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(71) Applicant: **Wonderland Nurserygoods Company Limited**
Hong Kong 999077 (HK)

(72) Inventor: **Mountz, Jonathan K.**
Birdsboro, PA 19508 (US)

(74) Representative: **Zimmermann & Partner Patentanwälte mbB**
Josephspitalstr. 15
80331 München (DE)

(54) **CHILD MOTION APPARATUS HAVING A FOLDABLE FRAME STRUCTURE**

(57) A child motion apparatus (100) includes a base (102) connected with an upright column (106), a seat (104) pivotally supported by the upright column (106) above the base (102) and including a first and a second surrounding frame portion (120, 118) pivotally connected with each other about a pivot axis (P1), and a carrying handle (111) pivotally connected with the first surrounding frame portion (120). A first latch (162) is operable to rotationally lock the carrying handle (111) with the first surrounding frame portion (120), the first latch (162) having a first surface (174). A second latch (140) is operable to lock the first and a second surrounding frame portions (120, 118) in an unfolded state, the second latch (140) having a second surface (172), and an unlocking displacement of the second latch (140) causing the second surface (172) to contact and push against the first surface (174) of the first latch (162) and thereby urge the first latch (162) in movement for unlocking the carrying handle (111).

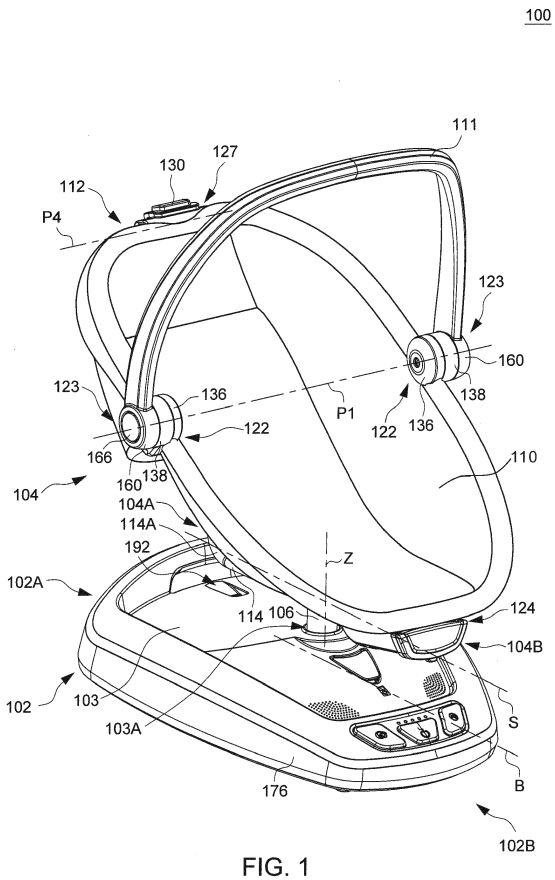

FIG. 1

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Description

CROSS-REFERENCE TO RELATED APPLICATION(S)

[0001] This application respectively claims priority to U.S. provisional patent application no. 62/097,641 filed on December 30, 2014, the disclosure of which is incorporated herein by reference.

BACKGROUND

1. Field of the Invention

[0002] The present invention relates to child motion apparatuses.

2. Description of the Related Art

[0003] Infant swing apparatuses have become common household items. An infant swing has the primary function of applying a gentle, swinging or gliding motion to soothe a child, while providing a safe and comfortable seating area. However, one main drawback of the current infant swings is that they are generally built with large standing frames and swing arms that are complicated to fold. This makes travelling with an infant swing all the more difficult.

[0004] Therefore, there is a need for an apparatus for soothing a child that is more convenient in use, and can address at least the foregoing issues.

SUMMARY

[0005] The present application describes a child motion apparatus that can be conveniently folded and unfolded, and can sway sideways to help soothe a child. In one embodiment, the child motion apparatus includes a base, an upright column connected with the base, a seat pivotally supported by the upright column above the base, a carrying handle, and a first and a second latch. The seat is disposed at a top of the upright column, and includes a first and a second surrounding frame portion pivotally connected with each other about a pivot axis. The carrying handle is pivotally connected with the first surrounding frame portion. The first latch has a first surface, and is operable to rotationally lock the carrying handle with the first surrounding frame portion. The second latch has a second surface, and is operable to lock the first and second surrounding frame portions in an unfolded state. An unlocking displacement of the second latch causes the second surface to contact and push against the first surface of the first latch, thereby urging the first latch in movement for unlocking the carrying handle.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006]

FIG. 1 is a perspective view illustrating an embodiment of a child motion apparatus;

FIG. 2 is a perspective view illustrating a rigid frame of the child motion apparatus shown in FIG. 1;

FIG. 3 is a perspective view illustrating the rigid frame of the child motion apparatus under another angle of view;

FIG. 4 is a side view illustrating the rigid frame of the child motion apparatus;

FIG. 5 is a schematic view illustrating the child motion apparatus in a collapsed state;

FIG. 6 is a cross-sectional view illustrating the construction of two pivot joints that are respectively provided at each of a left and a right side of a seat in the child motion apparatus, one of the two pivot joints connecting two surrounding frame portions, and the other one connecting a carrying handle with one of the two surrounding frame portions;

FIG. 7 is a schematic view illustrating construction details of the pivot joint connecting the surrounding frame portions of the seat;

FIG. 8 is a cross-sectional view illustrating the two pivot joints shown in FIG. 6 in an unlocking state;

FIG. 9 is a cross-sectional view illustrating the pivot joint connecting with the carrying handle in an unlocking state while the other pivot joint connecting the two surrounding frame portions remains in a locking state;

FIG. 10 is a schematic view illustrating an interior of the pivot joint connecting the two surrounding frame portions in a folded state;

FIG. 11 is a schematic view illustrating an interior of the pivot joint connecting the two surrounding frame portions in an intermediate angular position between the unfolded and folded state;

FIG. 12 is a schematic view illustrating an inner construction of a base of the child motion apparatus;

FIG. 13 is a schematic view illustrating the child motion apparatus provided with an anchor locking the seat in a centered position on the base;

FIG. 14 is a schematic view illustrating the anchor shown in FIG. 13 in an unlocking position;

FIG. 15 is a schematic view illustrating another embodiment of a child motion apparatus provided with

an anchor for locking the seat in a centered position on the base; and

FIG. 16 is a schematic view illustrating the anchor shown in FIG. 15 in an unlocking position.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0007] FIG. 1 is a perspective view illustrating an embodiment of a child motion apparatus 100, and FIGS. 2-4 are various perspective views illustrating a frame construction of the child motion apparatus 100. Referring to FIGS. 1-4, the child motion apparatus 100 can include a support base 102, a seat 104 arranged above the base 102, and an upright column 106 connected with the base 102. The base 102 can have an upper surface 103, and the upright column 106 can protrude upward through the upper surface 103. The upright column 106 is disposed below the seat 104, and pivotally supports the seat 104 above the base 102. The upright column 106 can define a pivot axis Z about which the seat 104 can rotate and oscillate to the left and right side in an alternated manner for soothing a child.

[0008] The seat 104 can have a rear 104A, a front 104B, and a longitudinal axis S extending centrally from the rear 104A to the front 104B. The seat 104 can include a rigid frame 108 (better shown in FIGS. 2-4), a fabric material 110 (shown in FIG. 1) secured with the rigid frame 108 to define a sitting area for receiving a child, and a carrying handle 111 connected with the rigid frame 108. As better shown in FIGS. 2-4, the rigid frame 108 can include a surrounding frame 112 to which is fixedly connected the fabric material 110, a bottom frame segment 114 and a seatback frame segment 116.

[0009] The surrounding frame 112 can surround a central region where the fabric material 110 can be stretched to form a seating support for receiving a child. The surrounding frame 112 can include two surrounding frame portions 118 and 120 that are pivotally connected with each other via two pivot joints 122 defining a same pivot axis P1. Each of the two surrounding frame portions 118 and 120 can exemplary have a semi-oval shape. When the child motion apparatus 100 is deployed, the surrounding frame portion 118 can extend downward from the pivot axis P1, and the surrounding frame portion 120 can extend upward from the pivot axis P1. The two pivot joints 122 can respectively connect the two surrounding frame portions 118 and 120 at a left and a right side thereof. The carrying handle 111 can have an arc shape having two sides respectively connected pivotally with the surrounding frame portion 120 about the pivot axis P1 via two pivot joints 123.

[0010] The bottom frame segment 114 can have a generally elongated shape, and can extend centrally along the longitudinal axis S from the rear 104A to the front 104B of the seat 104. The bottom frame segment 114 has a rear and a front end 114A and 114B respectively corresponding to the rear and front 104A and 104B of the seat 104, and is connected with a top of the upright column 106 at a location between the rear end 114A and the front end 114B. The seatback frame segment 116 can have a generally elongated shape, and can be disposed behind the portion of the fabric material 110 that forms the seat support, i.e., generally behind a back of a child received in the seat 104. The seatback frame segment 116 can rise upward from the bottom frame segment 114, and has a lower end 116A and an upper end 116B. The front end 114B of the bottom frame segment 114 can be pivotally connected with a lower region of the surrounding frame portion 118 via a hinge 124 defining a pivot axis P2. The rear end 114A of the bottom frame segment 114 can be pivotally connected with the lower end 116A of the seatback frame segment 116 via a hinge 126 defining a pivot axis P3. The upper end 116B of the seatback frame segment 116 can be pivotally connected with a top of the surrounding frame portion 120 via a pivot connection 127 defining a pivot axis P4. The pivot axes P1, P2, P3 and P4 are parallel to one another and extend transversally relative to the seat 104 (i.e., from a left to a right side thereof).

[0011] Referring to FIGS. 2-4, the pivot connection 127 can include a housing 129 that is pivotally connected with the surrounding frame portion 120 and is further slidably connected with the upper end 116B of the seatback frame segment 116. More specifically, the upper end 116B of the seatback frame segment 116 can be assembled for sliding movement through an interior of the housing 129. The housing 129 can further be assembled with one or more latches (not shown) for preventing an axial sliding displacement of the seatback frame segment 116 relative to the housing 129, and a release button 130 operable to drive unlocking displacement of the latches for allowing sliding displacement of the seatback frame segment 116 relative to the housing 129. Sliding displacement of the seatback frame segment 116 relative to the housing 129 may be allowed for facilitating rotation of the seatback frame segment 116 about the pivot axis P3 relative to the bottom frame segment 114.

[0012] Referring again to FIGS. 2-4, a seat pan 132 can be affixed with the bottom frame segment 114 at a location above the top of the upright column 106. The seat pan 132 can be formed with two sidewalls 132A rising upward respectively at the left and right sides thereof. Moreover, two lateral limiting pads 134 made of a rigid material can be respectively affixed with a left and a right side of the surrounding frame portion 120. The lateral limiting pads 134 can be disposed near a shoulder height of a child, and can symmetrically project downward and from the left and right sides of the surrounding frame portion 120 toward a central region thereof. The sidewalls 132A of the seat pan 132 can help to center the hips and legs of a child, and the lateral limiting pads 134 can help to center the chest and head of the child. With a child placed at a centered position on the seat 104, a more balanced sway motion of the seat 104 can be obtained about a center axis of the base 102.

[0013] The frame structure of the seat 104 can be unfolded for use and collapsed for convenient storage. FIGS. 1-4 show the seat 104 in the unfolded state, and FIG. 5 is a schematic view illustrating the seat 104 in an unfolded or collapsed state. When the seat 104 is deployed for use as shown in FIGS. 2-4, the surrounding frame portions 118 and 120 can be unfolded and extend generally in a same plane to define an oval shape. When the seat 104 is in the collapsed state as shown in FIG. 5, the surrounding frame portion 120 and the carrying handle 111 can respectively fold over the surrounding frame portion 118. Moreover, the pivot joints 122 and 123 can include latches operable to rotationally lock the surrounding frame 112 and the carrying handle 111.

[0014] In conjunction with FIGS. 2-4, FIG. 6 is a cross-sectional view illustrating exemplary construction of the pivot joints 122 and 123 that are respectively arranged at each of the left and right side of the seat 104, and FIG. 7 is a schematic view illustrating further construction details of the pivot joint 122. The pivot joints 122 and 123 at each of the left and right side of the seat 104 can have a same construction. Referring to FIGS. 2-4, 6 and 7, the pivot joint 122 can include two coupling shells 136 and 138, a latch 140, a spring 142 and a release actuator 144. Each of the coupling shells 136 and 138 can respectively have a circular shape. The coupling shell 136 can be affixed with an end of the surrounding frame portion 118, and the coupling shell 138 can be affixed with an end of the surrounding frame portion 120. The coupling shell 136 can be pivotally connected with a first side of the coupling shell 138 about the pivot axis P1. The assembly of the coupling shells 136 and 138 can define at least partially an inner cavity 139 in which the latch 140 is movably assembled. For clarity, the representation of the coupling shell 136 affixed with the surrounding frame portion 118 is omitted in FIG. 7 to better show the placement and interaction of the latch 140 with respect to the coupling shell 138.

[0015] The latch 140 can have a disk shape substantially centered on the pivot axis P1. The latch 140 can be formed as one integral part having two opposite sides 140A and 140B. A central hole 146 can be formed through the latch 140 and opened on the two opposite sides 140A and 140B. The latch 140 can include a plurality of teeth protruding radially outward from the round shape and distributed around the pivot axis P1, e.g., teeth 147A, 147B, 147C and 147D. The two teeth 147A and 147B can be diametrically opposite to each other along a first diametrical direction, and the two teeth 147C and 147D can be diametrically opposite to each other along a second diametrical direction different from the first diametrical direction. The latch 140 can further have a channel 148 on the side 140A that extends annularly around the pivot axis P1. The channel 148 can exemplary have a generally V-shaped cross-section, and can define two ramp surfaces 148A.

