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Moss et al.

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(54) **LADDERS, LADDER COMPONENTS AND RELATED METHODS**

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E06C 1/00 (2006.01)
E06C 5/32 (2006.01)

(52) **U.S. Cl.** **182/129**; 182/165; 182/176; 182/25

(58) **Field of Classification Search** 182/129, 182/165, 180.1, 175, 25, 21, 176; 248/210, 248/238, 309.1
See application file for complete search history.

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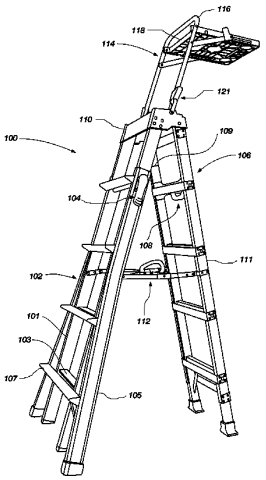
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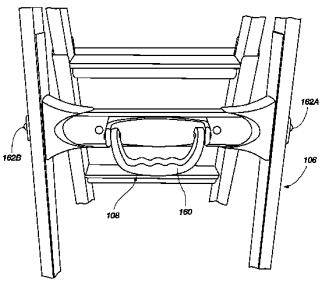
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(57) **ABSTRACT**

Ladders, ladder components and related methods are provided. In some embodiments, adjustable stepladders are provided which include locking mechanisms that enable height adjustment of the ladder through application of a force towards the rails of the ladder. In other embodiments, spreader mechanisms are provided with cross bracing located and configured to provide additional stability to the ladder while also incorporating a handle that enables efficient collapsing of the ladder while reducing the potential of pinching ones hands or fingers. In another embodiment, a device is provided for selective coupling with the ladder that includes a support or safety rail and an adjustable tray. The device may be coupled with the ladder in a number of different positions including a stowed position. In another embodiment, a hinge assembly is provided having a magnetic component configured to be magnetically coupled with and temporarily store an object on the ladder.

10 Claims, 23 Drawing Sheets





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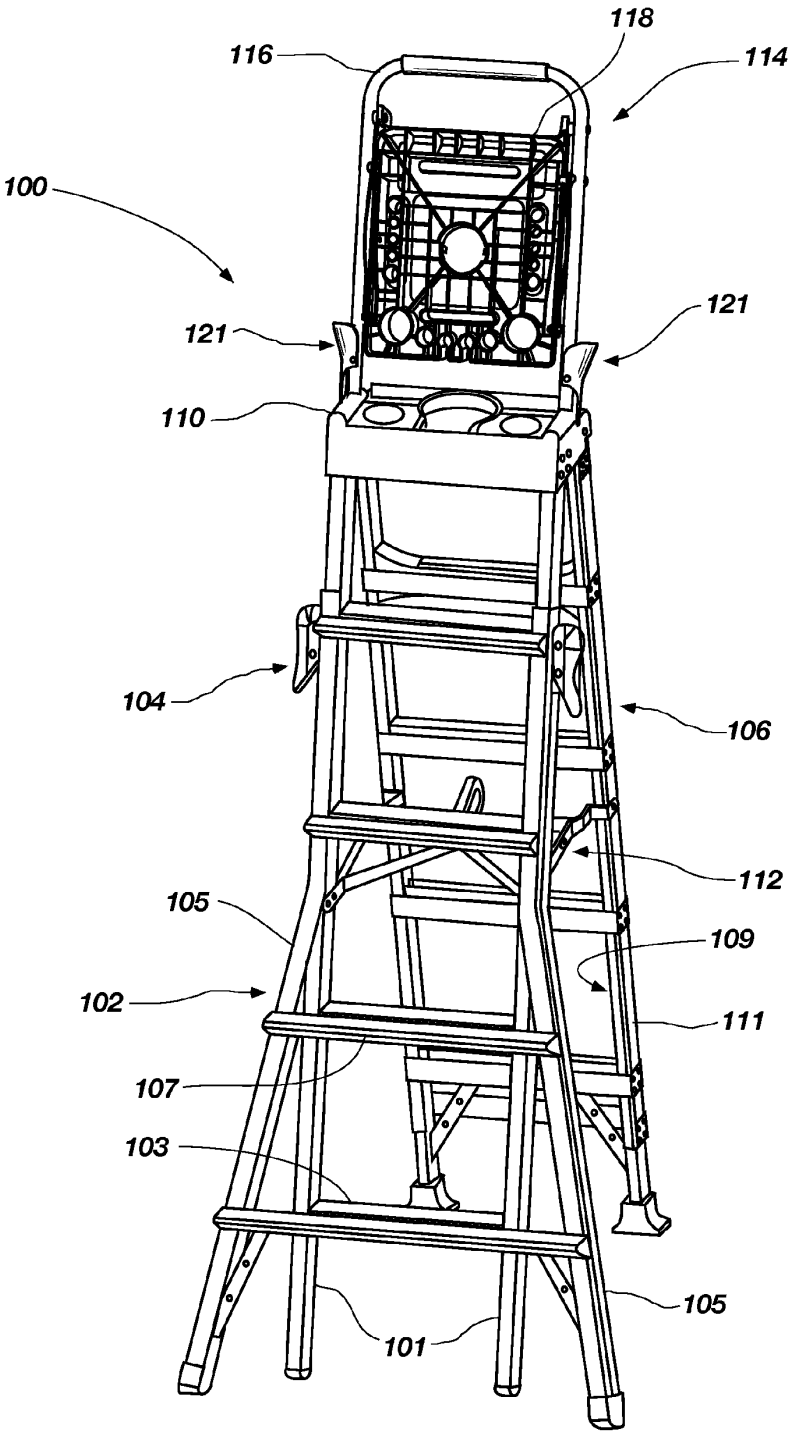


FIG. 1

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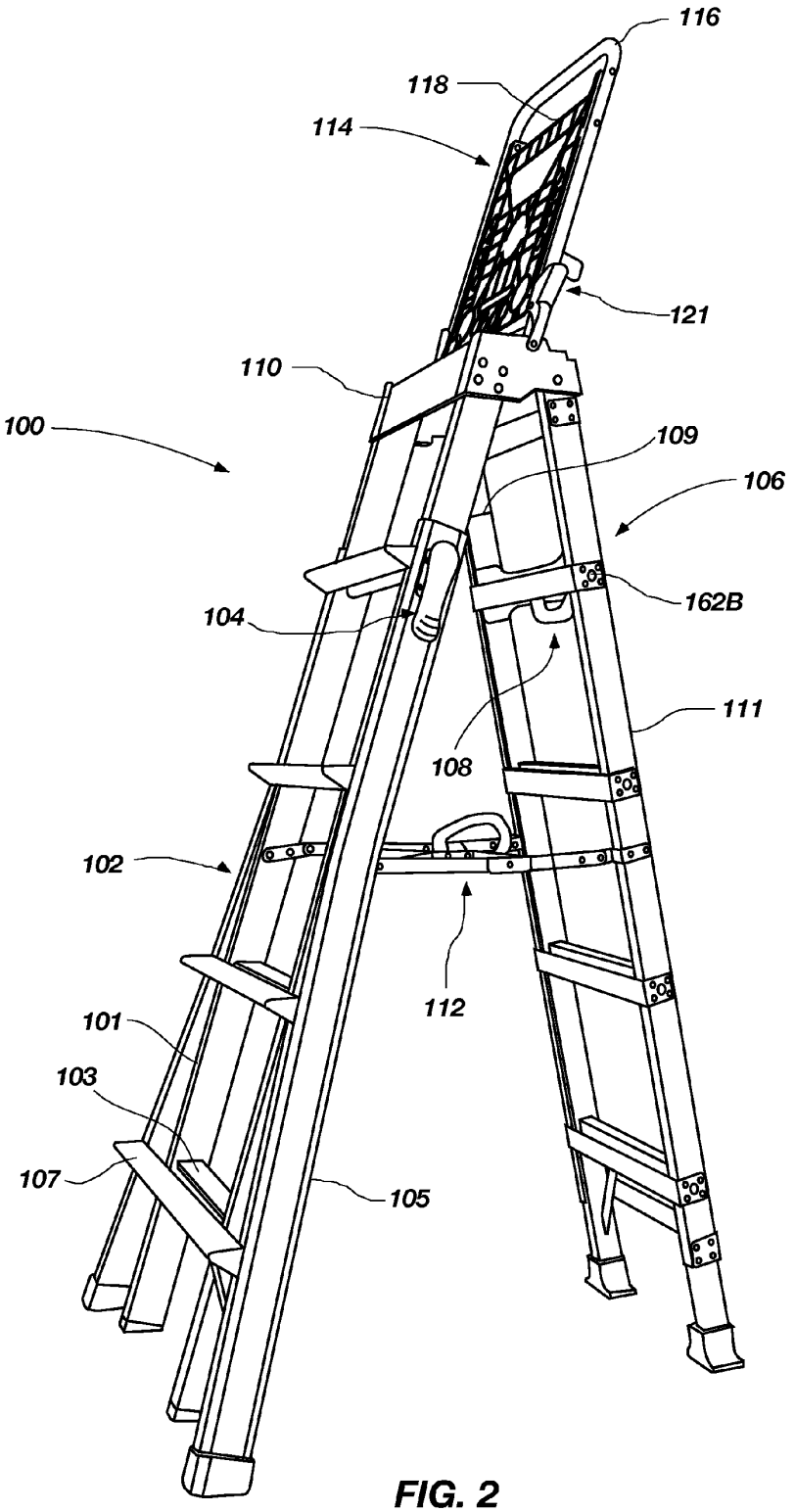


FIG. 2

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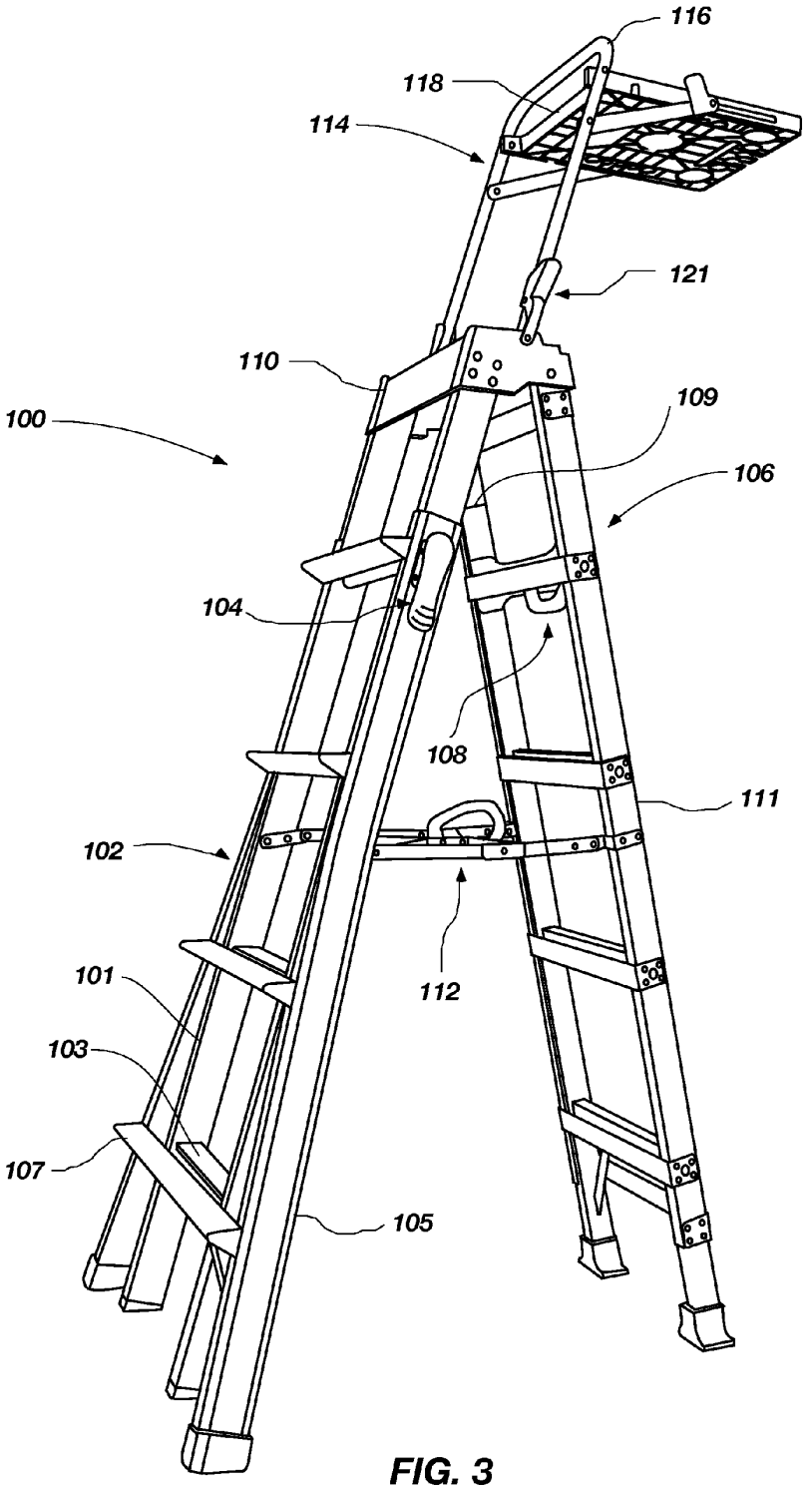


