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(54) **GLIDER MECHANISM AND CHAIR WITH INDEPENDENT TILT**

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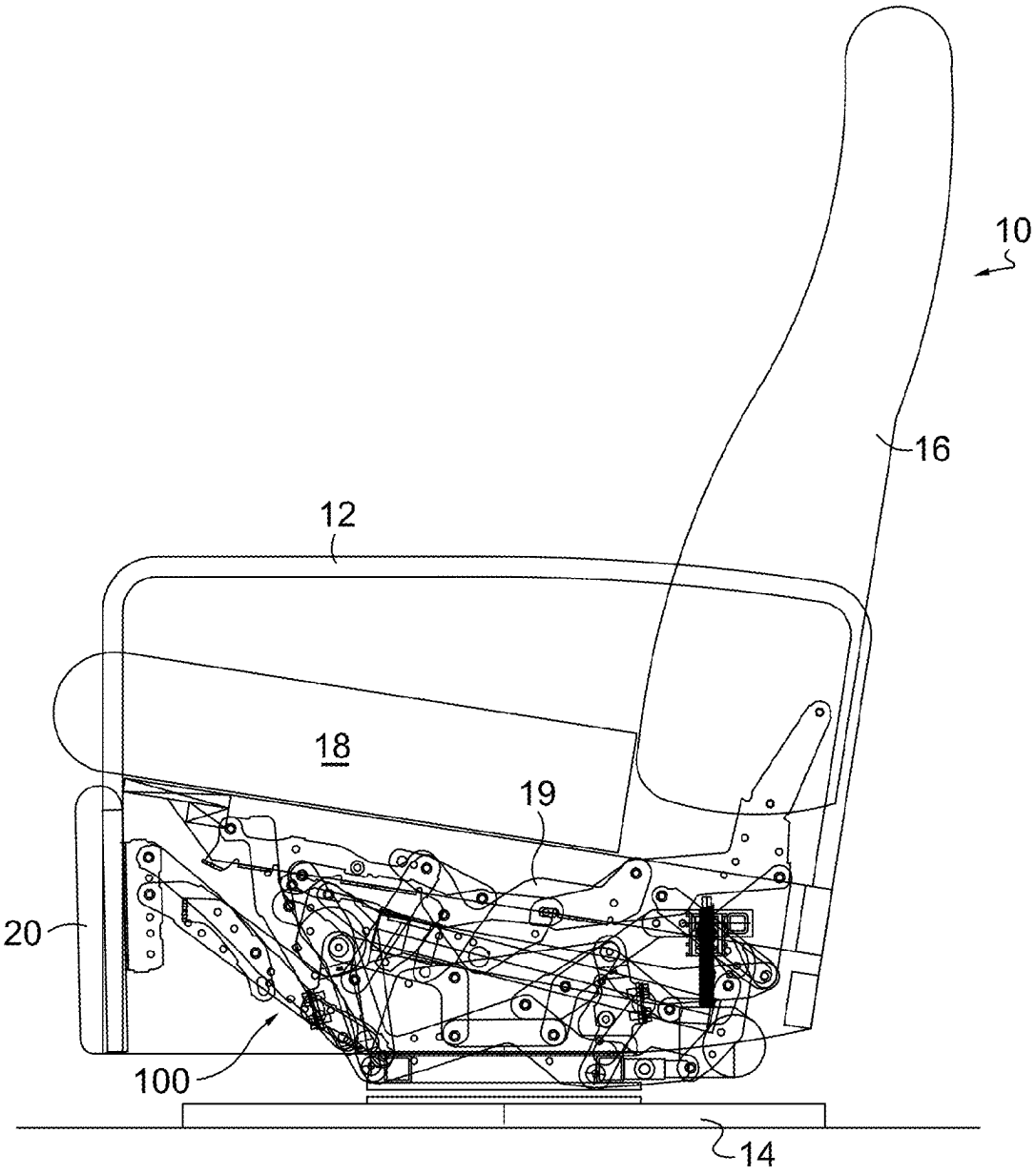
(52) **U.S. Cl.**
CPC ***A47C 3/0255*** (2013.01); ***A47C 1/024*** (2013.01)

(57) **ABSTRACT**

A recliner seating unit is provided that allows a gliding motion and that allows the angle of the seat to be independently adjustable through a powered glide and tilt assembly.



