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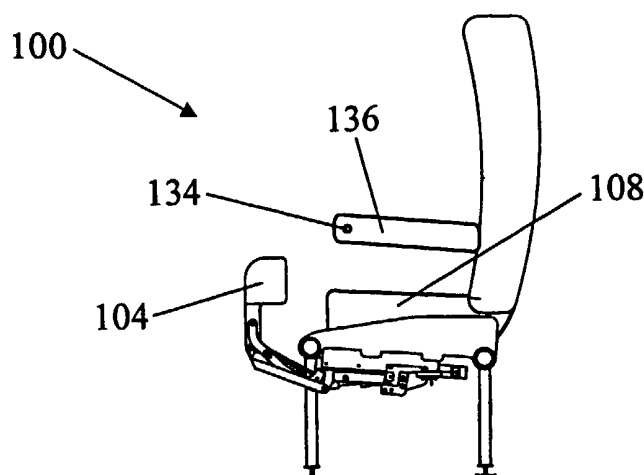
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(54) Title: ADJUSTABLE CHAIR AND METHOD OF USE



(57) Abstract: An adjustable chair device (100) and method of use for supporting a user in either a traditional seated position in which a pair of legs of the user rest upon a floor, or in a relaxed seated position in which the legs of the user are supported above the floor, provides a base supporting an aft cushion assembly (108), a forward cushion assembly (104), and an upwardly extending seat back which cooperate to support the user in a seated position. The forward cushion assembly (104) is adjustably attached to the aft cushion assembly (108) with an adjustment assembly that allows both horizontal and vertical adjustment of the forward cushion assembly (104).



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TITLE: ADJUSTABLE CHAIR AND METHOD OF USE**BACKGROUND OF THE INVENTION**

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FIELD OF THE INVENTION:

10 This invention relates generally to adjustable chairs, and more particularly to an adjustable chair device for supporting a user, in particular a passenger in a bus or airplane, between a traditional seated position in which a pair of legs of the user rest upon a floor, and a relaxed seated position in which the legs of the user are lifted with respect to the traditional seated position, the device comprising:

a base supporting an aft cushion assembly, a forward cushion assembly, and an upwardly extending seat back;

15 the aft cushion assembly providing an aft supporting surface, the forward cushion assembly providing a thigh supporting surface, and the upwardly extending seat back providing a back supporting surface, the aft supporting surface, the thigh supporting surface, and the back supporting surface cooperating to support the user in a seated position; and

20 a means for adjusting the vertical position of the thigh supporting surface with respect to the aft supporting surface thereby lifting the legs of the user.

DESCRIPTION OF RELATED ART:

25 Such an adjustable chair device is known from Scholin et al., US 4,775,185. Scholin teaches a seat having an infinitely adjustable thigh support, wherein a thigh support member is positionable at any of an infinite number of intermediate support positions with a thigh support cushion maintained in contact with a seat cushion at all positions of the thigh support. Further the entire seat can be adjusted in horizontal direction by means of a slide rails which supports the seat. This known seat is especially designed for a car driver. This
30 means that in every position the feet of the driver has to contact the floor of the car.

This known seat does not offer maximum comfort for a passenger, especially

a passenger in a bus or airplane where there is less space available for the legs of the passenger. The very limited space between the airplane or bus seat-rows does not leave much legroom. Several airlines have been dealing seriously with this issue, investing tens millions of dollars in attempts to add a little room (4 inches) to passenger legs. However,
5 this would not solve the real cause for passenger suffering, which is the prolonged, motionless sitting in an unsuitable chair, rather than lack of legroom. The lack of movement resulting from being confined to one's seat might cause the forming of thrombosis or other adverse symptoms.

The disadvantage of the above mentioned known seat is that for users with
10 long legs it can not contact the lower thigh portion of the legs of the user, while especially supporting the lower thigh portion of the legs offers maximum comfort to the user. Furthermore the height adjustment of the thigh support is limited because the thigh support only cants with respect to the rest of the seat. Even in the highest position of the thigh support the feet of the user rest upon the floor.

15 The present invention provides an adjustable chair that offers more comfort than the known seat and provides further related advantages as described in the following summary.

SUMMARY OF THE INVENTION

20 An object of the invention is to provide an adjustable chair device of the kind mentioned in the preamble which better supports the legs of the user for a better comfort. To that end a method according to the invention is characterized in that the chair device further comprises a means for adjusting the horizontal position of the thigh supporting
25 surface with respect to the aft supporting surface, so that the thigh supporting surface contacts a lower thigh portion of the legs or the back of the knees of the user.

The advantages of this invention provide a solution to the phenomenon called "Economy-Class-Syndrome" (Deep-Vein-Thrombosis). The possibilities incorporated in the seat according to the present invention considerably improve passenger physical wellbeing
30 and facilitate travelling considerably. Passengers can change the sitting angle by lifting his/her legs to various heights, and even detach the legs completely from the aircraft or bus floor. The mere leg lifting off the floor allows relaxing muscle pressure and tension,

significantly improving passenger's feeling.

The narrow passages between the rows pose no problem to users of the new seat since the seat is especially designed to operate in these limited spaces. Even tall passengers can enjoy the seat features like any other passenger. Lifting the legs to the desirable height with the movable part, which supports the thighs resting on the seat, allows the shins and feet to remain hanging in the air, enjoying the relaxing feeling of freedom from pressure.

The chair device of the present invention offers more freedom of movement for the legs of the user without the need of more space. This is particularly advantageous for seats in airplanes and long distance busses where the space for the user's legs is limited as a result of which there is a risk of thrombosis in the user's legs.

