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(54) Title: COLLAPSIBLE FABRIC PODS

(57) Abstract: Collapsible fabric pods may include a plurality of posts attached to a base and a fabric bin array attached to the plurality of posts, wherein the plurality of posts are displaceable between an upright position and collapsed position. When the plurality of posts are in the upright position, the plurality of posts support the fabric bin array above the base, and when the plurality of posts are in the collapsed position, the plurality of posts are decoupled or displaced and the fabric bin array is in a compressed position on top of the base.



COLLAPSIBLE FABRIC PODS

RELATED APPLICATIONS

[0001] The present application claims priority to US Patent Application No. 15/050,068 filed on February 22, 2016, entitled "Collapsible Fabric Pods", which is incorporated by reference herein in its entirety.

BACKGROUND

[0002] Modern storage systems, such as those used in warehouses, distribution centers, airport luggage systems, and manufacturing facilities, face significant challenges in managing items. As storage systems grow, the challenges of simultaneously completing large numbers of storage-related tasks, e.g., packing, transporting, and other storage-related tasks, become non-trivial.

[0003] A mobile storage unit may utilize substantially rigid shelving systems. However, these rigid shelving systems can consume valuable storage space when the rigid shelving systems are not in use, and the rigid shelving systems are difficult and time consuming to assemble, break down and transport, resulting in inefficient utilization of storage space that results in lower throughput, unacceptably long response times, and, in general, poor system performance.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004] The detailed description is set forth with reference to the accompanying figures. In the figures, the left-most digit(s) of a reference number identifies the figure in which the reference number first appears. The use of the same reference numbers in different figures indicates similar or identical items.

[0005] FIG. 1 is a perspective diagram of an inventory storage and order fulfillment system that includes an inventory facility, having a floor surface that may define an identifiable pattern, and multiple unmanned drive units that may navigate within the facility using the identifiable pattern on the floor to move collapsible fabric pods.

[0006] FIG. 2 is a block diagram illustrating an example configuration of an inventory management and order fulfillment system that may be implemented within the inventory facility of FIG. 1.

[0007] FIG. 3 is a side view showing an example inventory holder and mobile drive unit that may be used in the systems of FIGS. 1 and 2.

[0008] FIG. 4 illustrates an exploded, perspective view of an example collapsible fabric pod.

[0009] FIG. 5 illustrates a perspective view of an assembled example collapsible fabric pod.

[0010] FIG. 6 illustrates a perspective view of an example collapsible fabric pod in an upright position and a front view of the example collapsible fabric pod in a collapsed position.

[0011] FIG. 7 illustrates a perspective view of the collapsible fabric pod illustrated in FIG. 6 with the legs of the collapsible fabric pod arranged up beneath the base.

[0012] FIG. 8 illustrates an example structural connection corresponding to location A illustrated in FIG. 5.

[0013] FIG. 9 illustrates an example process of using an example collapsible fabric pod.

DETAILED DESCRIPTION

[0014] This application describes, in part, collapsible fabric-based pods or collapsible inventory holders (“collapsible fabric pods”), as well as techniques for use in an infrastructure that uses a mobile order fulfillment system in which mobile drive units, which in some instances may be robotic drive units, forklifts, lift trucks, etc. may be dispatched and instructed to bring inventory holders to a workstation and/or to store inventory holders in a storage area. The techniques may include applying an “identifiable pattern” or “image,” such as a random pattern, to a floor surface of the infrastructure, from which a map may be created that associates locations within the infrastructure to different portions of the image. A mobile drive unit may then reference the map along with images of the floor surface captured by its imaging device, e.g., a camera, in order to determine its current location, as well as how to reach a desired destination.

[0015] While in some examples, the collapsible fabric-based pods may be portable and mobile drive units may transport the collapsible fabric-based pods in an upright (e.g., erect, popped-up, expanded, etc.) position or in a collapsed (e.g., broken down, compressed, flattened, etc.) position, in other examples, the collapsible fabric-based pods may not be transported by mobile drive units. Because the collapsible fabric-based pods can be disassembled or collapsed into an inactive configuration, an amount of space needed to store collapsible fabric-based pods when not in use can be reduced compared to fabric-based pods that are not collapsible. In various examples, the inactive configuration can reduce the amount of space by about two to twelve times compared to fabric-based pods that are not collapsible or collapsible fabric-based pods in their expanded or active state. In a few particular examples, the inactive configuration can reduce the amount of space by about two times, five times or ten times. Moreover, because the collapsible fabric-based pods can be disassembled or collapsed into the collapsed position, the collapsible fabric-based pods can provide for sharing assets between inventory facilities. Also, the collapsible fabric-based pods can be built up into the upright position in much less time than assembling fabric-based pods that are not collapsible. Further, because the collapsible fabric-based pods can be transported in an upright position with product stored in the collapsible fabric-based pods, the collapsible fabric-based pods can be shipped via a trailer (e.g., a standard 53 foot trailer, a standard 12 meter trailer, a standard 16 meter trailer, etc.) and provide for sharing inventory items between inventory facilities. While in some examples, the collapsible fabric-based pods may be used in an inventory facility (e.g., a warehouse, a depot, distribution center, etc.), in other examples, the collapsible fabric-based pods may be used in a retail environment (e.g., a store, a brick and mortar store, a shopping mall, a marketplace, etc.).

[0016] FIG. 1 illustrates the components of an inventory storage and order fulfillment system or infrastructure 100 that includes an inventory facility 102 that is used to store inventory items that are ordered by and shipped to customers or other entities. In the described embodiment, the inventory facility 102 uses an automated mobile fulfillment system in which inventory items are stored in portable inventory holders 104 and moved about the facility 102 by mobile drive units. The mobile drive units may be “unmanned” or “robotic” drive units 106. While some mobile drive units 106 may be “unmanned”—and therefore do not transport a human—other mobile drive units (or simply “drive units”) described herein may be configured to transport a human, regardless of whether that human controls the navigation of the corresponding drive unit. Within the illustrated environment, inventory holders 104 may be moved to a human worker 108 using the drive units 106 so that the worker can

manually retrieve or “pick” ordered items from, store or “stow” inventory items into, or otherwise manipulate or adjust inventory items within, the inventory holders 104.

[0017] As a specific example, a received order may specify a plurality of inventory items. In response to such an order, the inventory holders 104 containing the inventory items are moved by the mobile drive units 106 to a workstation or other area 110 where the worker 108 retrieves the ordered items. In some implementations, inventory items retrieved in this manner may be placed on an additional inventory holder 104 that contains one or more outgoing orders. Once completed, the additional inventory holder 104 may be moved by a mobile drive unit 106 to a shipping workstation or other processing point. In addition, certain inventory holders 104 that have been loaded with specified inventory items may also be moved to or onto a transport vehicle for shipment to a different inventory facility.

[0018] As another example, inventory restocking may be performed when receiving new inventory at an inventory facility 102. The mobile fulfillment system identifies one or more inventory holders 104 that are to be used for storage of the incoming inventory items. For example, the one or more inventory holders 104 may include a unique identifier that the mobile fulfillment system utilizes to identify the one or more inventory holders 104. The mobile drive units 106 bring the identified inventory holders 104 to the worker 108 at the location of the new inventory. The worker 108 can then load the new inventory onto the inventory holders 104. After being loaded, mobile drive units 106 may be used to move the inventory holders 104 to appropriate locations within the inventory facility 102 for storage or to waiting transport vehicles for transport to different inventory facilities 102.

[0019] As described in further detail below, the mobile drive units 106 may include an imaging device, e.g., a camera, pointed substantially downwards for the purpose of capturing images of the floor surface of the inventory facility 102. In some instances, this floor surface may include an image (e.g., a random pattern or other image) that the mobile drive units 106 may utilize in order to navigate about the inventory facility 102. That is, the mobile drive units may reference a map that associates different locations of the facility 102 to different portions of the image on the floor. By doing so, the units 106 may compare the images captured by their respective cameras to the map to determine their current location, as well as to determine a path to reach a desired location.

[0020] FIG. 2 illustrates an example configuration of an inventory management and/or order fulfillment system 200 that may be implemented in the inventory facility 102 described above. In the system 200 of FIG. 2, the mobile drive units 106 are used to transport the inventory holders 104 between points within a workspace 202 of an inventory facility. The workspace may include workstations 110, one or more loading docks 204, and cargo compartments 206 of one or more transport vehicles such as the transport vehicle 112 of FIG. 1. The workspace 202 may also include designated locations 208 for placement and storage of the inventory holders 104.

[0021] The mobile drive units 106 move the inventory holders 104 between locations within the workspace 202 under the general direction and control of a management component 210, which is also referred to herein as control logic 210. The management component 210 assigns tasks 212 to the mobile drive units 106 and other components of the system and coordinates operation of the mobile drive units 106 in completing the tasks 212. The tasks 212 may relate not only to the movement and processing of inventory holders 104, but also to the management and maintenance of the components of the system 200. For example, the management component 210 may assign portions of the workspace 202 as parking spaces for the mobile drive units 106, the scheduled

recharge or replacement of mobile drive unit batteries, the storage of empty inventory holders 104, or any other operations associated with the functionality supported by the system 200 and its various components.

[0022] Although shown in FIG. 2 as a single, discrete component, the management component 210 may represent multiple components and may represent or include portions of the mobile drive units 106 or other elements of the system 200. As a result, any or all of the interaction between a particular mobile drive unit 106 and the management module 210 that is described below may in particular embodiments represent peer-to-peer communication between that mobile drive unit 106 and one or more other mobile drive units 106.

[0023] The mobile drive units 106 may comprise any devices or components appropriate for use in the system 200 based on the characteristics and configuration of the inventory holders 104 and/or other elements of the system 200. In a particular embodiment, the mobile drive units 106 are self-powered, wheeled devices configured to move autonomously about the workspace 202 without direct human supervision. In general, the mobile drive units 106 may be powered, propelled, and controlled in any manner appropriate based on the configuration and characteristics of the system 200.

[0024] The mobile drive units 106 may be capable of communicating with the management component 210 to receive information identifying selected inventory holders 104, to transmit the locations of the mobile drive units 106, and/or to exchange any other suitable information to be used by the management component 210 or the mobile drive units 106 during operation. The mobile drive units 106 may communicate with the management component 210 wirelessly, using wired connections between the mobile drive units 106 and the management component 210, and/or in any other appropriate manner. As one example, particular embodiments of the mobile drive unit 106 may communicate with the management component 210 and/or with one another using 802.11, Bluetooth, or Infrared Data Association (IrDA) standards, or any other appropriate wireless communication protocol. Furthermore, as noted above, the management component 210 may include components of individual mobile drive units 106. Thus, for the purposes of this description and the claims that follow, communications between the management component 210 and a particular mobile drive unit 106 may represent communication between components of a particular mobile drive unit 106.

[0025] The inventory holders 104 store inventory items. Inventory items may comprise any objects suitable for storage, retrieval, and/or processing by the system 200. In one example, inventory items may comprise completed orders, groups of items, and/or kits. In a particular embodiment, the inventory holders 104 include multiple storage bins with each storage bin capable of holding one or more types of inventory items. In some examples, the storage bins (or each storage bin) may have a unique identifier associated with a unique identifier of a respective inventory holder 104. The inventory holders 104 are capable of being carried, rolled, and/or otherwise moved by the mobile drive units 106. In some embodiments, some of the inventory holders 104 may be attached to each other.

[0026] In an example implementation, the system 200 may be implemented by a mail or online order warehouse facility, and inventory items may comprise merchandise stored in the warehouse facility. During operation, the mobile drive units 106 may retrieve inventory holders 104 containing one or more inventory items requested in an order to be packed for delivery to a customer. Moreover, in particular embodiments of the system 200, boxes containing completed orders may themselves represent inventory items.