[0016] Referring to FIGS. 6 and 7, an interior of the coupling shell 138 can be affixed with a protruding axle 150 centered on the pivot axis P1. The latch 140 can be assembled in the inner cavity 139 with the axle 150 extending through the central hole 146 of the latch 140 for movably supporting the latch 140. The latch 140 can thereby slide in the inner cavity 139 along the pivot axis P1 between a locking state for locking the surrounding frame portions 118 and 120 in an unfolded, and an unlocking state for allowing folding and unfolding of the surrounding frame portions 118 and 120. Moreover, the latch 140 can be assembled with the coupling shell 136 such that both the latch 140 and the coupling shell 136 are rotationally locked with each other (i.e., they cannot rotate relative to each other). When the latch 140 is in the unlocking state, the coupling shell 138 thus can rotate about the pivot axis P1 relative to the coupling shell 136 and the latch 140.

[0017] As shown in FIG. 7, the interior of the coupling shell 138 can further include a plurality of indentations corresponding to the teeth of the latch 140 distributed around the pivot axis P1, e.g., indentations 152, 154, 156 and 158. For example, the indentations 152 and 154 are disposed diametrically opposite to each other along a first diametrical direction, and the indentations 156 and 158 are disposed diametrically opposite to each other along a second diametrical direction different from the first diametrical direction. The latch 140 can slide along the pivot axis P1 to engage and disengage the teeth 147A, 147B, 147C and 147D with respect to the indentations 152, 154, 156 and 158. For example, the teeth 147A, 147B, 147C and 147D of the latch 140 can respectively engage with the indentations 152, 154, 156 and 158 of the coupling shell 138 (as better shown in FIG. 7) for locking the two surrounding frame portions 118 and 120 in the unfolded state, and the teeth 147A, 147B, 147C and 147D of the latch 140 can be respectively positioned in the indentations 154, 152, 158 and 156 (as better shown in FIG. 10) when the two surrounding frame portions 118 and 120 are in the folded state.

[0018] When they are engaged by the teeth of the latch 140, the indentations 152, 154, 156 and 158 can be configured to block rotation of the surrounding frame portion 120 relative to the surrounding frame portion 118 only in a folding direction, while allowing rotation in the unfolding direction. To this purpose, each of the indentations 152, 154, 156 and 158 can be respectively delimited at one side by a stop sidewall (e.g., stop sidewalls 152A, 154A, 156A and 158A for the indentations 152, 154, 156 and 158, respectively) against which a correspondingly engaged tooth of the latch 140 can be stopped for preventing rotation in the folding direction. Moreover, one or more of the indentations 152, 154, 156 and 158 can further be delimited by a ramp at another side opposite to that of the stop sidewall (e.g., ramps 154B, 156B and 158B for the indentations 154, 156 and 158, respectively), such that the teeth of the latch 140 can freely slide in contact with the ramps during unfolding rotation of the surrounding frame portion 120 relative to the surrounding frame portion 118. The coupling shells 136 and 138 can further

include respective structures that can abut against each other to stop the surrounding frame portions 118 and 120 when they reach the unfolded state.

[0019] Referring to FIG. 6, the spring 142 is assembled in the inner cavity 139, and can have two opposite ends respectively connected with the side 140B of the latch 140 and an inner sidewall of the coupling shell 136. The spring 142 can bias the latch 140 toward the locking state for engagement with the coupling shell 138.

[0020] The release actuator 144 is operable to cause unlocking displacement of the latch 140 against the biasing action of the spring 142. The release actuator 144 can include a ring 144A and an actuating portion 144B affixed with each other, the actuating portion 144B extending at a side of the ring 144A. In one embodiment, the release actuator 144 including the ring 144A and the actuating portion 144B may be formed as an integral part. The release actuator 144 can be assembled with the coupling shell 138 for sliding relative to the coupling shell 138 and the surrounding frame portion 120 along a plane substantially perpendicular to the pivot axis P1. Once the release actuator 144 is assembled with the coupling shell 138, the axle 150 passes through the ring 144A, the actuating portion 144B extends outward through an opening of the coupling shell 138, and the ring 144A is disposed between the side 140A of the latch 140 and the coupling shell 138. The ring 144A of the release actuator 144 can be in sliding contact with the channel 148 on the side 140A of the latch 140.

[0021] In conjunction with FIGS. 6 and 7, FIG. 8 is a schematic view illustrating the two pivot joints 122 and 123 in an unlocking state. Referring to FIGS. 2-4 and 6, suppose that the surrounding frame portions 118 and 120 are locked in the unfolded state. In this configuration, the actuating portion 144B of the release actuator 144 can be exposed outward at a lower side of the joint 122. Moreover, the latch 140 can engage with the coupling shell 138 as schematically illustrated in FIGS. 6 and 7.

[0022] Referring to FIG. 8, for unlocking the surrounding frame portions 118 and 120, the actuating portion 144B can be depressed in the direction G so as to cause a sliding displacement of the release actuator 144 perpendicular to the pivot axis P1. Owing to the siding contact between the ring 144A of the release actuator 144 and the ramp surfaces 148A of the channel 148, this sliding displacement of the release actuator 144 can push the latch 140 to slide along the pivot axis P1 and disengage from the coupling shell 138. The surrounding frame portion 120 can be thereby unlocked for folding rotation about the pivot axis P1 relative to the surrounding frame portion 118. The release actuator 144 and the surrounding frame portion 120 are rotatable in unison relative to the surrounding frame portion 118 and the latch 140 during the folding rotation.

[0023] FIG. 10 is a schematic view illustrating an interior of the pivot joint 122 when the surrounding frame portions 118 and 120 are in the folded state. In this configuration, the surrounding frame portion 120 can lie generally parallel to the surrounding frame portion 118. Moreover, the teeth 147A, 147B, 147C and 147D of the latch 140 can respectively engage in the indentations 154, 152, 158 and 156. In case a caregiver wants to unfold the surrounding frame portions 118 and 120, the surrounding frame portion 120 can be rotated relative to the surrounding frame portion 118 until the unfolded state is reached, without the need of operating the release actuator 144.

[0024] In certain situations, it may happen that a caregiver mistakenly thinks that the surrounding frame portions 118 and 120 are properly set in the unfolded state while the latch 140 has not yet engaged the coupling shell 138. In order to prevent accidental folding of the surrounding frame 112 away from the unfolded state, the pivot joint 122 can further include a safety feature configured to stop the surrounding frame portion 120 at an intermediate angular position relatively closer to the unfolded state than the folded state. Referring to FIGS. 7, 10 and 11, this safety feature can include at least one additional indentation 159 provided in the coupling shell 138. The indentation 159 can be defined at least partially between a stop sidewall 159A and a ramp 159B. The indentation 159 is disposed along a radial direction with respect to the pivot axis P1 that is different from those of the indentations 152, 154, 156 and 158. In one embodiment, an angle A defined between the two radial directions of the indentations 156 and 159 can be between about 35 degrees and about 45 degrees.

[0025] The indentation 159 can correspond to an intermediate angular position of the surrounding frame portion 120 relative to the surrounding frame portion 118 between the unfolded and folded state, which is schematically shown in FIG. 11. The angle A between the intermediate angular position of the surrounding frame portion 120 shown in FIG. 11 and the position of the surrounding frame portion 120 in the unfolded state as shown in FIG. 7 can be between about 35 degrees and about 45 degrees. When the surrounding frame portion 120 is located at the intermediate angular position shown in FIG. 11, the tooth 147C of the latch 140 can engage in the indentation 159 owing to the biasing action of the spring 142 applied on the latch 140. While the tooth 147C is positioned in the indentation 159, the contact between the tooth 147C and the stop sidewall 159A can block rotation of the surrounding frame portion 120 toward the folded state. For further rotating the surrounding frame portion 120 from the intermediate angular position to the folded state, the release actuator 144 has to be operated as described previously to disengage the tooth 147C from the indentation 159. The disengaged tooth 147C then can travel past the indentation 159 as the surrounding frame portion 120 rotates past the intermediate angular position to the folded state.

[0026] Owing to the inclination of the ramp 159B, unfolding rotation of the surrounding frame portion 120 past the position of the indentation 159 is allowed: the tooth 147C can be in sliding contact with the ramp 159B while

the surrounding frame portion 120 rotates relative to the surrounding frame portion 118 from the intermediate angular position toward the unfolded state. The indentation 159 thus can effectively prevent accidental folding of the surrounding frame 112, and allow normal unfolding operation.

[0027] Referring again to FIGS. 6 and 7, the pivot joint 123 connecting the carrying handle 111 with the surrounding frame portion 120 can include the coupling shell 138, another coupling shell 160 affixed with an end of the carrying handle 111, a latch 162, a spring 164 and a release button 166. The coupling shell 160 is affixed with an end of the carrying handle 111, and is further pivotally connected with a second side of the coupling shell 138 (i.e., opposite to that of the coupling shell 136) about the pivot axis P1. The coupling shell 138 is thereby sandwiched between the coupling shells 136 and 160. The coupling shells 138 and 160 can define at least partially an inner cavity 167 in which are respectively assembled the latch 162 and the spring 164. The coupling shell 160 and the second side of the coupling shell 138 can be respectively provided with a plurality of inner teeth, e.g., teeth 138A for the coupling shell 138, and teeth 160A for the coupling shell 160.

[0028] The latch 162 can have a generally disk shape 162A centered about the pivot axis P1, and can be provided with a plurality of teeth 168 protruding radially outward from the disk shape 162A. Moreover, the latch 162 can further be affixed with an elongated segment 162B that extends axially along the pivot axis P1 from the disk shape 162A and has a distal end formed with one or more lips 169. In one embodiment, the latch 162 (including the disk shape 162A, elongated segment 162B, teeth 168 and lips 169) may be integrally formed as a single part. The elongated segment 162B can be formed as a hollow tube.

[0029] Referring to FIG. 6, the second side of the coupling shell 138 can be affixed with a protruding axle 170 centered about the pivot axis P1. The latch 162 can be slidably assembled in the inner cavity 167 with the axle 170 of the coupling shell 138 extending through an interior of the elongated segment 162B of the latch 162, and the elongated segment 162B extending axially along the pivot axis P1 through the ring 144A of the release actuator 144 and the central hole 146 of the latch 140. In particular, the elongated segment 162B can extend past a surface 172 defined on the side 140B of the latch 140 around the central hole 146, and the lips 169 can define a surface 174 facing the surface 172 of the latch 140. The surface 172 can be exemplary formed by a protruding rim of the central hole 146. During unlocking displacement of the latch 140, the surface 172 of the latch 140 and the surface 174 of the latch 162 can interact with each other so as to cause concurrent unlocking of both the latches 140 and 162.

[0030] With the aforementioned assembly, the latch 162 can slide in the inner cavity 167 along the pivot axis P1 between a locking state for rotationally locking the carrying handle 111 with the surrounding frame portion 120, and an unlocking state for allowing rotation of the carrying handle 111 about the pivot axis P1 relative to the surrounding frame portion 120. More specifically, when the latch 162 is in the locking state, the teeth 168 of the latch 162 can respectively engage with the teeth 138A of the coupling shell 138 and the teeth 160A of the coupling shell 160 to block rotation of the carrying handle 111 about the pivot axis P1 relative to the surrounding frame portion 120. When the latch 162 is slidably switched to the unlocking state, the teeth 168 of the latch 162 can disengage from the teeth 160A of the coupling shell 160 to allow rotation of the carrying handle 111 about the pivot axis P1 relative to the surrounding frame portion 120. While it is in the unlocking state, the latch 162 can be rotationally locked with the coupling shell 138 and the surrounding frame portion 120, and rotationally decoupled from the coupling shell 160 and carrying handle 111.

[0031] The spring 164 is assembled in the inner cavity 167, and can have two opposite ends respectively connected with the latch 162 and an inner sidewall of the coupling shell 138. The spring 164 can bias the latch 162 toward the locking state for engagement with the coupling shell 160.

[0032] The release button 166 is slidably assembled with the coupling shell 160, and is connected with the latch 162 (e.g., the release button 166 can have one or more tongue 166A in contact with the latch 162). When it is depressed, the release button 166 can slide along the pivot axis P1 and push the latch 162 to slide along the pivot axis P1 in the same direction for disengaging from the coupling shell 160, thereby unlocking the carrying handle 111. The unlocked coupling shell 160 and carrying handle 111 then can rotate about the pivot axis P1 relative to the coupling shell 138 and surrounding frame portion 120.

[0033] Exemplary interaction between the two latches 140 and 162 is described hereinafter with reference to FIGS. 6, 8 and 9. Referring to FIG. 6, suppose that the child motion apparatus 100 is in the unfolded state for use, and both the latches 140 and 162 are in their respective locking state. In this configuration, the surface 172 of the latch 140 can be adjacent to (or slightly distant from) the surface 174 of the latch 162.