The means for adjusting the vertical position of the thigh supporting surface with respect to the aft supporting surface, thereby lifting the legs of the user from the traditional seated position to the relaxed seated position, preferably can lift the legs of the user to a level in which the legs do not contact the floor, thereby providing the maximum of comfort.

Other features and advantages of the present invention will become apparent from the following more detailed description, taken in conjunction with the accompanying drawings, which illustrate, by way of example, the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWING

The accompanying drawings illustrate the present invention. In such drawings:

FIGURE 1 is a perspective view of the preferred embodiment of the present invention, a chair device having a base that supports a forward cushion assembly, an aft cushion assembly, and an upwardly extending seat back;

FIGURE 2 is a side elevational view of the chair device with the forward cushion assembly in a traditional seated position;

FIGURE 3 is a perspective view of an adjustment assembly that adjustably connects the forward cushion assembly to the aft cushion assembly;

FIGURE 4 is a second perspective view of the adjustment assembly;

FIGURE 5 is a side elevational view of the chair device with the forward cushion assembly in a relaxed seated position;

FIGURE 6 is a perspective view of an alternative embodiment of the forward cushion assembly wherein the forward cushion assembly further includes an air bladder operably controlled by a hand pump and an air release valve;

FIGURE 7 is perspective view of the adjustment assembly of the forward cushion assembly of a further embodiment;

FIGURE 8 is a side elevational view of the chair device with the forward cushion assembly in a traditional seated position;

FIGURE 9 is a side elevational view of the chair device with the forward cushion assembly in a horizontal displaced position;

FIGURE 10 is a side elevational view of the chair device with the forward cushion assembly in a vertical lifted position; and

FIGURE 11 is a side elevational view of the chair device with the forward cushion assembly in both a horizontal and vertical displaced position.

DETAILED DESCRIPTION OF THE INVENTION

The above described drawing figures illustrate the invention, an adjustable chair device 20 for supporting a user 10 in either a traditional seated position in which a pair of legs 12 of the user 10 rest upon a floor 18, or in a relaxed seated position in which the legs 12 of the user 10 are supported above the floor 18.

As shown in Fig. 1, the chair device 20 includes a base 22 supporting an aft cushion assembly 24, a forward cushion assembly 30, and an upwardly extending seat back 34. The aft cushion assembly 24 provides an aft supporting surface 26. The forward cushion assembly 30 provides a thigh supporting surface 32. The upwardly extending seat back 34 provides a back supporting surface 36. The aft supporting surface 26, the thigh supporting surface 32, and the back supporting surface 36 cooperate to support the user 10 in a seated position, as is described in detail below. The aft cushion assembly 24 is preferably fixedly attached to the base 22, although various adjustable frames can be used in alternative embodiments to add further adjustability to the chair device 20. The upwardly extending seat back 34 is preferably attached to the aft cushion assembly 24 with a seat back hinge 38,

although in an alternative embodiment (not shown) the seat back hinge 38 is attached directly to the base 22. The forward cushion assembly 30 is adjustably attached to the aft cushion assembly 24 as described in more detail below. Typical seats having generally similar construction are disclosed in Scholin et al., US 4,775,185, and Mawbey, U.S. 4,629,248, which are hereby incorporated by reference.

In the traditional seated position, as shown in Fig. 2, the chair device 20 supports the user 10 in a posture wherein the legs 12 of the user 10 rest upon the floor 18. In this position, an ischium 13 (the lower portion of the hipbone) of the user 10 is supported by the aft supporting surface 26, the back of the user 10 is supported by the back supporting surface 36, and a thigh 14 of the user 10 is supported by the thigh supporting surface 32. While the traditional seated position is comfortable for most purposes, the position can cause great fatigue in the legs 12 of the user 10. The weight of the legs 12 of the user 10 causes stress to knees 16 and ankles 17 of the user 10, and the vibrations of the floor 18 increase the strain on the legs 12. During long journeys, common in airplanes, automobiles, busses, ferries, and other forms of transportation, the fatigue imposed on users 10 can be considerable. Furthermore, there is growing evidence that ordinary seats used in the prior art can cause deep-vein thrombosis, a potentially fatal condition caused by blood pooling and clotting in the legs due to restricting the movement of the legs for long periods of time.

To overcome the disadvantages of the prior art, the chair device 20 of this invention includes a unique connection between the forward cushion assembly 30 and the aft cushion assembly 24. The forward cushion assembly 30 and the aft cushion assembly 24 are connected with a means for adjusting the vertical position of the thigh supporting surface 32 with respect to the floor 18, thereby lifting the legs 12 of the user 10 from the traditional seated position, as shown in Fig. 2, to the relaxed seated position, as shown in Fig. 5. In the relaxed seated position, the legs 12 of the user 10 do not contact the floor 18.

In the preferred embodiment, the chair device 20 further includes a means for adjusting the horizontal position of the forward cushion assembly 30 with respect to the aft cushion assembly 24 so that the thigh supporting surface 32 contacts a lower thigh portion 15 of the legs 12 of the user 10, preferably the back of the knees 16 of the user 10, thereby providing the maximum of comfort. The lower thigh portion 15 includes any portion of the leg 12 from the thigh to behind the knees, depending upon the position desired by the user 10 for maximum comfort. It is worth noting that while we specify that the legs 12 of the

user 10 do not contact the floor 18, this does not necessarily means that the legs 12 have no contact with the floor 18 at all. Even in the relaxed seated position the legs 12 of the user 10 might touch the floor 18 to a small extent, depending upon the individual comfort of the user 10. The important consideration is that the substantial portion of the weight is taken
5 off of the legs 12 so that there is no strain on the knees 16 and ankles 17 of the user 10. In the preferred embodiment, there is no contact between the legs 12 of the user 10 and the floor 18, because this avoids the transmission of vibrations from the floor 18 to the legs 12.

