such as a garage.

**[0051]** One aspect of accessibility is a user's ability to quickly store an object and remove the object from storage. Another aspect of accessibility is the storage system's ability to engage many objects with a standardized connection mechanism between the system and the object. This may also permit an object to engage the storage system at a plurality of locations. Storage systems may also be accessible for extension or expansion. The modular shelving unit 10 as disclosed herein may provide enhanced stability, anchoring, and versatility to engage many objects with a standardized connection mechanism as described herein, thereby improving accessibility within the storage area.

**[0052]** A method of securing items in a storage system is disclosed herein. A modular shelving unit 10 may be provided. As described above, the modular shelving unit 10 may include a plurality of shelves 12 forming a plurality of tiers 16 of vertical storage. The shelves 12 may include mount interfaces 34 on sides thereof. The modular shelving unit 10 is secured to a storage area. The step of securing the modular shelving unit 10 to the storage area includes coupling a bracket to a mounting interface of a shelf of the modular shelving unit 10, and coupling securing an opposite site of the bracket to a vertical support surface. The vertical support surface may be a wall to which the bracket is fastened with a fastener and/or a wall rail having a complementary mount interface that receives the bracket securely therein. One or more storage items, containers, bins, or the like are secured to a top surface of the shelves. The shelves 12 may include pucks 100 configured for complementary engagement with a bottom of the storage items, container, bins, etc. One or more enclosed cabinets may be formed between tiers 16 of the modular shelving unit 10. The step of securing storage items to the top surface of the shelves may be performed before or after securing the modular shelving unit 10 to the storage area. Multiple columns 92 of shelves 12 may be coupled together with brackets 60. Each column 92 may be independently secured to the storage area. Additional storage accessories, containers, tools having complementary coupling features, or the like may be coupled to the mount interfaces 34 of the shelves 12. The storage area may be part of a trailer, vehicle or other mobile unit, and the modular shelving unit 10 may be transported after securing the modular shelving unit 10 to the storage area.

**[0053]** Further aspects of the invention are provided by one or more of the following embodiments: A modular shelving unit includes: a first shelf comprising a top surface, a plurality of sides surrounding the top surface, each side having a side surface perpendicular

to the top surface, and a plurality of frame members coupled to the first shelf. The first shelf comprises at least one first mount interface on one of the plurality of sides. The first mount interface is recessed from the side surface.

**[0054]** The modular shelving unit of any one or more of the embodiments, further comprising at least one second mount interface on one of the plurality of sides, wherein the second mount interface is formed on a protrusion that protrudes outward from the side surface.

**[0055]** The modular shelving unit of any one or more of the embodiments, wherein each protrusion comprises an outer surface on either side of the second mount interface, wherein the second mount interface is formed by a second mount surface parallel to the side surface and first and second angled surfaces recessed inward from the outer surface of the protrusion.

**[0056]** The modular shelving unit of any one or more of the embodiments, further comprising a second shelf coupled to the plurality of frame members, wherein the modular shelving unit comprises at least two tiers of shelves.

**[0057]** The modular shelving unit of any one or more of the embodiments, further comprising a bracket configured to couple with the first mounting interface.

**[0058]** The modular shelving unit of any one or more of the embodiments, wherein the bracket comprises a body having a first portion, a second portion, and a third portion, wherein the third portion is removably coupled between the first portion and the second portion.

**[0059]** The modular shelving unit of any one or more of the embodiments, wherein the bracket is configured to mount the modular shelving unit to a vertical support surface.

**[0060]** The modular shelving unit of any one or more of the embodiments, wherein the vertical support surface is a wall, wherein the bracket comprises an aperture configured to receive a fastener to secure the bracket to the wall.

**[0061]** The modular shelving unit of any one or more of the embodiments, wherein the vertical support surface includes a storage rail comprising a plurality of cleats, wherein the bracket is configured to couple with a mounting surface of the storage rail defined between two of the cleats.

**[0062]** The modular shelving unit of any one or more of the embodiments, wherein the bracket is configured to mount the first shelf to an adjacent shelf having a top surface parallel to the top surface of the first shelf.

**[0063]** The modular shelving unit of any one or more of the embodiments, wherein the adjacent shelf is identical to the first shelf.

**[0064]** The modular shelving unit of any one or more of the embodiments, further comprising at least one projection extending upward in a vertical direction relative to the top surface and comprising a tab configured to engage a bottom of a secondary storage item to hold the secondary storage item in place on the top surface of the

first shelf.

**[0065]** The modular shelving unit of any one or more of the embodiments, wherein the at least one projection comprises a polygonal shaped profile.

5 **[0066]** The modular shelving unit of any one or more of the embodiments, wherein the projection is a puck configured to be removably coupled with the top surface of the first shelf, wherein each puck comprises at least one tab configured to be received within a pocket recessed from the top surface of the first shelf and at least one overhanging portion.

10 **[0067]** The modular shelving unit of any one or more of the embodiments, wherein the first shelf further comprises a recessed storage feature beneath the top surface and configured to removably receive one or more removable storage containers.

15 **[0068]** The modular shelving unit of any one or more of the embodiments, wherein the first shelf further comprises an underside opposite the top surface, wherein the underside comprises at least one recess configured to receive and hold a frame member of the plurality of frame members in a storage configuration.

20 **[0069]** The modular shelving unit of any one or more of the embodiments, further comprising a cabinet formed between the first shelf and a second shelf, the cabinet comprising at least one door and a plurality of side walls, wherein each of the side walls of the cabinet extends between two of the frame members.

25 **[0070]** A modular shelving system comprising: a modular shelving unit, a bracket, and a storage rail. The modular shelving unit comprises a first shelf comprising a top surface, a plurality of sides surrounding the top surface, each side having a side surface perpendicular to the top surface, and a plurality of frame members coupled to the first shelf. The first shelf comprises at least one first mount interface on one of the plurality of sides, wherein the first mount interface is recessed from the side surface. The bracket is configured to be received at the first mount interface. The storage rail comprises a plurality of cleats.

30 **[0071]** The modular shelving system of any one or more of the embodiments, further comprising at least one puck removably coupled with the modular shelving unit, the at least one puck configured to secure a storage item to the modular shelving unit.

35 **[0072]** A mobile storage system comprises a vehicle or trailer, and the modular shelving unit of any one or more of the embodiments, wherein the modular shelving unit is anchored within the vehicle or trailer by a bracket received in the at least one first mount interface, the bracket being secured to the vehicle or trailer by a fastener or a complementary wall rail.

40 **[0073]** This written description uses examples to disclose the invention, including the best mode, and also to enable any person skilled in the art to practice the invention, including making and using any devices or systems and performing any incorporated methods. The patent-

able scope of the invention is defined by the claims, and may include other examples that occur to those skilled in the art. Such other examples are intended to be within the scope of the claims if they include structural elements that do not differ from the literal language of the claims, or if they include equivalent structural elements with insubstantial differences from the literal language of the claims.

## Claims

### 1. A modular shelving unit comprising:

a first shelf comprising a top surface, a plurality of sides surrounding the top surface, each side having a side surface perpendicular to the top surface, and  
a plurality of frame members coupled to the first shelf,  
the first shelf comprising at least one first mount interface on one of the plurality of sides, wherein the first mount interface is recessed from the side surface.

### 2. The modular shelving unit of claim 1, further comprising at least one second mount interface on one of the plurality of sides, wherein the second mount interface is formed on a protrusion that protrudes outward from the side surface.

### 3. The modular shelving unit of claim 2, wherein each protrusion comprises an outer surface on either side of the second mount interface, wherein the second mount interface is formed by a second mount surface parallel to the side surface and first and second angled surfaces recessed inward from the outer surface of the protrusion.

### 4. The modular shelving unit of claim 1, further comprising a second shelf coupled to the plurality of frame members, wherein the modular shelving unit comprises at least two tiers of shelves.

### 5. The modular shelving unit of claim 1, further comprising a bracket configured to couple with the first mounting interface to mount the modular shelving unit to a vertical support surface, wherein the bracket comprises a body having a first portion, a second portion, and optionally a third portion, wherein the third portion is removably coupled between the first portion and the second portion.

