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(54) **TABLE CART**

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Publication Classification

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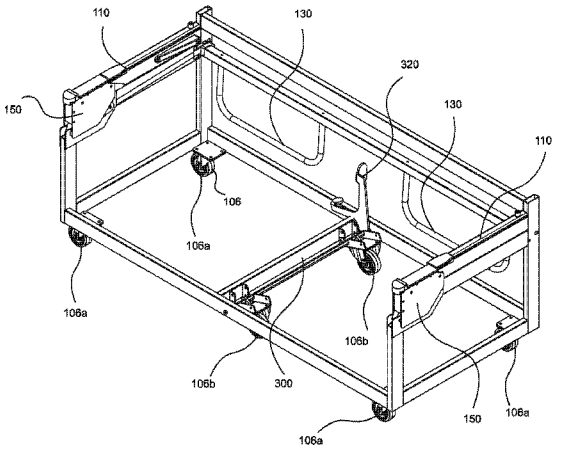
B65G 67/02	(2006.01)

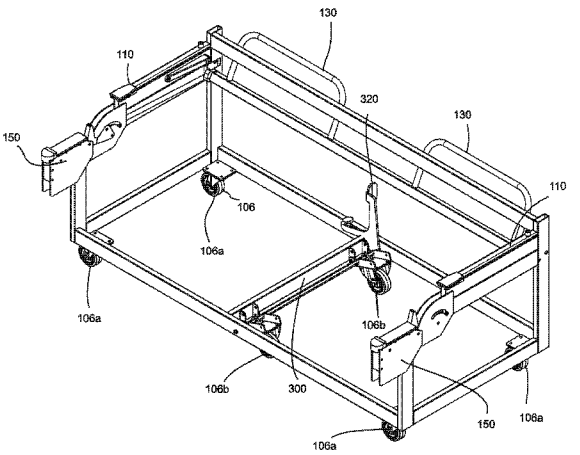
(52) **U.S. Cl.**

CPC . ***B62B 3/04*** (2013.01); ***B65G 67/02*** (2013.01); ***B62B 3/108*** (2013.01)

(57) **ABSTRACT**

Disclosed herein is a furniture moving device having a frame with a lower portion and an upper portion. The upper portion includes a support rail. The frame also includes a lift mechanism connected to one end of the support rail. The lift mechanism is operable to raise a furniture article off the ground such that the furniture article is supported at the height of the support rail. The support rail and the lift mechanism also are sufficiently continuous to allow sliding of the furniture article from one to the other.





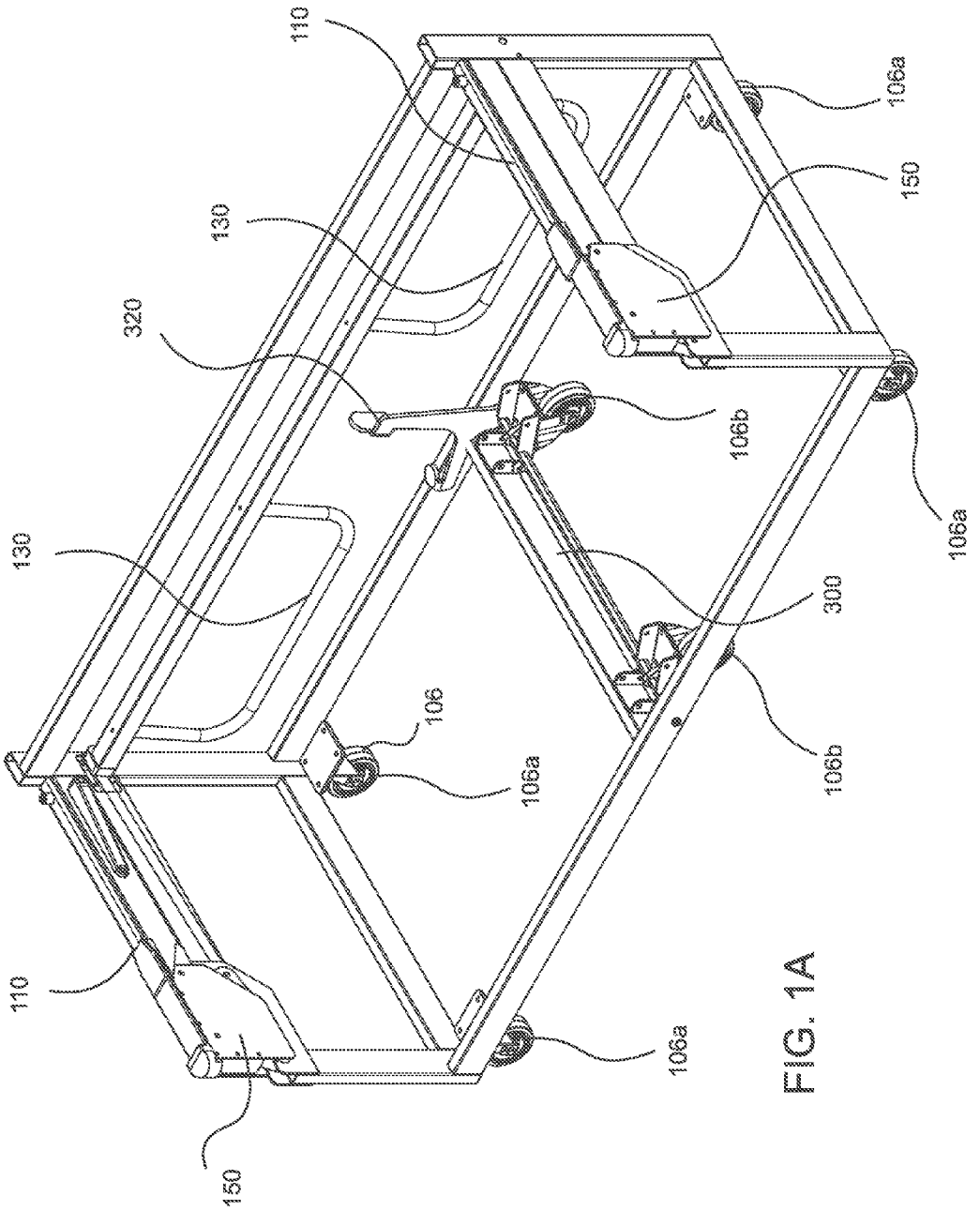


FIG. 1A

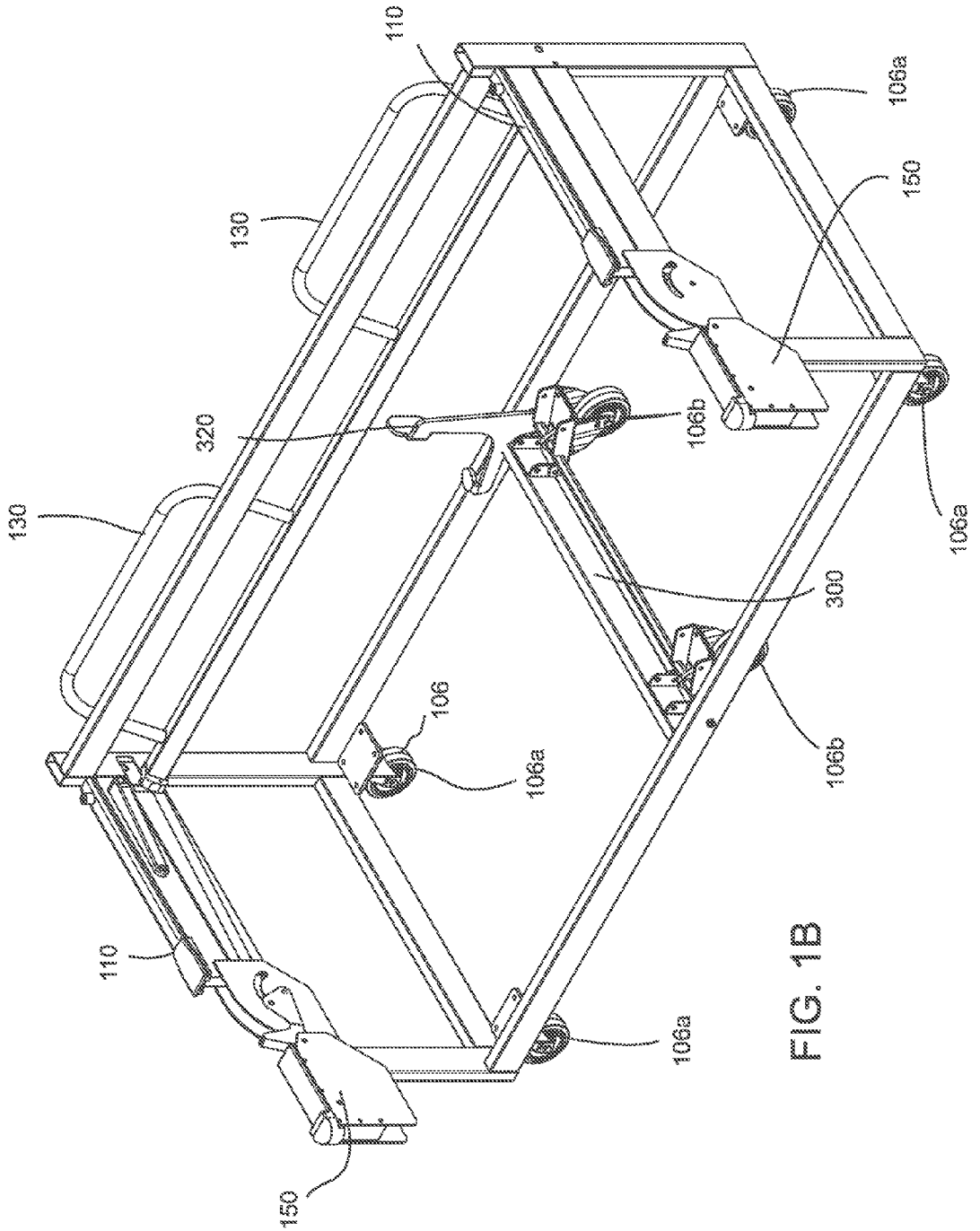

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FIG. 1B

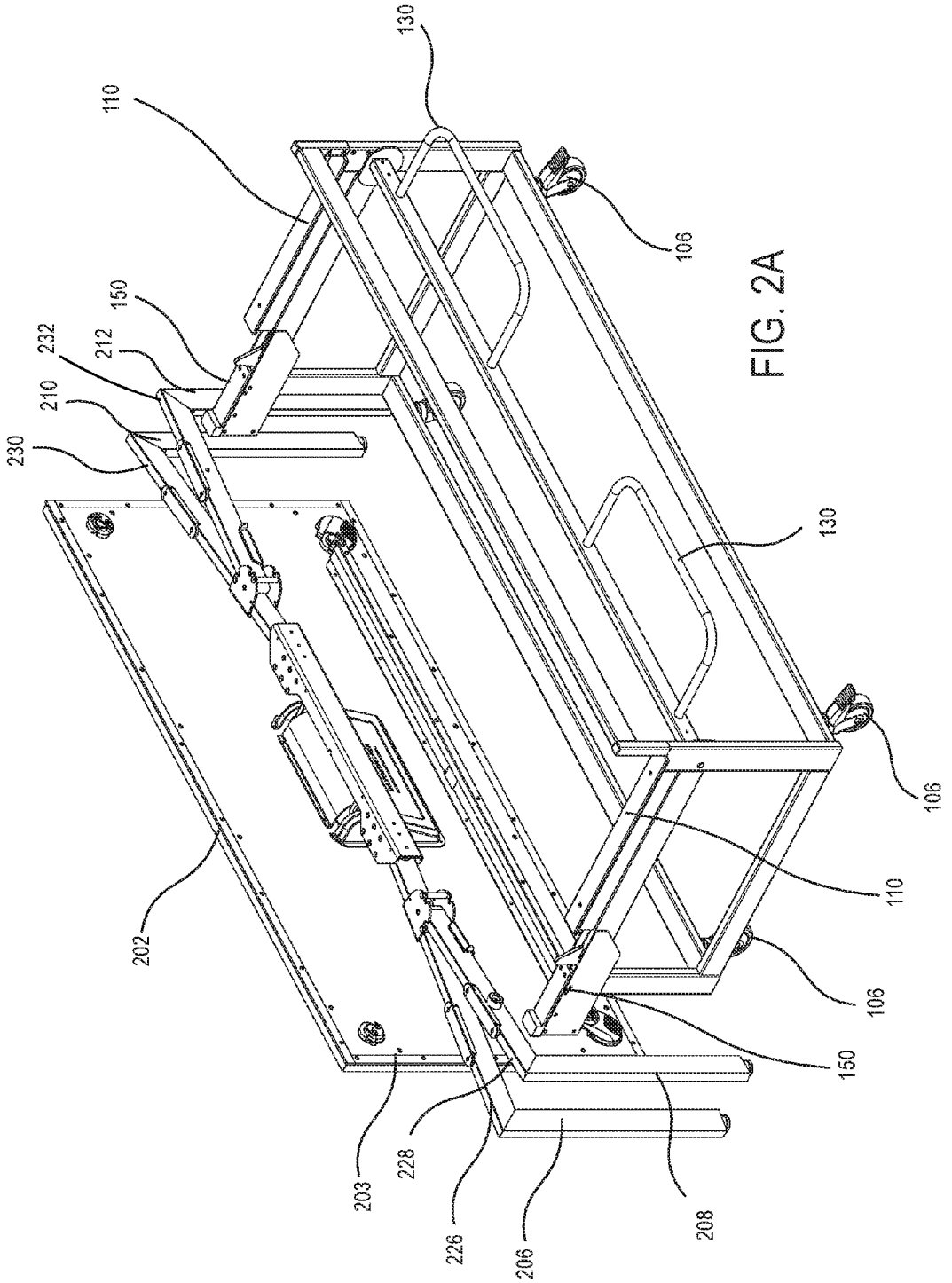
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FIG. 2A

