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(54) **KNEELING ROCKING CHAIR**

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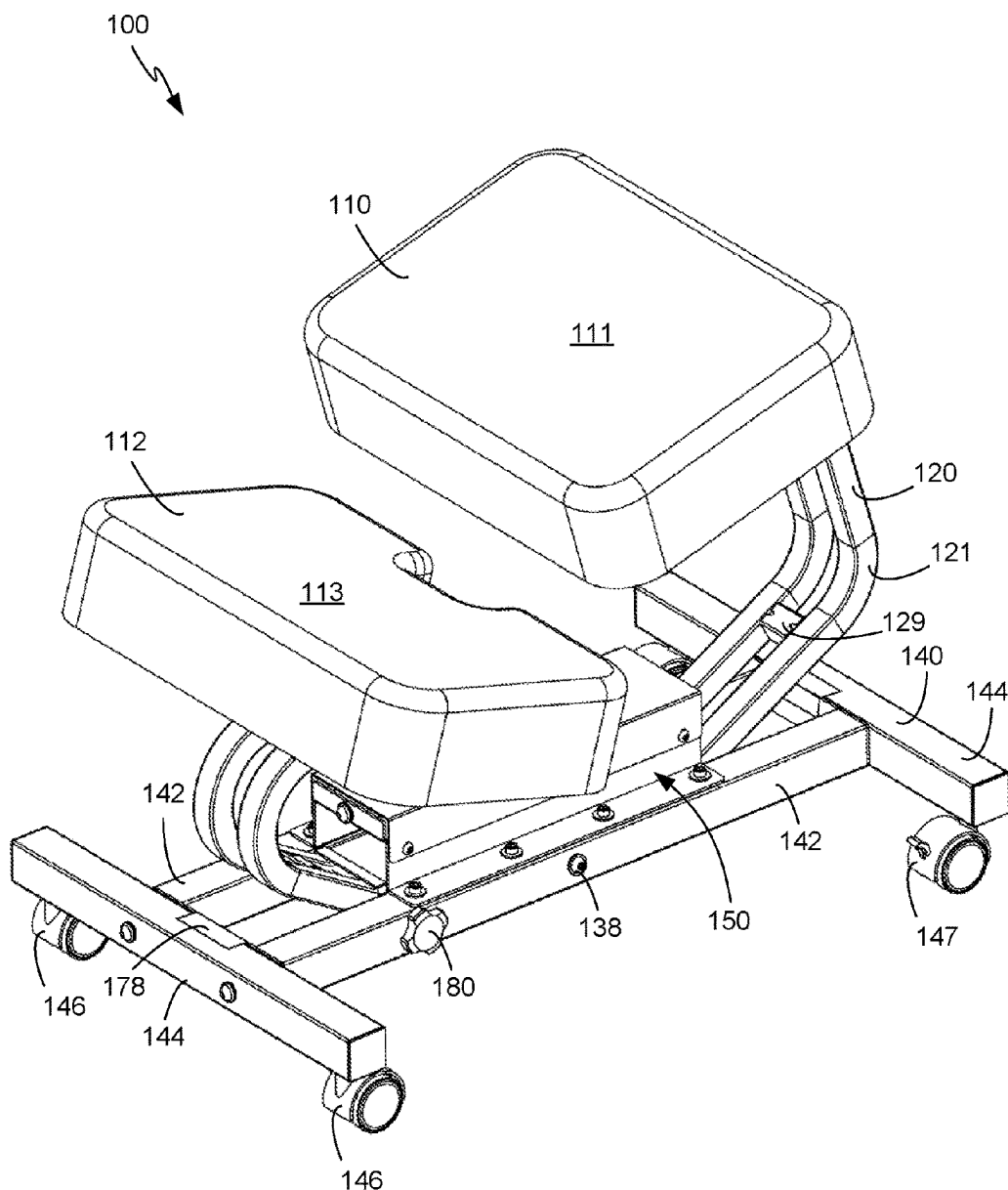
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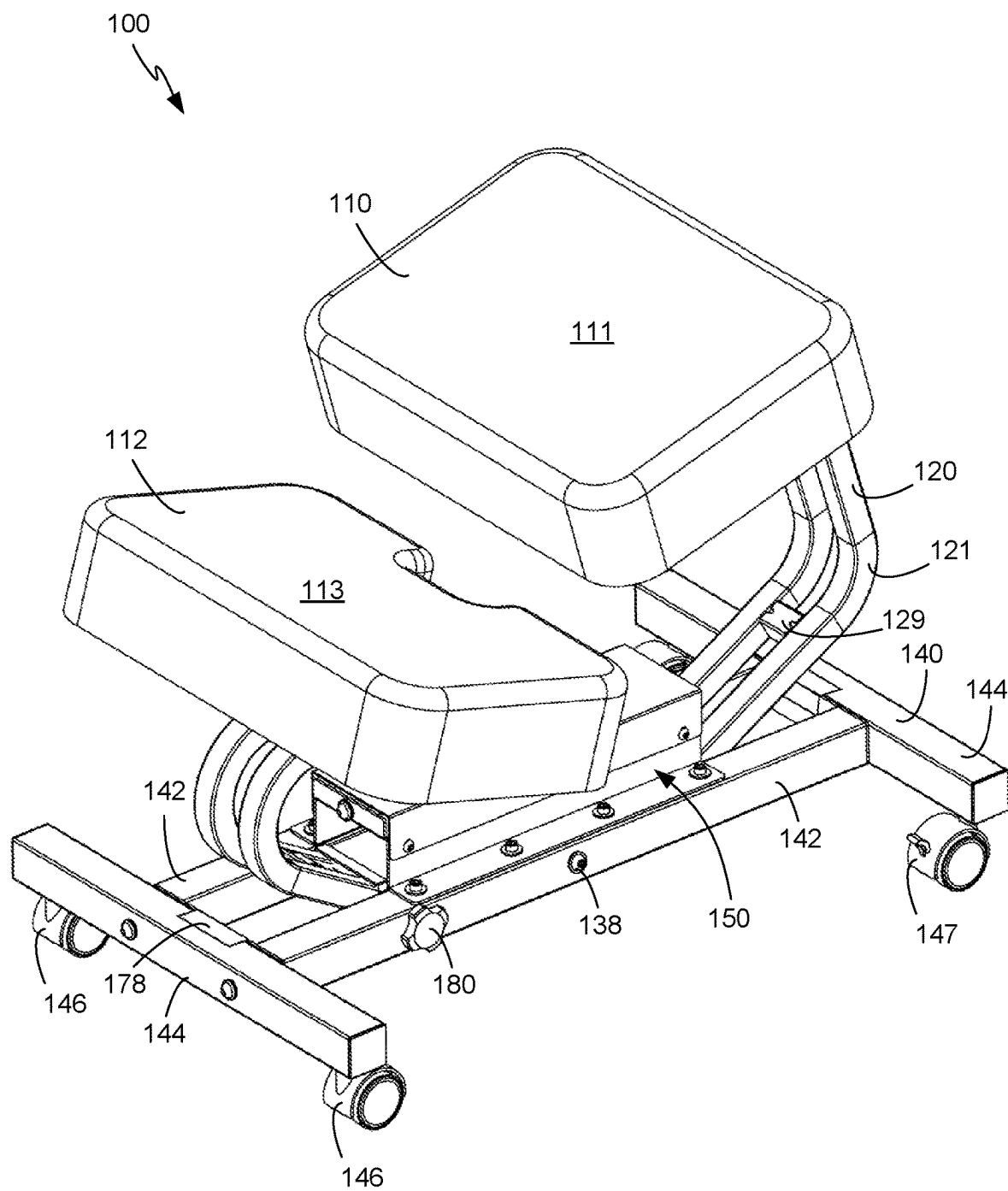
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**ABSTRACT**

A kneeling rocking chair includes a base configured to support the chair on a floor, a common frame pivotably mounted to the base, the common frame supporting a seat and a shin rest, and an adjustable rocking mechanism coupled to the base and the common frame, the adjustable rocking mechanism configured to provide adjustable resistance to a rocking motion of the common frame relative to the base