### 6. The modular shelving unit of claim 5, wherein the vertical support surface is a wall, wherein the bracket comprises an aperture configured to receive a fastener to secure the bracket to the wall, and/or wherein the vertical support surface includes a stor-

age rail comprising a plurality of cleats, wherein the bracket is configured to couple with a mounting surface of the storage rail defined between two of the cleats.

### 7. The modular shelving unit of claim 5, wherein the bracket is configured to mount the first shelf to an adjacent shelf having a top surface parallel to the top surface of the first shelf.

### 8. The modular shelving unit of claim 1, further comprising at least one projection extending upward in a vertical direction relative to the top surface and comprising a tab configured to engage a bottom of a secondary storage item to hold the secondary storage item in place on the top surface of the first shelf.

### 9. The modular shelving unit of claim 8, wherein the at least one projection comprises a polygonal shaped profile.

### 10. The modular shelving unit of claim 8, wherein the projection is a puck configured to be removably coupled with the top surface of the first shelf, wherein each puck comprises at least one tab configured to be received within a pocket recessed from the top surface of the first shelf and at least one overhanging portion.

### 11. The modular shelving unit of claim 1, wherein the first shelf further comprises a recessed storage feature beneath the top surface and configured to removably receive one or more removable storage containers, and/or wherein the first shelf further comprises an underside opposite the top surface, wherein the underside comprises at least one recess configured to receive and hold a frame member of the plurality of frame members in a storage configuration.

### 12. The modular shelving unit of claim 1 further comprising a cabinet formed between the first shelf and a second shelf, the cabinet comprising at least one door and a plurality of side walls, wherein each of the side walls of the cabinet extends between two of the frame members.

### 13. A modular shelving system comprising:

a modular shelving unit comprising:

a first shelf comprising a top surface, a plurality of sides surrounding the top surface, each side having a side surface perpendicular to the top surface, and  
a plurality of frame members coupled to the first shelf,

the first shelf comprising at least one first mount interface on one of the plurality of sides, wherein the first mount interface is recessed from the side surface;

a bracket configured to be received at the first mount interface; and 5

a storage rail comprising a plurality of cleats, wherein the bracket is configured to couple with a mounting surface of the storage rail defined between two of the cleats. 10

14. The modular shelving system of claim 13, further comprising at least one puck removably coupled with the modular shelving unit, the at least one puck configured to secure a storage item to the modular shelving unit. 15

15. A mobile storage system comprising:

a vehicle or trailer, and

the modular shelving unit of claim 1, wherein the modular shelving unit of claim 1 is anchored within the vehicle or trailer by a bracket received in the at least one first mount interface, the bracket being secured to the vehicle or trailer by a fastener or a complementary wall rail. 20 25