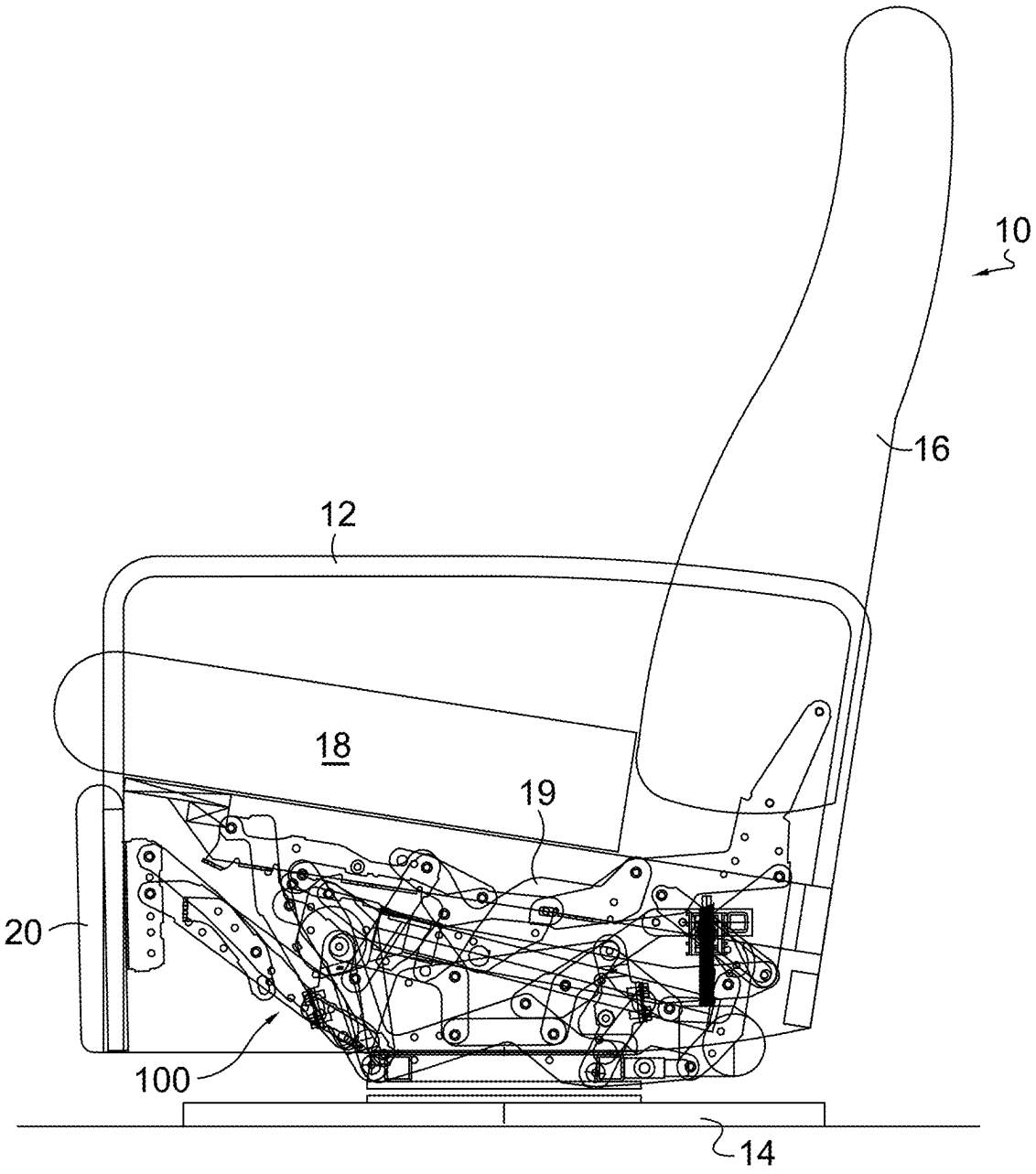


FIG. 1

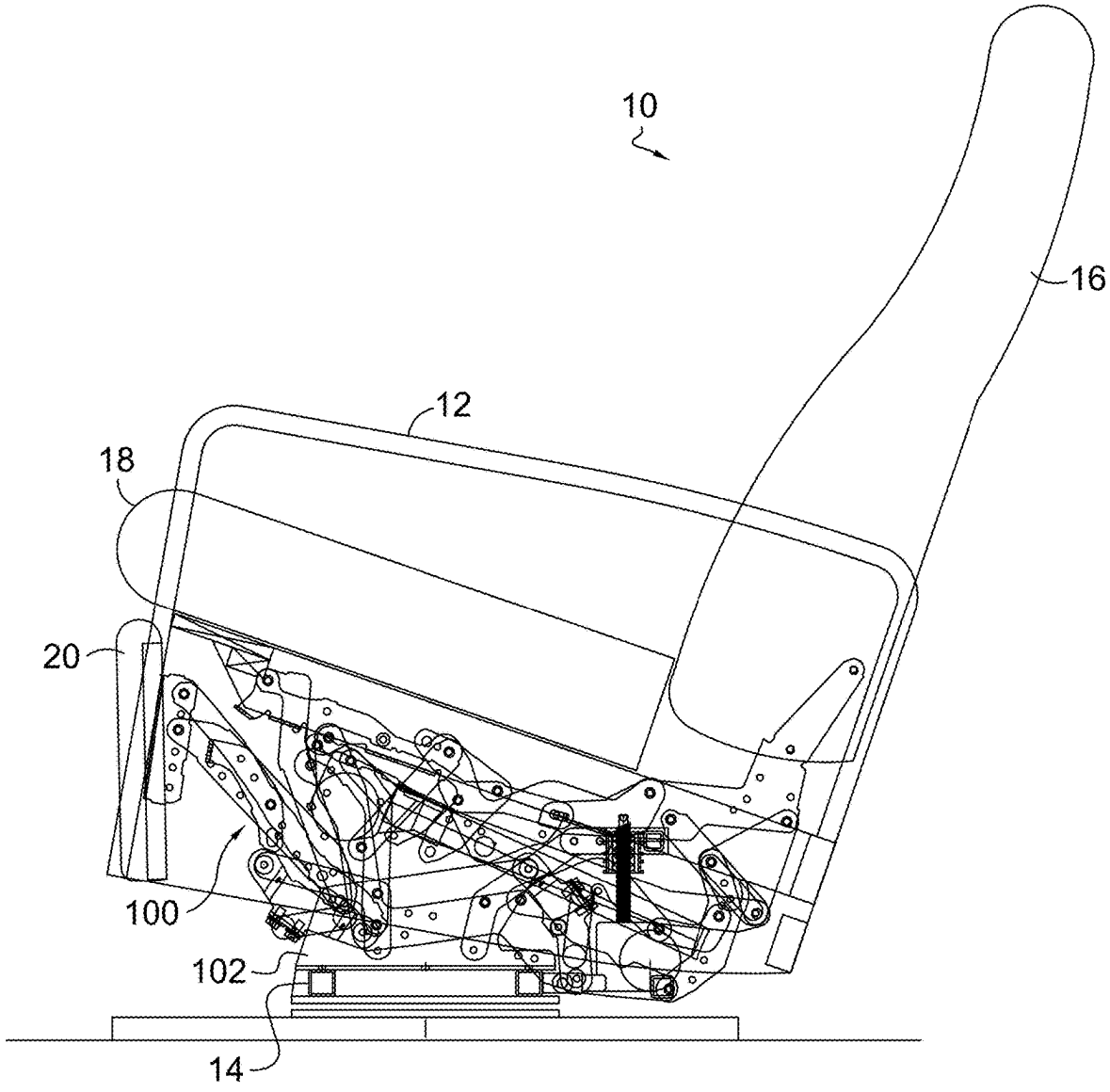


FIG. 2

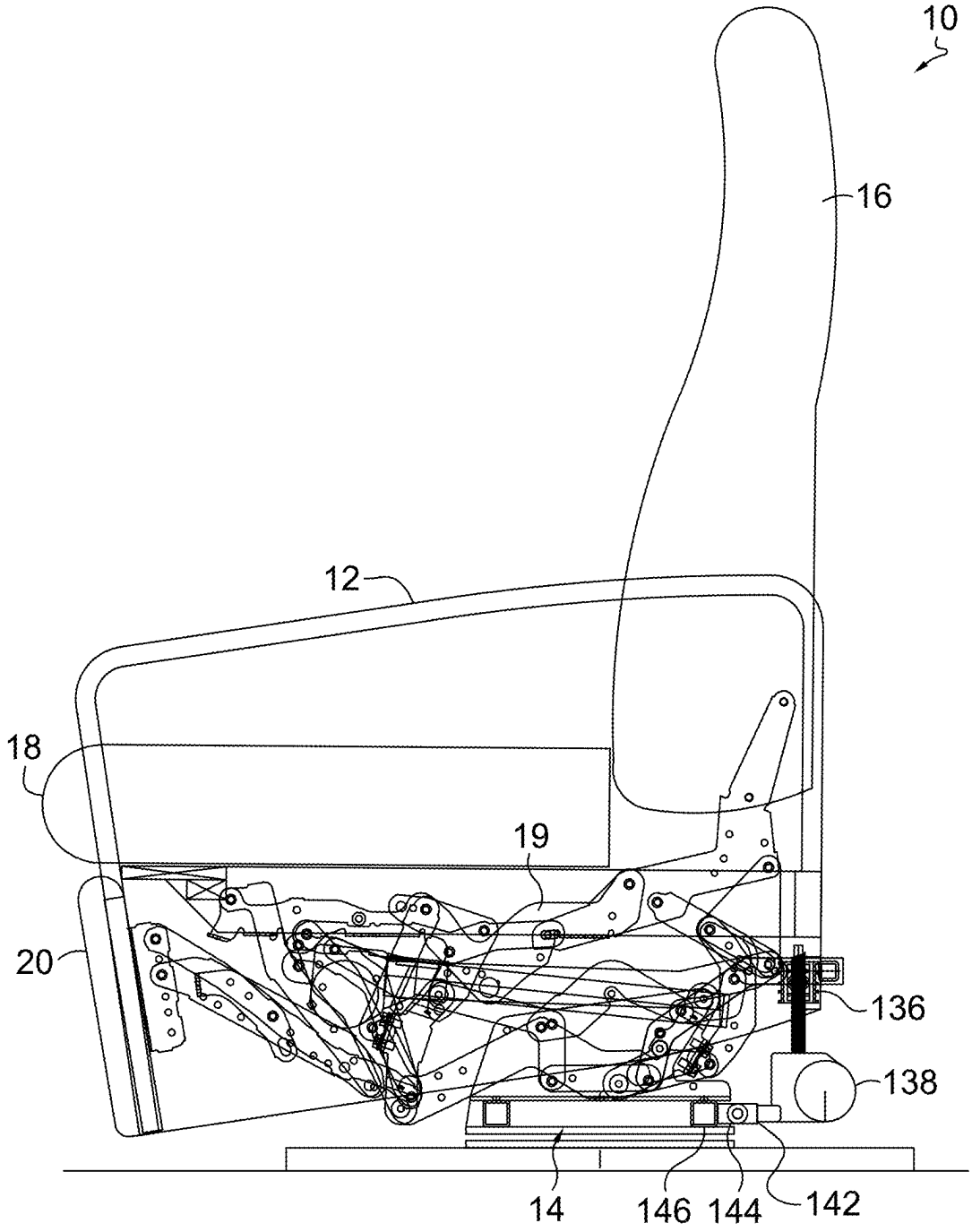


FIG. 3

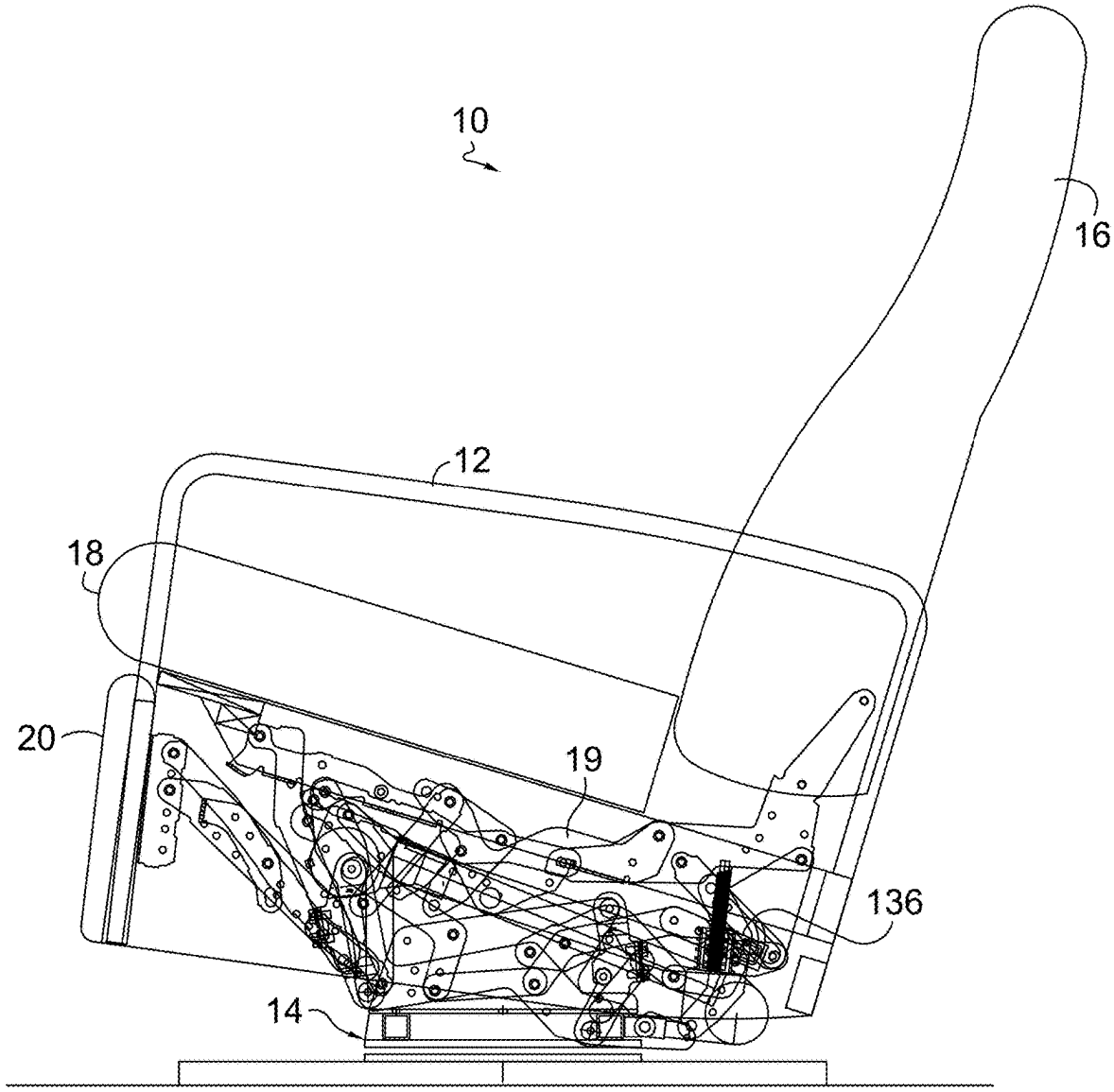


FIG. 4

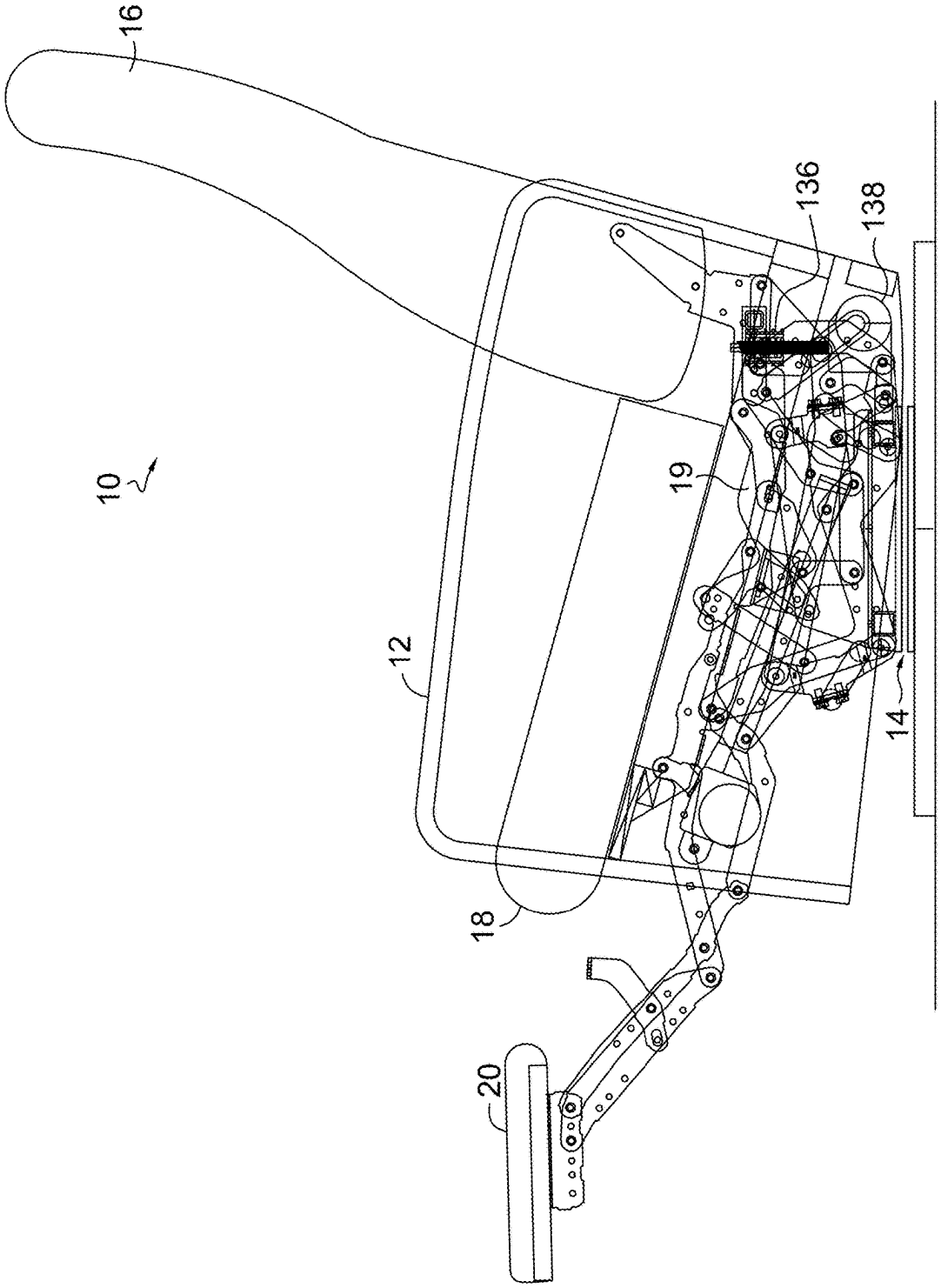
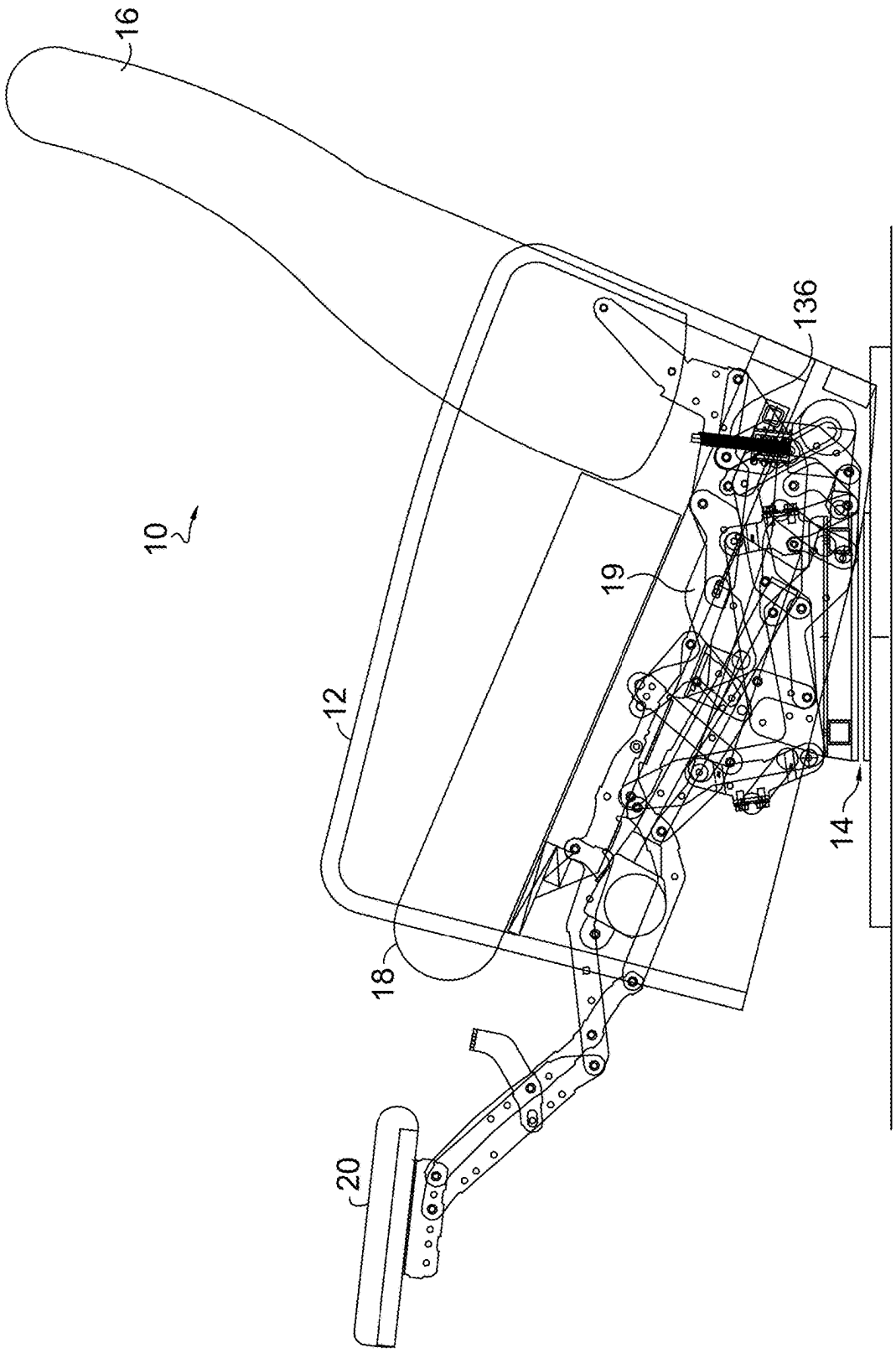


FIG. 5



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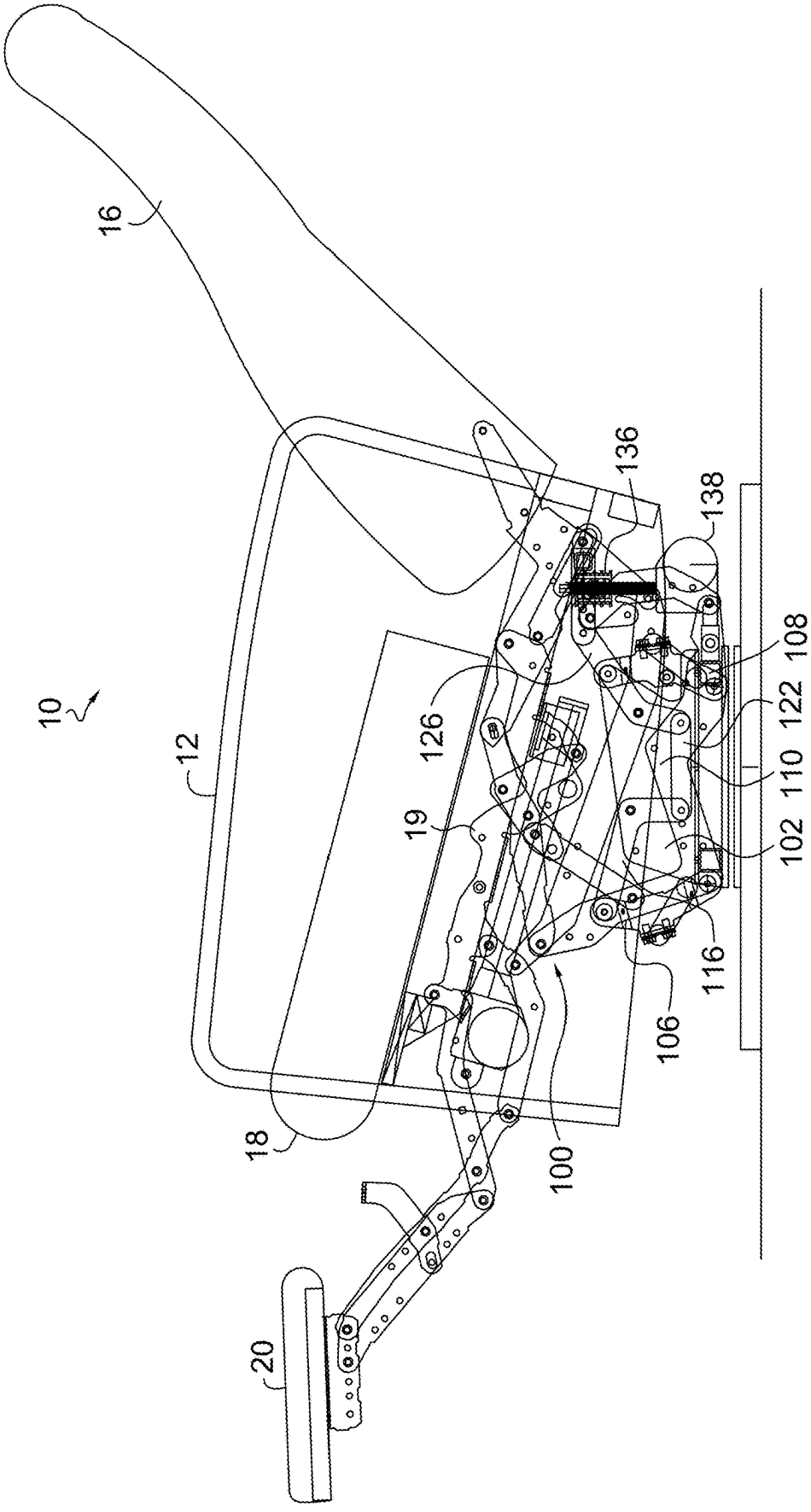