**FIG. 1A**

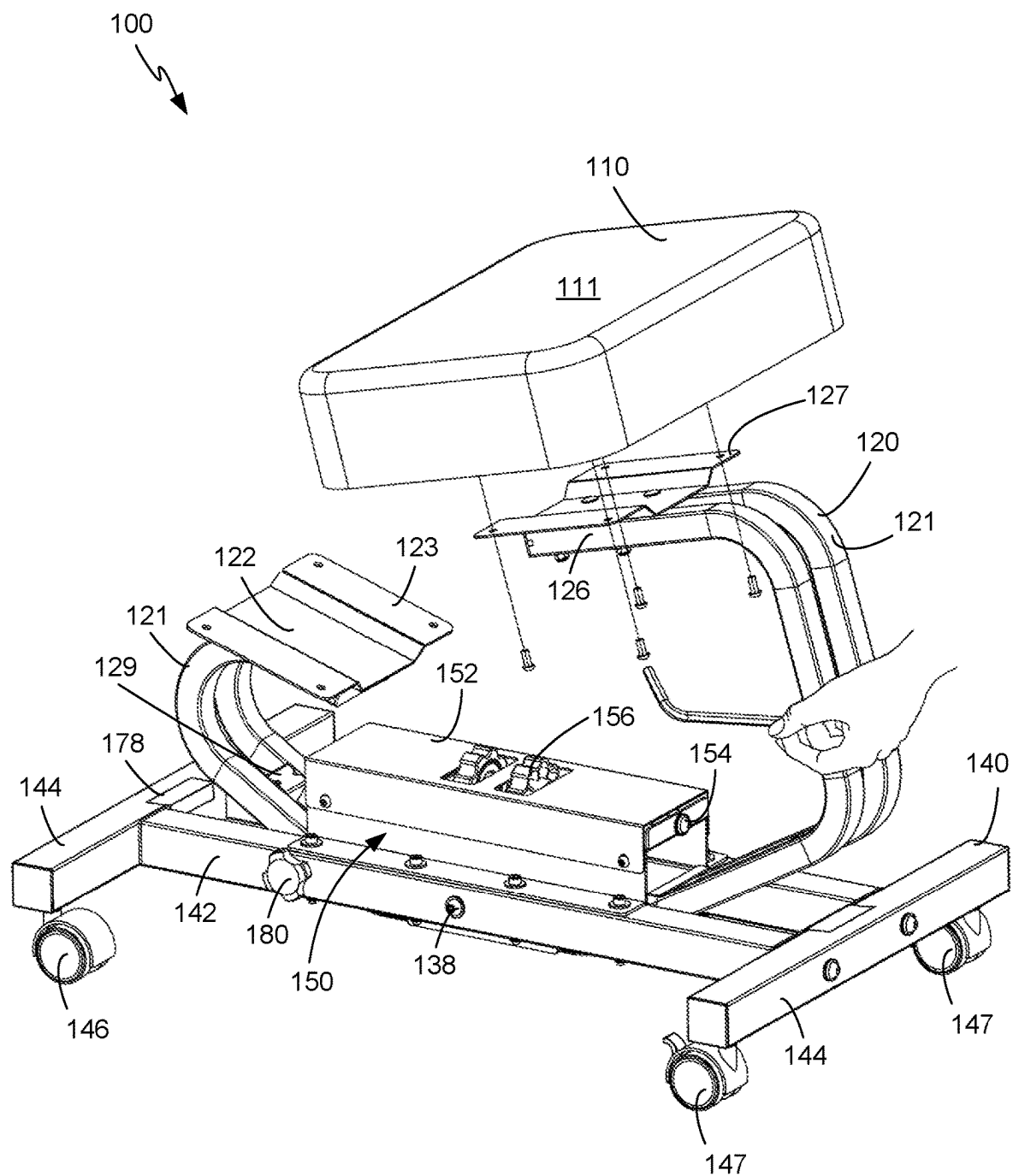


FIG. 1B

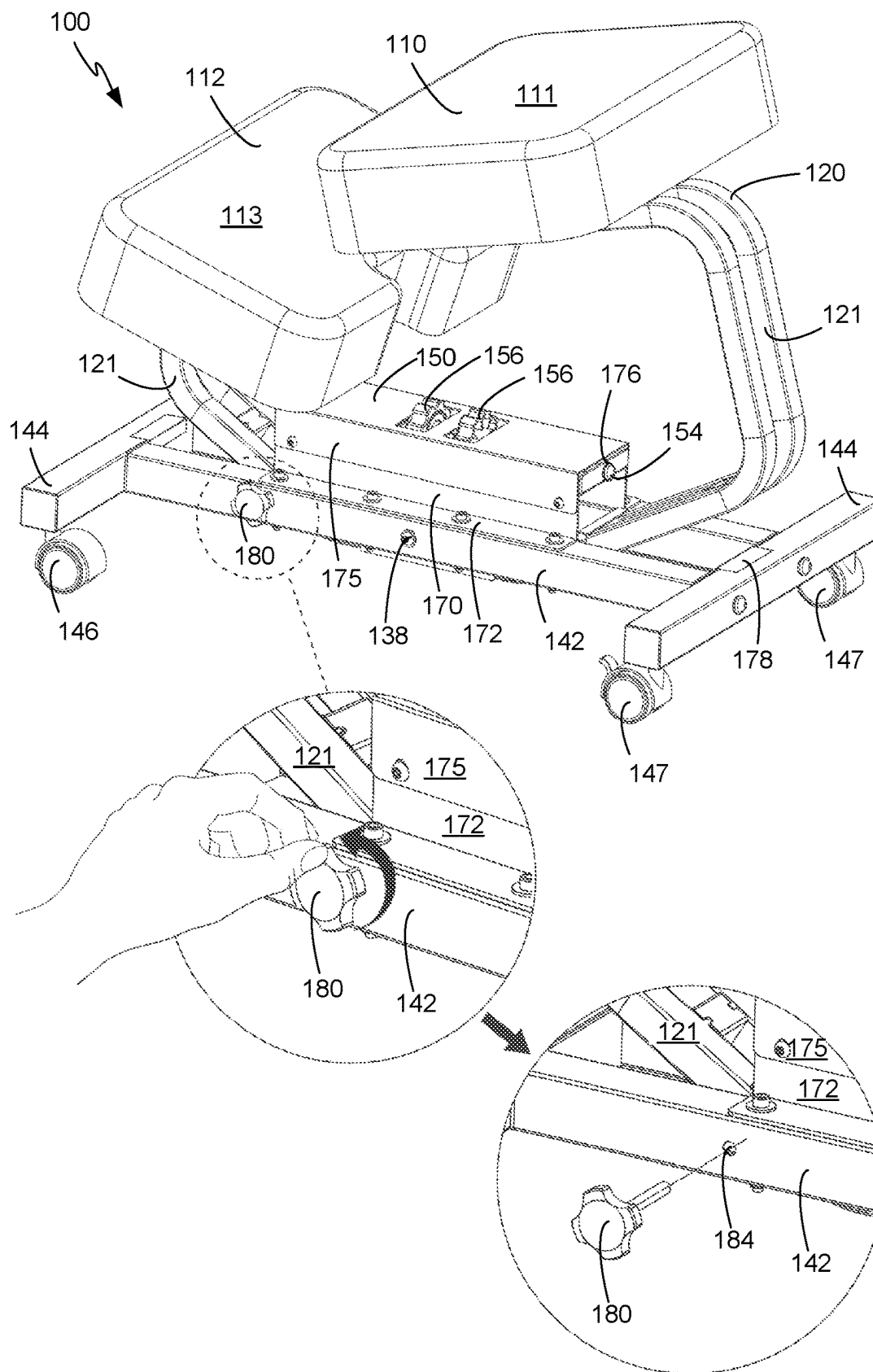
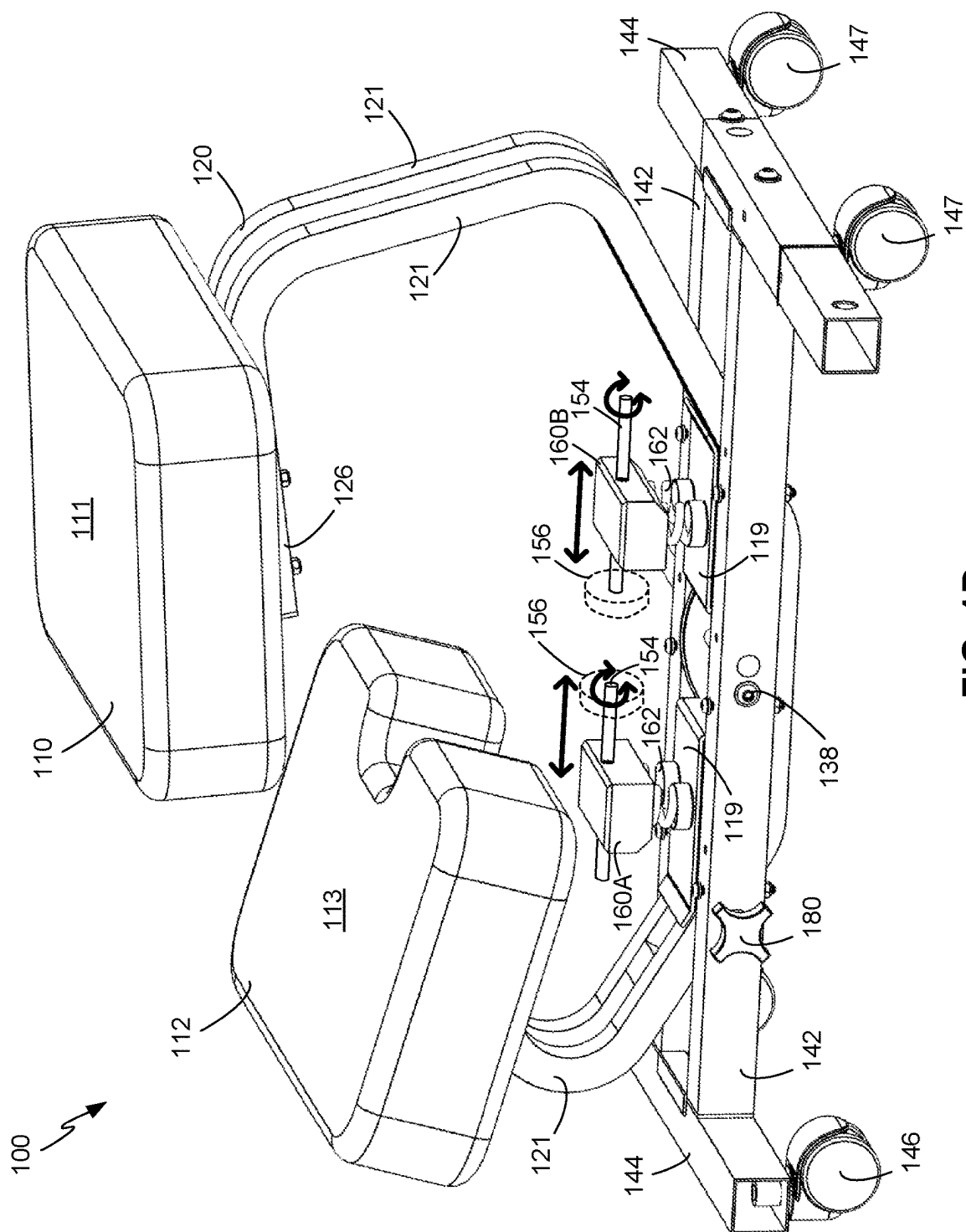