[0034] Referring to FIG. 9, in case a caregiver wants to adjust the carrying handle 111 while the surrounding frame portions 118 and 120 are in the unfolded state, the release button 166 can be depressed in the direction F to cause unlocking movement of the latch 162 along the pivot axis P1. This unlocking movement of the latch 162 moves the surface 174 of the latch 162 away from the surface 172 of the latch 140, and has no effect on the latch 140 which can remain stationary in the locking state. The unlocked carrying handle 111 then can be pivotally adjusted about the pivot axis P1, while the surrounding frame portions 118 and 120 remain locked in the unfolded state.

[0035] Referring to FIG. 8, when the caregiver wants to collapse the child motion apparatus, the release actuator 144 can be depressed in the direction G. As a result, the release actuator 144 slides perpendicular to the pivot axis P1, which can push the latch 140 to slide along the pivot axis P1 and disengage from the coupling shell 138 owing to the siding contact between the ring 144A of the release actuator 144 and the ramp surface 148A of the channel 148. This unlocking displacement of the latch 140 causes the surface 172 of the latch 140 to contact and push against the surface 174 of the latch 162, so that the latch 162 is also urged by the latch 140 to slide along the pivot axis P1 in the same direction for unlocking the carrying handle 111. The carrying handle 111 can be accordingly unlocked without the need of pressing on the release button 166, in parallel to the unlocking of the surrounding frame portion 120. The unlocked surrounding frame portion 120 and carrying handle 111 then can be rotated about the pivot axis P1 relative to the surrounding frame portion 118 to the folded state as shown in FIG. 5.

[0036] With the construction described herein, the pivot joints 122 and 123 at each of the left and right sides of the seat 104 thus can be unlocked in a concurrent manner for convenient folding operation of the surrounding frame 112 and carrying handle 111.

[0037] Referring again to FIGS. 2-4, the rotation axis Z defined by the upright column 106 can be substantially adjacent to the longitudinal axis S of the seat 104. Moreover, the rotation axis Z can be inclined toward a rear of the seat 104 by an angle relative to a vertical direction, such that the seat 104 is inclined rearward. As a result, a distance between the upper surface 103 of the base 102 and a bottom of the seat 104 can be greater at the front 104B of the seat 104 than at the rear 104A of the seat 104. In one embodiment, the rearward inclination angle of the rotation axis Z relative to a vertical direction can be between about 0 and about 15 degrees, and more preferably about 10 degrees. Owing to the rearward inclination of the upright column 106, the sideways swaying motion performed by the seat 104 can also have a vertical component in addition to a horizontal component, which can make use of gravity action to help maintaining the oscillating movement of the seat 104.

[0038] In conjunction with FIGS. 2-4, FIG. 12 is a schematic view illustrating an inner construction of the base 102. Referring to FIGS. 2-4 and 12, the base 102 can have a rear 102A, a front 102B, and a longitudinal axis B extending centrally from the rear 102A to the front 102B and lying substantially adjacent to the rotation axis Z of the upright column 106. The base 102 can include a shell body 176 in which are arranged a base frame 178 and a support frame 180. The shell body 176 can have a bottom surface for providing a stable resting support on a floor, and an upper surface defining the upper surface 103 of the base 102. The upper surface 103 has an opening 103A (better shown in FIG. 1) through which the upright column 106 protrudes outward.

[0039] Referring to FIG. 12, the base frame 178 can be affixed inside the shell body 176, and can be formed by a tubular assembly extending from a rear to a front of the shell body 176. The base frame 178 can form a reinforcing structure for the base 102.

[0040] The support frame 180 can be arranged inside the shell body 176, and can be movably connected to the base frame 178 for up and down displacement below the upper surface 103 of the base 102. In one embodiment, the support frame 180 can be pivotally connected with the base frame 178 about a pivot axis P6 near the rear 102A of the base 102. The support frame 180 may be constructed as a unitary block of a generally U-shape including a transversal segment 180A and two side segments 180B. The two side segments 180B can be respectively connected with a left and a right side of the transversal segment 180A, and can have respective distal ends pivotally connected with the base frame 178 about the pivot axis P6. The transversal segment 180A can be provided with tongues 181 that can rest on abutments 183 assembled with the shell body 176. While the support frame 180 is shown as having a specific shape, it will be understood that the support frame 180 may also be formed with any shapes in general.

[0041] Referring to FIG. 12, the upright column 106 can be connected with the support frame 180. In one embodiment, the upright column 106 can include a shaft 182 affixed with the support frame 180, and a sleeve 184 affixed with the seat 104. The shaft 182 can be fixedly connected to a central region of the transversal segment 180A, and can define the rotation axis Z of the seat 104. The sleeve 184 can be affixed with the bottom frame segment 114 at a location between the rear end 114A and the front end 114B thereof (better shown in FIGS. 2-4). The shaft 182 can be assembled through an interior of the sleeve 184, such that the sleeve 184 and the seat 104 are rotatable about the rotation axis Z relative to the shaft 182 and the support frame 180 of the base 102.

[0042] A bar segment 186 can be disposed in the shell body 176 between the two side segments 180B of the support frame 180, and can be affixed with the sleeve 184 adjacent to the rotation axis Z. Since the sleeve 184 is affixed with the seat 104, the bar segment 86 is also affixed with the seat 104. The bar segment 186 can extend centrally with respect to the seat 104 (i.e., substantially aligned with the longitudinal axis S of the seat 104 shown in FIG. 1) and along a radial direction from the upright column 106 toward the rear 104A of the seat 104.

[0043] Referring to FIGS. 1 and 12, the child motion apparatus 100 can further include a magnetic drive system operable to drive the seat 104 to sway sideways about the rotation axis Z defined by the upright column 106. The magnetic drive system can exemplary include two fixed magnetic members 188A and 188B symmetrically affixed with the shell body 176 at two sides of the longitudinal axis B of the base 102, and another magnetic member 188C affixed with a distal end of the bar segment 186 distant from the upright column 106. In one embodiment, one or two of the magnetic members 188A and

188B can be electromagnets, and the magnetic member 188C affixed with the bar segment 186 can be a permanent magnet. As the seat 104 sways sideways about the rotation axis Z, a magnetic force may be generated between the magnetic member 188C and any of the two magnetic members 188A and 188B when they are in proximity of each other to maintain the swaying motion of the seat 104. The swaying motion of the seat 104 can help soothing a child and substantially remain within the footprint of the base 102, which can reduce the size of the child motion apparatus 100.

[0044] When the swaying motion of the seat 104 is not needed, it may be further desirable to have a lock mechanism for locking the seat 104 in a centered position relative to the base 102 (i.e., such that the two longitudinal axes S and B are vertically aligned with each other). For example, locking the seat 104 in a centered position relative to the base 102 can facilitate transportation of the child motion apparatus 100.

[0045] FIGS. 13 and 14 are schematic views illustrating a lock mechanism provided in the child motion apparatus 100 for blocking rotation of the seat 104 about the rotation axis Z. The lock mechanism can include an anchor 190 movably assembled with the seat 104. More specifically, the anchor 190 can be provided as a single part, and can be pivotally connected with the bottom frame segment 114 at a location easily accessible. For example, the anchor 190 can be placed at a location distant from the upright column 106 and adjacent to the rear end 114A of the bottom frame segment 114. The anchor 190 can be movable relative to the seat 104 between a locking position (as shown in FIG. 13) where the anchor 190 protrudes across the gap between the bottom of the seat 104 and the upper surface 103 of the base 102, and an unlocking position (as shown in FIG. 14) where the anchor 190 is stowed substantially adjacent to the bottom of the seat 104.

[0046] When it is in the locking position, the anchor 190 protrudes downward from the bottom of the seat 104 and engages with the upper surface 103 of the base 102. More specifically, the anchor 190 can engage a pocket 192 that is formed on the upper surface 103 at a location substantially aligned vertically with the longitudinal axis B of the base 102. The pocket 192 can be placed between the upright column 106 and the rear 102A of the base 102, in a region with a relatively smaller distance between the bottom of the seat 104 and the upper surface 103 of the base 102. The engagement of the anchor 190 with the pocket 192 can provide an anchorage that is located adjacent to the rear of the seat 104 (in particular adjacent to the rear end 114A of the bottom frame segment 114) and is substantially aligned vertically with the longitudinal axis B of the base 102. In this manner, the seat 104 can be rotationally locked with the base 102 at a centered position on the base 102 (i.e., the respective longitudinal axes B and S of the base 102 and seat 104 as shown in FIG. 1 are substantially aligned with each other).

[0047] Referring to FIG. 14, when it is pivoted to the unlocking position, the anchor 190 is disengaged from the pocket 192 of the upper surface 103 so as to allow rotation of the seat 104 about the rotation axis Z relative to the base 102. The anchor 190 in the unlocking position can be conveniently stowed adjacent to the rear end 114A of the bottom frame segment 114, e.g., it can be received and substantially concealed in a cavity provided in the bottom frame segment 114.

[0048] It will be appreciated that the anchorage for preventing rotation of the seat 104 about the rotation axis Z may also be implemented with an anchor that is assembled with the base 102 rather than with the seat 104. FIGS. 15 and 16 are schematic views illustrating another embodiment of a lock mechanism provided in the child motion apparatus 100 for blocking rotation of the seat 104 about the rotation axis Z. The lock mechanism shown in FIGS. 15 and 16 can include an anchor 194 movably assembled with the base 102. More specifically, the anchor 194 can be provided as a single part, and can be pivotally connected with the shell body 176 of the base 102. The anchor 194 can be placed at a location that is between the upright column 106 and the rear 102A of the base 102 and is substantially aligned with the longitudinal axis B. The anchor 194 can be movable relative to the base 102 between a locking position (as shown in FIG. 15) where the anchor 194 protrudes across the gap between the upper surface 103 of the base 102 and the bottom of the seat 104, and an unlocking position (as shown in FIG. 16) where the anchor 194 is stowed substantially adjacent to the upper surface 103 of the base 102.

[0049] When it is in the locking position, the anchor 194 protrudes upward from the upper surface 103 of the base 102 and engages with the bottom of the seat 104. More specifically, the anchor 194 can engage a pocket that is formed on the bottom frame segment 114 at a location near the rear end 114A thereof. The engagement of the anchor 194 with the bottom frame segment 114 can provide an anchorage that is adjacent to the rear of the seat 104 and is substantially aligned vertically with the longitudinal axis B of the base 102. In this manner, the seat 104 can be rotationally locked with the base 102 at a centered position on the base 102.

[0050] Referring to FIG. 16, when it is pivoted to the unlocking position, the anchor 194 is disengaged from the bottom frame segment 114 so as to allow rotation of the seat 104 about the rotation axis Z relative to the base 102. The anchor 194 in the unlocking position can be conveniently stowed adjacent to the upper surface 103 of the base 102, e.g., it can be received in a cavity formed on the upper surface 103.

[0051] A child motion apparatus (100) includes a base (102) connected with an upright column (106), a seat (104) pivotally supported by the upright column (106) above the base (102) and including a first and a second surrounding frame portion (120, 118) pivotally connected with each other about a pivot axis (P1), and a carrying handle (111) pivotally connected with the first surround-

ing frame portion (120). A first latch (162) is operable to rotationally lock the carrying handle (111) with the first surrounding frame portion (120), the first latch (162) having a first surface (174). A second latch (140) is operable to lock the first and a second surrounding frame portions (120, 118) in an unfolded state, the second latch (140) having a second surface (172), and an unlocking displacement of the second latch (140) causing the second surface (172) to contact and push against the first surface (174) of the first latch (162) and thereby urge the first latch (162) in movement for unlocking the carrying handle (111).

[0052] Advantages of the structures described herein include the ability to provide a child motion apparatus that can be conveniently operated for collapsing its rigid frame structure. Moreover, the child motion apparatus can have an anchor easily accessible for locking the seat of the child motion apparatus in a centered position for facilitating its transportation.

[0053] Realizations of the child motion apparatus has been described in the context of particular embodiments. These embodiments are meant to be illustrative and not limiting. Many variations, modifications, additions, and improvements are possible. These and other variations, modifications, additions, and improvements may fall within the scope of the inventions as defined in the claims that follow.

Claims

1. A child motion apparatus (100) comprising:

a base (102);
an upright column (106) connected with the base (102);
a seat (104) pivotally supported by the upright column (106) above the base (102), the seat (104) being disposed at a top of the upright column (106) and including a first and a second surrounding frame portion (120, 118) pivotally connected with each other about a pivot axis (P1);
a carrying handle (111) pivotally connected with the first surrounding frame portion (120);
a first latch (162) operable to rotationally lock the carrying handle (111) with the first surrounding frame portion (120), the first latch (162) having a first surface (174); and
a second latch (140) operable to lock the first and second surrounding frame portions (120,118) in an unfolded state, the second latch (140) having a second surface (172), and an unlocking displacement of the second latch (140) causing the second surface (172) to contact and push against the first surface (174) of the first latch (162) and thereby urge the first latch (162) in movement for unlocking the carrying handle (111).

2. The child motion apparatus (100) according to claim 1, wherein the carrying handle (111) and the second surrounding frame portion (118) are respectively pivotally connected with the first surrounding frame portion (120) about the same pivot axis (P1).

3. The child motion apparatus (100) according to claim 2, wherein the first and second latches (162, 140) are slidable along the pivot axis (P1), and while the second latch (140) remains stationary an unlocking displacement of the first latch (162) moves the first surface (174) away from the second surface (172).

4. The child motion apparatus (100) according to any of claims 1 to 3, wherein each of the first and second latches (162, 140) is spring biased toward a locking state.

5. The child motion apparatus (100) according to any preceding claim, further including a release actuator (144) operable to cause unlocking displacement of the second latch (140), the release actuator (144) having a ring (144A) in sliding contact with the second latch (140).