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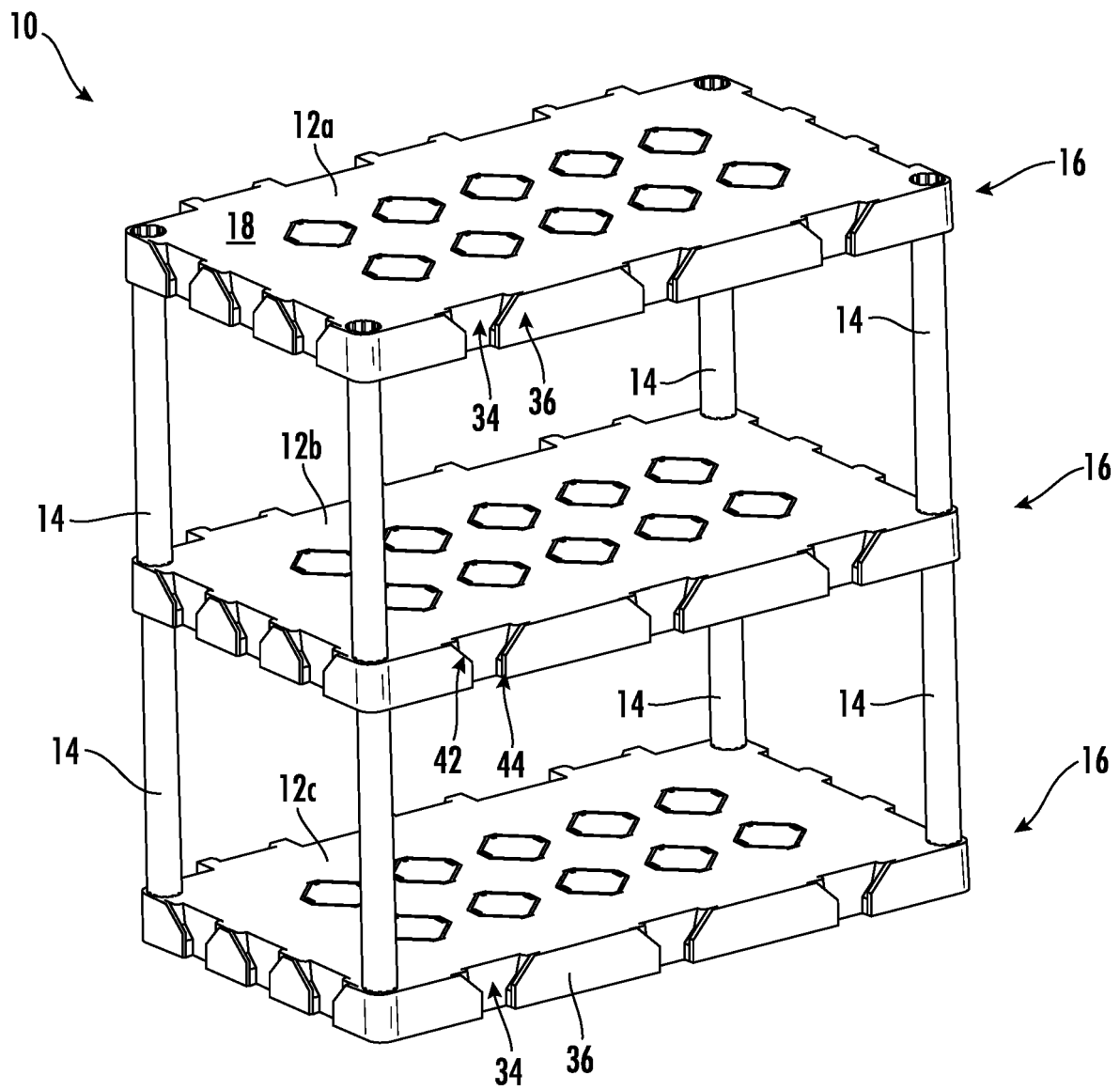
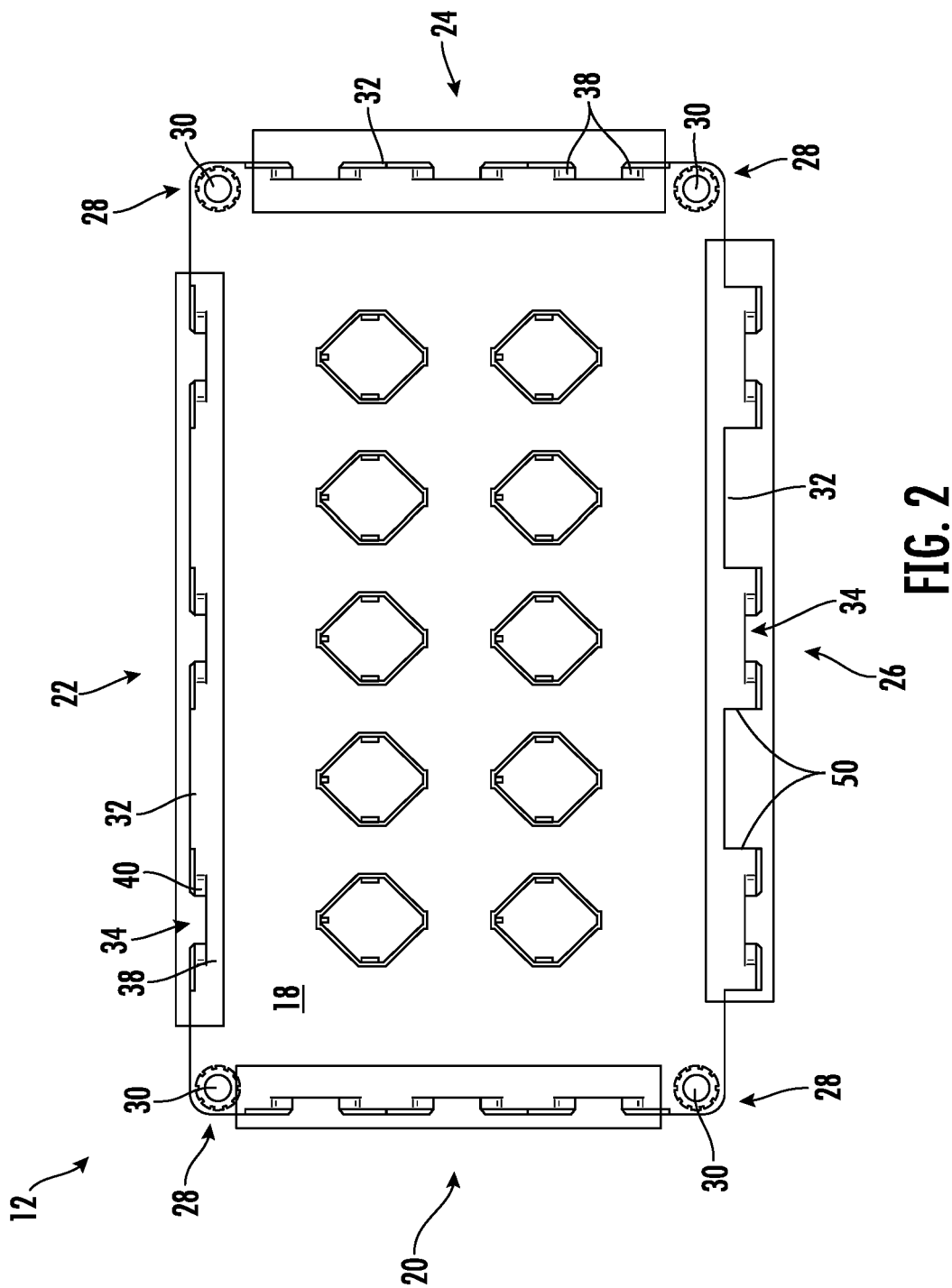
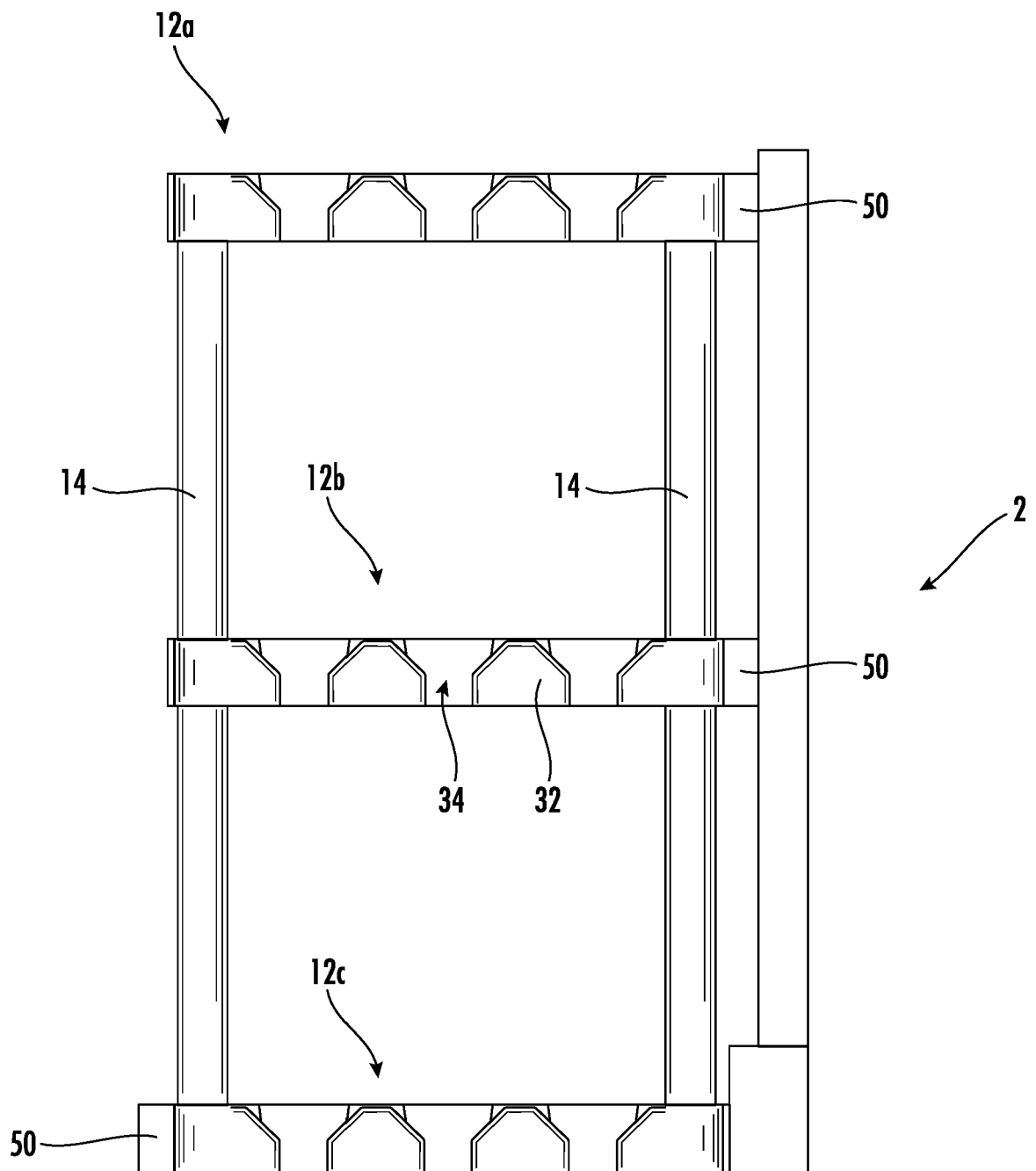