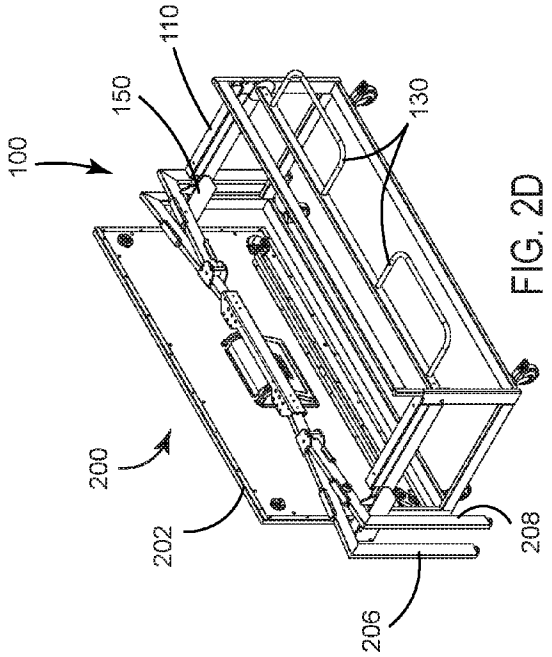

FIG. 2D

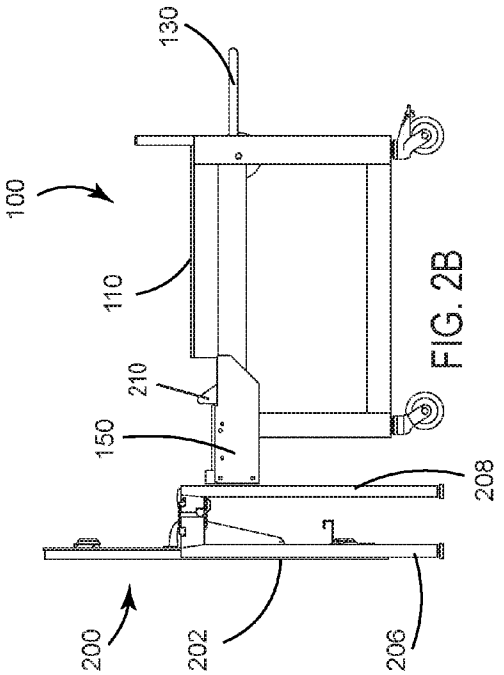

FIG. 2B

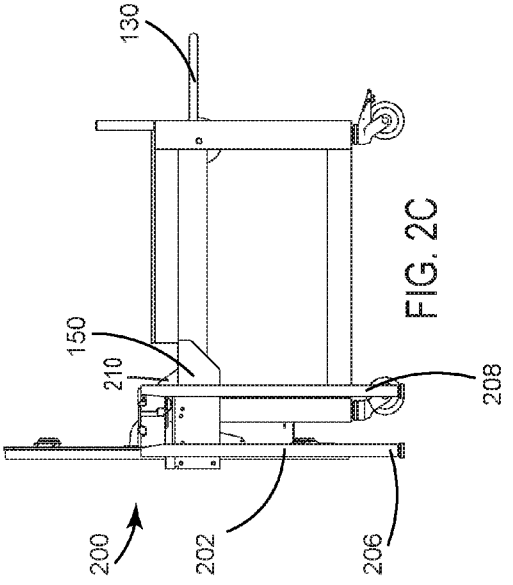

FIG. 2C

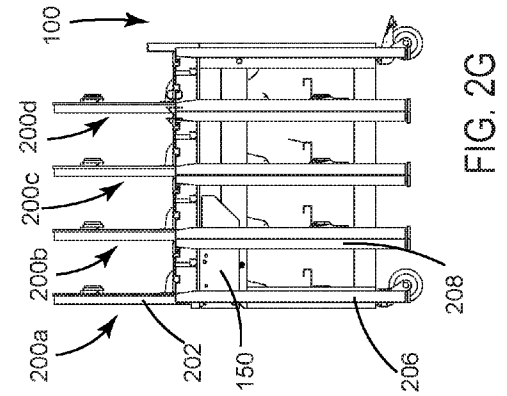

FIG. 2G

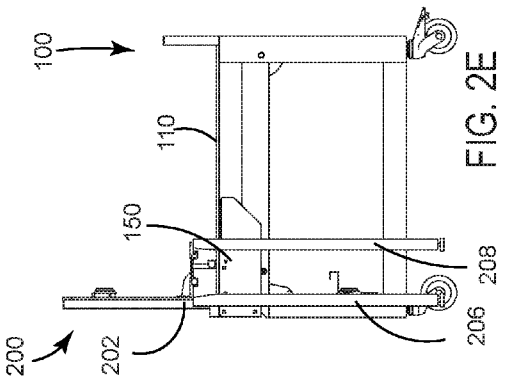

FIG. 2E

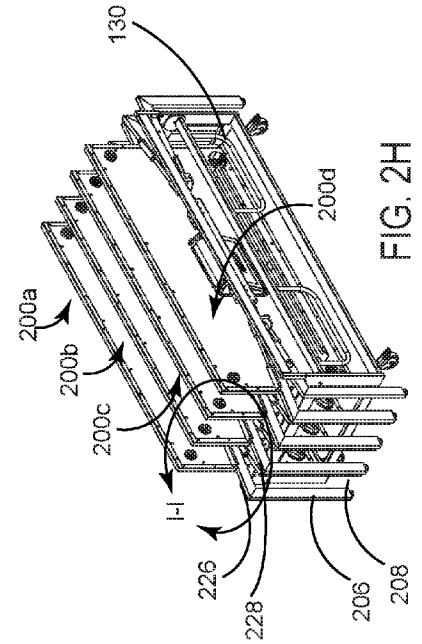

FIG. 2H

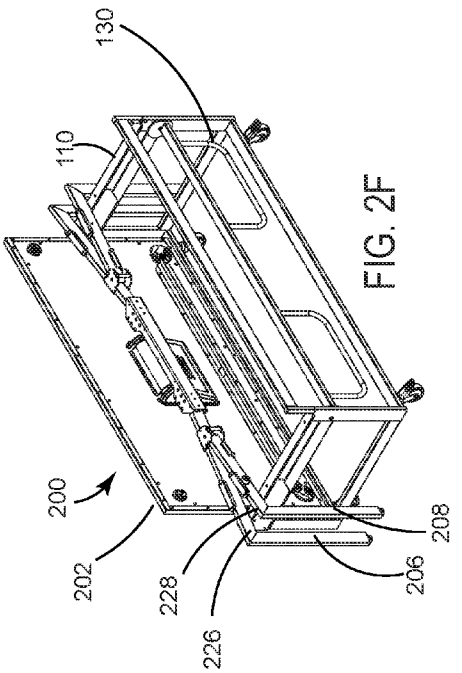

FIG. 2F

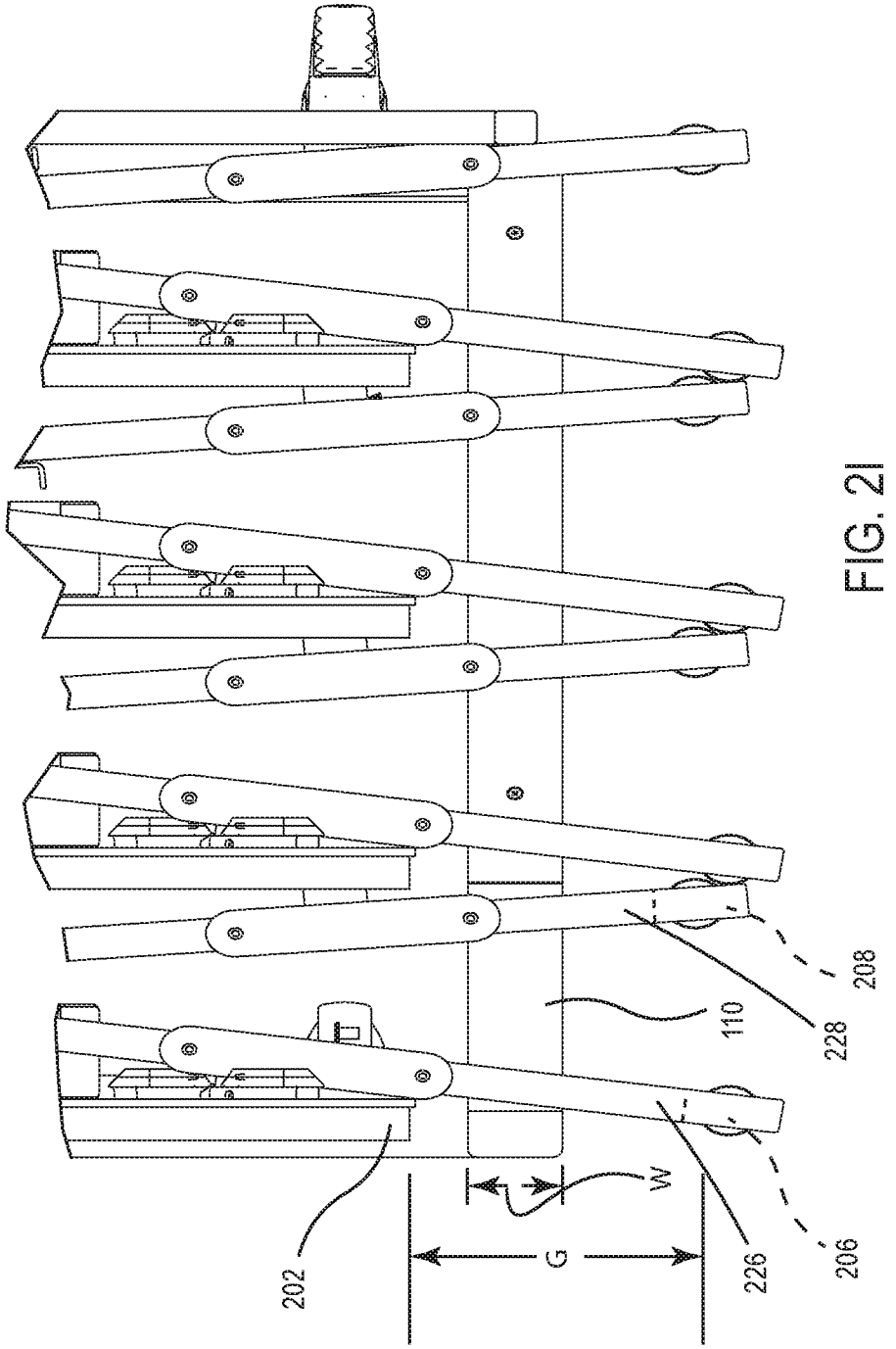

FIG. 2I

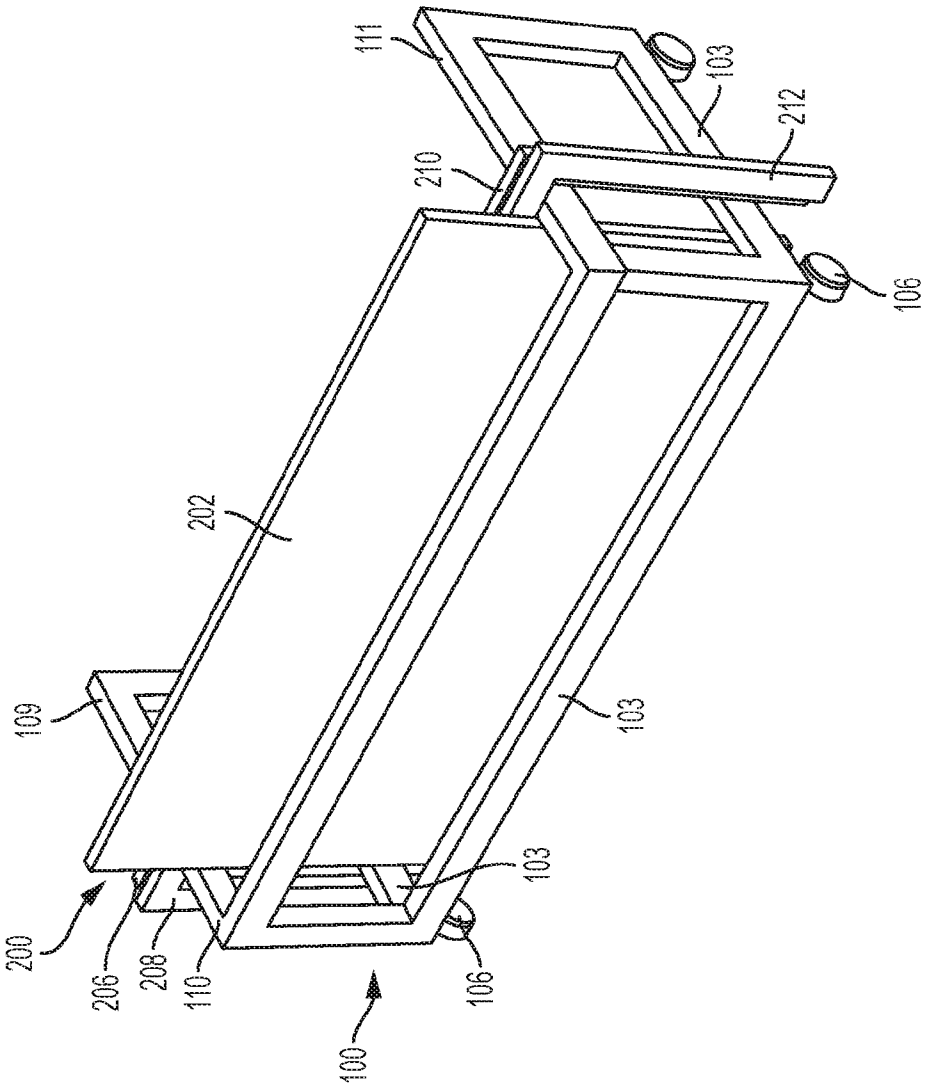

FIG. 3A

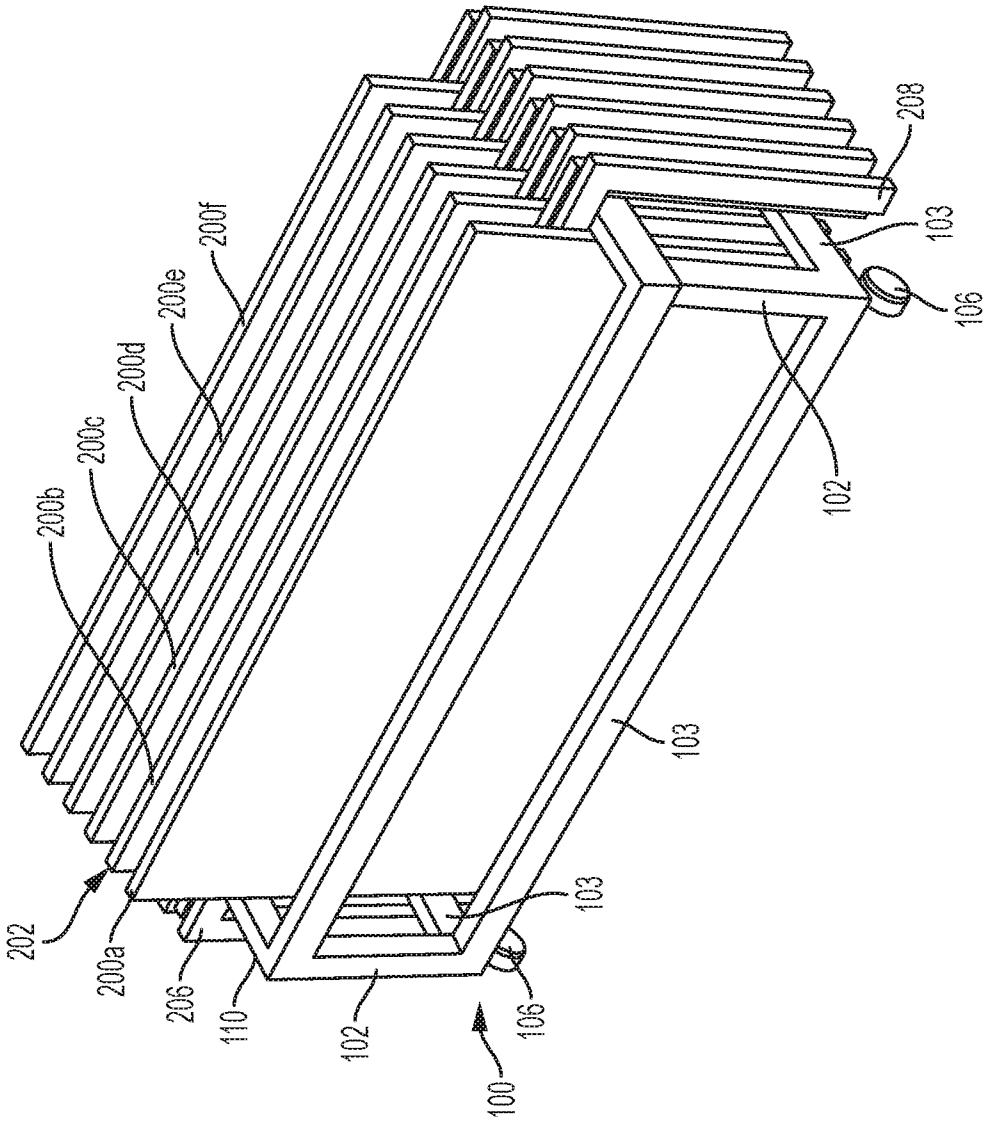
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FIG. 3B