[0027] As another example, the system 200 may be implemented by a merchandise-return facility. In such an embodiment, inventory items may represent merchandise returned by customers. Units of these inventory items

may be stored in the inventory holders 104 when received at the workspace 202. At appropriate times, a large number of units may be removed from a particular inventory holder 104 and packed for shipment back to a warehouse or other facility. For example, individual units of a particular inventory item may be received and stored in the inventory holders 104 until a threshold number of units of that inventory item have been received.

5 The mobile drive units 106 may then be tasked with retrieving an inventory holder 104 in this state. The inventory holder 104 may then be shipped to another facility, such as a mail-order warehouse.

[0028] As another example, the system 200 may be implemented by an airport luggage facility. In such an embodiment, inventory items may represent pieces of luggage stored in the luggage facility. The mobile drive units 106 may retrieve inventory holders 104 storing luggage that is arriving and/or departing on particular flights
10 or luggage that is destined for particular types of processing, such as x-ray or manual searching.

[0029] As yet another example, the system 200 may be implemented by a manufacturing facility, and inventory items may represent individual components of a manufacturing kit. More specifically, inventory items may represent components intended for inclusion in an assembled product, such as electronic components for a customized computer system. In such an embodiment, the system 200 may retrieve particular components
15 identified by a specification associated with an order for the product so that a customized version of the product can be built.

[0030] More generally, the system 200 may be implemented by or within any facility or system for storing and processing inventory items, and inventory items may represent objects of any type suitable for storage, retrieval, and/or processing in a particular system 200. In addition, the system 200 and the techniques described herein
20 may apply in any environment in which it may be advantageous to move individual, unmanned drive units about an environment.

[0031] The workstations 110 may comprise locations designated for the completion of particular tasks involving inventory items. Such tasks may include the removal of inventory items from the inventory holders 104, the introduction of inventory items into the inventory holders 104, the counting of inventory items in the inventory
25 holders 104, the decomposition of inventory items (e.g. from pallet or case-sized groups to individual inventory items), and/or the processing or handling of inventory items in any other suitable manner. In particular embodiments, the workstations 110 may represent the physical locations where a particular task involving inventory items can be completed within the workspace 202. In alternative embodiments, the workstations 110 may represent both the physical location and also any appropriate equipment for processing or handling inventory
30 items, such as scanners for monitoring the flow of inventory items in and out of the system 200, communication interfaces for communicating with the management component 210, and/or any other suitable components.

[0032] The workstations 110 can be controlled, entirely or in part, by human workers or may be fully automated. Moreover, the human or automated operators of the workstations 110 may be capable of performing certain tasks with respect to inventory items, such as packing or counting inventory items, as part of the operation of the system
35 200.

[0033] The workspace 202 may include an area associated with the system 200 in which the mobile drive units 106 can move and/or the inventory holders 104 can be stored. For example, the workspace 202 may represent all or part of the floor of a mail-order warehouse in which the system 200 operates. Although FIG. 2 shows an embodiment of the system 200 in which workspace 202 includes a fixed, predetermined, and finite physical space,

particular embodiments of the system 200 may include unmanned mobile drive units 106 and inventory holders 104 that are configured to operate within a workspace 202 that is of variable dimensions and/or an arbitrary geometry. Also, while the workspace 202 may be enclosed in a building, alternative embodiments may utilize workspaces 202 in which some or all of the workspace 202 is located outdoors, within a vehicle (such as a cargo ship), or otherwise unconstrained by any fixed structure. Moreover, in particular embodiments, the workspace 202 may include multiple portions that are physically separated from one another, including but not limited to separate floors, rooms, buildings, and/or portions divided in any other suitable manner.

[0034] When moving the inventory holders 104 to different locations within the workspace 202, the mobile drive units 106 may dock with and transport the inventory holders 104. The mobile drive units 106 may dock with the inventory holders 104 by connecting to, lifting, and/or otherwise interacting with the inventory holders 104 or in any other suitable manner so that, when docked, the mobile drive units 106 are coupled to and/or support the inventory holders 104 and can move the inventory holders 104 within the workspace 202. While the description below focuses on particular embodiments of the mobile drive unit 106 and inventory holder 104 that are configured to dock in a particular manner, alternative embodiments of mobile drive unit 106 and inventory holder 104 may be configured to dock in any manner suitable to allow the mobile drive unit 106 to move an inventory holder 104 within the workspace 202. Additionally, as noted below, in particular embodiments the mobile drive units 106 may represent all or portions of the inventory holders 104. In such embodiments, the mobile drive units 106 may not dock with inventory holders 104 before transporting the inventory holders 104 and/or the mobile drive units 106 may each remain continually docked with a particular inventory holder 104.

[0035] FIG. 3 illustrates an example implementation of an inventory holder 104 and a mobile drive unit 106. The inventory holder 104 includes a base or base portion 302 and a storage portion 304. The storage portion may comprise one or more bins or shelves 306. The bins or shelves 306 may be formed integrally with the base 302 and with each other, or may comprise separate stackable trays that are detachable from each other and/or from the base portion 302. In some embodiments, the inventory holder 104 may be expandable and/or collapsible. For example, the bins or shelves 306 may be expanded from a collapsed position where the bins or shelves 306 are in a non-use position (e.g., closed and not arranged to hold or store inventory items) to an expanded position where the bins or shelves 306 are in a use position (e.g., open and arranged to hold or store inventory items).

[0036] In some embodiments, the storage portion may have connection points, such as holes, hooks, etc., suitable for use by a manned lift such as a forklift or other drive lift. For example, the storage portion may have slots or hooks for engagement by a forklift or other equipment. In embodiments where the base portion 302 and storage portion 304 are integral, lifting the storage portion 304 by the slots or hooks will also lift the base portion 302. In embodiments where the base portion 302 and the storage portion 304 are detachable, lifting the storage portion 304 by the slots or hooks may separate the storage portion 304 from the base portion 302 so that the storage portion may be moved independently of the base portion 302. In some embodiments, some of the storage bins 306 may be attached to each other. In some embodiments, some of the portable inventory holders 104 may be attached to each other.

[0037] A plurality of inventory items 308 are held or stored by the bins or shelves 306. In some cases, the bins or shelves 306 may have adjustable dividers to provide separate spaces for different inventory items on individual

bins or shelves 306. In some examples, the storage bins 306 (or each storage bin 306) may have a unique identifier 316, which in some instances may be associated with a unique identifier of a respective inventory holder 104.

[0038] In some embodiments inventory holders 104 include collapsible fabric pods. In such embodiments, storage portion 304 and/or the bins or shelves 306 can include one or more fabric bin arrays. In some
5 embodiments, the collapsible fabric bin array of an inventory holder 104 may be attached to at least another collapsible fabric bin array of another inventory holder 104 adjacent to the inventory holder 104. The collapsible fabric bin array attached to the other collapsible fabric bin array may define an array of arrays of collapsible fabric bins. Further, the collapsible fabric pods may be displaceable between an upright position and a collapsed position, and may include one or more intermediate positions. When in the upright position the collapsible fabric
10 pod may be arranged substantially vertically above the base portion 302 of the inventory holder 104 for holding the plurality of inventory items 308, and when in the collapsed position the collapsible fabric pod may be arranged in a substantially compressed position on top of the base portion 302 of the inventory holder 104 for storing the inventory holder 104 until a time of use when the inventory holder 104 is needed to hold the plurality of inventory items 308. When in the one or more intermediate positions, one or more shelves 306 of the collapsible fabric pod
15 may be partially or completely collapsed such that only a portion of the fabric pod is collapsed.

[0039] The inventory holder 104 or the base portion 302 of the inventory holder 104 may have a plurality of legs 310 that extend downward from the base 302 to support the inventory holder on a floor or surface 312 of an inventory facility 102 and/or transport vehicle 112. The legs 310 provide a space above the floor 312 and between each other so that the mobile drive unit 106 can maneuver itself beneath the base portion 302. In some
20 embodiments, the legs 310 may be arranged to foldup (e.g., pivoted) into the base portion 302 to provide for converting the base portion 302 into a pallet (or to be received by a pallet) and shipping the inventory holder 104. While FIG. 3 illustrates the inventory holder 104 including a base or base portion 302, the inventory holder may omit a base or base portion 302. For example, the inventory holder 104 may include three or more posts that may support the one or more bins or shelves and the three or more posts may rest on the floor 312. Moreover, the
25 three or more posts may provide a space above the floor 312 and between each other so that the mobile drive unit 106 can maneuver itself beneath the storage portion 304. For example, the three or more posts may extend past a structural member (e.g., a crossbeam(s) or a cable(s)) arranged below the storage portion so that the mobile drive unit 106 can maneuver itself beneath the structural member.

[0040] The mobile drive unit 106 may comprise a motorized lift having a plurality of wheels 314 and a lift
30 mechanism 318 to lift and/or transport an inventory holder 104 (e.g., a collapsible fabric pod). The lift mechanism may be a surface, a projection(s) (e.g., a tooth, a tang, a tongue, a pin), a coupling (e.g., a self-locking joint), etc. One or more of the wheels 314 may be driven to move the drive unit 106 over the floor or surface 312. One or more of the wheels 314 may be steerable to guide the drive unit 106 in different directions or paths.

[0041] The lift surface 318 may be configured to dock with the inventory holder 104 by raising the lift surface
35 318 into engagement with the base 302. In one example, the inventory holder 104 may comprise a collapsible fabric pod and the base 302 may provide for the lifting surface 318 to dock with the collapsible fabric pod. In operation, the mobile drive unit 106 may be configured to maneuver itself beneath the inventory holder 104, to raise the inventory holder 104 off of the surface 312 and to move the inventory holder 104 to any desired location under the direction of or in response to instructions from the management component 210. After reaching the

desired location, the mobile drive unit 106 can undock from the inventory holder 104 by lowering the lift surface 318 and thereby placing the inventory holder 104 back on the floor 312.

[0042] Although FIG. 3 illustrates a particular embodiment of mobile drive unit 106 containing certain components and configured to operate in a particular manner, the mobile drive unit 106 may comprise any appropriate component and/or collection of components configured to transport and/or facilitate the transport of inventory holders 104.

[0043] As described above, the mobile drive units may include at least one imaging device, e.g., a camera, which is aimed toward a predefined surface, such as a floor surface, a wall surface, a ceiling surface, or the like. In one particular example, a mobile drive unit 106 may include a camera pointed substantially downwards towards to a floor surface. The unit 106 may capture images of the floor surface and may compare these images to a pre-existing map to identify the unit's location within a facility as well as to determine how to navigate to other locations in the facility. As such, the floor surface may include an image, which may be painted on, etched in, or otherwise formed within or applied to the floor surface. For instance, the image may be based on multiple different colors painted or applied to the floor, etchings in the floor, natural non-uniform textures of a particular material from which the floor has been made, and/or combinations thereof.

[0044] In some embodiments, inventory holders 104 include collapsible fabric pods that may be used for storing and transporting inventory. The collapsible fabric pods may be constructed with one or more fabric bin arrays of any suitable combination of fabric or fabric-like material, such as woven material, nonwoven material, Tyvek®, vinyl, canvas, cotton, plastic, nylon, or composites, other flexible materials including natural fibers such as bamboo, silk, wool or others, animal hides/skins, or plant-based materials such as coconut husks, palm leaves or others. The base portion and storage portion may be constructed with structural elements of any suitable combination of structural material such as steel, aluminum, carbon-based products, plastics, fiberglass, wood, composite and any other suitable structural materials. In some examples, a collapsible fabric pod may be a shelving unit that is made of one or more of: a structural base, corner posts of a structural material that are displaceable between an upright position and a collapsed position, removable structural supports, crossbeams, and/or tubes at the top constructed from one or more structural materials, and at least one fabric bin array constructed from one or more fabric or fabric-like materials. In some implementations, the fabric wraps around the corner posts and when the corner posts are in the upright position, the corner posts support the fabric bin array substantially vertically above the structural base, and when the corner posts are in the collapsed position the corner posts are collapsed (e.g., separated into segments, folded, bent, telescoped, broken down, etc.) in the fabric bin array and the fabric bin array is arranged in a substantially compressed (e.g., packed, flattened, folded, overlaid, crushed, etc.) position on the structural base.