FIG. 1





**FIG. 3**

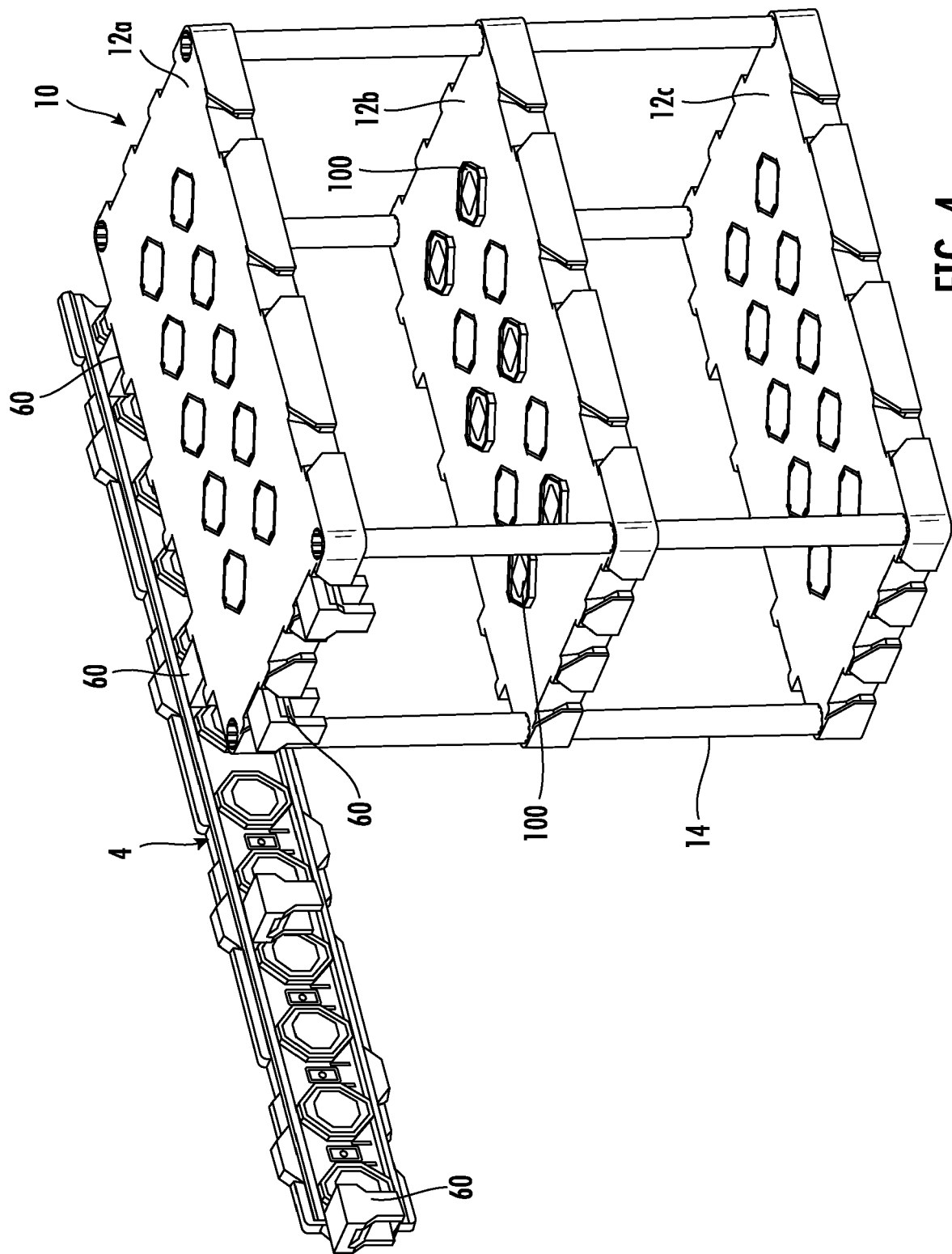
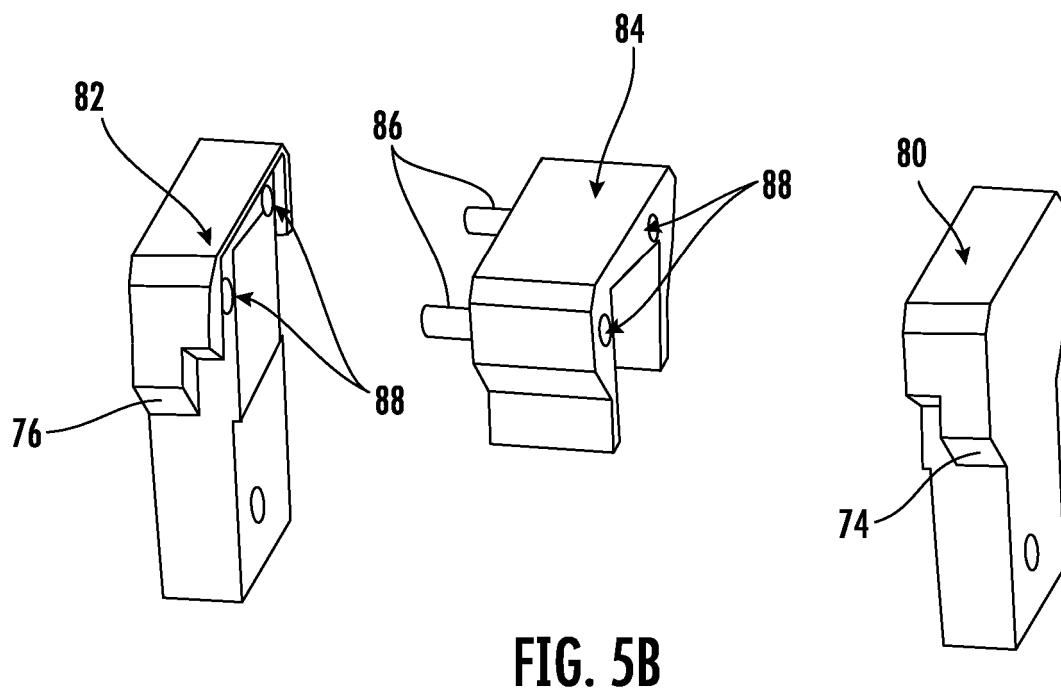
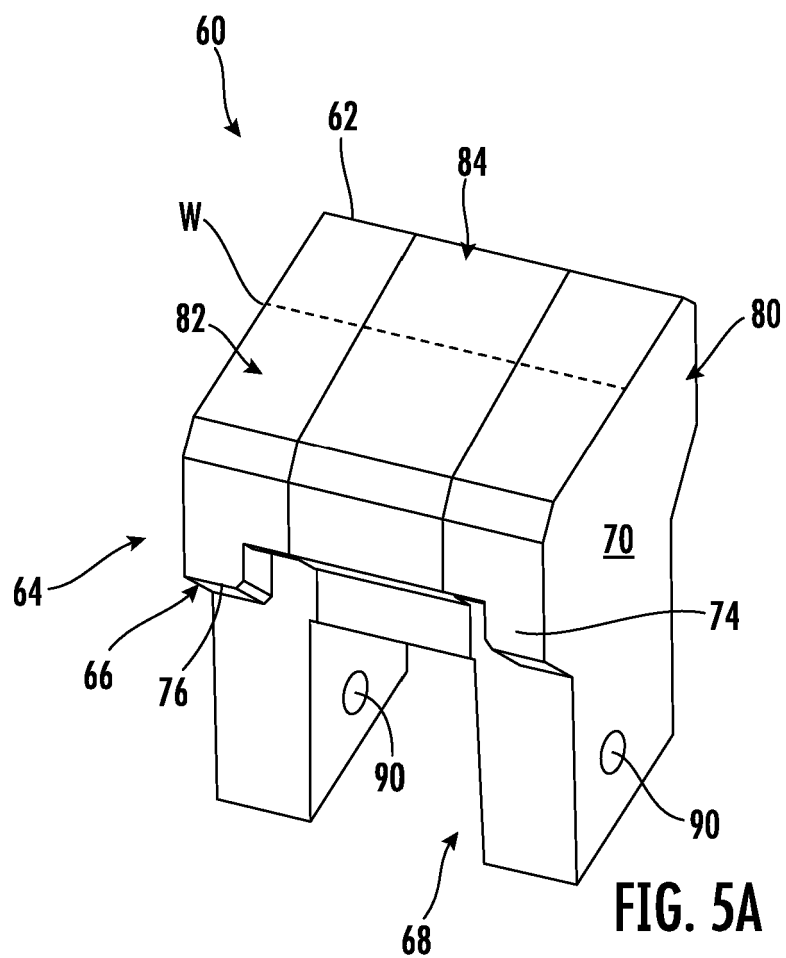