FIG. 3

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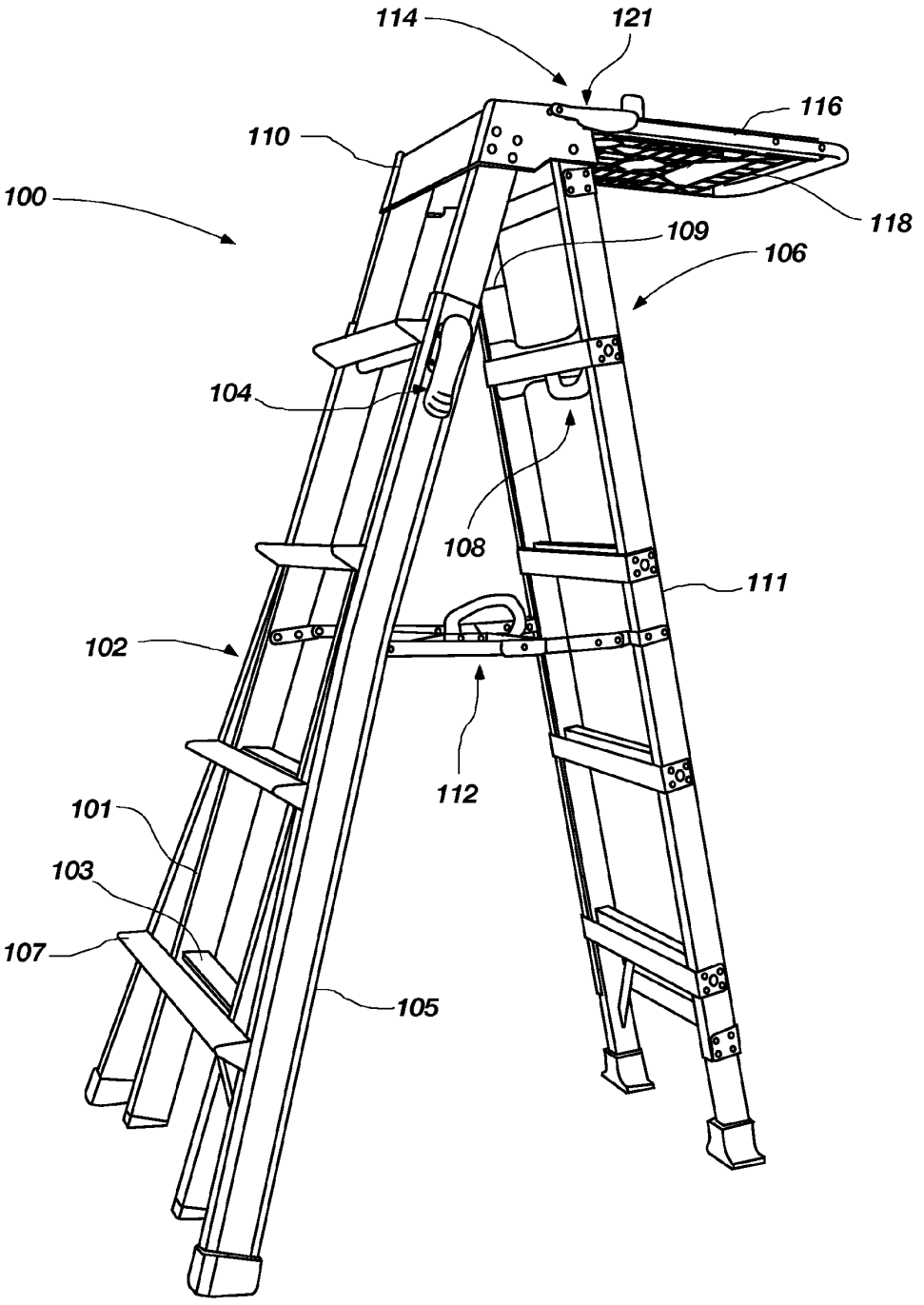


FIG. 4

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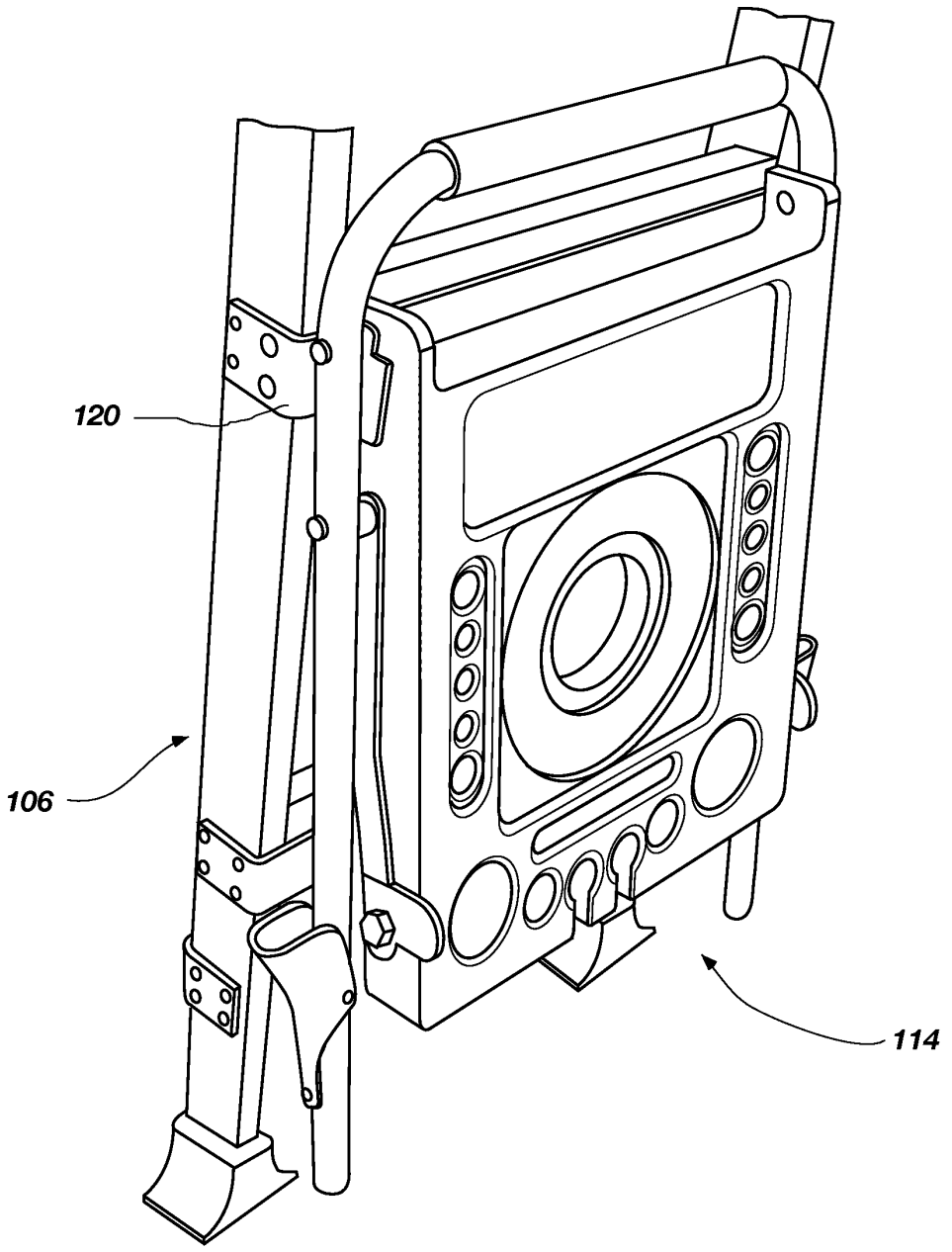


FIG. 5

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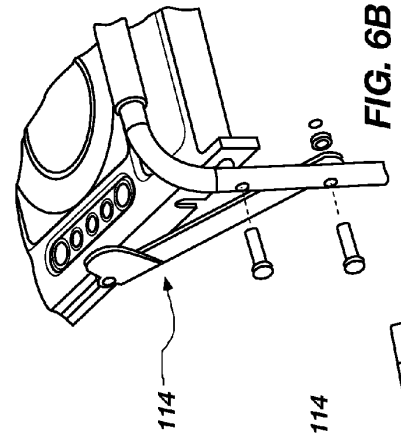


FIG. 6B

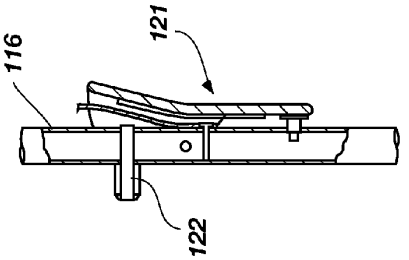


FIG. 6E

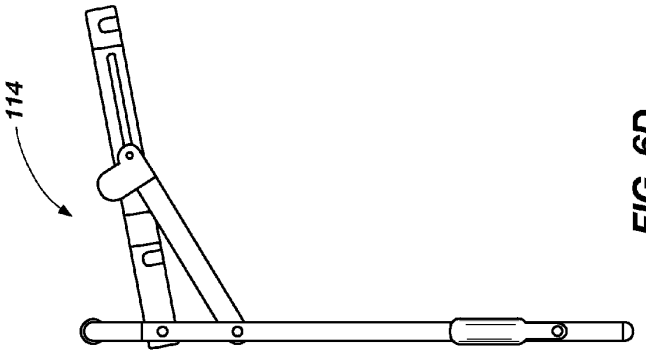


FIG. 6D

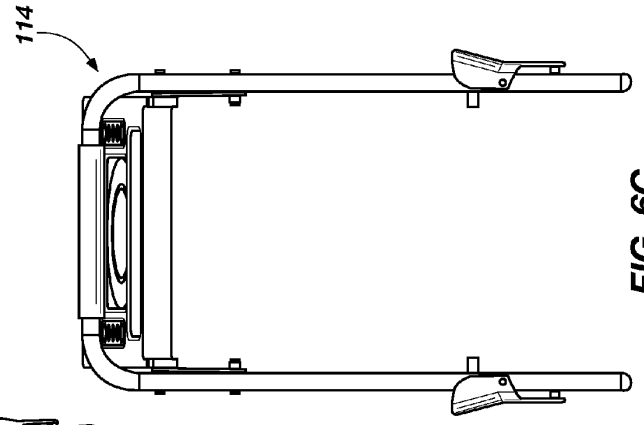


FIG. 6C

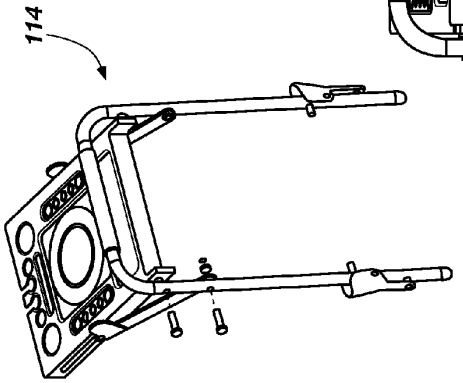


FIG. 6A

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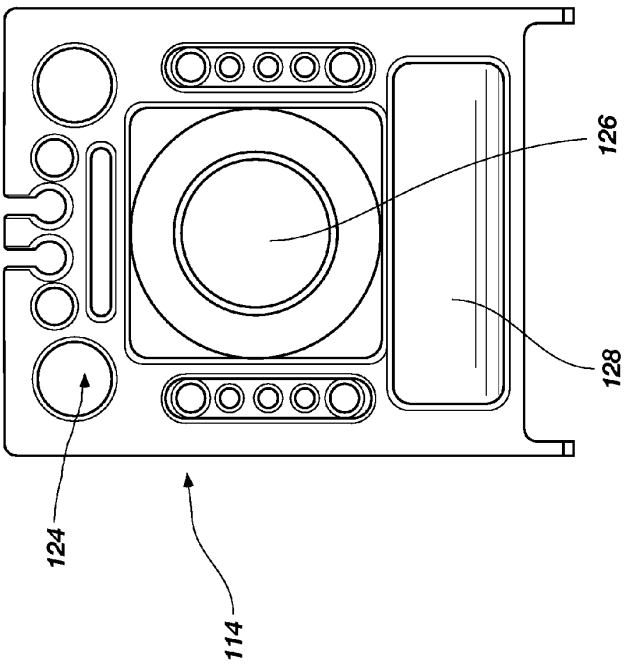


