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Other: **None**

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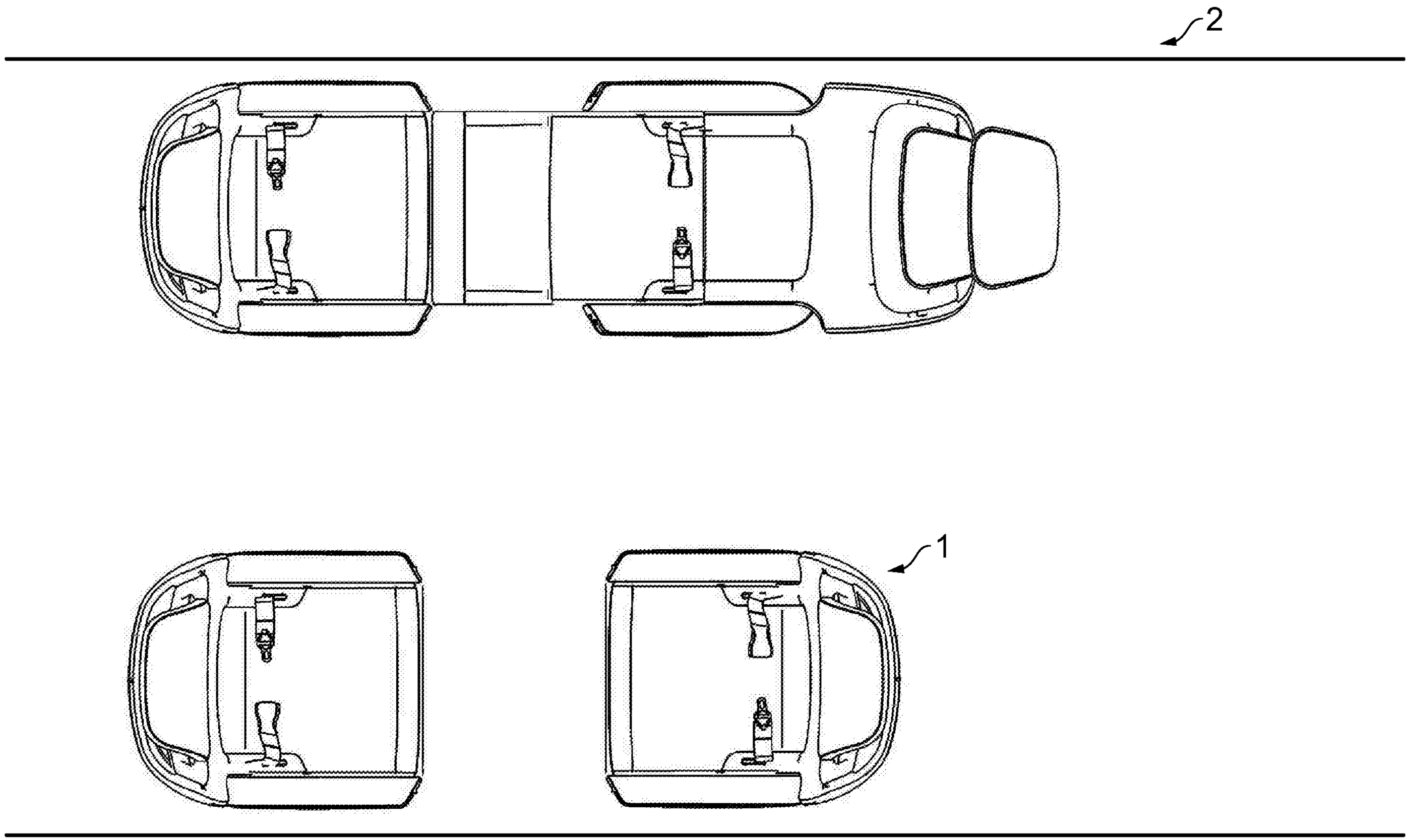


FIG. 1

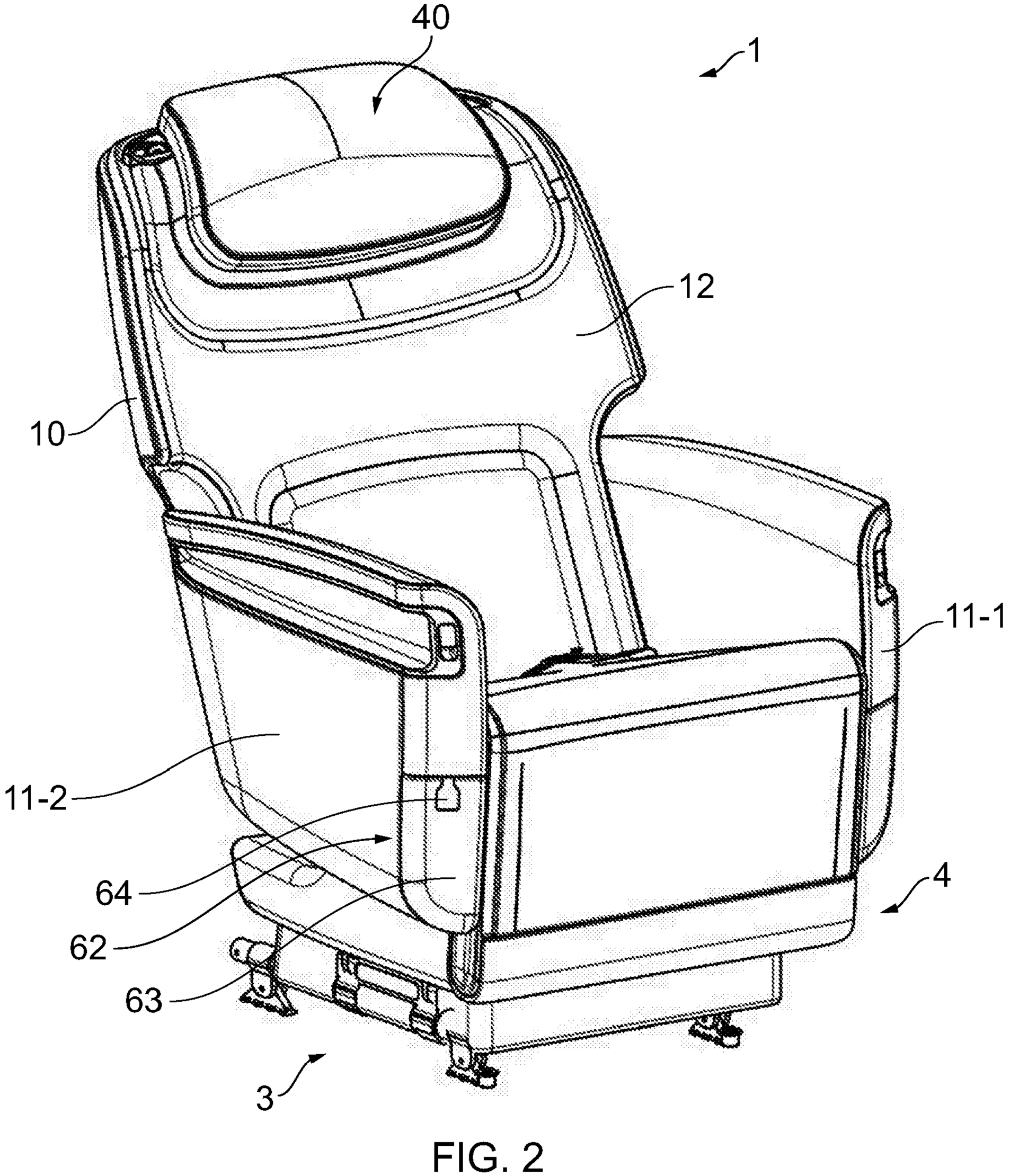
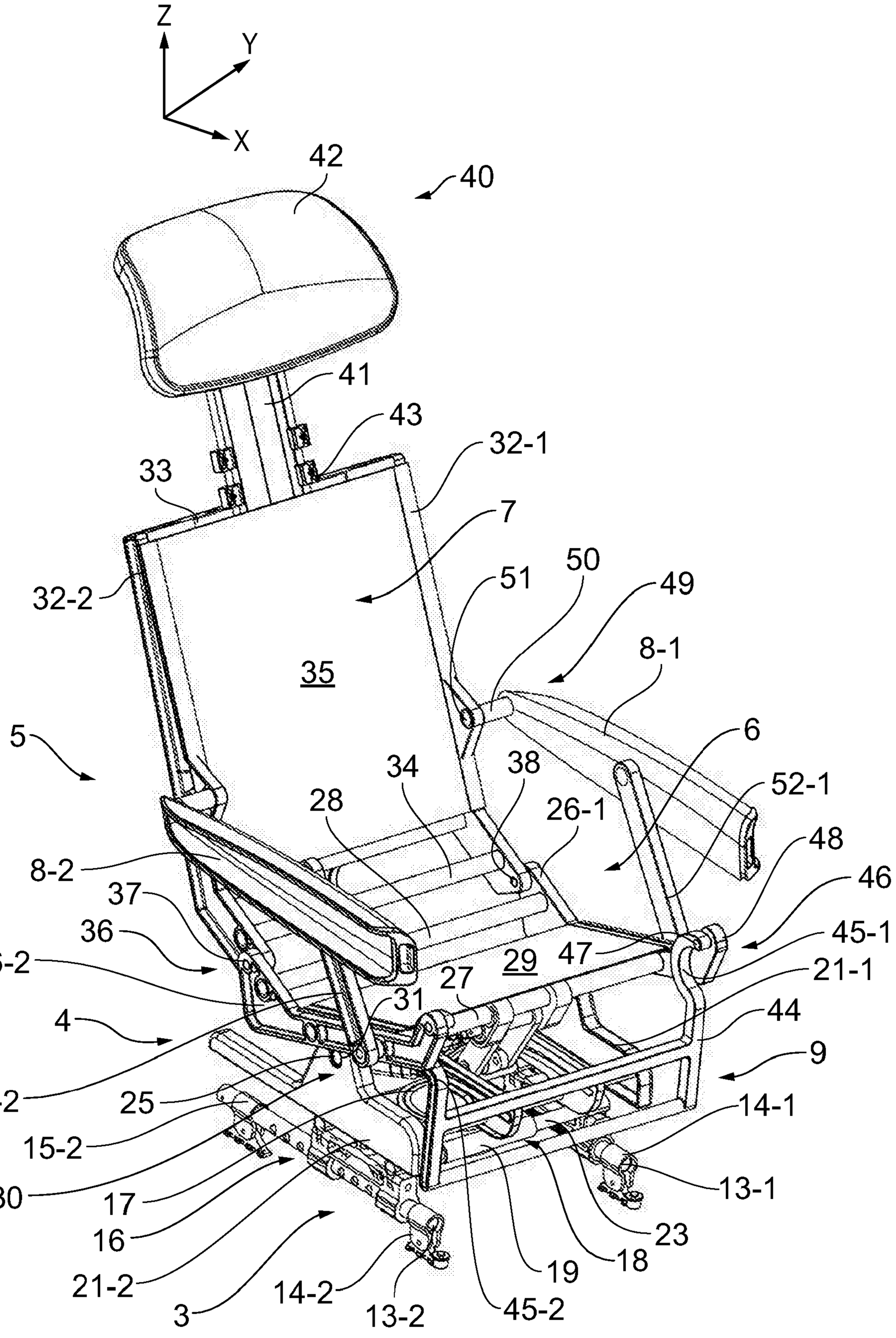


FIG. 2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13-1
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FIG. 3