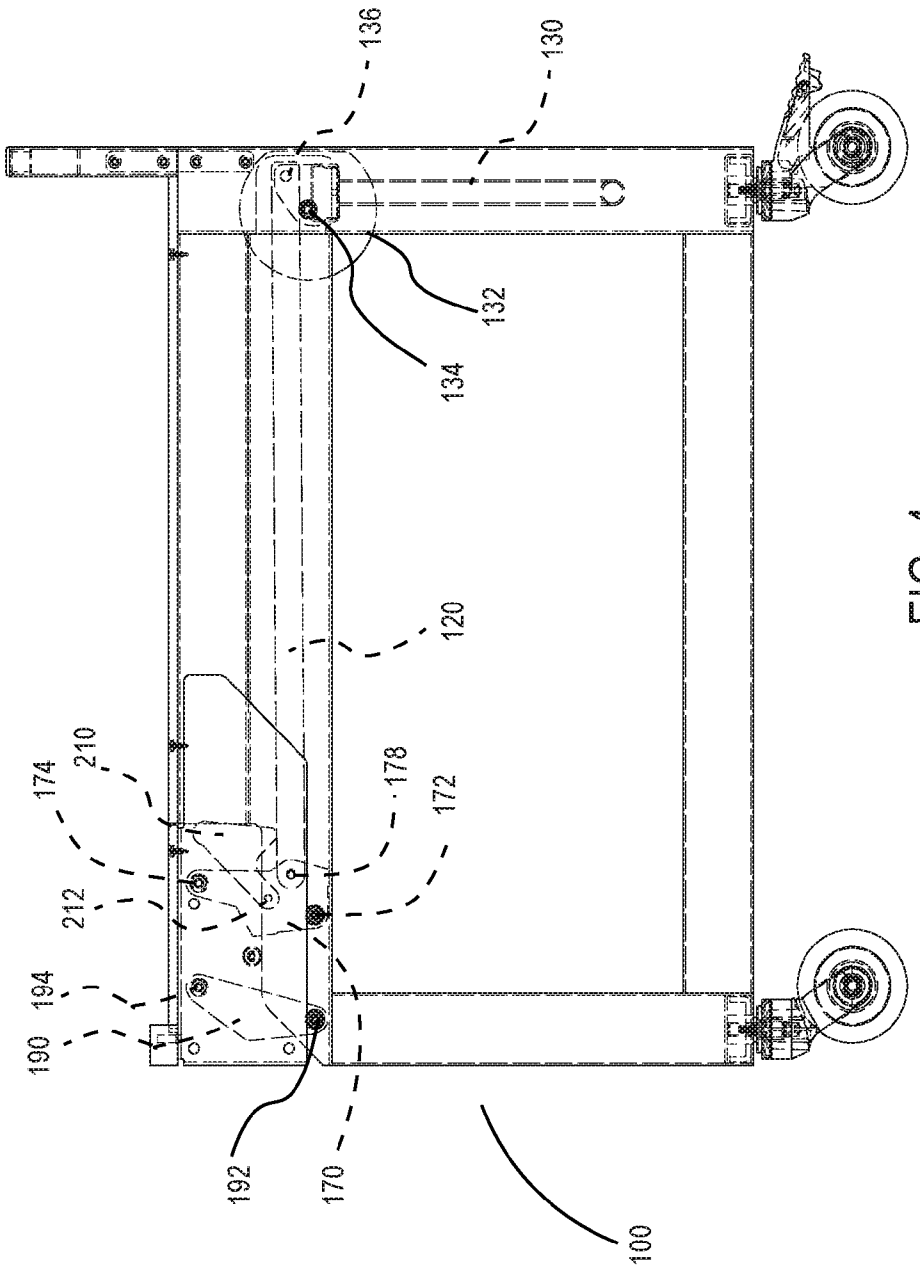

FIG. 4

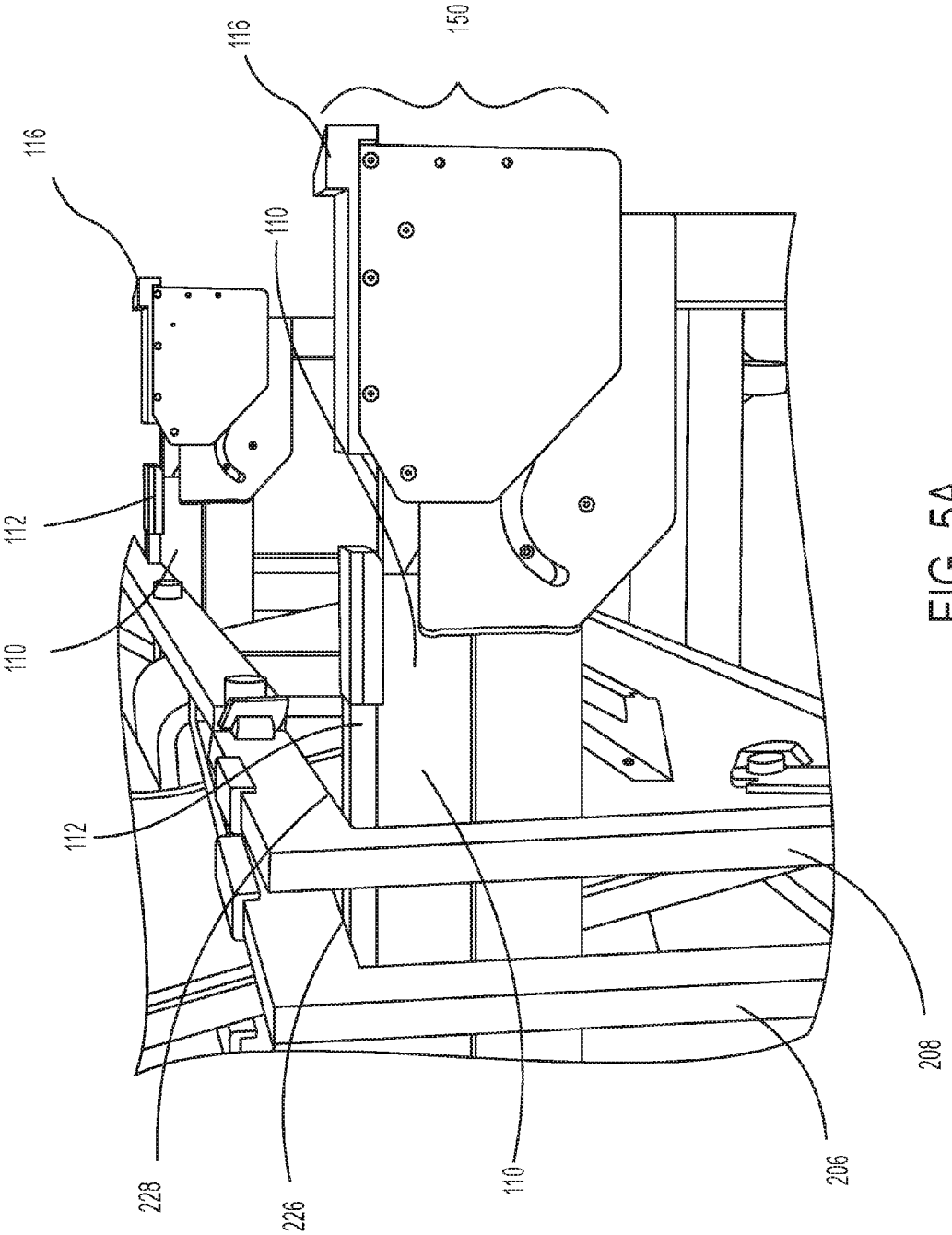

FIG. 5A

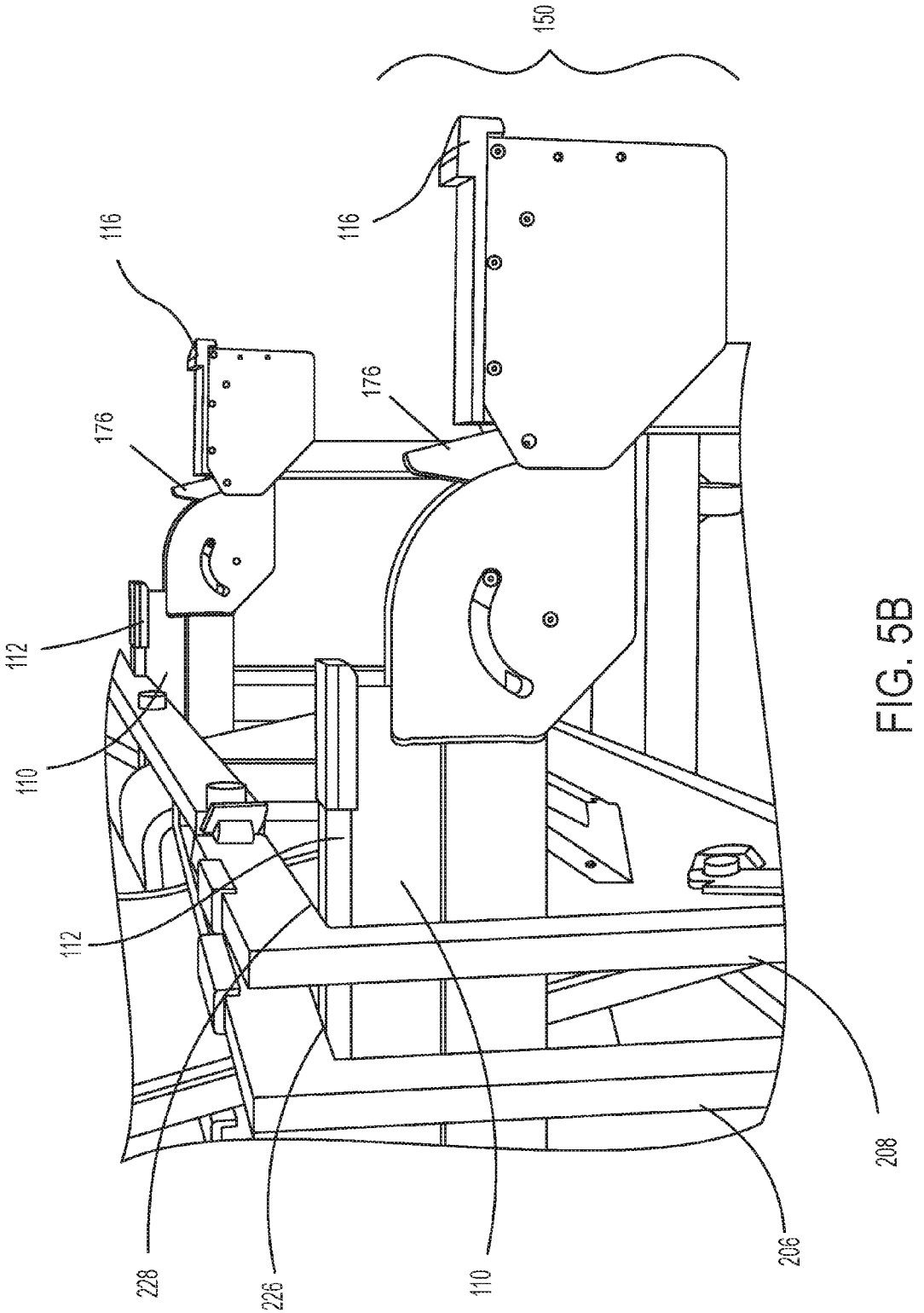

FIG. 5B

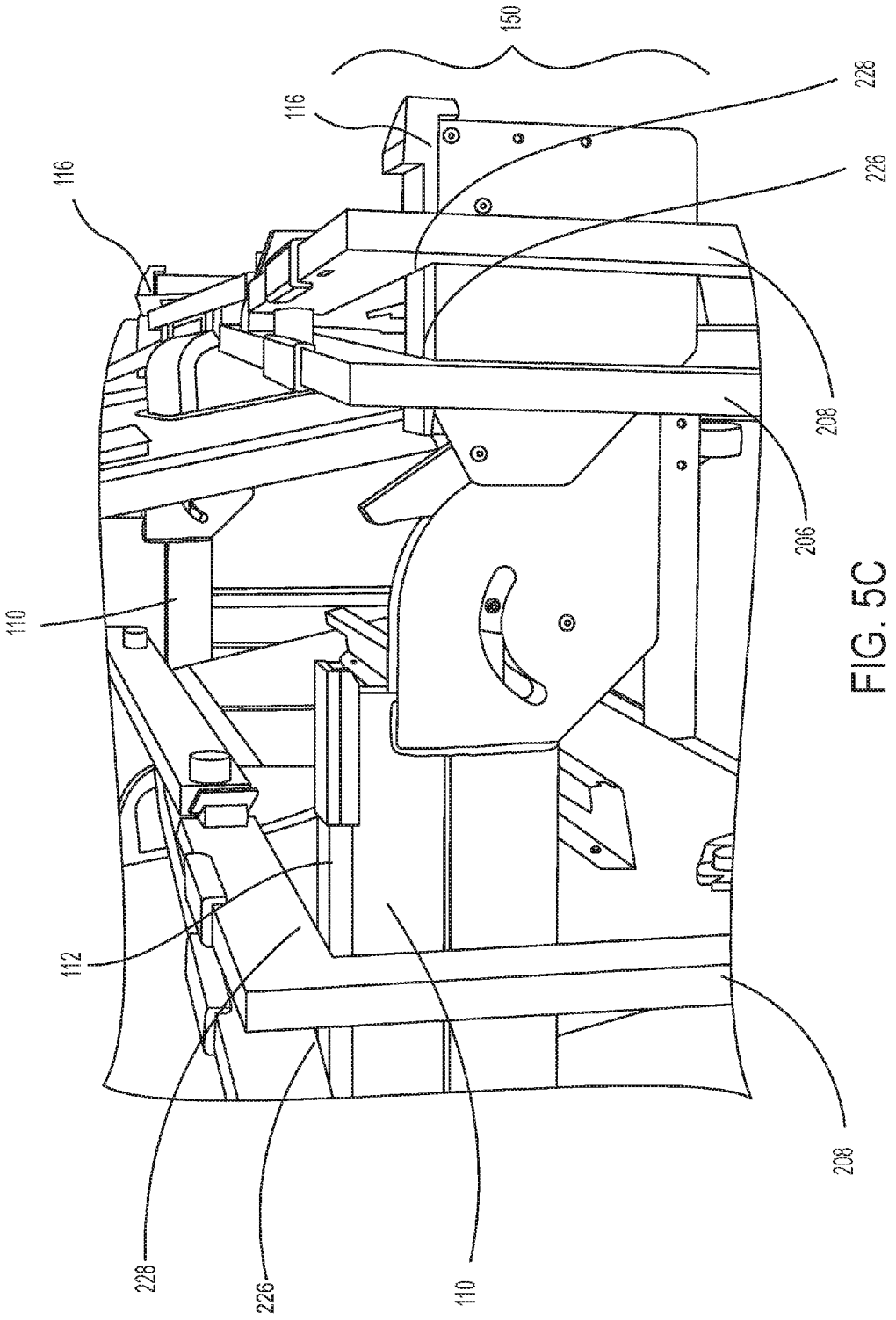

FIG. 5C

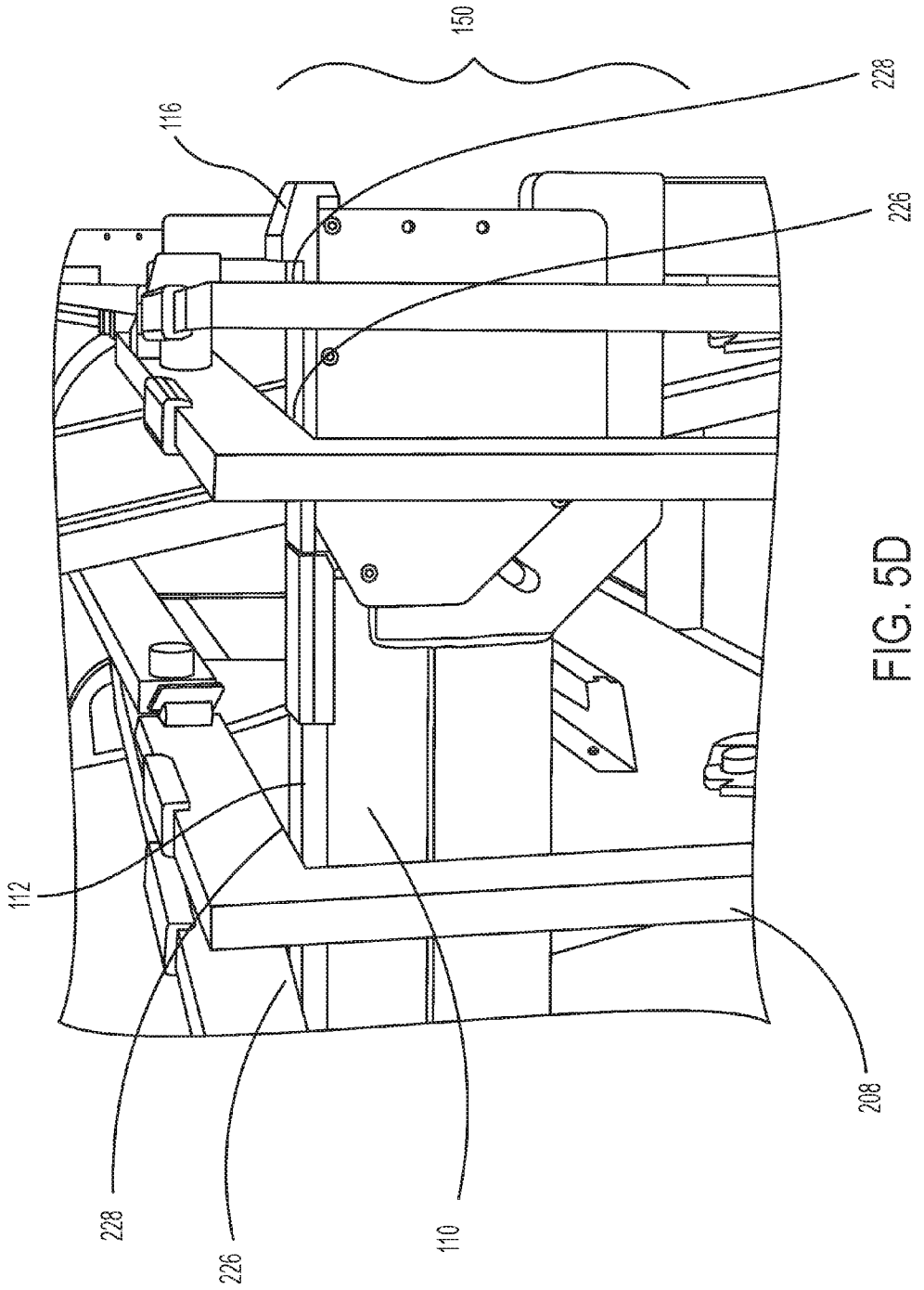

FIG. 5D

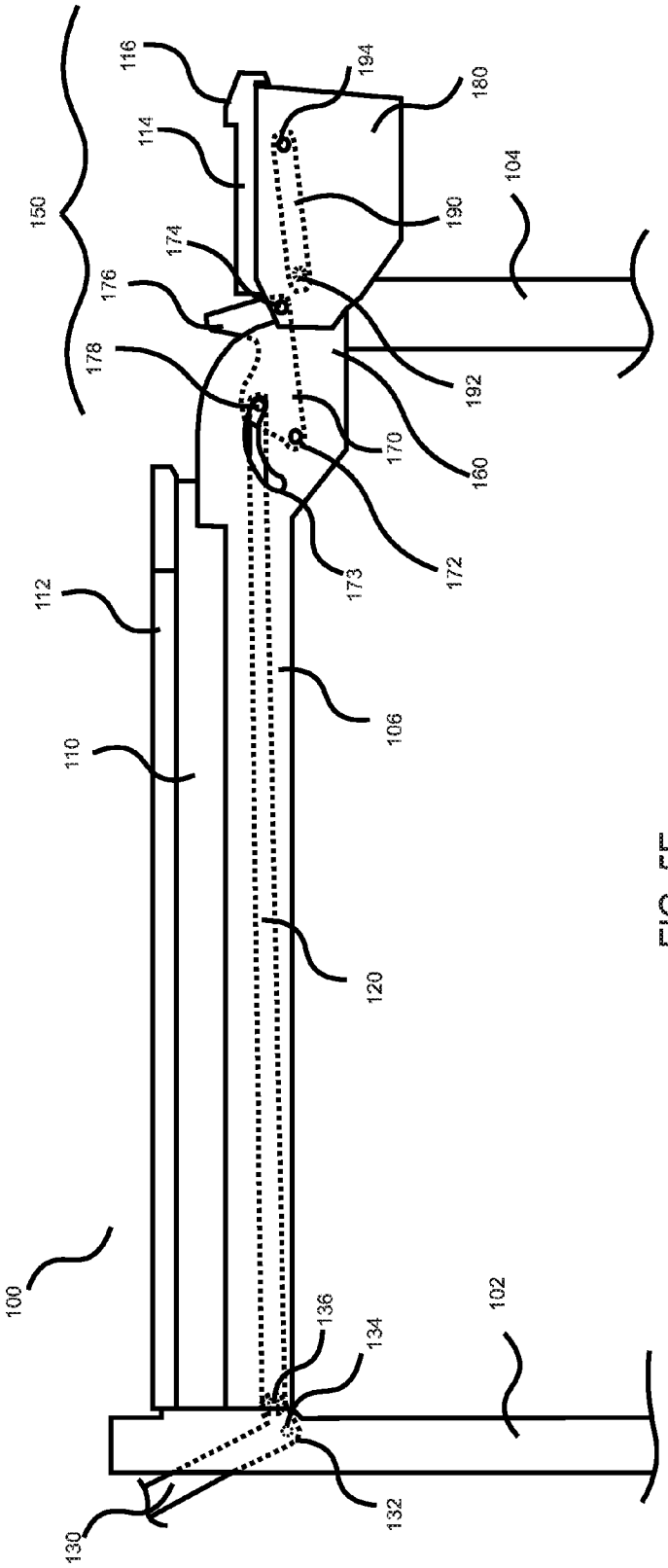
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FIG. 5E