[0045] In some examples, a process involves displacing corner posts from an upright position to a collapsed position and compressing a fabric bin array to collapse a collapsible fabric pod. In another example, a process involves displacing corner posts from a collapsed position to an upright position and stretching a fabric bin array to assemble a collapsible fabric pod. Such collapsible fabric pods may provide for quick and efficient disassembly (e.g., teardown, breakdown, take apart, etc.) of the collapsible fabric pods for storage and/or shipping purposes. By having displaceable corner posts and compressible fabric bin arrays, the collapsed fabric pod may have a size less than a size of an upright non-collapsed fabric pod. Because the collapsed fabric pods have a size less than a

size of an upright non-collapsible fabric pod, the amount of space required to store collapsed fabric pods that are inactive can be reduced by about two to twelve times as compared to the amount of space required to store upright non-collapsed fabric pods that are inactive. Also, because the amount of space required by the collapsible fabric pods is reduced, the collapsible fabric pods provide for lower costs of establishing inventory facilities, lower costs of delivering collapsible fabric pods to inventory facilities, and/or shared collapsible fabric pods between inventory facilities. Such collapsible fabric pods may further provide for quick and efficient assembly (e.g., construction, build-up, erection, etc.) of the collapsible fabric pods for containing a plurality of inventory items. Because the collapsible fabric pods minimize an assembly time, the collapsible fabric pods provide for quickly establishing temporary sites during a peak in activity of receiving, storing, picking, managing and delivering inventory items.

[0046] By having the structural, e.g., steel, support on the top and at the posts, the assembly may have a firm shape and be capable of holding and supporting a large amount of weight. Furthermore, the associated capacity may be larger and more flexible than traditional storage products. Moreover, the associated functional storage space may be greater than traditional rigid storage structures such as steel or plastic storage structures.

[0047] In some instances, the collapsible fabric pod includes a fabric bin array that has bins (or shelves) for holding product. A bin can be up to any width or height within the envelope of the collapsible fabric pod. Thus, the collapsible fabric pod may store items of various sizes, shapes, and weights. Furthermore, in some examples, the collapsible fabric pod can be built to have any suitable bin size on any face or side. For example, one side of a collapsible fabric pod may have a different number and different sizes of bins than a different side.

[0048] Furthermore, in some examples, different combinations of materials, colors, bin sizes, and collapsible fabric pod sizes may be used to increase the functionality and efficiency of collapsible fabric pods. For example, different combinations of the above characteristics may be used to depict shelf height, product location, labeling, and other storage-related aspects for product. For example, the fabric pod may include a first row or column of fabric bins associated with a first color and a second row or column of fabric bins associated with a second color different from the first color, and a user (e.g., an operator or human worker) may identify the first row or column or the second row or column based on the first and/or second colors to obtain an inventory item contained in a fabric bin arranged in the first row or column of fabric bins or in the second row or column of fabric bins. Furthermore, in some examples, a collapsible fabric pod itself can be a color associated with an inventory item. For example, collapsible fabric pods may be different colors depending on the type of inventory items each collapsible fabric pod may be designated to contain. For example, a collapsible fabric pod may be a particular color indicating a high value item, a hazardous material item, a fragile item, a perishable item, etc.

[0049] Thus, the collapsible fabric pod may be configurable for any product and can be configured, manufactured, assembled, or pre-assembled (e.g., prefabricated) to have multiple bin arrays that are suitable for different types of inventory. In some instances, the fabric edges of collapsible fabric pods can prevent or reduce injuries to lower rates than those associated with non-fabric pods (e.g., metal-based edges). Furthermore, in some examples, a collapsible fabric pod can be reconfigured by replacing or modifying the fabric, while retaining the same structure. Thus, collapsible fabric pods may be changed based on changing inventory sizes or quantities.

[0050] FIG. 4 illustrates an exploded, perspective view of an example collapsible fabric pod 400. In some examples, the collapsible fabric pod 400 may be a type of the inventory holder 104 of FIG. 3. Thus, the collapsible

fabric pod 400 may be suitable for being handled by a mobile drive unit, such as the mobile drive unit 106 of FIG. 3.

[0051] As illustrated, the collapsible fabric pod 400 includes a fabric bin array 402. The collapsible fabric pod 400 may include more than one fabric bin array 402, such as a fabric bin array 402 on more than one side of the collapsible fabric pod 400. In the example, the fabric bin array 402 includes multiple bins on two sides of the collapsible fabric pod. The bins may be of one or more varying sizes. In some instances, each bin is approximately the same size. Furthermore, there may be any number of rows and columns of bins in the fabric bin array 402. In some examples, one or more individual bins of the fabric bin array 402 may have a unique identifier 404, which in some instances may be associated with a unique identifier of the collapsible fabric pod 400. In some examples, one or more individual bins of the fabric bin array 402 may have a door, a drawer, retaining lip, ledge, or an elastic band(s) that may contain the one or more inventory items within the individual bin.

[0052] In the illustrated example, the fabric bin array 402 slides onto four posts 406 of approximately equal height via sleeves 408 along the four corners of the fabric bin array 402. In other examples, clips, loops, magnets, glue, or any other suitable attachment method may be used. Thus, a different portion of the fabric bin array 402 wraps around each of the posts 406.

[0053] The posts 406 are each attached to a respective corner of a base 410. In this example, the posts 406 include segments 412 that are removeably coupled via a locking mechanism 414. The segments 412 can include a plurality of tubular segments constructed from at least one of steel, aluminum, composite, carbon fiber, or plastic. The tubular segments can have a curvilinear cross-section (e.g., circular cross-section, oval cross-section, etc.), or polygonal cross-section (e.g., rectangular cross-section, triangular cross-section, rhombus cross-section etc.). In another example, the posts 406 may include segments that are foldably (e.g., pivotably) coupled via a locking hinge, or a hinge and corresponding locking sleeve that maintains the hinge in a particular position. In another example, the posts 406 may include segments that are slideably coupled (e.g., telescoping) via tubular couplings. The base 410 is rectangular in the illustrated example. In some examples, the base may be polygonal (e.g., square, triangular, rhombus), curvilinear (e.g., circular, oval), have rounded edges, or be any other suitable shape. Furthermore, four crossbeams 416 are illustrated configured to be attached to a top portion of each of the four posts 406 to form the rectangle. Thus, each of the four crossbeams 416 supports a respective portion of the fabric bin array. Furthermore, the four crossbeams 416 may be tubes, solid beams, wires, or any other suitable structure for supporting the middle portion of the fabric bin array 402. Furthermore, the four crossbeams 416 may include at least one locking mechanism 418 arranged to attach a respective portion of the fabric bin array 402 to each of the four crossbeams 416. In some embodiments there may be more or less than four crossbeams 416. The base 410 may also include the locking mechanisms 418 arranged to attach a respective portion of the fabric bin array 402 to each of the four side members of the base 410. The four posts 406 may also include the locking mechanisms 418 arranged to attach a respective portion of the fabric bin array 402 to respective segments 412.

[0054] In some instances, one or more additional top supports or crossbeams are attached to two of the four crossbeams 416. Thus, the additional crossbeams support a middle portion of the fabric bin array 402. In some examples, the one or more additional crossbeams are attached to two of the four crossbeams 416 via sleeves at

the top of the fabric bin array 402. In some examples, clips, loops, magnets, glue, or any other suitable attachment method may be used. Furthermore, the additional crossbeams may be tubes, solid beams, wires, or any other suitable structure for supporting the middle portion of the fabric bin array 402. In some examples, clips fixed to the fabric bin array 402 may attach to one or more of the four crossbeams 416 to support a respective portion of the fabric bin array. In some instances, one or more straps fixed to the fabric bin array 402 may attach to a respective portion of the crossbeams 416, additional top supports, the posts 406 and/or the base 410 to support a respective portion of the fabric bin array.

[0055] In the illustrated example, the collapsible fabric pod 400 includes four legs 420. The legs 420 are an example of the legs 310 of FIG. 3. The legs 420 can be displaceably attached to the corners of the base 410. For example, the legs 420 can be pivotably or foldably attached to the base 410 via hinges. The legs 420 may be arranged to fold up into the bottom of the base 410 (described in more detail with regard to FIG. 7).

[0056] FIG. 5 illustrates a perspective view of an assembled example collapsible fabric pod 500. The collapsible fabric pod 500 is an example of the collapsible fabric pod 400 of FIG. 4. FIG. 5 illustrates the locking mechanisms 418 attaching respective portions of the fabric bin array 402 to the segments 412 of the four posts 406, the four crossbeams 416, and the base 410. Detail view 502 illustrates the locking mechanism 418 is a grommet (e.g., metal grommet, plastic grommet, composite grommet, wood grommet, etc.). For example, a tab or knob may be received by the grommet and fix or lock the respective portion of the fabric bin array to a segment, a crossbeam and/or base. The locking mechanisms 418 arranged in the four crossbeams 416 provide for stabilizing the top of the collapsible fabric pod 500. While Detail view 502 illustrates the locking mechanism 418 is a grommet, the locking mechanism 418 can be a turn or twist lock, a folding lock, button lock, etc. In one example, the respective portion of the fabric bin array may be a strap (e.g., top strap, side strap, bottom strap, etc.) fixed to the fabric bin array. In another example, the respective portion of the fabric bin array may be a sleeve (e.g., post sleeve, corner sleeve, segment sleeve, etc.).

[0057] Detail view 504 illustrates the locking mechanism 414 in a coupled position 506 and a decoupled position 508. Detail view illustrates the locking mechanism 414 is a button lock (e.g., push button lock, pop button lock, pop lock, tube pin, snap clip tube pin, locking tube pin, locking snap clip, etc.). For example, a depressible button arranged in a first segment of a first post may be received by an aperture arranged in a second segment of the first post. The depressible button received by the aperture may fix or lock the first segment of the first post with the second segment of the first post. While Detail view 504 illustrates the locking mechanism 414 is a button lock, the locking mechanism 414 can be a threaded nut, a c-clamp, a compression fitting, etc. The locking mechanism 414 provides for removeably coupling each of the segments together in the upright position to support the fabric bin array substantially vertically above the top of the base. One or more fasteners 510 (e.g., bolts, screws, pins, locking pins, etc.) may also be used to secure the segments together. The coupled position 506 and decoupled position 508 illustrated in detail view 504 illustrates a portion of a first segment of a first post may be removeably receivable by a second segment of the first post. For example, a portion of the first segment may be removeably received by a coupling portion of the second segment.

[0058] Detail view 512 illustrates a side post lock 514 is a button (e.g., push button lock, pop button lock, pop lock, tube pin, snap clip tube pin, locking tube pin, locking snap clip, etc.) similar to the locking mechanism 414. For example, a depressible button arranged in a segment 412 of a post 406 may be received by an aperture

arranged in structural member fixed to a corner of the base 410. The depressible button received by the aperture may fix or lock the segment of the post with the structural member of the base 410. Detail view 512 illustrates the segments 412 of the posts 406 are received by the structural member of the base 410 to provide stability to the posts extending up from the base 410. One or more fasteners 516 (e.g., bolts, screws, pins, locking pins, etc.) may also be used to secure the posts 406 to the base 410. Detail view 512 illustrates the base 410 can include stacking pegs 518. Stacking pegs 518 may provide for stacking collapsible fabric pods.