FIG. 7B

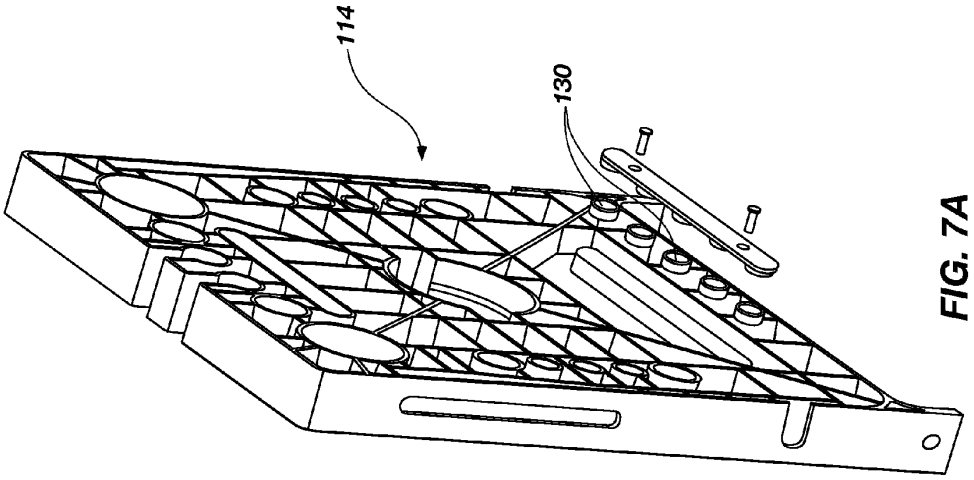


FIG. 7A

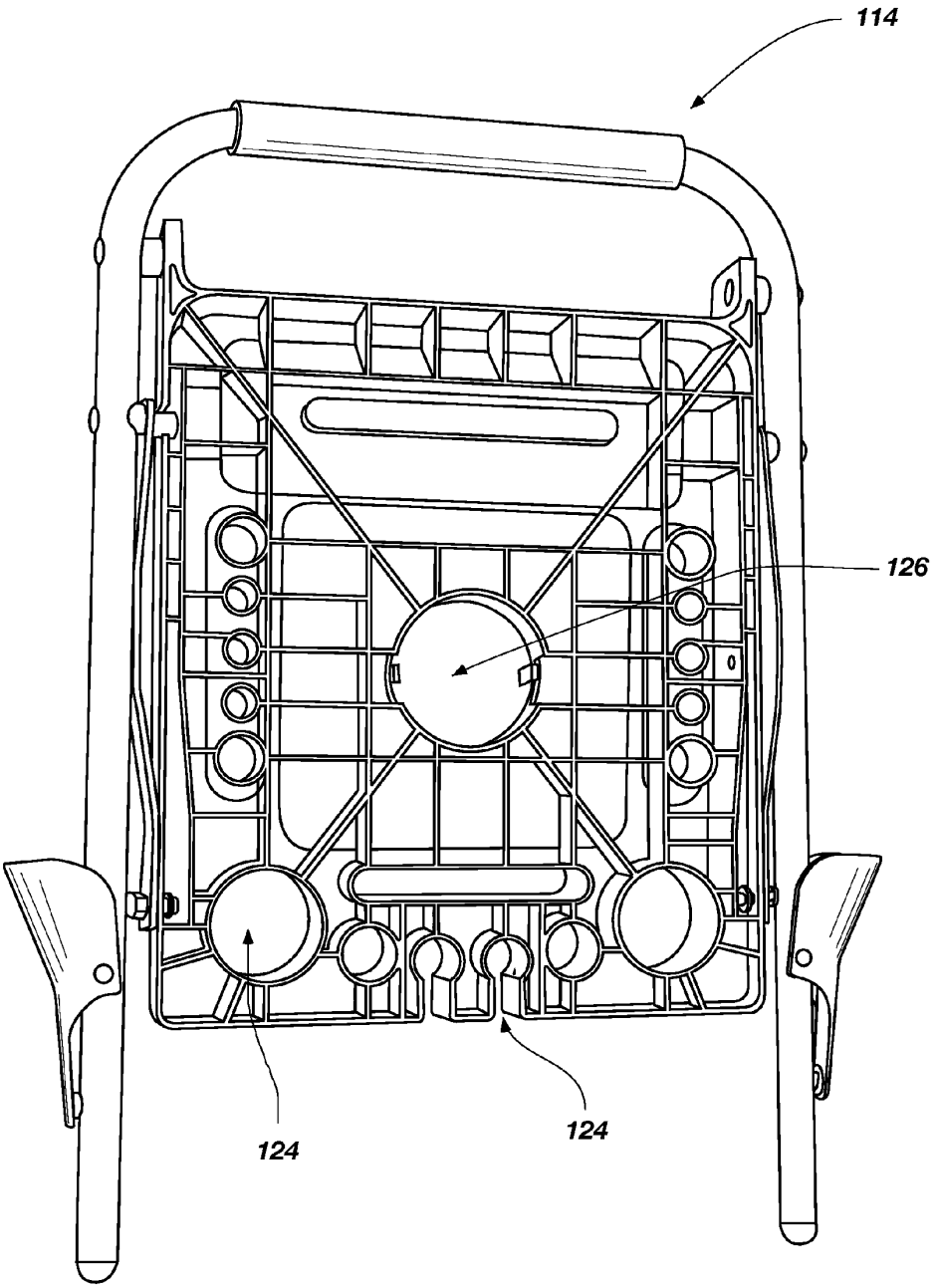


FIG. 8A

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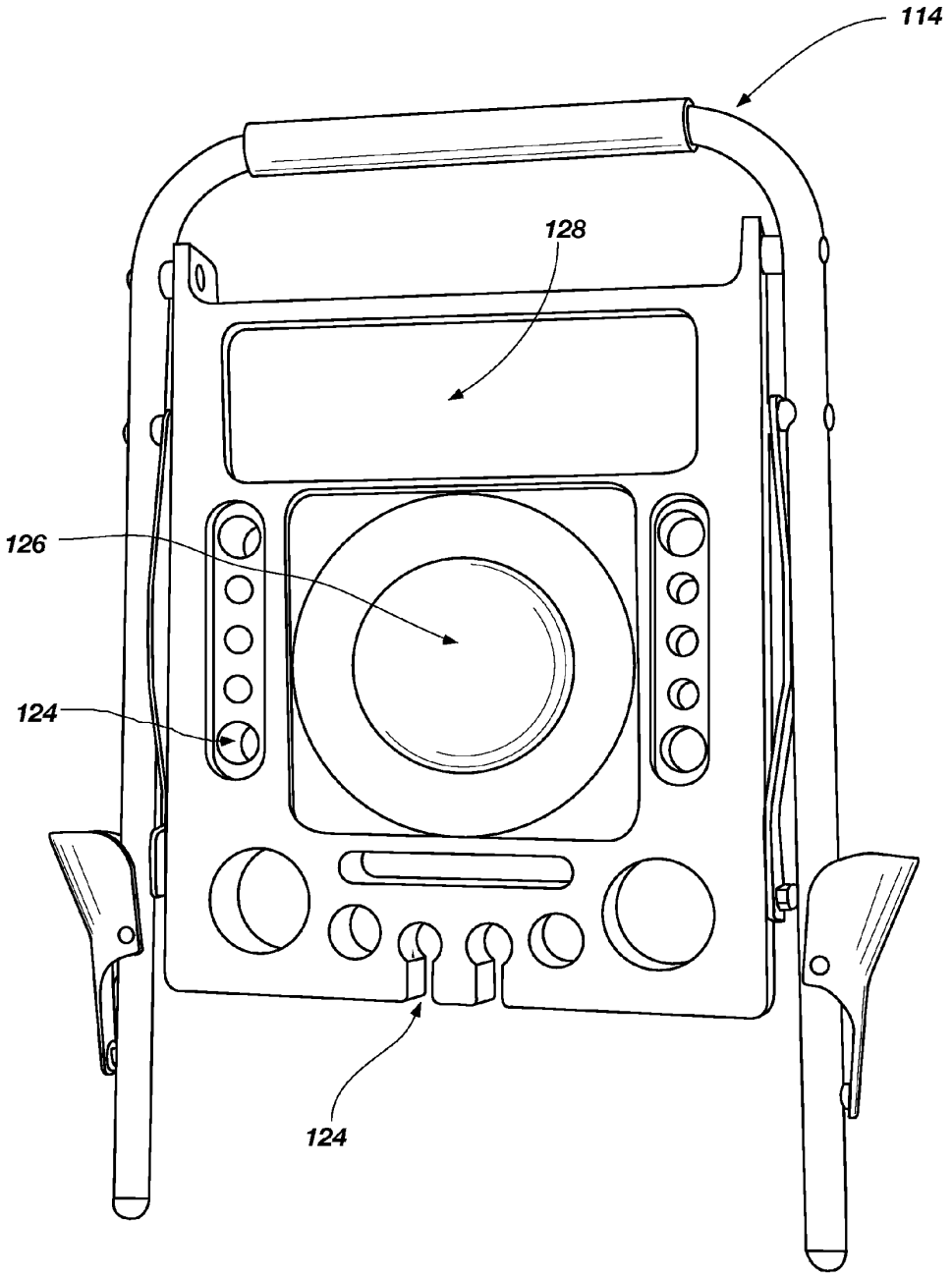


FIG. 8B

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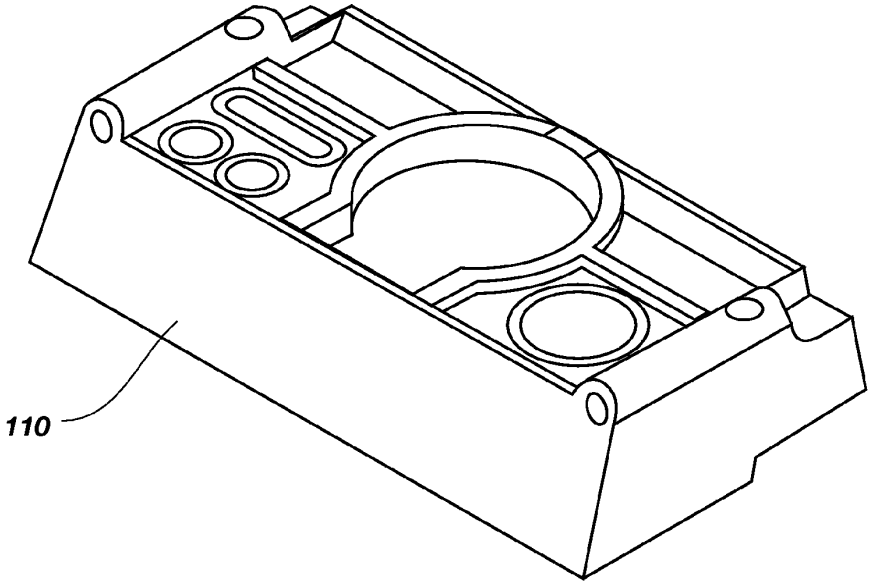


FIG. 9A

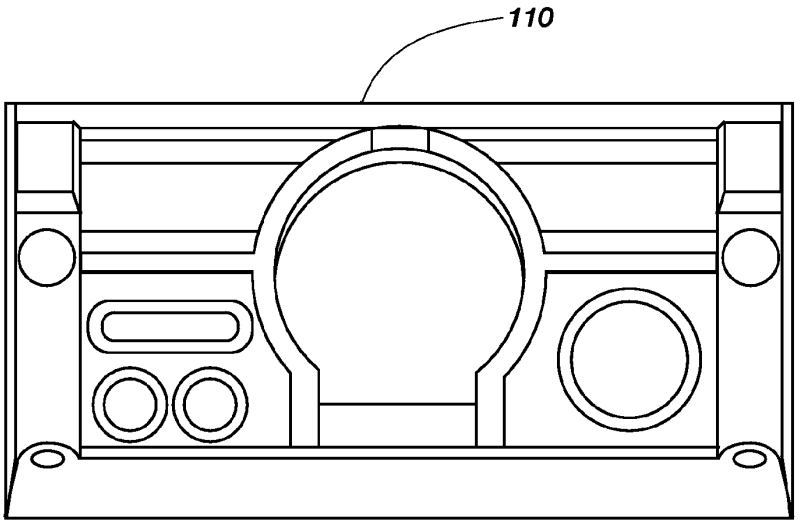


FIG. 9B

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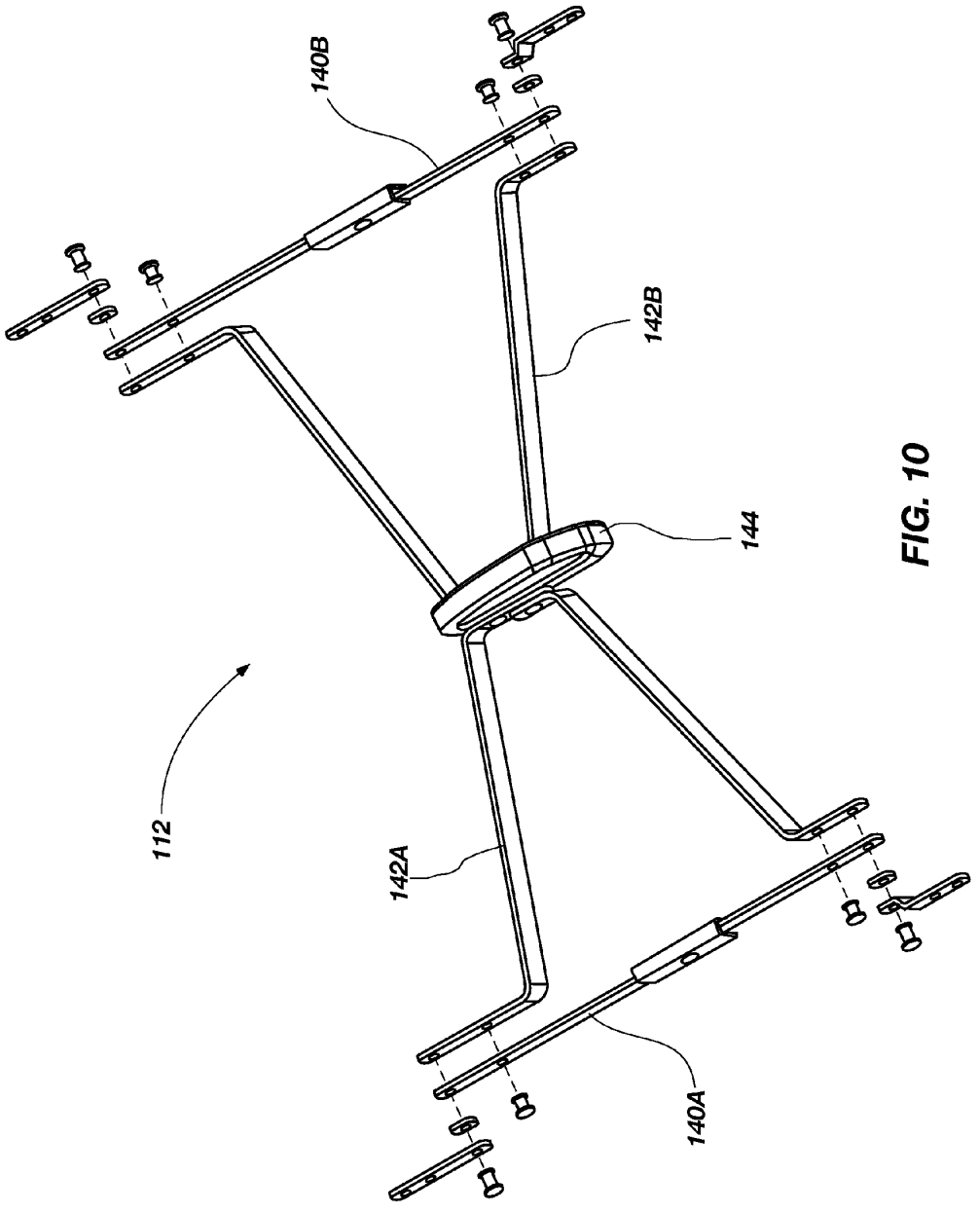