FIG. 1C



**FIG. 1D**

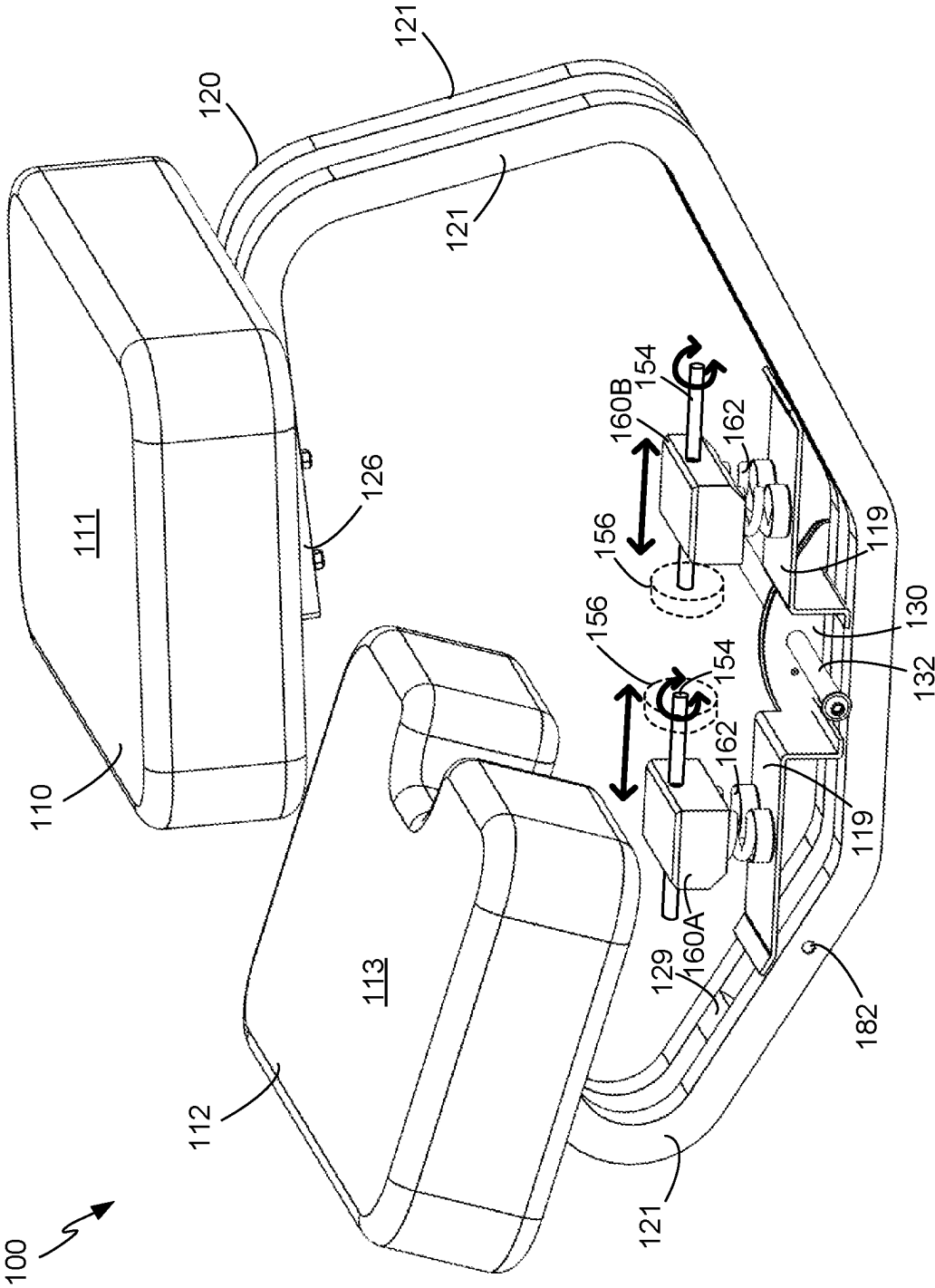
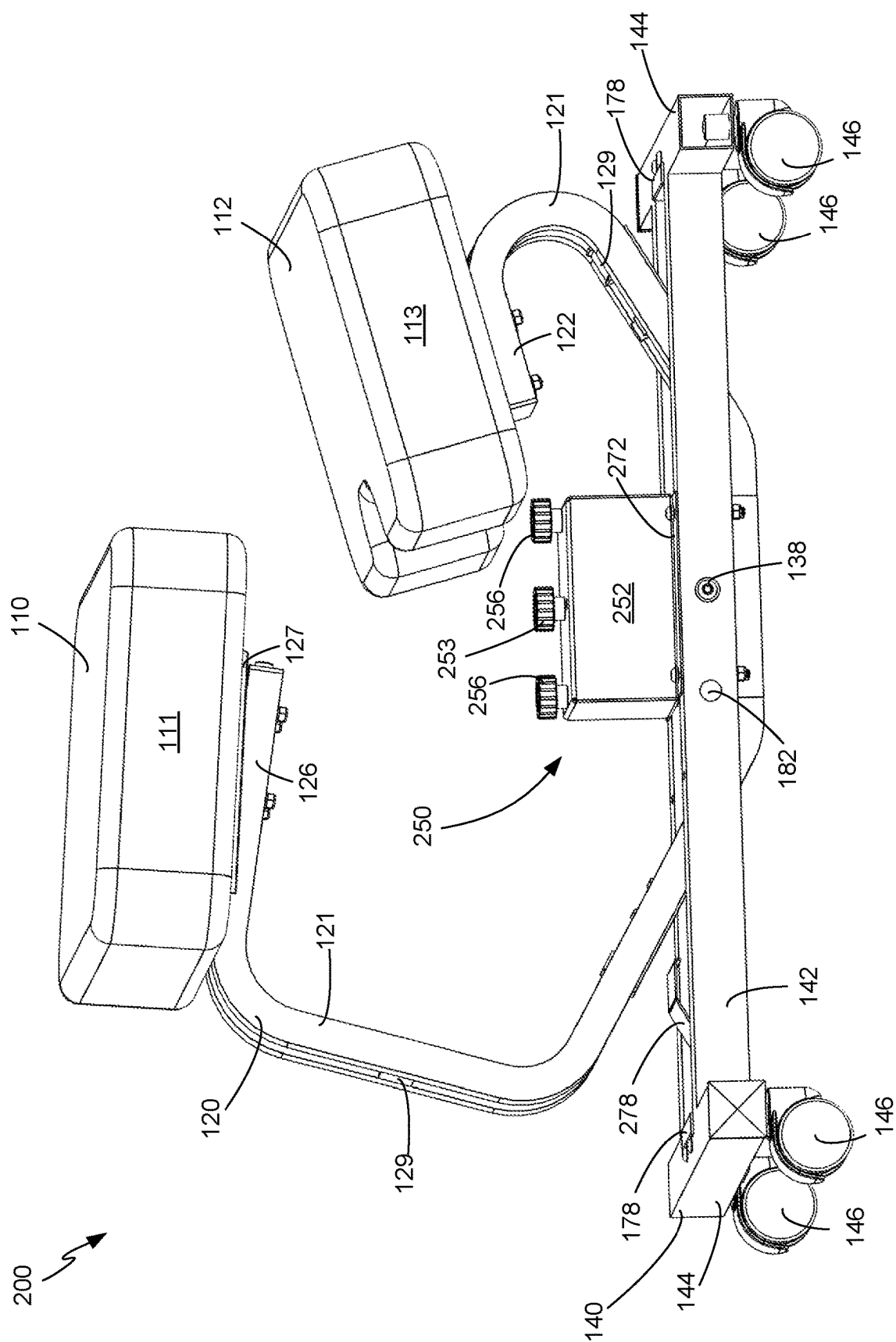