FIG. 7

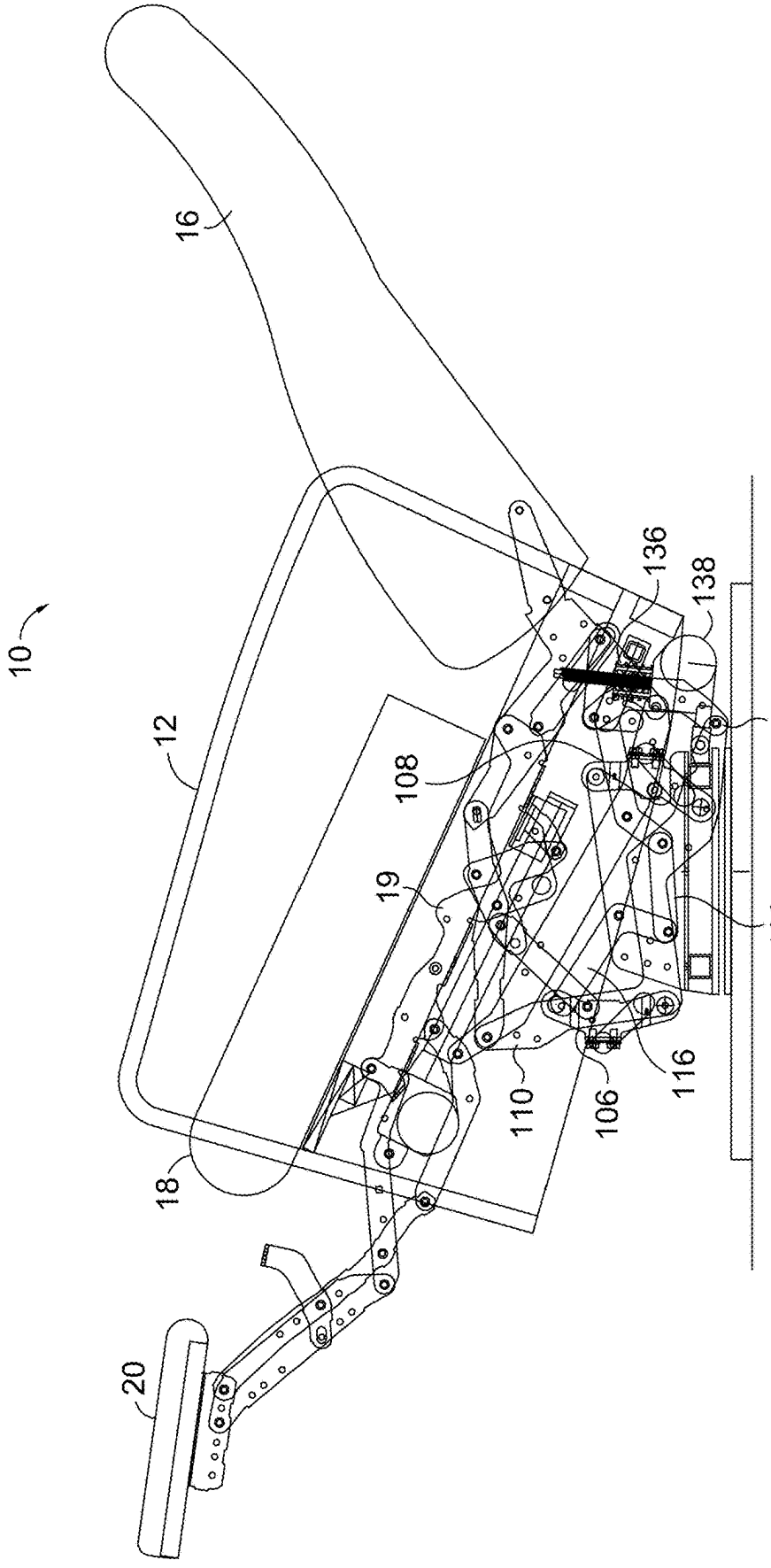

FIG. 8

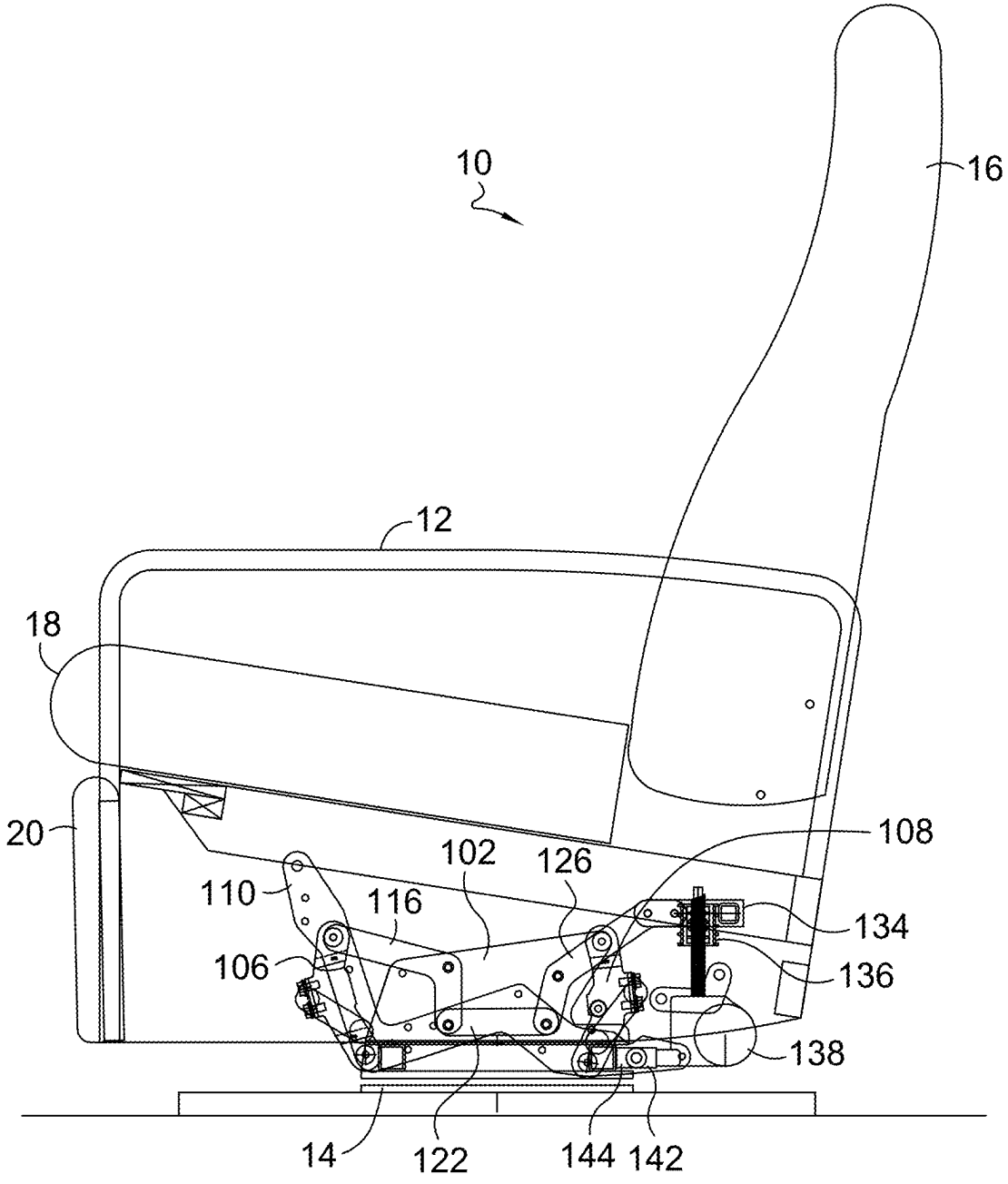

FIG. 9

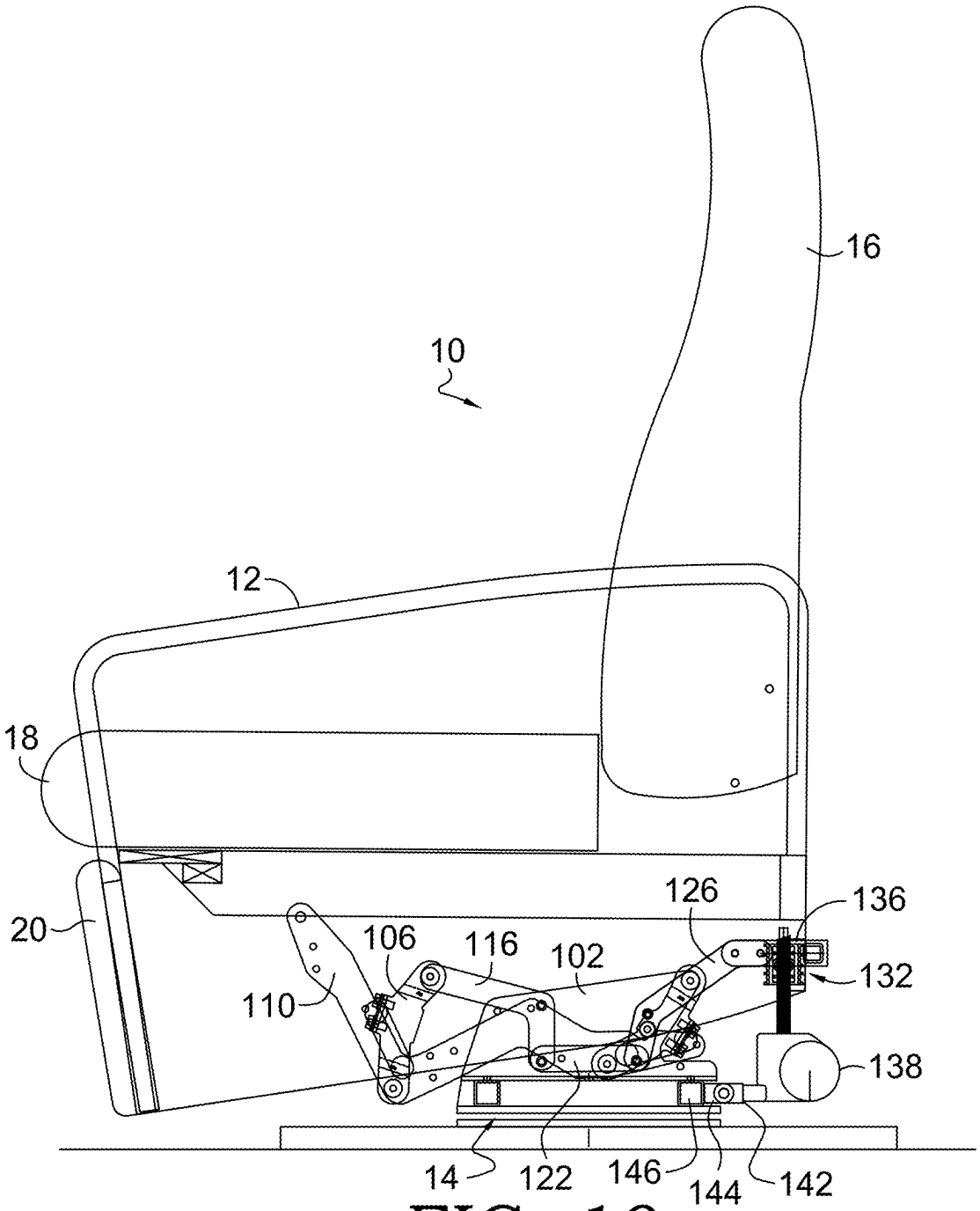

FIG. 10

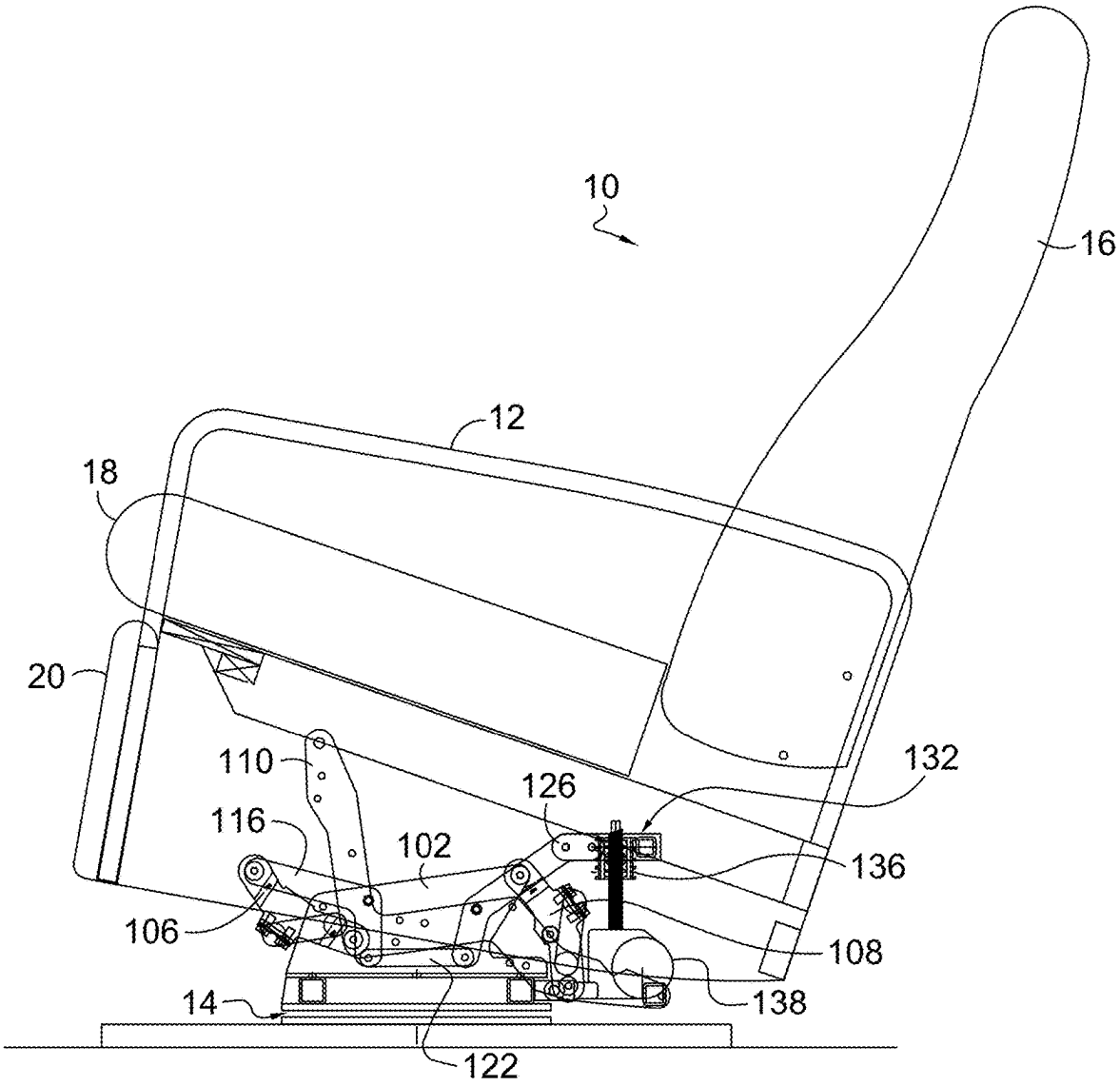

FIG. 11

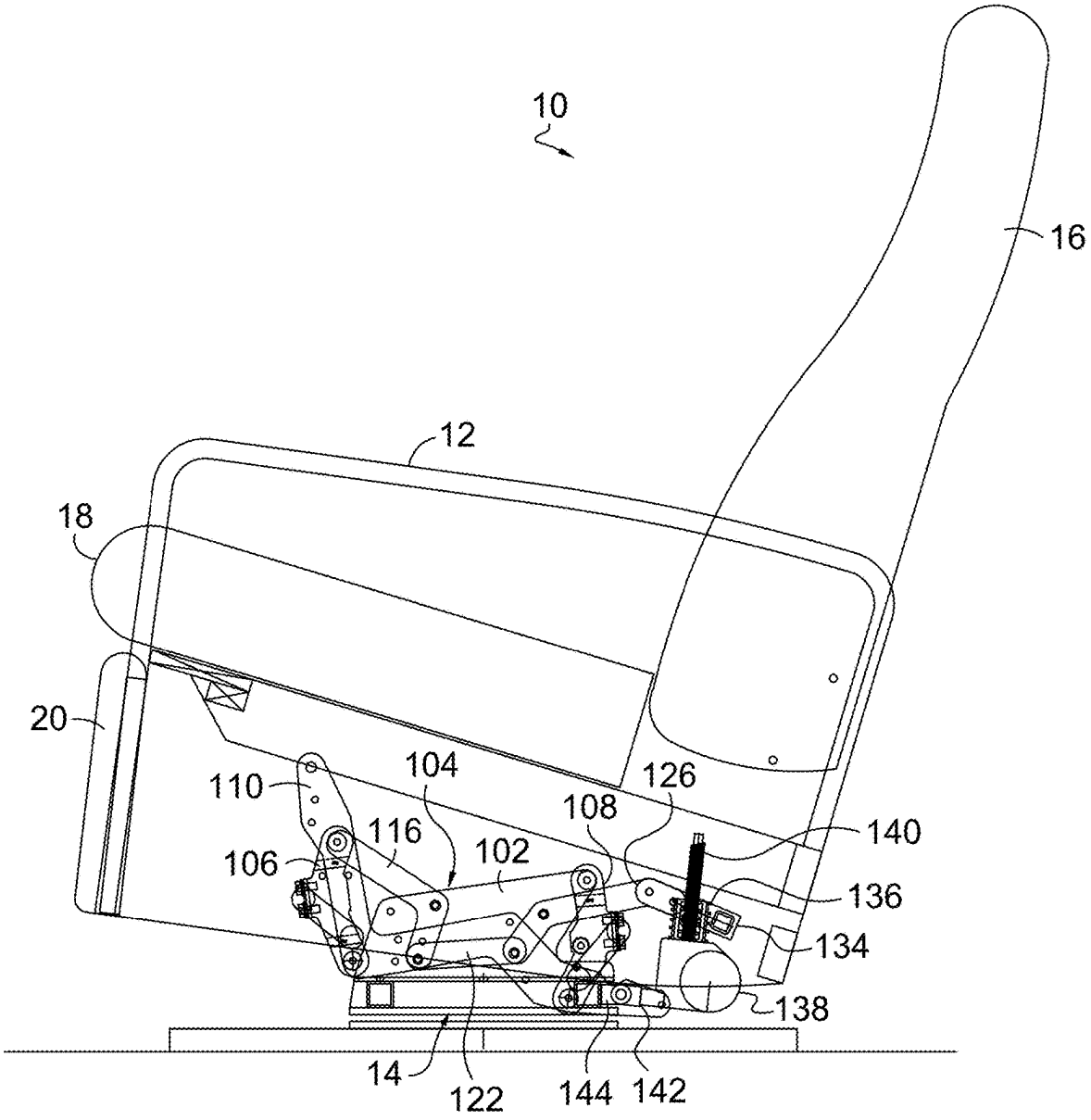
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FIG. 12