FIG. 10

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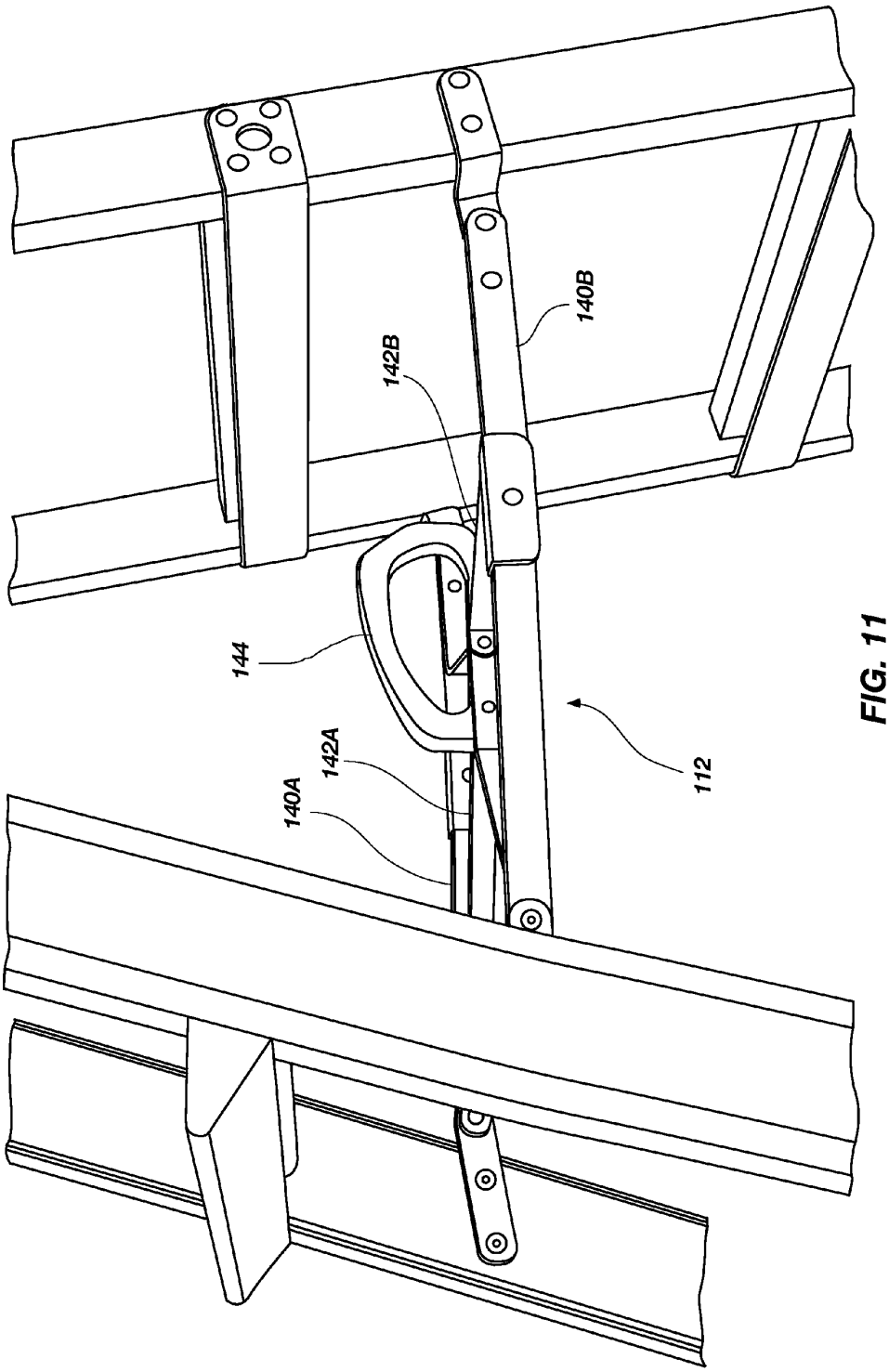


FIG. 11

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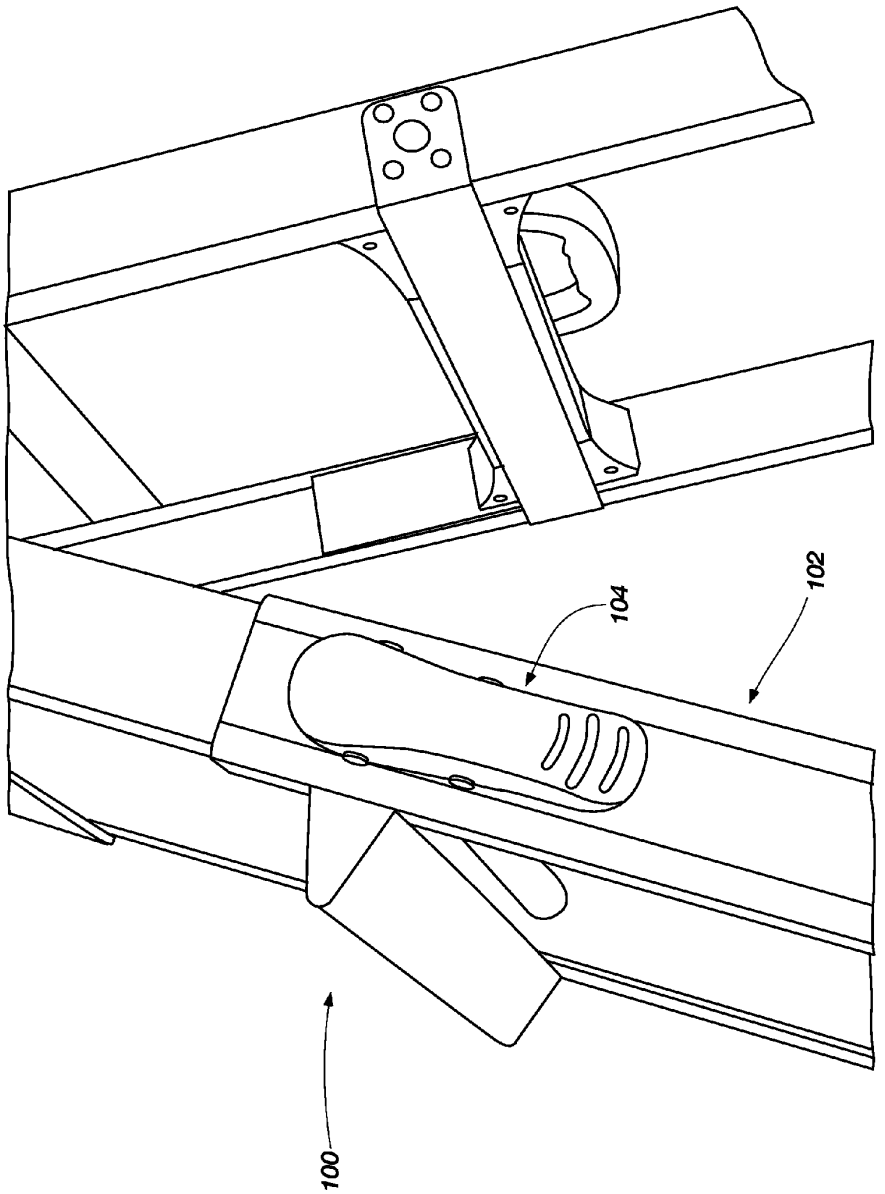


FIG. 12

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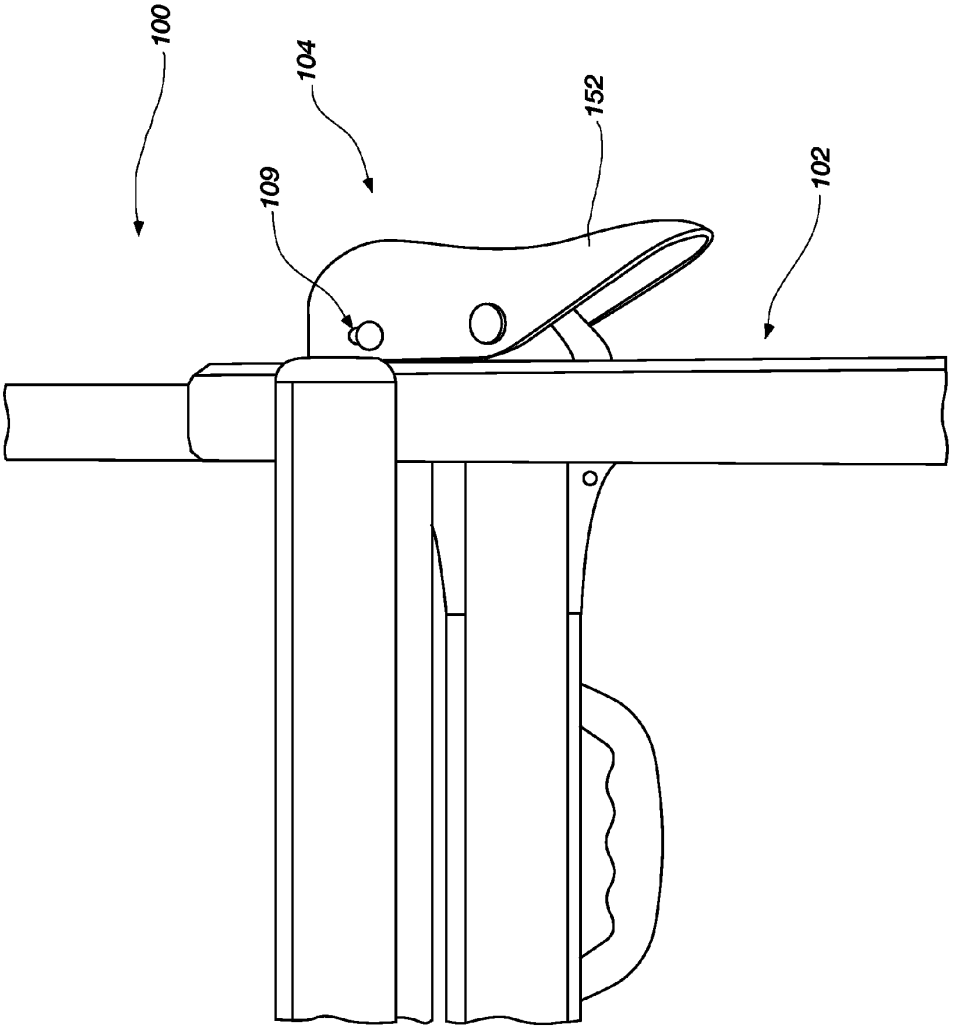


FIG. 13A

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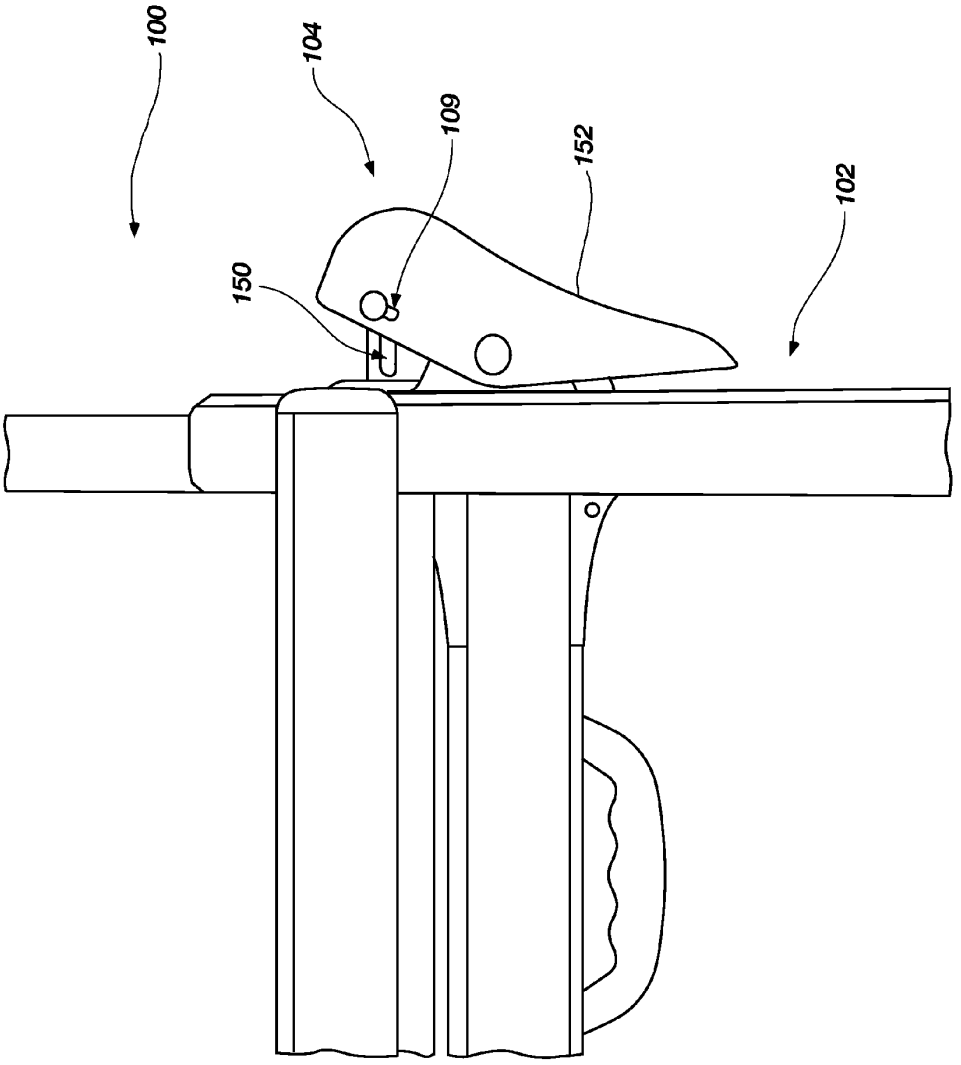