In a first embodiment shown in Figs. 1-6, the vertical position adjusting means and the horizontal position adjusting means are provided by an adjustment assembly
10 40 that allows both horizontal and vertical adjustment of the forward cushion assembly 30. The adjustment assembly 40 includes a horizontal slide bar guide 40A mounted on the aft cushion assembly 24, and a slide frame 44 that has a horizontally extending horizontal slide bar 46 and a vertically extending vertical slide bar guide 40B. The horizontal slide bar 46 slidably engages the horizontal slide bar guide 40A for horizontal adjustment of the slide
15 frame 44. The adjustment assembly 40 further includes a vertical slide bar 48 mounted on the forward cushion assembly 30. The vertical slide bar 48 slidably engaging the vertical slide bar guide 40B for vertical adjustment of the forward cushion assembly 30. The adjustment assembly 40 is preferably constructed of a strong, rugged, rigid material such as steel or aluminum.

20 The adjustment assembly 40 further includes a locking mechanism 60 that locks the forward cushion assembly 30 into a selected position. The locking mechanism 60 is capable of being moved from a locked position to an unlocked position for adjustment of the forward cushion assembly 30; but a biasing means for biasing the locking mechanism 60 from the unlocked position to the locked position, thereby preventing further movement of
25 the forward cushion assembly 30. The locking mechanism 60 further includes a horizontal pin 62, a vertical pin 64. In the locked position, the horizontal pin 62 removably engages one of a plurality of horizontal locking holes 42 in the horizontal slide bar guide 40A; and the vertical pin 64 removably engages one of a plurality of vertical locking holes 52 in a forward slide plate 50 attached to the forward cushion assembly 30.

30 The biasing means is preferably a spring 71 operably attached to both a bell crank 72 and a bell crank mounting plate 54. The bell crank mounting plate 54 is preferably fixedly mounted on the forward cushion assembly 30. The bell crank mounting plate 54

preferably includes a bell crank pivot point 56 upon which the bell crank 72 is pivotally mounted. The bell crank 72 has a bell crank pin 74 that engages a locking slot 66 of the locking mechanism 60. In use, the spring 71 biases the bell crank 72 such that the bell crank pin 74 biases the locking mechanism 60 towards the locked position.

5 The locking mechanism 60 further includes an unlocking means 80 for overcoming the bias of the spring 71 to move the locking mechanism 60 from the locked position to the unlocked position, wherein the horizontal and vertical pins 62 and 64 are pulled from the horizontal and vertical locking holes 42 and 52, respectively, thereby allowing the relative horizontal and vertical position of the forward cushion assembly 30 to
10 be adjusted. Release of the unlocking means 80 allows the spring 71 to return the locking mechanism 60 to the locked position. The unlocking means 80 preferably includes a handle 82 slidably mounted on a handle guide 84 of the forward cushion assembly 30. The handle 82 is pivotally attached to a lever arm 76 of the bell crank 72 with a handle link 86 such that pulling the handle 82 causes the handle link 86 to pull the lever arm 76. The lever arm 76
15 causes the bell crank 72 to rotate about the bell crank pivot point 56 against the bias of the spring 71, thereby causing the bell crank pin 74 to move the locking mechanism 60 towards the unlocked position.

 In a second, preferred embodiment of the chair device 100, as shown in Figs. 7 – 11, the adjustment assembly 102 of the forward cushion assembly 104 has a different
20 construction. In Fig. 7 the adjustment assembly 102 of the forward cushion assembly 104 of this embodiment is shown. For horizontal adjustment of the forward cushion assembly 104 the adjustment assembly 102 again comprises a horizontal slide bar guide 106 mounted on the aft cushion assembly 108 (see Fig. 8) and a slide frame 110 having a horizontal slide bar 112 that slidably engages the horizontal slide bar guide 106 for horizontal adjustment
25 of the slide frame 110. The horizontal control of the forward cushion assembly 104 is substantially similar to the first embodiment described above.

 For vertical adjustment of the forward cushion assembly 104 the adjustment assembly 102 comprises a different mechanism. The adjustment assembly 102 includes at least one vertical support arm 114, preferably two vertical support arms located at either end
30 of the forward cushion assembly 104. In the preferred embodiment, the adjustment assembly 102 further includes two additional support arms 116 for supporting and stabilizing the forward cushion assembly 104. The two vertical support arms 114 and the two additional

support arms 116 are pivotally connected to both the forward cushion assembly 104 and the slide frame 110. The two vertical support arms 114 and the two additional support arms 116 are constructed of strong and rigid material such as steel, although they are more preferably constructed of a lightweight material such as aluminum when the chair device 20 is designed for use in an airplane.

The two vertical support arms 114 of the chair device 100 are connected to each other via a connecting bar 118. The connecting bar 118 is pivotally connected to a piston 120 of a gas cylinder device 122. The piston 120 is preferably pivotally connected to a pair of tabs 119 that extend downwardly from the connecting bar 118. The gas cylinder 122 is attached to a vibrating means 124 for vibrating the forward cushion assembly 104. The vibrating means 124 is pivotally connected to the slide frame 110. The gas cylinder 122 is similar to other gas cylinders well known in the art, such as Bauer, U.S. 3,711,054, and Claus et al., U.S. 6,116,555, hereby incorporated by reference. Of course, those skilled in the art will recognize that the piston 120 and the gas cylinder 122 can be reversed, or replaced with an equivalent mechanism such as a spring, and such modifications should be considered within the scope of the invention.