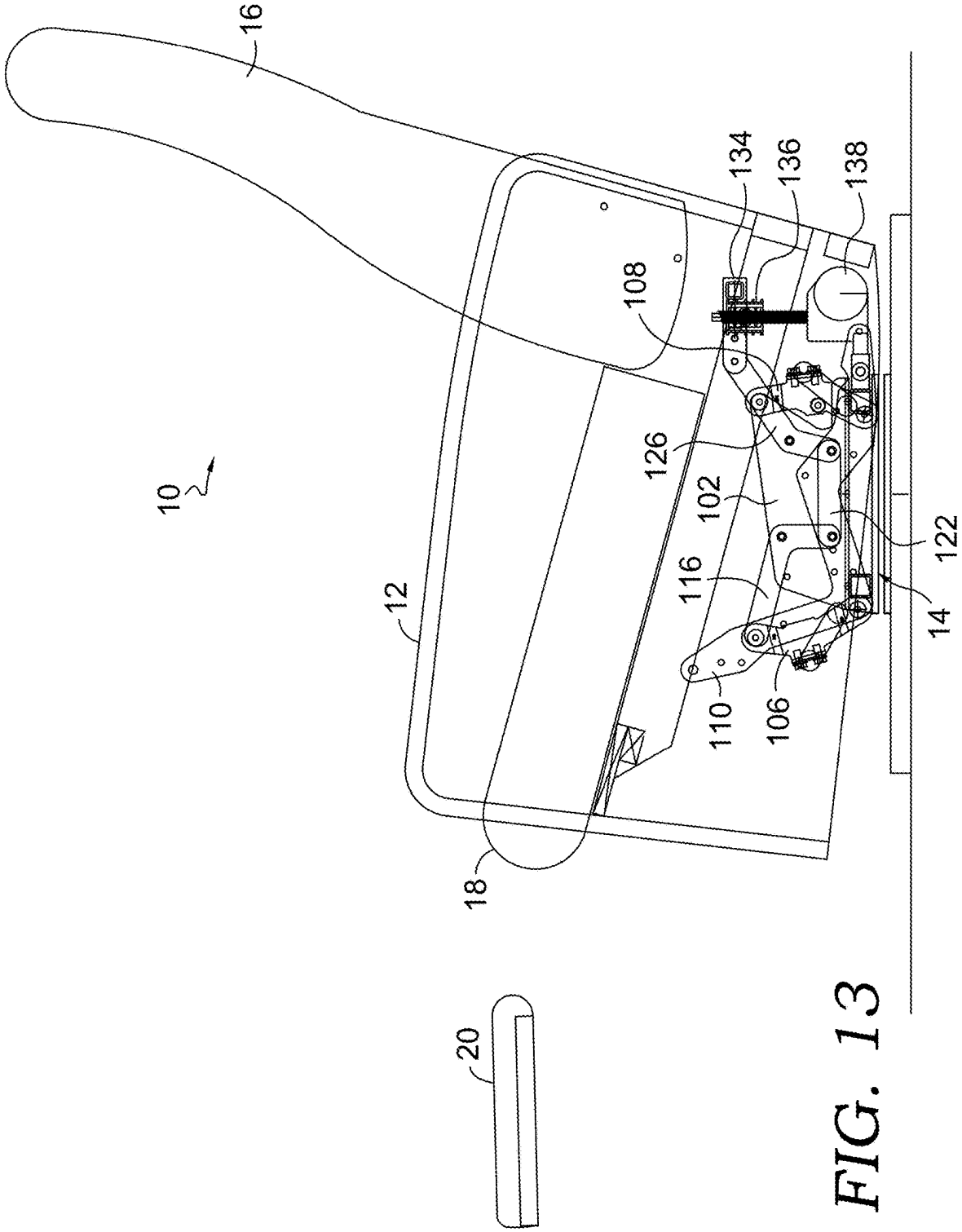

FIG. 13

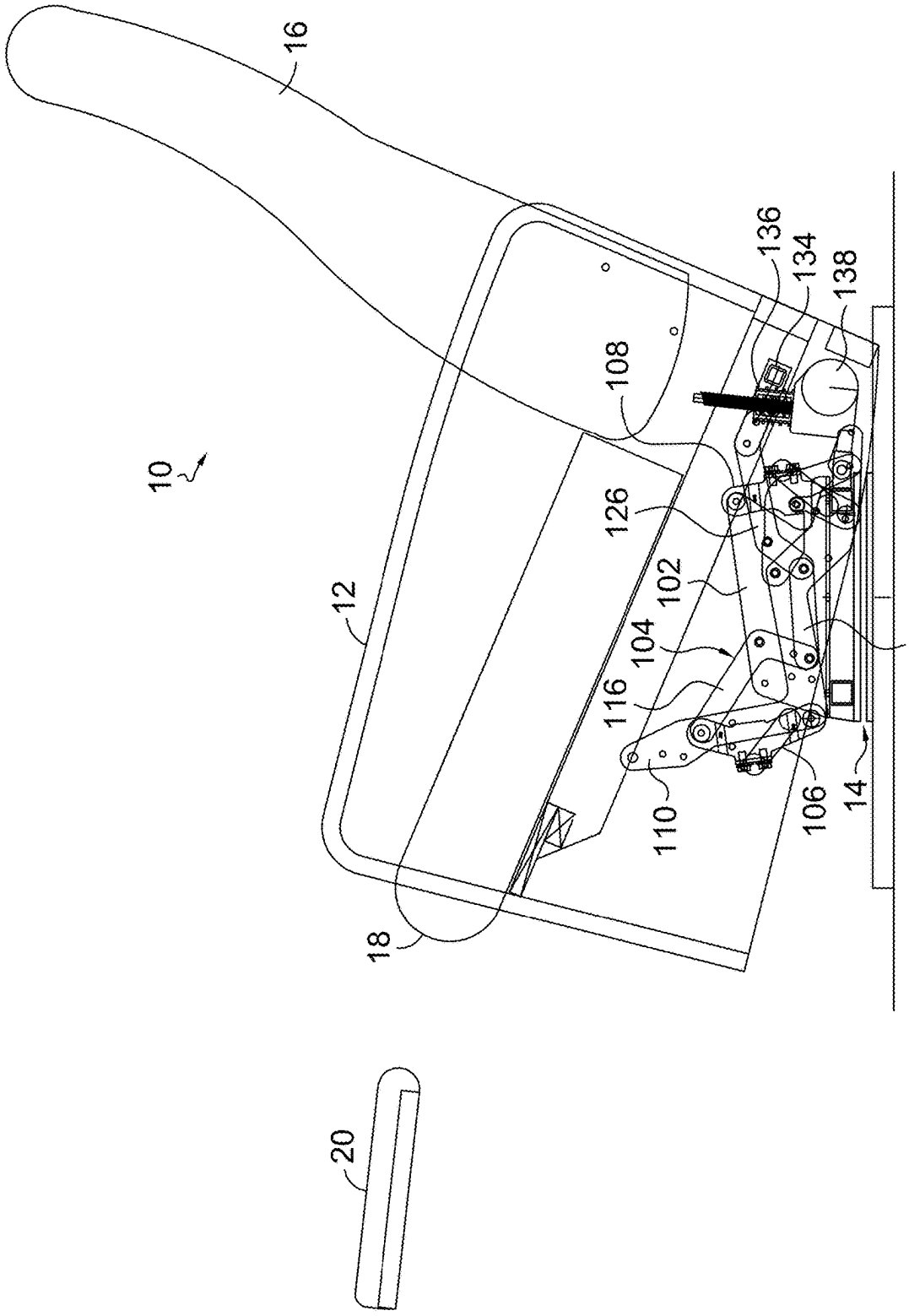

FIG. 14

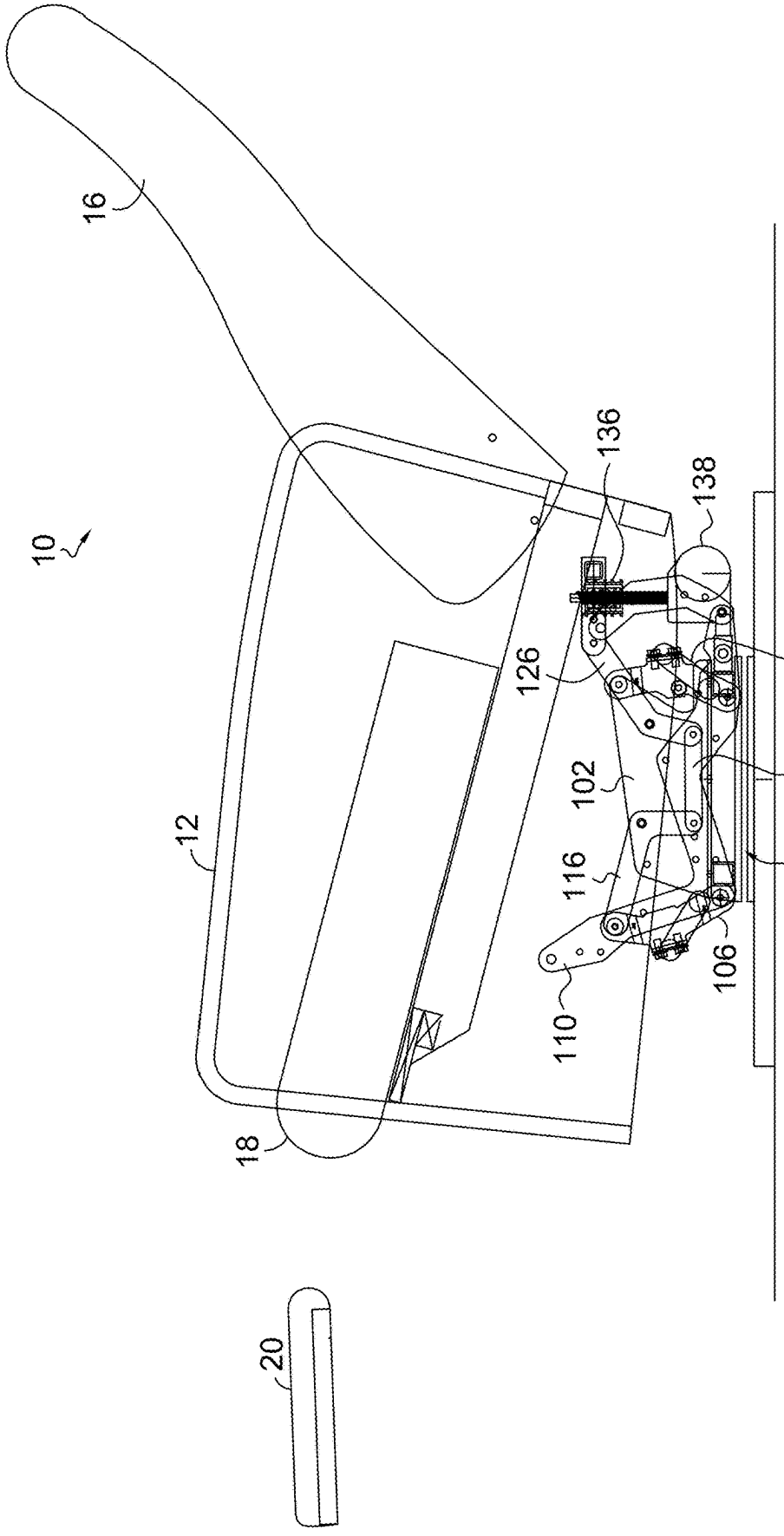

FIG. 15

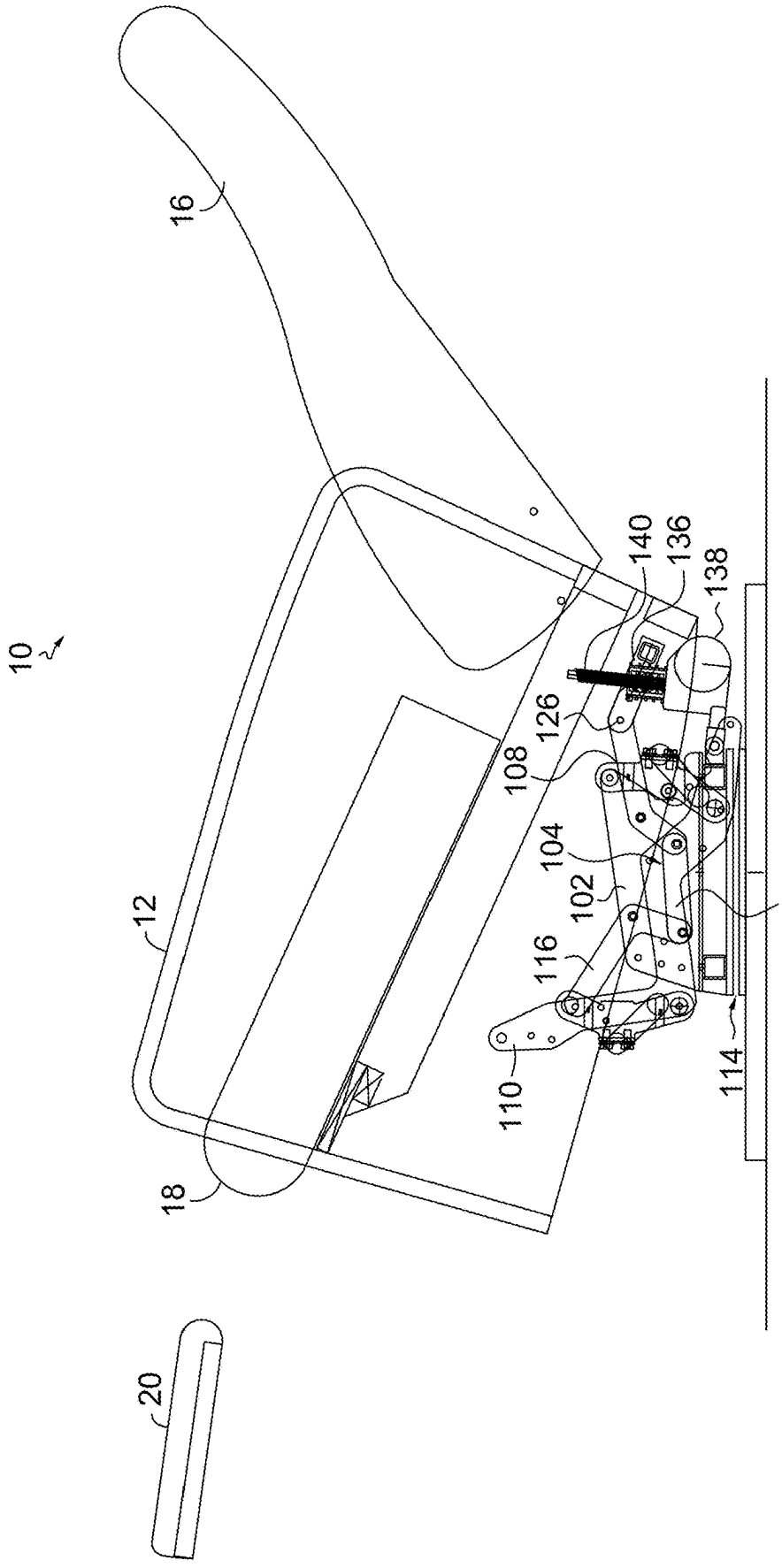

FIG. 16

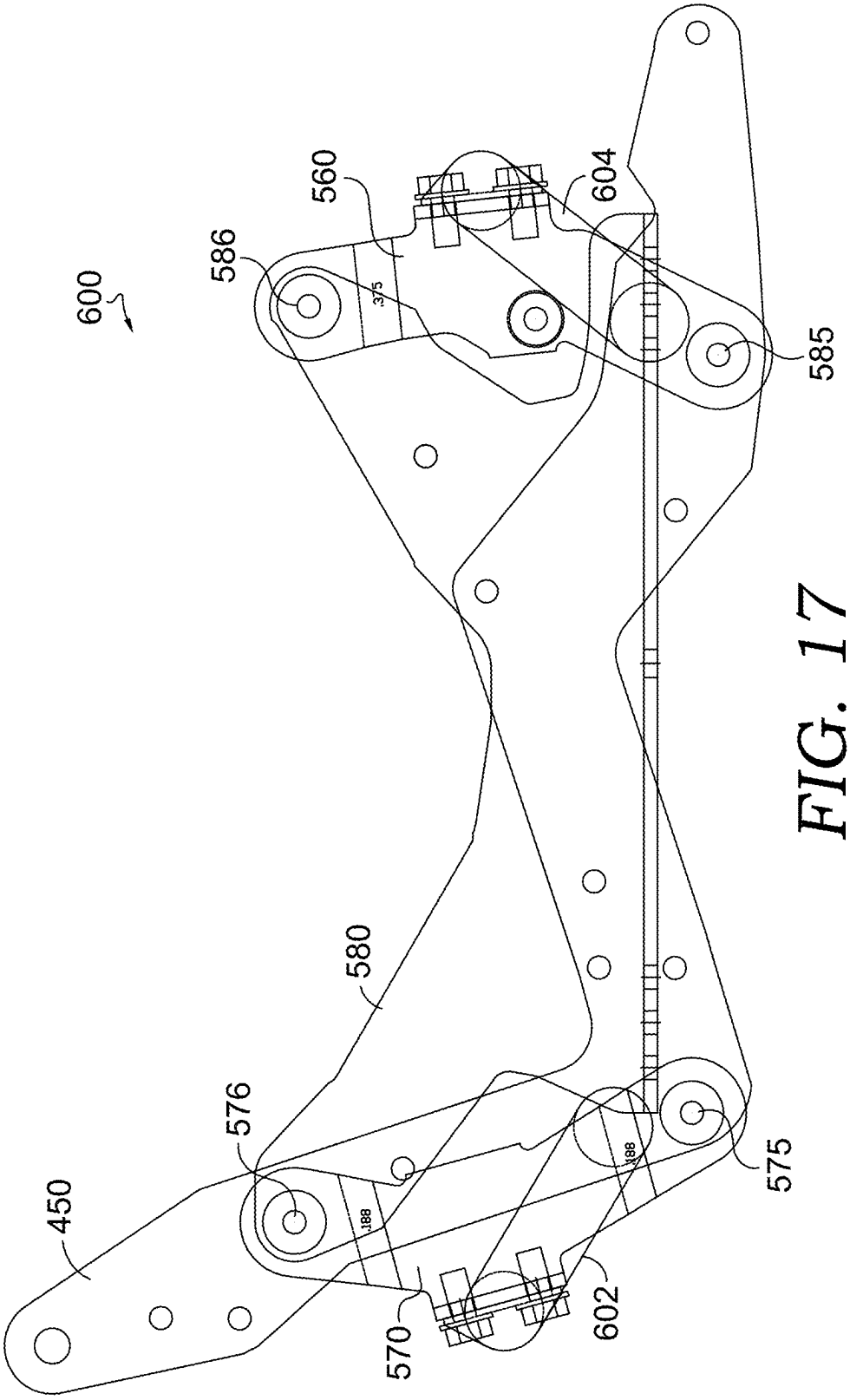

FIG. 17
(PRIOR ART)

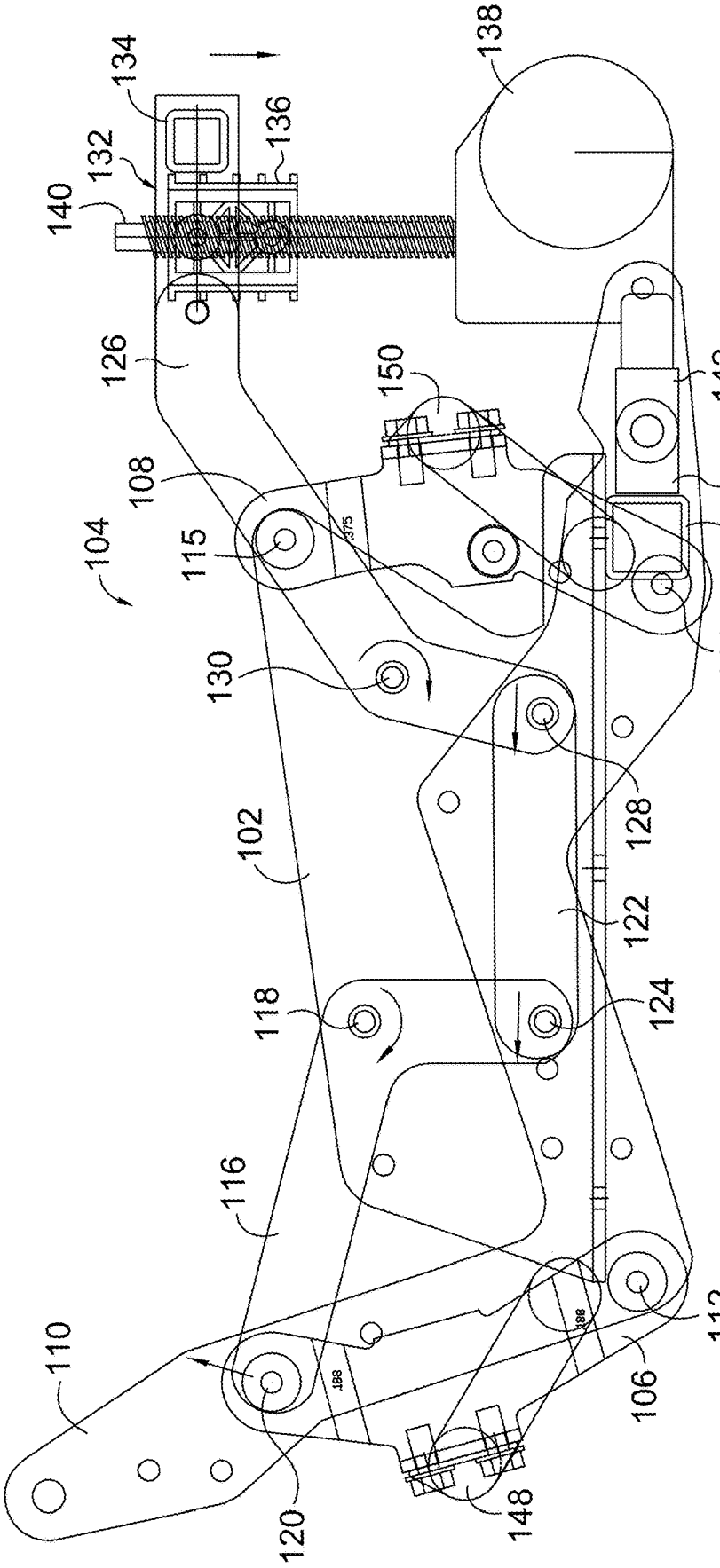
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FIG. 18

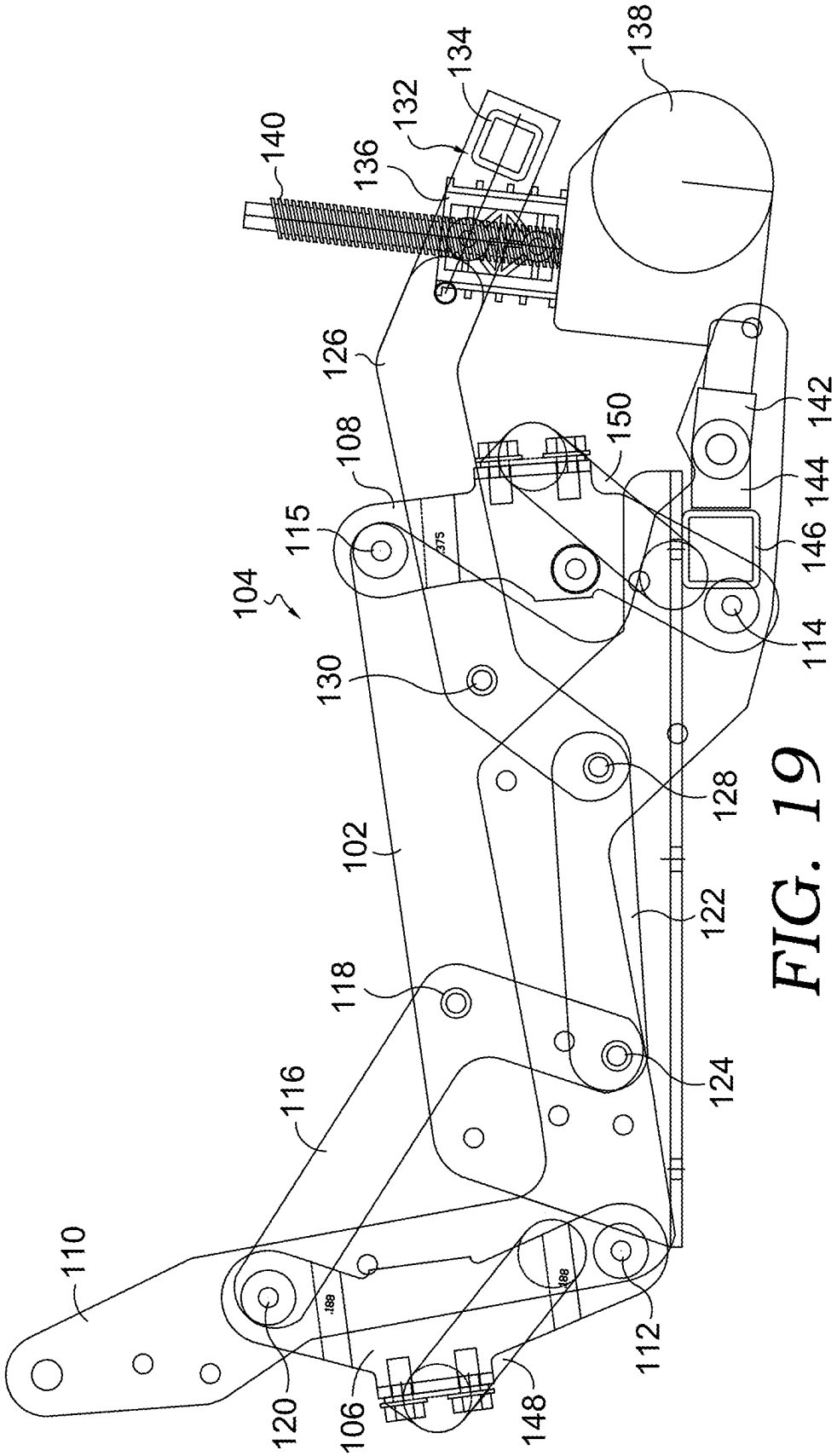
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FIG. 19

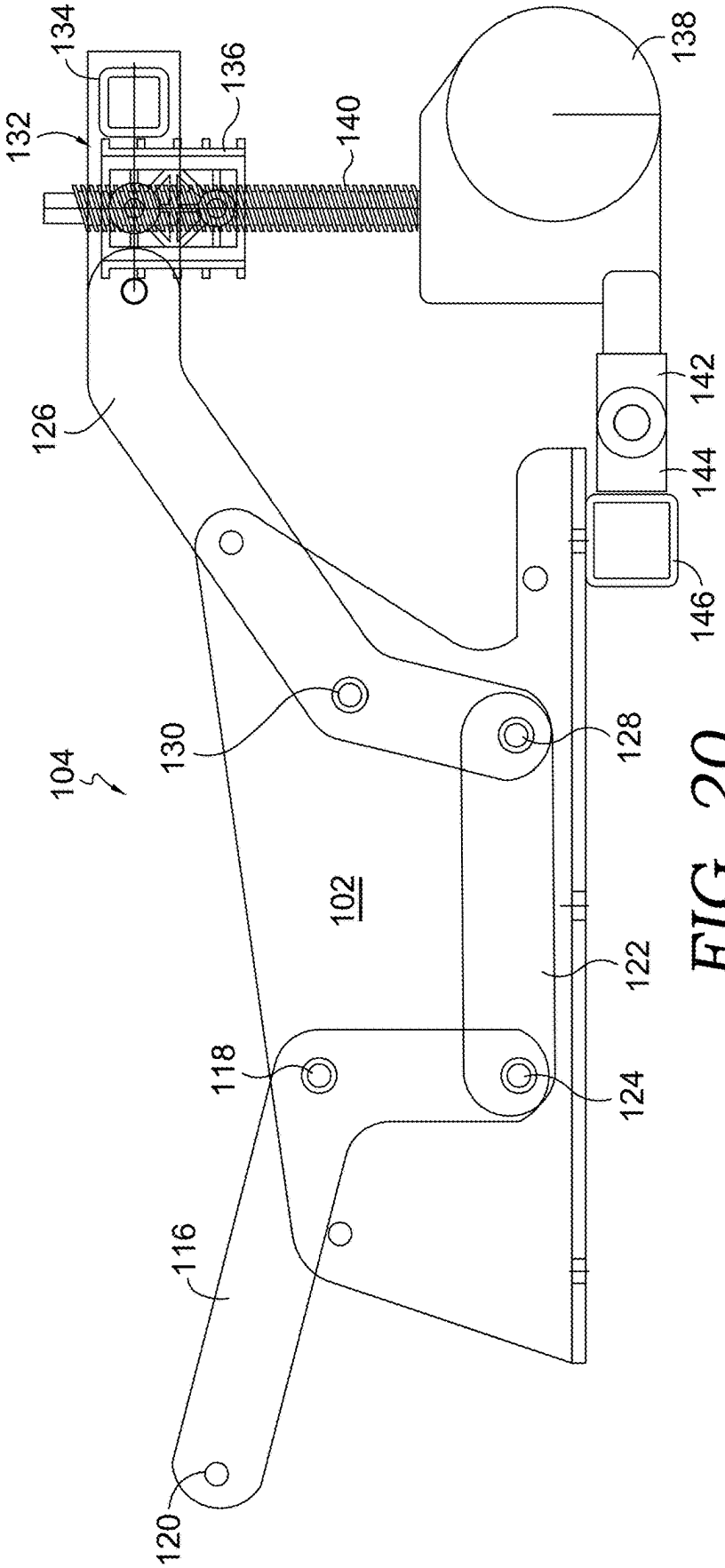
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FIG. 20

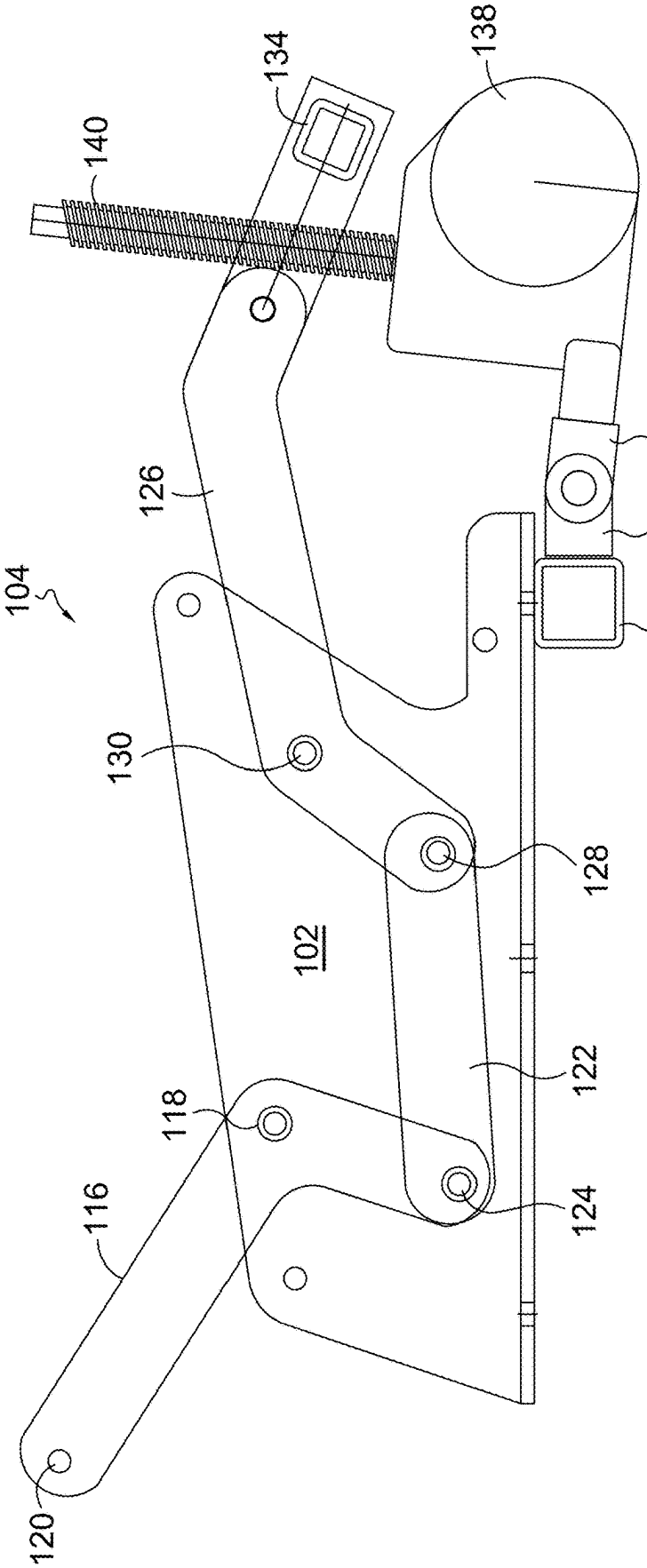

FIG. 21

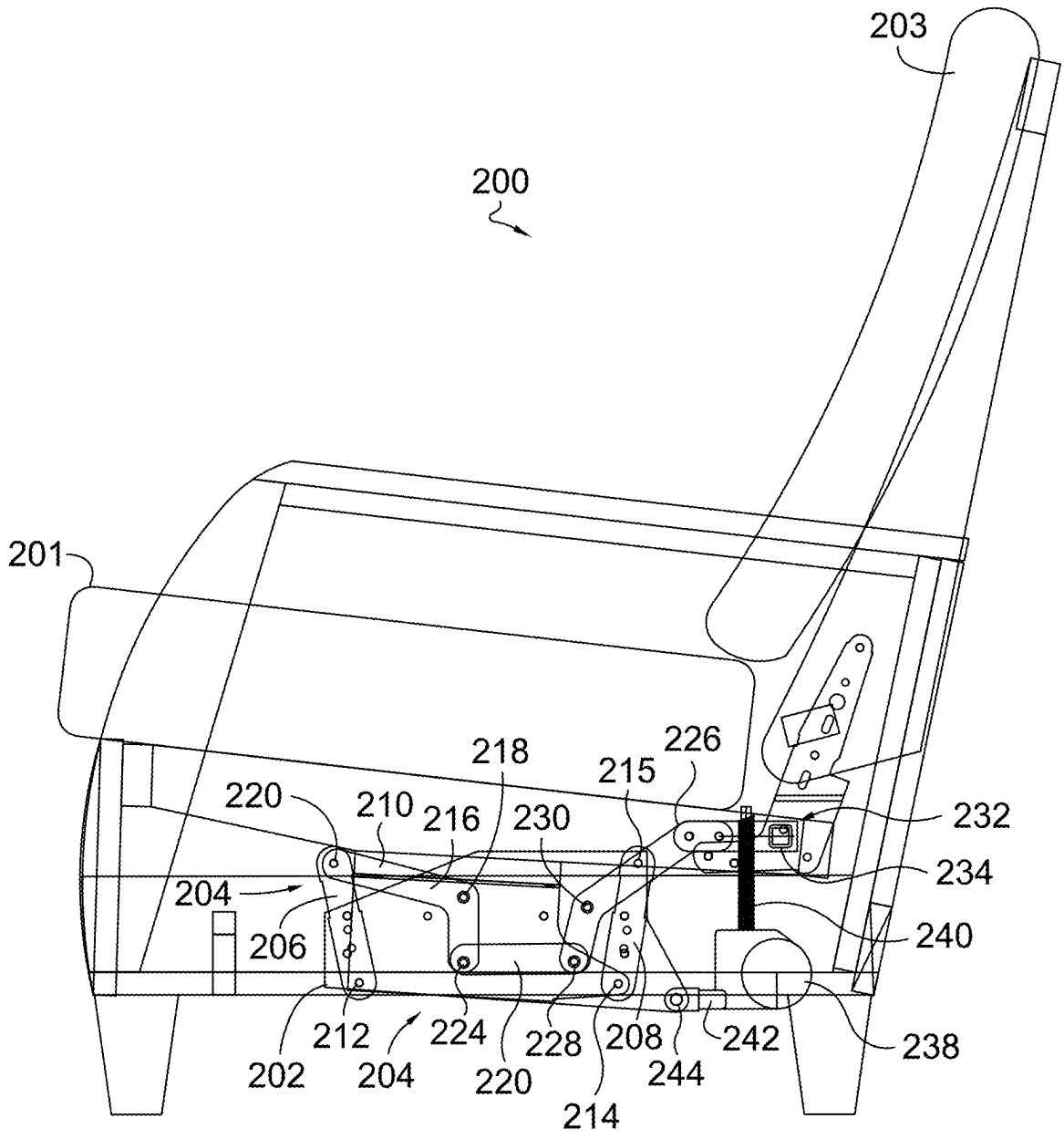
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FIG. 22