FIG. 13B

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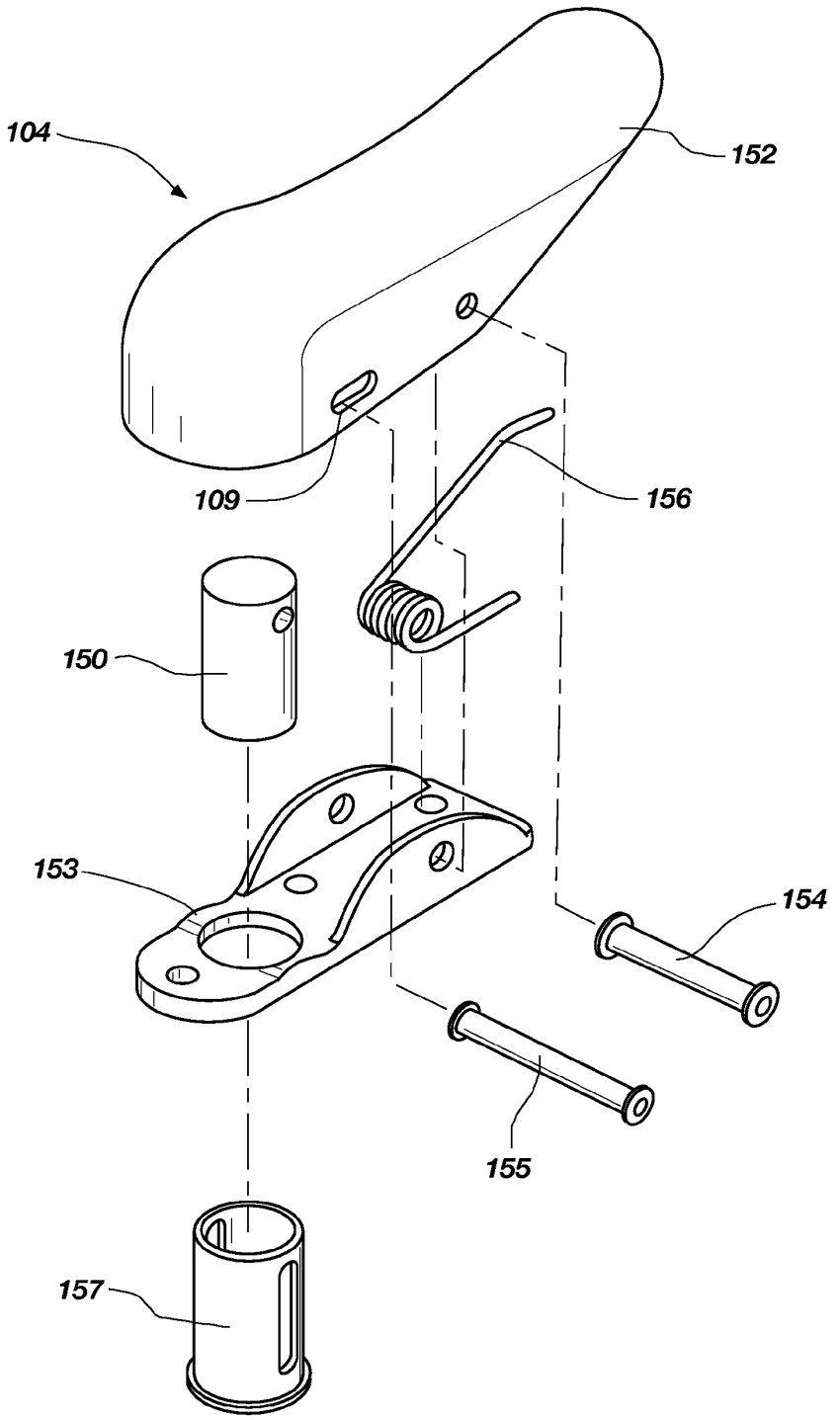


FIG. 14

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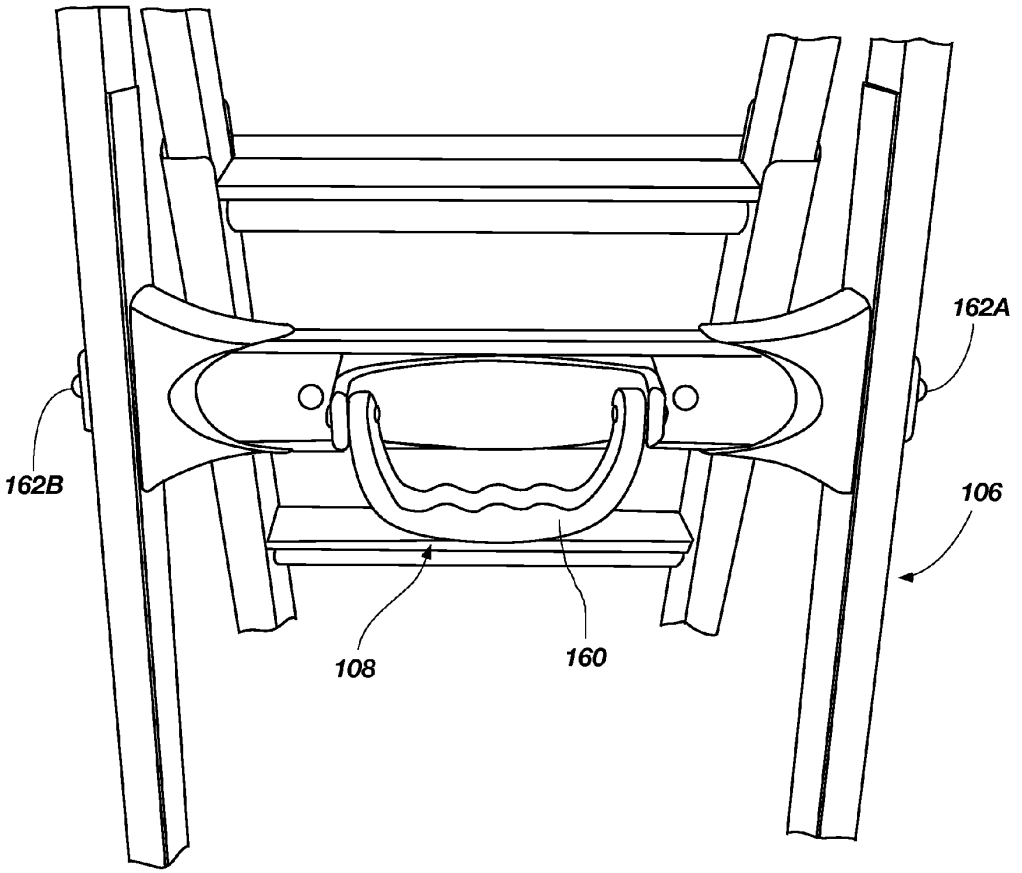


FIG. 15

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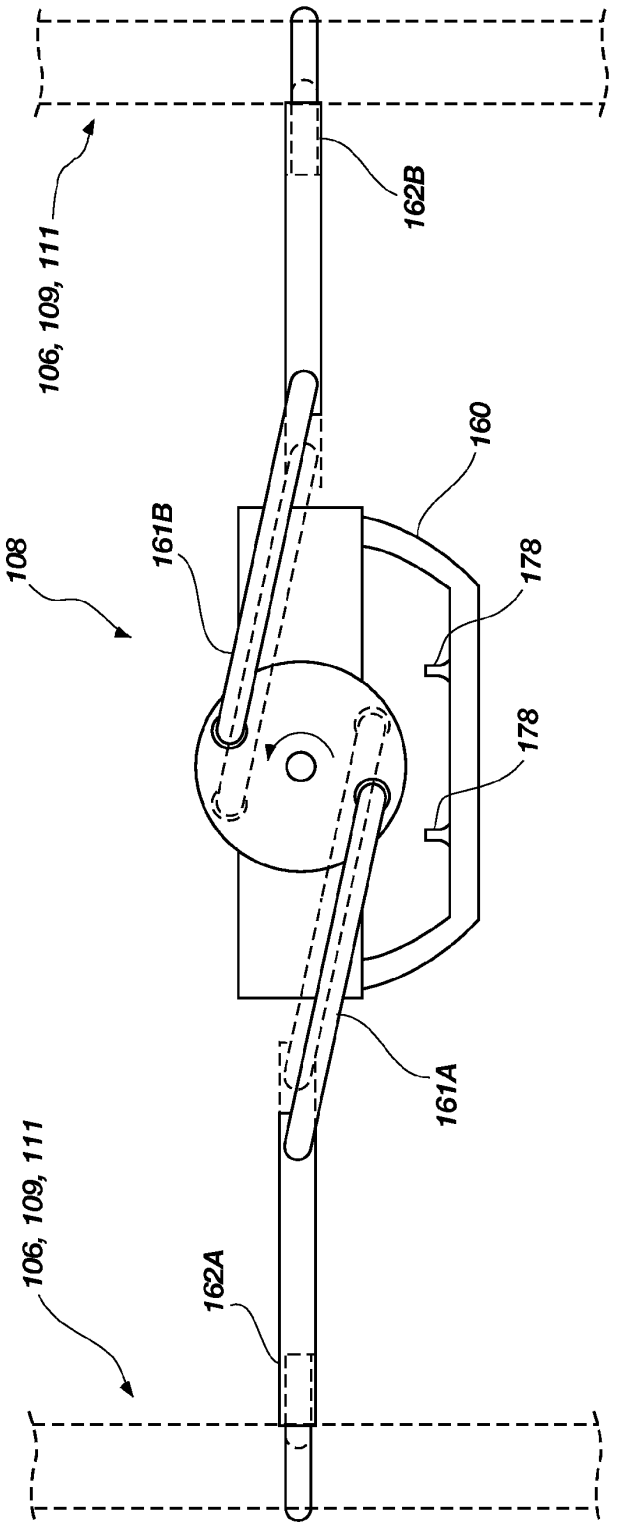