FIG. 4



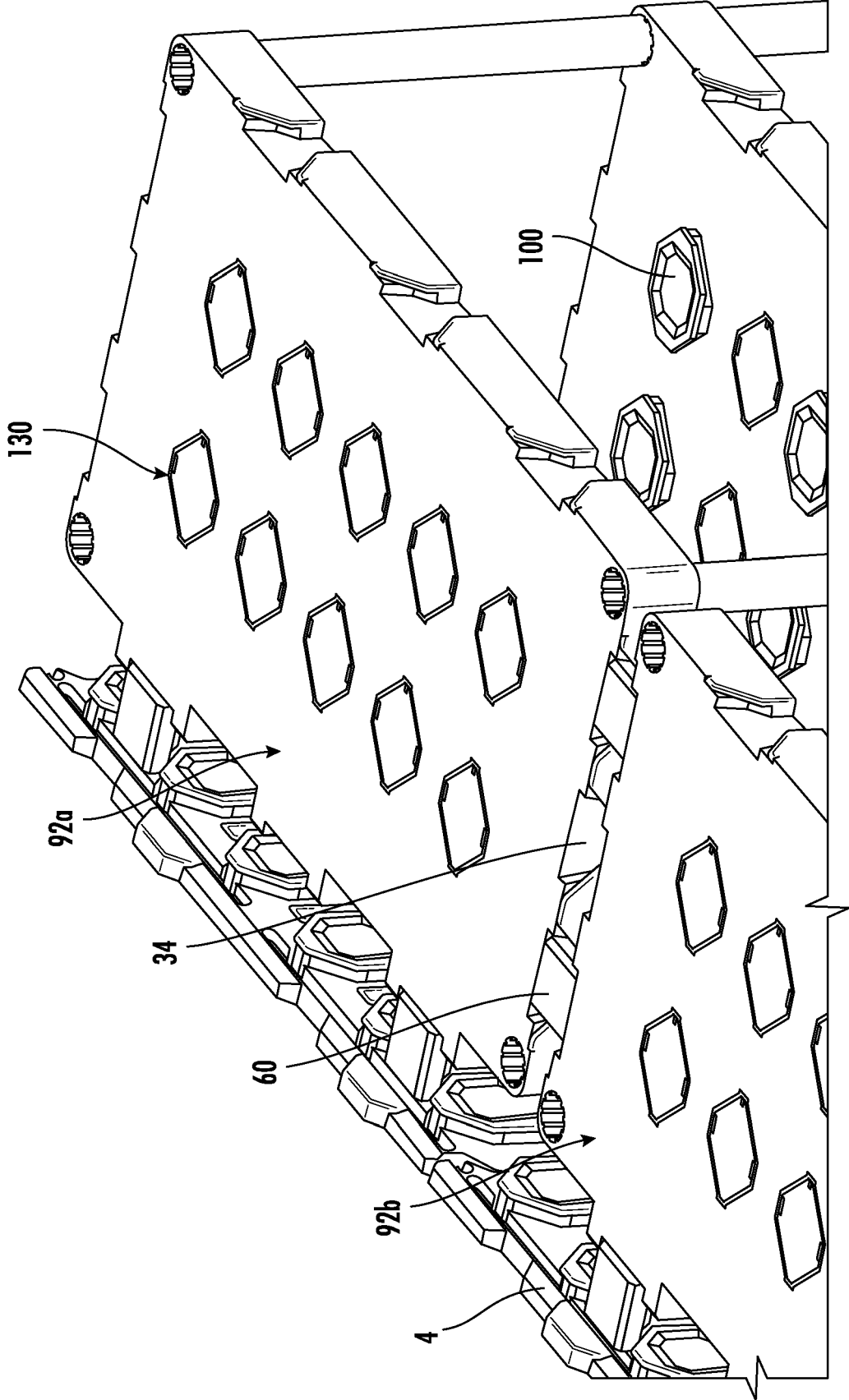


FIG. 6

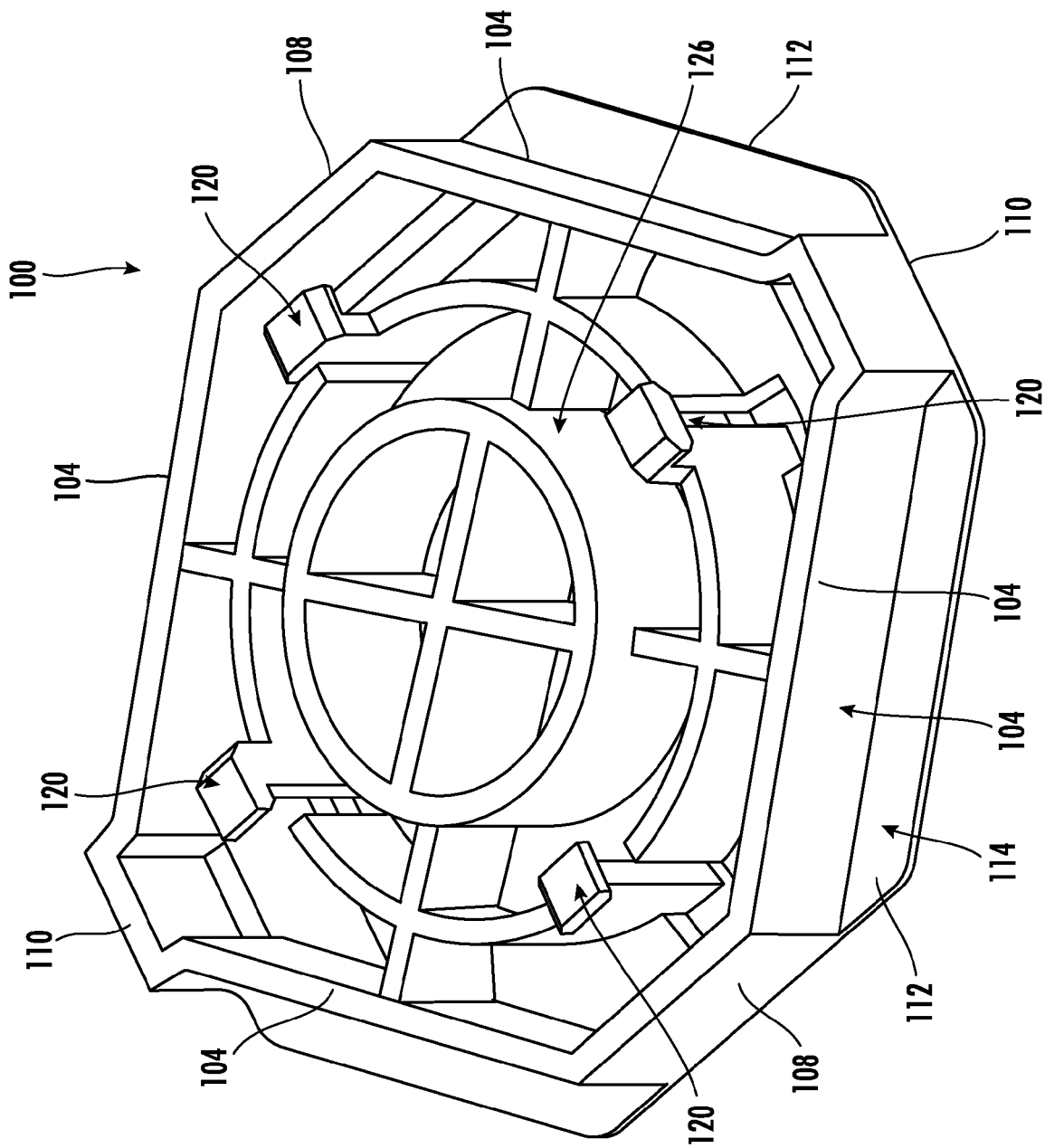
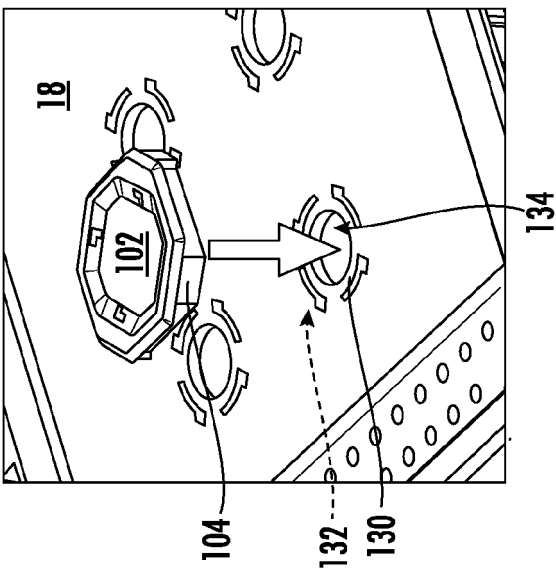