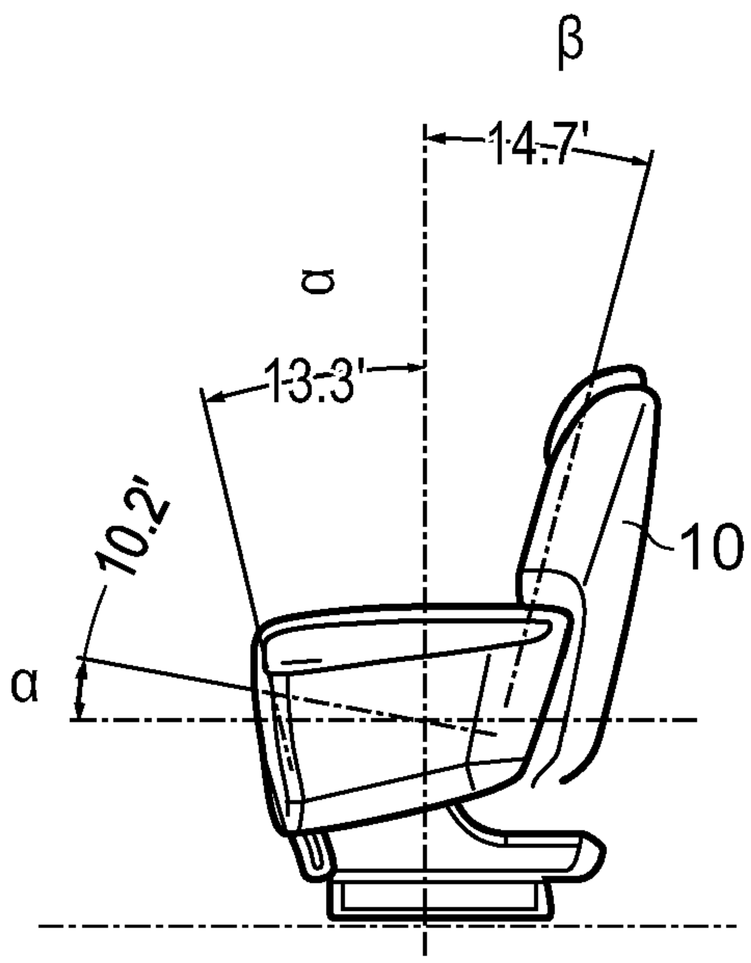

FIG. 4A

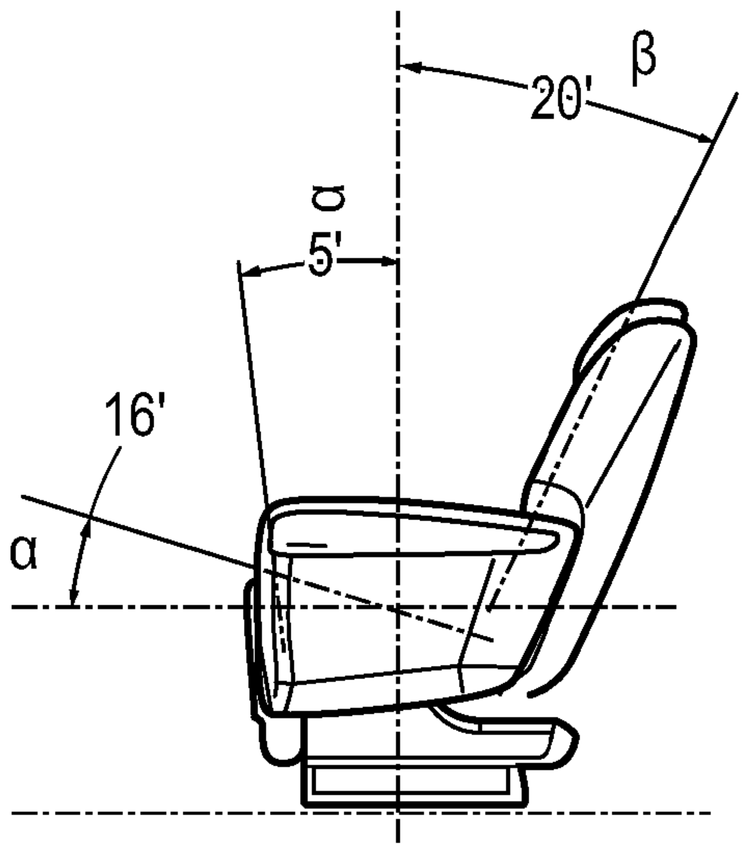

FIG. 4B

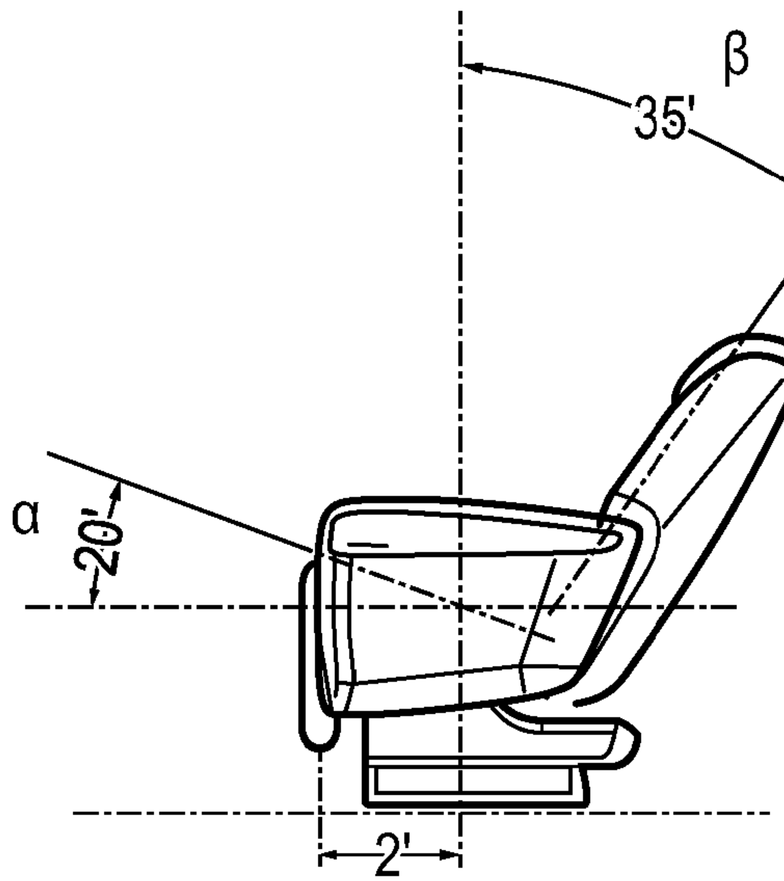

FIG. 4C

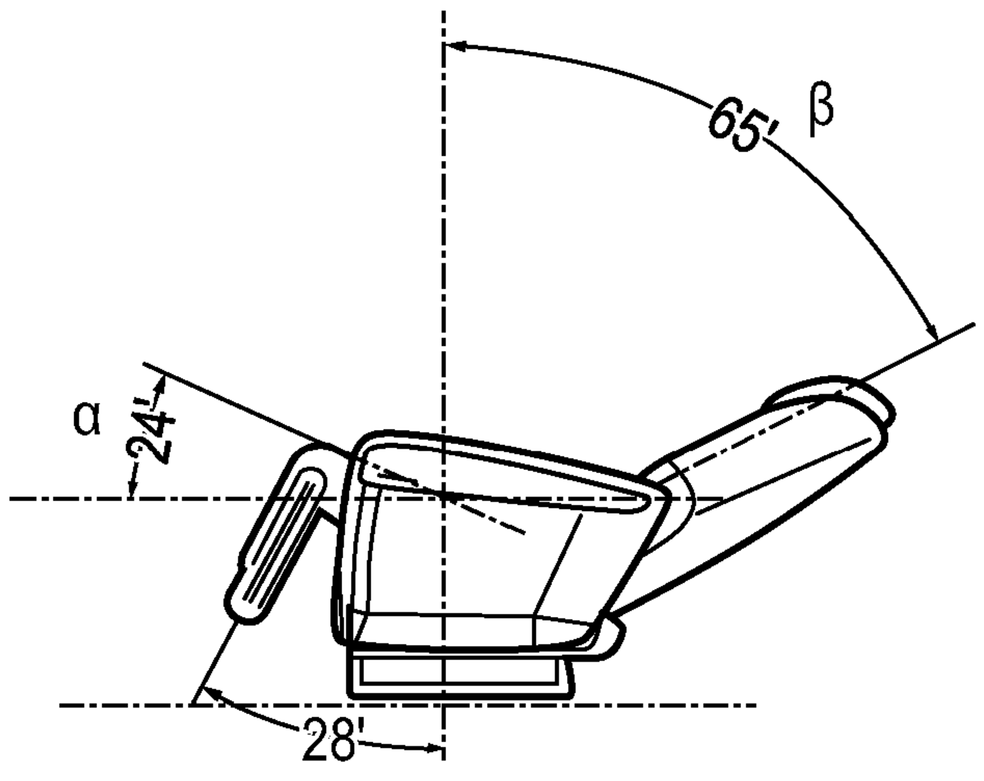

FIG. 4D

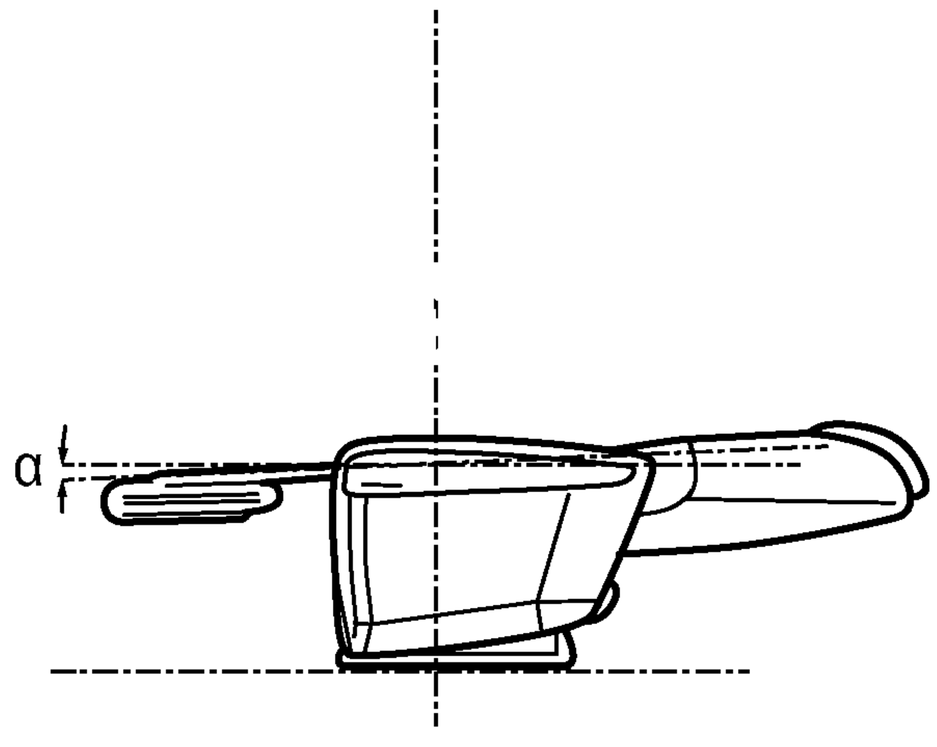

FIG. 4E

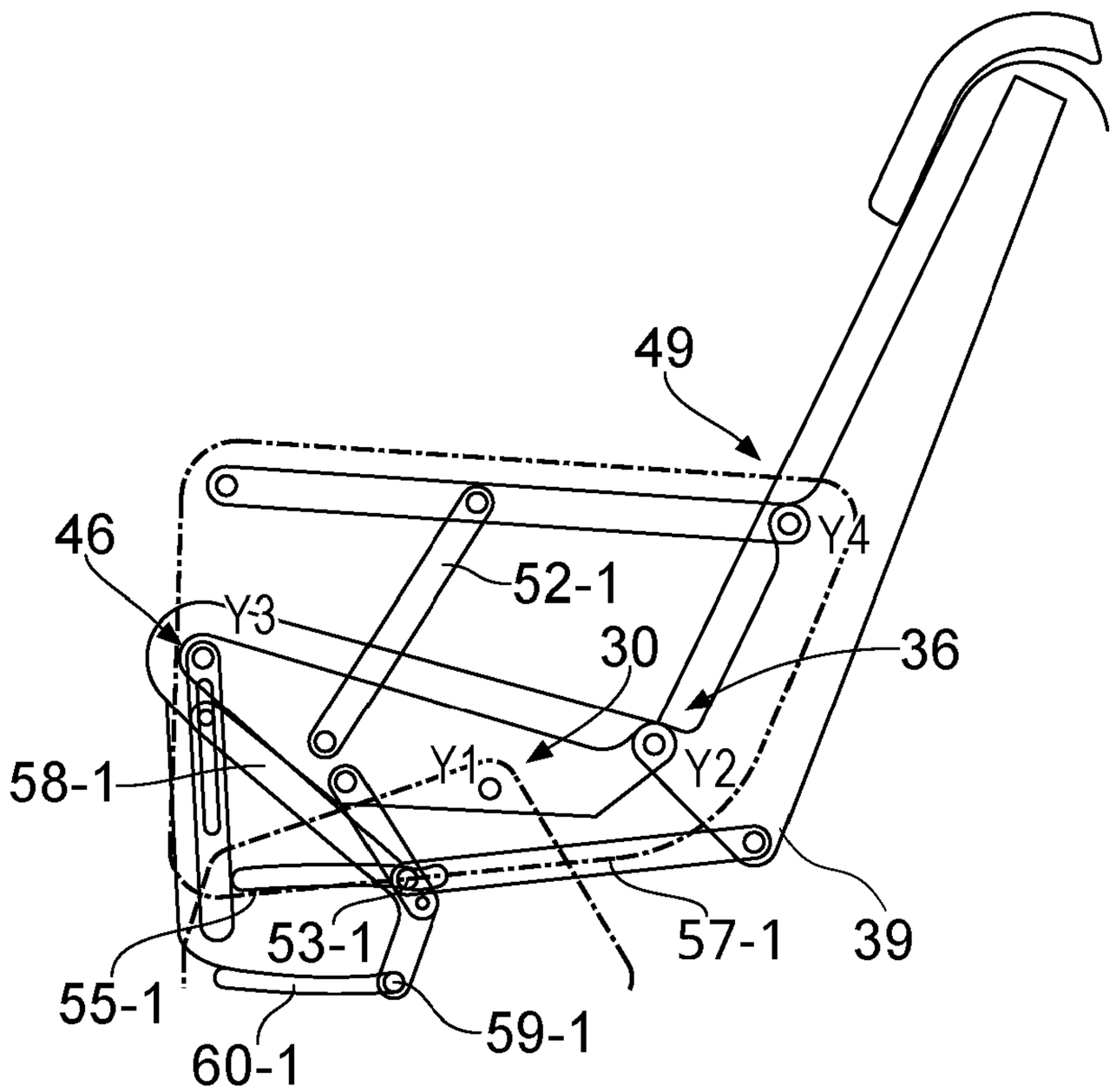

FIG. 5

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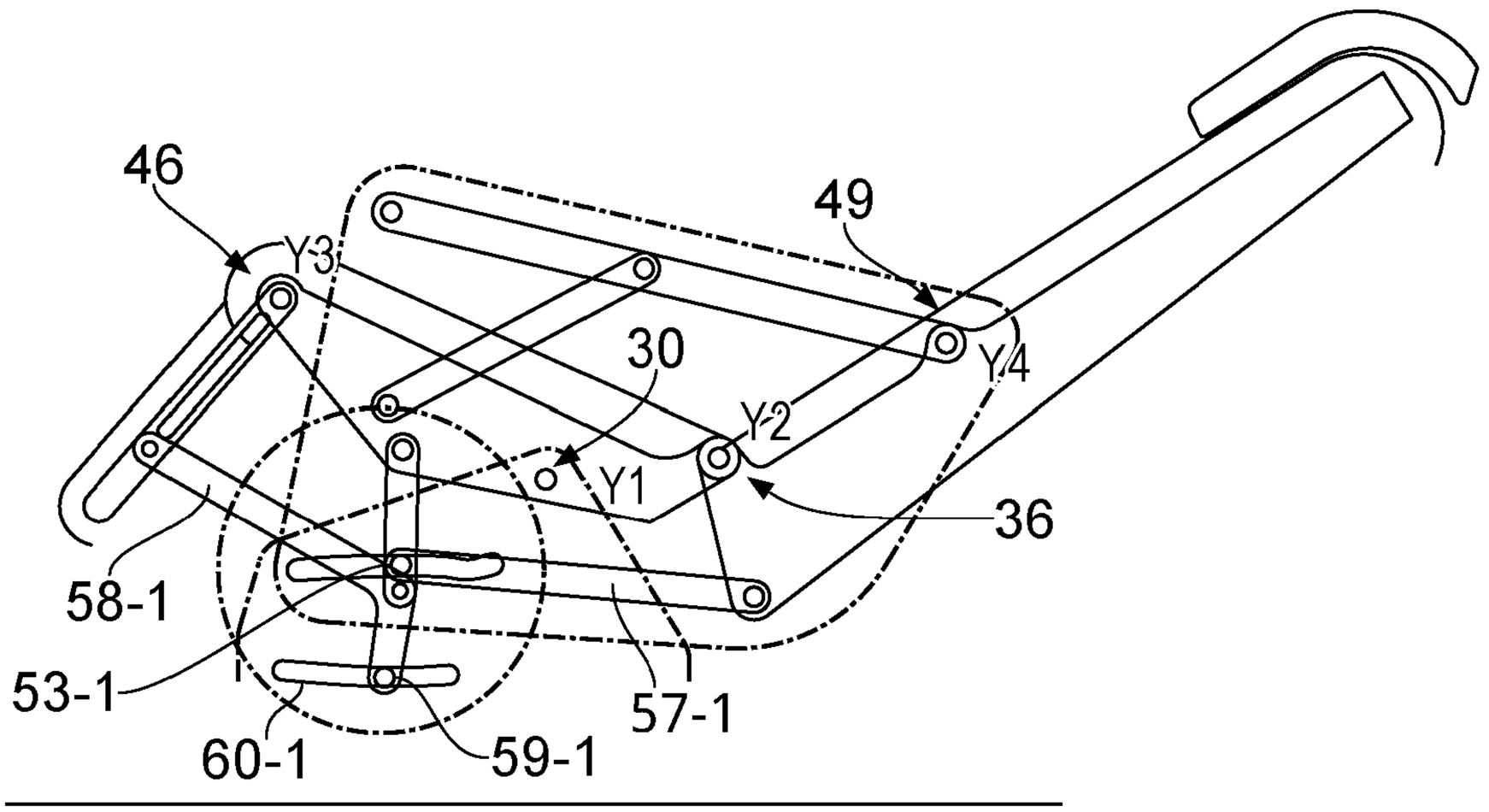