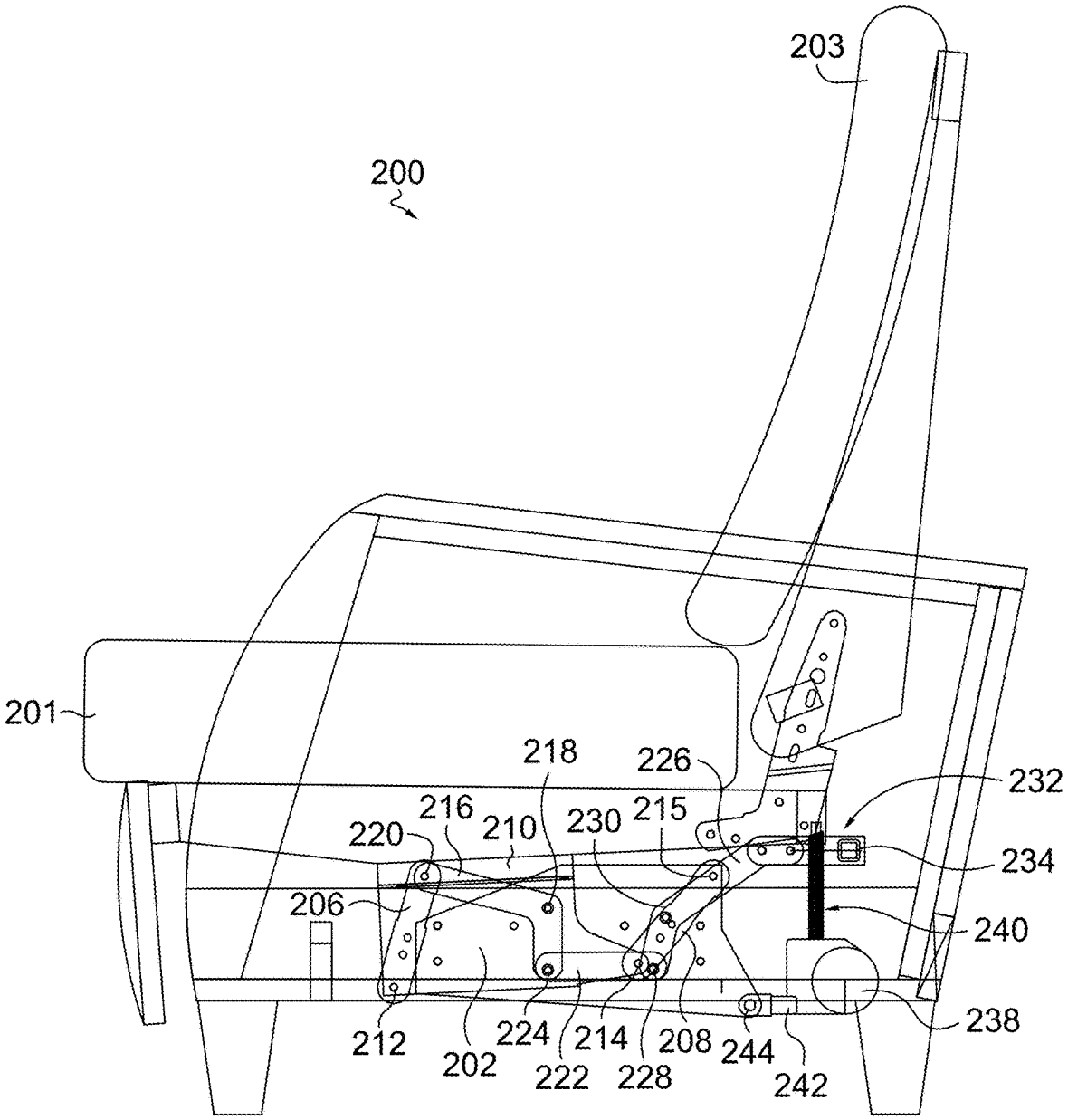
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FIG. 23

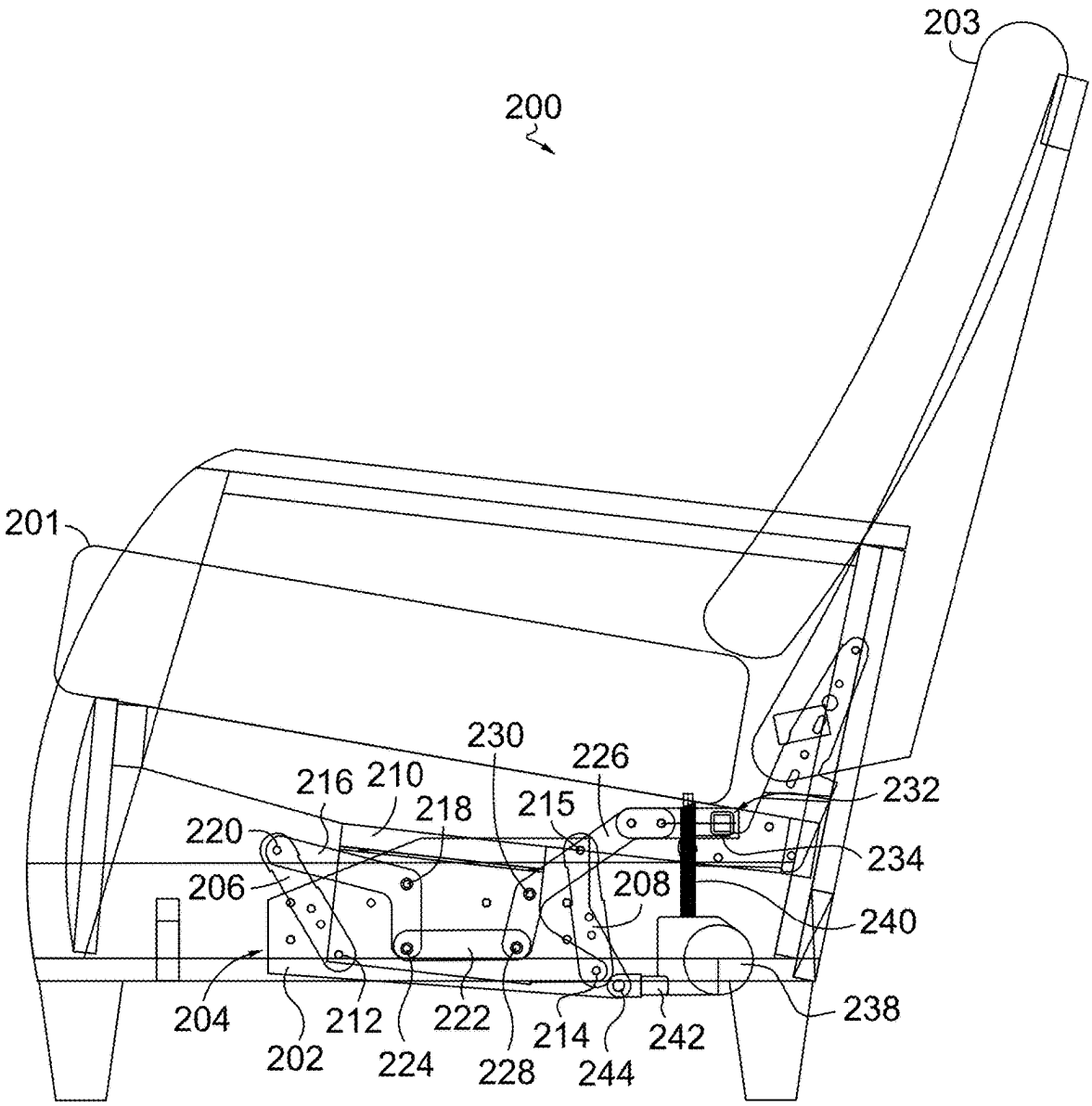
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FIG. 24

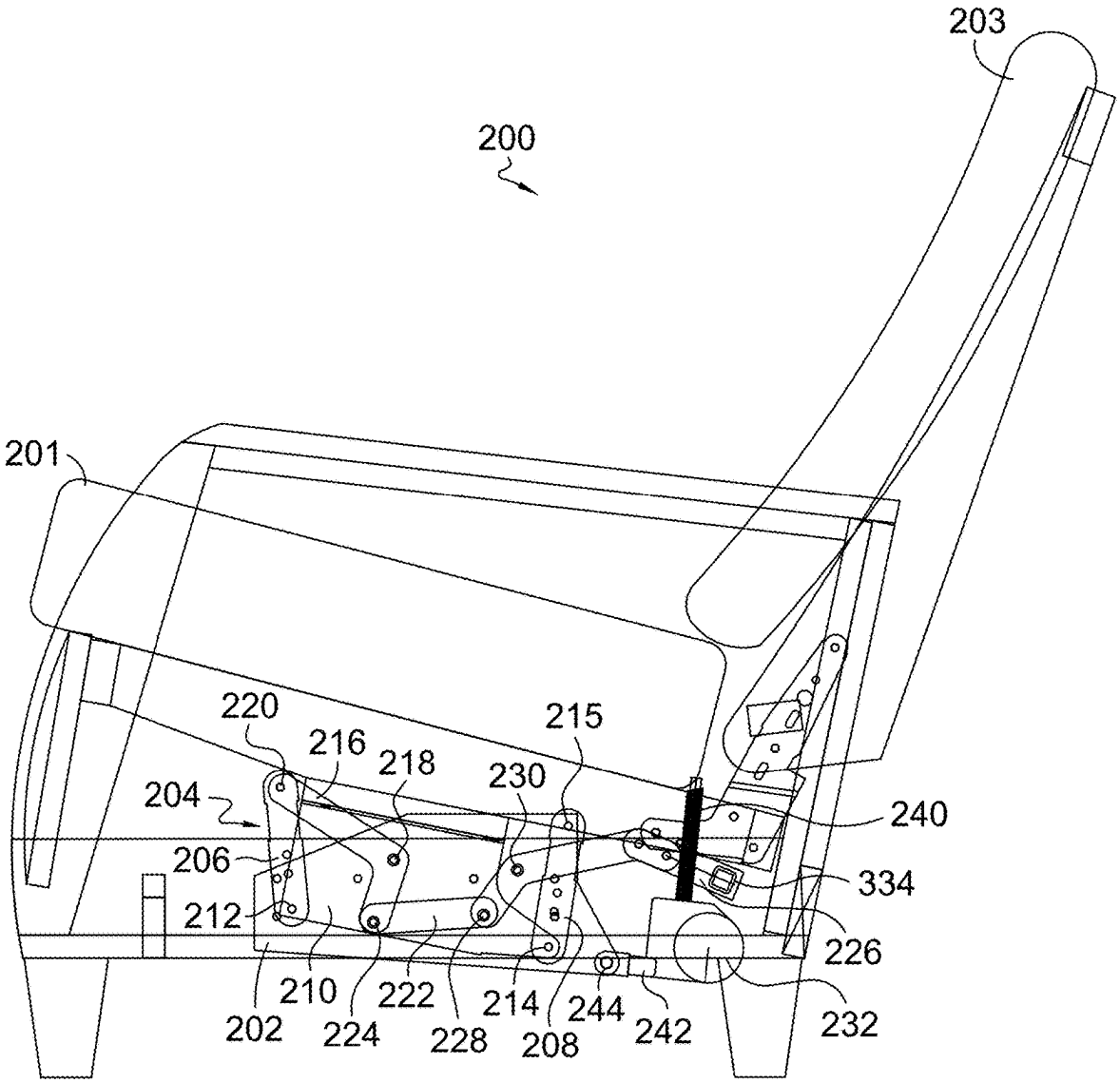
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FIG. 25