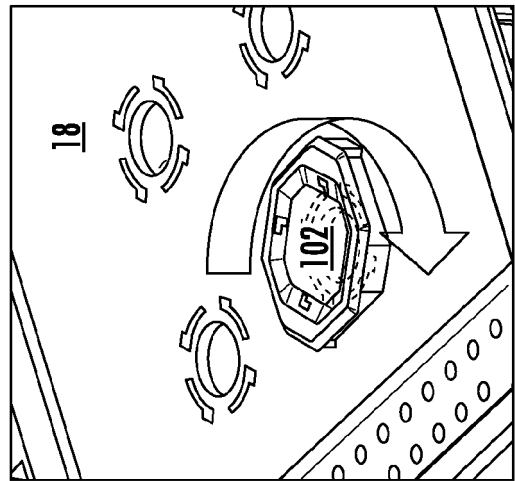
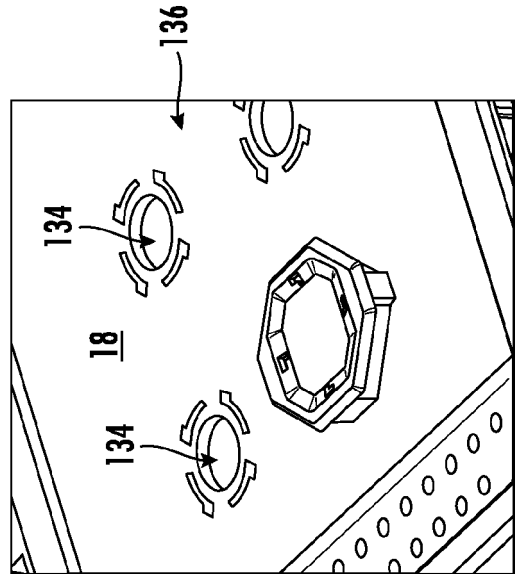
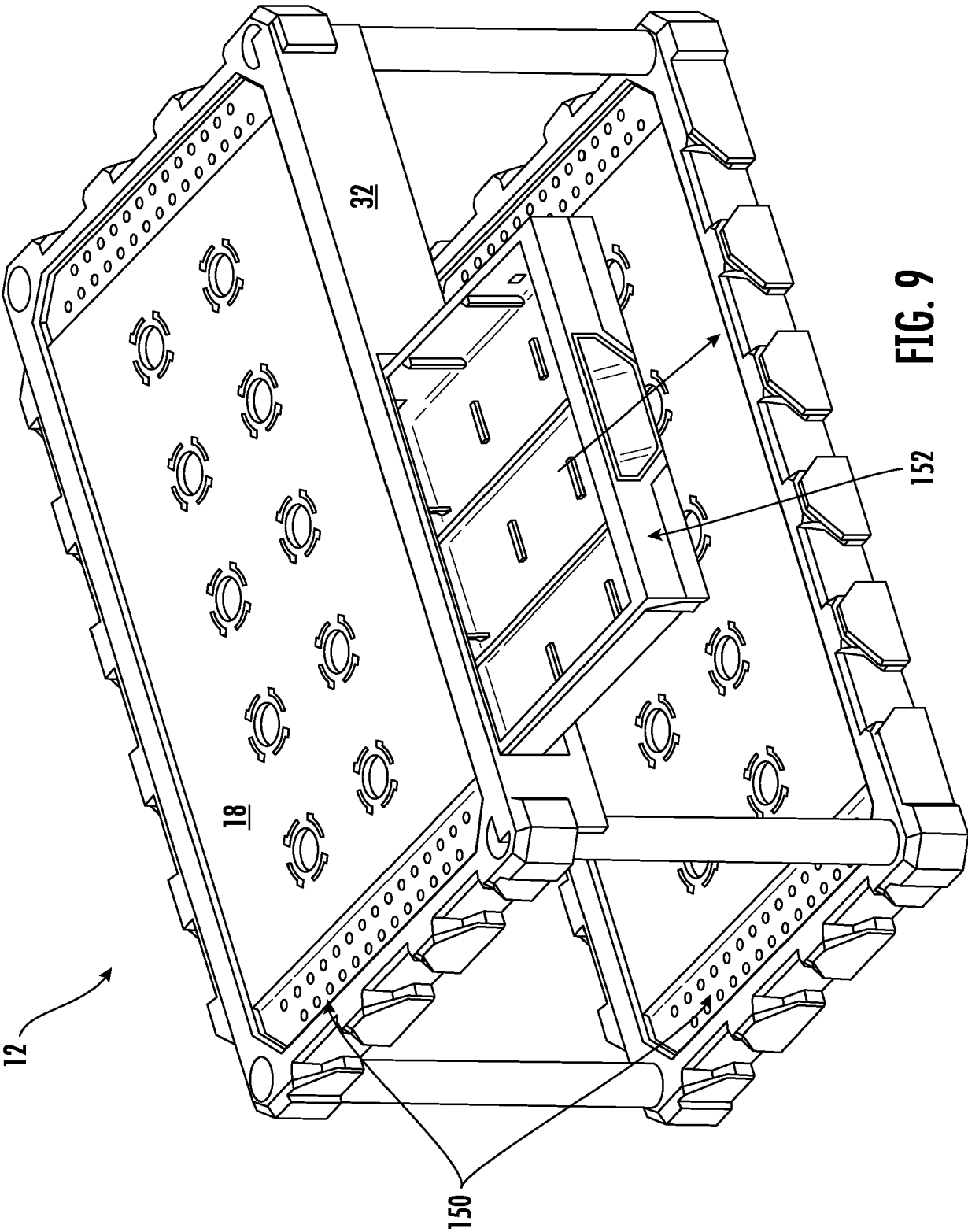