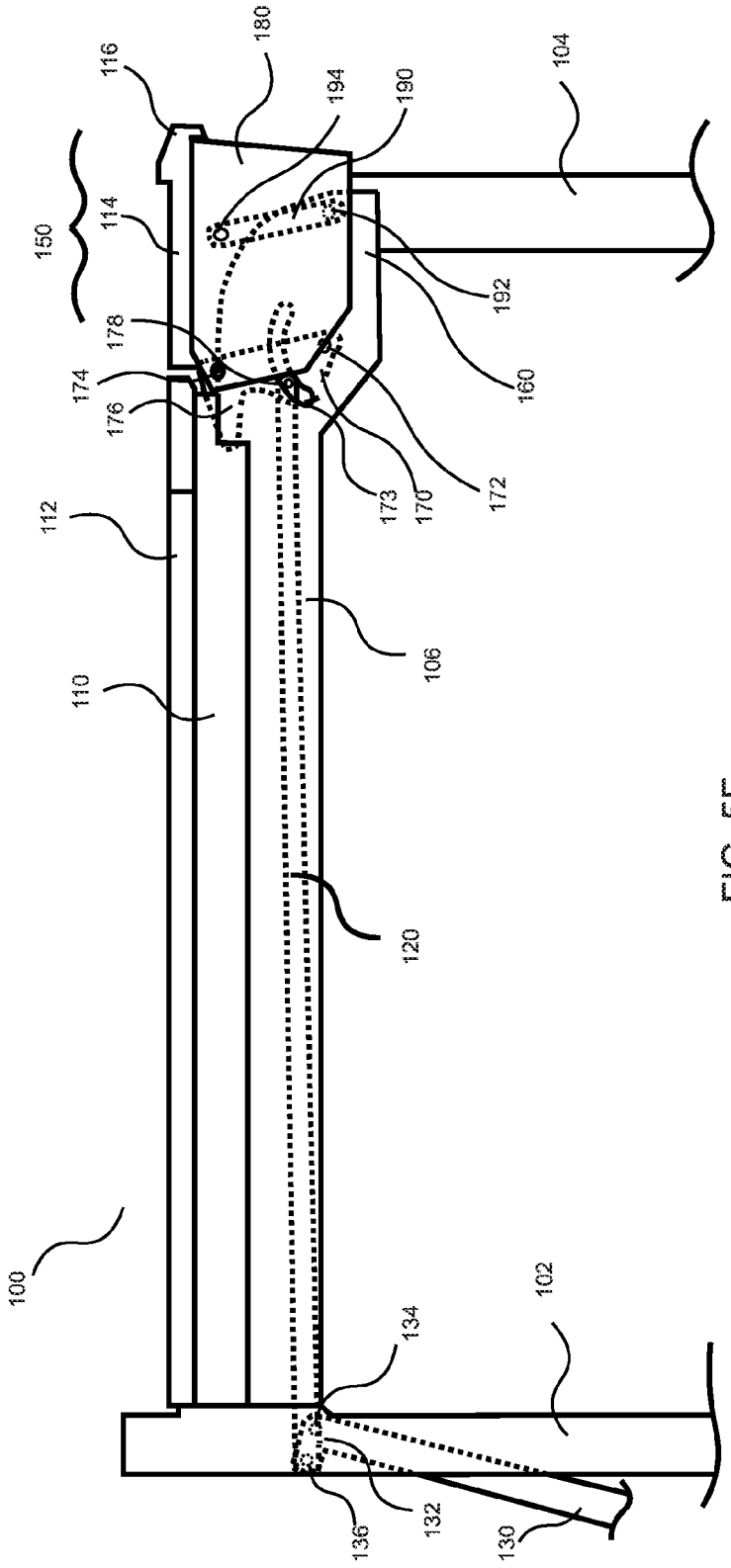
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FIG. 5F

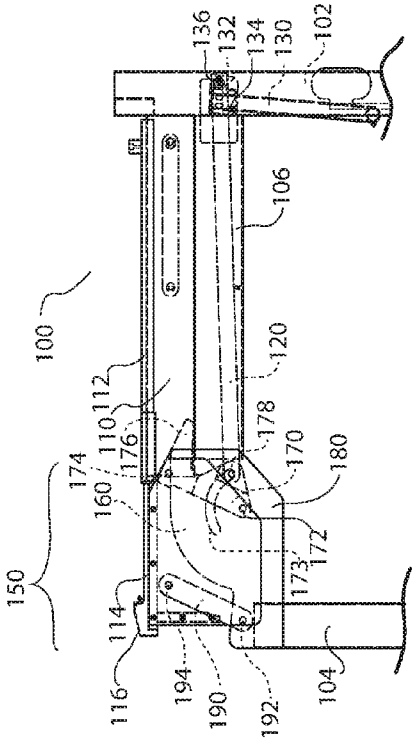
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FIG. 5H

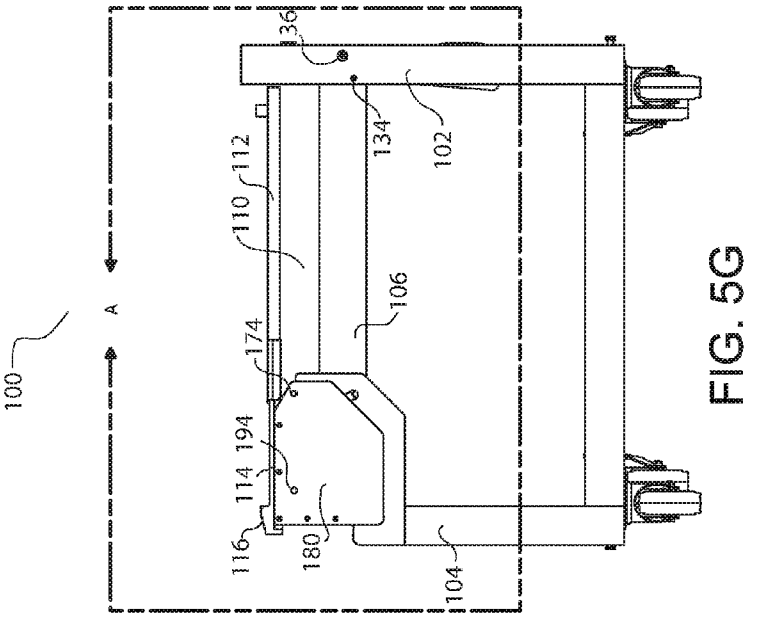
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FIG. 5G