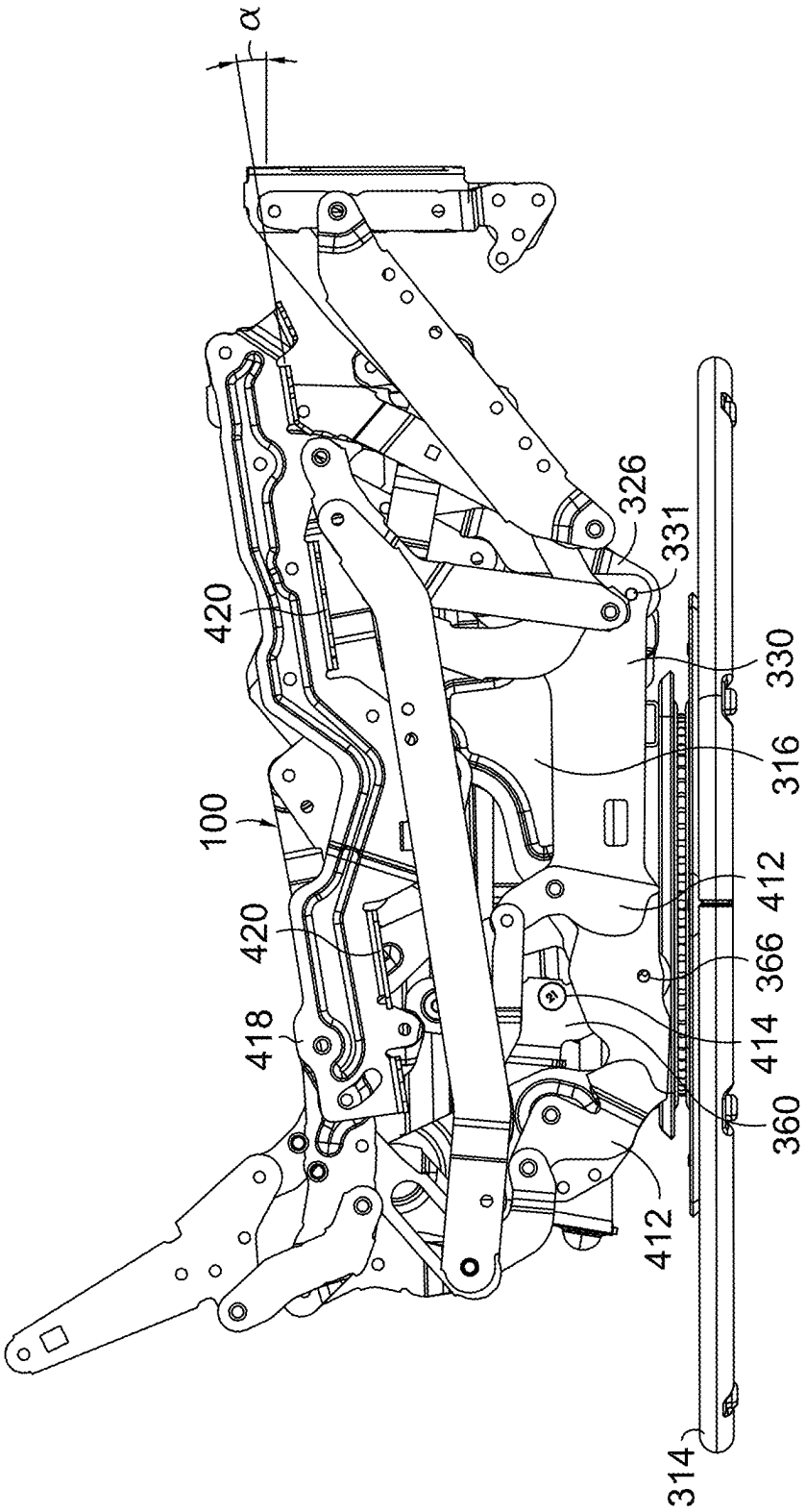

FIG. 26

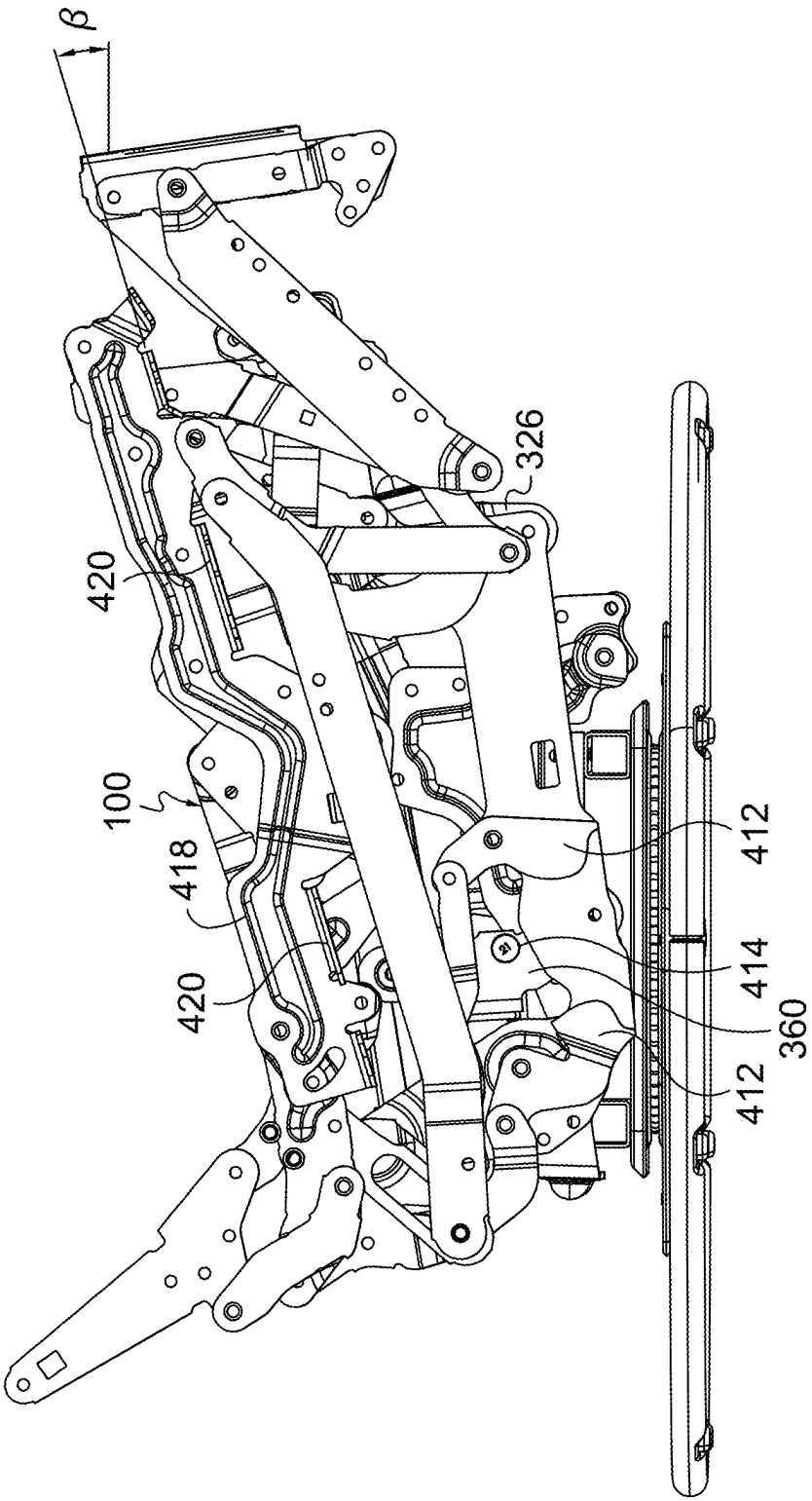

FIG. 27

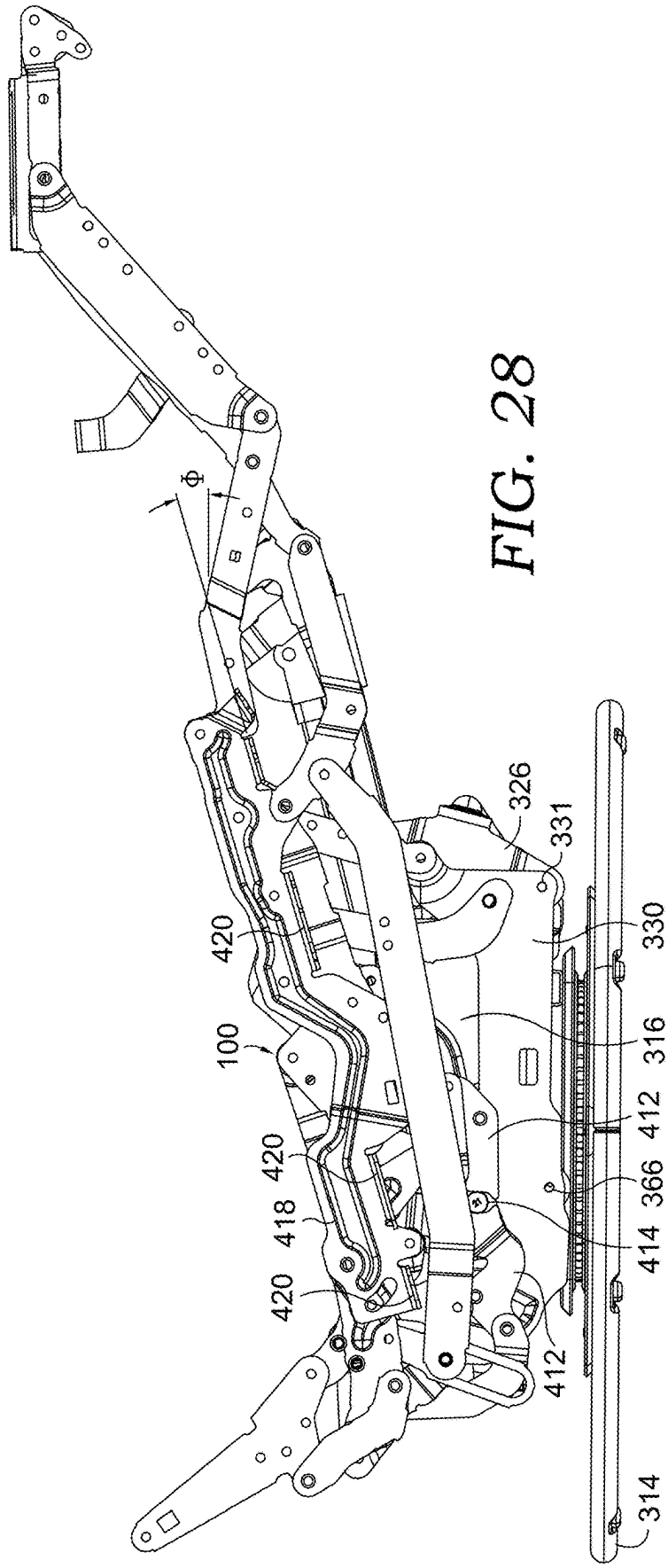

FIG. 28

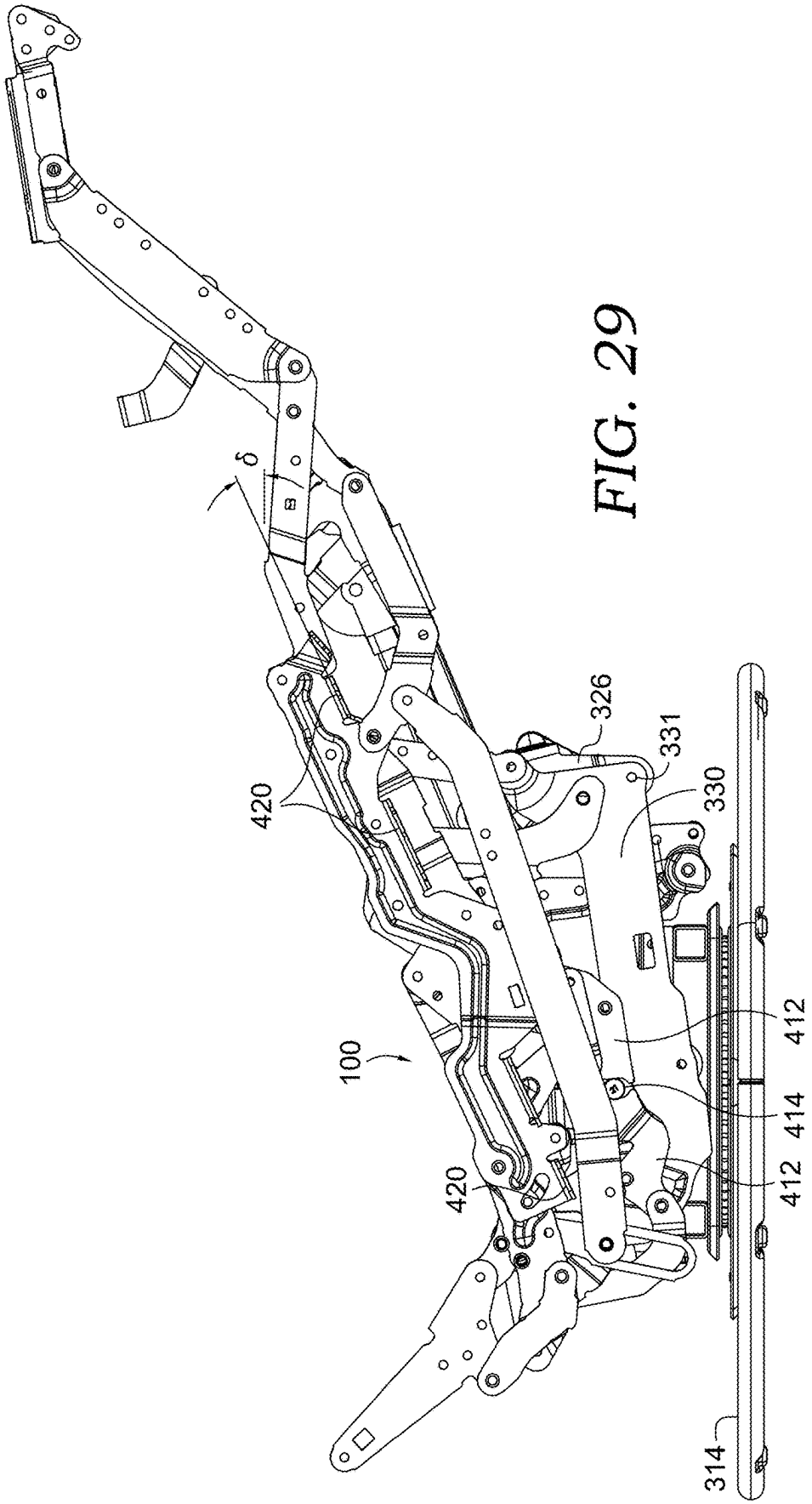

FIG. 29

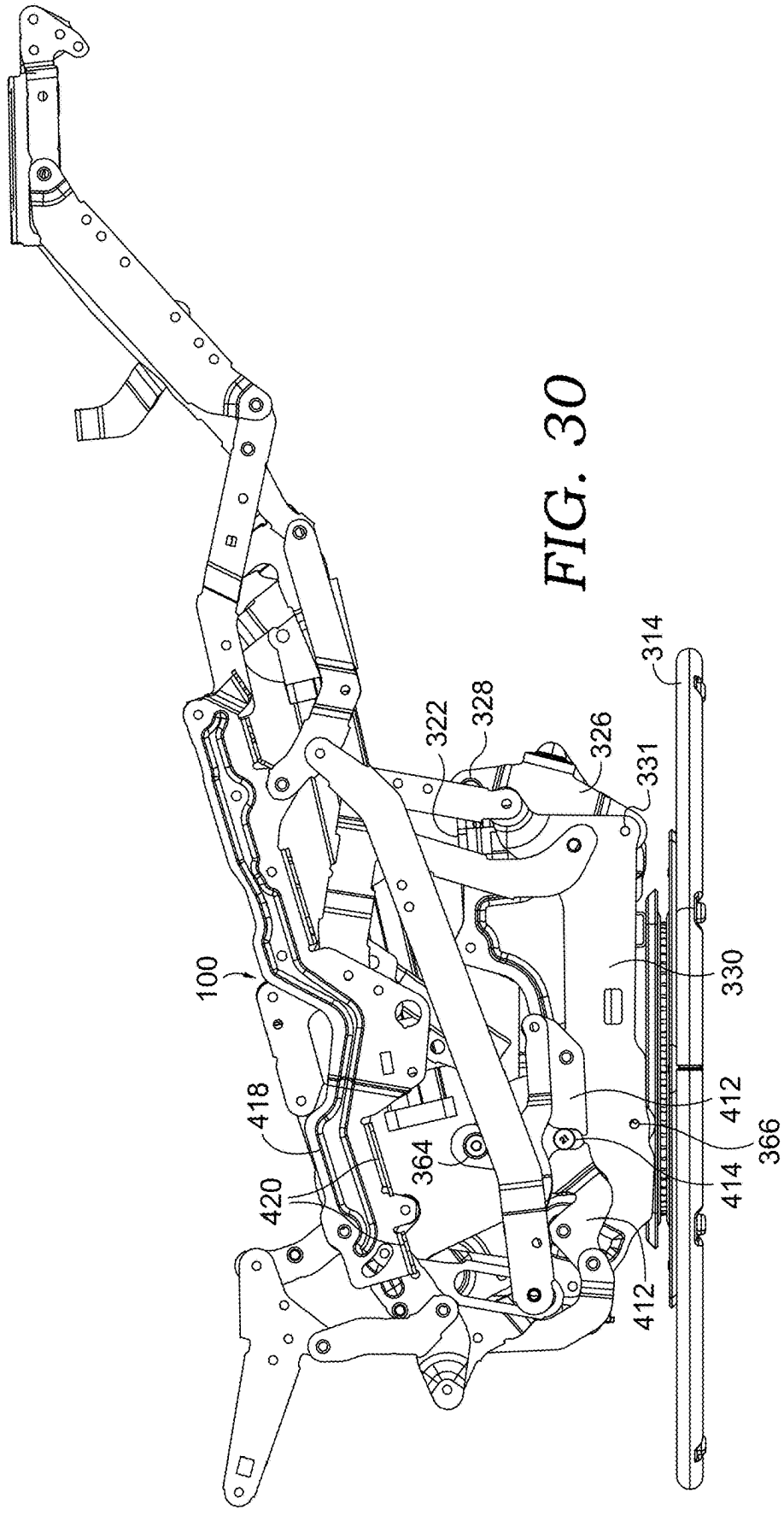

FIG. 30

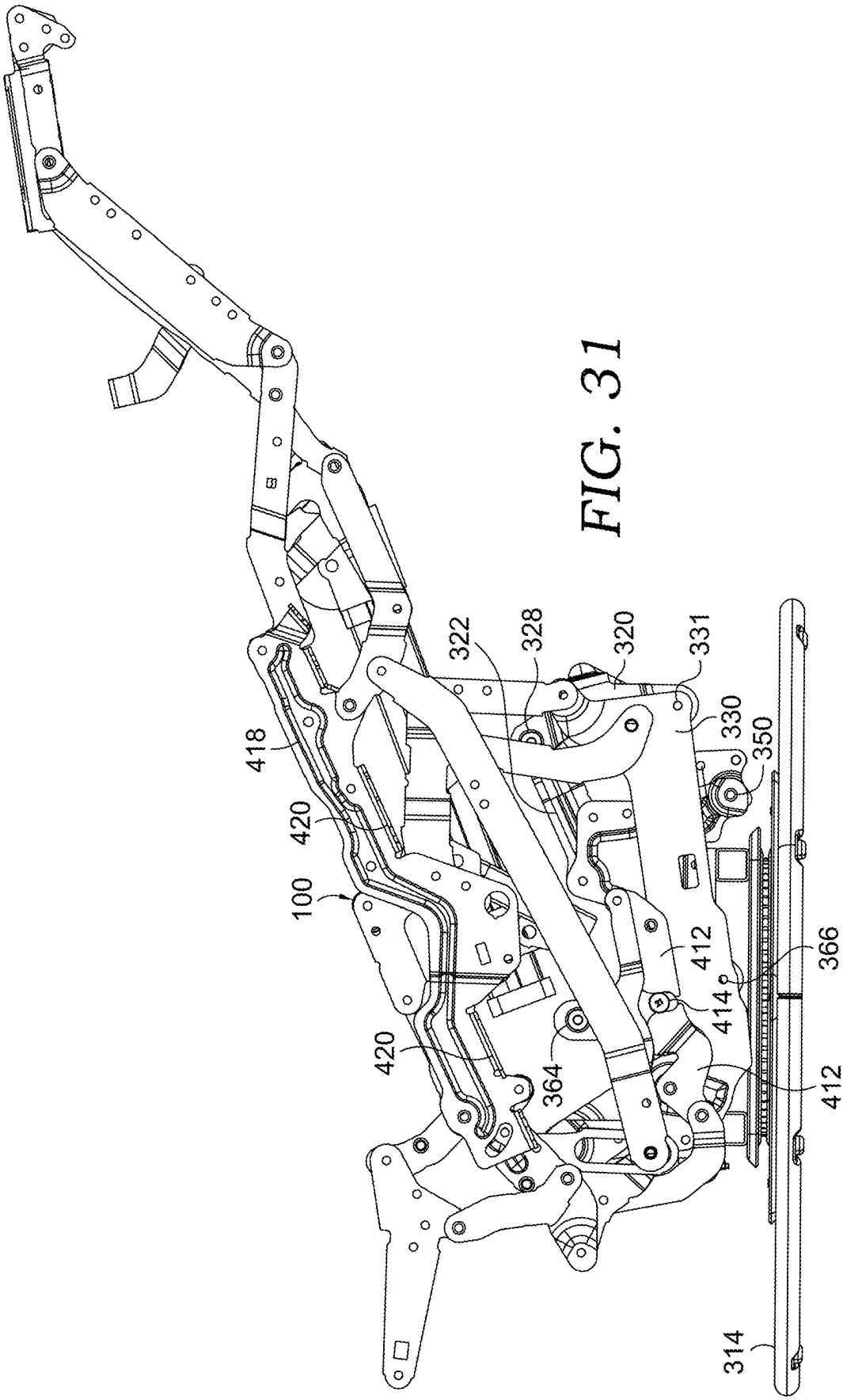

FIG. 31

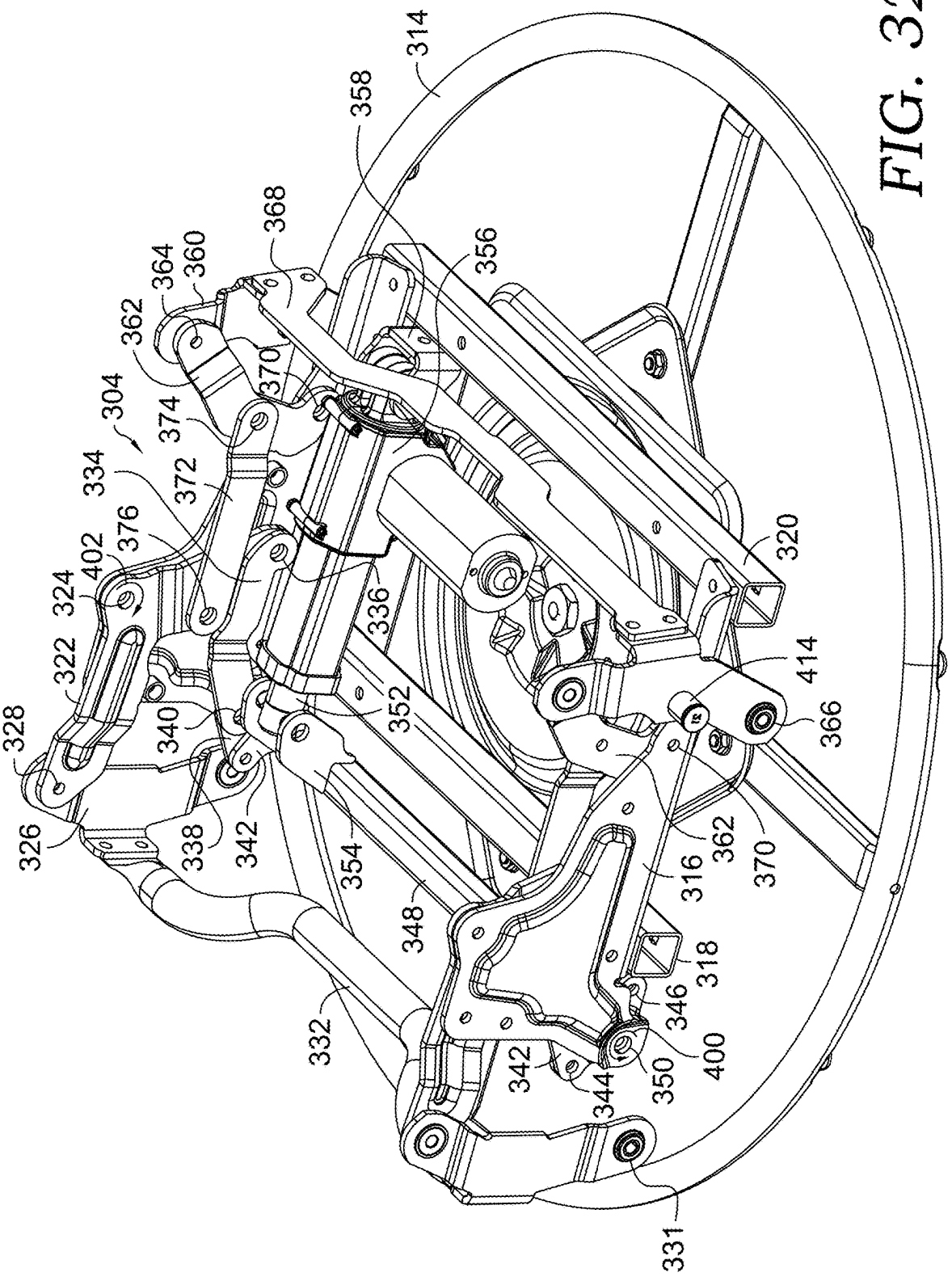
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FIG. 32

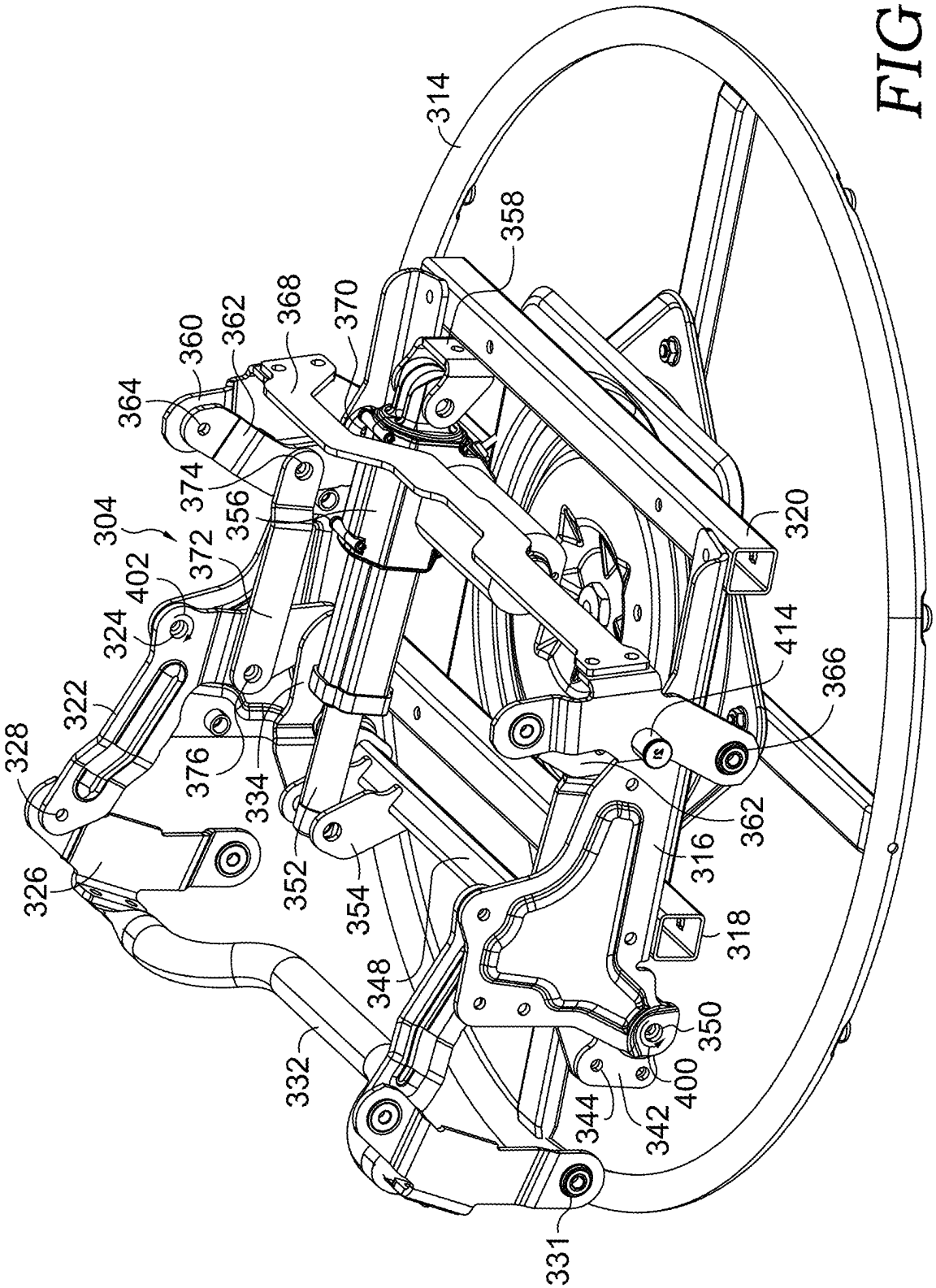
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FIG. 33