FIG. 7





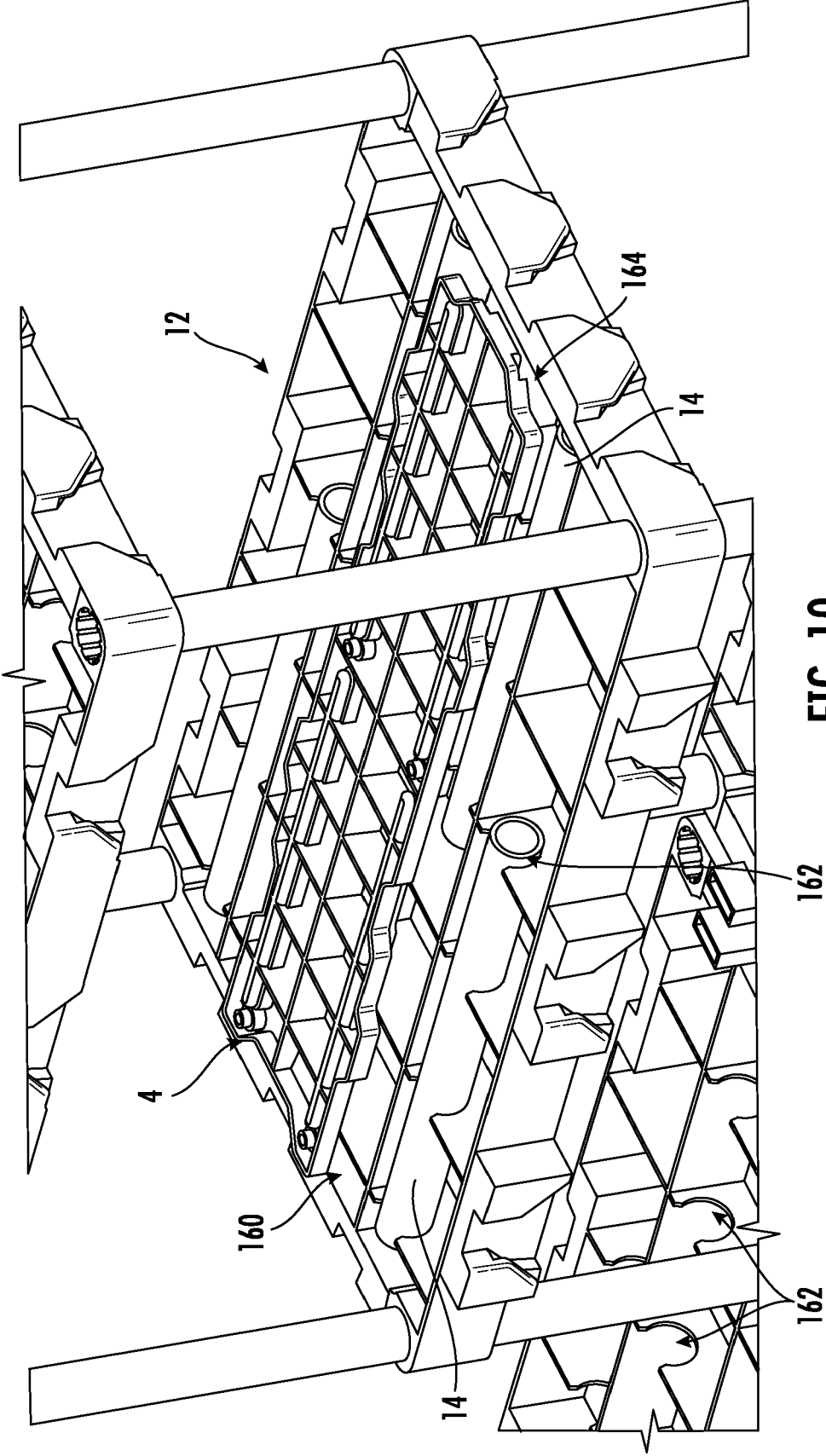
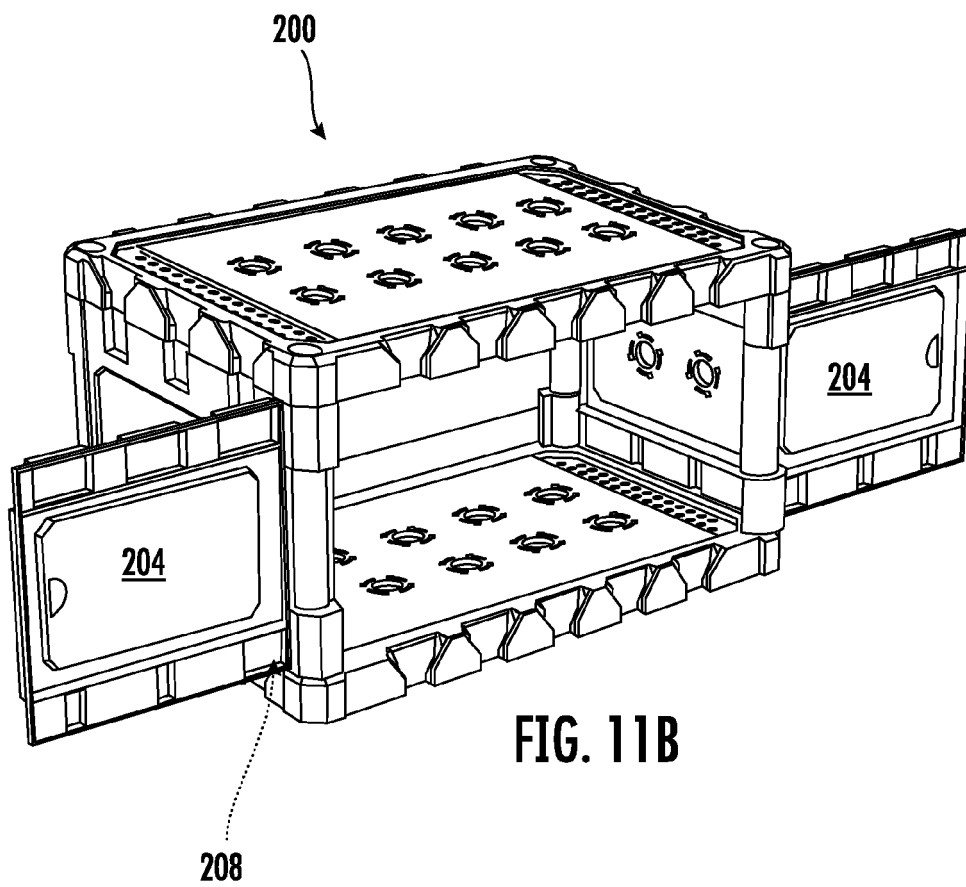
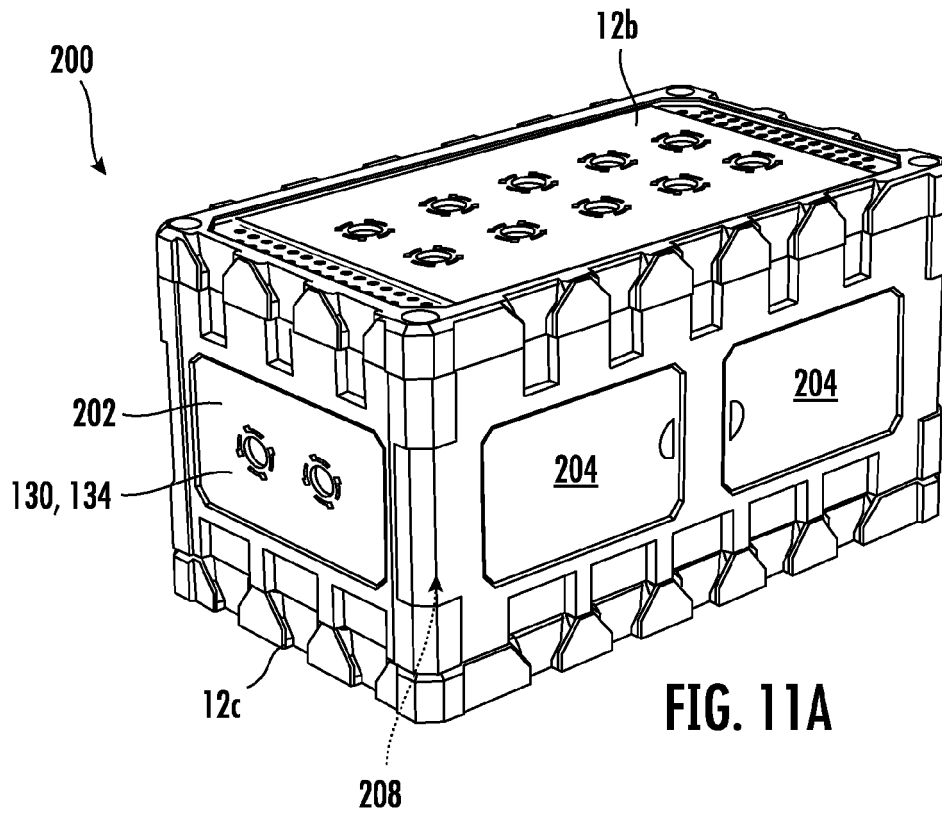
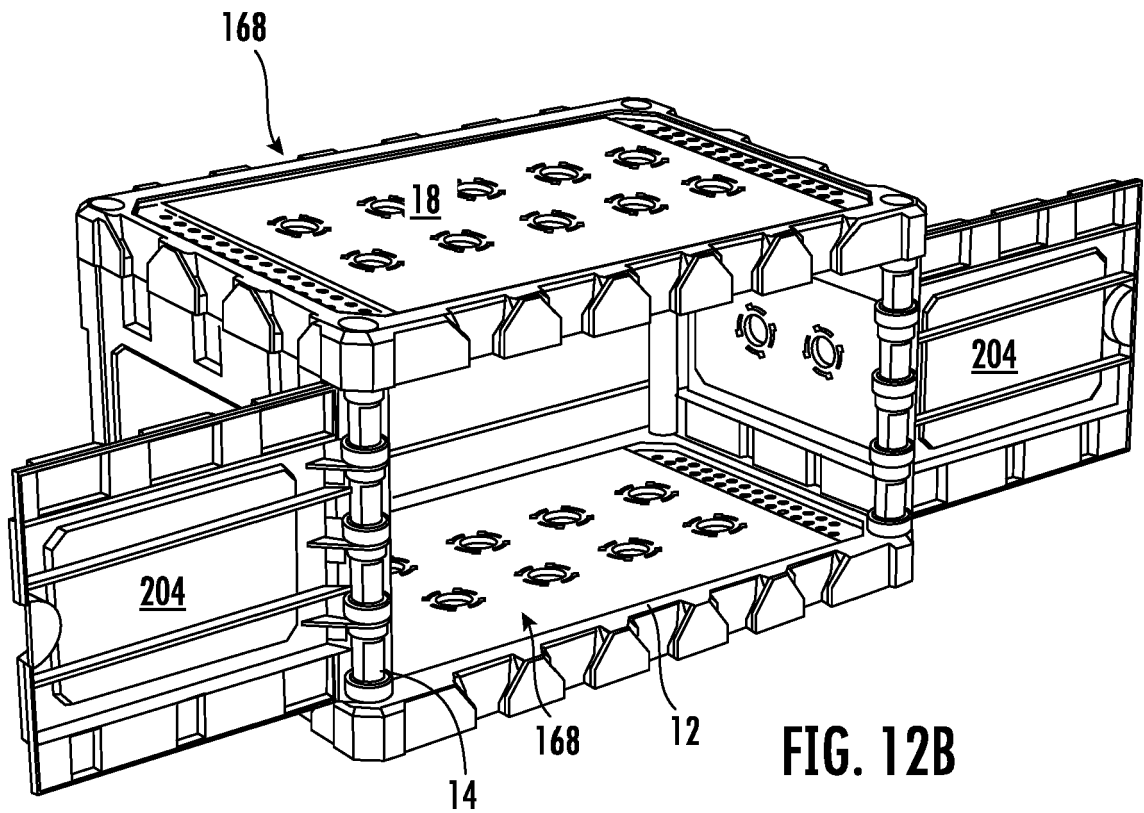
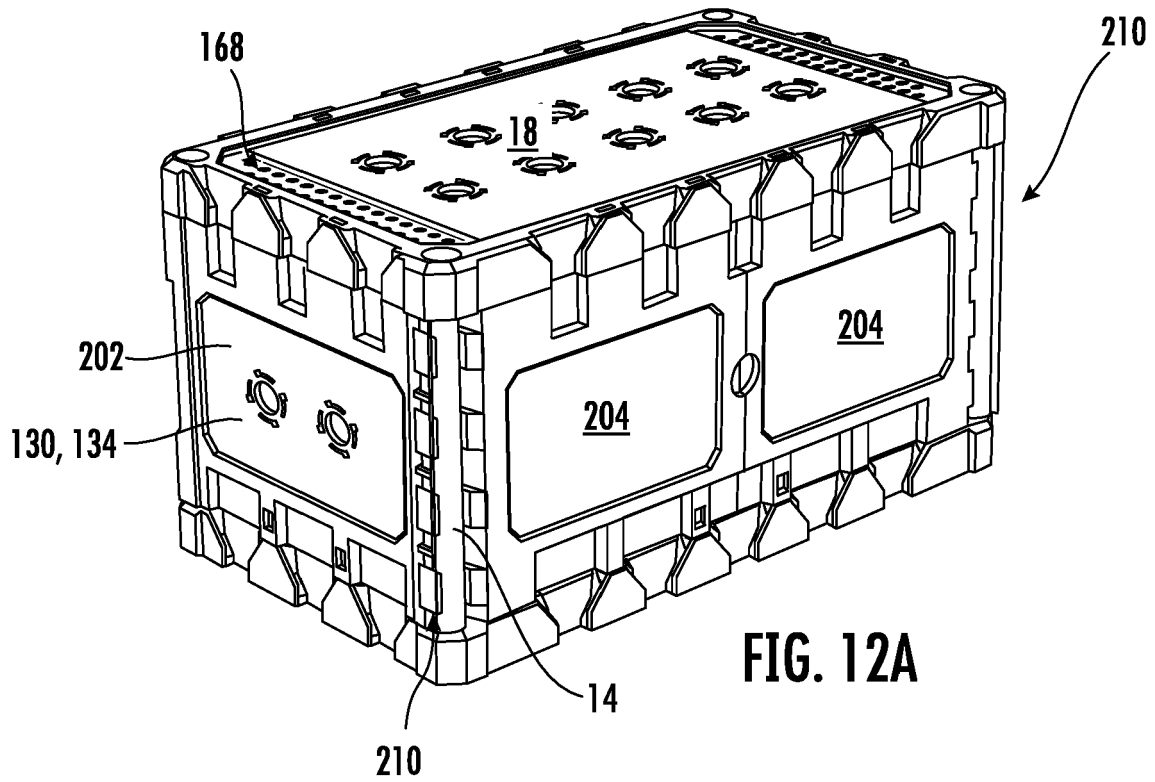