FIG. 16

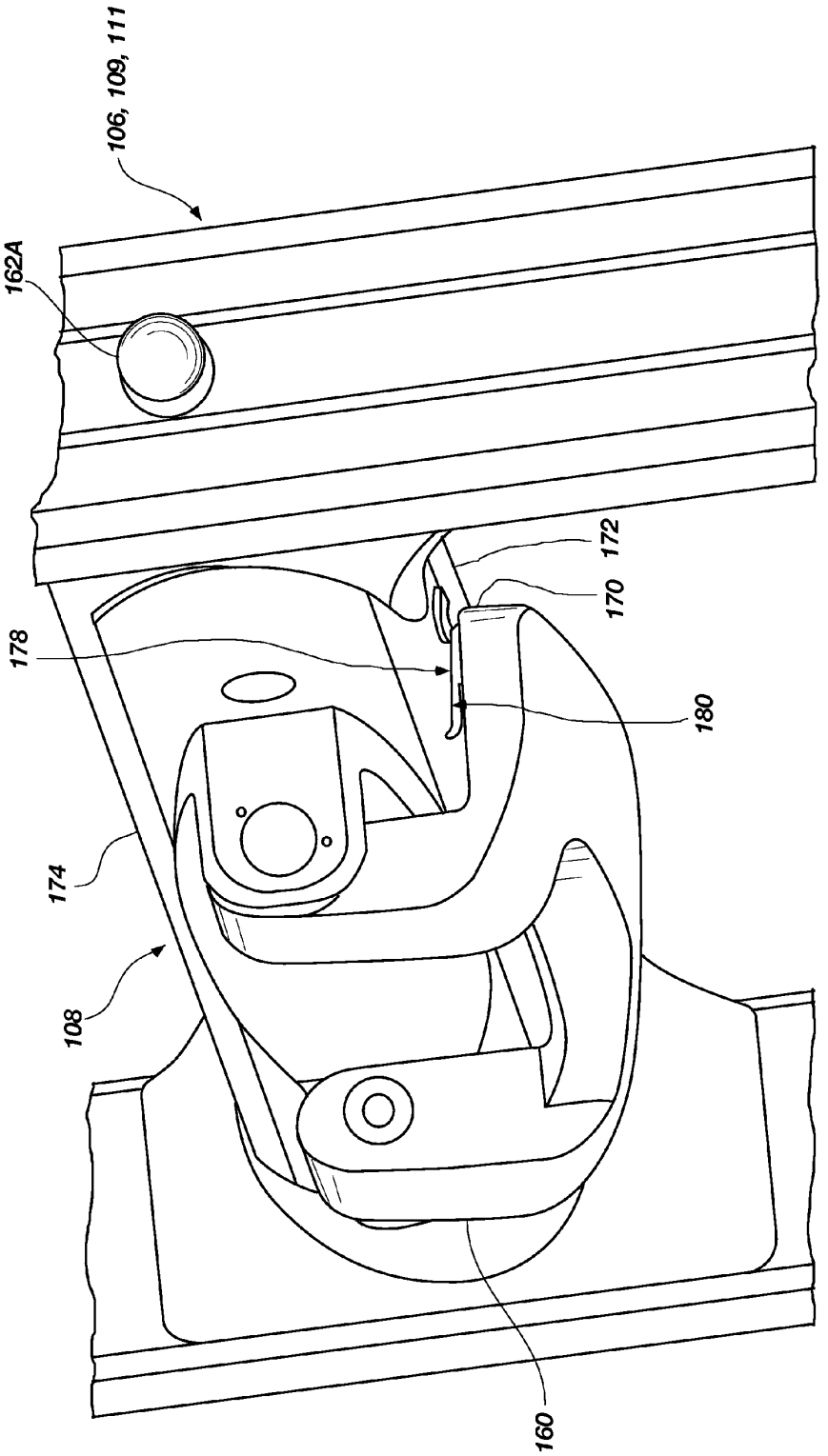


FIG. 17

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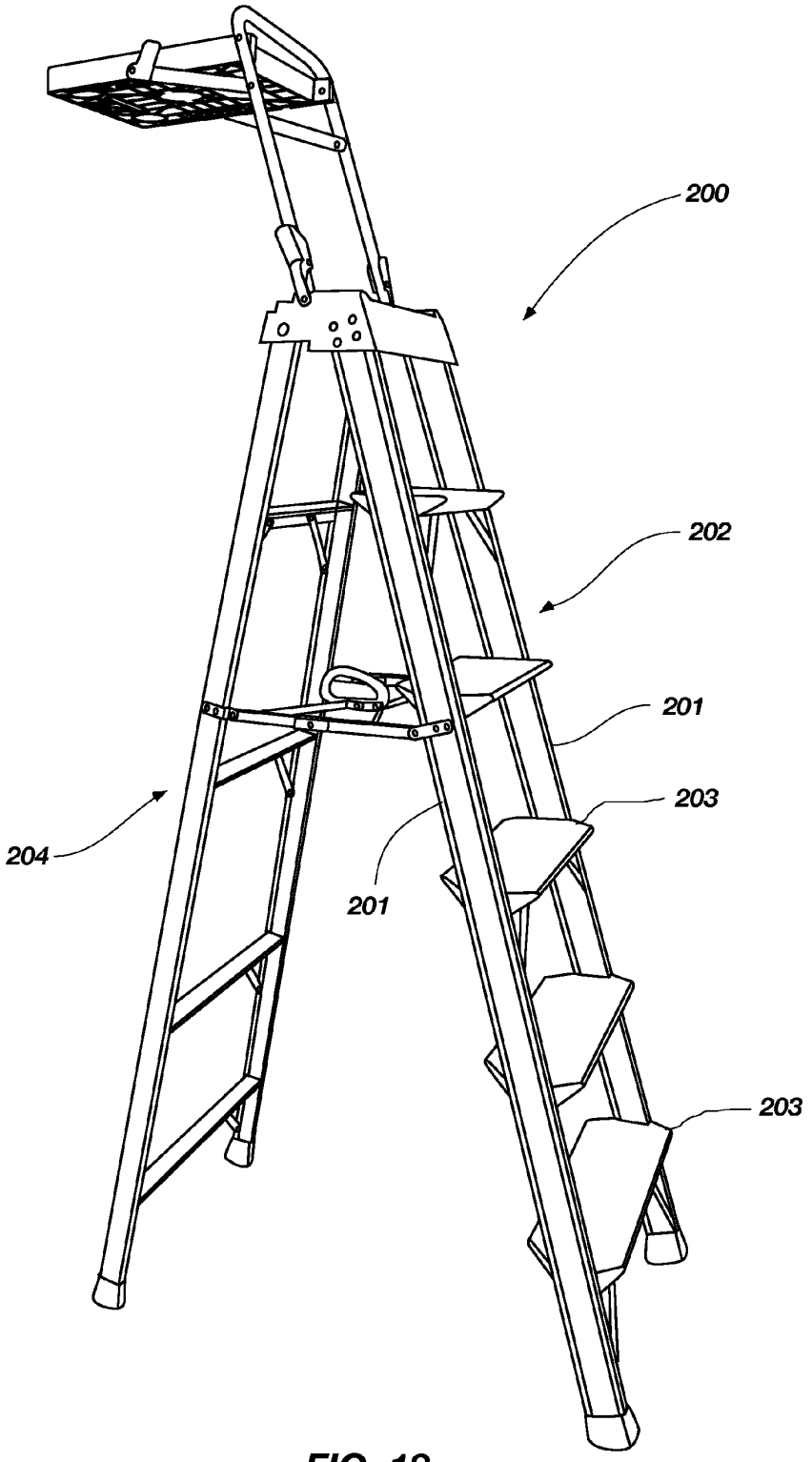


FIG. 18

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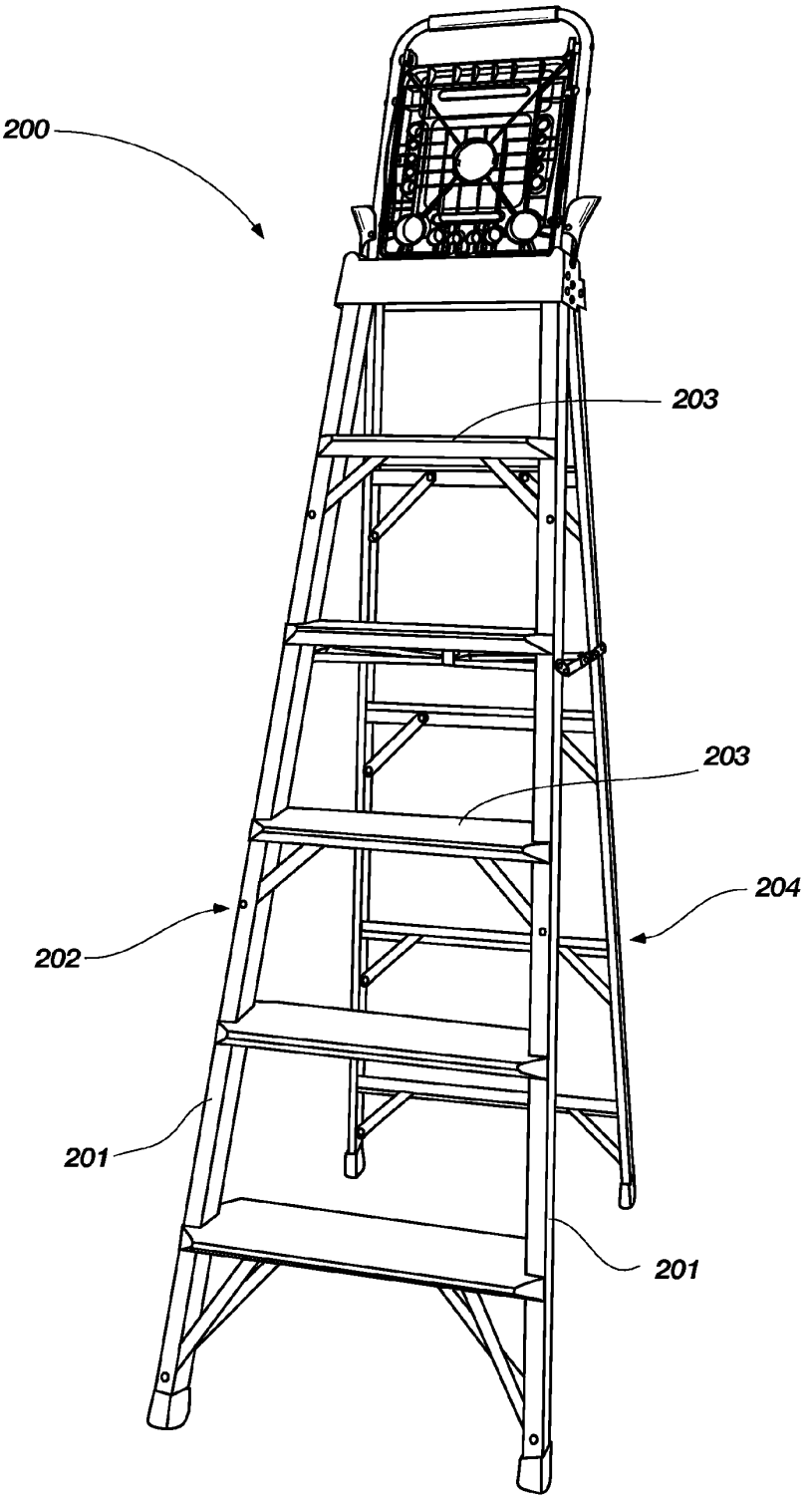


FIG. 19

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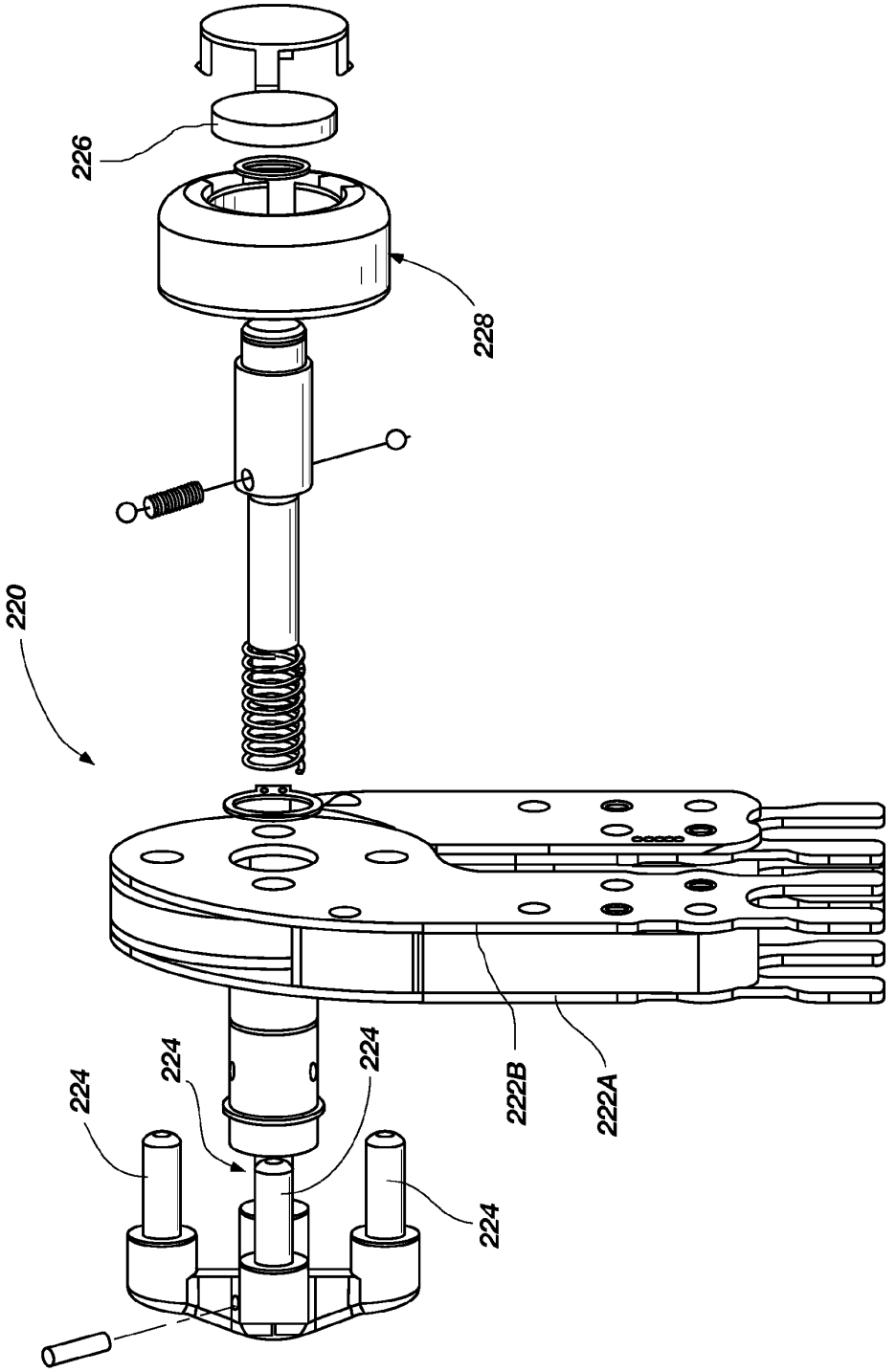


FIG. 20

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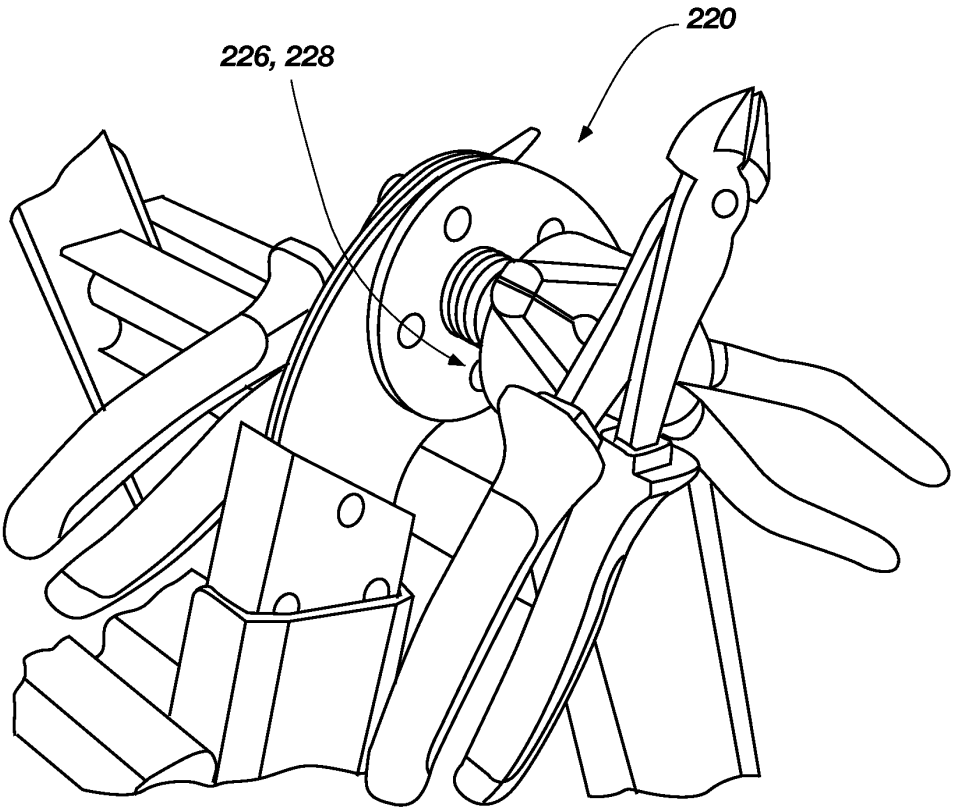


FIG. 21

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LADDERS, LADDER COMPONENTS AND RELATED METHODS

CROSS-REFERENCE TO RELATED APPLICATIONS

The present application claims the benefit of U.S. Provisional Application No. 61/068,656 entitled LADDERS, LADDER COMPONENTS AND RELATED METHODS, filed Mar. 7, 2008, the disclosure of which is incorporated by reference herein in its entirety.

TECHNICAL FIELD

The present invention relates generally to ladders, ladder systems, ladder components and related methods and, more specifically, to adjustable rail configurations, rail structures, locking mechanisms, trays and platform configurations, hinge configurations and related methods of manufacturing and operating the same.

BACKGROUND

Ladders are conventionally used to provide a user thereof with improved access to locations that might otherwise be inaccessible. Ladders come in many shapes and sizes, such as straight ladders, straight extension ladders, stepladders, and combination step and extension ladders. So-called combination ladders incorporate, in a single ladder, many of the benefits of other ladder designs.