FIG. 1E



**FIG. 2A**

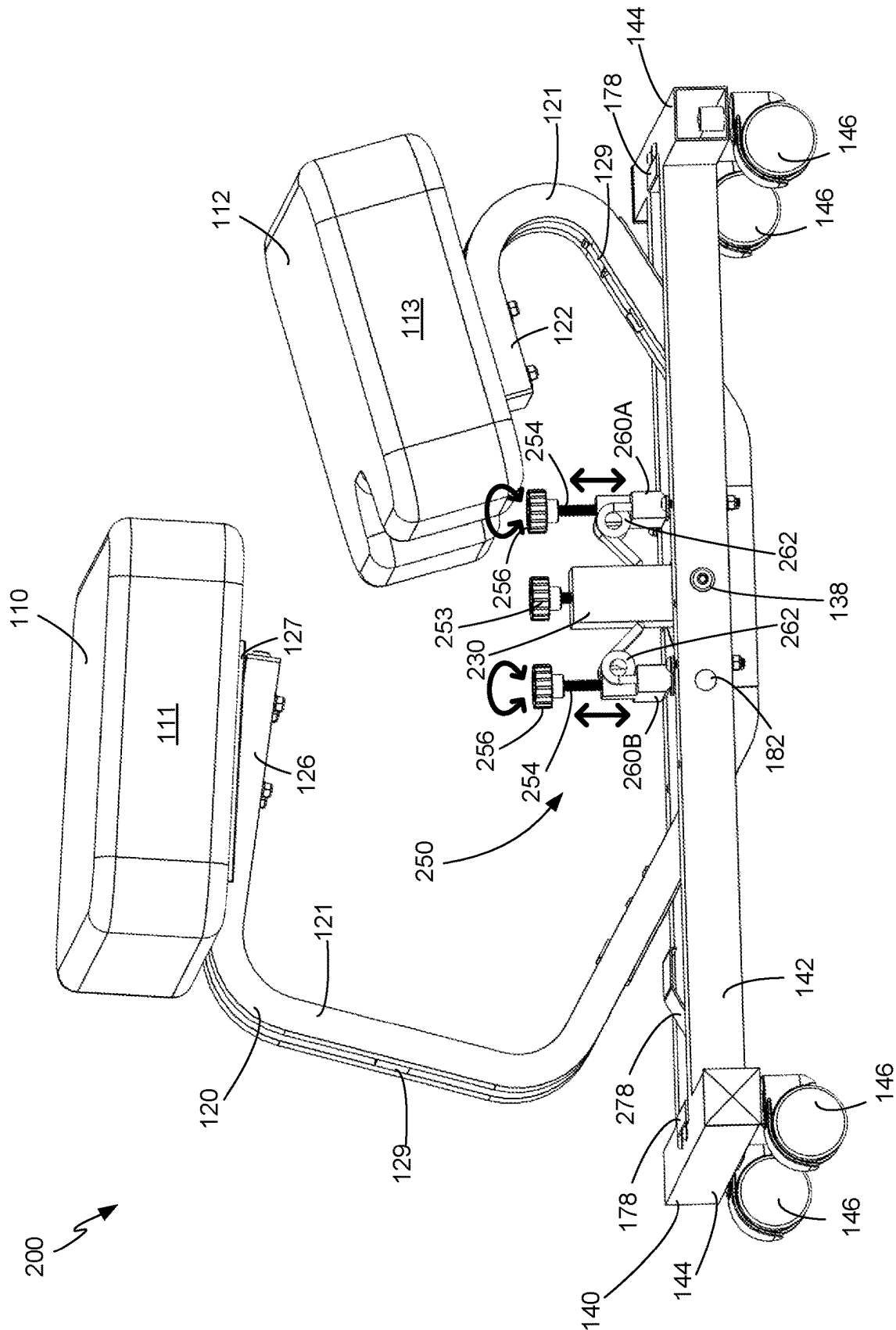


FIG. 2B



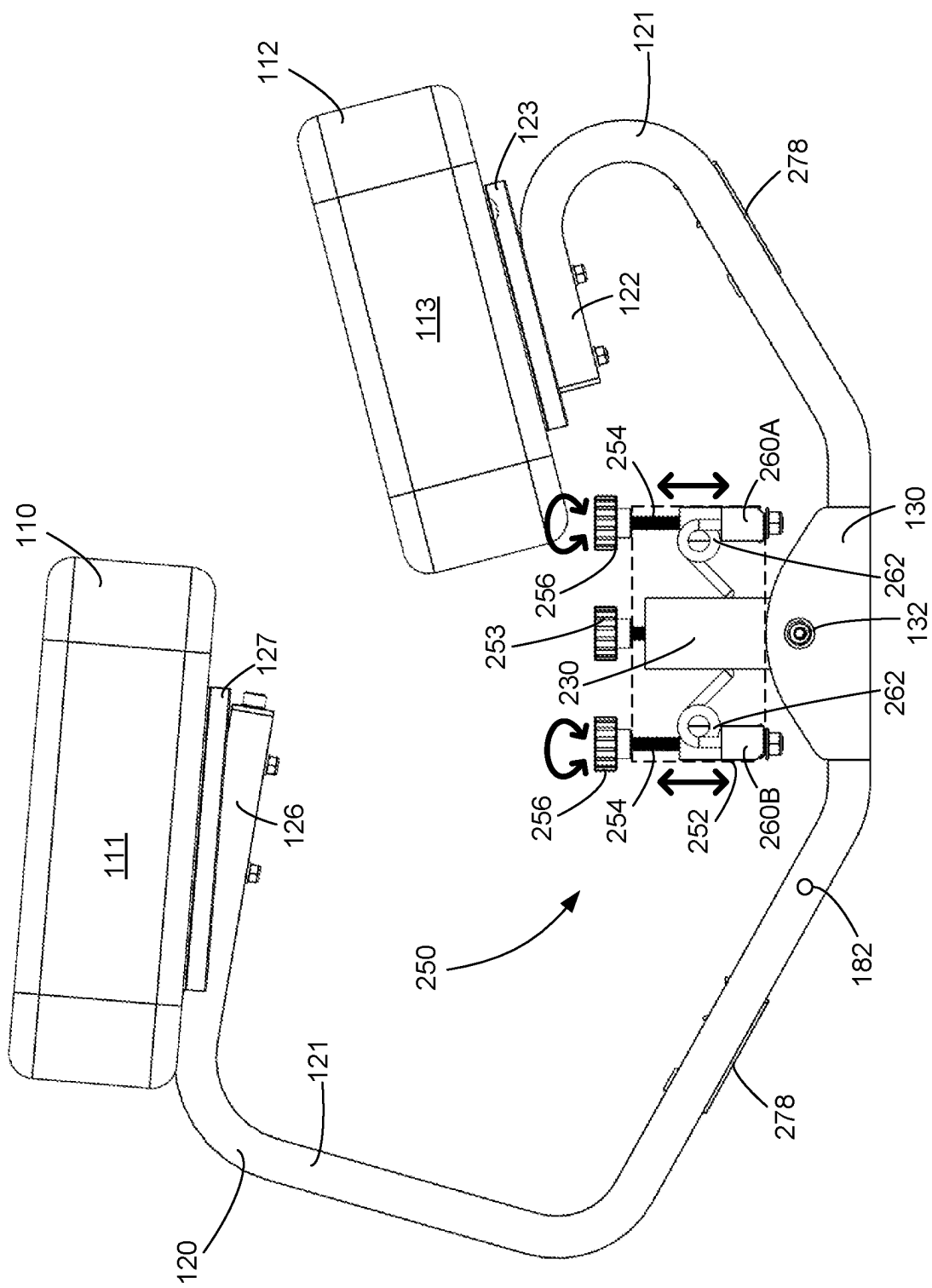
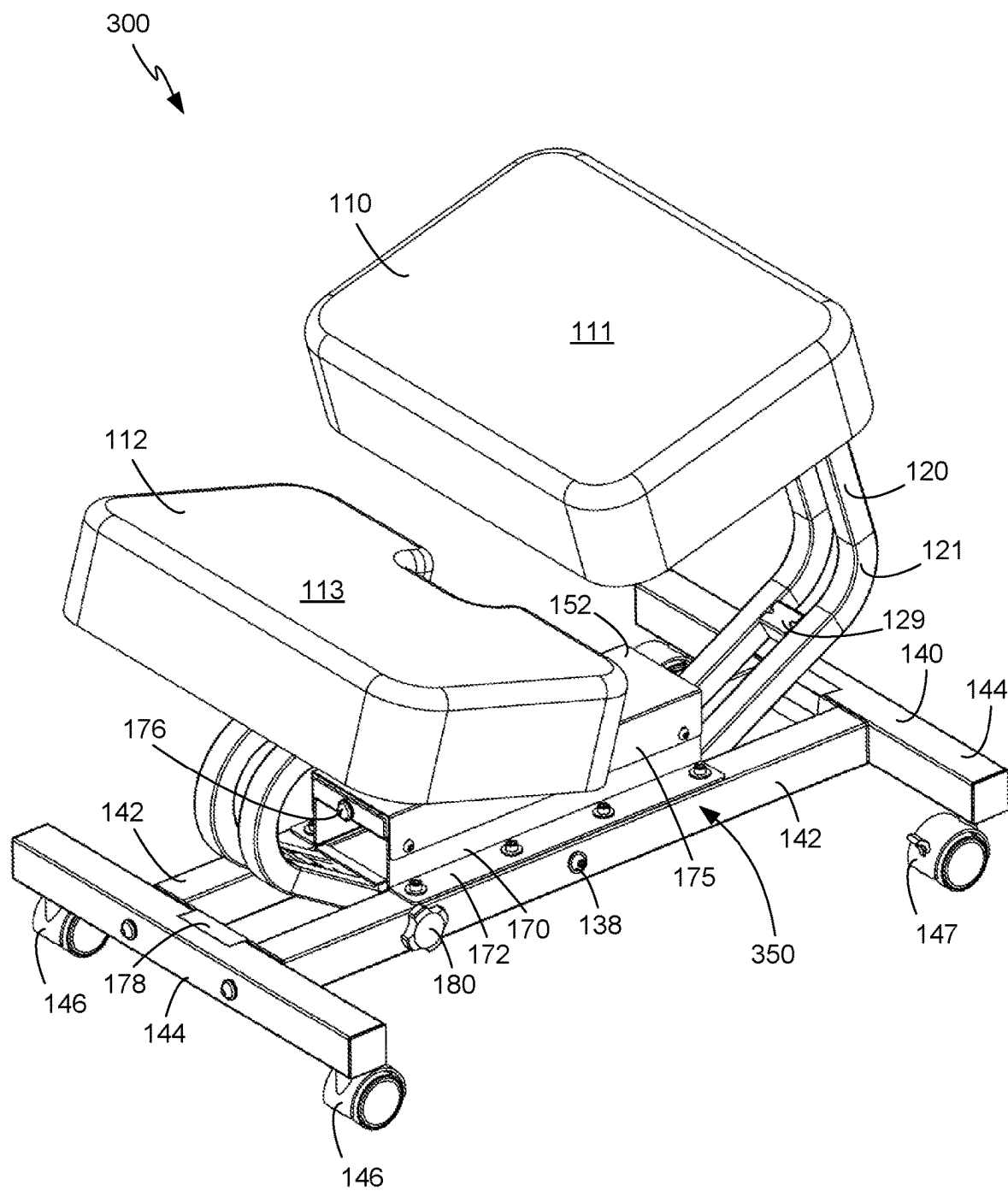


FIG. 2C



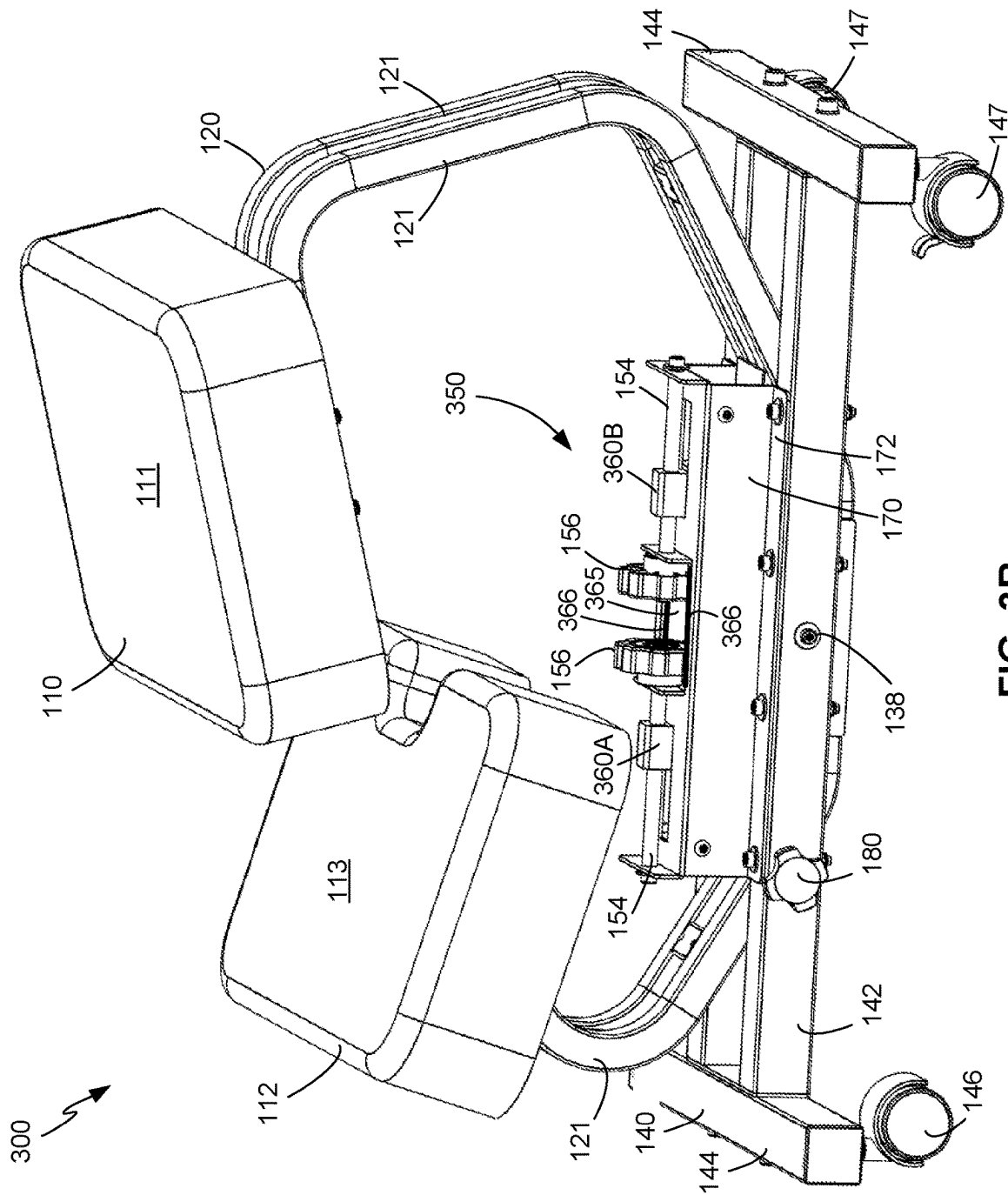
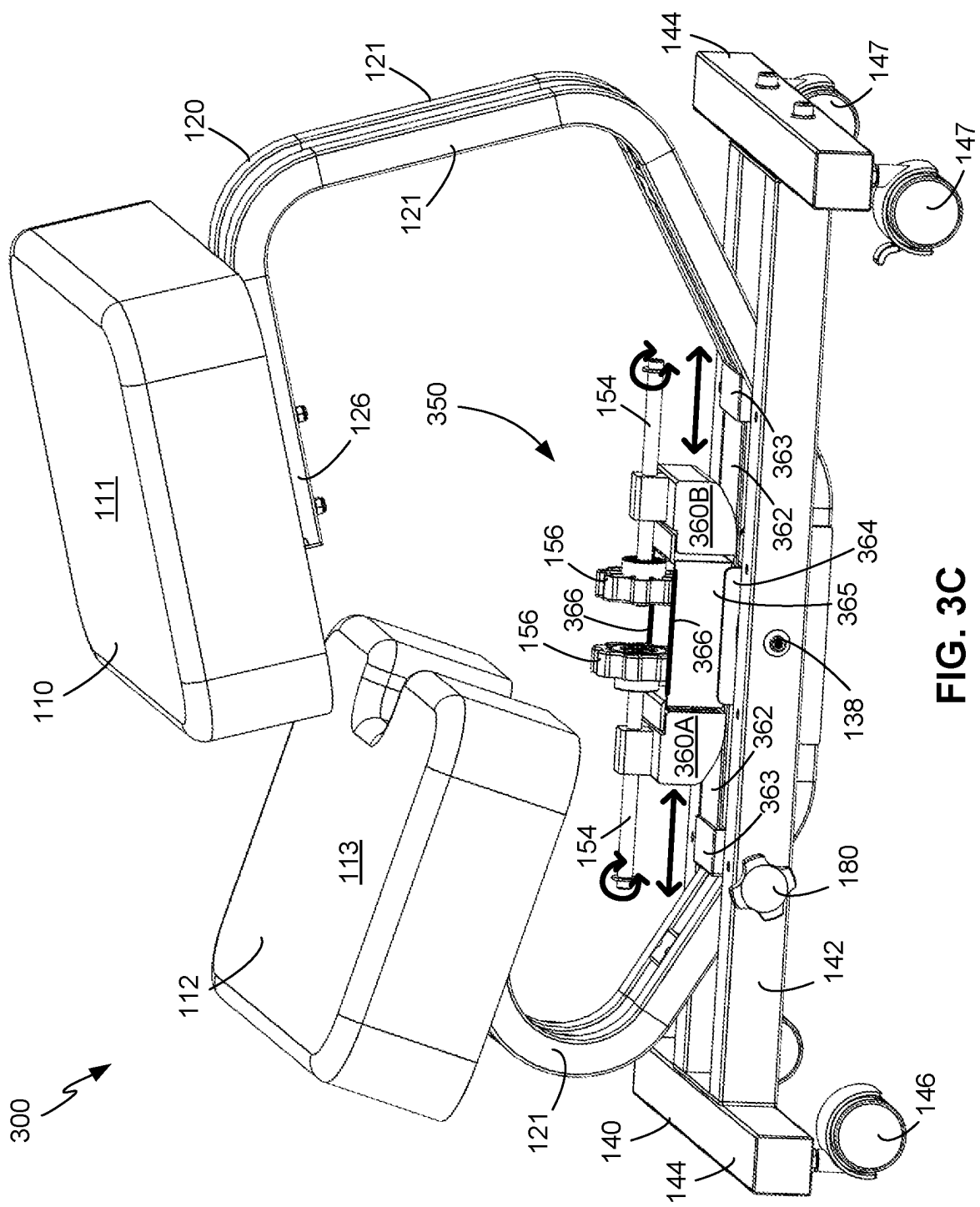