Further the chair device 100 comprises a vertical locking mechanism for blocking the vertical adjustment of the forward cushion assembly 104. The vertical locking mechanism is capable of moving between a locked position in which the movement of the piston 120 with respect to the gas cylinder 122 is blocked and an unlocked position in which the piston 120 can move with respect to the gas cylinder 122. The blocking of the piston 120 to the gas cylinder 122 is operated by a wire 130 which moves a blocking lever 132 connected to the gas cylinder 122. As shown in Fig. 8, the movement of the wire 130 is controlled via a push button 134 on a armrest 136 of the chair device 100.

The chair device 100 further comprises a horizontal locking mechanism for blocking the horizontal adjustment of the forward cushion assembly 104. The horizontal locking mechanism comprises a toothed bar 126 fixed to the slide frame 110 and a toothed piece 128 being movable between a locked position in which it meshes with the toothed bar 126 and blocks the movement of the horizontal slide bar 112 to the horizontal slide bar guide 106, and an unlocked position in which it is free from the toothed bar 126 so that the horizontal slide bar 112 can move with respect to the horizontal slide bar guide 106.

The chair device 100 further comprises a release mechanism which moves the

horizontal locking mechanism to the unlocked position and keeps it in the unlocked position in case the forward cushion assembly 104 is in a lifted position higher than a given level. The horizontal locking mechanism preferably includes a horizontal locking lever 150 that is pivotally attached to the slide frame 110. The horizontal locking lever 150 is used to mount the toothed piece 128 adjacent the toothed bar 126 such that pivoting the horizontal locking lever 150 causes the toothed piece 128 to engage or disengage the toothed bar 126. The horizontal locking lever 150 is attached to a second wire 152 which is also attached to the forward cushion assembly 104. In this arrangement, lifting the forward cushion assembly 104 above a given point, to the relaxed seated position, causes the second wire 152 to pull the horizontal locking lever 150 causing it to pivot to the point that the toothed piece 128 disengages the toothed bar 126. The level of the given point can be adjusted by an adjustment screw 138 on the chair device 100.

Fig. 8 shows a side view of the chair device 100 with the forward cushion assembly 104 in a traditional seated position. On one side of the forward cushion assembly 104, the connection points of the vertical support arm 114 and the additional support arm 116 are at a distance 140 from each other. On one side of the slide frame 110, the connection points of the vertical support arm 114 and the additional support arm 116 are at a distance 142 from each other.

As shown in Fig. 8, the vertical support arm 114 is slightly longer than the additional support arm 116; that is, the distance 144 between the connection points of the vertical support arm 114 on one side of the chair device 100 is slightly greater than the distance 146 between the connecting points of the additional support arm 116 on the same side of the chair device 100. In this way, the forward cushion assembly 104 rotates a little bit when moving from the lower position to a lifted position whereby the lower part of the forward cushion assembly moves a little bit to the aft cushion assembly 108 (see Figs. 10 and 11) so that the front side 148 of the forward cushion assembly 104 does not contact the legs of the user and the user's legs have more freedom of movement.

The user can extend the length of the chair device 100 by pulling the forward cushion assembly 104 away from the aft cushion assembly 108. Fig. 9 shows the chair device 100 with the forward cushion assembly 104 in a horizontal shifted position. The toothed piece 128 does not engage the toothed bar 126 strong enough to prevent the outward movement, only to slightly restrict the movement.

The user can also change the vertical position of the forward cushion assembly 104 by pressing the button 134 on the armrest. Fig. 10 shows the chair device 100 with the forward cushion assembly 104 in a vertical shifted position. The user has to lift his legs and the forward cushion assembly 104 will follow under the bias of the gas cylinder 122. When the user releases the button 134, the forward cushion assembly 104 is locked in place such that further vertical movement is denied.

In the lifted position of the forward cushion assembly 104 (see also Fig. 11), the second wire 152 causes the toothed piece 128 to disengage from the toothed bar 126, thereby allowing unrestricted horizontal movement, which provides the user with greater flexibility and freedom of movement. In this way, the user can put the forward cushion assembly 104 in the horizontal position that is the most comfortable.

Fig. 11 shows the chair device 100 with the forward cushion assembly 104 in a relaxed position in which the forward cushion assembly 104 is displaced in both a horizontal and vertical direction. To set the seat back in the traditional seated position the user needs to press the button 134 on the armrest 136 and push the forward cushion assembly 104 down with the weight of his legs. The user can then push back in the forward cushion assembly 104 until the forward cushion assembly 104 abuts the aft cushion assembly 108.

While the two embodiments of the means for horizontal and vertical adjustment of the chair device 20 have been described in detail, it is recognized that those skilled in the art can devise countless equivalent mechanisms to accomplish the goal of suitably adjusting the forward cushion assembly 30 and the thigh supporting surface 32. Structures that are considered equivalent include, but are not limited to pneumatic adjustment devices, motor driven and power assisted devices, and various mechanical adjustment mechanisms such as can be readily devised by those skilled in the art. These equivalent structures should be construed as within the scope of this invention and accordingly within the scope of the claims, below.

In one particular alternative embodiment, as shown in Fig. 6, the vertical position adjusting means is provided by an air bladder 90 mounted within the forward cushion assembly 30 beneath the thigh supporting surface 32. The vertical position adjusting means further includes a means for adjusting the volume 92 of the air bladder 90, thereby raising or lowering the thigh supporting surface 32. The volume adjusting means 92 is

preferably a hand pump used in combination with an air release valve 94. By pumping the hand pump 92, the user 10 is able to inflate the air bladder 90, thereby raising the level of the thigh supporting surface 32. By actuating the air release valve 94, the user 10 is able to deflate the air bladder 90, thereby lowering the level of the thigh supporting surface 32. The use of the air bladder 90 removes the necessity of many of the above-listed parts of the adjustment assembly 40, although the horizontal slide bar 46 and the horizontal slide bar guide 40A are still preferably included to allow the horizontal adjustment of the forward cushion assembly 30.