FIG. 6

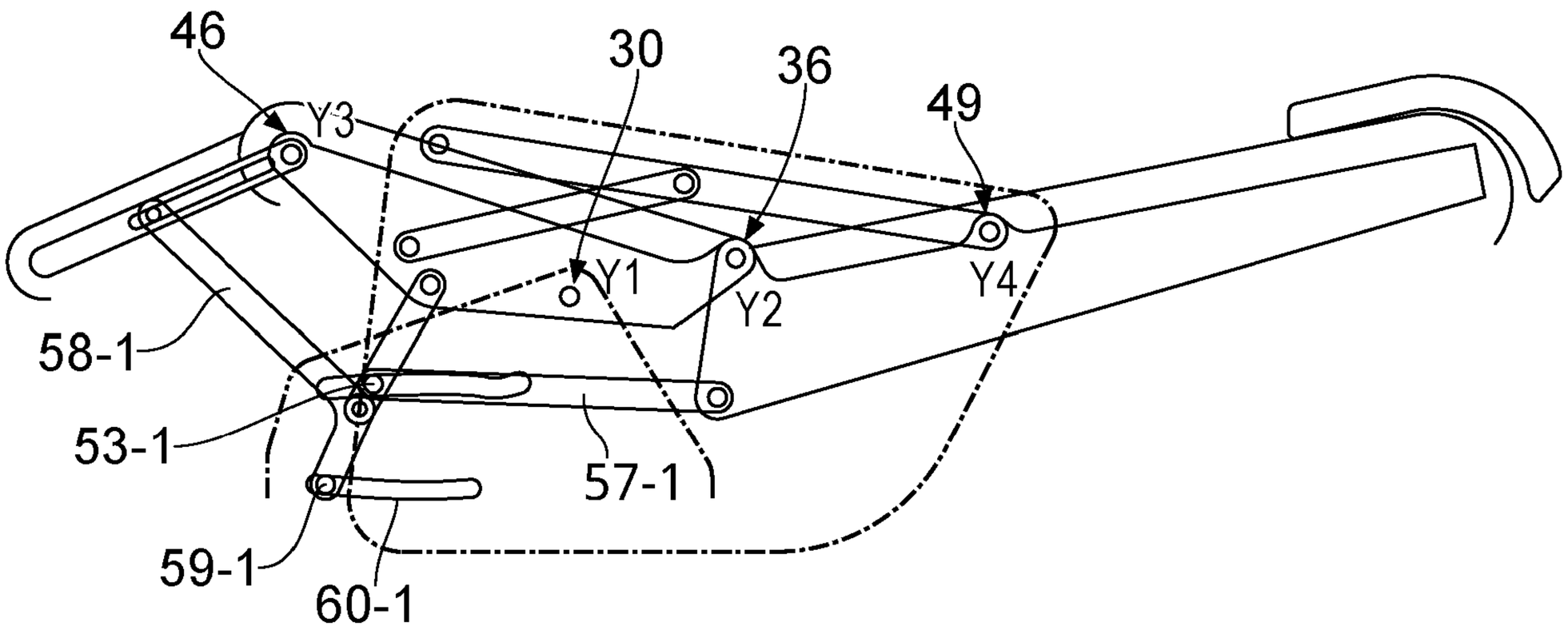


FIG. 7

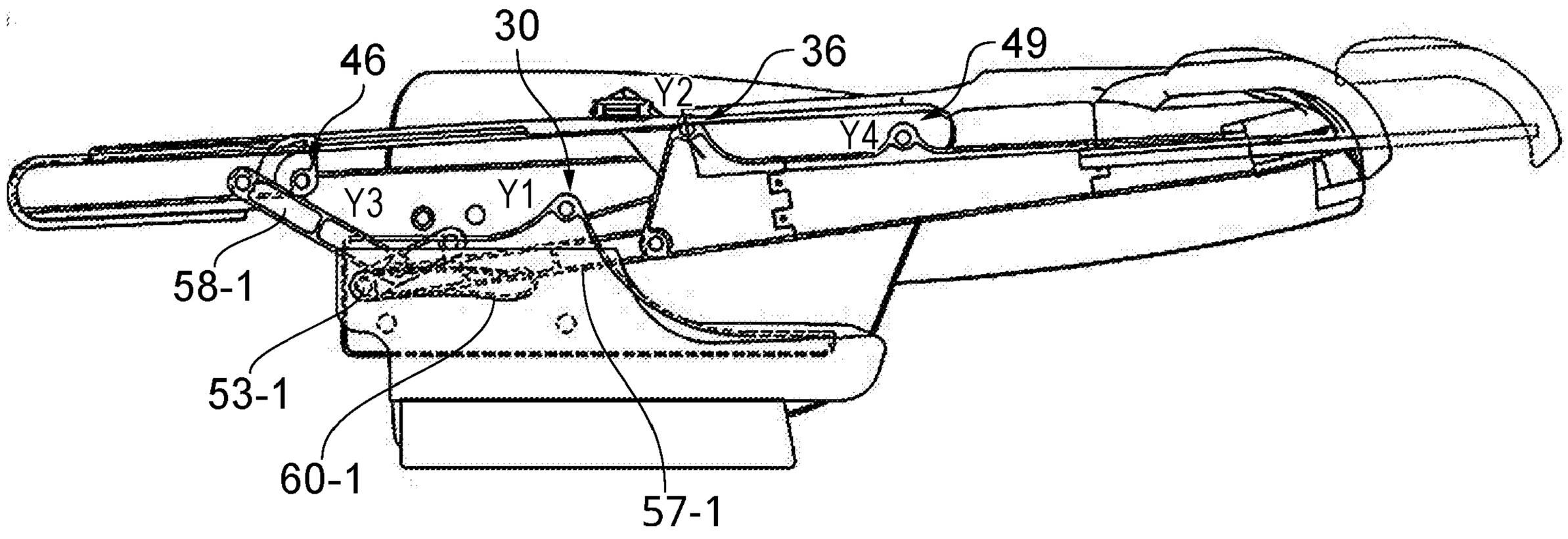
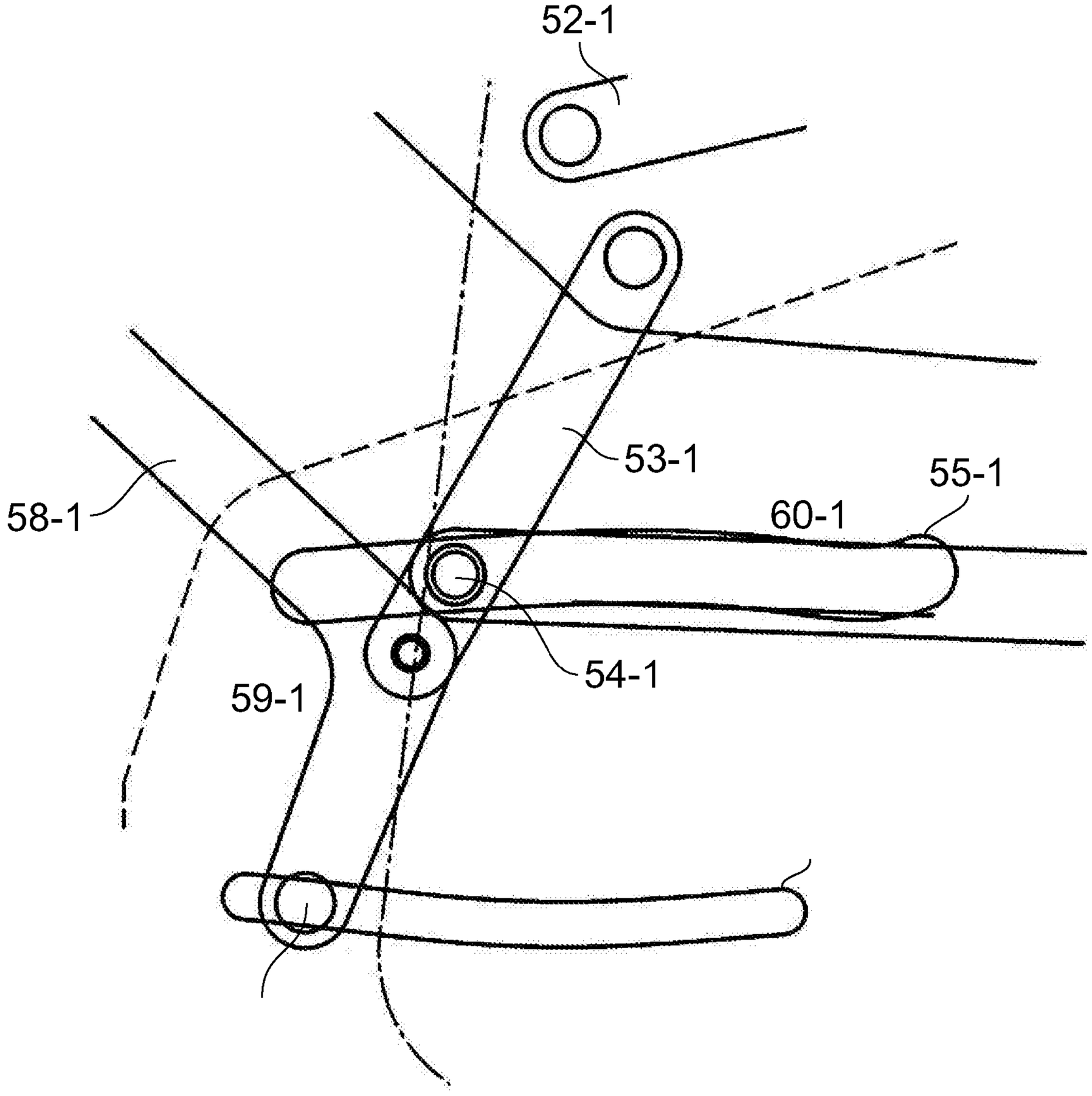