6. The child motion apparatus (100) according to claim 5, wherein the second latch (140) has a channel (148) having a generally V-shaped cross-section that extends annularly around the pivot axis (P1), the ring (144A) being in sliding contact with the channel (148).

7. The child motion apparatus (100) according to claim 5 or 6, wherein the release actuator (144) and the first surrounding frame portion (120) are rotatable in unison relative to the second surrounding frame portion (118), and the release actuator (144) is further slidable relative to the first surrounding frame portion (120) along a plane substantially perpendicular to the pivot axis (P1).

8. The child motion apparatus (100) according to claim 5, 6 or 7, wherein the first latch (162) is affixed with an elongated segment (162B) that extends axially through the ring (144A) of the release actuator (144) and a hole (146) of the second latch (140), an end of the elongated segment (162B) having a lip (169) defining the first surface (174).

9. The child motion apparatus (100) according to any of claims 5 to 8, further including a release button (166) operable to cause unlocking displacement of the first latch (162), the release button (166) sliding along the pivot axis (P1).

10. The child motion apparatus (100) according to any

preceding claim, wherein the first and second surrounding frame portions (120, 118) are respectively affixed with a first and a second coupling shell (138, 136), and the carrying handle (111) is affixed with a third coupling shell (160), the second and third coupling shells (136, 160) being respectively connected pivotally with the first coupling shell (138) at two opposite sides thereof, the first latch (162) being movable in a first inner cavity (167) defined at least partially by the first and third coupling shells (138, 160), and the second latch (140) being movable in a second inner cavity (139) defined at least partially by the first and second coupling shells (138, 136).

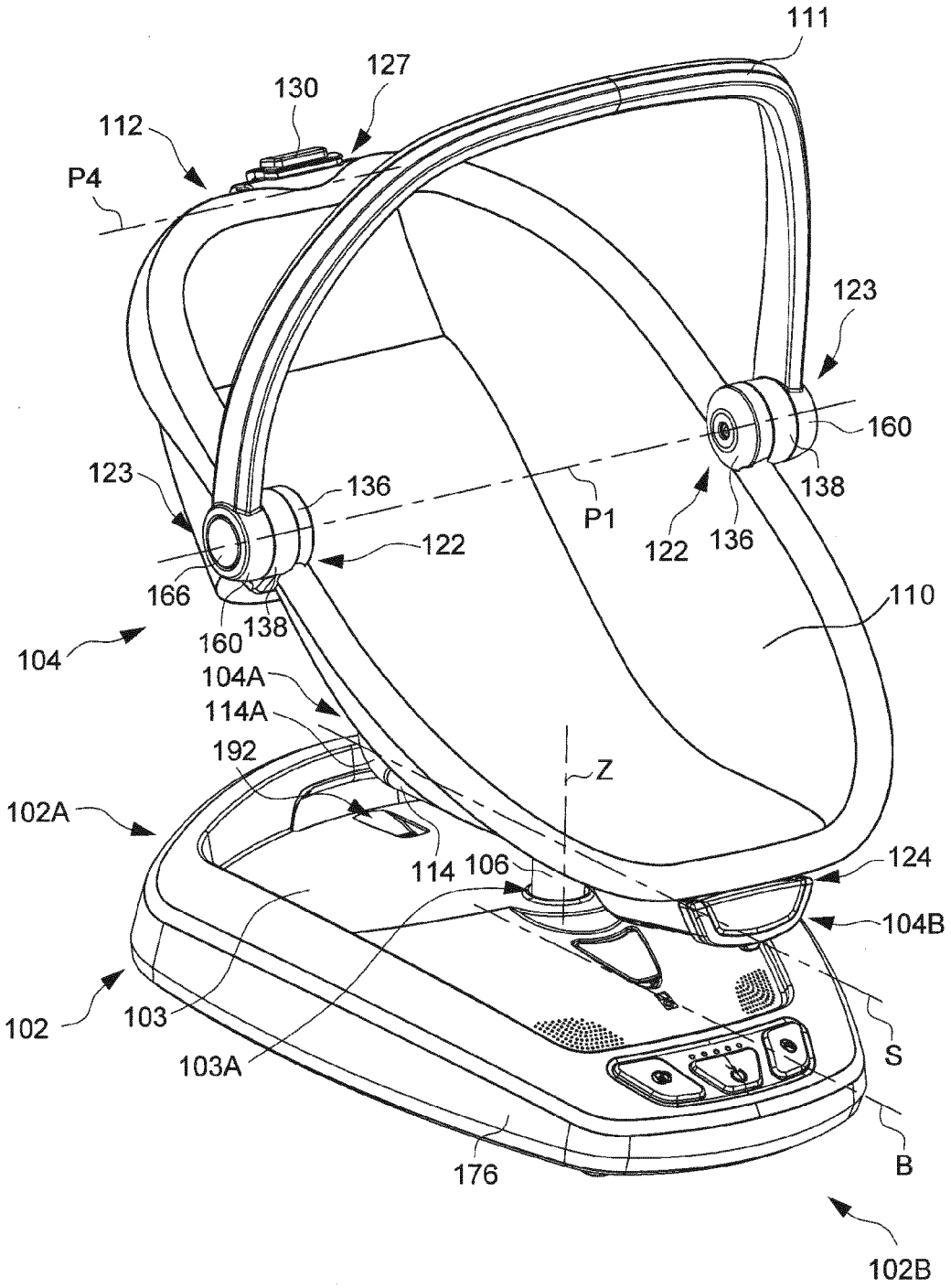
11. The child motion apparatus (100) according to claim 10, wherein the second latch (140) and the second coupling shell (136) are rotationally locked with each other, the first coupling shell (138) includes a plurality of indentations (152, 154, 156, 158) disposed around the pivot axis (P1), and the second latch (140) has a plurality of teeth (147A, 147B, 147C, 147D) disposed around the pivot axis (P1), the indentations (152, 154, 156, 158) when engaged by the teeth (147A, 147B, 147C, 147D) of the second latch (140) blocking rotation of the first surrounding frame portion (120) relative to the second surrounding frame portion (118) only in a folding direction.

12. The child motion apparatus (100) according to claim 11, wherein the first coupling shell (138) further includes an additional indentation (159), one (147C) of the teeth (147A, 147B, 147C, 147D) of the second latch (140) being engaged in the additional indentation (159) when the second surrounding frame portion (118) is located at an intermediate angular position between the unfolded and folded state, the engagement of the tooth (147C) of the second latch (140) in the additional indentation (159) blocking rotation of the second surrounding frame portion (118) relative to the first surrounding frame portion (120) only in a folding direction while allowing rotation in an unfolding direction.

13. The child motion apparatus (100) according to claim 12, wherein the intermediate angular position is spaced apart from the unfolded state by an angle between about 35 degrees and about 45 degrees.

14. The child motion apparatus (100) according to claim 12 or 13, wherein the additional indentation (159) is defined at least partially between a stop sidewall (159A) and a ramp (159B), a contact between one of the tooth (147C) of the second latch (140) and the stop sidewall (159A) blocking rotation of the second surrounding frame portion (118) in the folding direction, and the tooth (147C) being in sliding contact with the ramp (159B) while the second surrounding frame portion (118) rotates from the intermediate angular position toward the unfolded state.

15. The child motion apparatus (100) according to any preceding claim, wherein the seat (104) further includes a bottom frame segment (114) and a seatback frame segment (116), the bottom frame segment (114) having a front and a rear end (114B, 114A) and being connected with the top of the upright column (106) at a location between the front end and the rear end (114B, 114A), the seatback frame segment (116) being pivotally connected with the rear end (114A) of the bottom frame segment (114), the first surrounding frame portion (120) further being connected with the seatback frame segment (116), and the second surrounding frame portion (118) further being connected with the front end (114B) of the bottom frame segment (114).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P4
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P1
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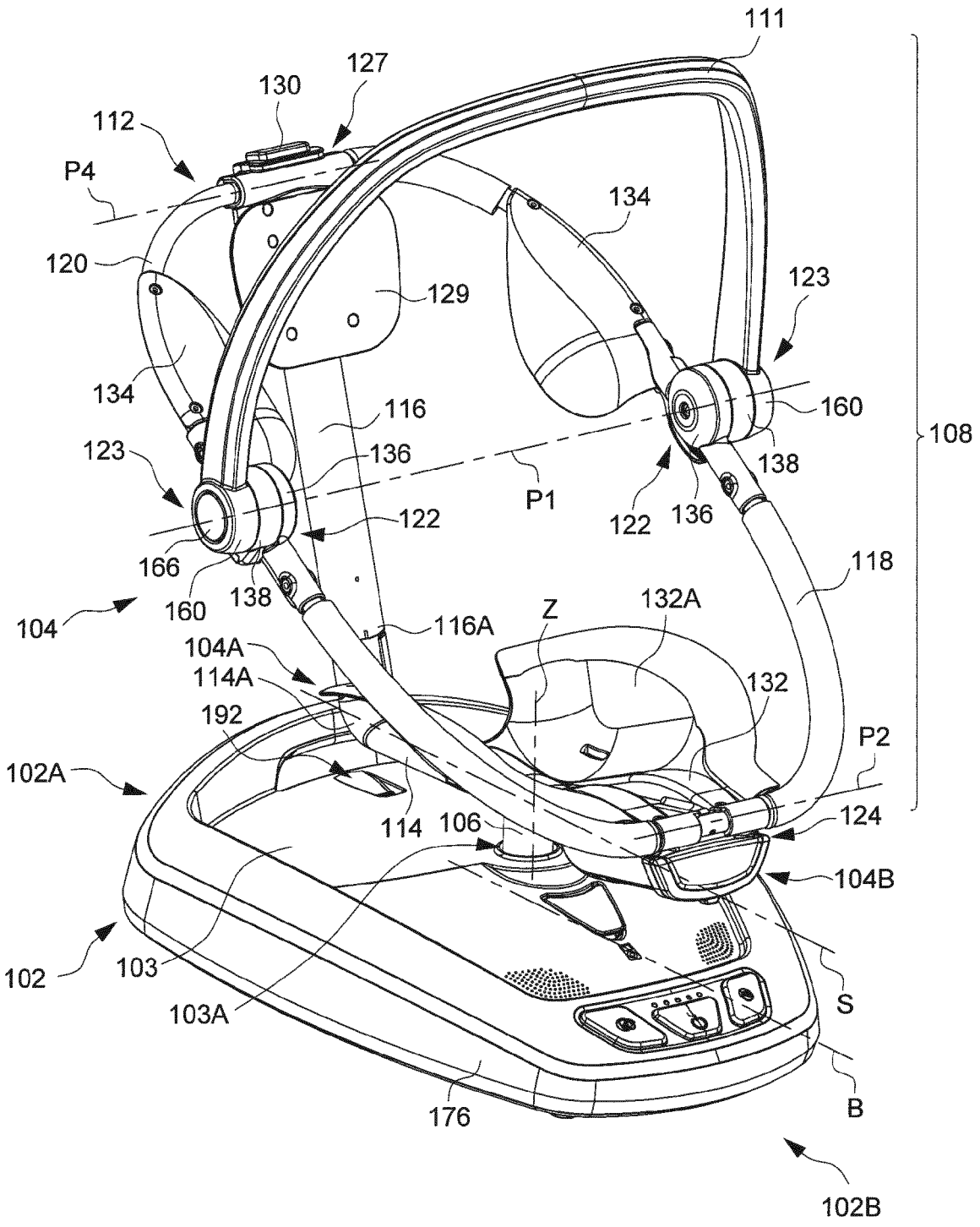
110
104
104A
114A
192
Z
102A
114
106
124
104B
102
103
103A
S
B
176
102B