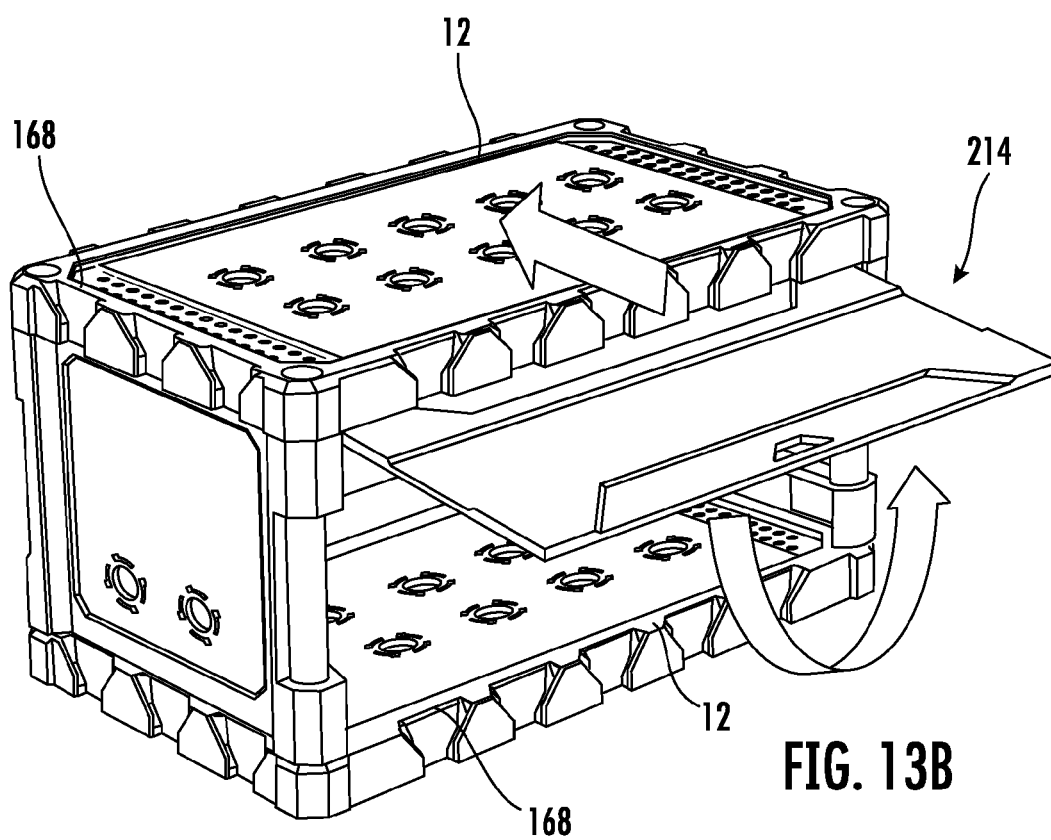
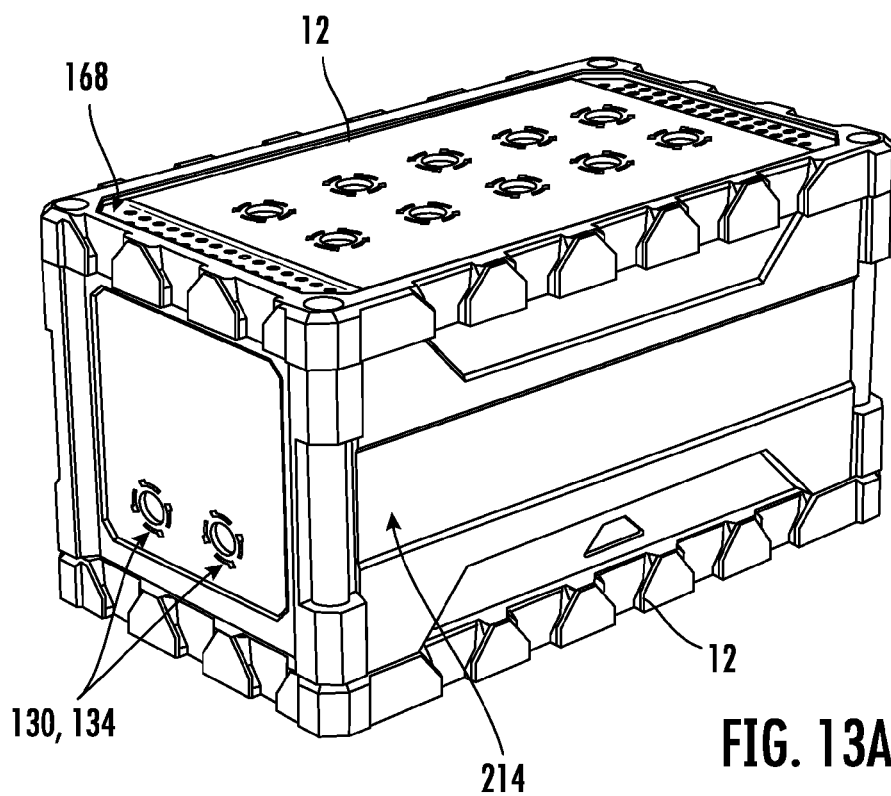


FIG. 10







**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

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