FIG. 3B



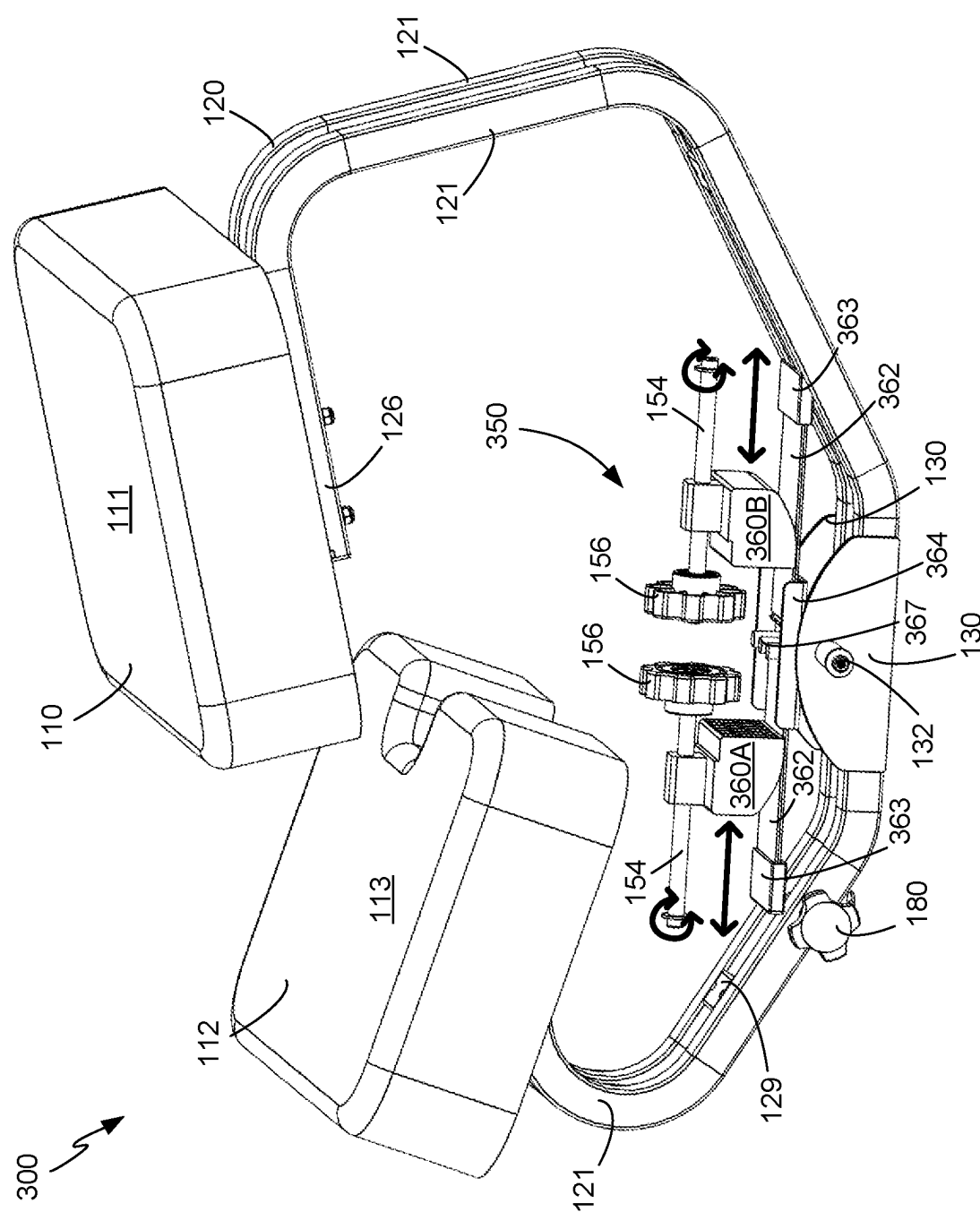


FIG. 3D

## KNEELING ROCKING CHAIR

### TECHNICAL FIELD

[0001] This disclosure relates to kneeling chairs.

### BACKGROUND

[0002] Kneeling chairs include a forwardly slanted seat and a shin rest, encouraging an upright posture and an open hip angle. Users can sit on the slanted seat with legs tucked back and shin resting on the shin rest. In this position, users can adjust their weight between their butt and shins. User can also sit with their feet on the floor and adjust their weight between their butt and feet. In either position, the open hip angle resulting from the forward slant of the seat encourages good posture.

### BRIEF SUMMARY

[0003] Kneeling chairs disclosed herein include a forwardly slanted seat, a supportive shin rest, and an adjustable rocking mechanism. This chair not merely facilitates a static kneeling posture but also introduces dynamic movement, allowing users to rock while maintaining an ergonomic position. The adjustable rocking mechanism offers customizable resistance, enabling users to tailor the rocking motion to their individual preferences.

[0004] In one example, a kneeling rocking chair includes a base configured to support the chair on a floor, a common frame pivotably mounted to the base, the common frame supporting a seat and a shin rest, and an adjustable rocking mechanism coupled to the base and the common frame, the adjustable rocking mechanism configured to provide adjustable resistance to a rocking motion of the common frame relative to the base.

### BRIEF DESCRIPTION OF THE DRAWINGS

[0005] FIGS. 1A-1E illustrate a kneeling rocking chair including an adjustable rocking mechanism with compression springs.

[0006] FIGS. 2A-2C illustrate a kneeling rocking chair including an adjustable rocking mechanism with torsion springs.

[0007] FIGS. 3A-3D illustrate a kneeling rocking chair including an adjustable rocking mechanism with plate springs.

### DETAILED DESCRIPTION

[0008] FIGS. 1A-1E illustrate a kneeling rocking chair 100 including an adjustable rocking mechanism 150 with compression springs 162. More specifically, FIG. 1A is a perspective view of chair 100, FIG. 1B is a perspective view of chair 100 during assembly of forwardly slanted padded seat 110, FIG. 1C is a perspective view of chair 100 illustrating the operation of locking thumb screw 180, and FIGS. 1D and 1E illustrate the components of the adjustable rocking mechanism 150. In FIG. 1D, the cover 152 of the adjustable rocking mechanism 150 is removed to illustrate the its internal components, whereas in FIG. 1E, the cover 152 and the base 140 of kneeling rocking chair 100 is removed.

[0009] Chair 100 includes slanted padded seat 110 and a padded shin rest 112 connected to a common frame 120. The common frame 120 is pivotably mounted to a base 140 by

way of a simple pivot connection 138 to facilitate a rocking motion of the frame 120 relative to the base 140. Adjustable rocking mechanism 150 is coupled to the frame 120 and the base 140 to resist the rocking motion of the frame 120 relative to the base 140 by way of two coiled compression springs 162.

[0010] Forwardly slanted padded seat 110 includes a forward slant relative to the base 140, whereas padded shin rest 112 includes an opposing slant relative to the base 140. A gap between the padded seat 110 and the shin rest 112 is large enough for a user's lower legs, such that the user may sit on the padded seat 110 while resting their shins on the shin rest 112 with their feet tucked under the padded seat 110 and toes on the floor.

[0011] The user may rock in this position while remaining supported by the slanted padded seat 110 and the shin rest 112. Rocking includes pivoting the common frame 120 with sufficient force to overcome the resistance of the adjustable rocking mechanism 150 in both forward and backwards directions, e.g., by leaning and/or by pushing on the floor with the user's feet. As described in further detail below, the adjustable rocking mechanism 150 provides adjustable resistance to pivoting the common frame 120 relative to the base 140 in both forward and backwards directions.

[0012] As best illustrated in FIG. 1E, common frame 120 forms both a shin support 122 and a seat support 126. A seat pad 111 is mounted to the seat support 126 to form the padded seat 110, and a shin pad 113 is mounted to the shin support 122 to form the padded shin rest 112.

[0013] In the example of kneeling rocking chair 100, common frame 120 is formed from two elongated parallel frame members 121 separated by spacers 129. Parallel frame members 121 connect shin support 122 and seat support 126 to each other and to pivot connection 138. The parallel frame members 121 form a series of bends such that the parallel frame members 121 approximate a C-shape with the shin support 122 and seat support 126 on opposite sides with the pivot connection to base 140 between the shin support 122 and seat support 126.

[0014] In some examples, various components of common frame 120, such as parallel frame members 121 and spacers 129, may be formed from bent tubular stock, such steel or aluminum metal. Any suitable technique may be used to join components of common frame 120, such as parallel frame members 121 and spacers 129, including but not limited to, screws, rivets, welds, brazing, friction fit, etcetera. In other examples, various components, or the entirety of common frame 120 may be unitary components formed from a single piece of material.

[0015] Shin support 122 includes a bent plate 123 (FIG. 1B) spanning the two parallel frame members 121. Shin pad 113 is mounted on top of plate 123 with screws through the mounting holes of plate 123. Seat support 126 includes a bent plate 127 (FIG. 1B) spanning the two parallel frame members 121. Seat pad 111 is mounted on top of plate 127 with screws through the mounting holes of plate 127.

[0016] In the example of chair 100, pivot connection 138 between the base 140 and the common frame 120 is a simple pivot connection in that the common frame 120 is rotatable about a stationary axis of the pivot relative to the base 140. As shown in FIG. 1E, the pivot connection includes a stationary axle 132 extending through a plate 130 attached

to a center portion of the common frame 120. The axel 132 further extends through holes in base 140 to form the pivot connection 138.