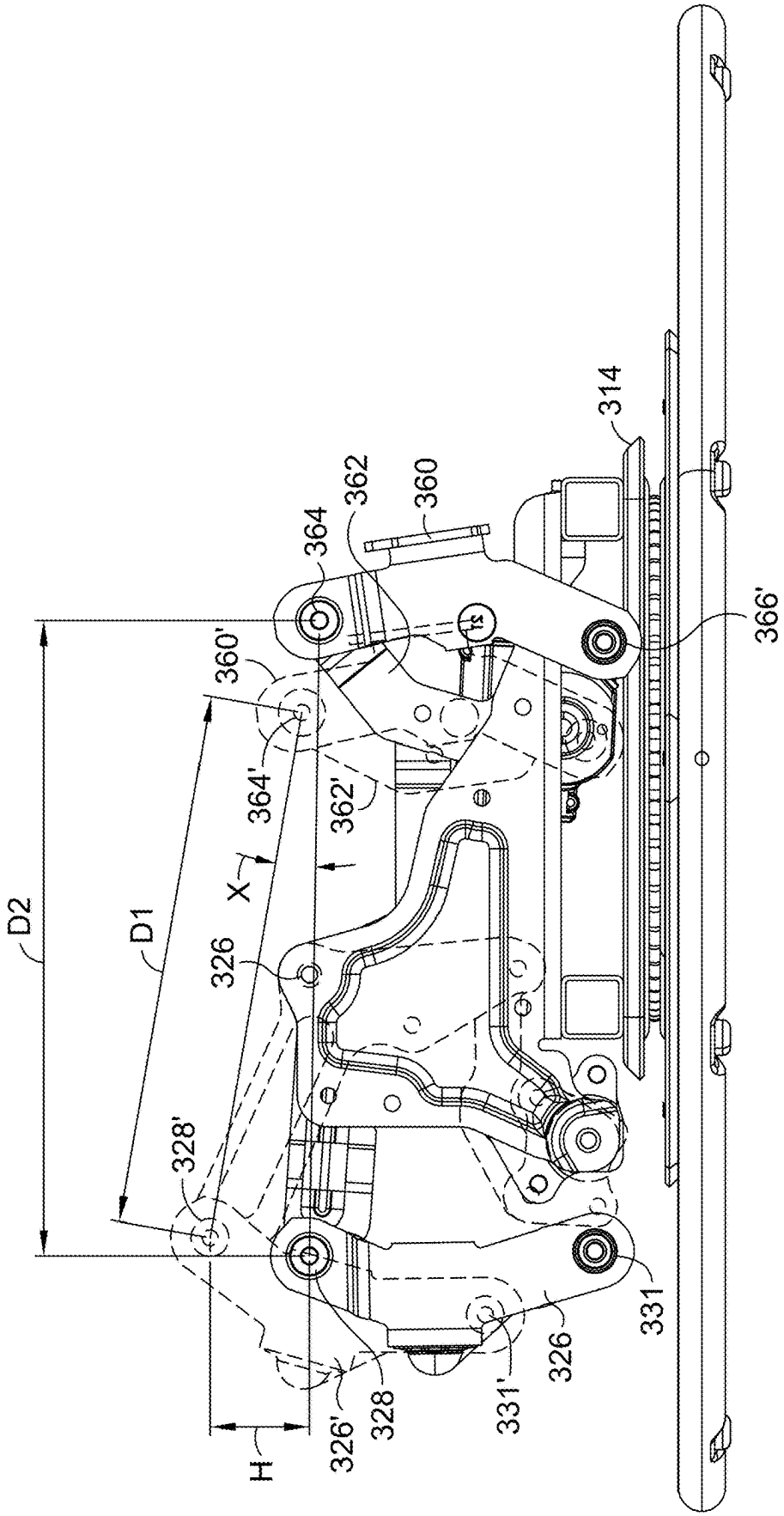
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FIG. 34

GLIDER MECHANISM AND CHAIR WITH INDEPENDENT TILT

TECHNICAL FIELD

[0001] Aspects herein relate to a chair and a mechanism for use on a glider chair that allows added tilt.

BACKGROUND

[0002] The present invention relates broadly to motion upholstery furniture designed to support a user's body in an essentially seated disposition. Motion upholstery furniture includes recliners, gliders, incliners, sofas, love seats, sectionals, theater seating, traditional chairs, and chairs with a moveable seat portion, such furniture pieces being referred to herein generally as "seating units." In some aspects, the present invention relates to an improved glider mechanism allowing an added tilt. In some aspects, the present invention relates to an improved powered glider reclining mechanism allowing an added tilt in any of the closed, TV and fully reclined positions. And, in some aspects, a glide and tilt assembly is provided that allows added tilt, while moving the chair forwardly with respect to a base.

[0003] Glider chairs exist that allow a back-and-forth gliding motion when in the closed position. Some of these glider recliners provide a powered mechanism that moves the chair between three basic positions: a normal non-reclined sitting position with the seat generally horizontal and the back substantially upright (the closed position); a partially reclined position often referred to as a "TV" position with an extended ottoman and with the seat and back disposed in a slightly reclined position but with the back still sufficiently upright to permit comfortable television viewing from the recliner; and a fully reclined position with the back pivoted farther than that in the TV position. In these existing gliders, the mechanism positions the overall orientation of the chair. It would be desirable to provide a glider mechanism (for a chair or recliner chair) that allows a further independent tilt adjustment of the chair orientations. It would also be desirable to provide a powered glider recliner mechanism that allows a further independent tilt adjustment of the chair orientation, in any of the closed, TV or fully reclined positions. It would also be desirable to move the chair mechanism forwardly as tilt is added in any position between the TV position and the fully reclined position. Such a chair would offer a user further orientation adjustment options and increase the comfort to the user.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004] Examples of aspects herein are described in detail below with reference to the attached drawings figures, wherein:

[0005] FIG. **1** illustrates a side view of a chair in a closed, neutral, position, in accordance with aspects herein;

[0006] FIG. **2** illustrates a side view of the chair of FIG. **1** in the closed position, but in a rearward glide position, in accordance with aspects herein;

[0007] FIG. **3** illustrates a side view of the chair of FIG. **1** in the closed position, but in a forward glide position, in accordance with aspects herein;

[0008] FIG. **4** illustrates a side view of the chair of FIG. **1** in the closed position, but in an increased tilt position, in accordance with aspects herein;

[0009] FIG. **5** is a side view of the chair of FIG. **1** in the TV position (shown without the mid-ottoman cushioning), in accordance with aspects herein;

[0010] FIG. **6** is a side view of the chair of FIG. **5** in the TV position but in an increased tilt position, in accordance with aspects herein;

[0011] FIG. **7** is a side view of the chair of FIG. **1** in the fully reclined position (shown without the mid-ottoman cushioning), in accordance with aspects herein;

[0012] FIG. **8** is a side view of the chair of FIG. **7** in the fully reclined position but in an increased tilt position, in accordance with aspects herein;

[0013] FIG. **9** is a side view similar to FIG. **1**, but shown with certain linkage elements hidden to make other links more visible, in accordance with aspects herein;

[0014] FIG. **10** is a side view similar to FIG. **3**, but shown with certain linkage elements hidden to make other links more visible, in accordance with aspects herein;

[0015] FIG. **11** is a side view similar to FIG. **2**, but shown with certain linkage elements hidden to make other links more visible, in accordance with aspects herein;

[0016] FIG. **12** is a side view similar to FIG. **4**, in the closed and increased tilt position, but shown with certain linkage elements hidden to make other links more visible, in accordance with aspects herein;

[0017] FIG. **13** is a side view similar to FIG. **5**, but shown with certain linkage elements hidden to make other links more visible, in accordance with aspects herein;

[0018] FIG. **14** is a side view similar to FIG. **6**, in the TV position with increased tilt, but shown with certain linkage elements hidden to make other links more visible, in accordance with aspects herein;

[0019] FIG. **15** is a side view similar to FIG. **7**, but shown with certain linkage elements hidden to make other links more visible, in accordance with aspects herein;

[0020] FIG. **16** is a side view similar to FIG. **8**, in the fully reclined position with increased tilt, but shown with certain linkage elements hidden to make other links more visible, in accordance with aspects herein;

[0021] FIG. **17** illustrates a side perspective view of a selected links in a prior-art mechanism in the closed position, in accordance with aspects herein;

[0022] FIG. **18** illustrates a side perspective view of a selected links in the mechanism of FIGS. **1-16** in the neutral tilt position, in accordance with aspects herein;

[0023] FIG. **19** illustrates a view similar to FIG. **18**, but shown in the increased tilt position, in accordance with aspects herein;

[0024] FIG. **20** illustrates a side perspective view similar to FIG. **18**, but shown without the glide bracket and glide links, in accordance with aspects herein;

[0025] FIG. **21** illustrates a view similar to FIG. **20**, but shown in the increased tilt position, in accordance with aspects herein;

[0026] FIG. **22** illustrates a side view of a glider chair in a neutral position, in accordance with aspects herein;

[0027] FIG. **23** illustrates a side view of the chair of FIG. **22**, but in a forward glide position, in accordance with aspects herein;

[0028] FIG. **24** illustrates a side view of the chair of FIG. **22**, but in a rearward glide position, in accordance with aspects herein;

[0029] FIG. **25** illustrates a side view of the chair of FIG. **22** in the neutral position, but in an increased tilt position, in accordance with aspects herein;

[0030] FIG. **26** illustrates a side view of a glider chair in a closed neutral position, in accordance with aspects herein;

[0031] FIG. **27** illustrates a side view of a chair of FIG. **26**, but in an increased tilt position, in accordance with aspects herein;

[0032] FIG. **28** illustrates a side view of the chair of FIG. **26**, but in a non-tilted TV position, in accordance with aspects herein;

[0033] FIG. **29** illustrates a view similar to FIG. **28**, but in an increased tilt position, in accordance with aspects herein;

[0034] FIG. **30** illustrates a side view of the chair of FIG. **26**, but in a non-tilted fully reclined position, in accordance with aspects herein;

[0035] FIG. **31** illustrates a view similar to FIG. **30**, but in an increased tilt position, in accordance with aspects herein;

[0036] FIG. **32** illustrates the base and the glide and tilt assembly of the chair of FIGS. **26-31**, shown in the non-tilted position, in accordance with aspects herein;

[0037] FIG. **33** is a view similar to FIG. **32**, but in the tilted position, in accordance with aspects herein; and

[0038] FIG. **34** is a view comparing the positioning of various links in the two positions shown in FIGS. **32** and **33**, comparing a non-tilted position to a tilted position.

DETAILED DESCRIPTION

[0039] The subject matter of the present invention is described with specificity herein to meet statutory requirements. However, the description itself is not intended to limit the scope of this disclosure. Rather, the inventors have contemplated that the claimed or disclosed subject matter might also be embodied in other ways, to include different steps or combinations of steps similar to the ones described in this document, in conjunction with other present or future technologies.

[0040] FIGS. **1-8** depict a swivel, glider recliner chair **10** in various positions, guided by a mechanism **100**. FIGS. **9-16** are similar, but show fewer parts of the mechanism to better illustrate other links. The mechanism **100** allows the chair **10** to be in a closed, neutral position shown in FIGS. **1** and **9**. As a glider recliner, the mechanism **100** allows the chair **10** to reciprocate (or glide) between a rearward glide position (shown in FIGS. **2** and **11**) and a forward glide position (shown in FIGS. **3** and **10**). The chair **10** may include a pair of spaced apart arms **12**, suspended above the floor by a swivel base **14**. While shown with a swivel base **14**, the mechanism **100** could also be used on a glider base without the swivel feature. The chair **10** includes a back **16** pivotally coupled between the arms **12** via the mechanism **100**. The mechanism **100** further carries a seat **18** (carried on a seat mounting plate **19**) and an extendable ottoman broadly designated as **20** (in some aspects, the ottoman **20** includes both a footrest and a mid-ottoman). In addition to allowing the gliding motion, the mechanism **100** is operable (via a motor) to move the chair between the closed position (such as that shown in FIG. **1**), to the TV position (such as that shown in FIG. **5**), to the fully reclined position (such as that shown in FIG. **7**), and can stop at various positions intermediate of each of these positions.

[0041] The mechanism **100** is supported above the swivel base **14** via a glide bracket **102** and a glide and tilt assembly **104** (as best seen in FIGS. **18** and **19**). Prior to discussing the glide and tilt assembly **104**, a prior art glider assembly **600** will be discussed with reference to FIG. **17**. As shown in FIG. **17**, and as described in U.S. Pat. No. 8,398,168, a glide bracket **580** may be mounted to the glider base. The glide bracket **580** pivotally supports a front glide link **570** at a pivot point **576**. Similarly, the glide bracket **580** pivotally supports a rear glide link **560** at a pivot point **586**. The lower end of the front glide link **570** is pivotally coupled to a carrier link **450** at a pivot point **575**. Similarly, the lower end of the rear guide link **560** is pivotally coupled to the carrier link **450** at a pivot point **585**. A front cross tube **602** may be coupled between opposing front glide links **570** and a rear cross tube **604** may be coupled between the rear glide links **560** for stability. The carrier link **450** is used to support the remainder of the mechanism, with a linkage allowing a powered motion from the closed position, to the TV position, to the fully reclined position, and back. This prior art assembly **600** allows for the oscillating movement of the chair in the closed position, with the carrier link **450** (which carries the remainder of the mechanism, and thus the seat, back and ottoman) directly supported by the front glide link **570** and the rear glide link **560** on the glide bracket **580**. The prior art assembly **600** can be used in a powered glider recliner, but any additional tilting movements, discussed further below, are not enabled or possible.

[0042] In some aspects, as seen in FIG. **18**, a new glide and tilt assembly **104** is shown for use on the glider chair **10**. The assembly **104** supports an oscillating motion of the glider chair **10** in the closed position, and allows an added tilt of the glider chair **10**. The added tilt of the chair **10** provided by the assembly **104** can be provided by the assembly **104** in any of the closed position, the TV position and the fully reclined position, (or any intermediate position) as desired by the user of the chair **10**.

[0043] As shown in FIG. **18**, the assembly **104** includes the glide bracket **102**, which is coupled to the swivel base **14**. The glide bracket **102** indirectly supports a front glide link **106** and directly supports a rear glide link **108**. The lower end of the front glide link **106** is pivotally coupled to a carrier link **110** at pivot point **112**. Similarly, the lower end of the rear glide link **108** is pivotally coupled to the carrier link **110** at pivot point **114**. The upper end of the rear glide link **108** is pivotally coupled to the glide bracket **102** at pivot point **115**. The carrier link **110** supports the remainder of the linkage of the mechanism **100**. From the carrier link **110** upward, the links of the mechanism **100** are similar to those found in existing powered glider recliners. For example, the links of the mechanism **100** from the carrier link **110** upward are similar to those shown and described in U.S. Pat. No. 8,398,168, the disclosure of which is hereby incorporated in its entirety. These links (and the motor powering them) allow the mechanism **100** to move from the closed position, to the TV position, to the fully reclined position (and back). However, the glide and tilt assembly **104** also provides the option of an added tilt to the chair **10** in any of the closed position, the TV position and the fully reclined position, or any position intermediate these positions.

[0044] To allow the tilting functionality, the assembly **104** includes a generally L-shaped front tilt link **116** that is pivotally coupled to the glide bracket **102** at pivot point **118**. One end of the front tilt link **116** is pivotally coupled to the upper end of the front glide link **106** at a pivot point **120**. The other end of the front tilt link **116** is pivotally coupled to a connector link **122** at a pivot point **124**. The connector link

122 extends rearwardly from pivot point 124, and is pivotally coupled at its other end to a tilt drive link 126 at a pivot point 128. The tilt drive link 126, in some aspects, has two angled bends and may be formed as a unitary piece, or may be formed in multiple parts that are fixedly coupled to one another. Near the bend closest to pivot point 128, the tilt drive link 126 is pivotally coupled to the glide bracket 102 at a pivot point 130. The end of the tilt drive link 126 opposite pivot point 128 is fixedly coupled to a tilt motor tube assembly 132, such as by welding. While not shown, it should be understood that only one side of the assembly 104 is shown, but the mechanism 100 includes opposed sides, spaced apart from one another that are mirror images of each other. The front glide links 106 may be coupled to one another for stability, such as with a support tube 148. Similarly, the rear glide links 108 may be coupled to one another for stability, such as with a support tube 150. The tilt motor tube assembly 132 includes a support tube 134 extending between, and coupled to, the tilt drive links 126. The tilt motor tube assembly 132 also includes a motor block 136 coupled to the support tube 134. The motor block 136 is moveable by a tilt motor 138 along a shaft or track 140. The tilt motor 138 has a bracket 142 extending from its lower end. The bracket 142 is pivotally coupled to another bracket 144. The bracket 144 is fixedly coupled to the base 14, such as by welding it to a rear glider cross tube 146. In some aspects, the tilt motor 138 is mounted slightly off-center between opposing sides of the mechanism 100 to provide clearance for other parts of the mechanism 100 (such as the recline motor).

[0045] The glide and tilt assembly 104 thus indirectly couples the front glide link 106 (and thus the carrier link 110) to the glide bracket 102. In use, the mechanism 100 can operate as the prior art mechanism, allowing the chair 10 to reciprocate or glide in the closed position, and to be moved from the closed position, to the TV position, and to the fully reclined position. In any position, the assembly 104 can also be used to provide added tilt to the chair 10, as may be desired by the user. To provide added tilt, the tilt motor 138 is activated to move the assembly from the position shown in FIGS. 18 and 20, to the position shown in FIGS. 19 and 21. When the tilt motor 138 is activated, the motor block 136 moves down the track 140, rotating the tilt drive link 126 about pivot point 130, causing a rotation of the front tilt link 116 about pivot point 118, moving the top of the front glide link 106 upwardly. This moves the carrier link 110 from the position shown in FIG. 18 to the position shown in FIG. 19. Because the carrier link 110 carries the remainder of the linkage of the mechanism 100, moving the glide and tilt assembly 104 from the position shown in FIGS. 18 and 20 to the position shown in FIGS. 19 and 21 provides added tilt to the chair 10. The assembly 104 can be activated in any of the closed position, the TV position, or the fully reclined position, or any intermediate position. Stated another way, the assembly 104 can provide added tilt, independent of the position of the glider chair 10.

[0046] In some aspects, the added tilt can be in a wide range between zero and 40 degrees. In some aspects, the added tilt can be in a range of between about 4-16 degrees, or about 8-12 degrees, or about 9-11 degrees. FIGS. 1 and 9 show the chair 10 in a closed, neutral position (with no added tilt and the assembly 104 in the position of FIG. 18). FIGS. 4 and 12 show the chair 10 in a closed position with added tilt and the assembly 104 in the position of FIG. 19. Similarly, FIGS. 5 and 13 show the chair 10 in the TV, neutral position (with no added tilt and the assembly 104 in the position of FIG. 18). FIGS. 6 and 14 show the chair 10 in TV position with added tilt and the assembly 104 in the position of FIG. 19. Similarly, FIGS. 7 and 15 show the chair 10 in the fully reclined, neutral position (with no added tilt and the assembly 104 in the position of FIG. 18). FIGS. 8 and 16 show the chair 10 in fully reclined position with added tilt and the assembly 104 in the position of FIG. 19. While the figures show the assembly 104 in either the neutral, non-tilted position of FIG. 18, or the position of FIG. 19 with full tilt added, it should be understood that the tilt motor 138 could be stopped such that the assembly 104 could exist in any position between that of FIG. 18 and that of FIG. 19. With the assembly 104 on the mechanism 100, a user can position the chair 10 to achieve more of a position known as a zero-gravity position by adding tilt to the chair in any of the closed position, the TV position and the fully reclined position, or any position therebetween. Such functionality provides additional options for positioning and comfort. In some aspects, the glide and tilt assembly 104 can be engaged to provide an added pitch anywhere within the range of added tilt, by stopping the motor 138 at an intermediate point. As one example, the mechanism 100 may be mounted on the chair 10 such that the seat 16 sits at an angle relative to horizontal of about nine degrees. The mechanism 10 may move this plane to an angle relative to horizontal of about 17 degrees as the chair 10 moves from the closed position to the TV position. This angle remains relatively the same as the mechanism 100 moves the chair 10 to a fully reclined position. With the glide and tilt assembly 104, the pitch of the chair 10 may be increased in any position. Continuing with the above example, by engaging the motor 138, with the chair 10 in the closed position, the pitch of the chair 10 can be increased, such that the seat 16 sits at an angle relative to horizontal of about 18 degrees, with the glide and tilt assembly 104 adding nine degrees of tilt, or pitch (again, this is an example, and the range of added tilt can vary, and in some aspects is the added pitch can be up to forty degrees). Similarly, with the chair 10 in the TV or fully reclined positions (or any position intermediate those two positions), the pitch of the chair 10 can be increased, such that the seat sits at an angle relative to horizontal of about 26 degrees (again, this is an example, and the range of the final seat pitch in the TV or fully reclined positions can be up to fifty degrees).

[0047] A similar glide and tilt assembly 204 could be used on a glider chair 200 as shown in FIGS. 22-25. The chair 200 includes a seat 201 and a back 203 that move together, as one unit. The glider chair 200 offers a gliding motion, allowing a user to glide between the neutral position shown in FIG. 22, to a forward glide position shown in FIG. 23, to a rearward glide position shown in FIG. 24 (and to reciprocate back and forth between the forward glide position and the rearward glide position). The chair 200 is a glider chair, without having the swivel or reclining features of the chair 10 described above with respect to FIGS. 1-16.