[0059] FIG. 5 illustrates the base 410 can include a telescoping mechanism 520. The telescoping mechanism 520 may allow the base 410 to be increased or reduced in size. For example, one or more telescoping mechanisms 520 may be arranged within the base 410 to provide for increasing or reducing a length and/or a width of the base 410. For example, the base 410 can be made up of telescoping members similar to side posts 406 so that one member can slide into the adjacent member. In the example where the base is made up of telescoping members, the members of the base 410 can have similar push button locks as the side posts 406. Further, the base 410 can have telescoping mechanisms on two or more sides of the base. Because the telescoping mechanism 520 allows the length and/or width of the base 410 to be reduced, at least two collapsible fabric pods 500 can be arranged adjacent to each other in a smaller space than the space needed to arrange at least two collapsible fabric pods not having the telescoping mechanism 520. Because the collapsible fabric pods 500 can be arranged adjacent to each other in a smaller space, a larger quantity of the collapsible fabric pods 500 can be shipped via trailer, container, crate, etc.

[0060] FIG. 5 illustrates location A at one of the top four corners of the collapsible fabric pod 500. An example structural connection corresponding to the location A is described in detail with regard to FIG. 8 below.

[0061] FIG. 6 illustrates a perspective view of an example collapsible fabric pod 600 in an upright position 602 and a front view of the example collapsible fabric pod 600 in a collapsed position 604. The perspective view of the collapsible fabric pod 600 in the upright position 602 shows each of the four posts 406 are in the upright position 602. The front view of the collapsible fabric pod 600 in the collapsed position 604 shows each of the four posts in the collapsed position 604. The perspective view of the example collapsible fabric pod 600 in the upright position 602 shows that when in the upright position 602 each of the four posts 406 support the fabric bin array 402 substantially vertically above a top of the base 410. The front view of the collapsible fabric pod 600 in the collapsed position 604 shows that when in the collapsed position 604 each of the four posts are collapsed in the fabric bin array 402 and the fabric bin array 402 is in a substantially compressed position on the top of the base 410. The upright position 602 and the collapsed position 604 illustrate each of the segments are removeably coupleable to displace each of the plurality of posts 406 between the upright position 602 and the collapsed position 604. For example, when in the upright position 602 each of the segments 412 of each of the plurality of posts 406 are in the coupled position 506 (illustrated in FIG. 5) and support the fabric bin array 402 substantially vertically above the top of the base 410, and when in the collapsed position 604 each of the segments 412 of each of the plurality of posts 406 are in the decoupled position 508 (illustrated in FIG. 5) and the fabric bin array 402 is in the compressed position on the top of the base 410.

[0062] While FIG. 6 illustrates the collapsible fabric pod 600 is displaceable between the upright position 602 and the collapsed position 604, the collapsible fabric pod 600 is collapsible to positions between the upright position 602 and the collapsed position 604. For example, the collapsible fabric pod 600 can be collapsed or

expanded per collapsible section 606. The collapsible fabric pod 600 can be collapsed per collapsible section 606 for configuring a size of the fabric bin array. For example, each of a first plurality of segments 412 of a first collapsible section can be decoupled from a respective one of a second plurality of segments 412 of a second collapsible section. When the first plurality of segments of the first collapsible section are decoupled from the second plurality of segments of the second collapsible section, the first collapsible section is collapsed down in a direction 608 to a position on the top of the second collapsible section. Because the collapsible fabric pod 600 can be collapsed or expanded per collapsible section 606 a size of the fabric bin array 402 can be configured based on inventory items to be contained in the fabric bin array 402.

[0063] When in the upright position 602, in one example, the collapsible fabric pod 600 may have a length of about 37 inches (94 centimeters), a width of about 37 inches (94 centimeters), and a height of about 108 inches (274 centimeters). When in the collapsed position 604, in one example, the collapsible fabric pod 600 may have a length of about 37 inches (94 centimeters), a width of about 37 inches (94 centimeters), and a height of about 16 inches (41 centimeters). In another example, when in the upright position 602, the collapsible fabric pod 600 may have a length of at least about 18 inches (46 centimeters) to at most about 55 inches (140 centimeters), a width of at least about 18 inches (46 centimeters) to at most about 55 inches (140 centimeters), and a height of at least about 54 inches (137 centimeters) to at most about 162 inches (411 centimeters), and when in the collapsed position 604, the collapsible fabric pod 600 may have a height of at least about 8 inches (20 centimeters) to at most about 24 inches (61 centimeters).

[0064] While the collapsed position 604 illustrates a plurality of decoupled segments 412, one or more of the segments 412 may not be decoupled in the collapsed position 604. For example, each of the four posts 406 can be composed of a plurality of segments that are rotatably coupleable or internally telescoping to displace the four posts 406 between the upright position 602 and the collapsed position 604. When in the upright position 602 each of the rotatably coupleable segments or internally telescoping segments of each of the four posts 406 are coupled together and support the fabric bin array substantially vertically above the top of the base. When in the collapsed position each of the rotatably coupleable segments or internally telescoping segments of each of the four posts 406 are collapsed and the fabric bin array is in the compressed position on the top of the base. In an example, where the plurality of segments are rotatably coupleable or internally telescoping, each of the sections 606 may be rotatable relative to other sections 606. For example, each section 606 may rotate down on top of another section 606. In this example, where the sections 606 may rotate down on top of each other via rotatable joints located vertically between corresponding tops and bottoms of each row of shelves, a footprint of the collapsible fabric pod may increase when in the collapsed position. For example, where the sections 606 may rotate down on top of each other, the footprint of the collapsible fabric pod may increase to a size larger than a standard pallet size (e.g., International Organization for Standardization (ISO) Standard 6780). In another example, where the plurality of segments are rotatably coupleable or internally telescoping, the sections 606 may fold at folding joints located vertically adjacent to corresponding tops and/or bottoms of each row of shelves. In this example, where the plurality of segments fold at folding joints between the plurality of segments, each section 606 may fold relative to each other into the collapsed position or the upright position while maintaining an overall footprint in the collapsed position that stays within the footprint of the base 410. In another example, where the plurality of segments are rotatably coupleable or internally telescoping, the plurality of segments may rotate and telescope

relative to each other. For example, one or more of the segments may rotate relative to one or more other segments, and one or more of the segments may telescope relative to one or more other segments. In this example, where the plurality of segments may rotate and telescope relative to each other, each section may rotate and/or telescope relative to each other into the collapsed position or the upright position.

5 **[0065]** FIG. 7 illustrates a perspective view of the collapsible fabric pod 600 in the upright position 602 with the legs 420 arranged up beneath the base 410. The perspective view of the collapsible fabric pod 600 in the upright position 602 illustrates the base 410 includes pockets 700 arranged in a side of the base 410 for receiving a lifting member (e.g., tines of a forklift). The pockets 700 provide for the lifting member to raise the base 410 off of a surface. For example, the pockets 700 provide for raising the base 410 off of a surface to move the
10 collapsible fabric pod 600, when the four posts 406 are in the upright position, to a location based at least in part on one or more inventory items contained in the fabric bin array 402. Because the legs 420 can be arranged up beneath the base 410 and the collapsible fabric pod 600 can be moved with inventory items contained in the fabric bin array 402, the collapsible fabric pod 600 can attain a reduced height in order to be shipped via a trailer (e.g., a standard 53 foot trailer, a standard 12 meter trailer, a standard 16 meter trailer, etc.). Further, because the
15 collapsible fabric pods 600 can be moved with inventory items contained in the fabric bin array 402, the collapsible fabric pods 600 provide for sharing assets between facilities.

[0066] FIG. 7 illustrates a front view of the collapsible fabric pod 600 in the collapsed position 604 with the legs 420 arranged up beneath the base 410. The front view of the collapsible fabric pod 600 in the collapsed position 604 illustrates the base 410 includes the pockets 700 arranged in the side of the base 410 for receiving
20 the lifting member and moving the collapsible fabric pod 600 when the four posts 406 are in the collapsed position. Because the legs 420 can be arranged up beneath the base 410 and the collapsible fabric pod 600 can be moved in the collapsed position 604, the collapsible fabric pod 600 can be shipped via a trailer (e.g., a standard 53 foot trailer) and provide for delivering collapsible pods 600 for faster installations. For example, the collapsible fabric pods 600 can be delivered and setup in less time to new facilities (e.g., newly constructed type facilities, under
25 construction type facilities, newly established type facilities, etc.) and/or temporary facilities (e.g., peak time type facilities, tent type facilities, portable type facilities, shelter type facilities, etc.). Moreover, because the legs 420 can be arranged up beneath the base 410 and the collapsible fabric pod 600 can be moved in the collapsed position 604, the collapsible fabric pods 600 can be stacked on each other.

[0067] FIG. 7 illustrates a bottom view 702 of the base 410 of the collapsible fabric pod 600 with a lifting
30 member 704 received by the pockets 700 arranged in the side of the base 410. The bottom view 702 shows the each of the four legs 420 configured to attach to a respective corner of the base 410 and arranged to fold up into a bottom of the base 410 opposite the top of the base 410. The bottom view 702 shows the legs 420 can be attached to the base 410 via hinges 706. The bottom view 702 also shows respective two adjacent legs 420 of the four legs 420 fold up into the bottom of the base 410 toward each other and along the side of the base 410.
35 Because adjacent legs 420 fold up toward each other on the sides the base 410, this provides for folding the legs 420 into the base 410 subsequent to the lifting member 704 lifting the base 410 off a surface. In one example, the four legs 420 can be maintained in the folded position via one or more straps fixed to the fabric bin array 402. For example, one or more straps fixed to the fabric bin array 402 may wrap around the legs 420 folded in the base 410, and attach to a respective portion of the crossbeams 416 and/or the base 410 to maintain the legs 420 in the

folded position. In another example, the four legs 420 can be maintained in the folded position via pins, springs, latches, etc. arranged with the four legs 420 and the base 410. In another example, each of the four legs 420 may include a locking mechanism (e.g., the locking mechanism 414) to provide for locking the four legs 420 in the folded position. Further, the locking mechanism can provide for locking the four legs 420 in the un-folded or extended position. Additionally or alternatively, the legs 420 may include one or more springs or other biasing mechanisms, either separately or integrated/incorporated with the hinges or other components, to bias the legs 420 into their extended position, their folded position, or both.

[0068] FIG. 8 illustrates an example structural connection 800 corresponding to location A illustrated in FIG. 5 when the collapsible fabric pod 500 is assembled. The illustrated structural connection 800 includes example first and second crossbeams 802(1) and 802(2) of the four crossbeams 416 illustrated in FIG. 4, and an example top 804 of an example post 806 of the four posts 406 illustrated in FIG. 4. The structural connection 800 illustrates the first crossbeam 802(1) pivotably connected to the top 804 of the post 806 via a pin 808 and removeably coupled to an adjacent post (not shown). The first crossbeam 802(1) is pivotably connected to the top 804 of the post 806 and removeably coupled to the adjacent post of the four posts 406 defining a first position 810 of the first crossbeam 802(1). After the second crossbeam 802(2) is pivotably displaced in a direction 812 toward an adjacent post (not shown) of the four posts 406, the first crossbeam 802(1) can be pivotably displaced about the pin 808 in a direction 814 such that the first crossbeam 802(1) is arranged above the top 804 of the post 806. A channel 816 can be arranged in the post 806 for receiving the first crossbeam 802(1). The channel 816 can extend a full length of the post 806 or stop after a full length of the crossbeam 802(1).

[0069] In one example, when the first crossbeam 802(1) is in the first position 810, the four posts 406 can be in the upright position 602 (illustrated in FIG. 6). In another example, when the first crossbeam 802(1) is in the first position 810, the four posts 406 can be in the collapsed position 604 (illustrated in FIG. 6).

[0070] FIG. 8 illustrates an example structural connection 818 corresponding to location A illustrated in FIG. 5 when the collapsible fabric pod 500 is disassembled and the first crossbeam 802(1) is arranged in a second position 820. The first crossbeam 802(1) is arranged in the second position 820 when the first crossbeam 802(1) is pivotably attached, via the pin 808, to the top 804 of the post 806 and arranged adjacent to the post 806. For example, the first crossbeam 802(1) can continue to be pivotably displaced in the direction 814 about the pin 808 such that the first crossbeam 802(1) is arranged in the channel 816 of the post 806.