The invention includes a method for adjusting the chair device 20 described above to support a user 10 in either a traditional seated position or a relaxed seated position wherein the legs 12 of the user 10 are supported above the floor 18. The chair device 20 is preferably installed upon a floor 18 of an airplane, bus, ferry, or other vehicle that subjects passengers to confinement to the chair device 20 for long periods of time. The user 10 is positioned upon the chair device 20 such that the aft supporting surface 26, the thigh supporting surface 32, and the back supporting surface 36 cooperating to support the user 10 in a traditional seated position in which a pair of legs 12 of the user 10 rest upon the floor 18. In this position, the ischium 13 of the user 10 is supported by the aft supporting surface 26, the back of the user 10 is supported by the back supporting surface 36, and the thigh 14 of the user 10 is supported by the thigh supporting surface 32. The traditional seated position allows the user 10 to rest comfortable for much of any given trip.

During long trips, however, the user 10 may begin to experience fatigue in his or her legs 12, as described above. To relieve the strain, and perhaps to attempt to sleep for a period, the user 10 simply adjusts the horizontal position adjusting means to position the thigh supporting surface 32 to contact a lower thigh portion 15 of the legs 12 of the user 10; and the user 10 then adjusts the vertical position adjusting means so that the thigh supporting surface 32 moves from the traditional seated position to a relaxed seated position, thereby supporting the legs 12 of the user 10 above the floor 18, as shown in Fig. 5.

While the legs 12 of the user 10 are supported above the floor 18, the weight of the legs 12 is removed from the knees 16 and ankles 17, and vibrations from the floor 18 are no longer transmitted through the legs 12 of the user 10. In this position, the user 10 experiences the illusion that his or her legs 12 are actually comfortably supported, as if by

an ottoman or similar leg rest, without requiring the additional leg room required by the prior art devices. Indeed, even with the leg room constraints of modern airplanes, the user 10 can be given a comfortable seated position. By further reclining the upwardly extending seat back 34, the user 10 can shift into a sleeping position that allows the user 10 to sleep in comfort.

While the invention has been described with reference to at least one preferred embodiment, it is to be clearly understood by those skilled in the art that the invention is not limited thereto. Rather, the scope of the invention is to be interpreted only in conjunction with the appended claims.

Instead of being attached to the gas cylinder 122 the vibrating means 124 could also be present in the forward cushion assembly 104.

Further, in the normal seated position of the user, the thigh supporting surface could not be in contact with the user. For example, in this situation the thigh supporting surface could be the forward facing surface of the forward cushion assembly. In the relaxed seated position the forward cushion assembly could be rotated and lifted, so that the thigh supporting surface would become the upward facing surface of the forward cushion assembly and will support the thigh of the user.

CLAIMS

1. An adjustable chair device (20; 100) for supporting a user, in particular a passenger in a bus or airplane, between a traditional seated position in which a pair of legs of the user rest upon a floor, and a relaxed seated position in which the legs of the user are lifted with respect to the traditional seated position, the device comprising:
- 5 a base (22) supporting an aft cushion assembly (26; 108), a forward cushion assembly (30; 104), and an upwardly extending seat back (34);
- the aft cushion assembly (26; 108) providing an aft supporting surface (26), the forward cushion assembly (30; 104) providing a thigh supporting surface (32), and the
- 10 upwardly extending seat back (34) providing a back supporting surface (36), the aft supporting surface (26), the thigh supporting surface (32), and the back supporting surface (36) cooperating to support the user in a seated position; and
- a means for adjusting the vertical position of the thigh supporting surface (32) with respect to the aft supporting surface (26) thereby lifting the legs of the user,
- 15 characterized in that the chair device (20; 100) further comprises:
- a means for adjusting the horizontal position of the thigh supporting surface (32) with respect to the aft supporting surface (26), so that the thigh supporting surface (32) contacts a lower thigh portion (15) of the legs or the back of the knees (16) of the user.
2. Chair device according to claim 1, characterized in that said means for
- 20 adjusting the vertical position of the thigh supporting surface (32) is able to displace the forward cushion assembly (30; 104) in vertical direction with respect to the aft cushion assembly (26; 108), and
- wherein said means for adjusting the horizontal position of the thigh supporting surface (32) is able to displace the forward cushion assembly (30; 104) in
- 25 horizontal direction with respect to the aft cushion assembly (26; 108).
3. Chair device according to claim 1 or 2, characterized in that said means for adjusting the vertical position of the thigh supporting surface (32) is able to lift the legs of a user to a position in which the feet are lifted from the floor.
4. Chair device according to claim 1, 2 or 3, characterized in that said means
- 30 for adjusting the vertical position of the thigh supporting surface (32) is able to lift the forward cushion assembly (30; 104) to a level where it is at a vertical distance from the aft cushion assembly (26; 108).

5. Chair device according one of the preceding claims, characterized in that said means for adjusting the horizontal position of the thigh supporting surface (32) is able to displace the forward cushion assembly (30; 104) to a position where it is at a horizontal distance from the aft cushion assembly (26; 108).

5 6. The device according to one of the preceding claims, characterized in that the horizontal position adjusting means is provided by an adjustment assembly (40; 102) comprising:

a horizontal slide bar guide (40A; 106) mounted between the base (22) and the aft cushion assembly (26; 108); and

10 a slide frame (44; 110) having a horizontal slide bar (46; 112) that slidably engages the horizontal slide bar guide (40A; 106) for horizontal adjustment of the slide frame (44; 110).