[0048] As shown in FIG. 22, the assembly 204 includes an arm mounting plate 202 that functions somewhat similarly to the glide bracket 102 in the chair 10. In some aspects, the arm mounting plate 202 is coupled to the side of the chair 200. The arm mounting plate 202 indirectly supports a front glide link 206 and directly supports a rear glide link 208. The lower end of the front glide link 206 is pivotally coupled to

a seat plate **210** at pivot point **212**. Similarly, the lower end of the rear glide link **208** is pivotally coupled to the seat plate **210** at pivot point **214**. The seat plate **210** supports the seat **201** and back **203** of the chair **200**. The upper end of the rear glide link **208** is pivotally coupled to the seat plate **202** at pivot point **215**.

[0049] To allow the tilting functionality, the assembly **204** includes a generally L-shaped front tilt link **216** that is pivotally coupled to the arm mounting plate **202** at pivot point **218**. One end of the front tilt link **216** is pivotally coupled to the upper end of the front glide link **206** at a pivot point **220**. The linkage of the arm mounting plate **202**, the front glide link **206**, the rear glide link **208**, the front tilt link **216** and the seat plate **210** provides a gliding motion to the seat **201** and back **203** of the chair **200**. The other end of the front tilt link **216** is pivotally coupled to a connector link **222** at a pivot point **224**. The end of the connector link **222** opposite pivot point **224** is pivotally coupled to a tilt drive link **226** at a pivot point **228**. The tilt drive link **226**, in some aspects, has two angled bends and may be formed as a unitary piece, or may be formed in multiple parts that are fixedly coupled to one another. Near the bend closest to pivot point **228**, the tilt drive link **226** is pivotally coupled to the arm mounting plate **202** at a pivot point **230**. The end of the tilt drive link **226** opposite pivot point **228** is fixedly coupled to a tilt motor tube assembly **232**, such as by bolting. While not shown, it should be understood that only one side of the assembly **204** is shown, but the assembly **204** includes opposed sides, spaced apart from one another that are mirror images of each other. The front glide links **206** may be coupled to one another for stability. Similarly, the rear glide links **208** may be coupled to one another for stability. The tilt motor tube assembly **232** includes a support tube **234** extending between, and coupled to, the tilt drive links **226**. The tilt motor tube assembly **232** also includes a motor block (not shown) that is similar to the motor block **136** of FIGS. **1-16** and **18-21**. The motor block is coupled to the support tube **234**, and is moveable by a tilt motor **238** along a shaft or track **240**. The tilt motor **238** has a bracket **242** extending from its lower end. The bracket **242** is pivotally coupled to the arm mounting plate **202** at a pivot point **244** such as, for example, via a lower motor tube extending between the arm mounting plates **202**.

[0050] The glide and tilt assembly **204** thus indirectly couples the front glide link **206** (and thus the seat plate **210**) to the arm mounting plate **202**. In use, the assembly **204** can operate to allow the chair **200** to reciprocate or glide. The assembly **204** can also be used to provide added tilt, as may be desired by the user. To provide added tilt, the tilt motor **238** is activated to move the assembly **204** from the position shown in FIGS. **22-24**, to the position shown in FIG. **25**. When the tilt motor **238** is activated, the motor block moves down the track **240**, rotating the tilt drive link **226** about pivot point **230**, causing a rotation of the front tilt link **216** about pivot point **218**. This moves the seat plate **210** from the position shown in FIG. **22** to the position shown in FIG. **25**. Because the seat plate **210** carries the seat **201** and the back **203**, moving the glide and tilt assembly **204** from the position shown in FIG. **22** to the position shown in FIG. **25** provides added tilt to the chair **200**. In the position of FIG. **25**, the chair **200** remains a glider, allowing the back and forth reciprocation discussed above. In some aspects, the added tilt can be in the range of about 4-16 degrees, or about 8-14 degrees, or about 10-12 degrees. While the figures show the assembly **204** in either the neutral, non-tilted position of FIGS. **22-24**, or the position of FIG. **25** with full tilt added, it should be understood that the tilt motor **238** could be stopped such that the assembly **204** could exist in any position between that of FIG. **22** and that of FIG. **25**. The pitch of the chair **200** can be adjusted in ranges similar to those discussed above with respect to FIGS. **1-16** and **18-24**. From the above, it should be understood that glide and tilt assemblies similar to assembly **104** and assembly **204** could be used on other seating arrangements to provide added tilt (and added comfort to the user).

[0051] A similar glide and tilt assembly **304** could be used on a glider recliner chair **300** as shown in FIGS. **26-34**. While the figures do not show the chair back, chair seat and ottoman, it should be understood that these components would be, in practice, installed to complete the chair **300**. The chair **300** offers a gliding motion, allowing a user to glide between the neutral position, to a forward glide position, to a rearward glide position (and to reciprocate back and forth between the forward glide position and the rearward glide position) as described above with respect to FIGS. **1-15**. The chair **300** is shown as a glider recliner chair, but the glide and tilt assembly **304** could also be used on a glider chair without having the swivel or reclining features (similar to the aspects shown and described with respect to FIGS. **18-25**). As described below, the glide and tilt assembly **304** translates the chair **300** forwardly as the chair tilts to provide added stability to the chair **300** when in the tilted positions.

[0052] Similar to the aspect shown in FIGS. **1-16**, the glide and tilt assembly **304** carries a recline mechanism **100** that is the same as, or similar to, the recline mechanism **100** shown in FIGS. **1-16**. As such, the mechanism **100** is supported above a swivel base **314** and is operable via a motor to move the chair **300** between the closed position (such as that shown in FIG. **26**) to a TV position (such as that shown in FIG. **28**), to a fully reclined position (such as that shown in FIG. **30**), and can stop at any of a number of various intermediate positions between those shown. Additionally, while shown on a swivel base **314**, the mechanism **100** could also be used on a glider base without the swivel feature.

[0053] With initial reference to FIG. **32**, the glide and tilt assembly **304** is carried on the swivel base **314**. The glide and tilt assembly **304** includes a glide bracket **316** that is rigidly mounted to the base **314**, such as on a front tube **318** and a rear tube **320**. In this aspect, a front glide lift link **322** is pivotally mounted to the glide bracket **316** at a pivot point **324**. The front glide lift link **322** is somewhat L-shaped, with the center section pivotally mounted to the glide bracket **316**. The front glide lift link **322** has a forward end that is pivotally mounted to the upper end of a front glide link **326** at a pivot point **328**. The lower end of the front glide link **326** is pivotally coupled to a carrier link **330** (as seen in FIG. **26**, for example) at a pivot point **331**. As with the aspects described above with respect to FIGS. **1-16**, the carrier link **330** carries the remainder of the mechanism **100**. Each of the two front glide links **326** may be coupled to one another with a cross-tube **332**.

[0054] The lower or rear end of the front glide lift link **322** is pivotally coupled to a pitch control link **334** at a pivot point **336**. The pitch control link **334** extends forwardly from pivot point **336**, and is pivotally coupled at its other end to a pitch tube connector link **338** at a pivot point **340**. The

pitch tube connector link **338** is fixedly coupled to a bracket **342**, such as at points **344** and **346**. The bracket **342** is also fixedly coupled to a pitch motor tube **348** that extends between two opposed brackets **342**. The pitch tube connector link **338** is also pivotally coupled to the glide bracket **316** at a pivot point **350**. The pitch motor tube **348** is pivotally coupled to a motor shaft **352**, via a bracket **354** that is fixedly coupled to the pitch motor tube **348**. The rear end of a motor **356** (that is operable to extend and retract the shaft **352**) is pivotally coupled to the base **314**, such as through a bracket **358**. In the aspect of FIGS. **26-34**, the motor **356** is lower and more near the base **314** than in the aspect of FIGS. **1-16**, allowing the glide and tilt assembly **304** to be used on a greater variety of chair designs. The motor **356** is also oriented substantially horizontally, verses the relatively vertical orientation of the motor **138** in FIGS. **1-16**.

[0055] With this arrangement, the front glide link **326** is indirectly coupled to the glide bracket **316**. As discussed below, in this aspect, a rear glide link **360** is also indirectly coupled to the glide bracket **316**. More specifically, as opposed to the aspect described above with reference to FIGS. **1-16**, the rear glide link **360** in this aspect is not directly coupled to the glide bracket **316**. Instead, the top of the rear glide link **360** is pivotally coupled to a glide transfer link **362** at a pivot point **364**. The lower end of the rear glide link **360** is pivotally coupled to the carrier link **330** at a pivot point **366**. In some aspects, the rear glide links **360** are coupled by a rear cross plate **368** to provide stability. The lower end of the glide transfer link **362** is pivotally coupled to the glide bracket **316** at a pivot point **370**. The glide transfer link **362** is also pivotally coupled to a connector link **372** at a pivot point **374**. The connector link **372** extends forwardly from point **374** and is pivotally connected at the forward end to the front glide lift link **322** at a pivot point **376**.

[0056] In any position, the glide and tilt assembly **304** may be used to increase the overall pitch of the chair **300** relative to the base **314**. To increase the pitch, the motor **356** is activated, extending the shaft **352**. This extension rotates the pitch tube connector link **342** about pivot point **350** (counterclockwise as viewed in FIG. **32**, shown by arrow **400**). This rotation pulls the pitch control link **334** forwardly, which rotates the front glide lift link **322** about pivot point **324** (clockwise as viewed in FIG. **32**, shown by arrow **402**). As the front glide lift link **322** rotates, the front glide link **326** is raised, as seen in FIG. **33**, to increase the pitch of the chair **300** in any position. By way of example, the chair **300** is shown tilted in each of the closed, TV and fully reclined positions in FIGS. **27**, **29** and **31**, respectively.

[0057] In the aspect of FIGS. **26-34**, in the non-titled position, pivot point **328** is level with, or approximately level with, pivot point **324**. This allows a more linear movement upwardly of the front glide link **326** (as opposed to a configuration where the pivot point **324** is substantially lower than the pivot point **328**, which would bring the front glide link **326** both upwardly and rearwardly in somewhat of an arc).

[0058] Additionally, in the aspect of FIGS. **26-34**, as the glide and tilt assembly **304** increases the overall pitch of the chair **300** relative to the base **314**, it also translates the mechanism **100** (and thus the seat, back and ottoman of the chair **300**) forwardly relative to the base **314**. More specifically, as the front glide lift link **322** rotates as shown by arrow **402**, it pulls the connector link **372** forwardly. This pulling motion, in turn, rotates the glide transfer link **362** about pivot point **370**, and pulls the rear glide link **360** forwardly with respect to the base **314**, as can be seen by comparing FIG. **32** to FIG. **33** (or by comparing FIG. **28** to FIG. **29** or FIG. **30** to FIG. **31**, or in the overlay shown in FIG. **34**). As viewed in FIG. **4**, the glide and tilt assembly **304** may move the mechanism forwardly relative to the base by comparing the positions of pivot point **364** (non-tilted) to pivot point **364'** (tilted). In some aspects, pivot point **364'** may move about 1.5" forwardly, although other movement distances are possible. This motion is achieved through the glide and tilt assembly **304**, and assisted by a glide lock. As seen in FIG. **26**, the glide lock includes locking fingers **412** that rotate as the mechanism **100** moves from the closed position (FIG. **26**) to the TV position (FIG. **28**). As the fingers **412** rotate to the TV position, they entrap a pin **414** extending from the rear glide link **360** (see, for example, FIGS. **28** and **30**). Therefore, in the TV and fully reclined positions, as the rear glide link **360** moves forwardly, the entire mechanism **100** moves forwardly relative to the base **314** (compare, for example, FIG. **27** to FIG. **28** or FIG. **29** to FIG. **30**). This moves the center of gravity of the chair **300** forwardly relative to the base **314** as the pitch of the chair increases and provides added stability to the chair **300** (making a tipping condition less likely).

[0059] Additionally, in the aspect shown in FIGS. **26-34**, pivot point **328** (the top of the front glide link **326**) is approximately the same height, if not the same height, as pivot point **324** (the rotational point of the front glide lift link **322**). This allows the pivot point **328** to be driven more upwardly and less rearwardly than the aspect shown in FIGS. **1-16**. This also allows the center of gravity of the chair to stay more forward relative to the base **314** as the glide and tilt assembly **304** moves to the tilted position. The aspect shown in FIGS. **26-34** also moves pivot point **364** (the top of the rear glide link **360**) closer to pivot point **328** as the glide and tilt assembly moves **304** to the tilted position. By moving these two pivot points closer together as the pitch of the chair increases, the amount of gliding motion is limited in the closed, tilted position of FIG. **27** (or in any tilted position prior to pin **414** being entrapped by fingers **412**). As viewed in FIG. **34**, the distance D**1** may be approximately 8.5", and the distance D**2** may be approximately 10", with the pivot point **364'** about 1.5" closer to pivot point **328'** in the tilted position, as compared to pivot point **328** and **364** in the non-tilted position. So, the chair **300** can still glide in the closed, tilted position of FIG. **27**, but with a more limited glide motion as compared to the closed, non-tilted position of FIG. **26**. This also adds stability to the glide chair **300** in the closed, tilted position.

[0060] As known to those in the art, the mechanism **100** includes a seat plate **418** that is used to couple the seat of the chair **300** to the mechanism **100**. The seat plate **418** may include a number of seat tabs **420** to aid in this attachment. The added pitch effected by the glide and tilt assembly **304** can be seen by comparing the orientation of seat tabs **420**, as seen in FIG. **26** and indicated by angle α to the orientation of the seat tabs **420** as seen in FIG. **27** as indicated by angle β. In practice, the mechanism **100** may be coupled to the chair **300** in an orientation chosen by the chair designer or manufacturer. In most designs, the mechanism **100** is mounted such that the seat plate **418** (and the plane defined by the seat tabs **420**) is somewhat inclined from the rear of the chair **300** to the front of the chair **300**, when in a closed,

neutral (non-gliding) position. In some aspects, the initial pitch may be between about 5-12 degrees. The glide and tilt assembly **304** can be independently (with the chair **300** in any position) engaged to increase the pitch of the chair. In some aspects, the glide and tilt assembly **304** can provide an added pitch of up to forty added degrees of tilt (see the angle X in FIG. **34**). In some aspects, the added tilt can be in the range of about 4-16 degrees, or about 8-12 degrees, or about 9-11 degrees (although, again, the added tilt could range up to forty degrees). In some aspects, the glide and tilt assembly **304** can be engaged to provide an added pitch anywhere within that range, by stopping the motor **356** at an intermediate point. As one example, the mechanism **100** may be mounted on the chair **300** such that the seat tabs **420** form a plane relative to horizontal of about nine degrees (angle α in FIG. **26**). The mechanism **100** may move this plane to an angle relative to horizontal of about 17 degrees as the chair moves to the TV position (angle ϕ in FIG. **28**). This angle remains relatively the same as the mechanism **100** moves the chair **300** to a fully reclined position. With the glide and tilt assembly **304**, the pitch of the chair **300** may be increased in any position. Continuing with the above example, by engaging the motor **356**, with the chair **300** in the closed position, the pitch of the chair **300** can be increased, such that the seat tabs **420** form a plane relative to horizontal of about 18 degrees (angle β in FIG. **27**), with the glide and tilt assembly **304** adding nine degrees of tilt, or pitch. Similarly, with the chair **300** in the TV or fully reclined positions (or any position intermediate those two positions), the pitch of the chair **300** can be increased, such that the seat tabs **420** define a plane relative to horizontal of about 26 degrees (angle δ in FIG. **29**). It should be understood that the above is only one example, and the angle δ in FIG. **29** could be adjusted up to fifty degrees in some aspects. Again, with the glide and tilt assembly **304**, the chair **300** translates forwardly relative to the base **314** as the pitch increases, to increase the stability of the chair **300** in a tilted position. In some aspect, the glide and tilt assembly **304** translates the chair forwardly between about 1-2 inches, and in some aspects, about 1.5 inches.

[0061] Aspects of the present disclosure have been described with the intent to be illustrative rather than restrictive. Alternative aspects will become apparent to those skilled in the art that do not depart from its scope. A skilled artisan may develop alternative means of implementing the aforementioned improvements without departing from the scope of the present disclosure.

[0062] It will be understood that certain features and subcombinations are of utility and may be employed without reference to other features and subcombinations and are contemplated within the scope of the claims. Not all steps listed in the various figures need be carried out in the specific order described.

1. A powered glider recliner seating unit moveable between closed, TV and fully reclined positions, the seating unit comprising;

a base;

a glide and tilt assembly coupled to the base;

a linkage mechanism supported on the glide and tilt, the linkage mechanism including a seat mounting plate, and being configured to move the seating unit between the closed, TV and fully reclined positions;

the glide and tilt assembly allowing a reciprocating gliding motion of the seat mounting plate above the base at least when the recliner is in the closed position; and including a powered actuator operable to change the orientation of the seat mounting plate independent of the position of the seating unit.

2. The powered glider recliner of claim **1**, further comprising:

a glide bracket coupled to the base;

and wherein the linkage mechanism comprises a carrier link at least indirectly coupled to the seat mounting plate; and

wherein the glide and tilt assembly is coupled between the glide bracket and the carrier link.

3. The powered glider recliner of claim **2**, wherein the glide and tilt assembly includes a front glide link having a top and a bottom, and a rear glide link having a top and a bottom, and wherein the carrier link is pivotally coupled to the bottom on the front glide link and to the bottom of the rear glide link.

4. The powered glider recliner of claim **3**, wherein at least the top of the front glide link is indirectly coupled to the glide bracket.

5. The powered glider recliner of claim **4**, wherein the top of the rear glide link is also indirectly coupled to the glide bracket.

6. The powered glider recliner of claim **4** wherein the top of the front glide link is indirectly coupled to the glide bracket via a front glide lift link, the front glide lift link pivotally coupled to glide bracket and operably coupled to the powered actuator to effect rotation of the front glide lift link with respect to the glide bracket, to lift the top of the front glide link as the actuator rotates the front glide lift link, and wherein the lifting of the top of the front glide lift link increase the angular orientation of the seat mounting plate relative to horizontal and independent of the position of the seating unit.

7. The powered glider of claim **1**, wherein actuation of the powered actuator increases the pitch of the seat plate with the recliner in any position by between zero and forty degrees.

8. The powered glider of claim **1**, wherein actuation of the powered actuator tilts the seat plate to an angle relative to horizontal of between 10-50 degrees.

9. The powered glider of claim **4**, wherein actuation of the powered actuator brings the top of the rear glide link closer to the top of the front glide link, lowering the amount of glide possible.

10. The powered glider of claim **4**, wherein the glide and tilt assembly translates the linkage mechanism forwardly upon actuation of the powered actuator, to move a center of gravity of the linkage mechanism forwardly.

11. The powered glider of claim **6**, wherein the front glide lift link is coupled to the rear glide link through a connector linkage.

12. A glider seating unit, having opposed sides, a seat and a back, comprising;

a stationary base;

a seat plate coupled to the seat, and supported by the base; and

a glide and tilt assembly coupled between the base and the seat plate, and operable to change the orientation of the seat plate and allowing a reciprocating motion of the seat and back.

13. The glider seating unit of claim **12**, wherein the base comprises an arm mounting plate coupled to each of the opposed sides.

14. The glider seating unit of claim **13**, wherein the glide and tilt assembly includes a front glide link having a top and a bottom, and a rear glide link having a top and a bottom, and wherein the top of the rear glide link is directly pivotally coupled to the arm mounting plate, and the top of the front glide link is indirectly coupled to the arm mounting plate.

15. The glider seating unit of claim **14**, further comprising a powered actuator coupled to the glide and tilt assembly and operable to move the glide and tilt assembly to change the orientation of the seat mounting plate.

16. A powered glider recliner seating unit moveable between closed, TV and fully reclined positions, the seating unit comprising;

a base;

a glide and tilt assembly coupled to the base;

a linkage mechanism supported on the glide and tilt assembly, the linkage mechanism including a seat mounting plate, and being configured to move the seating unit between the closed, TV and fully reclined positions;

the glide and tilt assembly allowing a reciprocating gliding motion of the seat mounting plate above the base at least when the recliner is in the closed position; and including a powered actuator operable to increase the angle of the seat mounting plate relative to horizontal and independent of the position of the seating unit, and to translate the seat mounting plate forwardly as the powered actuator increases the angle of the seat mounting plate.

17. The powered glider recliner of claim **16**, further comprising:

a glide bracket coupled to the base;

and wherein the linkage mechanism comprises a carrier link at least indirectly coupled to the seat mounting plate; and

wherein the glide and tilt assembly is coupled between the glide bracket and the carrier link.

18. The powered glider recliner of claim **17**, wherein the glide and tilt assembly includes a front glide link having a top and a bottom, and a rear glide link having a top and a bottom, and wherein the carrier link is pivotally coupled to the bottom on the front glide link and to the bottom of the rear glide link.

19. The powered glider recliner of claim **18**, wherein the top of the front glide link is indirectly coupled to the glide bracket, and wherein the top of the rear glide link is also indirectly coupled to the glide bracket.

20. The powered glider recliner of claim **19**, wherein the glide and tilt assembly can add pitch to the angle of the seat mounting plate of between one and forty degrees independently of the position of the powered glider recliner.

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