[0071] In one example, when the first crossbeam 802(1) is in the second position 820, the four posts 406 can be in the collapsed position 604 (illustrated in FIG. 6). In another example, when the first crossbeam 802(1) is in the second position 820, the four posts 406 can be in the upright position 602 (illustrated in FIG. 6).

[0072] FIG. 8 illustrates the post 806 can include apertures 822 for receiving respective portions of the first and second crossbeams 802(1) and 802(2). In some examples, the first and second crossbeams 802(1) and 802(2) can include notches (e.g., grooves, slits, slots, etc.) for receiving a portion of the top 804 of the post 806. In some examples, the first crossbeam 802(1) can include a locking mechanism (pop lock, turn or twist lock, folding lock, etc.) arranged in an end of the first crossbeam 802(1). For example, a locking mechanism can be arranged in the end of the first crossbeam 802(1) to provide for locking the first crossbeam 802(1) and/or the second crossbeam 802(2) to the top 804 of the post 806. In some examples, a cap 824 can be removeably received by the top 804 of the post 806. The cap 824 can provide for locking the structural connection 800 in the top 804 of the post 806.

Alternatively, the top portion of the collapsible fabric pod 500 may not include any pivotable or removable connections, and may instead include a substantially rigid, integrated structure, similar to the base 410 as described herein. Additionally or alternatively, the top portion of the collapsible fabric pod 500 may include telescoping mechanisms, similar to the telescoping mechanisms 520 as described herein with respect to the base 410, that allow the overall footprint of the top portion of the pod to be increased or reduced.

[0073] FIG. 9 illustrates an example process 900 of using an example collapsible fabric pod (e.g., collapsible fabric pod 500). For instance, this process may be performed to collapse a collapsible fabric pod based at least in part on storing the collapsible fabric pod, shipping the collapsible fabric pod, and/or transporting inventory items contained in the collapsible fabric pod.

[0074] Method 900 may include an operation 902, which represents unlocking locking one or more of the mechanisms (e.g., locking mechanisms 418) attaching a respective portion of a fabric bin array (e.g., fabric bin array 402) to each of four crossbeams (e.g., crossbeams 416) and/or unlocking one or more of the locking mechanisms attaching a respective portion of the fabric bin array to segments (e.g., segments 412) of posts (e.g., posts 406) or any other locking mechanisms attaching portions of the fabric bin array to the collapsible fabric pod. For example, a user may unlock the locking mechanisms so that the fabric bin array can slide along the crossbeams and the segments of the posts. Method 900 may proceed to operation 904, which represents collapsing one or more of the posts and the fabric bin array from the top of the collapsible fabric pod toward the bottom of the collapsible fabric pod. For example, a user may decouple the segments via unlocking one or more of the locking mechanisms (e.g., locking mechanisms 414), separating the segments, such that the segments are in a decoupled position (e.g., decoupled position 508) and free floating in the fabric bin array, while folding the fabric bin array down toward the base and into an intermediate position or a collapsed position (e.g., collapsed position 604). Additionally or alternatively to decoupling the segments, the segments may be rotated, pivoted, telescoped together or apart, or otherwise collapsed into an intermediate position or a collapsed position. Additionally or alternatively, the base and top portions may be telescoped together in order to reduce the overall footprint of the collapsible fabric pod. Further additionally or alternatively, the legs of the base may be folded up to reduce the height of the collapsible fabric pod. Method 900 may be complete at operation 906, which represents fastening down, via one or more of the locking mechanisms (e.g., locking mechanisms 418), the collapsible fabric pod in the collapsed position. Operation 906 may also include stacking the collapsible fabric pod on another collapsible fabric pod via stacking pins (e.g., stacking pins 518).

[0075] Although the subject matter has been described in language specific to structural features, it is to be understood that the subject matter defined in the appended claims is not necessarily limited to the specific features described. Rather, the specific features are disclosed as illustrative forms of implementing the claims.

[0076] Embodiments of the present disclosure can be described in view of the following clauses:

[0077] Clause 1. A collapsible storage structure comprising: a rectangular base; four posts of approximately equal height, each of the four posts configured to attach to a respective corner of the base; and a rectangular fabric bin array, wherein individual ones of four corners of the fabric bin array are configured to attach to a respective one of the four posts; and wherein each of the four posts is configured to be displaceable between an upright position and a collapsed position, wherein each of the four posts supports the fabric bin array substantially

vertically above a top of the base in the upright position, and each of the four posts is collapsed toward the base and the fabric bin array is in a substantially compressed position on the top of the base in the collapsed position.

[0078] Clause 2. The collapsible storage structure as recited in clause 1, wherein the base includes pockets arranged in a side of the base configured to receive a lifting member configured to raise the base off of a surface and move the collapsible storage structure, in the upright position, to a location based at least in part on one or more inventory items contained in the fabric bin array.

[0079] Clause 3. The collapsible storage structure as recited in clause 1, wherein the base includes pockets arranged in a side of the base configured to receive a lifting member configured to raise the base off of a surface and move the collapsible storage structure, in the collapsed position, to a location based at least in part on storing the collapsible storage structure until a time of use.

[0080] Clause 4. The collapsible storage structure as recited in clause 1, further comprising four legs, each of the four legs configured to attach to a respective corner of the base and arranged to fold into a bottom of the base opposite the top of the base.

[0081] Clause 5. The collapsible storage structure as recited in clause 1, further comprising at least one crossbeam displaceable between a first position and a second position, wherein in the first position with the four posts in the upright position, the at least one crossbeam is attached to a top portion of a first post of the four posts and removeably coupled to a top portion of a second post of the four posts and supporting a respective portion of the fabric bin array.

[0082] Clause 6. The collapsible storage structure as recited in clause 1, wherein each of the four posts is configured to be at least partially displaceable to one or more intermediate positions between the upright position and the collapsed position, wherein each of the four posts partially supports the fabric bin array substantially vertically above the top of the base and is partially collapsed toward the base with the fabric bin array in a partially compressed position on the top of the base in the one or more intermediate positions.

[0083] Clause 7. A storage structure comprising: a base; a plurality of posts configured to attach to the base, each of the plurality of posts being displaceable between an upright position and a collapsed position; a fabric bin array having individual sections attached to a respective one of the plurality of posts; and wherein each of the plurality of posts supports the fabric bin array substantially vertically above a top of the base in the upright position, and each of the plurality of posts is collapsed toward the base and the fabric bin array is in a compressed position on the top of the base in the collapsed position.

[0084] Clause 8. The storage structure as recited in clause 7, wherein each of the plurality of posts includes a plurality of segments and each of the segments is removeably coupleable to displace each of the plurality of posts between the upright position and the collapsed position, wherein each of the segments of each of the plurality of posts is coupled together and supports the fabric bin array substantially vertically above the top of the base in the upright position, and each of the segments of each of the plurality of posts is collapsed and the fabric bin array is in the compressed position on the top of the base in the collapsed position.

[0085] Clause 9. The storage structure as recited in clause 8, further comprising a locking mechanism arranged to lock at least two segments together, the locking mechanism comprising at least one of a pop lock, a c-clamp, or a threaded nut.

[0086] Clause 10. The storage structure as recited in clause 8, wherein the plurality of segments include a plurality of tubular segments constructed from at least one of steel, aluminum, composite, carbon fiber, or plastic.

[0087] Clause 11. The storage structure as recited in clause 7, wherein each of the plurality of posts includes a plurality of segments and each of the segments is at least one of rotatably coupleable or internally telescoping to displace each of the plurality of posts between the upright position and the collapsed position, wherein each of the segments of each of the plurality of posts is coupled together and supports the fabric bin array substantially vertically above the top of the base in the upright position, and each of the segments of each of the plurality of posts is collapsed and the fabric bin array is in the compressed position on the top of the base in the collapsed position.

[0088] Clause 12. The storage structure as recited in clause 7, further comprising at least one crossbeam configured to attach to a top portion or a bottom portion of respective two adjacent posts of the plurality of posts, the at least one crossbeam including at least one locking mechanism arranged to attach a respective portion of the fabric bin array to the at least one crossbeam.

[0089] Clause 13. The storage structure as recited in clause 12, wherein the locking mechanism of the at least one crossbeam comprises at least one of a metal grommet, a turn lock, or a fold down lock.

[0090] Clause 14. The storage structure as recited in clause 12, wherein the at least one crossbeam comprises a telescoping mechanism configured to increase or decrease a length of the at least one crossbeam.

[0091] Clause 15. The storage structure as recited in clause 7, further comprising a plurality of legs, each of the plurality of legs configured to attach to the base and arranged to fold into a bottom of the base opposite the top of the base.

[0092] Clause 16. A storage structure comprising: a base; a first collapsible section including: a first plurality of segments configured to attach to the base; and a first fabric bin array having individual sections attached to a respective one of the first plurality of segments; and a second collapsible section attached to the first collapsible section above the first collapsible section, the second collapsible section including: a second plurality of segments removeably coupleable to the first plurality of segments; a second fabric bin array having individual sections attached to a respective one of the second plurality of segments; and wherein each of the second plurality of segments of the second fabric bin array is configured to be displaceable between an upright position and a collapsed position, such that: each of the second plurality of segments is moveably coupled to a respective one of the first plurality of segments of the first collapsible section and supports the second fabric bin array above a top of the first collapsible section in the upright position, and each of the second plurality of segments is displaceable relative to the respective one of the first plurality of segments of the first collapsible section and collapses down to a position on the top of the first collapsible section in the collapsed position.

[0093] Clause 17. The storage structure as recited in clause 16, wherein each of the first plurality of segments of the first collapsible section is removeably coupled to the base and displaceable between an upright position and a collapsed position, wherein each of the first plurality of segments is removeably coupled to a respective portion of the base and supports the first fabric bin array above a top of the base in the upright position, and wherein each of the first plurality of segments is displaceable relative to the respective portion of the base and collapses down to a position on the top of the base in the collapsed position.

[0094] Clause 18. The storage structure as recited in clause 16, wherein the base includes pockets arranged in a side of the base configured to receive a lifting member configured to raise the base off of a surface and move the storage structure, with each of the second plurality of segments in the upright position, to a location based at least in part on one or more inventory items contained in at least one of the first or second fabric bin arrays, or move
5 the storage structure, with each of the second plurality of segments in the collapsed position, to a location based at least in part on storing the storage structure until a time of use.

[0095] Clause 19. The storage structure as recited in clause 16, further comprising a plurality of legs of approximately equal height, each of the plurality of legs attached to a respective portion of the base to provide a space beneath the base and between each adjacent pair of the legs adapted to allow a mobile drive unit to maneuver
10 beneath the base.

[0096] Clause 20. The storage structure as recited in clause 19, wherein the base includes pockets arranged in a side of the base between respective two adjacent legs of the plurality of legs, the pockets configured to receive a lifting member configured to raise the base off of a surface and move the storage structure, and wherein each of the plurality of legs is arranged to fold into the base and into a position adjacent to the lifting member received
15 by the pockets.