FIG. 8



DETAIL A

FIG. 9

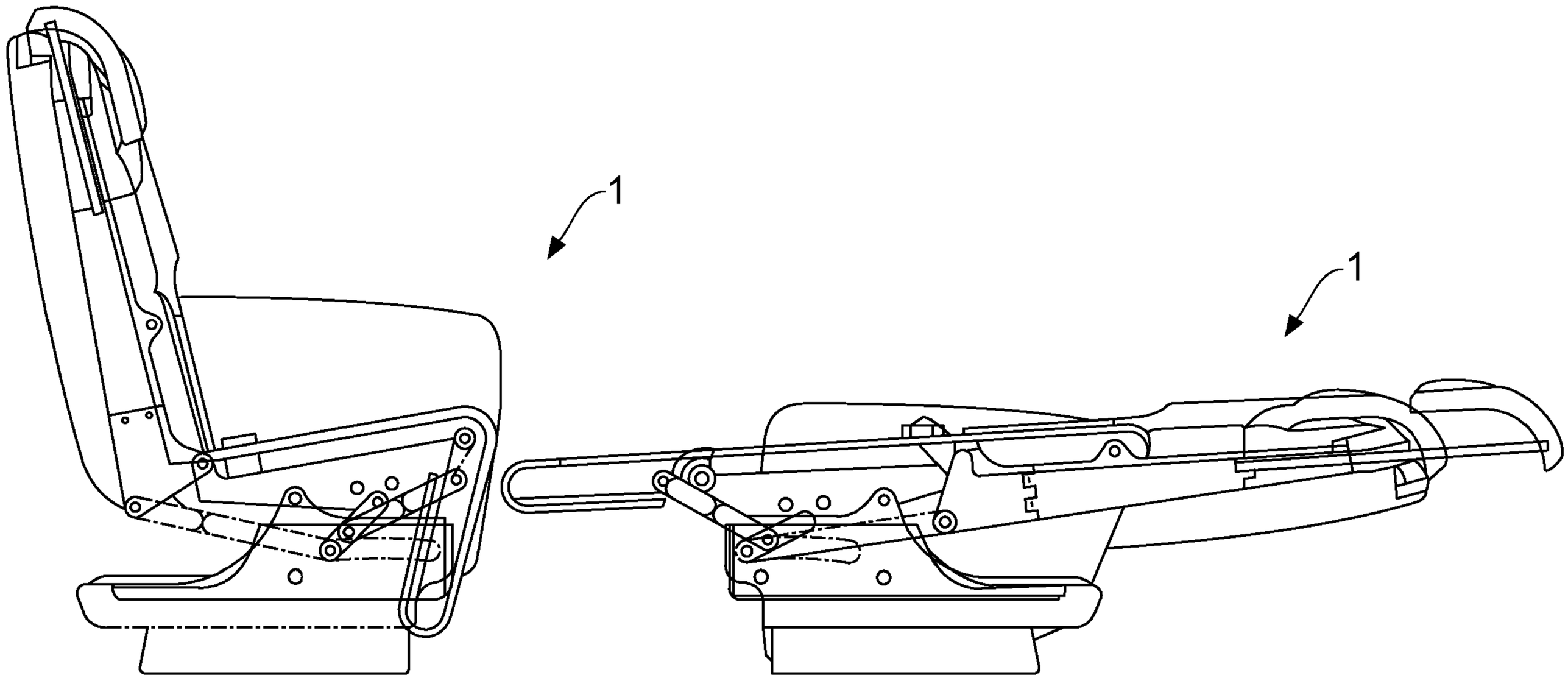


FIG. 10

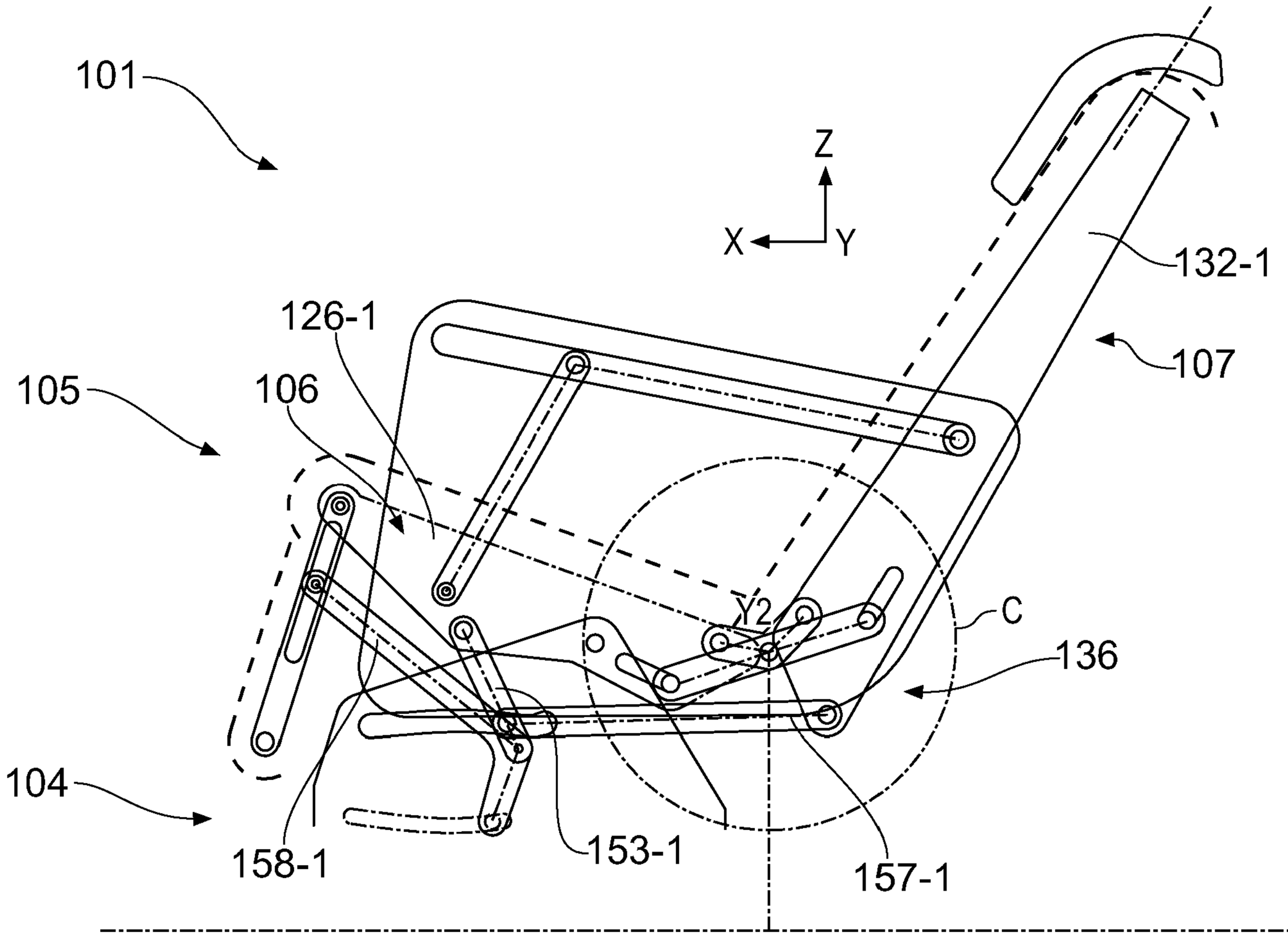


FIG. 11

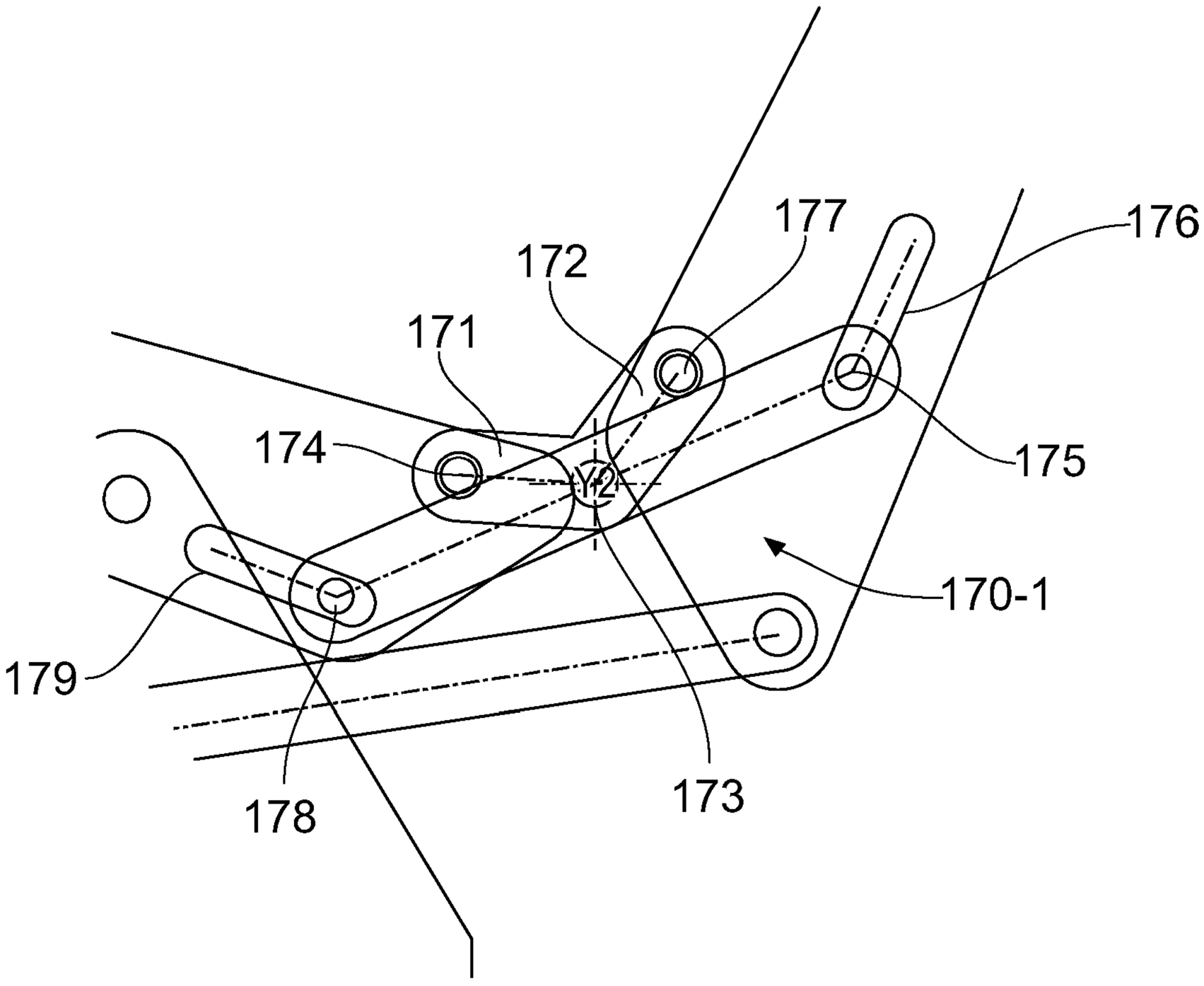


FIG. 12

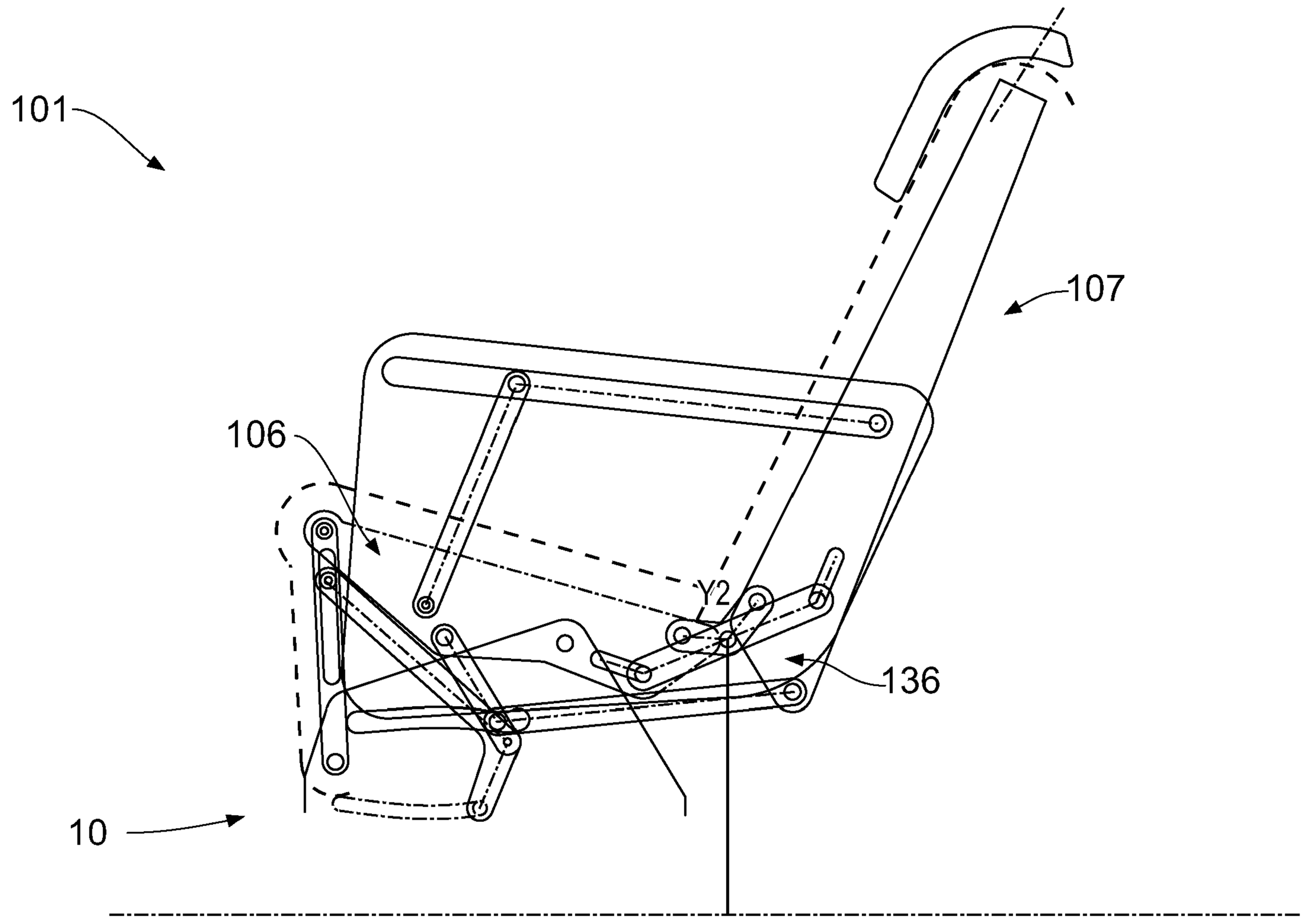


FIG. 13

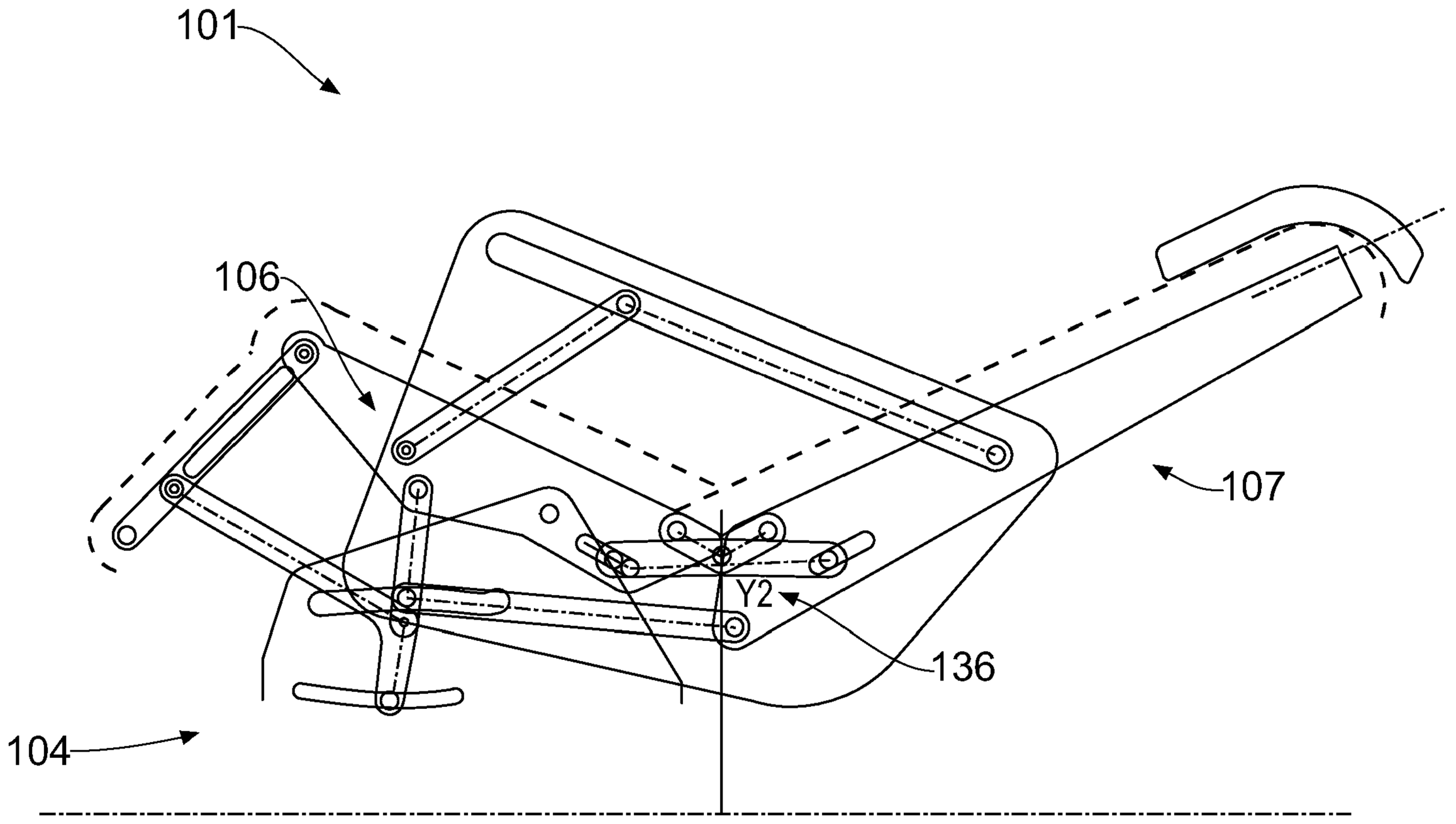


FIG. 14

SEATING APPARATUS

TECHNICAL FIELD

The present disclosure relates to a seating apparatus. More particularly, but not exclusively, the present disclosure relates to an aircraft seat and to an aircraft.

BACKGROUND

It is known to provide an aircraft seat that is re-configurable between one or more seating configuration and a berthing configuration. A known aircraft seat typically comprises a seat back and a seat pan. A leg rest may optionally also be provided. In said berthing configuration, the seat back, the seat pan and, if fitted, the leg rest may align with each other to form a bed.

It is known from EP 2134602 to mount the seat pan to pivot about a front pivot axis. The seat pan is inclined upwardly when in a seating configuration. The rear of the seat pan is raised to re-configure the seat to a berthing configuration.

SUMMARY OF THE INVENTION

Aspects of the present invention relate to an aircraft seat; and to an aircraft as claimed in the appended claims.