FIG. 1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166
160
138
118
104
116A
Z
132A
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P2
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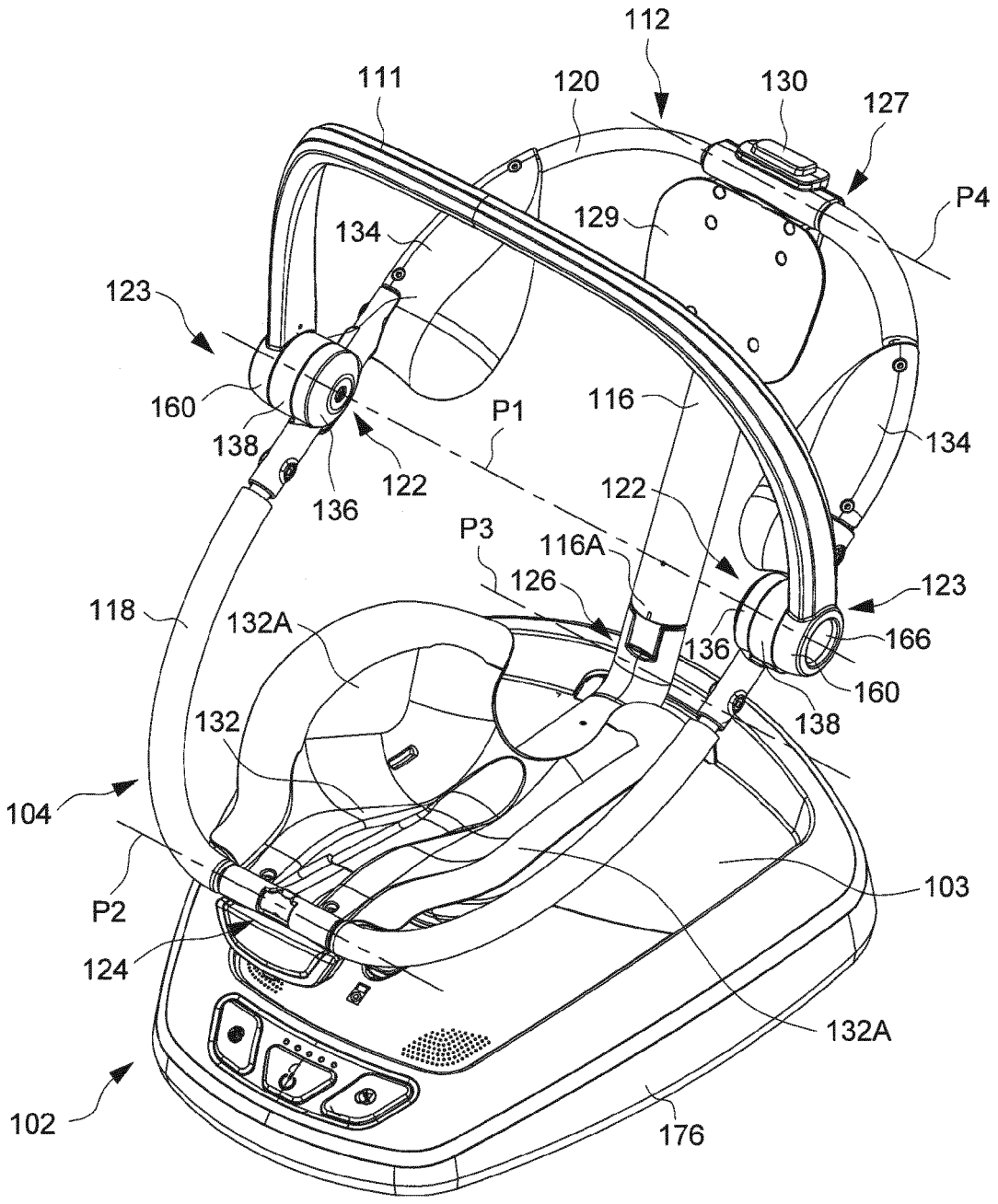
104B
102
103
103A
S
176
B
102B

FIG. 2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P3
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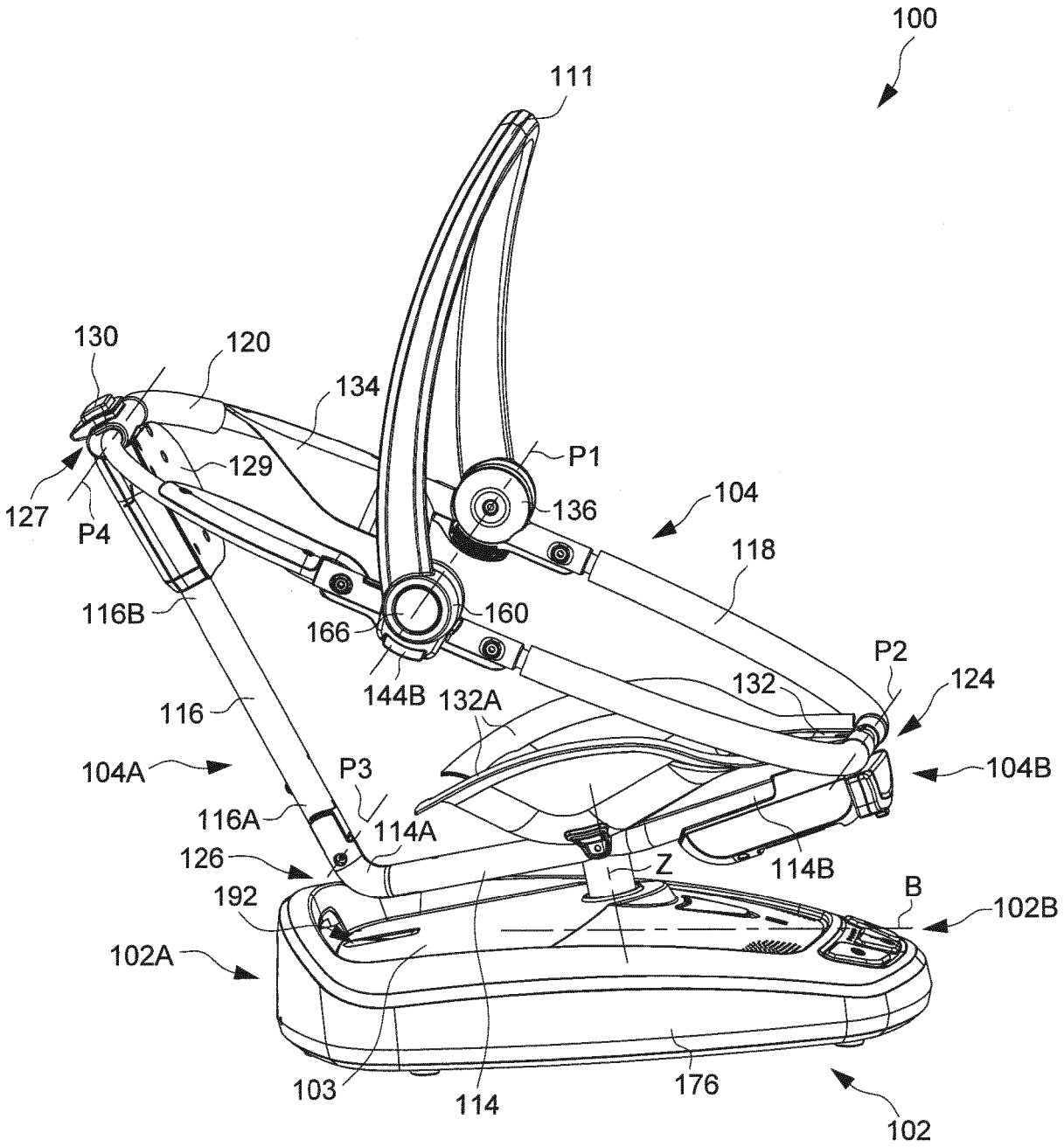
132A
136
166
160
138
132
104
P2
124
103
132A
102
176

FIG. 3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132
116
104A
P3
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116A
114A
126
Z
114B
192
B
102B
102A
103
114
176
102

FIG. 4

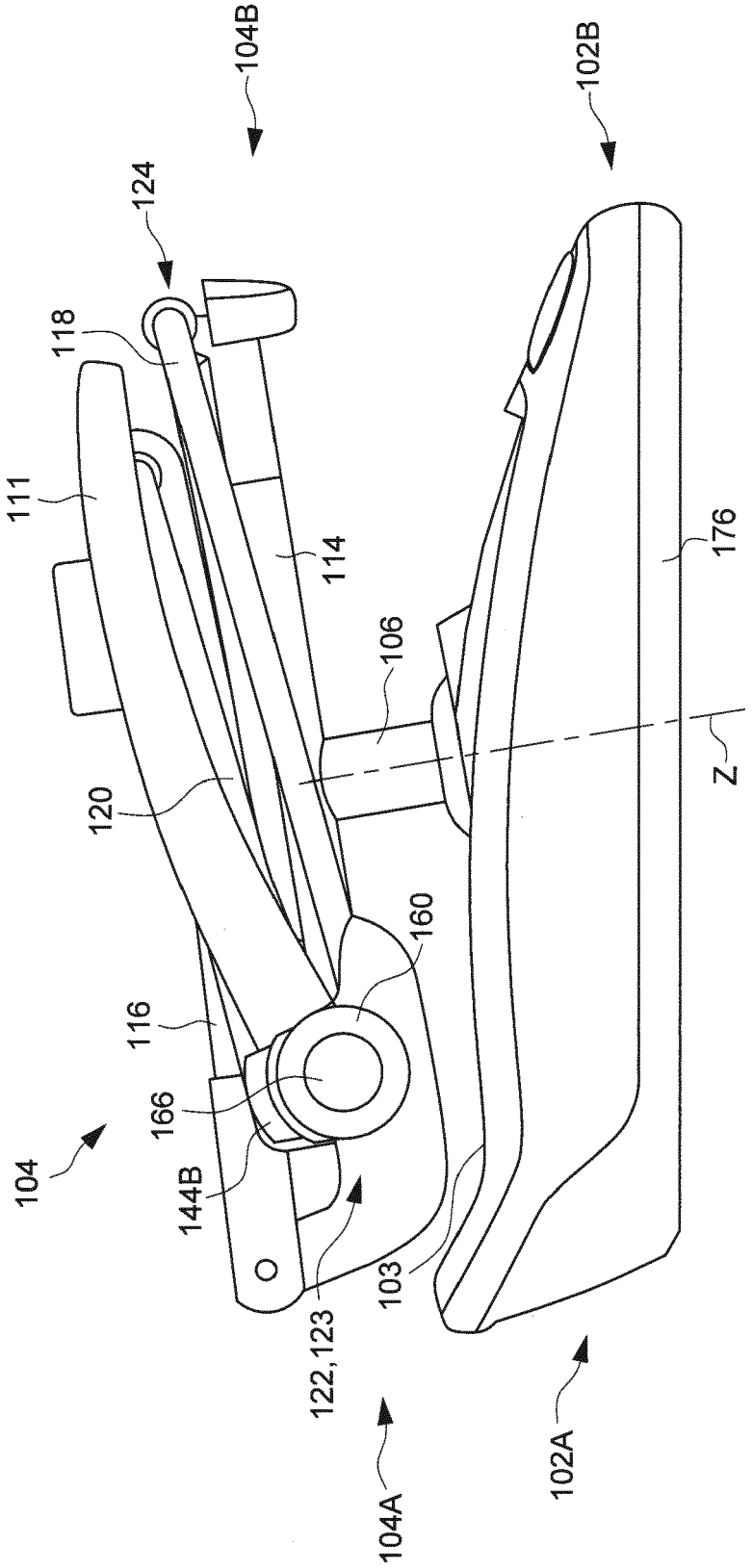
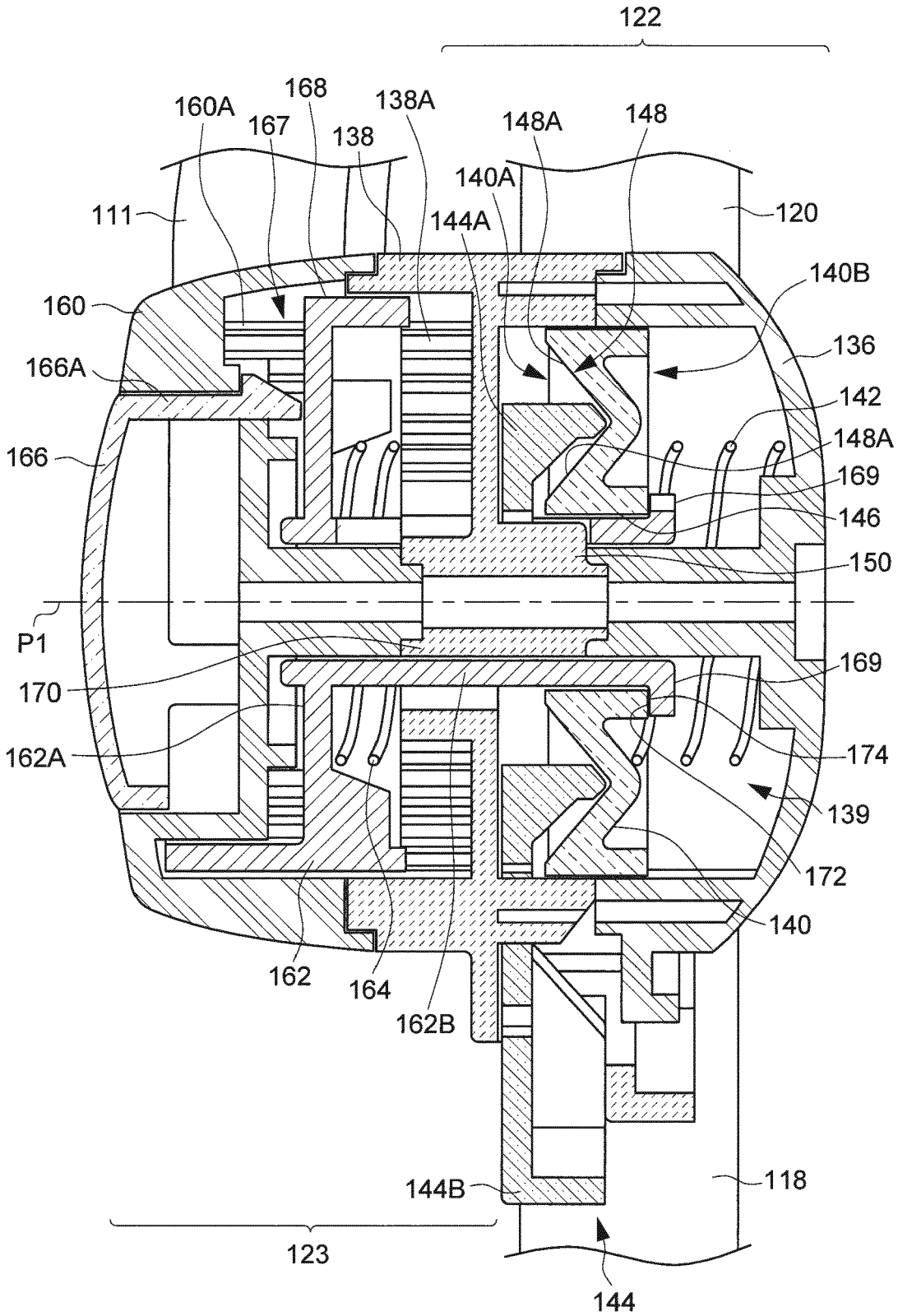