CLAIMS

What is claimed is:

1. A collapsible storage structure comprising:
 - a rectangular base;
 - four posts of approximately equal height, each of the four posts configured to attach to a respective corner of the base; and
 - a rectangular fabric bin array, wherein individual ones of four corners of the fabric bin array are configured to attach to a respective one of the four posts; and
 - wherein each of the four posts is configured to be displaceable between an upright position and a collapsed position, wherein each of the four posts supports the fabric bin array substantially vertically above a top of the base in the upright position, and each of the four posts is collapsed toward the base and the fabric bin array is in a substantially compressed position on the top of the base in the collapsed position.
2. The collapsible storage structure as recited in claim 1, wherein the base includes pockets arranged in a side of the base configured to receive a lifting member configured to raise the base off of a surface and move the collapsible storage structure, in the upright position, to a location based at least in part on one or more inventory items contained in the fabric bin array.
3. The collapsible storage structure as recited in claim 1, wherein the base includes pockets arranged in a side of the base configured to receive a lifting member configured to raise the base off of a surface and move the collapsible storage structure, in the collapsed position, to a location based at least in part on storing the collapsible storage structure until a time of use.
4. The collapsible storage structure as recited in claim 1, further comprising four legs, each of the four legs configured to attach to a respective corner of the base and arranged to fold into a bottom of the base opposite the top of the base.
5. The collapsible storage structure as recited in claim 1, further comprising at least one crossbeam displaceable between a first position and a second position,
 - wherein in the first position with the four posts in the upright position, the at least one crossbeam is attached to a top portion of a first post of the four posts and removeably coupled to a top portion of a second post of the four posts and supporting a respective portion of the fabric bin array.
6. The collapsible storage structure as recited in claim 1, wherein each of the four posts is configured to be at least partially displaceable to one or more intermediate positions between the upright position and the collapsed position, wherein each of the four posts partially supports the fabric bin array substantially vertically above the

top of the base and is partially collapsed toward the base with the fabric bin array in a partially compressed position on the top of the base in the one or more intermediate positions.

7. A storage structure comprising:
a base;
a plurality of posts configured to attach to the base, each of the plurality of posts being displaceable between an upright position and a collapsed position;
a fabric bin array having individual sections attached to a respective one of the plurality of posts; and
wherein each of the plurality of posts supports the fabric bin array substantially vertically above a top of the base in the upright position, and each of the plurality of posts is collapsed toward the base and the fabric bin array is in a compressed position on the top of the base in the collapsed position.

8. The storage structure as recited in claim 7, wherein each of the plurality of posts includes a plurality of segments and each of the segments is removeably coupleable to displace each of the plurality of posts between the upright position and the collapsed position, wherein each of the segments of each of the plurality of posts is coupled together and supports the fabric bin array substantially vertically above the top of the base in the upright position, and each of the segments of each of the plurality of posts is collapsed and the fabric bin array is in the compressed position on the top of the base in the collapsed position.

9. The storage structure as recited in claim 8, further comprising a locking mechanism arranged to lock at least two segments together, the locking mechanism comprising at least one of a pop lock, a c-clamp, or a threaded nut.

10. The storage structure as recited in claim 8, wherein the plurality of segments include a plurality of tubular segments constructed from at least one of steel, aluminum, composite, carbon fiber, or plastic.

11. The storage structure as recited in claim 7, wherein each of the plurality of posts includes a plurality of segments and each of the segments is at least one of rotatably coupleable or internally telescoping to displace each of the plurality of posts between the upright position and the collapsed position, wherein each of the segments of each of the plurality of posts is coupled together and supports the fabric bin array substantially vertically above the top of the base in the upright position, and each of the segments of each of the plurality of posts is collapsed and the fabric bin array is in the compressed position on the top of the base in the collapsed position.

12. The storage structure as recited in claim 7, further comprising at least one crossbeam configured to attach to a top portion or a bottom portion of respective two adjacent posts of the plurality of posts, the at least one crossbeam including at least one locking mechanism arranged to attach a respective portion of the fabric bin array to the at least one crossbeam.

13. The storage structure as recited in claim 12, wherein the locking mechanism of the at least one crossbeam comprises at least one of a metal grommet, a turn lock, or a fold down lock.

14. The storage structure as recited in claim 12, wherein the at least one crossbeam comprises a telescoping mechanism configured to increase or decrease a length of the at least one crossbeam.

15. The storage structure as recited in claim 7, further comprising a plurality of legs, each of the plurality of legs configured to attach to the base and arranged to fold into a bottom of the base opposite the top of the base.