[0017] In other examples, the pivot connection 138 may be replaced with a different mechanism, such as a hinge, a four bar linkage including the base 140 and the common frame 120, a hanging pivot in which the base 140 can both swing and pivot relative to the common frame 120, or other simple or complex rotating connection.

[0018] Base 140 is configured to rest on the floor and serve as a platform for the common frame 120 via the pivot connection 138. In the example of kneeling rocking chair 100, base 140 is formed from four tubular frame members: two parallel base members 142 and two foot members 144 that extend transversely to the two parallel base members 142. The base members 142 include holes to receive the axel 132 for the pivot connection 138 to common frame 120. Foot members 144 form joints at the ends of the parallel base members 142. Foot members 144 are secured to the ends of the parallel base members 142 with screws extending through holes in the foot members 144 and engaged with threaded holes in caps in the base members 142. In other examples, any suitable technique may be used to join the base members 142 with the foot members 144, including but not limited to, screws, rivets, welds, brazing, friction fit, etcetera. In other examples, various components, or the entirety of base 140 may be unitary components formed form a single piece of material. While base 140 includes foot members 144 in line with the base members 142, other examples may include the foot members 144 below the two parallel base members 142.

[0019] Base 140 also includes optional swiveling rollers 146, 147. Rollers 146 are free rolling, whereas rollers 147 include a locking mechanism. Any combination of free-rolling or locking wheels, swiveling or non-swiveling, may be used. Other examples may not include any rollers, such that base 140 is configured to remain stationary on the floor.

[0020] As mentioned above, kneeling rocking chair 100 further includes adjustable rocking mechanism 150 with compression springs 162 to resist the forward and backward motion of the common frame 120 relative to the base 140 on the pivot connection 138.

[0021] As best shown in FIG. 1C, the adjustable rocking mechanism 150 includes a cover 152 with two threaded adjustment bolts 154 with protruding knobs 156 extending through holes in the cover 152. A user may adjust the resistance of the forward and backward motion of the common frame 120 relative to the base 140 on the pivot connection 138 using the protruding knobs 156 of the threaded adjustment bolts 154.

[0022] The cover 152 is fixedly attached to the two parallel base members 142, and further forms pivot support on either end of the threaded adjustment bolts 154. Cover 152 may be formed from one or more bent metal components. In the example of chair 100, cover 152 includes a bottom portion 170 with flanges 172 screwed to the upper surfaces of the parallel base members 142, and a top portion 175 with the pivot supports 176 for the threaded adjustment bolts 154. For example, the pivot supports 176 may be through holes sized to receive the threaded adjustment bolts 154 in flanges of the top portion 175. In this manner, threaded adjustment bolts 154 are rotatable relative to cover 152 along an axis fixed relative to the base 140.

[0023] The adjustable rocking mechanism 150 includes a front spring block 160A and a rear spring block 160B (collectively, “spring blocks 160”), which serve as mounts for the compression springs 162. The front spring block 160A is fixed relative to the base 140 and provides an anchor point, holding one end of a first compression spring 162, while the rear spring block 160B serves a similar purpose for the second compression spring 162. These spring blocks 160A and 160B are secured to the base 140 and do not move with the common frame 120, thereby providing a stationary mount for the springs 162 to exert force against the pivoting motion of the common frame 120.

[0024] The adjustable resistance to the forward and reverse rocking motion occurs within the cover 152. Specifically, each of the threaded adjustment bolts 154 engages a threaded hole of one of spring blocks 160A, 160B. Two coiled compression springs 162 extend between each spring blocks 160 and the common frame 120. In the example of chair 100, the common frame 120 includes plates 119 with an extended spring contact surfaces attached to the upper side of the parallel frame members 121 on either side of the pivot connection 138. The plates 119 move in conjunction with the common frame 120 as the common frame 120 pivots relative to the base 140. In contrast, the spring blocks 160 remain fixed relative to the base 140 by their connection to the cover 152 via the threaded adjustment bolts 154. When pivoting forward past a neutral position, springs 162 on the front spring block 160A are deflected in compression. When pivoting backwards past the neutral position, springs 162 on the rear spring block 160B are deflected in compression. In an alternative configuration, springs may instead be deflected by stretching. For example, rear springs may be stretched when pivoting forward past the neutral position, whereas front springs may be stretched when pivoting backwards past the neutral position. Such an alternative configuration would require the springs to be attached on both ends, whereas springs 162 are only attached to spring blocks 160A with spring contacts free to slide on the plates 119.

[0025] The adjustable rocking mechanism 150 is equipped with protruding knobs 156 attached to the threaded adjustment bolts 154. These knobs 156 are designed for manual operation, allowing the user to easily adjust the resistance of the rocking motion by rotating the knobs. By turning the protruding knobs 156, the user can individually move either of the spring blocks 160A and 160B closer to or further from the pivot connection 138, thereby adjusting the tension of the compression springs 162 and customizing the rocking resistance to their preference. More specifically, turning one of threaded adjustment bolts 154 with the associated protruding knob 156 moves the position of the associated spring block 160 relative to the extended spring contact surfaces of the corresponding plate 119. The outer sides and upper surfaces of the spring blocks 160 register with the inner surfaces of the cover 152 to keep the spring blocks 160 oriented in a common direction when being actuated by their associated threaded adjustment bolt 154.

[0026] Moving the spring block 160 further from the pivot connection 138 increases the rocking resistance as the spring compression increases for a given angle of the common frame 120 relative to the base 140. Conversely, moving the spring block 160 closer to the pivot connection 138

decreases the rocking resistance as the spring compression decreases for a given angle of the common frame 120 relative to the base 140.

[0027] Compression springs 162 can be fabricated from a variety of materials depending on the requirements for strength, corrosion resistance, and cost-effectiveness. High carbon steel is commonly used for its high tensile strength and fatigue life, making it suitable for a broad range of applications. Stainless steel is another option that provides excellent corrosion resistance, which is beneficial in environments where the chair may be exposed to moisture or chemicals. Alloy steels, such as chrome silicon or chrome vanadium, offer superior properties for high stress applications, including enhanced strength at higher temperatures and better resistance to shock loads.

[0028] The dimensions of the compression springs 162 is determined by the space available within the adjustable rocking mechanism 150 and the desired range of motion for the chair. The physical dimensions of the springs, including the outer diameter, inner diameter, wire diameter, and free length, are selected to fit within the confines of the mechanism while providing the requisite force to support the rocking motion. The size of the springs also influences the spring rate, which is the amount of force per unit of deflection.

[0029] The strength of compression springs 162 is characterized by the spring rate and the maximum load they can withstand. The spring rate is chosen based on the desired responsiveness and the weight of the user, ensuring that the chair can accommodate a wide range of body types without bottoming out or being too stiff. The maximum load is related to the material's tensile strength and the spring's design, including the number of active coils and the type of ends (closed and ground, closed and not ground, open and ground, or open and not ground). The springs are designed to operate within the elastic limit of the material to prevent permanent deformation after repeated use.

[0030] While the adjustable rocking mechanism 150 allows adjustable resistance to rocking, both forwards and backwards, the overall motion of the common frame 120 relative to the base 140 is limited by contact between the parallel frame members 121 and the foot members 144. Optional anti-collision pads 178 are located between the contact points of the parallel frame members 121 and the foot members 144. In the example of chair 100, anti-collision pads 178 are located on the upper inside corner of each foot member 144 cushions the contact to increase comfort for the user and reduce noise from the contact. Such anti-collision pads may be made from any elastomeric material suitable for such purpose, including but not limited to rubber, foam, polyurethane, and the like. The elastomeric material may be attached to either the common frame 120 or the base 140 with an adhesive.

[0031] The kneeling rocking chair 100, 200 includes a tilt lock mechanism that allows the user to selectively fix the position of the common frame 120 relative to the base 140. As best shown in FIG. 1C, the tilt lock mechanism includes a tilt locking thumb screw 180 including a threaded shaft extending through a hole 184 in the base 140 and engaged with a threaded hole 182 (FIG. 1E) in the frame 120. Removal of the thumb screw 180 from the threaded hole 182 in the frame 120 allows frame 120 to pivot about pivot connection 138. Conversely, a user may reinsert the thumb screw 180 through the hole 184 in the base 140 and engaged

the threaded hole 182 in the frame 120 to lock the position of the frame relative to the base 140.

[0032] FIGS. 2A-2C illustrate a kneeling rocking chair 200 including an adjustable rocking mechanism 250 with torsion springs 262. More specifically, FIG. 2A is a perspective view of chair 200, FIGS. 2B and 2C illustrate the components of the adjustable rocking mechanism 150. In FIG. 2B, the cover 252 of the adjustable rocking mechanism 250 is removed to illustrate the its internal components, whereas in FIG. 2C, the cover 252 and the base 140 of kneeling rocking chair 200 is removed.

[0033] Kneeling rocking chair 200 is substantially similar to kneeling rocking chair 100 except that adjustable rocking mechanism 150 has been replaced with adjustable rocking mechanism 250. Details, examples, and variations described with respect to kneeling rocking chair 100 are equally applicable to kneeling rocking chair 200. Conversely, details, examples, and variations described with respect to kneeling rocking chair 200 are equally applicable to kneeling rocking chair 100. Common elements between kneeling rocking chair 100 and kneeling rocking chair 200 include the same element labels.

[0034] As previously described with respect to kneeling rocking chair 100, the common frame 120 of kneeling rocking chair 200 is the primary support structure for the slanted padded seat 110 and the padded shin rest 112. It is composed of two elongated parallel frame members 121, which are held apart by spacers 129. These frame members 121 are bent to approximate a C-shape, with the shin support 122 and seat support 126 positioned at either end of the C-shape. The common frame 120 is pivotably mounted to the base 140 via pivot connection 138, which allows for a rocking motion.

[0035] The slanted padded seat 110 includes a seat pad 111 mounted on the seat support 126, which is part of the common frame 120. The padded shin rest 112 comprises a shin pad 113 mounted on the shin support 122. The seat 110 and shin rest 112 are designed to support the user in a kneeling position with an open hip angle.

[0036] The base 140 is configured to rest on the floor and support the common frame 120. It consists of parallel base members 142 and foot members 144 that extend transversely to the base members 142. Swiveling rollers 146 are attached to the base 140 to allow for mobility, although swiveling rollers 147 including locking mechanism may also be used. The base 140 is connected to the common frame 120 through pivot connection 138, which includes a stationary axel 132 that extends through a plate 130 attached to the common frame 120 and through holes in the base 140.

[0037] The adjustable rocking mechanism 250 of kneeling rocking chair 200 includes torsion springs 262 held by spring blocks 260, which are front spring block 260A and rear spring block 260B. The mechanism allows for adjustable resistance to the rocking motion of the common frame 120 relative to the base 140. The resistance can be adjusted by turning threaded adjustment bolts 254 with protruding knobs 256. The cover 252 is fixedly attached to the base 140 and provides pivot supports for the adjustment bolts 254.