104B
102B
124
118
111
114
176
106
Z
120
160
116
166
104
144B
103
122,123
104A
102A

FIG. 5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160A
168
167
138A
138
148A
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140A
111
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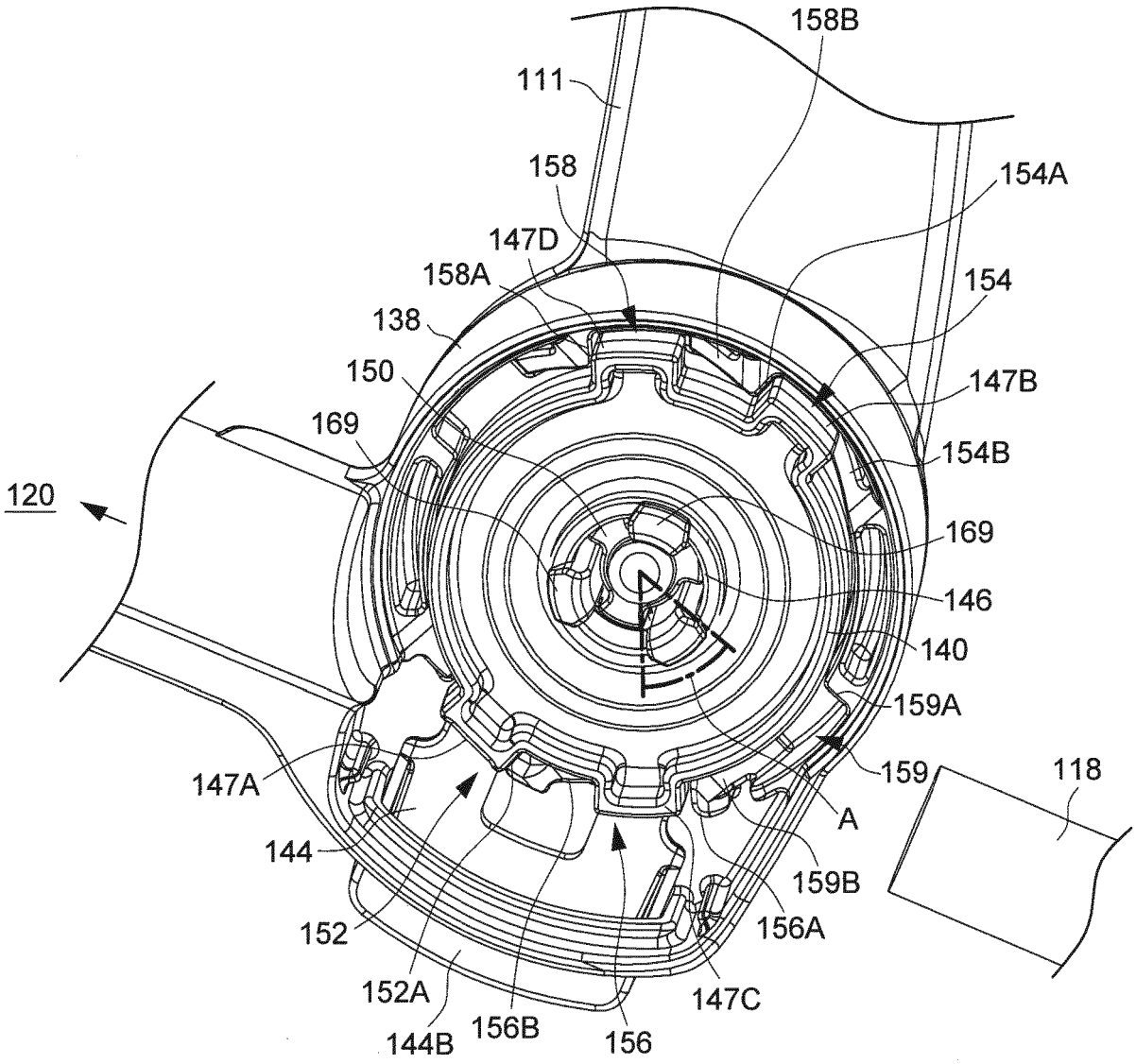
148A
166
169
146
150
P1
169
170
174
162A
139
172
140
162
164
162B
144B
118
123
144

FIG. 6


158B
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154A
147D
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147B
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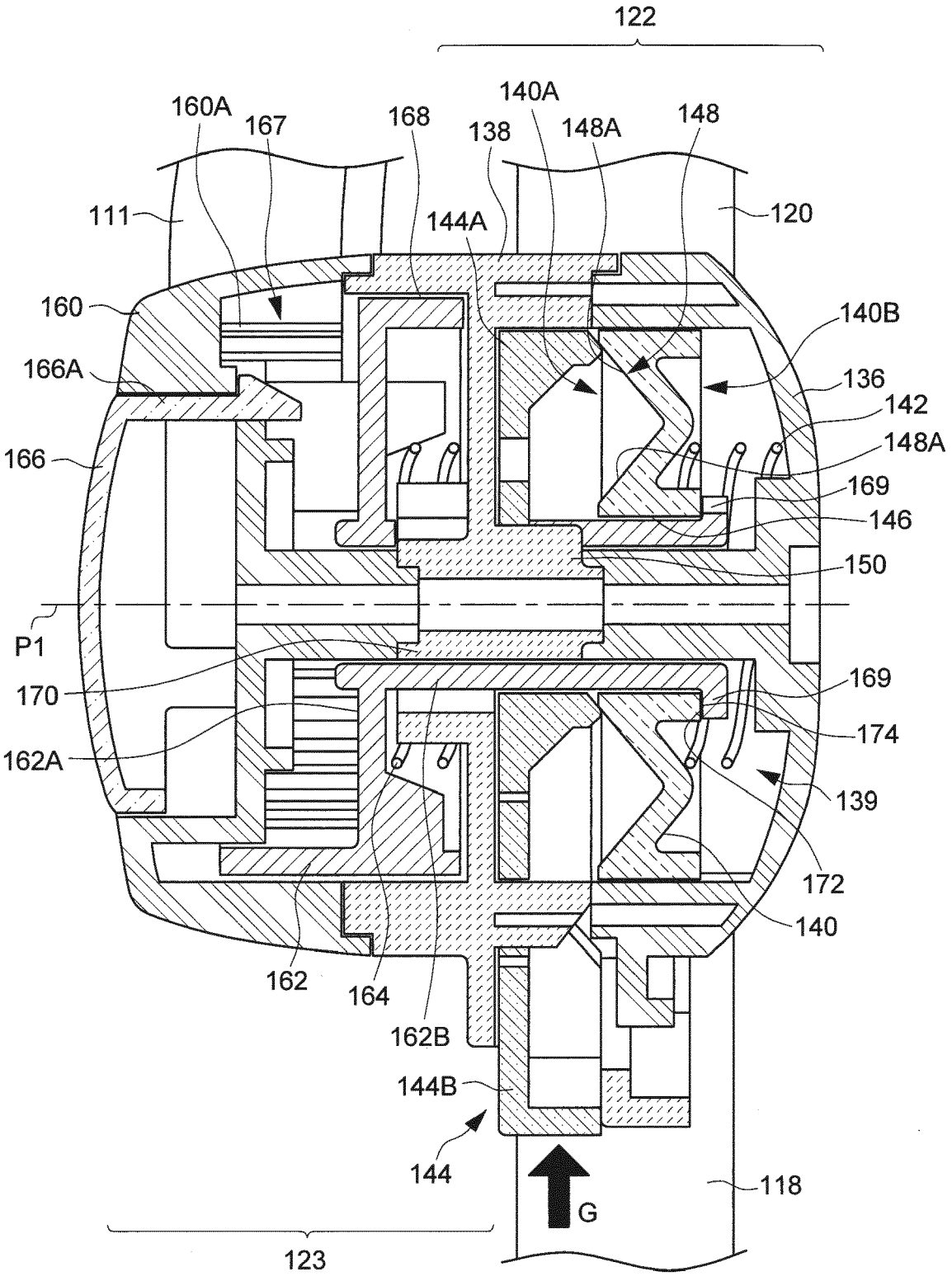
120
169
146
140
159A
147A
159
118
A
144
159B
156A
152
152A
147C
144B
156B
156

FIG. 7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P1
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162A
139
172
140
162
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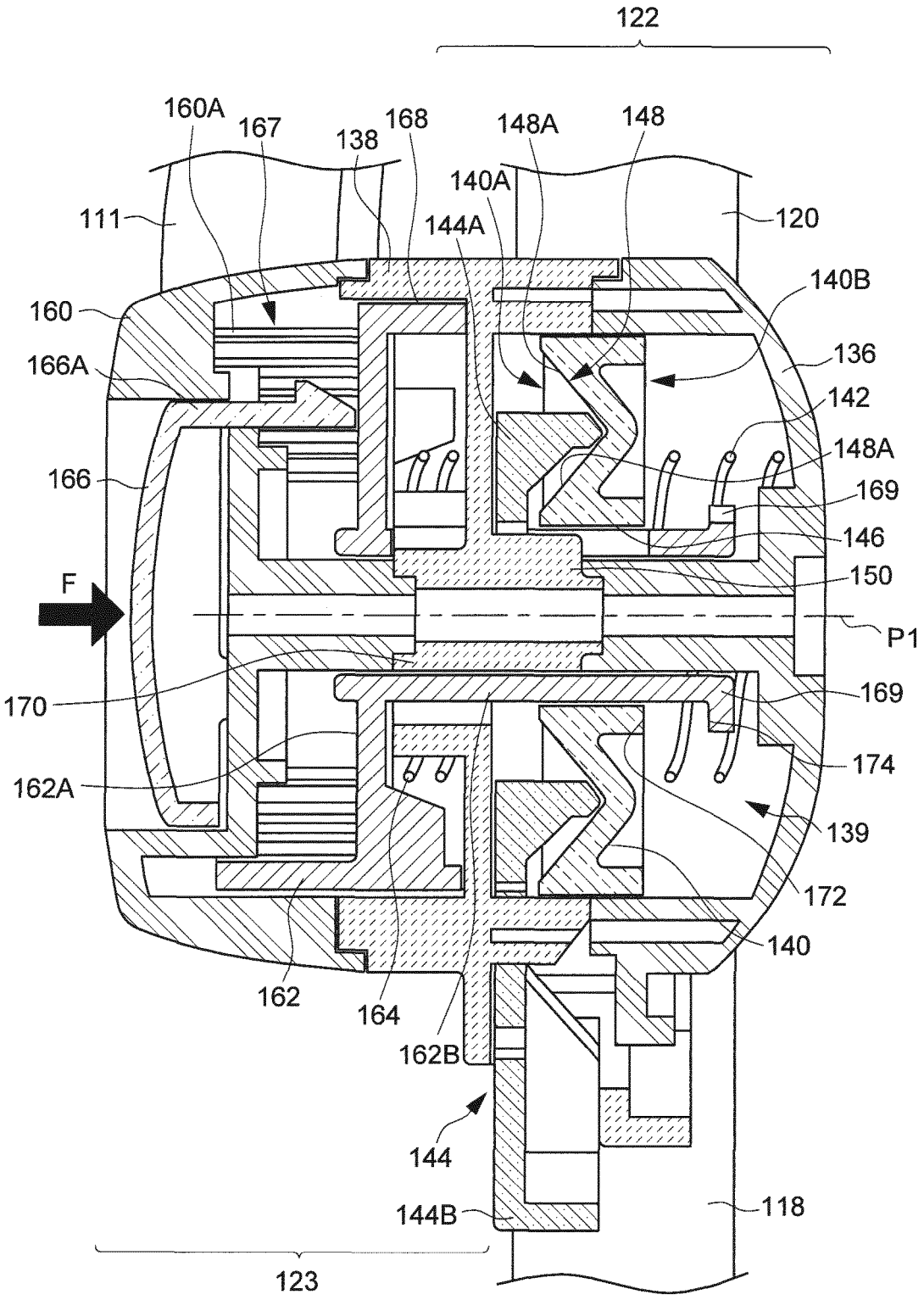
162B
144B
144
118
G
123