Ladders are common tools for professional tradesman and homeowners alike. Sometimes the use of a ladder can be an awkward experience, even for those who use ladders on a regular basis, when certain tasks are to be performed while standing on a ladder. For example, it can be easy to lose one's balance on a ladder while working on an overhead project (e.g., painting a ceiling, changing a light bulb, etc.) Moreover, when one needs to utilize tools or access other resources (e.g., hardware, paint, etc.) while working on a ladder, temporary storage of such tools or other items is often problematic. Often, the user of a ladder may have to make many trips up and down the ladder to exchange tools or other equipment during the performance of a particular job making the use of the ladder less efficient than it could be.

Additionally, operation of some ladders is not always simple, efficient or safe. For example, in collapsing the spreaders of an A-frame type stepladder can result in the pinching of ones fingers or hands. Similarly, when ladders are adjustable in height or adjustable from one configuration to another, the associated actuation mechanism used to effect the adjustments may result in pinched hands or fingers or, in many cases, just difficulty in efficiently effecting the actuation at all.

For example, in some ladders, such as combination ladders, the height of the ladder may be adjusted by actuating locking members (sometimes referred to as "lock tabs") on the sides of the ladder. The action of actuating such locking members usually requires a lateral displacement of the locking members outward, or away from, the side rails of the ladders. Such an action can be awkward and difficult for some people to perform. In many cases, such as when smaller users are trying to adjust the height of the ladder, significant effort may be required.

Additionally, the structural stability of ladders is always an area for improvement. For example, in stepladders, a hinged or collapsing spreader conventionally extends between opposing rails on each lateral side of the ladder. Little else is used to maintain the opposing ladder rails in a desired relationship or to otherwise reduce or minimize "ladder walk" as will be recognized by most users of ladders.

Considering the desire within the industry to continually improve the safety, functionality and efficiency of ladders, the present includes a number of embodiments that provide enhanced ease of use, stability and safety in the use of ladders.

BRIEF SUMMARY OF THE INVENTION

Ladders, ladder components and related methods are provided in accordance with various embodiments of the present invention. In one embodiment, a ladder includes a first assembly having a pair of inner rails and a pair of outer rails. The pair of inner rails is slidably coupled with the pair of outer rails. At least one locking mechanism is coupled to an outer rail, the locking mechanism including a lever and an engagement pin coupled therewith. The lever is located and configured to pivot relative to the outer rail such that, upon application of a force to a portion of the lever in a first direction towards the outer rail, the engagement pin is retracted in a direction that is different from the first direction. In one embodiment, the engagement pin is pivotally coupled with the lever.

In another embodiment, a ladder is provided that includes a first rail assembly, including at least one pair of rails and a plurality of rungs coupled therewith, and a second rail assembly including at least one pair of rails. A top cap is coupled to the first rail assembly and the second rail assembly and a device is configured to be selectively coupled to the top cap in at least two different positions. The device includes a rail and a tray movably coupled to the rail. The ladder may further include at least one bracket coupled to the second rail assembly and configured for cooperatively coupling with the device to place the device in a stowed state.

In another embodiment a ladder includes a first rail assembly including at least one pair of rails and a plurality of rungs coupled therewith and a second rail assembly including at least one pair of rails. A spreader mechanism is disposed between, and coupled with, the first rail assembly and the second rail assembly. The spreader mechanism includes cross bracing configured to be selectively positioned between a deployed state and a hingedly collapsed state. At least one handle is coupled with the cross bracing. In one embodiment, the at least one handle is oriented and configured to extend in a direction that is substantially orthogonal to a direction in which the plurality of rungs each extend.

In accordance with yet another embodiment, a ladder includes a first rail assembly including at least one pair of rails and a plurality of rungs coupled therewith and a second rail assembly including a first pair of rails and a second pair of rails slidably coupled with the first pair of rails. A locking mechanism is configured to selectively engage the first pair of rails and the second pair of rails of the second rail assembly to lock the first pair of rails relative to the second pair of rails. The locking mechanism includes a pivoting structure disposed between the first pair of rails of the second rail assembly, a handle coupled with the pivoting structure and a pair of pins selectively displaceable and configured to engage aligned openings in respective inner and outer rails of the second rail assembly. The locking mechanism may further be associated with a cross-brace, wherein the handle is selectively positionable between a first position and a second position, the handle having a shoulder portion that abuts an undersurface of the cross-brace when in the first position. Additionally, at least one pin ma be associated with the handle, wherein the at least one pin is sized, located and

configured to engage an opening in the undersurface of the cross-brace when the handle is in the first position.

In accordance with another embodiment of the present invention, a hinge assembly is provided. The hinge assembly includes a first hinge component and a second hinge component pivotally coupled with one another. A mechanism is configured to selectively lock and disengage the first hinge component relative to the second hinge component. A magnet is associated with the mechanism, wherein the magnet is located and configured to exert a sufficient magnetic force on a specified object such that the object is held against the mechanism without aid of additional structure.

In accordance with another embodiment of the present invention, a method of adjusting a ladder is provided, wherein the ladder has an assembly with inner rails slidably coupled with outer rails. The method includes locking an inner rail relative to an associate outer rail by engaging aligned apertures in the inner and outer rails with an engagement pin, coupling a lever to the engagement pin, and applying a force to the lever in a direction of the outer rail and displacing the engagement pin in substantially opposite direction.

In accordance with a further embodiment of the present invention, a method of temporarily storing an object on a ladder is provided. The method includes magnetically coupling the object with a portion of the ladder such that the object is maintained in a substantially constant position relative to the ladder without the aid of additional structure being the force of the magnetic coupling.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

The foregoing and other advantages of the invention will become apparent upon reading the following detailed description and upon reference to the drawings in which:

FIG. **1** is a perspective view of a ladder in accordance with an embodiment of the present invention;

FIG. **2** is side perspective view of the ladder shown in FIG. **1** with a component shown in a first position or state;

FIG. **3** is a side perspective view of the ladder shown in FIG. **1** with a component shown in a second position or state;

FIG. **4** is a side perspective view of the ladder shown in FIG. **1** with a component shown in a third position or state;

FIG. **5** is an enlarged view of a portion of the ladder shown in FIG. **1** with a component in a stored state;

FIGS. **6**A-**6**E are various views of a component of the ladder shown in FIG. **1** in accordance with embodiments of the present invention;

FIGS. **7**A and **7**B are perspective and front views, respectively, of a subcomponent of the component shown in FIGS. **6**A-**6**E;

FIGS. **8**A and **8**B are front and rear views, respectively, of the component shown in FIGS. **6**A-**6**E;

FIGS. **9**A and **9**B are perspective and top views, respectively, of a top cap assembly that may be used with a ladder in accordance with an embodiment of the present invention;

FIG. **10** is a perspective, exploded view of a mechanism of the ladder shown in FIG. **1** in accordance with an embodiment of the present invention;

FIG. **11** is an enlarged, side perspective view of the ladder shown in FIG. **1**, showing portions of the mechanism shown in FIG. **10** in accordance with an embodiment of the present invention;

FIG. **12** shows a side view of the ladder shown in FIG. **1** including an enlarged view of a component or mechanism in accordance with an embodiment of the present invention;

FIGS. **13**A and **13**B show a front view of the ladder shown in FIG. **1** including the component or mechanism shown in FIG. **12** in first and a second states or positions, respectively.

FIG. **14** is an exploded assembly view of the component or mechanism shown in FIGS. **12**, **13**A and **13**B in accordance with an embodiment of the present invention;

FIG. **15** is an enlarged view from the rear of the ladder shown in FIG. **1** showing another component or mechanism in accordance with the present invention;

FIG. **16** shows operational aspects of the component or mechanism shown in FIG. **15**;

FIG. **17** is a perspective view, from below, of the component or mechanism shown in FIG. **15**;

FIGS. **18** and **19** are perspective views of ladder in accordance with another embodiment of the present invention;

FIG. **20** is a hinge assembly that may be used with a ladder in accordance with an embodiment of the present invention; and

FIG. **21** is perspective view of a hinge assembly in accordance with an embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Referring to FIGS. **1** through **4**, a ladder **100** is shown in accordance with an embodiment of the present invention. The ladder **100** is shown as a stepladder and includes a first assembly **102** including inner rails **101** having a plurality of rungs **103** extending between, and coupled to, the inner rails **101**. The first assembly **102** further includes outer rails **105** connected by a plurality of rungs **107**. The inner and outer rails **101** and **105** are slidably connected to each other such that they may be extended or retracted to exhibit different heights. One such assembly is described in U.S. Pat. No. 4,210,224 to Kummerlin, the disclosure of which is incorporated by reference herein in its entirety. The first assembly **102** further includes a locking mechanism **104** coupled with the outer rails **105** and configured to engage or release the inner rails **101** from the outer rails **105** so that they may be selectively displaced relative to one another and effect different ladder heights. The locking mechanism **104** will be discussed in further detail hereinbelow.

The ladder **100** further includes a second assembly **106** which may also include inner rails **109** and outer rails **111** slidingly coupled to one another. In the embodiment shown, the second assembly **106** includes cross bracing to stiffen the second assembly **106** and provide desired structural rigidity. However, in the embodiment shown in FIGS. **1** through **4**, the second assembly **106** does not include rungs for a user to climb on. Such a configuration is conventional for many stepladder configurations. However, it is noted that in other embodiments, the second assembly **106** may include rungs and may be configured, for example, similar to the first assembly **102**.

Another locking mechanism **108** may be used to selectively lock and release the inner rails **109** relative to the outer rails **111** of the second assembly **106**. The locking mechanism **108** will be described in further detail below.

The first and second assemblies **102** and **106** may each be coupled to a top cap **110**. One of the first and second assemblies **102** and **106** (or both) may be configured to pivot relative to the top cap **110** such that the assemblies **102** and **106** may be displaced toward each other for compact storage and as will be appreciated by those of ordinary skill in the art. The top cap **110** may include a number of features to enhance the efficiency and usability of the ladder **100** as will be described in further detail hereinbelow.

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The ladder **100** further includes a spreader mechanism **112** coupled between the first and second assemblies **102** and **106** which extends therebetween to provide desired structural stability to the ladder **100** when in use, while also being configured to fold, such as by pivots or hinges, enabling the first and second assemblies **102** and **106** to collapse toward one another (with at least one of the assemblies **102** and **106** pivoting relative to the top cap **110**) to place the ladder **100** in a stored state. Further details of the spreader mechanism **112** will be described hereinbelow.

The ladder **100** additionally includes a component **114** or mechanism that is releasably attached thereto and which provides multiple functions. For example, as shown in FIGS. **2** and **3**, the component **114** may be selectively installed or coupled with the ladder **100** (e.g., coupled with the top cap **110** of the ladder) such that a rail **116** may extend upward from the top cap **110**, at an angle that is generally acute relative to a horizontal line (with the ladder in an orientation of intended use), and provide support to a user, wherein a user may grasp or lean on the rail **116** to brace themselves or help support them when working at elevated heights on the ladder **100**. In the embodiment shown in FIGS. **2** and **3**, the rail **116** is shown as extending in a plane that is substantially parallel with a plane defined by the outer rails **103** of the first assembly **102**, although it may be configured to extend at other angles if desired. Additionally, the component **114** may include a tray **118** or platform that may be selectively positioned, such as shown in FIG. **3**, to hold tools, hardware, paint or other items in a convenient and organized manner as shall be discussed in further detail herein.

The component **114** may be selectively coupled with the ladder **100** in other positions. For example, as shown in FIG. **4**, the component may extend substantially horizontally or laterally from the top cap **110** (with the ladder in an orientation of intended use) so that the tray **118** may be selectively positioned to hold various items, but at a different elevation as compared to the configuration that is shown in FIG. **3**.

As seen in FIG. **5**, the component **114** may be removed from the upper portion of the ladder and then stored, such as with one or more brackets **120** coupled to, for example, inner or outer rails of the second assembly **106**. Thus, the component **114** may be selectively deployed in a number of usable configurations or in a stowed configuration depending on the specific needs of the user at a given time.

FIGS. **6**A-**6**D show various views of the component **114** in a deployed configuration, such as the configuration shown in FIG. **3** with the rail **116** extending upward from the ladder and the tray **118** being positioned relative to rail **116** to extend laterally, or substantially horizontally, therefrom. In other embodiments, the tray may be positioned to extend substantially parallel to, or lie within, a plane defined by the rail **116**.

As seen more clearly in FIG. **6**E, the component **114** may include one or more locking mechanisms **121** configured to selectively lock the component **114** in place relative to a portion of the ladder **100**. The locking mechanism **121** may include, for example, an engaging pin **122** or other structure that is selectively displaceable by a user of the ladder and configured to engage mating openings or apertures in various portions of the ladder **100** (e.g., the top cap).

FIGS. **7**A and **7**B are rear perspective and front views of the tray **118** in accordance with an embodiment of the present invention. Additionally, FIGS. **8**A and **8**B show front and rear views of the component **114** with the tray **118** being positioned to lie substantially in plane with the rail **116**. The tray **118** may include a plurality of openings **124** for holding various tools or other equipment. For example, some of such openings **124** may be sized to pass a portion of a screwdriver therethrough while holding a portion of the screwdriver above the tray **118** providing ready access to the tool for a user. The openings **124** may be variously sized to accept and support different types of tools (e.g., hammers, pliers, etc.). A relatively large opening may be formed in a portion of the tray **118** to accommodate temporary storage or holding of, for example, a power tool such as a drill. In the embodiment shown, a cap **126** is placed over the larger opening, and a recess is formed thereabout, to accommodate, for example, the holding of a paint can. Other recesses **128** may be formed in the tray **118** to temporarily hold or store other loose items (e.g., screws, nails, various tools, etc.). Magnets **130** may be disposed beneath or adjacent such recesses to provide further securement of such loose items. The tray **118** may further include slotted apertures, for example adjacent the peripheral edges of the tray **118**, to hold various items such as the end of an extension cord or the end of a lanyard coupled to a tool or other item.

Referring to FIGS. **9**A and **9**B, a top cap **110** may be configured to include various features similar to that of the tray **118**. For example, various openings, recesses, slotted apertures, or combinations thereof, may be formed in the top cap **110**. Thus, the top cap **110** and the tray **118** may provide a substantial amount of temporary storage for tools, hardware and other equipment such that the user need not make numerous trips up and down the ladder to exchange tools or other equipment while performing a given task.