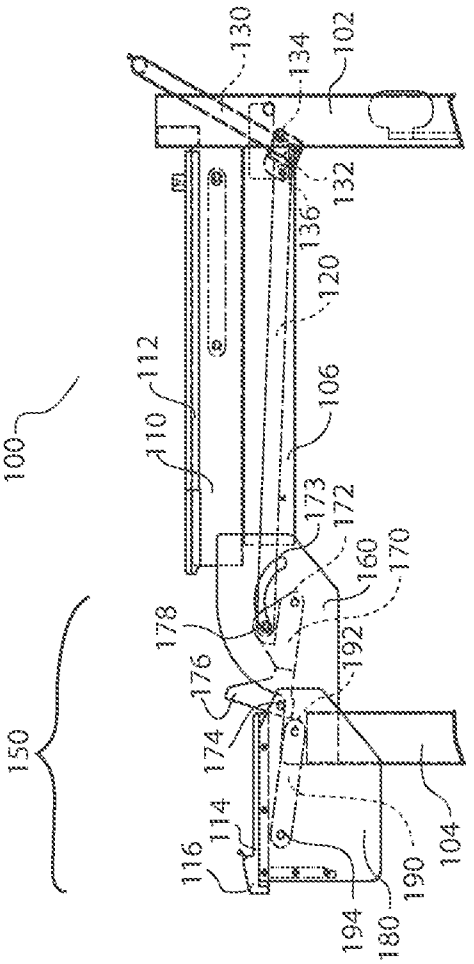
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FIG. 5J

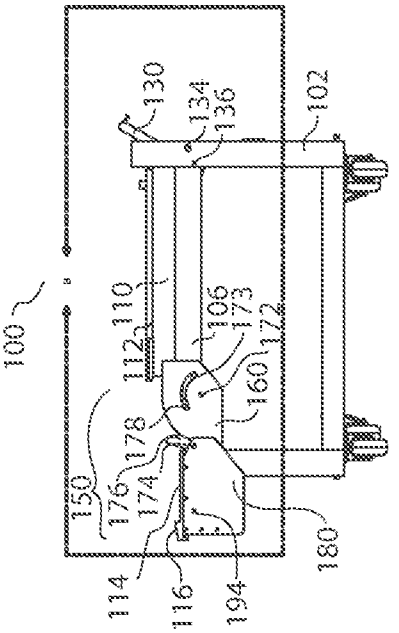
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FIG. 5I

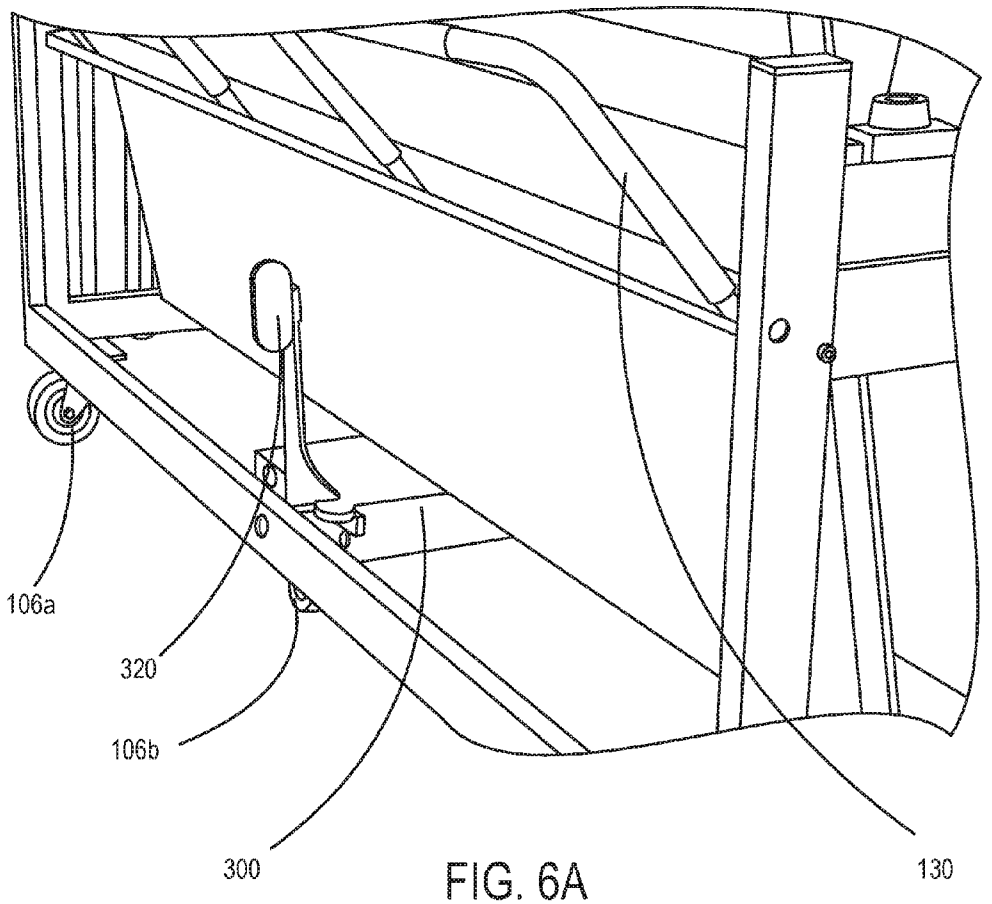

FIG. 6A

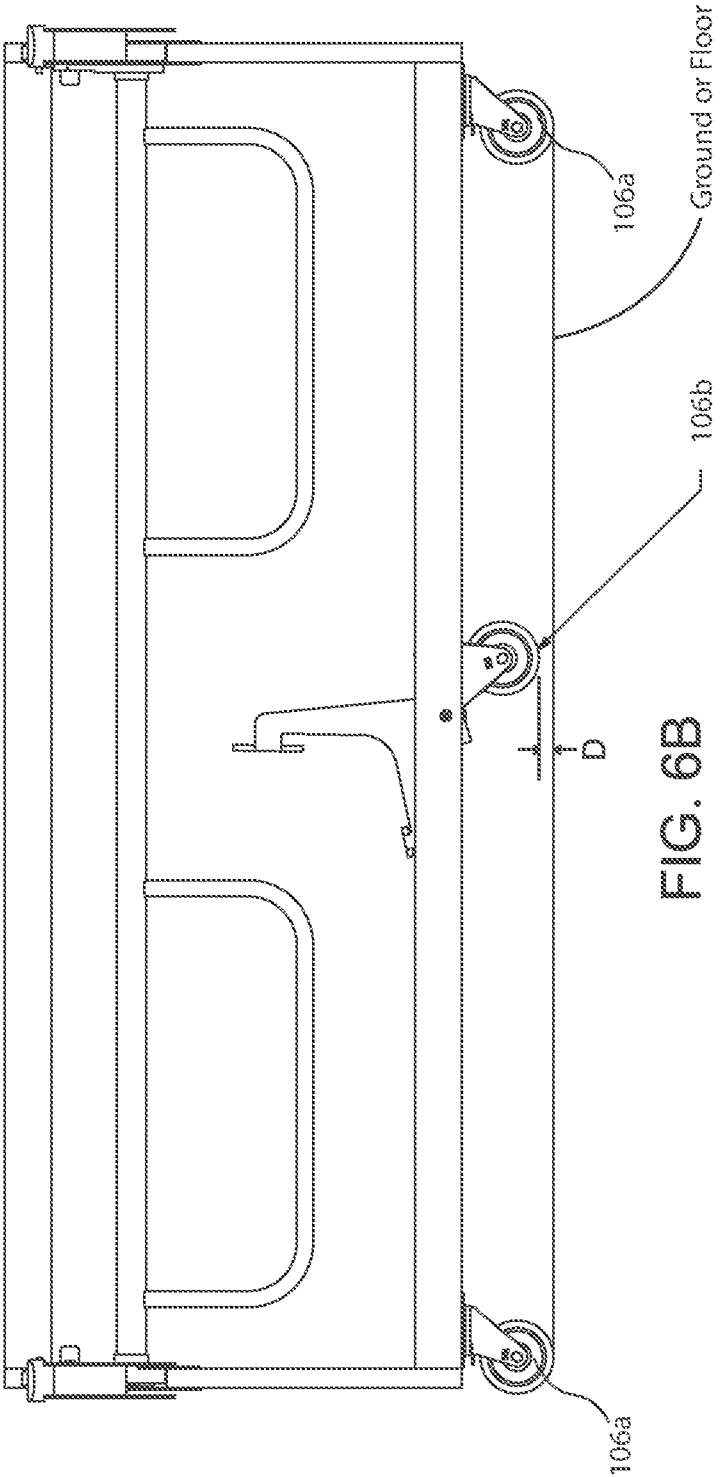

FIG. 6B

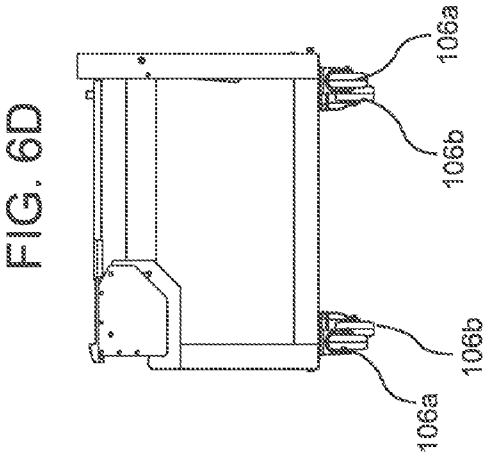

FIG. 6D

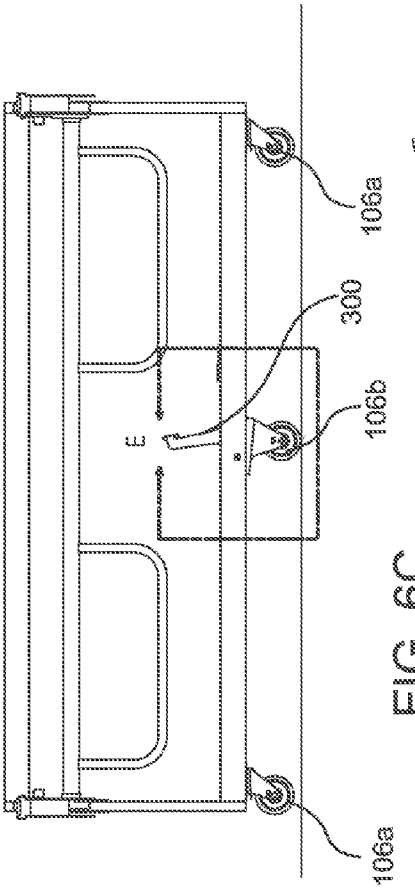

FIG. 6C

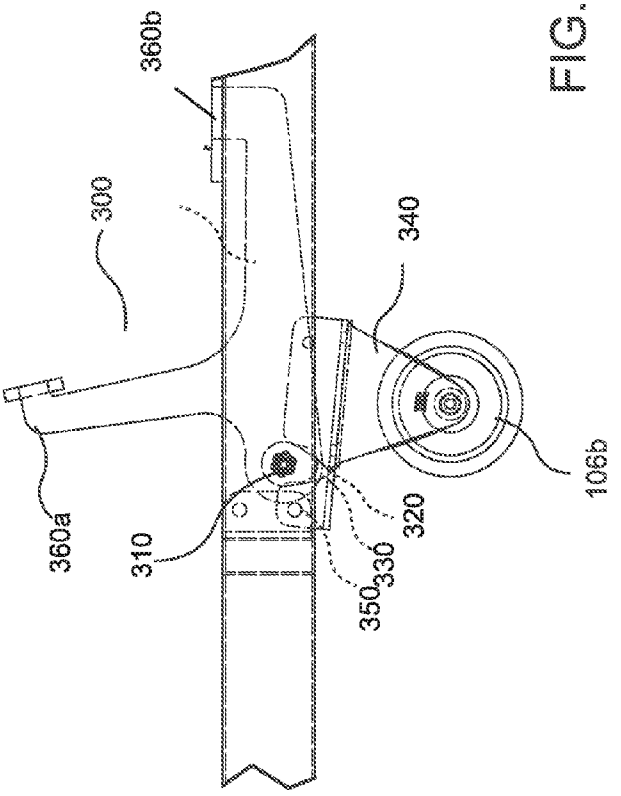

FIG. 6E

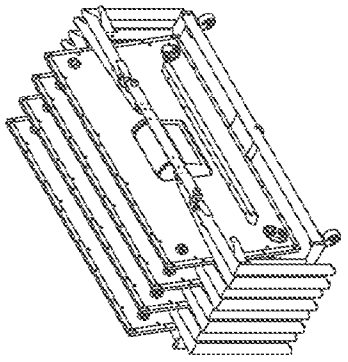

FIG. 7A

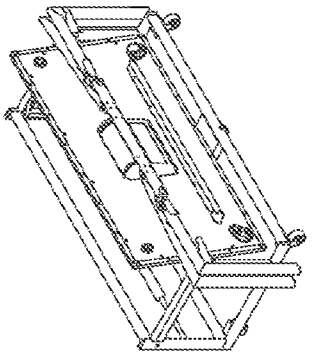

FIG. 7B

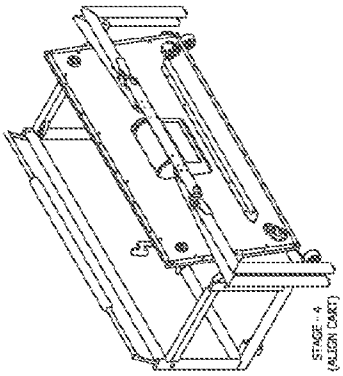

FIG. 7C

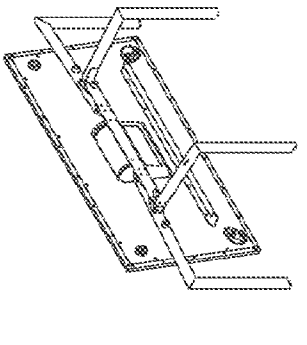

FIG. 7D

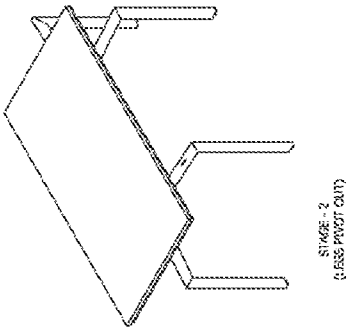

FIG. 7E

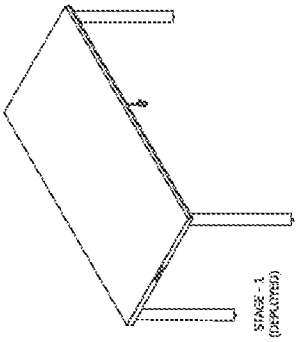

FIG. 7F

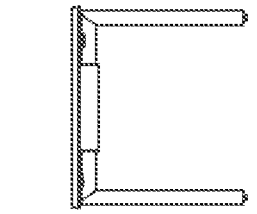

FIG. 8F

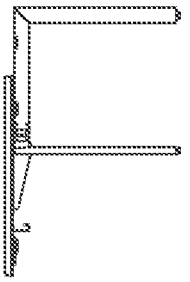

FIG. 8E

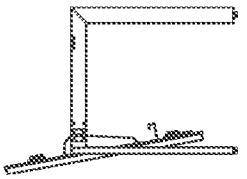

FIG. 8D

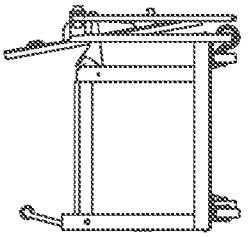

FIG. 8C

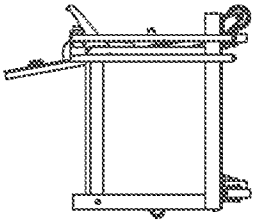

FIG. 8B

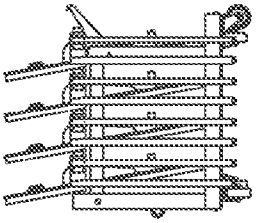

FIG. 8A

TABLE CART

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefit of provisional application No. 62/159,166 entitled "Table Cart," filed on May 8, 2015, and also the application No. 62/101,322 entitled "Collapsible Table", filed on Jan. 8, 2015, and also the application No. 62/159,152 entitled "Collapsible Table", filed on May 8, 2015, the contents of which are hereby incorporated by reference herein in their entirety. Additionally, this application is co-pending with application Ser. No. _____ entitled "Collapsible Table", filed Jan. 8, 2016, which is also hereby incorporated by reference in its entirety.