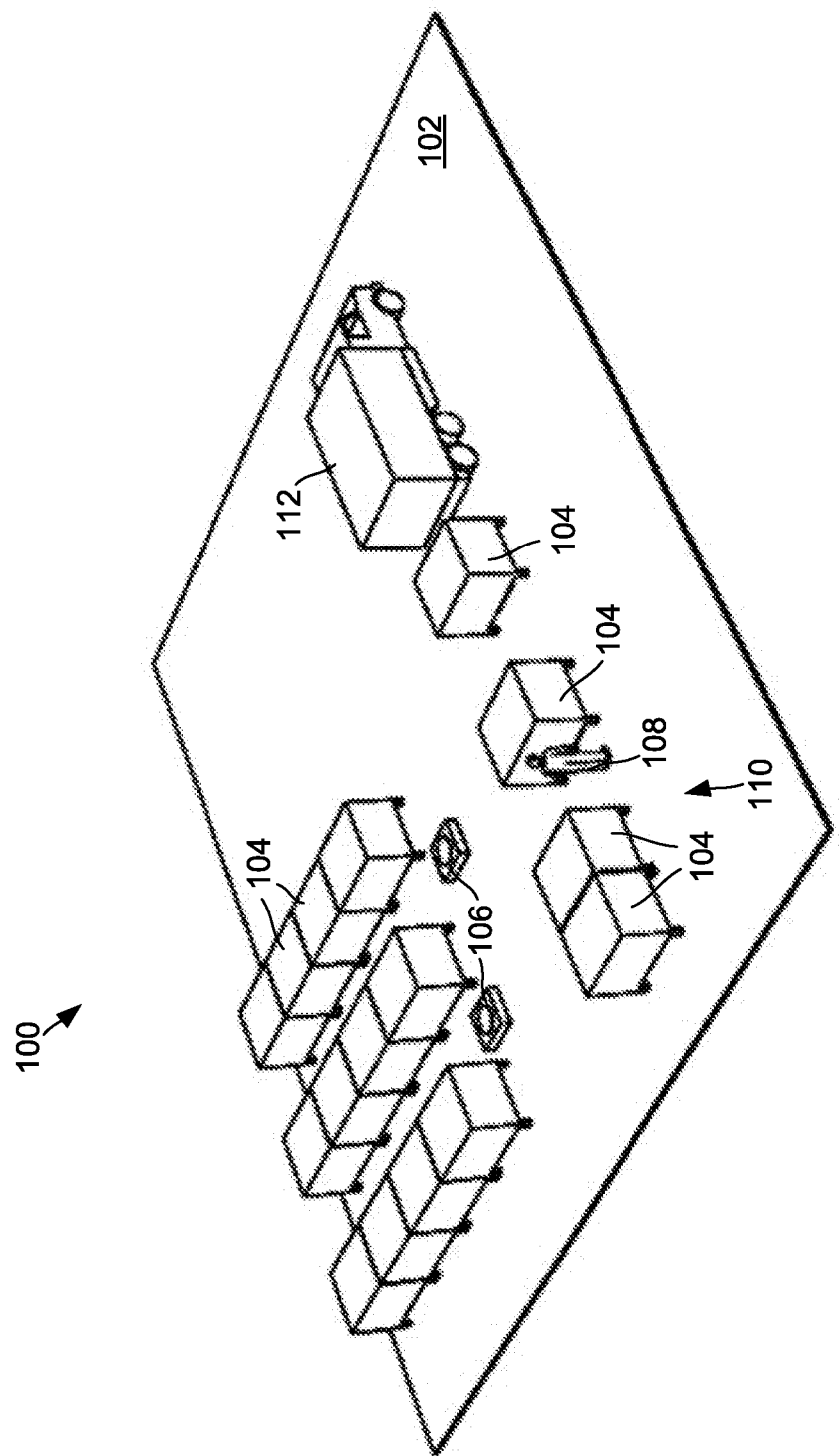


FIG. 1

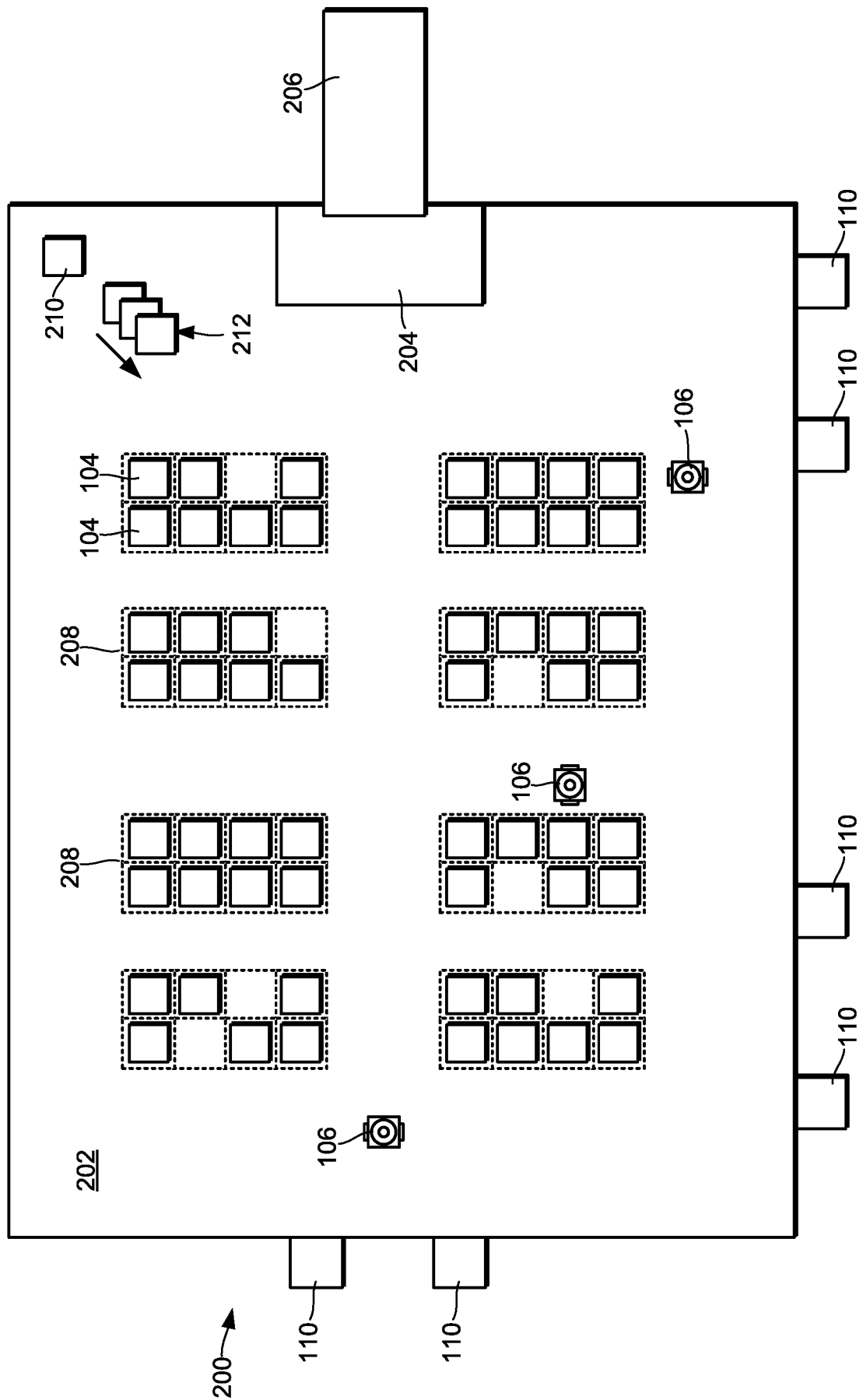


FIG. 2

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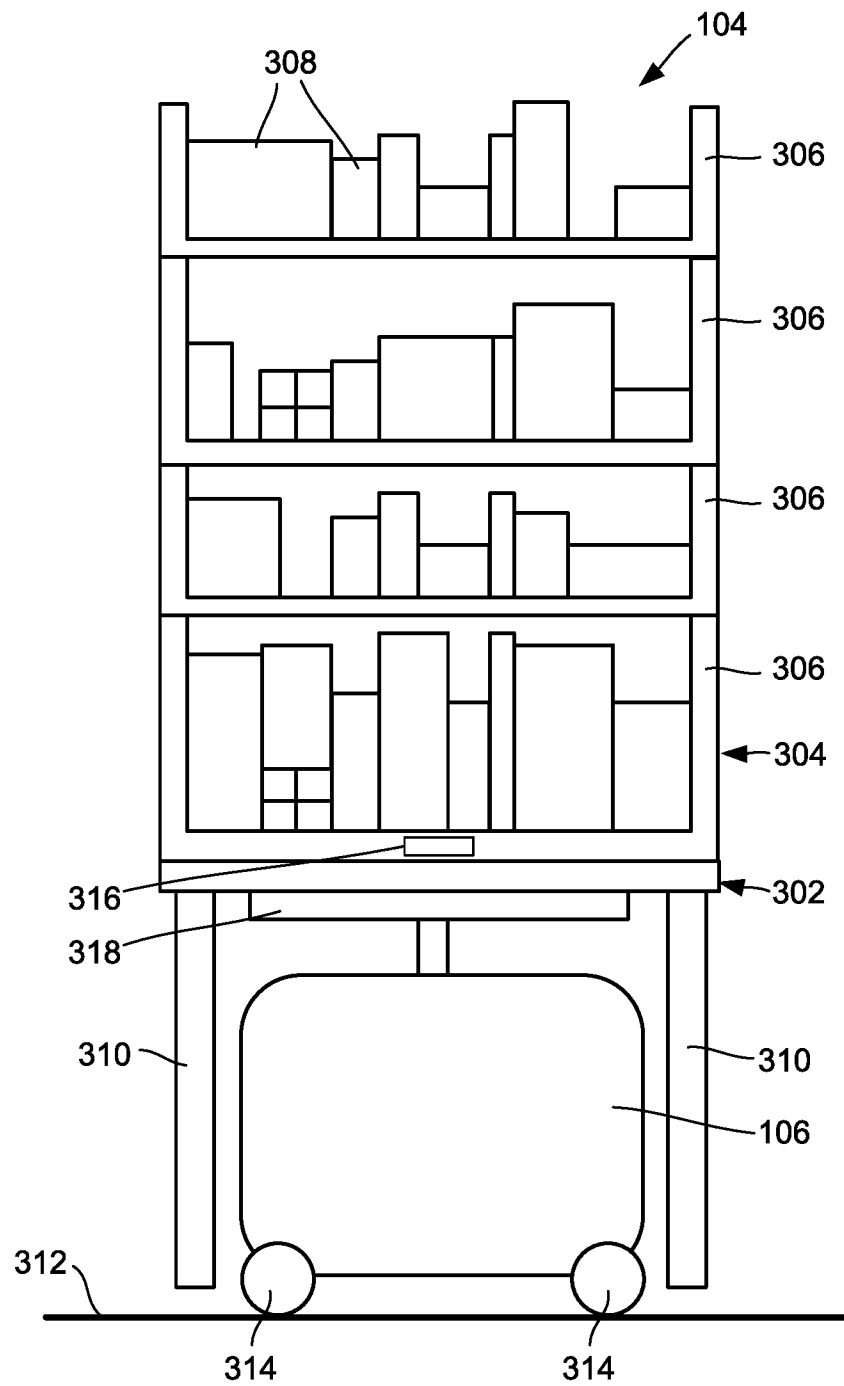