According to a further aspect of the present invention there is provided an aircraft seat comprising:

a seat chassis;

a seat assembly comprising a seat pan and a seat back, the seat pan being mounted to the seat chassis by a first pivoting connection defining a seat pan pivot axis about which the seat pan pivots; and

comprising at least one armrest, the at least one armrest being movable relative to said seat chassis;

the seat back being mounted to said seat pan by a second pivoting connection, the second pivoting connection defining a seat back pivot axis about which the seat back pivots, the seat pan pivot axis being located in front of the seat back pivot axis at a mid-point of the seat pan, or between the seat back pivot axis and the mid-point of the seat pan;

wherein the at least one armrest is pivotally connected to the seat back; and at least one armrest link is pivotally coupled to the at least one armrest and the seat pan; the at least one armrest link being pivotally coupled to the seat pan. The at least one armrest may, for example, be movable relative to said seat chassis in a vertical plane.

The at least one armrest is pivotally connected to the seat back. At least one armrest link pivotally couples the at least one armrest and the seat chassis.

The aircraft seat may comprise a seat base for mounting fixedly to a floor of an aircraft. The seat chassis may be movably mounted to said seat base. The seat base may comprise at least one longitudinal guide to provide longitudinal movement of the seat chassis relative to the seat base. The seat base may comprise at least one transverse guide to provide transverse movement of the seat chassis relative to the seat base. The seat base may provide vertical movement.

The seat base may comprise a turntable to enable the angular orientation of the seat chassis relative to be adjusted relative to the seat base.

The seat pan may comprise first and second seat pan sidemembers. The first and second seat pan sidemembers may be mounted to said seat chassis. A first tension membrane may be supported by said first and second seat pan sidemembers.

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The seat chassis may comprise first and second base sidemembers. The first pivoting connection may mount said first and second seat pan sidemembers to said first and second base sidemembers. For example, one or more pivot pin and bearing(s) may be provided to mount said first and second seat pan sidemembers to said first and second base sidemembers.

The seat base may be rotatable about a vertical axis. Alternatively, or in addition, the seat base may translate in a horizontal and/or vertical direction. At least in certain embodiments, the seat base may be configured such that rotation about a transverse axis is inhibited. The seat base sidemembers may not pivot about a transverse axis. The orientation of the seat base sidemembers may thereby be fixed.

The seat back may comprise first and second seat back sidemembers. A second tension membrane may be supported by said first and second seat back sidemembers.

The aircraft seat may be selectively configurable in a berthing configuration and one or more seating configuration. The seat pan, the leg rest and the seat back may be at least substantially aligned with each other when the aircraft seat is in said berthing configuration.

According to a further aspect of the present invention there is provided an aircraft comprising one or more aircraft seat as described herein.

The references herein to a real pivot axis refer to a physical pivot axis or an actual pivot axis. The real pivot axis may, for example, be defined by one or more pivot pin. In arrangements comprising more than one pivot pin, the pivot pins may be arranged coaxially to define said real pivot axis. For example, the real pivot axis may be defined by opposing first and second pivot pins.

Within the scope of this application it is expressly intended that the various aspects, embodiments, examples and alternatives set out in the preceding paragraphs, in the claims and/or in the following description and drawings, and in particular the individual features thereof, may be taken independently or in any combination. That is, all embodiments and/or features of any embodiment can be combined in any way and/or combination, unless such features are incompatible. The applicant reserves the right to change any originally filed claim or file any new claim accordingly, including the right to amend any originally filed claim to depend from and/or incorporate any feature of any other claim although not originally claimed in that manner.

BRIEF DESCRIPTION OF THE DRAWINGS

One or more embodiments of the present invention will now be described, by way of example only, with reference to the accompanying figures, in which:

Figure 1 shows a schematic representation of an aircraft comprising aircraft seat in accordance with an embodiment of the present invention;

Figure 2 shows a perspective view of the aircraft seat shown in Figure 1;

Figure 3 shows a perspective view of the aircraft seat shown in Figure 2 with the trim panels and seating trim cover omitted;

Figure 4A shows a side elevation of the aircraft seat in a dining configuration;

Figure 4B shows a side elevation of the aircraft seat in a take-off, taxi and landing (TTL) configuration;

Figure 4C shows a side elevation of the aircraft seat in a partially reclined configuration;

Figure 4D shows a side elevation of the aircraft in a reclined configuration;

Figure 4E shows a side elevation of the aircraft in a berthing configuration;

Figure 5 shows a schematic representation of the aircraft seat in the TTL configuration;

Figure 6 shows a schematic representation of the aircraft seat in the partially reclined configuration;

Figure 7 shows a schematic representation of the aircraft seat in the reclined configuration;

Figure 8 shows a schematic representation of the aircraft seat in the berthing configuration;

Figure 9 shows an enlarged view of the seat pan track and the leg rest track of the seat chassis when the aircraft seat is in the reclined configuration shown in Figure 7;

Figure 10 shows a side elevation of first and second like aircraft seat arranged to form an extending berthing configuration in accordance with a further aspect of the present invention; and

Figure 11 shows a schematic representation of an aircraft seat according to a further embodiment of the present invention;

Figure 12 shows an enlarged view of the hinge arrangement of the aircraft seat shown in Figure 11;

Figure 13 shows the aircraft seat shown in Figure 11 in a take-off, taxi and landing (TTL) configuration; and

Figure 14 shows the aircraft seat shown in Figure 11 in a reclined configuration.

DETAILED DESCRIPTION

An aircraft seat 1 in accordance with an embodiment of the present invention will now be described with reference to the accompanying figures. The aircraft seat 1 in the present embodiment is re-configurable between a plurality of seating configurations and a berthing configuration. The aircraft seat 1 in the present embodiment is an executive seat of the type typically installed in an executive aircraft 2 (shown schematically in Figure 1). However, it will be appreciated that the invention(s) described herein may be implemented in other types of aircraft seat.

With reference to Figure 2 and 3, the aircraft seat 1 comprises a seat base 3, a seat chassis 4 and a seat assembly 5. The aircraft seat 1 is described herein in relation to a seat reference frame comprising a longitudinal axis X, a transverse axis Y and a vertical axis Z. The seat base 3 is adapted to be fixedly mounted to a floor of the aircraft 2. The seat base 3 may, for example, be fastened to mounting rails provided in a floor of the aircraft 2. It will be understood that the seat base 3 may be mounted in a forward-facing or a rear-facing arrangement in the aircraft 2. The seat chassis 4 is mounted to the seat base 3. As described herein, the seat base 3 is configured to enable the position of the seat chassis 4 to be adjusted along said longitudinal axis X and optionally also along said transverse axis Y. The seat base 3 in the

present embodiment also allows the seat chassis 4 to be rotated through 180° about said vertical axis Z to adjust the orientation of the seat assembly 5 in the aircraft 2. Unless indicated to the contrary, the terms front and rear are used herein to define the relative position of features in the seat chassis 4 and the seat assembly 5.

The seat assembly 5 comprises a seat pan 6; a seat back 7; first and second armrests 8-1, 8-2; and a leg rest 9. As shown in figure 2, the aircraft seat 1 comprises a seat back trim panel 10; first and second armrest trim panels 11-1, 11-2; and a seating trim cover 12. The seat back trim panel 10; the first and second armrest trim panels 11-1, 11-2; and the seating trim cover 12 may be attached to the seat assembly 5 using suitable mechanical fasteners. The seating trim cover 12 comprises padding or cushioning. The seating trim cover 12 may, for example, form a seat squab supported by the seat pan 6; and a backrest cushion supported by the seat back 7. In a modified arrangement, a separate seat squab and backrest cushion may be provided.

The aircraft seat 1 is shown in Figure 3 with the seat back trim panel 10; the first and second armrest trim panels 11-1, 11-2; and the seating trim cover 12 omitted. The seat base 3 comprises first and second longitudinal guide tubes 13-1, 13-2 having front and rear fixing brackets 14-1, 14-2, 15-1, 15-2 for mounting the aircraft seat 1 to the floor of the aircraft 2. The seat base 3 comprises a longitudinal carrier 16, a turntable 17 and a transverse carrier 18. The longitudinal carrier 16 is mounted to said first and second longitudinal guide tubes 13-1, 13-2. The longitudinal carrier 16 is movable along said first and second longitudinal guide tubes 13-1, 13-2 to enable the position of the seat chassis 4 to be adjusted along said longitudinal axis X. A longitudinal travel locking mechanism (not shown) is provided to control the longitudinal movement of the longitudinal carrier 16 along said first and second longitudinal guide tubes 13-1, 13-2. The turntable 17 is mounted to the longitudinal carrier 16 and the transverse carrier 18 is mounted to said turntable 17. The turntable 17 is arranged to enable the transverse carrier 18 to be rotated about said vertical axis Z. In the present embodiment, the turntable 17 provides rotation of up to 180° about said vertical axis Z. A turntable locking mechanism (not shown) is provided to control the rotation of the turntable 17 about said vertical axis Z. The transverse carrier 18 comprises front and rear transverse sleeves 19 for movably mounting the seat chassis 4. The seat base 3 may optionally comprise one or more actuator (not shown), such as an electromechanical actuator, to adjust the longitudinal, transverse and angular position of the seat chassis 4. In a variant, the seat base 3 may be modified to omit one or more of the mechanisms provided for adjusting the longitudinal, transverse and angular position of the seat chassis 4.

The seat chassis 4 comprises first and second base sidemembers 21-1, 21-2; and front and rear mounting tubes 23. The first and second base sidemembers 21-1, 21-2 are disposed on respective sides of the seat chassis 4 and are adapted to mount the seat base 3. The front and rear mounting tubes 23 extend transversely between said first and second base sidemembers 21-1, 21-2. As shown in figure 3, the front and rear mounting tubes 23, 24 are disposed in the front and rear transverse sleeves 19 and movably mount the seat chassis 4 to the seat base 3. The front and rear mounting tubes 23 are movable within said front and rear transverse sleeves 19 to enable the position of the seat chassis 4 to be adjusted along said transverse axis Y. A transverse travel locking mechanism (not shown) is provided to control the transverse movement of the seat chassis 4. First and second aircraft seat pan pivot pins 25 are mounted in said first and second base sidemembers 21-1, 21-2 respectively. As described herein, the first and second aircraft seat pan pivot pins 25 are arranged to pivotally mount the seat assembly 5 to the seat chassis 4.

The seat assembly 5 will now be described with reference to Figure 3. As outlined above, the seat assembly 5 comprises a seat pan 6; a seat back 7; first and second armrests 8-1, 8-2; and a deployable leg rest 9. The seat pan 6 comprises first and second seat pan sidemembers 26-1, 26-2, and front and rear transverse tubes 27, 28. A first tension membrane 29 is supported by said first and second seat pan sidemembers 26-1, 26-2. The first tension membrane 29 may, for example, comprise a woven fabric. The seat pan 6 is mounted to the seat chassis 4 by a first pivoting connection (denoted generally by the reference numeral 30) having a seat pan pivot axis Y1. The seat pan pivot axis Y1 is a real pivot axis (as opposed to a virtual pivot axis) having a fixed position relative to the seat chassis 4 and the seat assembly 5. The seat pan 6 pivots about said seat pan pivot axis Y1 to adjust an incline angle of the seat pan 6. The seat pan pivot axis Y1 is located in a central region of the seat assembly 5 to facilitate pivoting of the seat pan 6. The seat pan pivot axis Y1 can be positioned at or proximal to a centre of gravity of the seat assembly 5 (in a longitudinal direction) to facilitate pivoting of the seat pan 6. In certain embodiments, the seat pan 6 may be pivoted using weight transfer. A seat occupant may shift their weight in the seat assembly 5, for example by leaning forwards and backwards, to shift their centre of gravity in front of or behind the seat pan pivot axis Y1. The first pivoting connection 30 comprises the aforementioned first and second aircraft seat pan pivot pins 25 which are mounted in first and second aircraft seat pan bearings 31. The first and second aircraft seat pan bearings 31 are mounted in said first and second base sidemembers 21-1, 21-2. The first and second aircraft seat pan pivot pins 25 define the seat pan pivot axis Y1. A seat incline locking mechanism (not shown) is provided to lock the angular orientation of the seat pan 6. The seat incline locking mechanism may be adapted to enable the seat pan 6 to be locked at any incline angle within an operating range (i.e. infinitely

variable). Alternatively, the seat incline locking mechanism may be operable to lock the seat pan 6 in one of a plurality of predefined angular orientations. The seat incline locking mechanism may be operated manually or by an actuator, such as an electromechanical actuator.