TECHNICAL FIELD

[0002] The disclosure provided herein is related to systems and methods for moving furniture and more particularly to furniture moving carts operable to lift, store, and move collapsible furniture.

BACKGROUND

[0003] In the furniture industry, collapsible or non-collapsible furniture is frequently used to set up events like conferences, assemblies, conventions, festivals, weddings, and the like. In setting up these events, large quantities of furniture are moved, stored, and set up. Examples of such furniture include collapsible or non-collapsible chairs and tables. While there are numerous trollies, carts, dollies or the like used in the industry, these devices require the workers to lift the furniture articles on and off of the devices. These devices also have a single movement configuration, meaning the ways the casters move are not adjustable. While the casters may be lockable or unlockable in rotation about their rolling axis, there are generally a static number of casters in use with their directional characteristic not generally being adjustable.

SUMMARY

[0004] In accordance with various embodiments, a furniture movement device may be provided that includes a lift mechanism that is operable to engage a furniture article and lift it from the ground to a support rail of the device. The furniture movement device may have a frame having a lower portion and an upper portion, wherein the upper portion includes a support rail. The furniture movement device may include a lift mechanism connected near one end of the support rail, with the lift mechanism operable to raise the furniture article off the ground such that the furniture article is supported at approximately the same height as the support rail.

[0005] In accordance with various embodiments, the lift mechanism may be movable relative to the support rail. The lift mechanism includes a first portion that is movable from a first lower position to a second higher position, with the first lower position located at a height operable to engage a lifting surface on a furniture article that is not supported by the moving device and the second higher position is approximately the same height as the top of the support rail. The furniture movement device further comprises a handle connected to the lift mechanism and operable to adjust the lift mechanism between the first position and the second position. The handle may be positioned on a side of the furniture moving device opposite the lift mechanism.

[0006] In accordance with various embodiments, the lift mechanism includes a support surface that moves from the first position to the second position enabling the furniture article to slide directly onto the rails. The lift mechanism support surface is substantially parallel to the rail in both the first position and the second position. The lift mechanism support surface can remain horizontal relative to the ground throughout the range of movement from the first position to the second position. The substantially parallel position of the support surface is maintained by a first link and a second link that extends from the platform to the frame with each link having first and second frame pivots, respectively, and first and second platform pivots, respectively. The first link and the second link may be substantially parallel to one another. The handle may be connected to the first link via a handle link that extends from a pivot on the handle to a pivot on the first link located between the frame pivot and the platform pivot on the first link. The support surface can include a sufficiently low-friction material that the furniture article slides along. The lift mechanism support surface may be at approximately the same height as the top of the support rail when the lift mechanism is positioned in the second position such that a furniture article is slid along the lift mechanism support surface and onto the support rail along a generally linear path. The support rail includes first and second rails that are generally parallel to one another with a space between the two sufficient to receive a tabletop there between, while the first and second support rails are operable to support table leg portions. The furniture moving also includes a plurality of wheels attached to a lower portion of the frame operable to allow the device to transport the furniture article. The plurality of wheels are a plurality of casters freely rotatable around a vertical axis such that the device is able to move forward, backward, sideways or a combination of each.

[0007] In accordance with various embodiments, a method of moving furniture includes providing a cart having a support surface and a lift mechanism operable to engage a furniture article and elevate it to the height of the support surface, wherein the cart has wheels enabling movement of the cart when loaded with furniture articles. The method also includes engaging a furniture article with the lift mechanism at a first height. The method also includes lifting the furniture article with the lift mechanism up to a second height equal to the support surface height. The method also includes sliding the furniture article off of the lift mechanism and onto the support surface. The method also includes lowering the lift mechanism to the first height. The method also includes engaging a second furniture article.

[0008] In accordance with various embodiments, a furniture moving system includes a furniture article having a support surface and a first and a second lift point positioned outboard of the support surface when the furniture article is in a collapsed configuration but positioned inboard of the support surface when the furniture article is in an extended configuration. The system also includes a moving device having a furniture article lift mechanism operable to engage the first and second lift points and lift the furniture article off the ground via the first and second lift points and also having wheels located at the base of the moving device suitable to move the furniture article from a first location to a second location while the furniture article is supported on the moving device.

[0009] In accordance with various embodiments, the device of the system includes a first support and a second

support that are positioned adjacent to the furniture article lift mechanism such that after the furniture article is lifted to the lift mechanism's full height the furniture article is slid off the lift mechanism and onto the first and second support. The first support and the second support are a first rail and a second rail respectively, with the first support rail and the second support rail may be spaced apart a distance greater than a width of the furniture article support surface, allowing the furniture article support surface to fit between the first rail and the second rail without interference between the furniture article support surface and either the first rail or the second rail. The lift mechanism includes a first lift mechanism extending from an end of the first rail and a second lift mechanism extending from an end of the second rail. The furniture article further includes a first and a second retaining element positioned outboard of the first and second lift points respectively such that when the lift mechanism is positioned to lift the furniture article. The first lift mechanism is positioned between the first retaining element and the furniture article support surface. The second lift mechanism is positioned between the second retaining element and the furniture article support surface. The first retaining element and the second retaining element are positioned sufficiently close to the first lift mechanism and the second lift mechanism such that when the furniture article shifts laterally on the lift mechanism, the first retaining element and the second retaining element will contact the first lift mechanism or the second lift mechanism respectively such that the furniture article support surface does not contact the lift mechanism. The furniture article support surface may be a table top. The first retaining element and the second retaining element may be a first table leg and a second table leg. The first lift point and the second lift point may be substantially horizontal members that connect to the first table leg and the second table leg respectively.

[0010] Additional embodiments and features are set forth in part in the description that follows, and will become apparent to those skilled in the art upon examination of the specification or may be learned by the practice of the disclosed subject matter. A further understanding of the nature and advantages of the present disclosure may be realized by reference to the remaining portions of the specification and the drawings, which forms a part of this disclosure. One of skill in the art will understand that each of the various aspects and features of the disclosure may advantageously be used separately in some instances, or in combination with other aspects and features of the disclosure in other instances.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] FIGS. **1**A-B illustrate perspective views of a furniture moving device in a raised position and lowered position respectively in accordance with various embodiments of the furniture moving device;

[0012] FIGS. **2**A-H illustrate various views of a furniture moving device in lowered (FIGS. **2**A-D) and raised positions (FIGS. **2**E-J) positions in accordance with other embodiments of the furniture moving device;

[0013] FIG. **2**I illustrates a top detail view of the furniture moving device of FIG. **2**H along detail I-I in accordance with other embodiments of the furniture moving device;

[0014] FIGS. **3**A-B illustrate a perspective view of various numbers of collapsible tables being supported on a furniture moving device in accordance with various embodiments of the furniture moving device;

[0015] FIG. **4** illustrates a side view of a furniture moving device with a lift mechanism positioned in a raised position in accordance with the embodiment of the furniture moving device depicted in FIGS. **2**A-I;

[0016] FIGS. **5**A-F illustrate a side view of a furniture moving device with a lift mechanism positioned in various different positions in accordance with another embodiment of the furniture moving device;

[0017] FIG. **5**G illustrates a side view of a furniture moving device with the lift mechanism in a raised position in accordance with an embodiment of the furniture moving device;

[0018] FIG. **5**H illustrates a detail view of detail A shown in FIG. **5**G of a furniture moving device with the lift mechanism in a raised position in accordance with an embodiment of the furniture moving device;

[0019] FIG. **5**I illustrates a side view of a furniture moving device with the lift mechanism in a lowered position in accordance with an embodiment of the furniture moving device;

[0020] FIG. **5**J illustrates a detail view of detail D shown in FIG. **5**G of a furniture moving device with the lift mechanism in a lowered position in accordance with an embodiment of the furniture moving device;

[0021] FIG. **6**A illustrates a perspective rear detailed view of a caster adjustment mechanism on a furniture moving device;

[0022] FIG. **6**B illustrates a rear view of a caster adjustment mechanism on a furniture moving device;

[0023] FIG. **6**C illustrates a front view of a caster adjustment mechanism on a furniture moving device;

[0024] FIG. **6**D illustrates a side view of a caster adjustment mechanism on a furniture moving device;

[0025] FIG. **6**E illustrates a detailed view of detail E in FIG. **6**C;

[0026] FIG. **7**A-F illustrates a perspective view loading of a pivot style furniture moving device in accordance with one embodiment; and

[0027] FIG. **8**A-F illustrates a side view loading of a pivot style furniture moving device in accordance with one embodiment.

DETAILED DESCRIPTION

[0028] The subject matter disclosed herein relates to systems for furniture movement. Particularly, the system includes a cart operable to support, lift, or transport furniture. The cart includes movement elements at the base allowing easy movement of the cart. The cart also includes a support structure operable to suspend furniture off the ground such that the furniture can be relocated with minimal or no contact with the floor. The cart also includes a lifting mechanism to raise the furniture off the floor such that direct lifting of the furniture by the user can be minimized or avoided.

[0029] In the events industry, it is sometimes necessary to set up large quantities of furniture, for example chairs, tables, stands, cubicles, walls, displays, etc. To set up the furniture, stacks or quantities of collapsed or non-collapsed furniture may be frequently moved around. Some of these pieces of furniture may be collapsed into a folded position while being moved or the pieces of furniture may be in a non-collapsed state or designed to be non-collapsible. In any configuration, the furniture may be moved in large quantities.

[0030] In accordance with various aspects of the subject matter disclosed herein, a furniture transportation device **100** is utilized to aid in moving one or more furniture articles **200** as illustrated in the various FIGS. **1**A-**8**G. In various embodi-

ments, the furniture transportation device **100** is a dolly, cart, trolley or similar mobile device. The furniture articles **200** include any type of furniture such as tables, chairs, stools, cubical walls, desks, stands, etc. A person of ordinary skill in the art would understand the adaptability of the devices disclosed herein to any type of furniture based upon the disclosure provided herein. However, as an example, a collapsible table **200** is described herein and shown in the figures.

[0031] Several embodiments of cart **100** are shown in the figures and discussed herein. For example, FIGS. **1**A-**1**B illustrate a first embodiment, FIGS. **2**A-**21** illustrate a second embodiment, FIGS. **3**A-B illustrate a third embodiment, and FIGS. **7**A-**8**G illustrate a fourth embodiment. It should be appreciated that any element of any one of the various embodiments can be interchanged with or applied with any other element of any of the other embodiments whether explicitly described as such or not.

[0032] In accordance with various embodiments, the furniture article **200** has a collapsed configuration (as shown in FIGS. **2**A-I, **3**A-**3**B, **5**C-D, **7**A-E, and **8**A-E) and an extended configuration (as shown in FIGS. **7**F-G and **8**F-G). In the extended configuration, the furniture article **200** is in a state that is usable of its intended furniture-purpose. For example, a chair can be sat on or a table has a top working or support surface that is spread out and sufficiently horizontal for use when configured for its intended furniture-purpose. In the collapsed configuration, the furniture article **200** is configured into a condensed state as compared to its configuration in the extended position. For example, a chair can be folded such that multiple chairs can be stacked together and can occupy a space that is smaller or more compact than a single extended chair.

[0033] In some embodiments, the furniture-article will decrease in all dimensions compared to in the expanded configuration. In other embodiments, while the furniture-article **200** will become smaller in one or more dimensions, other dimensions thereof may increase compared to in the expanded configuration. For example, the folded chair may be taller but narrower in width than the expanded chair. In another example, a table can be folded such that multiple folded tables can occupy a space that is smaller or more compact than a single extended table. For example, the table top support surface and the table legs may be placed in a closer to parallel configuration and positioned adjacent to one another so that they occupy less space or depth. While the overall space occupied may be less, the space may have different dimensions, e.g. the compact space may be longer or taller but narrower in width. The more parallel configuration may be a configuration in which the table top (i.e. the primary work or support surface) is closer to parallel than in the tables fully expanded configuration or another suitable configuration. This may include small angles between the table top and its legs. Other configurations of the furniture article **200** suitable to configure the furniture article in a more condensed state can also be incorporated.

[0034] In the collapsed configuration the furniture article may also have dedicated lifting elements that are positioned outside or outboard the perimeter of the furniture's support surface or other main member. As an example, a collapsed table may have lifting elements positioned outside the perimeter of the table top. These same lifting elements can be positioned inside the perimeter of the table top in the collapsed state. Such lifting elements are discussed in more detail below.