7. Chair device according to claim 6, characterized in that the chair device (20; 100) further comprises a horizontal locking mechanism (60; 126, 128) for blocking the horizontal adjustment of the forward cushion assembly (30; 104), said horizontal locking mechanism (60; 126, 128) being capable of moving between a locked position in which the movement of the horizontal slide bar (46; 112) to the horizontal slide bar guide (40A; 106) is blocked and an unlocked position in which the horizontal slide bar (46; 112) can move with respect to the horizontal slide bar guide (40A; 106).

20 8. Chair device according to claim 7, characterized in that the chair device (20; 100) further comprises:

a release mechanism which moves the horizontal locking mechanism (60; 126, 128) to the unlocked position and keeps it in the unlocked position in case the forward cushion assembly (30; 104) is in a lifted position higher than a given level; and

25 adjustment means (138) for adjusting the given level.

9. Chair device according to one of the preceding claims 1 up to and including 8, characterized in that the vertical position adjusting means is provided by an adjustment assembly (102) comprising:

30 at least one vertical support arm (114) attached to the forward cushion assembly (104) and adjustably attached to the slide frame (110); and

a means for adjusting the vertical position of the at least one vertical support arm (114).

10. Chair device according to claim 9, characterized in that the means for adjusting the vertical position of the at least one vertical support arm is a cylinder (122) or solenoid operably positioned between the slide frame (110) and the support arm (114), the cylinder (122) or solenoid being attached to the slide frame (110) and a piston (120) of the cylinder (122) or a movable bar of the solenoid being attached to the support arm (114).
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11. Chair device according to claim 10, characterized in that the cylinder (122) or solenoid functioning to lock the at least one vertical support arm (114) in either the traditional seated position or the relaxed seated position in response to a vertical locking mechanism (132) for blocking the vertical adjustment of the forward cushion assembly (30; 104), the vertical locking mechanism (132) being capable of moving between a locked position in which the movement of the piston (120) or bar with respect to the cylinder (122) or solenoid is blocked and an unlocked position in which the piston (120) or the bar can move with respect to the cylinder (122) or the solenoid.
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12. Chair device according to claim 11, characterized in that the at least one vertical support arm includes two vertical support arms (114), and the piston (120) of the cylinder (122) or the bar of the solenoid is attached to a connecting bar (118), the connecting bar (118) connecting the two vertical support arms (114).
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13. Chair device according to claim 10, 11 or 12, characterized in that the at least one vertical support arm further includes two additional support arms (116), the two additional support arms (116) each being connected to both the forward cushion assembly (104) and the slide frame (110).
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14. Chair device according to one of the preceding claims 1 up to and including 8, characterized in that the vertical position adjusting means is provided by an adjustment assembly (40) comprising:

25 a vertical slide bar guide (40B) mounted on the slide frame (44);
a vertical slide bar (48) mounted on the forward cushion assembly (30), the vertical slide bar (48) slidably engaging the vertical slide bar guide (40B) for vertical adjustment of the forward cushion assembly (30); and
a locking mechanism (60) capable of moving between a locked position and
30 an unlocked position.

15. Chair device according to claim 14, characterized in that the chair device (20) further comprises:

a means for biasing the locking mechanism (60) towards the locked position;

and

an unlocking means (80) for overcoming the biasing means to move the locking mechanism (60) from the locked position to the unlocked position, thereby allowing the relative horizontal and vertical position of the forward cushion assembly (30) to be adjusted, whereby release of the unlocking means (80) allows the biasing means to return the locking mechanism (60) to the locked position.

16. Chair device according to claim 15, characterized in that

the locking mechanism (60) having a horizontal pin (62) and a vertical pin (64), wherein in the locked position the horizontal pin (62) removably engages one of a plurality of horizontal locking holes (42) in the horizontal slide bar guide (40A), and the vertical pin (64) removably engages one of a plurality of vertical locking holes (52) in a forward slide plate (50) attached to the forward cushion assembly (30); and

in that in the unlocked position the horizontal and vertical pins (62, 64) are pulled from the horizontal and vertical locking holes (42, 52), respectively.

17. Chair device according to claim 15 or 16, characterized in that the biasing means comprises:

a bell crank (72) pivotally mounted onto a bell crank mounting plate (54) of the forward cushion assembly (30), the bell crank (72) having a bell crank pin (74) that engages a locking slot (66) of the locking mechanism (60); and

a spring (71) attached to both the bell crank (72) and the bell crank mounting plate (54) for biasing the bell crank (72) such that the bell crank pin (74) biases the locking mechanism (60) towards the locked position.

18. Chair device according to claim 17, characterized in that the unlocking means (80) comprises:

a handle (82) slidably mounted on a handle guide (84) of the forward cushion assembly (30), the handle (82) being pivotally attached to a lever arm (76) of the bell crank with a handle link such that pulling the handle causes the handle link to pull the lever arm, the lever arm (76) causing the bell crank (72) to rotate about the bell crank mounting plate (54) against the bias of the spring (71), thereby causing the bell crank pin (74) to move the locking mechanism (60) towards the unlocked position.

19. Chair device according to one of the preceding claims 1 up to and including

8, characterized in that the vertical position adjusting means comprises:

an air bladder (90) mounted within the forward cushion assembly (30) beneath the thigh supporting surface (32); and

a means for adjusting the volume of the air bladder (90), thereby raising or lowering the thigh supporting surface (32).

20. Chair device according to claim 19, characterized in that the volume adjusting means comprises a hand pump (92) and an air release valve (94).