FIG. 3

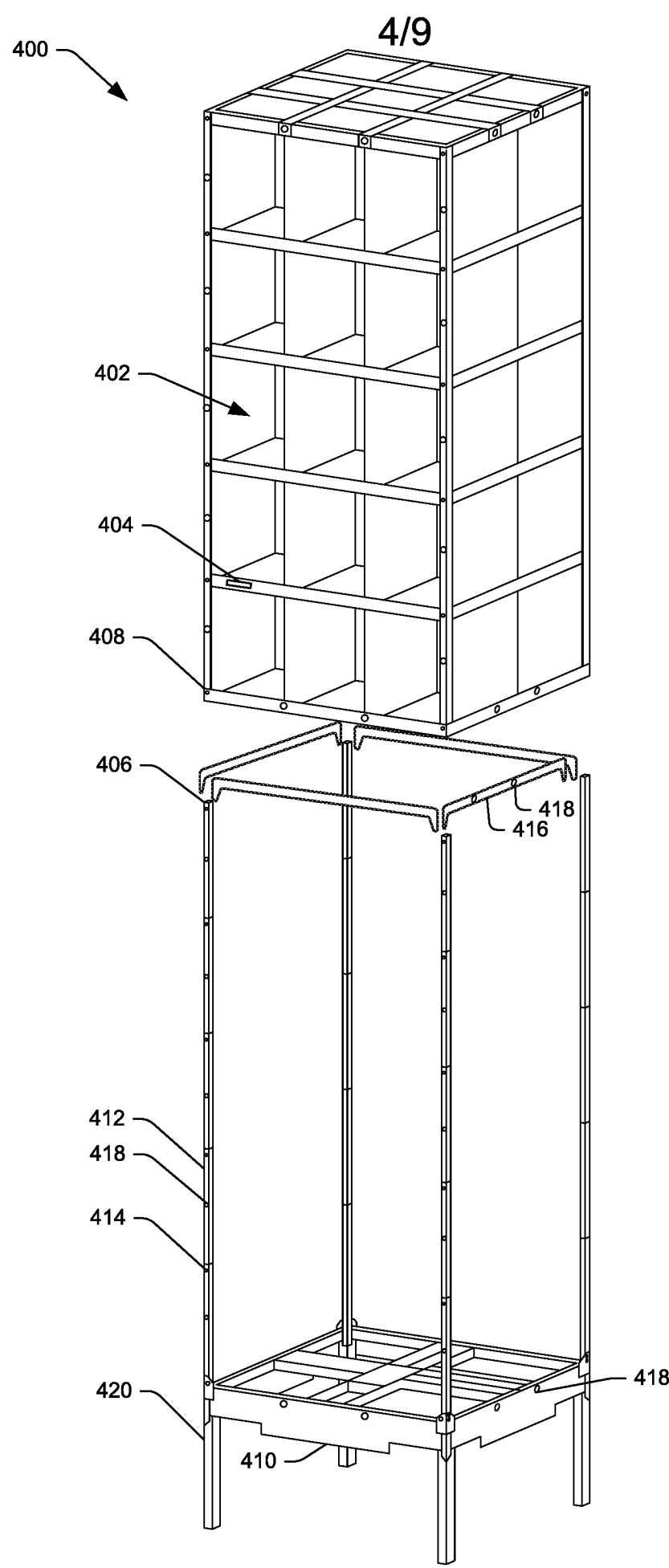


FIG. 4

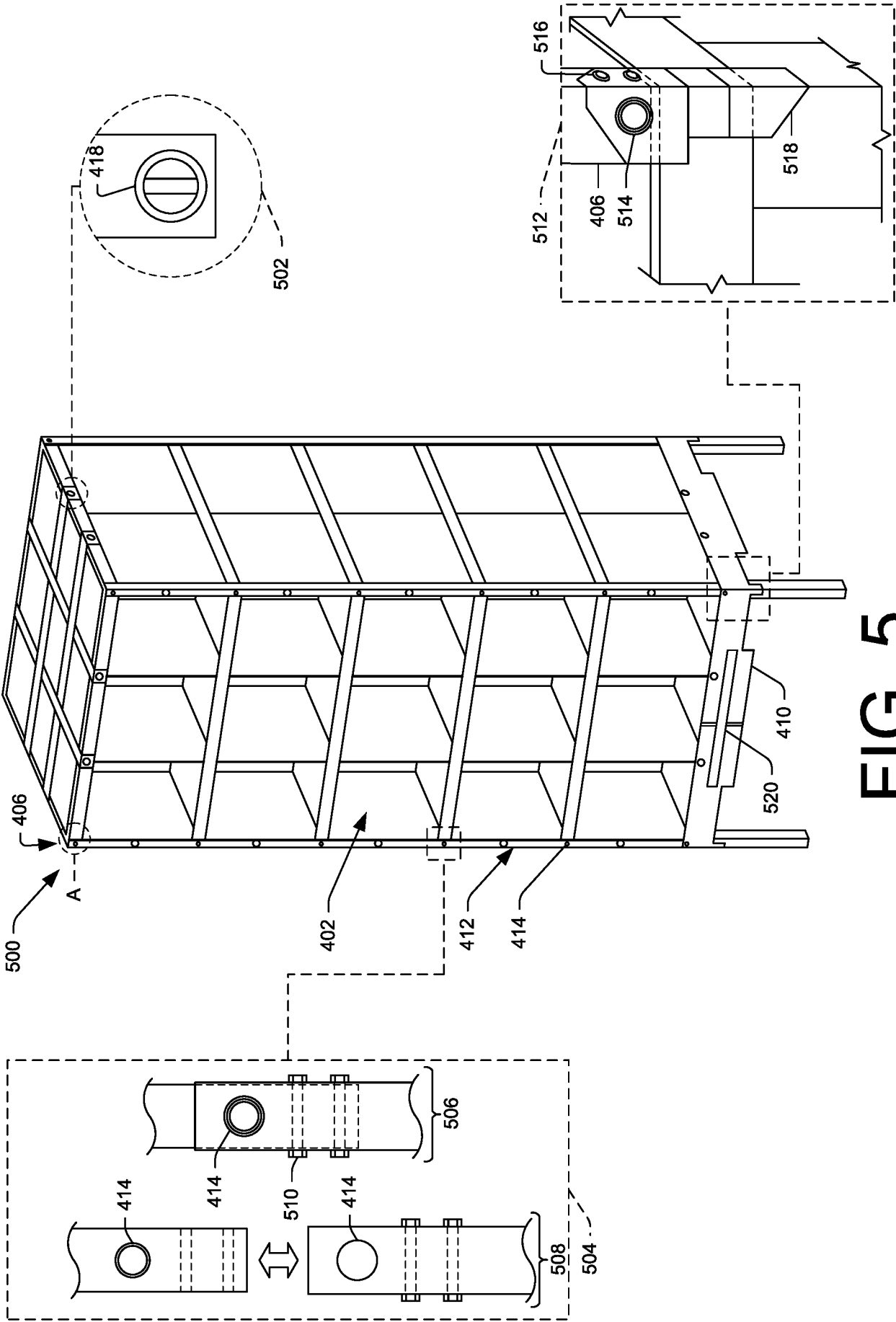


FIG. 5

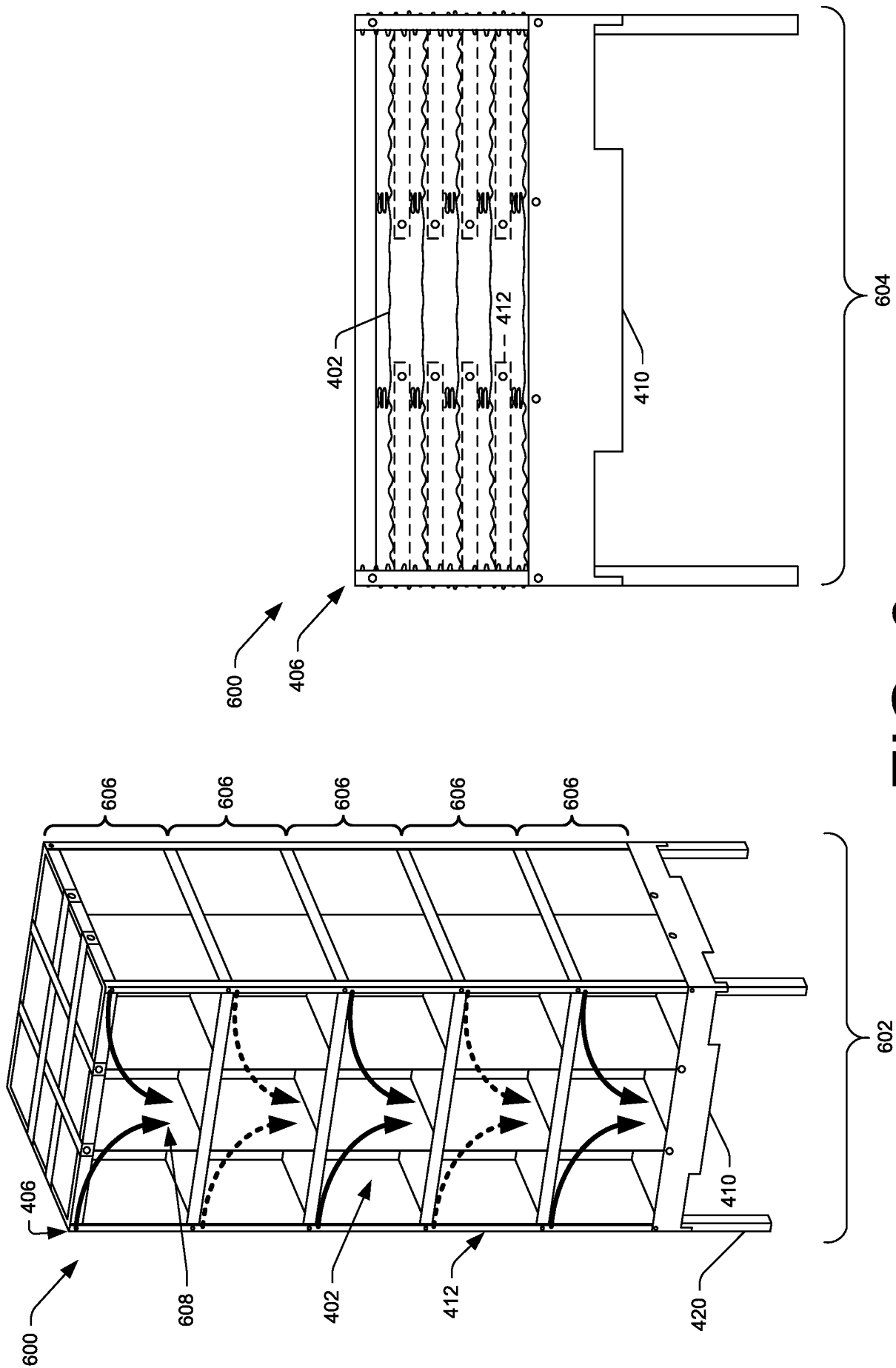
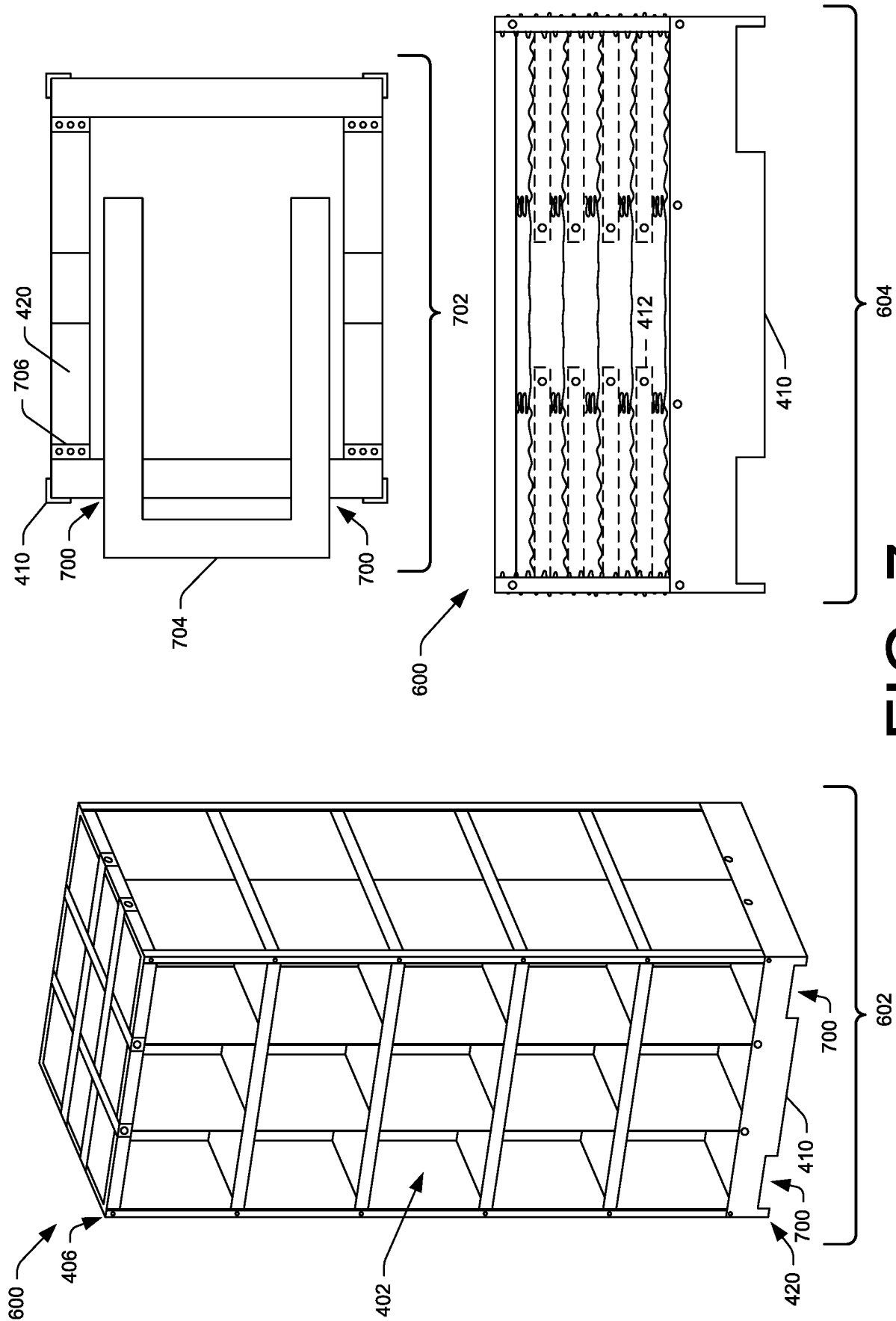


FIG. 6



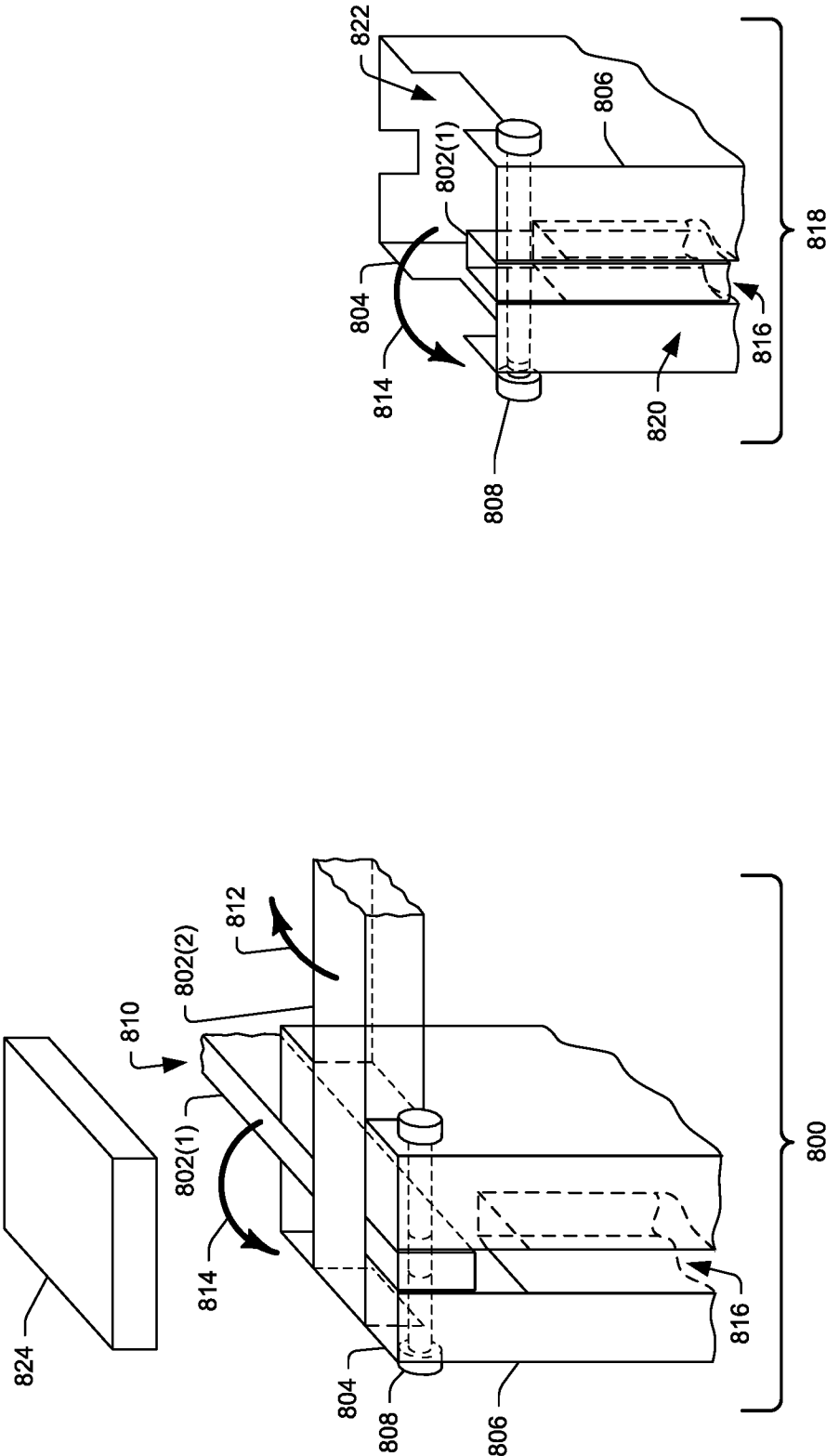


FIG. 8

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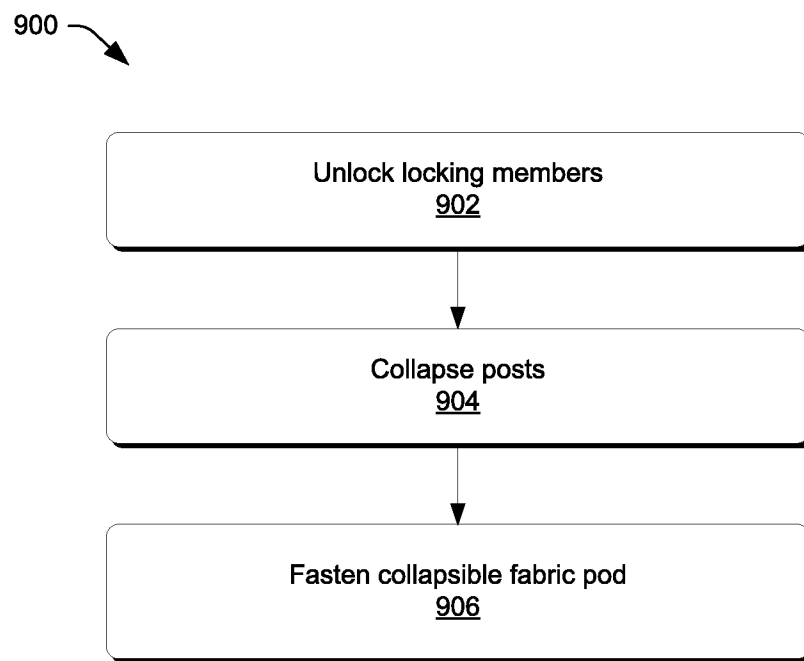


FIG. 9