FIG. 8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140B
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174
162A
139
172
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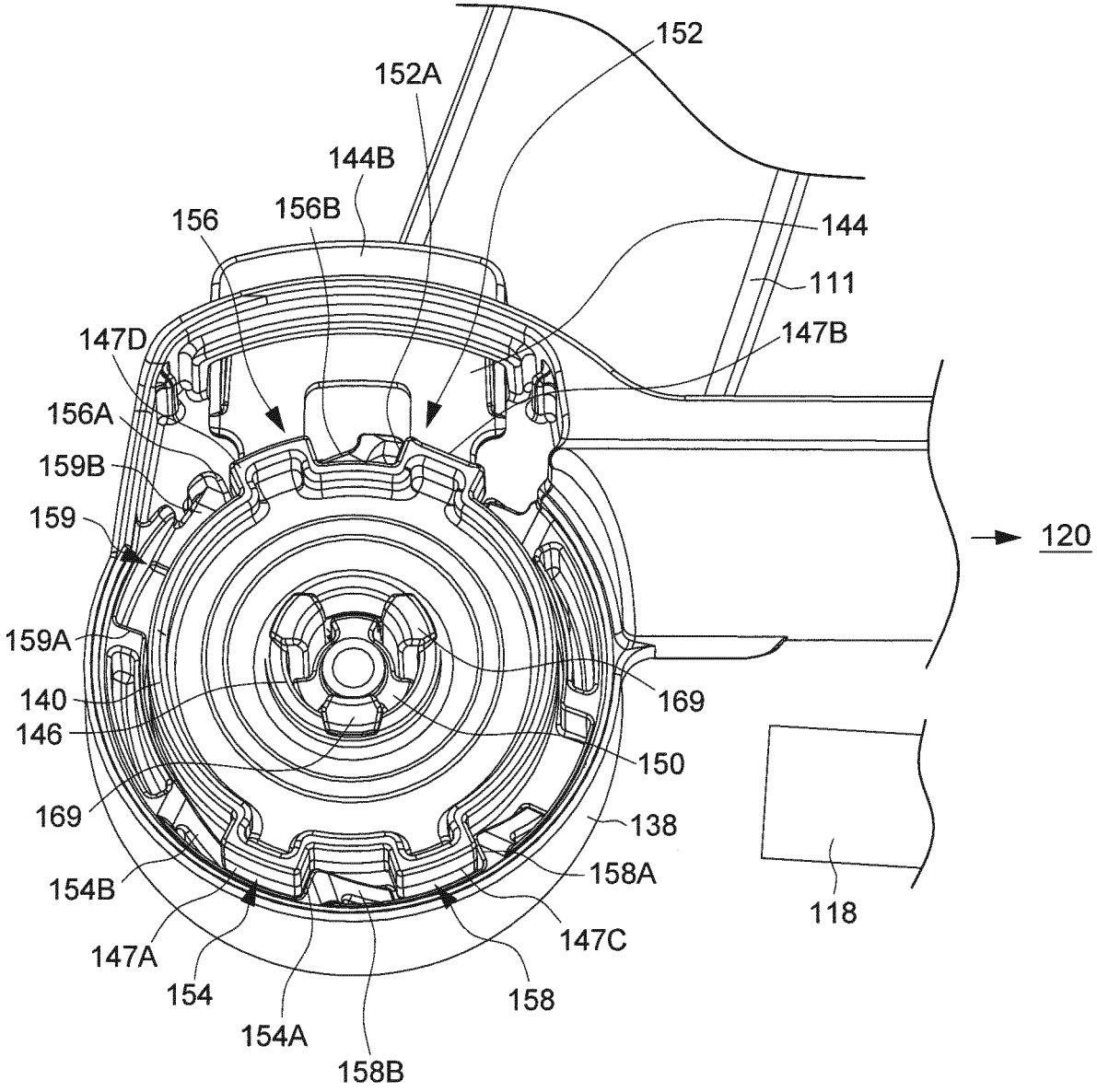
164
162B
144
144B
118
123

FIG. 9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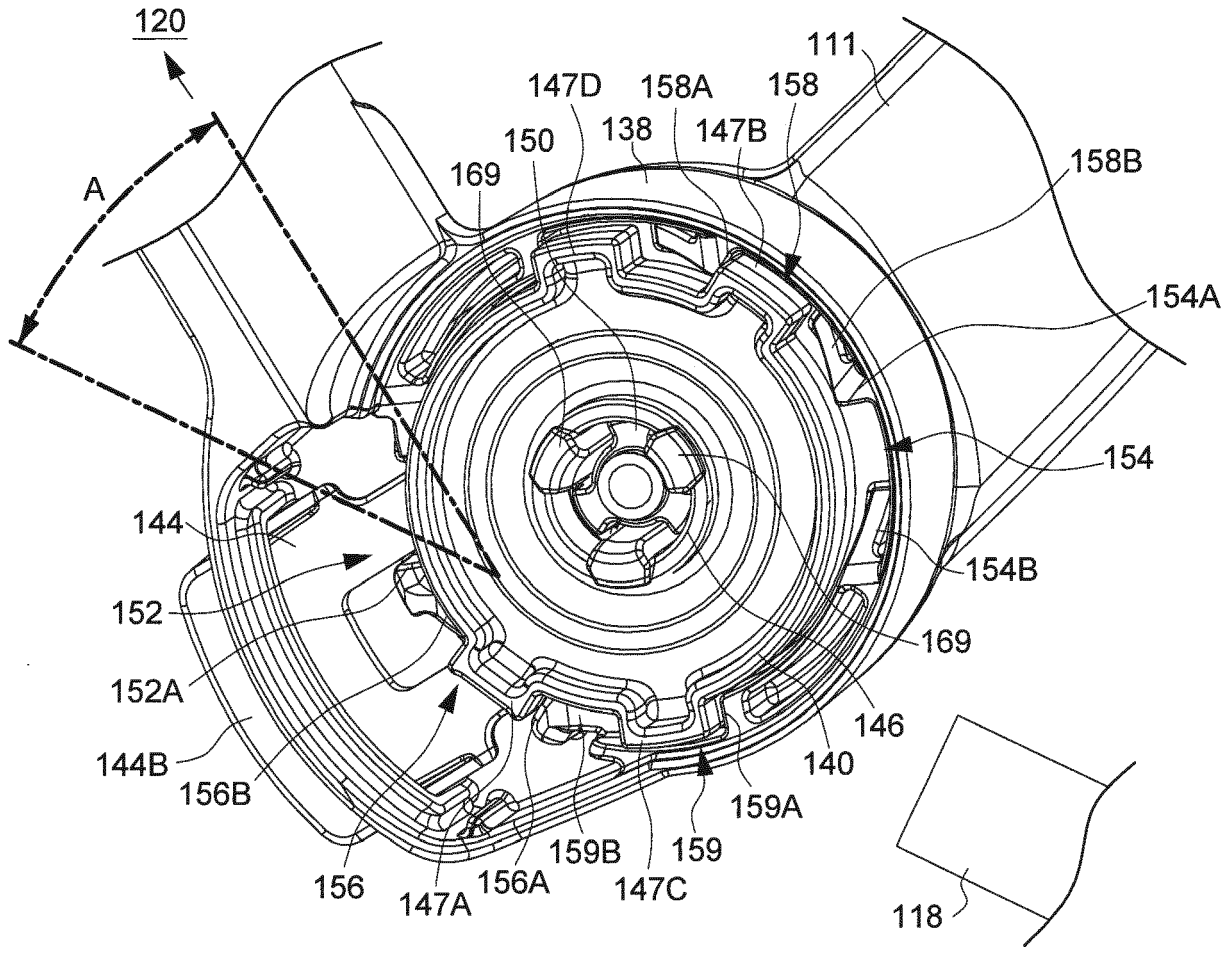
154B
147A
147C
154
158
154A
158B
118

FIG. 10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159A
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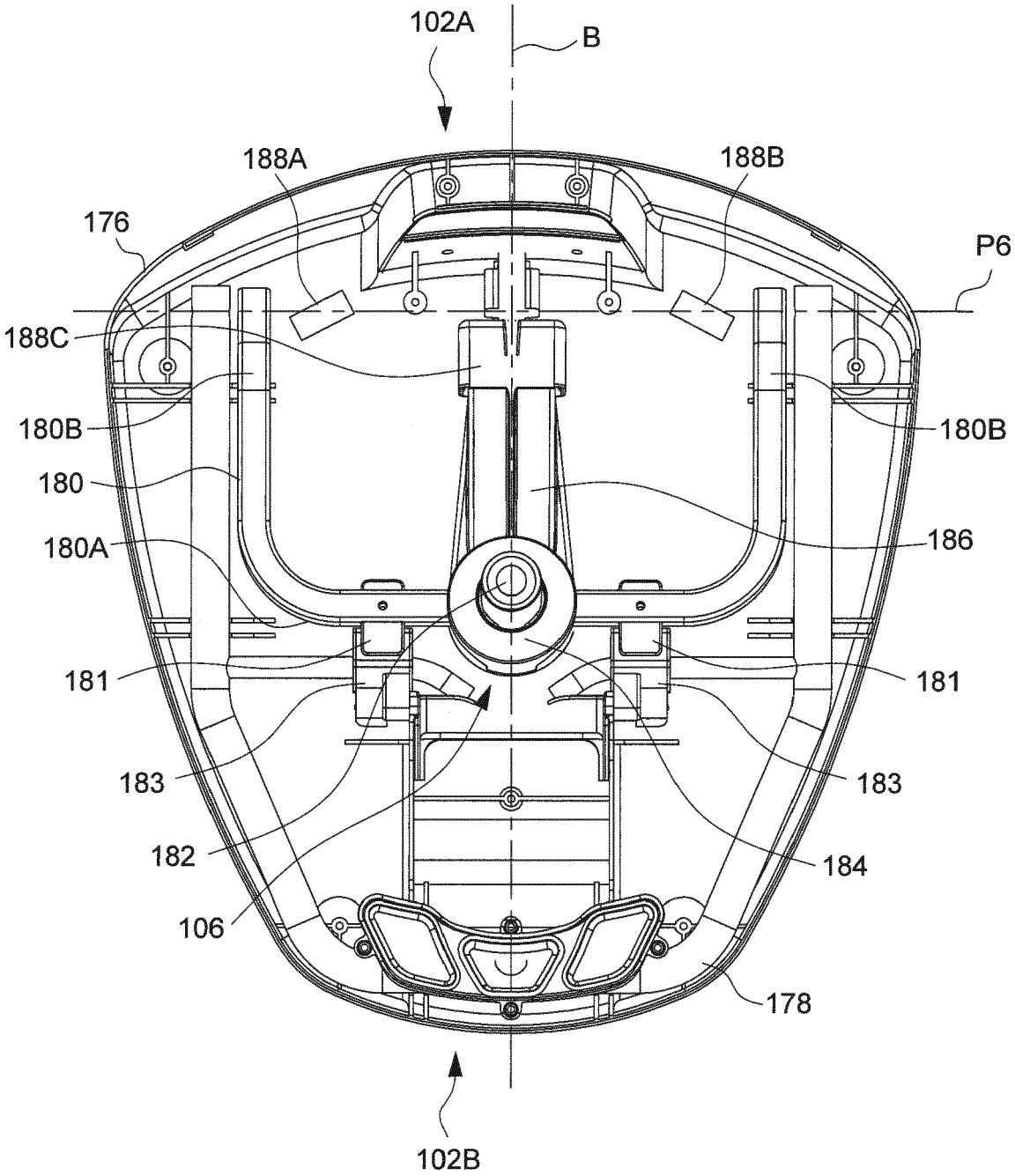
156
147A
156A
147C
118

FIG. 11


102A
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188A
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106
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102B

FIG. 12

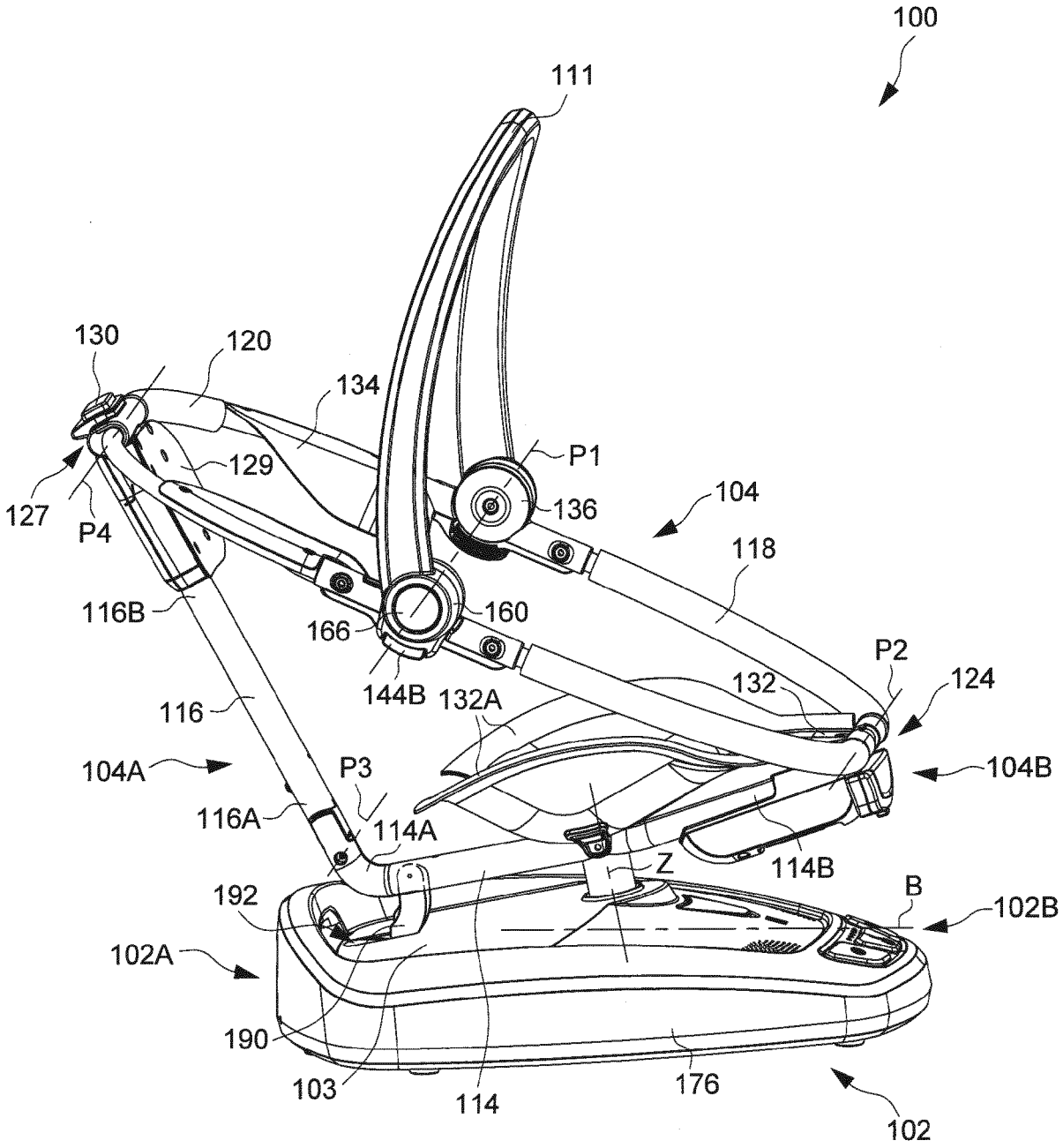
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FIG. 13