21. Chair device according to one of the preceding claims, characterized in that the chair device (100) further comprises means (124) for vibrating the thigh supporting surface.

22. Chair device according to claim 21, characterized in that the vibrating means (124) are mounted in the forward cushion assembly (104).

23. Chair device according to claim 21 and claim 8 or 9, characterized in that the means (124) for vibrating the thigh supporting surface are mounted between the cylinder (122) or solenoid and the slide frame (110) or between the piston (120) or the bar of the solenoid and the at least one vertical support arm (114) or the connecting bar (118).

24. Method for adjusting a chair device (20; 100) to support a user in either a traditional seated position in which a pair of legs of the user rest upon a floor, or in a relaxed seated position in which the legs of the user are lifted with respect to the traditional seated position, the method comprising the steps of:

a) providing an adjustable chair device (20; 100) comprising:
a base (22) supporting an aft cushion assembly (26; 108), a forward cushion assembly (30; 104), and an upwardly extending seat back (34);

the aft cushion assembly (26; 108) providing an aft supporting surface (26), the forward cushion assembly (30; 104) providing a thigh supporting surface (32), and the upwardly extending seat back (34) providing a back supporting surface (36);

a means for adjusting the vertical position of the thigh supporting surface (32) with respect to the aft supporting surface (26); and

a means for adjusting the horizontal position of the thigh supporting surface (32) with respect to the aft supporting surface (26);

b) installing the base (22) upon the floor;

c) positioning the user upon the chair device (20; 100) such that at least the aft

supporting surface (26) and the back supporting surface (36) cooperating to support the user in a traditional seated position in which the legs of the user rest upon the floor;

d) adjusting the horizontal position adjusting means to position the thigh supporting surface (32) to contact a lower thigh portion (15) of the legs of the user; and

5 e) adjusting the vertical position adjusting means so that the thigh supporting surface (32) moves from the traditional seated position to a relaxed seated position wherein the legs of the user are supported in a lifted position with respect to the traditional seated position.

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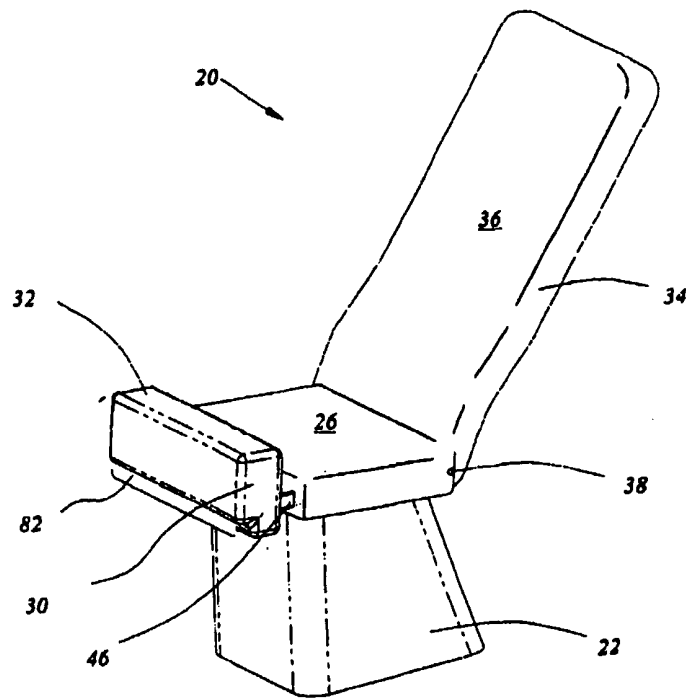