The seat back 7 comprises first and second seat back sidemembers 32-1, 32-2, and upper and lower transverse tubes 33, 34. The first and second seat back sidemembers 32-1, 32-2 are disposed on respective sides of the seat back 7 and support a second tension membrane 35. The second tension membrane 35 may, for example, comprise a woven fabric. The seat back 7 is mounted to the seat pan 6 by a second pivoting connection (denoted generally by the reference numeral 36) having a seat back pivot axis Y2. The seat back pivot axis Y2 is located behind said seat pan pivot axis Y1. The seat back 7 pivots about said seat back pivot axis Y2 to adjust a recline angle. The second pivoting connection 36 comprises first and second aircraft seat back pivot pins 37 mounted in first and second aircraft seat back bearings 38. The first and second aircraft seat back pivot pins 37 are mounted in the first and second seat pan sidemember 26-1, 26-2 respectively; and the first and second aircraft seat back bearings 38 are mounted in the first and second seat back sidemembers 32-1, 32-2 respectively. The first and second aircraft seat back pivot pins 37 define the seat back pivot axis Y2 about which the seat back 7 pivots relative to the seat pan 6. The seat back 7 comprises recline control arms 39 adapted to control a recline angle of the seat back 7. In the present embodiment, the recline control arms 39 are extensions of the seat back sidemembers 32-1, 32-2 and project downwardly below the seat pan 6. A headrest 40 comprising a mounting member 41 and a head support 42 is mounted to the seat back 7. The mounting member 41 is located in a vertical channel 43 mounted between the first and second seat back sidemembers 32-1, 32-2. The mounting member 41 is movable within the said vertical channel 43 to adjust the position of the head support 42. A headrest locking mechanism (not shown) may be provided to control the vertical position of the headrest 40. The headrest locking mechanism may be operated manually or by an actuator, such as an electromechanical actuator.

The leg rest 9 comprises a ladder frame 44 having first and second mounting arms 45-1, 45-2. The leg rest 9 is mounted to the seat pan 6 by a third pivoting connection (denoted generally by the reference numeral 46) having a leg rest pivot axis Y3. The leg rest 9 pivots about said leg rest pivot axis Y3 to adjust a deployment angle. The third pivoting connection 46 comprises first and second leg rest pivot pins 47 mounted in first and second leg rest bearings 48. The first and second leg rest pivot pins 47 are mounted in the first and second mounting arms 45-1, 45-2; and the first and second leg rest bearings 48 are mounted in the first and second seat

pan sidemember 26-1, 26-2 of the seat assembly 5. The first and second leg rest pivot pins 47 define the leg rest pivot axis Y3 about which the leg rest 9 pivots relative to the seat pan 6.

The first and second armrests 8-1, 8-2 are mounted on respective sides of the seat assembly 5. In particular, the first and second armrests 8-1, 8-2 are pivotally mounted to the first and second seat back sidemembers 32-1, 32-2 of the seat back 7. The first and second armrests 8-1, 8-2 are mounted to the first and second seat back sidemembers 32-1, 32-2 by a fourth pivoting connection (denoted generally by the reference numeral 49) having an armrest pivot axis Y4. The fourth pivoting connection 49 comprises first and second armrest pivot pins 50 mounted in first and second armrest bearings 51 mounted in the first and second armrests 8-1, 8-2 respectively. First and second armrest links 52-1, 52-2 connect the first and second armrests 8-1, 8-2 to the first and second seat pan sidemembers 26-1, 26-2. The first and second armrest links 52-1, 52-2 are pivotally connected at both ends to accommodate movement of the first and second armrests 8-1, 8-2 relative to the seat chassis 4. The first and second armrest links 52-1, 52-2 control the angular orientation of the first and second armrests 8-1, 8-2. It will be understood that the first and second armrest 8-1, 8-2 also translate (in longitudinal and vertical directions) as the recline angle of the seat back 7 changes.

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The aircraft seat 1 is re-configurable between multiple seating configurations and a berthing configuration. The different configurations of the aircraft seat 1 according to the present embodiment are illustrated in Figures 4A-E. The aircraft seat 1 is shown in a dining configuration in Figure 4A; a take-off, taxi and landing (TTL) configuration in Figure 4B, a partially reclined configuration in Figure 4C, a reclined configuration in Figure 4D; and the berthing configuration in Figure 4E. When in the reclined configuration shown in Figure 4D, the seat assembly 5 may be at least partially balanced and this may be referred to as a “Zero G” position. The combined centre of gravity of the seat assembly 5 and the seat occupant may be aligned with or proximate to the seat pan pivot axis Y1. In this reclined configuration, there is substantially even weight distribution such that the loading applied to the occupant is substantially uniform. The incline angle of the seat pan 6 (relative to the longitudinal axis X); the recline angle of the seat back 7 (relative to the vertical axis Z); and the deployment angle of the leg rest 9 (relative to the vertical axis Z) are shown in each of Figures 4A-E. The aircraft seat 1 is re-configured by pivoting the seat pan 6 about the seat pan pivot axis Y1 defined by the first pivoting connection 30. The pivoting movement of the seat assembly 5 controls the recline angle of the seat back 7, the angular orientation of the first and second armrests 8-1, 8-2 and the deployment angle of the leg rest 9.

The features of the aircraft seat 1 which control the relative movement of the seat pan 6, the seat back 7 and the leg rest 9 now be described with reference to Figures 5 to 9. These figures show a schematic side elevation of the aircraft seat 1 with the seat trim panels 10, 11-1, 11-2 and the seating trim cover 12 omitted for clarity. The control links within the aircraft seat 1 are duplicated on the first and second sides, but only those control links on the first side are visible in Figures 5 to 9. The aircraft seat 1 is shown in a take-off, taxi and landing (TTL) configuration in Figure 5, a partially reclined configuration in Figure 6, a reclined configuration in Figure 7; and the berthing configuration in Figure 8. The seat assembly 5 comprises first and second aircraft seat pan links 53-1 connected at a first end to the seat pan 6. First and second seat pan track followers 54-1 are mounted partway along the length of the first and second aircraft seat pan links 53-1. The first and second seat pan track followers 54-1 are rollers in the present embodiment and are adapted to travel in respective first and second seat pan tracks 55-1. The first and second seat pan tracks 55-1 are defined in first and second aircraft seat pan guide members 56-1, 56-2 (shown in Figure 2) fixedly mounted on respective sides of the seat chassis 4. As shown in more detail in Figure 9, the first and second seat pan tracks 55-1 comprise a generally arcuate path having a virtual centre disposed below said first and second aircraft seat pan guide members 56-1, 56-2. Thus, a central portion of the first and second seat pan tracks 55-1 is disposed above the ends thereof. The first and second seat pan tracks 55-1 also comprise an up-turned section at the rear end thereof. The first and second seat pan track followers 54-1 travel in said first and second seat pan tracks 55-1 as the seat pan 6 pivots about the seat pan pivot axis Y1. First and second recline links 57-1 are connected on respective sides of the recline control arm 39 of the seat back 7. The first and second recline links 57-1 are pivotally connected to the first and second aircraft seat pan links 53-1. The first and second aircraft seat pan links 53-1 pivot about the first and second seat pan track followers 54-1 as the incline angle of the seat pan 6 changes.

The seat assembly 5 comprises first and second leg rest links 58-1. The first and second leg rest links 58-1, 58 are dog-leg links. A first end of said first and second leg rest links 58-1 is connected to the leg rest 9. First and second leg rest track followers 59-1A are mounted to a second end of said first and second leg rest links 58-1. The first and second leg rest track followers 59-1 are adapted to travel in respective first and second leg rest tracks 60-1. The first and second leg rest links 58-1 are pivotally connected to a second end of the first and second aircraft seat pan links 53-1. The first and second aircraft seat pan links 53-1 pivot about the first and second seat pan track followers 54-1 and function as levers to impart an actuating force to the first and second leg rest links 58-1. The first and second leg rest track followers 59-1 are rollers in the present embodiment. The first and second leg rest tracks 60-1 are defined in first and second leg rest guide members fixedly mounted on respective sides

of the seat chassis 4. The first and second leg rest track followers 59-1 travel in said first and second leg rest tracks 60-1 as the seat pan 6 pivots about the seat pan pivot axis Y1. As shown in Figure 9, the first and second leg rest tracks 60-1 comprise a generally arcuate path having a virtual centre disposed above said first and second aircraft seat leg rest guide members. Thus, a central portion of the first and second leg rest tracks 60-1 is disposed below the ends thereof.

The first and second aircraft seat pan links 53-1; the first and second recline links 57-1; and the first and second leg rest links 58-1 connect the seat pan 6, the seat back 7 and the leg rest 9. Thus, the seat pan 6, the seat back 7 and the leg rest 9 move in concert with each other. In particular, adjusting the incline angle of the seat pan 6 changes the recline angle of the seat back 7 and the deployment angle of the leg rest 9. In the present embodiment the aircraft seat 1 is manually adjustable. A seat occupant can pivot the seat pan 6 about said seat pan pivot axis Y1 by changing their weight distribution in the seat assembly 5, for example by leaning backwards or forwards. The seat pan pivot axis Y1 is disposed in a rear portion of the seat pan 6 to facilitate adjusting the incline angle of the seat pan 6. At least when the aircraft seat 1 is in a seating configuration, the seat occupant may shift their centre of mass in front of or behind the seat pan pivot axis Y1 to adjust the incline angle of the seat pan 6. The change in the incline angle of the seat pan 6 results in a change in the recline angle of seat back 7 and the deployment angle of the leg rest 9. The aircraft seat 1 could be power assisted, for example incorporating one or more electromechanical actuator.

The aircraft seat 1 in the present embodiment can be configured in a berthing configuration, as shown in Figures 4E and 8. When in said berthing configuration, the seat pan 6, the seat back 7 and the leg rest 9 are at least substantially aligned with each other to form a substantially continuous surface. It may be desirable in certain scenarios to extend the resulting surface. The aircraft seat 1 may be configured in the aircraft 2 such that two of said aircraft seats 1 may be arranged to form an extended surface in said berthing configuration. With reference to Figure 10, a first said aircraft seat 1 may be arranged in said berthing configuration while a second said aircraft seat 1 remains in a seating configuration, for example the dining configuration. With the first and second aircraft seat 1 in this arrangement, the leg rest 9 of the first said aircraft seat 1 may be at least substantially aligned with the seat pan 6 of the second said aircraft seat 1. The first and second aircraft seat 1 may be mounted in the aircraft 2 in a face-to-face arrangement, or one of said aircraft seat 1 may be rotated through 180° about said vertical axis Z to provide the required arrangement. As illustrated in Figure 10, the headrest 40 of the first said aircraft seat 1 may be extended further to extend the surface.

As described herein, the aircraft seat 1 may be manually re-configured between said seating configurations and/or said berthing configuration. A further feature of the aircraft seat 1 is the arrangement whereby first and second channels 61-1, 61-2 are incorporated into the lateral outer surfaces of the first and second armrest trim panels 11-1, 11-2. The first and second channels 61-1, 61-2 in the present embodiment each extends along substantially the full length of the first and second armrests 8-1, 8-2 respectively. In use, the first and second channels 61-1, 61-2 provide an improved grip for a seat example, for example to facilitate changing between different seat configurations. By extending said first and second channels 61-1, 61-2 along the length of the first and second armrests 8-1, 8-2, they are available to the seat occupant irrespective of the configuration of the aircraft seat 1.

A further feature of the aircraft seat 1 described herein is that one or more storage compartment 62 may be incorporated into one or both of the first and second armrest trim panels 11-1, 11-2. In the present embodiment, a storage compartment 62 is incorporated into the first armrest trim panel 11-1. The storage compartment 62 is intended to store a lifejacket for emergency use. A removable front panel 63 having a grip tab 64 is provided to close the storage compartment 62.