[0038] Common frame 120 includes a stanchion 230, which is a structural component extending between the locations of the torsion springs 262. The stanchion 230 serves as a point of action for the torsion springs 262, transferring the resistive force generated by the springs to the common frame 120. The first torsion spring 262 is



secured to a front spring block 260A fixed relative to the base 140 with a second end of the front spring block 260A acting on the stanchion 230 when the common frame 120 is pivoted forward relative to the neutral position. Similarly, a first end of a second torsion spring 262 is secured to a rear spring block 260B fixed relative to the base 140 with a second end of the rear spring block 260B acting on the stanchion 230 when the common frame 120 is pivoted backward relative to the neutral position.

[0039] As the common frame 120 pivots, the stanchion 230 acts on the torsion springs 262 to deflect the torsion springs 262. The adjustable rocking mechanism further comprises a first threaded adjustment bolt 254 that engages with the front spring block 260A to vary resistance to the rocking motion of the common frame 120 when pivoting forward by varying a ratio of torsional compression of the first torsion spring 262 relative to forward rotation of the common frame 120 relative to the base 140. A second threaded adjustment bolt 254 engages with the rear spring block 260B to vary resistance to the rocking motion of the common frame 120 when pivoting backwards by varying a ratio of torsional compression of the second torsion spring 262 relative to backward rotation of the common frame 120 relative to the base 140.

[0040] Any suitable spring material may be used for torsion springs 262. Commonly utilized materials include high-carbon steel, which is known for its high tensile strength and fatigue resistance, making it suitable for the cyclic loading of the rocking chair. Stainless steel is another option, offering corrosion resistance and durability, particularly in environments with high humidity or exposure to corrosive substances. For applications requiring enhanced resistance to high stresses and temperatures, alloy steels such as chrome silicon or chrome vanadium can be employed. These materials maintain their strength under high stress and temperature conditions, providing a consistent performance over the life of the chair.

[0041] The dimensions of torsion springs 262 are determined by the space constraints within the adjustable rocking mechanism 250 and the mechanical requirements of the rocking motion. The dimensions include the wire diameter, spring diameter, body length, and leg length, which are all tailored to fit within the mechanism and to provide the correct torque for the desired rocking resistance. The wire diameter affects the strength of the spring, with thicker wires providing greater resistance. The spring diameter and body length are chosen to ensure that the spring fits within the housing of the mechanism and interacts correctly with the stanchion 230 and spring blocks 260. The leg length is designed to provide the appropriate leverage for the spring to exert the correct amount of force on the common frame 120.

[0042] The strength of torsion springs 262 is characterized by the torque they can exert and their ability to withstand repeated cycles without failure. The torque is a function of the material's modulus of elasticity, the wire diameter, the spring diameter, and the number of active coils. The springs are designed to provide a range of resistance levels that can be adjusted by the user through the threaded adjustment bolts 254, allowing for customization of the rocking resistance. The maximum load capacity of the springs is determined to ensure that they remain within their elastic limit during use, preventing permanent deformation or failure. The strength of the springs is also matched to the expected

weight range of users to ensure that the chair can accommodate a wide variety of individuals.

[0043] The adjustable rocking mechanism comprises a cover 252 fixedly attached to the base 140 and providing pivot supports for the first threaded adjustment bolt 254 and the second threaded adjustment bolt 254. The cover 252 is fixedly secured to the base 140 by way of flanges 272 and by thumb screw 253 which passes through a hole in the cover 252 to engage a threaded hole on the top surface of the stanchion 230. The outer surfaces of the spring blocks 260 register with the inner surfaces of the cover 152 to keep the spring blocks 260 oriented in a common direction when being actuated by their associated threaded adjustment bolt 254.

[0044] Anti-collision pads 178 and anti-collision plates 278 are located between the common frame 120 and the base 140 to cushion the contact points during the rocking motion. These pads and plates are made from materials suitable for absorbing impact and reducing noise.

[0045] A tilt lock mechanism is incorporated into kneeling rocking chair 200, featuring a thumb screw 180 that can be inserted through a hole 184 in the base 140 and engaged with a threaded hole 182 in the common frame 120. This mechanism allows the user to lock the common frame 120 in a stationary position relative to the base 140.

[0046] FIGS. 3A-3D illustrate a kneeling rocking chair 300 including an adjustable rocking mechanism 350 with plate springs 362. More specifically, FIG. 3A is a perspective view of chair 300, FIG. 3B is a perspective view of chair 300 with the top portion 175 of cover 152 of the adjustable rocking mechanism 350 removed, while FIG. 3C is a perspective view of chair 300 with the cover 152, including the bottom portion 170 and the top portion 175, whereas in FIG. 3D, the cover 152 and the base 140 of kneeling rocking chair 300 are removed.

[0047] Kneeling rocking chair 300 is substantially similar to kneeling rocking chair 100 except that adjustable rocking mechanism 150 has been replaced with adjustable rocking mechanism 350. Details, examples, and variations described with respect to kneeling rocking chair 100 and kneeling rocking chair 200 are equally applicable to kneeling rocking chair 300. Conversely, details, examples, and variations described with respect to kneeling rocking chair 300 are equally applicable to kneeling rocking chair 100 and kneeling rocking chair 200. Common elements between kneeling rocking chair 100 and kneeling rocking chair 300 include the same element labels.

[0048] As previously described with respect to kneeling rocking chair 100, the common frame 120 of kneeling rocking chair 300 is the primary support structure for the slanted padded seat 110 and the padded shin rest 112. It is composed of two elongated parallel frame members 121, which are held apart by spacers 129. These frame members 121 are bent to approximate a C-shape, with the shin support 122 and seat support 126 positioned at either end of the C-shape. The common frame 120 is pivotably mounted to the base 140 via pivot connection 138, which allows for a rocking motion.

[0049] The slanted padded seat 110 includes a seat pad 111 mounted on the seat support 126, which is part of the common frame 120. The padded shin rest 112 comprises a shin pad 113 mounted on the shin support 122. The seat 110 and shin rest 112 are designed to support the user in a kneeling position with an open hip angle.

[0050] The base 140 is configured to rest on the floor and support the common frame 120. It consists of parallel base members 142 and foot members 144 that extend transversely to the base members 142. Swiveling rollers 146 and swiveling rollers 147 including locking mechanism are attached to the base 140 to allow for mobility. The base 140 is connected to the common frame 120 through pivot connection 138, which includes a stationary axel 132 that extends through a plate 130 attached to the common frame 120 and through holes in the base 140.

[0051] As best shown in FIG. 3A, the adjustable rocking mechanism 350 includes a cover 152 with two threaded adjustment bolts 154 with protruding knobs 156 extending through holes in the cover 152. A user may adjust the resistance of the forward and backward motion of the common frame 120 relative to the base 140 on the pivot connection 138 using the protruding knobs 156 of the threaded adjustment bolts 154.

[0052] The cover 152 is fixedly attached to the two parallel base members 142, and further forms pivot support on either end of the threaded adjustment bolts 154. Cover 152 may be formed from one or more bent metal components. In the example of chair 300, cover 152 includes a bottom portion 170 with flanges 172 screwed to the upper surfaces of the parallel base members 142, and a top portion 175 with the pivot supports 176 for the threaded adjustment bolts 154. For example, the pivot supports 176 may be through holes sized to receive the threaded adjustment bolts 154 in flanges of the top portion 175. In this manner, threaded adjustment bolts 154 are rotatable relative to cover 152 along an axis fixed relative to the base 140.

[0053] The adjustable rocking mechanism 350 of kneeling rocking chair 300 includes plate springs 362 fixed relative to the base 40. A distal end of a first plate spring 362 engaging the common frame 20 when the common frame 20 is pivoted forward relative to the neutral position, and a distal end of the second plate spring 362 engages the common frame 20 when the common frame 20 is pivoted backwards relative to the neutral position. The distal ends of plate springs 362 are held by a compression fit between lower clip 364 and upper clip 365. More specifically, screws 367 (FIG. 3D) extend through holes in lower clip 364 and engage threaded holes in upper clip 365. Tightening screws 367 pinches the proximal ends of both plate springs 362 to secure them in place. The use of a compression fit for the proximal ends of both plate springs 362, reduces stress concentrations compared to other techniques, improving the service life of plate springs 362.

[0054] The upper clip 365 is fixedly attached to the bottom portion 170 of cover 152. While any suitable fixation technique may be used, in the illustrated example, weld joints 366 (FIG. 3B) secure the upper clip 365 to the bottom portion 170 of cover 152. The weld joints 366 are on either side of the aperture for protruding knobs 156 in the bottom portion 170 of cover 152. With upper clip 365 secured to the bottom portion 170 of cover 152, and flanges 172 of bottom portion 170 screwed to the upper surfaces of the parallel base members 142, the proximal ends of plate springs 362 are held in place with base 140. In other examples, upper clip 365 may be secured to the bottom portion 170 of cover 152 using screws, bolts, rivets, brazing, or other suitable techniques.

[0055] The adjustable rocking mechanism 350 further includes plate spring contacts 360, which are front plate

spring contact 360A and rear plate spring contact 360B. Plate spring contacts 360 include spring contact surfaces adjacent the plate springs 362. Each plate spring contact includes a spring contact surface adjacent to a corresponding plate spring 362. This surface is contoured to match the profile of the plate spring 362. The spring contact surface facilitates the bending of the plate spring 362, facilitating a smooth and controlled rocking motion. The front plate spring contact 360A is fixed relative to the base 40 during rocking of the common frame 20 relative to the base 40. The front plate spring contact 360A sets a free spring length of the first plate spring as measured from the front plate spring contact 360A to the distal end of the first plate spring 362 engaging the common frame 20. Likewise, the rear plate spring contact 360B is fixed relative to the base 40 during rocking of the common frame 20 relative to the base 40. The rear plate spring contact 360B sets a free spring length of the second plate spring 362 as measured from the rear plate spring contact 360B to the distal end of the second plate spring 362 engaging the common frame 20.

[0056] As the common frame 120 pivots relative to the base 140 the parallel frame members 121 actuate the distal ends of the plate springs 362 to bend the plate springs 362. When pivoting forward past a neutral position, plate spring 362 in contact with the front plate spring contact 360A is deflected. When pivoting backwards past the neutral position, plate spring 362 in contact with the rear plate spring contact 360B is deflected. The plate spring contacts 360 engage with the plate springs 362. Each plate spring contact includes a spring contact surface that is positioned adjacent to a corresponding plate spring 362. This surface is contoured to match the profile of the plate spring 362, ensuring a secure and effective interaction as the common frame 120 pivots. The spring contact surface facilitates the bending of the plate spring 362, providing a smooth and controlled rocking motion.

[0057] Plate springs 362 can be fabricated from a variety of materials depending on the requirements for strength, corrosion resistance, and cost-effectiveness. High carbon steel is commonly used for its high tensile strength and fatigue life, making it suitable for a broad range of applications. Stainless steel is another option that provides excellent corrosion resistance, which is beneficial in environments where the chair may be exposed to moisture or chemicals. Alloy steels, such as chrome silicon or chrome vanadium, offer superior properties for high stress applications, including enhanced strength at higher temperatures and better resistance to shock loads.