Referring to FIGS. **10** and **11**, a spreader mechanism **112** is shown in accordance with an embodiment of the present invention. The spreader mechanism **112** includes two outer structures **140**A and **140**B that are configured to hingedly transition between a collapsed or folded state (not shown) and an extended or deployed state (such as shown in FIGS. **10** and **11**) as will be appreciated by those of ordinary skill in the art. The spreader mechanism **112** further includes two inner structures **142**A and **142**B that are similarly configured to transition between a collapsed or folder state and an extended or deployed state. The inner structures **142**A and **142**B are coupled to one another and are coupled to corresponding outer structures **140**A and **140**B such that all of the structures extend and collapse as a unit. In other words, the inner structures **142**A and **142**B fold in a manner similar to the outer structures **140**A and **140**B. Inner structures **142**A and **142**B of the spreader mechanism **112**, when in an extended or deployed state, act as cross-braces for the spreader mechanism **112** providing added support and stability to the ladder **100** as compared to conventional spreaders used in a stepladder.

A handle **144** is coupled to the inner structures **142**A and **142**B of the spreader mechanism **112** without curtailing the folding nature of the inner structures **142**A and **142**B. In the embodiment shown, the handle **144** is oriented to extend in a direction substantially orthogonally to the direction in which the rungs of the ladder **100** extend (see also FIGS. **1**-**4**). Such a configuration enables a user of the ladder **100** to collapse the spreader mechanism **112** by, for example, reaching between the rails of the first assembly **102**, and between rungs of the first assembly **102**, and pulling on the handle **144** in a direction that is generally upwards and towards the user when the ladder **100** is in an intended in-use orientation. Such a configuration enables collapsing of the ladder **100** by a user without the need to reach around, or walk around, the side of the ladder **100** to displace the spreaders. Additionally, the use of the handle **144** helps to prevent the possibility of a user pinching their hands or fingers in the hinge of a spreader or spreader mechanism.

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Referring now to FIGS. **12**, **13**A, **13**B and **14**, a locking mechanism **104** is shown. FIG. **12** shows a side view of a ladder **100** including the locking mechanism **104**. FIGS. **13**A and **13**B show front views of a ladder **100** including the locking mechanism **104** in a first position or state (FIG. **13**A) and a second position or state (FIG. **13**B). FIG. **14** is an exploded assembly view of the locking mechanism **104** according to one embodiment of the present invention.

The locking mechanism **104** includes an engagement pin **150** that selectively engages, for example, apertures formed in the inner and outer rails **101** and **105** of the first assembly **102** when such apertures are aligned. The locking mechanism **104** includes a lever **152** pivotally coupled with the pin **150**. The lever **152** is configured to pivot or "rock" relative to the outer rails **105** of the first assembly **102** between the first and second positions or states. When the locking mechanism **104** is in the first state (as shown in FIG. **13**A), the pin **150** is engaged with, or passes through, aligned apertures of the inner and outer rails **101** and **105** preventing the inner rails **101** from being slidingly displaced relative to the outer rails **105**.

When a user desires to displace the inner and outer rails **101** and **105** of the first assembly **102** relative to each other, the user may, for example, grasp the lower portion of the lever **152** in their palm, grab a portion of the inner and outer rails **101** and **105** with their fingers, and squeeze so as to displace the lower portion of the lever **152** towards the outer rails **105** and thereby displace the upper portion of the lever **152** (and, thus, the pin **150**) away from the inner and outer rails **101** and **105** such that it is disengaged from the aperture of at least the inner rails **101** and placing the locking mechanism in the second position (as shown in FIG. **13**B).

The locking mechanism **104** may include additional components and features. For example, the locking mechanism **104** may include a detent or retaining mechanism to hold the lever **152** (and, thus, the pin **150**) in either, or each, of the first or second positions until a desired level of force is applied to the lever **152**. Thus, once disengaged (i.e., in the second position), the locking mechanism **104** may stay in that position or state until an appropriate level of force is applied inwardly to the upper portion of the lever (e.g., in a similar manner as was described with respect to applying a force to the lower portion of the lever **152** hereinabove) to cause the lever **152** to return to the first position.

As seen in FIG. **14**, the locking mechanism **104** may include a bracket **153** configured to be coupled with, for example, an outer rail **105** of the first assembly **102**, a pin or other connecting structure **154** pivotally coupling the lever **152** with the bracket **153**, a pin or other connecting structure **155** pivotally coupling the lever **152** with the engagement pin **150**, and a biasing **156** member that provides a desired biasing force between the lever **152** and the bracket **153**. The locking mechanism **104** may also include a sleeve **157** through which the engagement pin **150** passes and which helps to facilitate alignment and engagement of the engagement pin **150** with the openings or apertures of the rails in the first assembly **102**.

While the operation of the locking mechanism **108** is described above as a squeezing action by the user, other means of operating the locking mechanism may be employed. For example, a user may strike the lower portion of the lever **152** with a quick blow of sufficient force to displace it from the first position to the second position. Reengagement may be likewise accomplished.

The squeezing operation of the locking mechanism **104**, or the application of force in a direction toward the inner and outer rails **101** and **105** of the first assembly **102** is more ergonomic and natural for a user as compared to conventional lock tabs and provides for more efficient use of the ladder **100**.

As previously noted, the engagement pin **150** is pivotally or hingedly coupled with the lever **152** such that the pin **150** and the lever **152** do not keep the same geometric relationship between them when in the first and second positions. This enables the pin **150** to stay aligned with a specified axis. In some embodiments, the pin **150** may extend through the opening or aperture of the inner rail and into a space defined within an associated rung. In such a case, it may become important to maintain the pin **150** in alignment with the axis of the rung for satisfactory operation. To additionally assist with maintaining the alignment of the pin **150** with a specified axis (e.g., an axis extending through a rung **103** from one inner rail **101** to the other inner rail **101**), a slot **159** may be formed in the handle **152** enabling the corresponding pin **155** to become displaced along a length of the slot **159** when the handle **152** is displaced from the its first position or state (FIG. **13**A) to its second position or state (FIG. **13**B).

Referring now to FIGS. **15** and **16**, the locking mechanism **108** associated with the second assembly (see also FIGS. **1**-**4**) is described. FIG. **16** shows an embodiment of the locking mechanism **108** with many portions of the second assembly **106** not shown and a few portions of the second assembly **106** indicated by dashed lines for purposes of clarity. The locking mechanism **108** includes a handle **160** rotatably coupled to a pair of links **161**A and **161**B, which are in turn pivotally coupled to a pair of pins **162**A and **162**B, respectively. When in a locked state, the pins **162**A and **162**B extend through aligned openings or apertures formed in the inner and outer rails **109** and **111** of the second assembly **106**. When the handle **160** is rotated in a desired direction (e.g., clockwise), the pins **162**A and **162**B retract or become displaced inwardly toward the handle **160** such that they disengage openings in at least the outer rails **111** of the second assembly **106**. This enables the inner **109** and outer rails **111** of the second assembly **106** to be slidingly displaced relative to one another. In one embodiment, the handle **106** and pins **162**A and **162**B may be biased towards the engaged position such that, when the pins **162**A and **162**B become aligned with apertures or openings in the outer rails, they automatically extend through such openings.

Referring briefly to FIG. **17**, another embodiment of the handle **160** is shown which may include a shoulder portion **170** configured to abut the lower surface **172** of the cross-brace **174** associated with the locking mechanism. When in use (i.e., to disengage the pins **162**A and **162**B), the handle **160** pivots about pins **176** so that the shoulder portion **170** is displaced away from the cross-brace **174** and may then be used to actuate the locking mechanism **108** by rotating the handle in a desired direction as described above. When not in use, the shoulder portion **170** abuts the lower surface **172** of the cross-brace **174**, it prevents the handle from rotating and consequently displacing the pins **162**A and **162**B. In other words, the shoulder portion **170** acts as a safety device to prevent actuation of the locking mechanism **108** and inadvertent adjustment of the inner rails **109** relative to the outer rails **111** of the second assembly **106**.

In addition to the use of the shoulder portion **170**, a pin **178** may be formed on, or coupled with, the shoulder portion **170**. The pin **178** may be sized and configured to engage an opening or slot **180** formed on the lower surface **172** of the cross-brace **174**. Engagement of the pin **178** with the slot **180** provides an additional locking action to prevent inadvertent rotation of the handle **160**, and thus actuation of the locking mechanism **108**, by helping to maintain the handle **160** in the position shown in FIG. **15**, wherein the shoulder portion **170** abuts the lower surface **172** of the cross-brace **174**.

Referring now to FIGS. **18** and **19**, another ladder **200** is shown. The ladder **200** does not include adjustable assemblies. Rather, the ladder **200** includes a first assembly **202** having a plurality of rungs **203** coupled to two spaced apart, non-adjustable (with respect to height) rails **201**. The rungs **203** are configured with substantial depth that extends beyond

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the depth of the rails both inwardly (toward a second assembly **204**) and outwardly (in the direction away from the second assembly **204**) to provide a user with a larger surface area to stand on when working. In other words, the depth of the rungs **203** exceeds the depth of rails **201** and protrudes in each direction relative to the rails **201**. The enlarged surface area of the rungs **203** can provide increased comfort, stability and safety in certain working conditions as compared to the rungs of more conventional stepladders. The ladder **200** may include other features and components similar to those described above with respect to the ladder **100** shown in FIGS. **1** through **4**.

Referring now to FIG. **20**, a hinge assembly **220** is shown in accordance with an embodiment of the present invention. The hinge assembly **220** may be used in association with, for example, combination ladders similar to the hinge described in U.S. Pat. No. 4,407,045 to Boothe, the disclosure of which is incorporated by reference herein in its entirety. Such a hinge assembly **220** may be used on other types of ladders as well as will be appreciated by those of ordinary skill in the art. In one embodiment, the hinge assembly **220** includes multiple hinge components pivotally coupled with one another, wherein the outer hinge plates **222**A and **222**B of a hinge component are spaced further apart from one another as compared to those of previous hinge assemblies. Such spacing provides additional torsional stiffness and may enable the use of thinner, lighter hinge plates **222**A and **222**B. In one embodiment, the hinge assembly **220** further includes four locking pins **224** as compared to two locking pins in prior art assemblies. The use of four pins **224** strengthens the hinge assembly **220** and may increase the load rating of the ladder or otherwise provide for the use of lighter components such as hinge plates.

The hinge assembly **220** further includes at least one magnet **226** which may, for example, be disposed within a cavity of an actuation button **228**. The magnet **226** is configured to provide a sufficient magnetic force to hold a desired tool or other item on the side of the ladder (e.g., contiguous with the actuating button) without falling from the ladder. Thus, for example, a pair of pliers or wire cutters (or even multiple tools) may be magnetically coupled to the side of the ladder providing an easy, temporary storage of such tools or items during use of the ladder as shown in FIG. **21**. In certain embodiments, additional magnets may be disposed along the sides of the rails of a ladder such that tools may be magnetically coupled therewith, and temporarily stored, at different elevational locations on the ladder depending, for example, what rung a user may be standing on for a given job.

While the invention may be susceptible to various modifications and alternative forms, specific embodiments have been shown by way of example in the drawings and have been described in detail herein. However, it should be understood that the invention is not intended to be limited to the particular forms disclosed. Rather, the invention includes all modifications, equivalents, and alternatives falling within the spirit and scope of the invention as defined by the following appended claims.

What is claimed is:

1. A ladder comprising:

a first rail assembly including at least one pair of rails and a plurality of rungs coupled therewith;

a second rail assembly including at least one pair of rails;

a top cap coupled to the first rail assembly and the second rail assembly; and

a device configured to be selectively coupled to the top cap and maintained in at least a first deployed position and a second deployed position, the device including a rail and a tray movably coupled to the rail, wherein, when in the first deployed position, the rail extends from the top cap outwardly away from the ladder in a substantially horizontal direction when the ladder is in an orientation for intended use and wherein, when in the second deployed position, the rail extends from the top cap in a direction that is at an acute angle relative to the first position.

2. The ladder of claim **1**, further comprising at least one bracket coupled to the second rail assembly and configured to be selectively coupled with the device to place the device in a stowed state.

3. The ladder of claim **1**, wherein the tray is selectively positionable in a useable orientation while the device is in each of the first deployed position and the second deployed position.

4. The ladder of claim **1**, wherein the tray is selectively positionable such that, when the device is in the second position, and when a user stands on one or more of the plurality of rungs, the tray extends out and away from the user.

5. The ladder of claim **1**, wherein the direction of the rail when in the second position lies in a plane that is substantially parallel with a plane defined by the at least one pair of rails of the first rail assembly.

6. The ladder of claim **1**, further comprising a locking mechanism configured to lock the device in each of first deployed position and the second deployed position.

7. The ladder of claim **1**, wherein the tray is configured to be selectively positioned in at least a first position, wherein the tray lies in a substantially common plane with the rail, and a second position wherein the tray extends at an acute angle relative to the rail.

8. A ladder comprising;

a first rail assembly including at least one pair of rails and a plurality of rungs coupled therewith;

a second rail assembly including a first pair of rails and a second pair of rails slidably coupled with the first pair of rails to adjust a length of the second rail assembly; and

a locking mechanism configured to selectively engage the first pair of rails and the second pair of rails of the second rail assembly to lock the first pair of rails relative to the second pair of rails, the locking mechanism comprising:

a pivoting structure disposed between the first pair of rails of the second rail assembly;

a handle coupled with the pivoting structure;

a pair of pins associated with the pivoting structure, the pair of pins being selectively displaceable and configured to engage aligned openings in respective inner and outer rails of the second rail assembly to effect the adjustment of length of the second rail assembly.

9. The ladder assembly of claim **8**, wherein the locking mechanism is associated with a cross-brace, and wherein the handle is selectively positionable between a first position and a second position, the handle having a shoulder portion that abuts an undersurface of the cross-brace when in the first position.

10. The ladder assembly of claim **9**, further comprising at least one pin on the handle, the at least one pin being sized, located and configured to engage an opening in the undersurface of the cross-brace when the handle is in the first position.

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