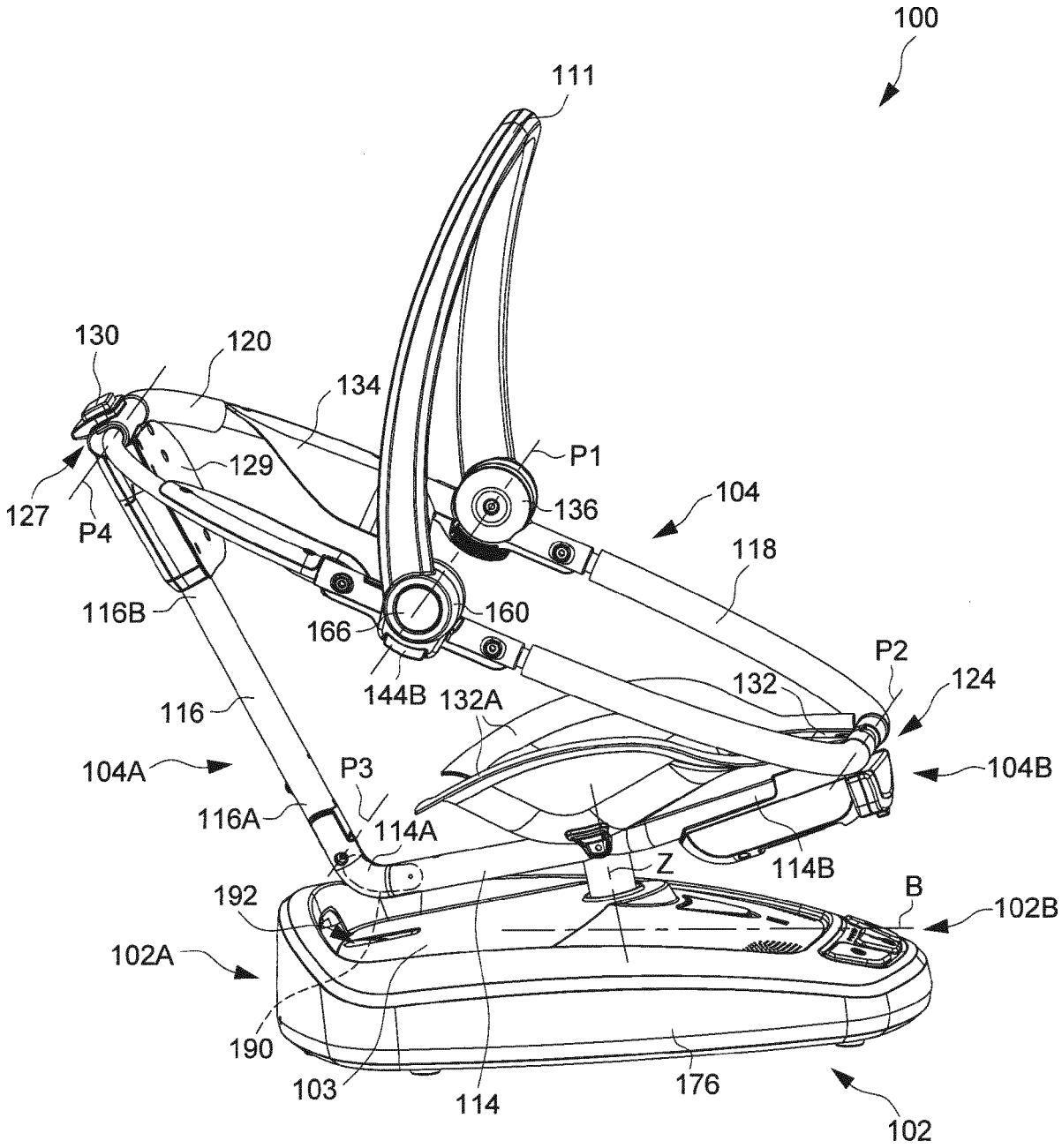
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FIG. 14

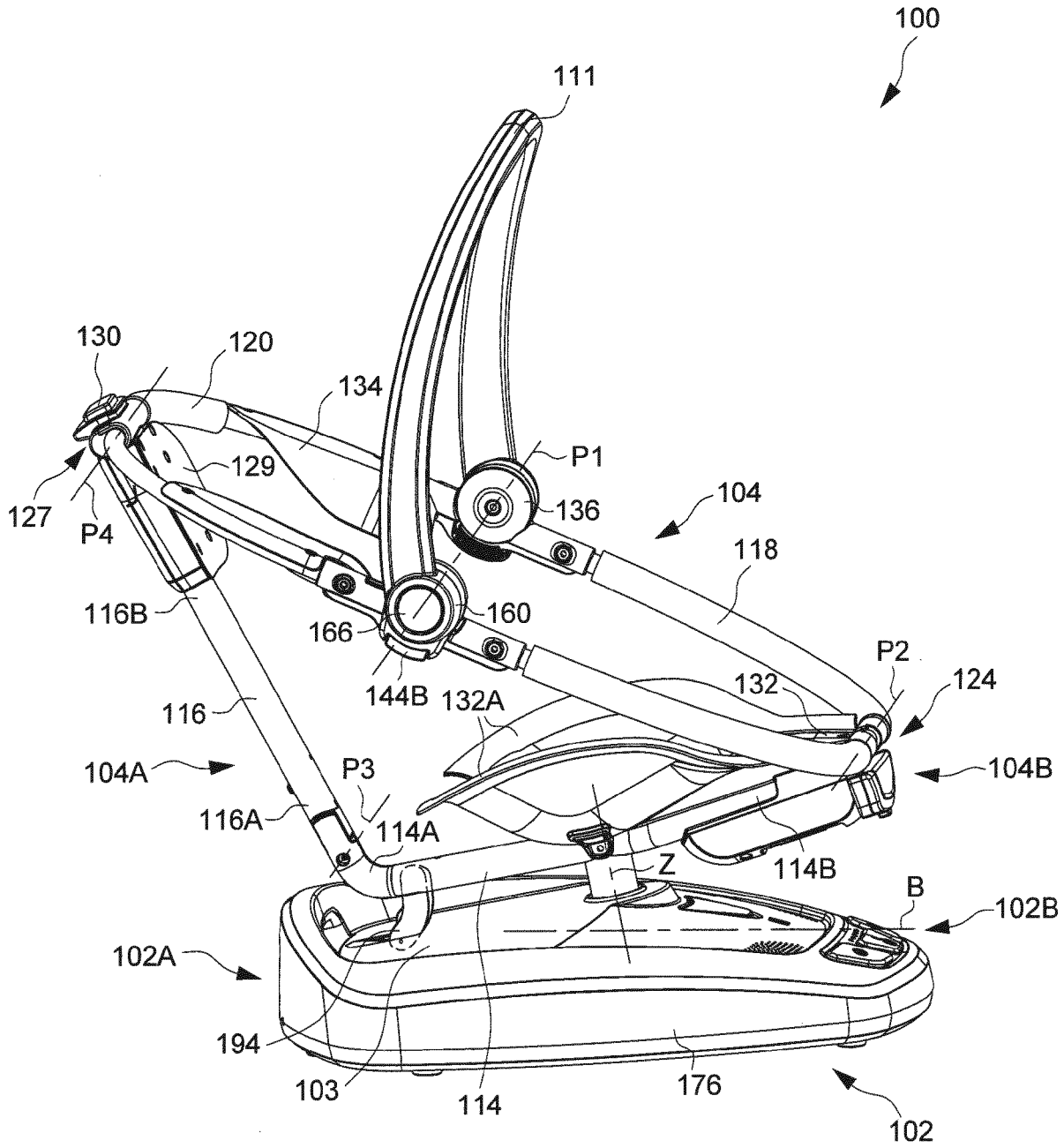
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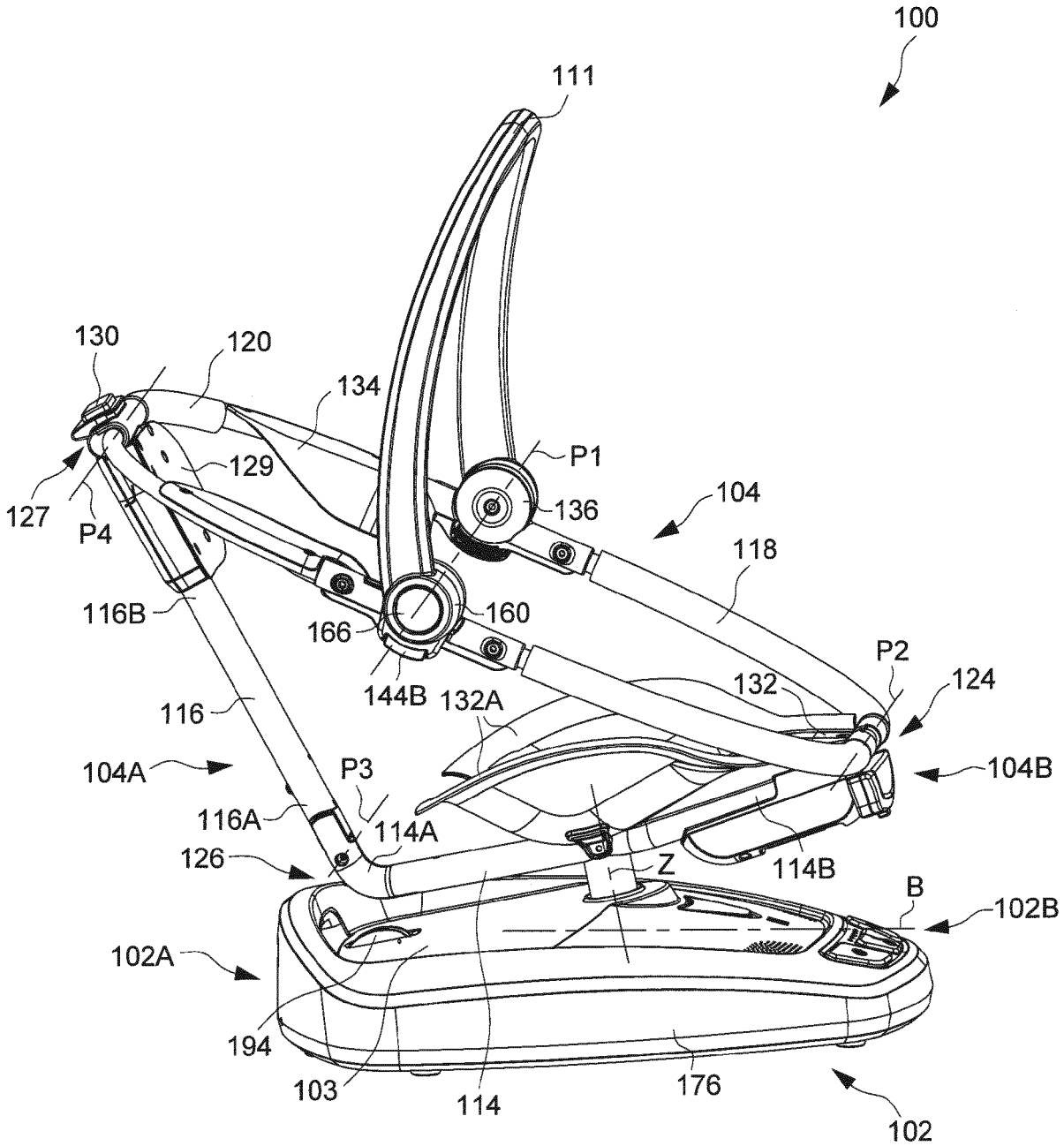
FIG. 15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176
102

FIG. 16

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EUROPEAN SEARCH REPORT

Application Number
EP 15 20 2078

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	CN 201 624 388 U (GOODBABY CHILD PRODUCTS CO LTD) 10 November 2010 (2010-11-10) * paragraph [0023] - paragraph [0030]; figures 1-6 *	1	INV. A47D9/02 A47D13/10
A	CN 202 515 140 U (GOODBABY CHILD PRODUCTS CO LTD) 7 November 2012 (2012-11-07) * paragraph [0022] - paragraph [0023]; figures 1,2 *	1	

TECHNICAL FIELDS SEARCHED (IPC)

A47D
B60N
A63G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	29 April 2016	Kus, Slawomir

CATEGORY OF CITED DOCUMENTS

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L : document cited for other reasons

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29-04-2016

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
CN 201624388 U	10-11-2010	NONE	
CN 202515140 U	07-11-2012	NONE	

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REFERENCES CITED IN THE DESCRIPTION

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