[0058] The dimensions of the plate springs 362 is determined by the space available within the adjustable rocking mechanism 150 and the desired range of motion for the chair. The physical dimensions of the springs, including the thickness, width, and free length, are selected to fit within the confines of the mechanism while providing the requisite force to support the rocking motion. The thickness of the springs directly affects their bending resistance, with thicker springs offering greater stiffness. The width and length are selected to ensure that the springs can deliver the desired force without exceeding the material's yield strength during operation.

[0059] The strength of plate springs 362 is characterized by the spring rate and the maximum load they can withstand. The spring rate is chosen based on the desired responsiveness and the weight of the user, ensuring that the chair can

accommodate a wide range of body types without bottoming out or being too stiff. The strength is characterized by the ability of the springs to withstand the applied loads without permanent deformation. This includes considering the yield strength of the material and ensuring that the spring design, including its dimensions, does not subject the springs to stresses that exceed this limit. The plate springs 362 should be selected to provide sufficient flexibility for the rocking motion while maintaining the structural integrity of the springs throughout the chair's lifespan.

[0060] The adjustable rocking mechanism 350 allows for adjustable resistance to the rocking motion of the common frame 120 relative to the base 140. The adjustable rocking mechanism 350 includes threaded adjustment bolts 154 operatively connected to the front and rear plate spring contacts 360, the threaded adjustment bolts 154 configured to adjust the position of the plate spring contacts 360 by translating rotational input from a user into linear movement of the plate spring contacts 360. The linear movement of the plate spring contacts 360 varies the free spring lengths to adjust the resistance to the rocking motion of the common frame 20 relative to the base 40. The resistance can be adjusted by turning threaded adjustment bolts 154 with protruding knobs 156.

[0061] The cover 152 is fixedly attached to the base 140 and provides pivot support for the adjustment bolts 154. The cover 152 of the adjustable rocking mechanism 350 serves a dual purpose. Firstly, it provides pivot supports 176 for the threaded adjustment bolts 154, ensuring their stable operation during adjustments. Secondly, the cover 152 is designed to enclose and house the plate springs 362, protecting them from external elements and potential interference. The cover's 152 construction forms a protective shell around the plate springs 362, while still allowing for their free movement and the effective transmission of force as the common frame 120 pivots relative to base 140.

[0062] The locations of plate spring contacts 360 are individually adjustable to adjust the rocking resistance of common frame 120 relative to the base. A larger space between the distal end of a plate spring 362 and the associated plate spring contact 360 provides a lower rocking resistance. This feature allows for precise control over the resistance of the rocking motion of the common frame 120 relative to the base 140. The individual adjustability enables the user to fine-tune the tension of each plate spring 362 separately, customizing the rocking experience to their preference.

[0063] Spring contact pads 363 are located on the distal ends of the plate springs 362. Spring contact pads 363 cushion the contact points against the common frame 120 during the rocking motion. Spring contact pads 363 are made from materials suitable for absorbing impact and reducing noise.

[0064] A tilt lock mechanism is incorporated into kneeling rocking chair 300, featuring a thumb screw 180 that can be inserted through a hole 184 in the base 140 and engaged with a threaded hole 182 in the common frame 120. This mechanism allows the user to lock the common frame 120 in a stationary position relative to the base 140.

[0065] As used herein, terms such as "upper," "lower," "side," "front," "back," "top," "bottom," and similar relational descriptors are used to convey the relative positions of components within a device or system. These terms do not denote absolute positions, but rather to describe the spatial

relationships between elements as they are typically oriented during standard use or as depicted in the accompanying figures. For instance, "upper" may refer to an element that is above another component when the device is in its intended operational orientation, while "lower" would refer to a component situated beneath it. Similarly, "side" could refer to a lateral aspect of an element relative to the central axis or main body of the device. It is understood that the actual orientation of the device may change during use, and thus these terms are flexible and relative to the context provided in the description.

[0066] In variations of the described techniques, for kneeling rocking chairs 100, 200, 300, any type of spring may be utilized. Various spring types that could be considered as alternatives to springs 162, 262, and 362 in the kneeling rocking chair include leaf springs, coil springs, torsion springs, Belleville washers, wave springs, gas springs, die springs, disc springs, rubber springs, and air springs (with adjustable air pressure). In other variations, a damping material may be used in place of the springs, either directly in replace of one of springs 162, 262, 362 or in a modified design. Options for such damping materials include, but are not limited to, open-cell foam, closed-cell foam, viscoelastic memory foam, and polyurethane foam, neoprene, silicone, butyl rubber, cork, as well as fibrous materials such as fiberglass insulation and mineral wools. Other options include engineered damping plastics, composite layers with constrained damping properties, and specialized materials like Sorbothane bumpers for targeted shock absorption and vibration isolation.

[0067] The specific techniques for kneeling rocking chairs, including techniques described with respect to kneeling rocking chairs 100, 200, 300 are merely illustrative of the general inventive concepts included in this disclosure as defined by the following claims.

What is claimed is:

1. A kneeling rocking chair comprising:
  - a base configured to support the chair on a floor;
  - a common frame pivotably mounted to the base, the common frame supporting a seat and a shin rest; and
  - an adjustable rocking mechanism coupled to the base and the common frame, the adjustable rocking mechanism configured to provide adjustable resistance to a rocking motion of the common frame relative to the base.
2. The kneeling rocking chair of claim 1, wherein the adjustable rocking mechanism includes:
  - a first spring that is deflected when the common frame pivots forward beyond a neutral position; and
  - a second spring that is deflected with the common frame pivots backwards past the neutral position.
3. The kneeling rocking chair of claim 2,
  - wherein the first spring extends between a first mount fixed relative to the base and a first portion of the common frame, and
  - wherein the first spring extends between a second mount fixed relative to the base and a second portion of the common frame.
4. The kneeling rocking chair of claim 2, wherein the adjustable rocking mechanism includes:
  - a front spring block holding a first end of the first spring;
  - a first threaded adjustment bolt that engages with the front spring block to vary resistance to the rocking motion of the common frame when pivoting forward by varying

a ratio of compression of the first spring relative to forward rotation of the common frame relative to the base;

a rear spring block holding a first end of the second spring; and

a second threaded adjustment bolt that engages with the rear spring block to vary resistance to the rocking motion of the common frame when pivoting backwards by varying a ratio of compression of the second spring relative to backward rotation of the common frame relative to the base.

5. The kneeling rocking chair of claim 4, wherein the front spring block and the rear spring block are held relative to the base during rotation of the common frame relative to the base,

wherein a second end of the first spring acts on the common frame when the common frame pivots forward relative to the neutral position, and

wherein a second end of the second spring acts on the common frame when the common frame pivots backwards relative to the neutral position.

6. The kneeling rocking chair of claim 4, wherein the adjustable rocking mechanism comprises a cover fixedly attached to the base and providing pivot supports for the first threaded adjustment bolt and the second threaded adjustment bolt.

7. The kneeling rocking chair of claim 4, wherein the adjustable rocking mechanism includes protruding knobs attached to the first and second threaded adjustment bolts, allowing a user to manually adjust the resistance of the rocking motion by rotating the protruding knobs.

8. The kneeling rocking chair of claim 2, wherein the first spring is a first compression spring and the second spring is a second compression spring.

9. The kneeling rocking chair of claim 2, wherein the first spring is a first torsion spring and the second spring is a second torsion spring.

10. The kneeling rocking chair of claim 9, wherein the common frame includes a stanchion extending between the first torsion spring and the second torsion spring,

wherein a first end of the first torsion spring is secured to a front spring block fixed relative to the base with a second end of the front spring block acting on the stanchion when the common frame is pivoted forward relative to the neutral position, and

wherein a first end of the second torsion spring is secured to a rear spring block fixed relative to the base with a second end of the rear spring block acting on the stanchion when the common frame is pivoted backward relative to the neutral position.

11. The kneeling rocking chair of claim 10, wherein the adjustable rocking mechanism further comprises:

a first threaded adjustment bolt that engages with the front spring block to vary resistance to the rocking motion of the common frame when pivoting forward by varying a ratio of torsional compression of the first spring relative to forward rotation of the common frame relative to the base;

a rear spring block holding a first end of the second spring; and

a second threaded adjustment bolt that engages with the rear spring block to vary resistance to the rocking motion of the common frame when pivoting backwards

by varying a ratio of torsional compression of the second spring relative to backward rotation of the common frame relative to the base.

12. The kneeling rocking chair of claim 11, wherein the adjustable rocking mechanism comprises a cover fixedly attached to the base and providing pivot supports for the first threaded adjustment bolt and the second threaded adjustment bolt.

13. The kneeling rocking chair of claim 2, wherein the first spring is a first plate spring and the second spring is a second plate spring.

14. The kneeling rocking chair of claim 13,

wherein a proximal end of the first plate spring is fixed relative to the base with a distal end of the first plate spring engaging the common frame when the common frame is pivoted forward relative to the neutral position, and

wherein a proximal end of the second plate spring is fixed relative to the base with a distal end of the second plate spring engaging on the common frame when the common frame is pivoted backwards relative to the neutral position.

15. The kneeling rocking chair of claim 14, wherein the adjustable rocking mechanism comprises:

a front plate spring contact fixed relative to the base during rocking of the common frame relative to the base, the front plate spring contact setting a free spring length of the first plate spring as measured from the front plate spring contact to the distal end of the first plate spring engaging the common frame; and

a rear plate spring contact fixed relative to the base during rocking of the common frame relative to the base, the rear plate spring contact setting a free spring length of the second plate spring as measured from the rear plate spring contact to the distal end of the second plate spring engaging the common frame.

16. The kneeling rocking chair of claim 15, wherein the adjustable rocking mechanism comprises threaded adjustment bolts operatively connected to the front and rear plate spring contacts, the threaded adjustment bolts configured to adjust the position of the plate spring contacts by translating rotational input from a user into linear movement of the plate spring contacts,

wherein linear movement of the plate spring contacts varies the free spring lengths to adjust the resistance to the rocking motion of the common frame relative to the base.

17. The kneeling rocking chair of claim 1, wherein the base includes two parallel base members and two foot members extending transversely to the parallel base members.

18. The kneeling rocking chair of claim 1, wherein the base is equipped with swiveling rollers to facilitate movement of the kneeling rocking chair relative to a floor.

19. The kneeling rocking chair of claim 1, wherein the common frame is formed from two elongated parallel frame members separated by spacers.

20. The kneeling rocking chair of claim 19, wherein the two parallel frame members are configured to approximate a C-shape with the seat and the shin rest on opposite sides of the C-shape.

**21.** The kneeling rocking chair of claim **19**, wherein the common frame includes a seat support and a shin support on opposing sides of a pivot connection pivotably mounting the common frame to the base, wherein the seat support includes a first plate spanning the two parallel frame members, wherein the shin support includes a second plate spanning the two parallel frame members, wherein the seat includes a seat pad mounted to the seat support, and wherein the shin rest includes a shin pad mounted to the shin support.

**22.** The kneeling rocking chair of claim **1**, wherein a pivot connection pivotably mounting the common frame to the base includes a stationary axel extending through a plate attached to the common frame and through holes in the base.

**23.** The kneeling rocking chair of claim **1**, further comprising a tilt lock mechanism operable to selectively fix the common frame relative to the base.

**24.** The kneeling rocking chair of claim **1**, further comprising anti-collision pads located between contact points of the common frame and the base.

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