[0035] In one example, the furniture article **200** is a table that can be configured into a collapsed configuration allowing a user to load the table **200** onto movement device **100**. When in the collapsed configuration, one or more of the legs **206**, **208**, **210**, **212** may extend beyond one or more edges of the tabletop **202**, so as to engage a portion of the movement device **100**. The legs **206**, **208**, **210**, **212** can extend over and rest upon at least one support surface **110** of the movement device **100**. The support surface **110** can extend between the tabletop **202** and the legs **206**, **208**, **210**, **212** on each side of the tabletop **202**. For example, as shown in FIG. **2**A, in preferred embodiments, the legs **206**, **208**, **210**, **212** each have a support arm **226**, **228**, **230**, **232** respectively supported each. The support arms **226**, **228**, **230**, **232** can extend substantially horizontally, and the legs **206**, **208**, **210**, **212** can extend substantially vertically. When the table **100** is in the collapsed position, there is a gap G (see FIG. **21**) between the tabletop **202** and the legs **206**, **208**, **210**, **212**. The portion of the support arms **226**, **228**, **230**, **232** that extend across gap G forms lift points suitable to engage the support surface **110** of the movement device **100**. The table **200** can thus be loaded onto movement device **100** so that the support surface **110** contacts the lift points on the support arms. This type of table as the furniture article is only an example of the types of furniture articles that can be used. A more detailed explanation of this table is provided in Co-pending application Ser. No. _____. The particular table is also described in more detail in provisional patent application Nos. 62/101,322 and 62/159,152.

[0036] In accordance with the various embodiments provided herein, at least one article of furniture **200** is supported and movable on the furniture transportation device **100**. In preferred embodiments, a plurality of furniture articles **200** are movable on each of the furniture transportation devices **100**.

[0037] In accordance with various embodiments and as illustrated in FIGS. **1**-**3**, a furniture moving device **100** includes a structure having a support surface **110**. The moving device **100** includes movement elements **106** proximal to the floor sufficient to easily move the device **100** about. The moving device **100** also includes a lift mechanism **150**. The lift mechanism **150** is operable to engage a furniture article and elevate it to the height of the support surface. In one example, the entire support surface **110** is adjustable to operate as the lift mechanism **150**. In another example, the lift mechanism **150** is located at the end of the support surface **110**. The lift mechanism **150** is operable to engage a furniture article **200** at a first height. The lift mechanism **150** is operable to lift the furniture article **200** up to a second height approximately equal to the height of support surface **110**. While the lift mechanism **150** and the support surface **110** are at about the same height, the furniture article **200** is easily slid off of the lift mechanism **150** and onto the support surface **110**. The lift mechanism **150** is operable to be lowered back to the first height. With the moving device **100** loaded, the supported furniture articles are easily moved around on the cart.

[0038] As shown in FIGS. **3**A-**3**B, the furniture **200** are loaded onto the furniture transportation device **100**. In various embodiments, the furniture legs **206**, **208**, **210**, **212** (shown in FIG. **3**A) can extend around or reside outside of at least one support element of the transportation device **100**. For example, the support element is rail **110** of the furniture transportation device **100**. One or more rails **110** can reside between separate legs such as legs **208** and **212**. In various

embodiments, the furniture top **202** (e.g. tabletop) resides between separate rails such as rails **109** and **111**. Each rail also resides between the furniture top **202** and the furniture legs **206**, **208**, **210**, **212** in such embodiments in which a furniture top **202** can be positioned between the legs as disclosed in application No. 62/101,322. As seen in FIGS. **3**B and **3**C, multiple pieces of furniture **200** can be loaded onto the furniture transportation device **100** and transported together, see e.g. **200***a*, **200***b*, **200***c*, **200***d*, **200***e*, and **200***f*.

[0039] In accordance with various embodiments, the rails **110** are positioned such that when the furniture **200** is positioned thereon, the furniture **200** is suspended off of the floor. One or more upright members **102** support the rails **110** at the support height. In one embodiment, each of the four corners of the cart includes an upright member **102**, which supports the rails **110**. The rails and upper portion of the upright member **102** forms an upper portion of the furniture transportation device **100**.

[0040] The one or more upright members **102** extend from a lower portion of the furniture transportation device **100**. The lower portion of the furniture transportation device **100** includes one or more lower frame members **103**. The lower frame members **103** directly or indirectly connect to or support the rails **110**. The lower frame member **103** extends between one or more of the one or more upright members **102**. As shown in FIG. **3**A-B, the lower frame members **103** connects to and supports the frame rails **110** via the upright members **102**. The lower frame members **103** also directly or indirectly connect to movement elements **106**.

[0041] As shown the various figures (e.g. FIGS. **1**-**3**), and in accordance with various embodiments, the movement elements **106** are elements that improve movement of the transportation device **100** or limit movement of the transportation device **100**. The movement elements **106** can be devices, such as casters, wheels, gliders, studs, breaks, or the like. In accordance with a preferred embodiment the movement elements include at least two casters located on the lower portion of the transportation device **100**. As shown, the movement elements **106** extends below the lower frame **103** and be operable to support the furniture transportation device **100** off the ground. The movement elements **106** allows for easy movement, e.g. rolling, of the furniture transportation device **100**, while supporting and transporting heavy loads of furniture **200** on the furniture transportation device **100**. In one embodiment, the movement elements **106** are positioned at four corners of the furniture transportation device **100**. The movement elements **106** are positioned proximal to the one or more upright members **102**. In various embodiments, each of the movement elements **106** includes a vertical axis and have freedom to rotate around the vertical axis (e.g. caster). In some embodiments, the movement elements **106** are fixed so they provide only liner movement (e.g. the elements **106** are wheels). The various movement elements **106** also can be a combination of types of devices (e.g. both castes and wheels).

[0042] As shown in FIGS. **1**-**2** and **4**-**5**, the furniture transportation device **100** includes a lift mechanism **150** that is operable to lift an article of furniture **200** off the floor and up to a support rail **110** height such that the furniture transportation device **100** is movable without the article of furniture dragging or otherwise engaging the floor. The lift mechanism **150** is movable between at least a lower position and an upper position. In the lower position, the lift mechanism **150** is positioned such that it can engage an article of furniture **200** that is supported by the floor. The lift mechanism **150** is movable to an upper position such that the lift mechanism **150** lifts the article of furniture **200** from the floor. When lifted, the lift mechanism assumes the support of the article of furniture **200**.

[0043] The lift mechanism **150** may include a support surface **114** and a platform **180**. When in the lower position (see e.g. FIG. **5**B, **5**C, or **5**E as an example of a lift in a lower position) the upper surface **114** is positioned to engage the furniture article **200**. For example, the support surface **114** contacts a collapsed furniture article **200** via lift points such as portions of the support arms **226**, **228**, **230**, **232**. The sidewall **180** may provide structural rigidity or support to the support surface **114** and provide a connection point between the frame of the furniture transportation device **100** and the lift mechanism **150**.

[0044] As indicated above, the lift points are portions of the furniture article that extend outboard of the furniture article support surface **202** when in the folded position, but remain inboard of the perimeter of the support surface **202** when the furniture article **200** is in the extended configuration. As an example, the lift points may be the portions of the support arms **226**, **228**, **230**, **232** that extend across the gap G (see FIG. **2**I). The furniture article can also include retaining elements that are positioned outboard of the lift points. The lift mechanism **150** is positionable between one retaining element and the furniture article support surface **202** on one side of the transportation device **100** and the lift mechanism **150** is positionable between another retaining element and the furniture article support surface **202** on the opposite side of the transportation device **100**. In this way each retaining element can be positioned sufficiently close to the lift mechanism **150** such that when the furniture article **200** shifts laterally on the lift mechanism **150**, one of the retaining elements can contact the lift mechanism **150** before the furniture article support surface **202** does. This relationship can help keep the support surface **202** in good condition. In one example, the retaining element can be one or more of the table legs **206**, **208**, **210**, and **212** of a table as shown in FIG. **2**.

[0045] As illustrated in FIG. **2**I, the rail **110** includes a width of W. The distance of gap G between the support surface **202** of the furniture article **200** and the retaining element or leg (for example, leg **206** or **208**) is greater than W. In this way, the rail **110** will fit within the gap G without interference from the support surface **202** or the retaining element or leg of the furniture article **200**.

[0046] The movement of the lift mechanism **150** may occur by a variety of structural arrangements. For example, lift mechanism **150** is linked (e.g. two-bar linkage, parallel linkage, four-bar linkage, or any combination thereof) to the frame (e.g. any one or more of upright member **102**, rail **110**, or lower frame **103**). Or, the lift mechanism **150** can be pivotally attached to the frame. Or, the lift mechanism **150** is slideably attached to the frame. Or, the lift mechanism **150** is attached to the frame through any combination of these or other mechanisms. The force applied to articulate lift mechanism **150** between the different positions can be provided by any mechanical mechanism, electromechanical mechanism, or the like such as lever arm, screw drive, hydraulic, pneumatic, linear drive, etc. In one example, a user can apply force directly to the lift mechanism (e.g. pivoting or directly lifting the furniture via the lift mechanism). In another example, the user may apply force indirectly to the lift mechanism via a mechanical linkage. The user may actuate the lift mechanism via electrical, hydraulic, or pneumatic controls.

[0047] In accordance with one embodiment, the lift mechanism **150** is pivotably connected to the frame. As indicated above, the frame may include, for example, any one or more of upright member **102**, rail **110**, or lower frame **103**. In one example, a frame mounting face **160** may extend between or from any one or more of upright member **102**, rail **110**, or lower frame **103**, such as between the upright member **102** and the rail **110** as shown in FIG. **5**E. The lift plate **180** is pivotably connected to a frame mounting face **160**. This connection can be direct or indirect. For example, in an indirect manner, the lift platform **180** is pivotably connected to a frame mounting face **160** via a link arm **170**. In another example, in a direct manner, the lift platform **180** may pivot at a single point as shown in FIGS. **7-8**.

[0048] In various embodiments, the rail **110** may include a support surface **112**. As indicated above, the lift platform **180** may also include a lift support surface **114**. In the upper position, shown for example in FIGS. **5**D and **5**F, the lift support surface **114** and the rail support surface **112** is generally aligned. This alignment may simplify the transition of furniture from the lift support surface **114** to the rail support **112** for transportation and storage of furniture **200**. For example, in the upper position, the furniture article **200** is slid from the lift support surface **114** to the rail support surface **112**. This may prepare the lift mechanism **150** to pick up another furniture article **200**. In the opposite direction, the furniture transportation device **100** is unloaded by sliding a furniture article **200** from the rail support surface **112** to the lift support surface **114**. The lift mechanism **150** may then be lowered from the upper position to the lower position. Once in the lower position, the furniture article **200** is removed from the furniture transportation device **100** and supported by itself. In one example, in the lower position, the lift support surface **114** is positioned approximately parallel to the rail support surface **112** or positioned at an angle thereto.

[0049] In accordance with various embodiments and illustrated in FIGS. **4-5**, the lift mechanism **150** is a parallel bar linkage. There can be several mechanisms that cause the lift support surface **114** to maintain a parallel position with respect to the rail support surface **112**. In one example, the lift support surface **114** is maintained in a parallel position with respect to the rail support surface **112** via a parallel linkage mechanism. For example, a first link **170** is pivotally connected to the frame mounting face **160** at a first pivot **172** and to the lift platform **180** at a second pivot **174**. A parallel second link **190** may also be pivotally connected to frame mounting face **160** but at a third pivot **192** and to the lift platform **180** at a fourth pivot **194**. While the connections are described with respect to mounting faces, it is understood that frame members themselves or any structural element of the lift mechanism may serve as a link mount.

[0050] The frame mounting face **160** may also function as a structural guide for a parallel bar linkage. While a parallel linkage may maintain a horizontal position of the platform, the linkage may provide little transverse structure with the pivots being in a similar plane. As shown in FIGS. **5**E-J, mounting face **160** may operate as an additional support for the linkage. Face **160** may include an arcuate slot **173** that provides clearance for the link **170** and its pivots (e.g. pivot **178**).

[0051] As indicated above, the lift mechanism can be actuated by a variety of mechanisms. In one embodiment, the lift mechanism **150** is connected to a handle **130**. For example, a linkage bar **120** may extend from a lever **132** on handle **130** to the lift mechanism **150**. In one example, the linkage bar may pivotally connect to a pivot **178** on frame link **170**. The pivot **178** is positioned directly between points **172** and **174** or, as shown in FIGS. **5**E and **5**F, the point **178** is out of alignment with points **172** and **174**, forming a triangle between the three pivots **172**, **174**, and **178**. In various embodiments, the link bar **120** is connected to any movable portion of the lift mechanism **150**. The link bar **120** may have a pivot on each end. The lift pivot **178** is on the end proximal to the lift mechanism **150**. The handle pivot **136** is on the end of the link bar **120** proximal to handle **130**.

[0052] The handle **130** pivots around pivot **134**. In one direction, the handle **130** may extend from pivot **134**. In another direction, lever **132** may extend from pivot **134**. The handle pivot **136** is positioned on the lever **132**. The lever **132** is cantilevered off of handle **130**. The handle **130** may extend out and away from the furniture transportation device **100**. In this way, the handle **130** is accessible to a user of the furniture transportation device **100** such that the user can apply a force on the handle. As the handle rotates around the pivot **134**, the lever **136** changes angular position causing handle pivot **136** to move. Movement of handle pivot **136** causes link bar **120** to articulate with the handle pivot **136**, which in turn causes lift pivot **178** to articulate. The movement of lift pivot **178** causes angular movement of links **170** and **190** about pivots **172** and **192**, respectively. FIG. **5**A illustrates an empty lift mechanism **150** in an upper position and FIG. **5**B illustrates the empty lift mechanism **150** in a lower position. FIG. **5**C illustrates the lift mechanism **150** engaging a table in the lower position and FIG. **5**D illustrates the lift mechanism **150** supporting a table in the upper position.

[0053] FIGS. **5**G-J illustrate various views of a furniture moving device **100** with the lift mechanism in a raised and lowered positions in accordance with various embodiments of the furniture moving device **100**. Like FIGS. **5**E and **5**F, FIGS. **5**G-J illustrate an embodiment of the lift system with hidden lines.

[0054] FIGS. **4** and **5** have a number of similarities in their respective embodiments. But a few differences are present as well. For example, FIG. **4** illustrates a backstop pivotally connected to the parallel linkage that makes up the lift mechanism **150** in this embodiment. FIGS. **5**A-J on the other hand illustrate a backstop that is integral with one of the linkages that make up the parallel linkage namely link **170**. In the embodiment of FIG. **5**B the backstop **176** is formed as a protrusion from the link **170**. As the link **170** rotates, the backstop **176** is tucked out of the way. In the embodiment of FIG. **4**, backstop **210** is pivotally connected to link **170** at pivot **212**. In the embodiment of FIG. **4**, as the parallel linkage is extended, link **170** rotates down and to the front of the device. This rotation pulls backstop **210** forward allowing it to rotate around pivot **212** as the pivot is lowered due to the rotation of link **170**. A side protrusion **211** extending from the backstop **210** contacts link **120** preventing backwards rotation (i.e. clockwise rotation as shown in FIG. **4**.) This limitation on backwards rotation limits or prevents the furniture article **200** from sliding beyond the backstop when loading the next furniture article. As the link **170** is rotated rearward, the lift mechanism **150** is elevated. This same motion causes the backstop **210** to rotate rearwardly (i.e. counterclockwise as shown in the FIG. **4**) and tuck out of the way (i.e. below the rail). With backstop **210** below the rail, the loaded and elevated furniture article **200** can slide rearwardly along the rail **110**.