The seat pan pivot axis Y1, the seat back pivot axis Y2, the leg rest pivot axis Y3 and the armrest pivot axis Y4 are arranged substantially parallel to each other. Furthermore, when the seat chassis 4 is in a forward-facing (or a rear-facing) configuration, the seat pan pivot axis Y1, the seat back pivot axis Y2, the leg rest pivot axis Y3 and the armrest pivot axis Y4 are arranged substantially parallel to the transverse axis Y.

An aircraft seat 101 in accordance with a further embodiment of the present invention will now be described with reference to Figures 11, 12, 13 and 14. The same reference numerals are used for like components, but are increased by 100 for the sake of clarity. The aircraft seat 101 is a development of the aircraft seat 1 and the description herein focuses on the differences.

The aircraft seat 101 is shown in a partially reclined configuration in Figure 11; a take-off, taxi and landing (TTL) configuration in Figure 13; and a reclined configuration in Figure 14. When the aircraft seat 101 is in the reclined configuration shown in Figure 14, the seat assembly 105 may be at least partially balanced and this may be referred to as a “Zero G” position. The aircraft seat 101 is described in relation to a seat reference frame comprising a longitudinal axis X, a transverse axis Y and a vertical axis Z.

As shown in Figure 11, the aircraft seat 101 comprises a seat base (not shown), a seat chassis 104 and a seat assembly 105. The seat assembly 105 comprises a seat pan 106; a seat back 107; first and second armrests 108-1, 108-2; and a leg rest 109. The configuration of the seat pan 106 and the seat back 107 are substantially unchanged from those of the aircraft seat 1. The seat pan 106 comprises first and second seat pan sidemembers 126-1, and front and rear transverse tubes (not shown). The seat back 107 comprises first and second seat back sidemembers 132-1 disposed on respective sides of the seat back 7. The seat back 107 is mounted to the seat pan 106 by a second pivoting connection (denoted generally by the reference numeral 136) having a seat back pivot axis Y2. The configuration of the second pivoting connection 136 is modified in the aircraft seat 101 and these changes will now be described in more detail herein with particular reference to Figure 12.

The second pivoting connection 136 comprises first and second hinges assemblies 170-1, disposed on opposing sides of the aircraft seat 101. The first and second hinges assemblies 170-1 are arranged such that the seat back pivot axis Y2 is substantially parallel to the transverse axis Y. The first and second hinges assemblies 170-1 are scissor-type hinges configured such that the location of the seat back pivot axis Y2 is not fixed relative to the seat pan 106. Rather, the location of the seat back pivot axis Y2 undergoes translation in dependence on the incline angle of the seat back 107. The first and second hinges assemblies 170-1 have the same general configuration as each other and the description herein focuses on the first hinge assembly 170-1 for the sake of brevity.

As shown in Figure 12, the first hinge assembly 170-1 comprises a first seat pan hinge link 171 and a first seat back hinge link 172 which are pivotally connected to each other by a first pivot pin 173. The first pivot pin 173 defines the seat back pivot axis Y2 about which the seat back 107 pivots. The first seat pan hinge link 171 and the first seat back hinge link 172 have substantially the same shape as each other, but are oriented in opposite directions within the first hinge assembly 170-1. The first seat pan hinge link 171 comprises a first arm 171A and a second arm 171B which are inclined at an obtuse angle relative to each other. The first arm 171A of the first seat pan hinge link 171 is shorter than the second arm 171B of the first seat pan hinge link 171. A first hole is formed in the first seat pan hinge link 171 between said first and second arms 171A, 171B to receive the first pivot pin 173. The first seat back hinge link 172 comprises first and second arms 172A, 172B which are inclined at an obtuse angle relative to each other. The first arm 172A of the first seat back hinge link 172 is shorter than the second arm 172B of the first seat back hinge link 172. A second hole is formed in the first seat back hinge link 172 between said first and second arms 172A, 172B to receive the first

pivot pin 173. It will be understood that the first seat pan hinge link 171 may comprise more than one first seat pan hinge link 171 and/or more than one first seat back hinge link 172. For example, the first seat pan hinge link 171 may comprise two of said first seat pan hinge links 171 and two of said first seat back hinge links 172 alternating with each other along the first pivot pin 173.

The first arm 171A of the first seat pan hinge link 171 is pivotally connected to a first seat base pin 174 fixedly mounted to the first seat pan sidemember 126-1. A first guide member 175 is mounted to the second arm 171B of the first seat pan hinge link 171 and arranged to travel in a first seat back track 176 formed in the first seat back sidemember 132-1. The first guide member 175 in the present embodiment comprises a first guide pin. The first arm 172A of the first seat back hinge link 172 is pivotally connected to a first seat back pin 177 fixedly mounted to the first seat back sidemember 132-1. A second guide member 178 is mounted to the second arm 172B of the first seat back hinge link 172 and arranged to travel in a first seat pan track 179 formed in the first seat pan sidemember 126-1. The second guide member 178 in the present embodiment comprises a second guide pin. The second arm 171B of the first seat pan hinge link 171 is partially received in the seat back 107; and the second arm 172B of the first seat back hinge link 172 is partially received in the seat pan 106. In the present embodiment the first seat back track 176 and the first seat pan track 179 each comprise a linear track having a central longitudinal axis. The central longitudinal axes of the first seat back track 176 and the first seat pan track 179 are substantially perpendicular to each other when the aircraft seat 101 is in the TTL configuration; and are substantially aligned with each other when the aircraft seat 101 is in the berthing configuration.

The first hinge assembly 170-1 has a line of symmetry (extending through the seat back pivot axis Y2) about which the first seat pan hinge link 171 and the first seat back hinge link 172 are symmetrical. This symmetry is maintained irrespective of the angular position of the first seat pan hinge link 171 and the first seat back hinge link 172 relative to each other. However, the vertical and longitudinal position of the seat back pivot axis Y2 changes in dependence on the relative angular position of the first seat pan hinge link 171 and the first seat back hinge link 172. Notably, the seat back pivot axis Y2 is displaced downwardly as the incline angle of the seat back 107 increases. When the aircraft seat 101 is in the berthing configuration, the seat back pivot axis Y2 is in its lowermost vertical position. This vertical displacement helps to maintain the first hinge assembly 170-1 clear of the upper surface of the seat pan 106.

As outlined above, the second hinge assembly 170-2 has the same configuration as the first hinge assembly 170-1. In particular, the second hinge assembly 170-2 comprises a second

seat pan hinge link and a second seat back hinge link which are pivotally connected to each other by a second pivot pin. The mounting arrangement of the second seat pan hinge link and the second seat back hinge link to the seat pan 106 and the seat back 107 is the same as for the first hinge assembly 170-1. The first pivot pin 173 is aligned with the second pivot pin along said seat back pivot axis Y2.

The aircraft seat 101 is controlled by first and second aircraft seat pan links 153-1 connected to the seat pan 106; first and second recline links 157-1 connected to the seat back 7; and first and second leg rest links 158-1. The configuration of the control links is substantially unchanged from the first embodiment described herein. The operation of the second pivoting connection 136 as the aircraft seat 101 is reconfigured will now be described with reference to Figures 11, 13 and 14. When the aircraft seat 101 is disposed in said TTL configuration, the first and second guide members 178 are located at or proximal to the ends of the first seat back track 176 and the first seat pan track 179 respectively which are closest to the seat back pivot axis Y2. As the incline angle of the seat back 107 is increased, the first and second guide members 175, 178 travel along the first seat back track 176 and the first seat pan track 179 towards the opposite ends thereof. When the aircraft seat 101 is in said berthing configuration (not shown), the first and second guide members 175, 178 are disposed at or proximal to the ends of the first seat back track 176 and the first seat pan track 179 which are distal from the seat back pivot axis Y2.

As described herein, the first pivot pin 173 and the second pivot pin are aligned with each other along the seat back pivot axis Y2 about which the seat back 107 pivots.

A first guide member 175 is mounted to the second arm 171B of the first seat pan hinge link 171 and arranged to travel in a first seat back track 176 formed in the first seat back sidemember 132-1. A second guide member 178 is mounted to the second arm 172B of the first seat back hinge link 172 and arranged to travel in a first seat pan track 179 formed in the first seat pan sidemember 126-1.

It will be appreciated that various modifications may be made to the embodiment(s) described herein without departing from the scope of the appended claims.

In the embodiments described herein the seat pan 6, the seat back 7 and the leg rest 9 are connected so as to move together. The aircraft seat 1 may be modified to enable one or more of the seat pan 6, the seat back 7 and the leg rest 9 to be decoupled. For example, the seat back 7 and/or the leg rest 9 may be decoupled from the seat pan 6. When decoupled from the

seat pan 6, the seat back 7 and/or the leg rest 9 may be adjusted independently. In order to decouple the seat back 7, the first and second recline links 57-1 may each comprise a decoupling mechanism, such as a lockable gas spring, which may be released to decouple the seat back 7 from the seat pan 6. In order to decouple the leg rest 9, the first and second leg rest links 58-1 may each comprise a decoupling mechanism, such as a lockable gas spring, which may be released to decouple the leg rest 9 from the seat pan 6.

CLAIMS:

1. An aircraft seat comprising:

a seat chassis;

a seat assembly comprising a seat pan and a seat back, the seat pan being mounted to the seat chassis by a first pivoting connection defining a seat pan pivot axis about which the seat pan pivots; and

comprising at least one armrest, the at least one armrest being movable relative to said seat chassis;

the seat back being mounted to said seat pan by a second pivoting connection, the second pivoting connection defining a seat back pivot axis about which the seat back pivots the seat pan pivot axis being located in front of the seat back pivot axis at a mid-point of the seat pan, or between the seat back pivot axis and the mid-point of the seat pan;

wherein the at least one armrest is pivotally connected to the seat back; and at least one armrest link is pivotally coupled to the at least one armrest and the seat pan; the at least one armrest link being pivotally coupled to the seat pan.

2. An aircraft seat as claimed in claim 1, wherein the at least one armrest comprises first and second armrests having respective first and second armrest trim panels.

3. An aircraft seat as claimed in claim 2, wherein first and second channels are incorporated into the lateral outer surfaces of the first and second armrest trim panels.

4. An aircraft seat as claimed in claim 3, wherein the first and second channels each extend along substantially the full length of the first and second armrests respectively.

5. An aircraft seat as claimed in any one of the preceding claims comprising a seat base for mounting fixedly to a floor of an aircraft, the seat chassis being movably mounted to said seat base.

6. An aircraft seat as claimed in claim 5, wherein said seat base comprises at least one longitudinal guide to provide longitudinal movement of the seat chassis relative to the seat base.

7. An aircraft seat as claimed in claim 5 or claim 6, wherein said seat base comprises at least one transverse guide to provide transverse movement of the seat chassis relative to the seat base.

8. An aircraft seat as claimed in any one of claims 5, 6 or 7, wherein said seat base comprises a turntable to enable the angular orientation of the seat chassis relative to be adjusted relative to the seat base.

9. An aircraft seat as claimed in any one of the preceding claims, wherein said seat pan comprises first and second seat pan sidemembers, the first and second seat pan sidemembers being mounted to said seat chassis.

10. An aircraft seat as claimed in claim 9, wherein a first tension membrane is supported by said first and second seat pan sidemembers.

11. An aircraft seat as claimed in claim 9 or claim 10, wherein the seat chassis comprises first and second base sidemembers, the first pivoting connection mounting said first and second seat pan sidemembers to said first and second base sidemembers.

12. An aircraft seat as claimed in any one of the preceding claims, wherein said seat back comprises first and second seat back sidemembers; and a second tension membrane is supported by said first and second seat back sidemembers.

13. An aircraft seat as claimed in any one of the preceding claims, wherein the aircraft seat is selectively configurable in a berthing configuration and one or more seating configuration.

14. An aircraft comprising one or more aircraft seat as claimed in any one of the preceding claims.