[0055] As shown in FIGS. **1** through **3**, the furniture transportation device **100** may include two support rails spaced apart sufficiently to receive a table top there between. Similarly, the rails are spaced to have a chair seat positioned there between or are merely spaced to be positioned between table or chair legs regardless of the top or seat position. The tops of the rails proximate the ends with the lifts **150** are structured without a cross frame. In this way, the side of the furniture transportation device **100** which lifts the furniture article **200** may have a clearance such that the article can be slid not just along the top of the rails but also between the rails **110** without interfering with the furniture transportation device **100** frame.

[0056] As shown in FIGS. **2** and **3**, the two support rails **109**, **111** may have a support surface **112** height that is sufficiently taller than the legs of the furniture article **200**. The distance that the lift mechanism travels is equal to or greater than the distance the furniture article **200** is lifted off the floor when supported by the support surface **112**. Thus, when lowered to the floor by the lift **150**, the furniture article **200** can support itself. But when lifted by the lift **150**, the furniture transportation device **100**, particularly the rails **110**, may support the entire weight or a significant portion of the furniture article **200**. In accordance with various embodiments, the support surface height is configured to support a table by its legs or by leg supports. In one example, the support surface height is from 26-48 inches off the ground. In various examples, the support surface height is equal to the height of the legs of a table stored on the transport device **100**, plus 1-6 inches, or more preferably 3-4 inches.

[0057] Along with the two support rails **109** and **111**, the furniture transportation device **100** may include two lift mechanisms **150** positioned proximal to each of the support rails **109** and **111**. In accordance with one embodiment discussed above, each lift mechanism **150** may have a parallel linkage. Together the systems may form a four-bar linkage connected at the handle **130**. The handle **130** may enable actuation of the separate lift mechanisms at the same time.

[0058] In accordance with various embodiments, the support surface **112** and the lift surface **114** may maintain a generally horizontal position. (As discussed above, these surfaces may also remain parallel to one another.) The generally horizontal surfaces may allow for easier insertion through the furniture article **200** by the lifting mechanism **150** and limit the tendency for the furniture article **200** to slide around on either the support surface **112** or the lift surface **114**. The support surface **114** may include a lead in **116** operable to ease the transition onto the lift support surface **114** as the surface engages the furniture **200** prior to lifting the furniture **200**.

[0059] The support rails **110** may include two or more portions. For example, the support rails **110** may have a structural portion shown in FIG. **5**E as rail **110** and a support surface **112**. In other examples the support surface and the support rail is the same structure, with the top of the structural portion operating as the support surface. However, in one embodiment, the support surface **112** is manufactured from a different material than the structural portion **110**. In one embodiment, the support surface **112** is made from a material with a lower frictional coefficient than the structural portion **110**. For example, the structural portion **110** is made from tube steel, with the support surface made from a low-friction material such as acetal (e.g. Delrin®). However, it should be noted that either element can be made from any of a polymer, elastomer, metal, silicone, wood, or similar industrial material capable of supporting, transporting, and storing furniture articles.

[0060] The furniture transportation device **100** may also include a plurality of different types of movement elements **106**. For example, one type of movement element **106** may allow the furniture transportation device **100** to roll freely in any direction (e.g. a caster). A second type of movement element **106** may allow the furniture transportation device **100** to roll freely in only one direction (e.g. a wheel). Another type of movement element **106** may inhibit movement in all directions compared to a wheel or caster. For example, the movement element **106** could be a stud, slider, brake, or some sort of anchor.

[0061] In various embodiments, the furniture transportation device **100** may have at least two types of movement elements. For example, one movement element can be vertically adjustable while the other movement element can be vertically fixed. As shown, for example, in FIG. **6**A, a first movement element **106***a* is first and second vertically-fixed casters attached to the lower portion of the frame. These vertically-fixed casters are operable to support the frame on the ground. A second type of movement element may also be attached to a lower portion of the frame. For example, at least one vertically-adjustable wheel **106***b* is attached to the lower portion of the frame. In one example, the vertically-adjustable wheel **106***b* is positioned between first and second vertically-fixed casters **106***a*.

[0062] In accordance with various embodiments, the vertically-adjustable movement element **106** may have an adjustment mechanism **300**. The adjustment mechanism **300** is operable to articulate the movement element **106** between a retracted position and an extended position. For example, the retracted position shown in FIGS. **1**A-B and **6**A-C may prevent or limit the contact between the movement element **106***b* and the ground. In the extended position, the contact between the movement element **106***b* and the ground is maximized.

[0063] In accordance with various embodiments, the adjustment mechanism **300** includes a shaft **310** connected to one or more external levers **320**. The shaft **310** is rotatably mounted to the lower frame portion of the furniture transportation device **100**. The external lever **320** may extend from the shaft **310** such that a moment is applied to the shaft. The shaft is able to rotate in response to the moment. The rotation of the shaft **310** may cause the movement element **106***b* to adjust vertically between the first position and the second position.

[0064] In accordance with various embodiments, the movement element **106***b* may engage the shaft **310** at a position that is eccentric with respect to an axis of rotation of the shaft. Thus, in response to the rotation of the shaft the eccentric engagement point moves up or down. The movement element **106***b* is pivotably attached to this point. As this point gets rotated downwardly as the shaft rotates, the vertically-adjustable movement element may extend and contact the ground. As this point gets rotated upwardly as the shaft rotates, the vertically-adjustable movement element **106***b* may retract away from the ground.

[0065] In another embodiment, as illustrated in FIG. **6**E, the eccentric point **320** is the exterior surface of a cam **330**. The movement element may not be attached to the eccentric point **320** but instead may act as a cam follower and be in contact with the eccentric point **320**. As shown housing **340** may have a surface at point **320** that acts as the follower of cam **330**. As the shaft **310** rotates the cam follower is pushed down,

thereby extending the movement element **106***b* toward the ground. The housing **340** may pivot about pivot **350** as the cam pushes down on the surface. As the shaft rotates in the other direction the cam follower is retracted without the downward force on the cam **330**. For example, the movement element is spring-loaded to automatically retract in absence of a force from a cam follower. A spring can be wound about pivot **350** providing a bias. It should be noted that the vertically-adjustable movement element **106***b* is adjusted in any manner known in the art including, for example, by being mechanically extended (e.g. sliding, threading, etc.), electromechanically extended (e.g. motor driven, linear actuated, etc.) or by any other method or combination of methods. Lever **360***a* is used to actuate the mechanism and cause rotation of shaft **310** and resulting rotation of cam **330**. Lever **360***b* is used to rotate the shaft **310** in the opposite direction.

[0066] The adjustment mechanism **300** may include a biasing mechanism operable to bias the caster into either or both the first position or the second position. The biasing mechanism may include a spring, detent, lock, or other methods.

[0067] In accordance with one embodiment, third and fourth vertically-fixed casters are included. The first, second, third, and fourth vertically-fixed casters are positioned on four corners of the frame. A second vertically-adjustable caster is positioned between the third and fourth vertically-adjustable casters. In one example, the six casters may generally form a rectangle.

[0068] Examples of these methods are illustrated in FIG. **7**A-F and FIG. **8**A-F, which illustrate a perspective view and side view respectively of loading of a pivot style furniture moving device in accordance with one embodiment. In the embodiments disclosed in these figures, the lift mechanism is attached to the frame at a single pivot and the handle causes the lift mechanism to swing up and down allowing loading of the articles of furniture thereon. However, other lift mechanisms as described herein can be used as well.

[0069] In accordance with various embodiments, a method of moving furniture includes providing a furniture moving device as discussed herein. For example, the device is cart having a lift mechanism, a support surface, and movement elements. The lift mechanism is operable to engage a furniture article and elevate it to the height of the support surface. The method may further include engaging a furniture article with the lift mechanism at a first height. The furniture article is lifted up with the lift mechanism to a second height approximately equal to the support surface height. The furniture article is slid off of the lift mechanism and onto the support surface. The lift mechanism is lowered back to the first height. The process may then be repeated by engaging a second furniture article. The supported furniture article may then be moved around on the cart.

[0070] In accordance with various embodiments, a method of setting up furniture may include providing a furniture moving device loaded with furniture. A first furniture article is slid off of a support surface and onto a lifting mechanism positioned at a first height approximately equal to the support surface. The lift mechanism is lowered to a second height suitable for the furniture article to support itself. The lift mechanism may then be raised back to the support surface at the first height and the process started over again. The methods described herein are shown by way of example with a cart having a single pivot lifting mechanism as illustrated in FIGS. **7**A-G and FIGS. **8**A-G and discussed in more detail above, but it may be noted that the methods are equally applicable to other types of lifting mechanisms as discussed throughout this application such as the parallel linkage lifting mechanism discussed herein.

[0071] Having described several embodiments herein, it will be recognized by those skilled in the art that various modifications, alternative constructions, and equivalents may be used. The various examples and embodiments may be employed separately or they may be mixed and matched in combination to form any iteration of the alternatives. Additionally, a number of well-known processes and elements have not been described in order to avoid unnecessarily obscuring the present invention. Accordingly, the above description should not be taken as not limiting the scope of the invention.

[0072] Those skilled in the art will appreciate that the presently disclosed embodiments teach by way of example and not by limitation. Therefore, the matter contained in the above description or shown in the accompanying drawings should be interpreted as illustrative and not in a limiting sense. The following claims are intended to cover all generic and specific features described herein, as well as all statements of the scope of the present method and system, which, as a matter of language, might be said to fall there between.

What is claimed is:

1. A furniture moving device, comprising:

a frame having a lower portion and an upper portion, wherein the upper portion includes a support rail; and

a lift mechanism connected near one end of the support rail, with the lift mechanism operable to raise a furniture article off the ground such that the furniture article is supported at approximately the same height as the support rail.

2. The device of claim **1**, wherein the lift mechanism is movable relative to the support rail.

3. The device of claim **1**, wherein the lift mechanism includes a first portion that is movable from a first lower position to a second higher position, with the first lower position located at a height operable to engage a lifting surface on a furniture article that is not supported by the moving device and the second higher position is approximately the same height as the top of the support rail.

4. The device of claim **3**, further comprising a handle connected to the lift mechanism and operable to adjust the lift mechanism between the first position and the second position.

5. The device of claim **4**, wherein the handle is positioned on a side of the furniture moving device opposite the lift mechanism.

6. The device of claim **3**, wherein the lift mechanism includes a support surface that moves from the first position to the second position enabling the furniture article to slide directly onto the rails.

7. The device of claim **6**, wherein the lift mechanism support surface is substantially parallel to the rail in both the first position and the second position.

8. The device of claim **6**, wherein the lift mechanism support surface remains horizontal relative to the ground throughout the range of movement from the first position to the second position.

9. The device of claim **7**, wherein the substantially parallel position of the support surface is maintained by a first link and a second link that extend from the platform to the frame with each link having first and second frame pivots, respectively, and first and second platform pivots, respectively.

10. The device of claim **9**, wherein the first link and the second link are substantially parallel to one another.

11. The device of claim **10**, wherein the handle is connected to the first link via a handle link that extends from a pivot on the handle to a pivot on the first link located between the frame pivot and the platform pivot on the first link.

12. The device of claim **6**, wherein the support surface comprises a sufficiently low-friction material that the furniture article slides along.

13. The device of claim **7**, wherein the lift mechanism support surface is at approximately the same height as the top of the support rail when the lift mechanism is positioned in the second position such that a furniture article is slid along the lift mechanism support surface and onto the support rail along a generally linear path.

14. The device of claim **1**, wherein the support rail includes first and second rails that are generally parallel to one another with a space between the two sufficient to receive a tabletop there between, while the first and second support rails are operable to support table leg portions.

15. The device of claim **1**, further comprising a plurality of wheels attached to a lower portion of the frame operable to allow the device to transport the furniture article.

16. The device of claim **15**, wherein the plurality of wheels are a plurality of casters freely rotatable around a vertical axis such that the device is able to move forward, backward, sideways or a combination of each.

17. A method of moving furniture, comprising:

providing a cart having a support surface and a lift mechanism operable to engage a furniture article and elevate it to the height of the support surface, wherein the cart has wheels enabling movement of the cart when loaded with furniture articles;

engaging a furniture article with the lift mechanism at a first height;

lifting the furniture article with the lift mechanism up to a second height equal to the support surface height;

sliding the furniture article off of the lift mechanism and onto the support surface;

lowering the lift mechanism to the first height; and

engaging a second furniture article.

18. A furniture moving system, comprising:

a furniture article having a support surface and a first and a second lift point positioned outboard of the support surface when the furniture article is in a folded position but positioned inboard of the support surface when the furniture article is expanded into the furniture article's usable position; and

a moving device having a furniture article lift mechanism operable to engage the first and second lift points and lift the furniture article off the ground via the first and second lift points and also having wheels located at the base of the moving device suitable to move the furniture article from a first location to a second location while the furniture article is supported on the moving device.

19. The furniture moving system of claim **19**, wherein the moving device includes a first support and a second support that are positioned adjacent to the furniture article lift mechanism such that after the furniture article is lifted to the lift mechanism's full height the furniture article is slid off the lift mechanism and onto the first and second support.

20. The furniture moving system of claim **19**, wherein the first support and the second support are a first rail and a second rail respectively, with the first support rail and the second support rail being spaced apart a distance greater than a width of the furniture article support surface, allowing the furniture article support surface to fit between the first rail and the second rail without interference between the furniture article support surface and either the first rail or the second rail.

21. The furniture moving system of claim **19**, wherein the lift mechanism includes a first lift mechanism extending from an end of the first rail and a second lift mechanism extending from an end of the second rail.

22. The furniture moving system of claim **19**, wherein the furniture article further comprises a first and a second retaining element positioned outboard of the first and second lift points respectively such that when the lift mechanism is positioned to lift the furniture article, the first lift mechanism is positioned between the first retaining element and the furniture article support surface and the second lift mechanism is positioned between the second retaining element and the furniture article support surface.

23. The furniture moving system of claim **19**, wherein the first retaining element and the second retaining element are positioned sufficiently close to the first lift mechanism and the second lift mechanism such that when the furniture article shifts laterally on the lift mechanism, the first retaining element and the second retaining element will contact the first lift mechanism or the second lift mechanism respectively such that the furniture article support surface does not contact the lift mechanism.

24. The furniture moving system of claim **19**, wherein the furniture article support surface is a table top.

25. The furniture moving system of claim **19**, wherein the first retaining element and the second retaining element are a first table leg and a second table leg.

26. The furniture moving system of claim **19**, wherein the first lift point and the second lift point are substantially horizontal members that connect to the first table leg and the second table leg respectively.

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