FIG. 1

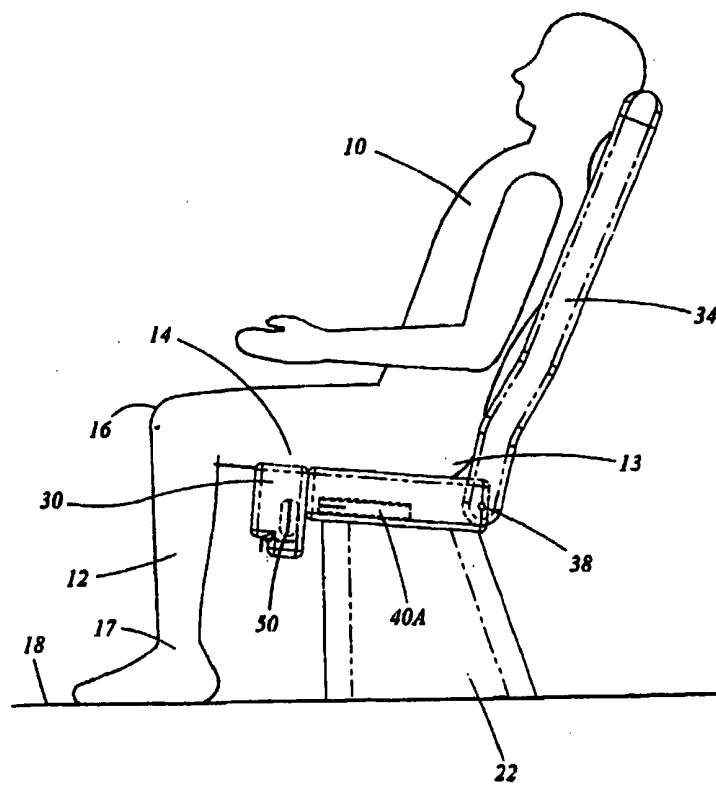


FIG. 2

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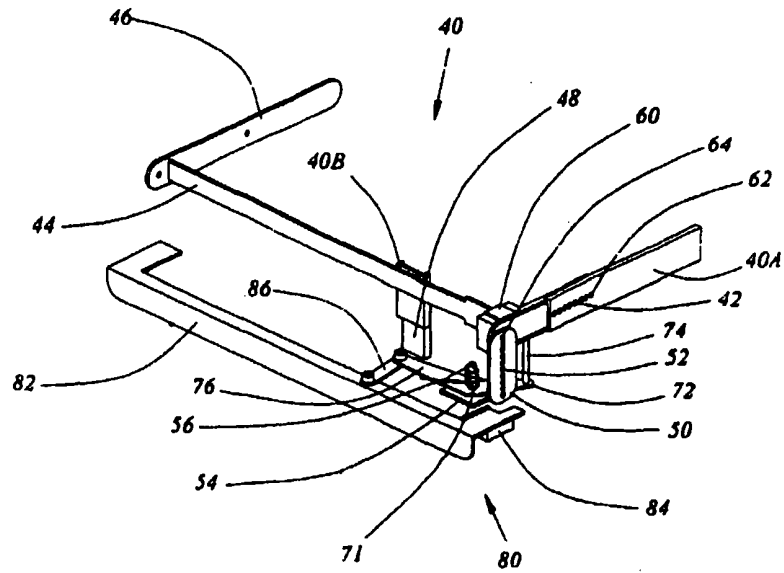


FIG. 3

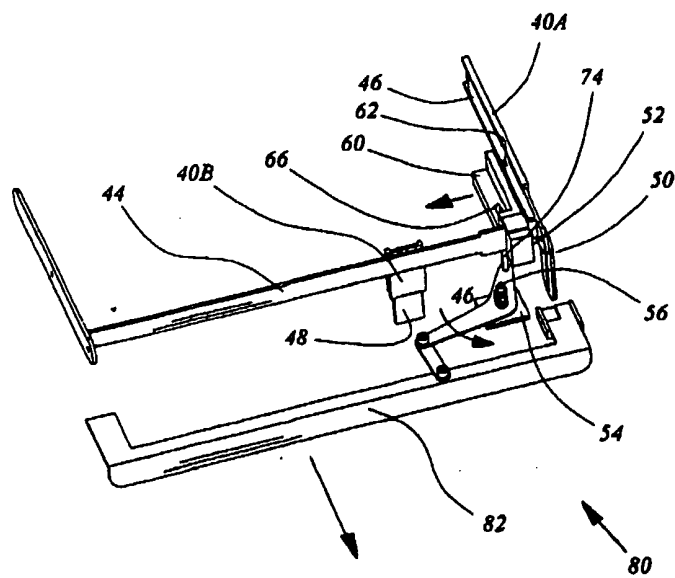


FIG. 4

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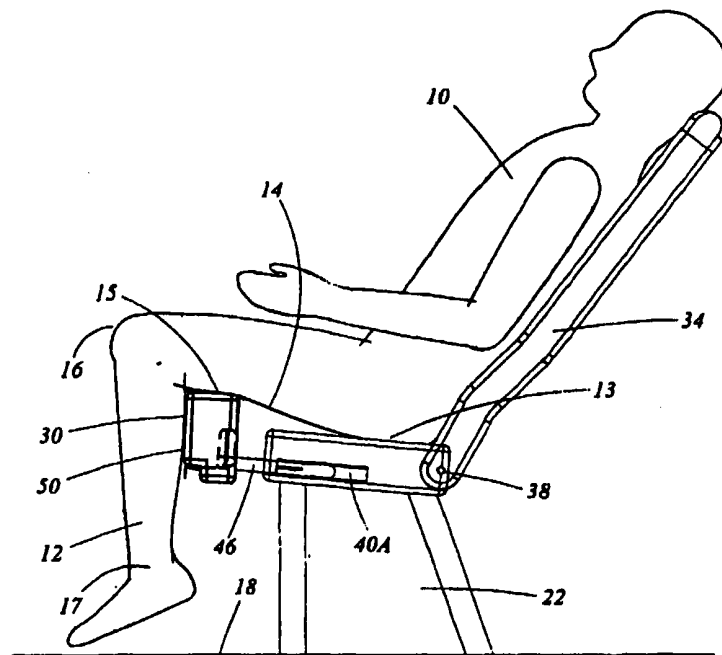


FIG. 5

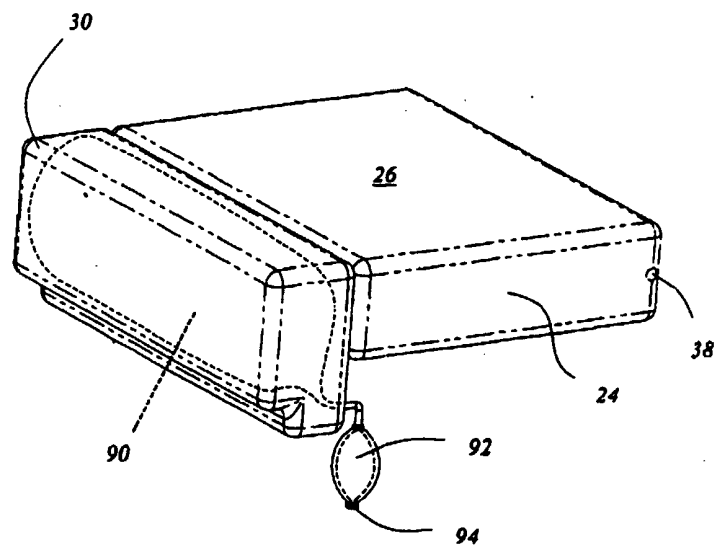


FIG. 6

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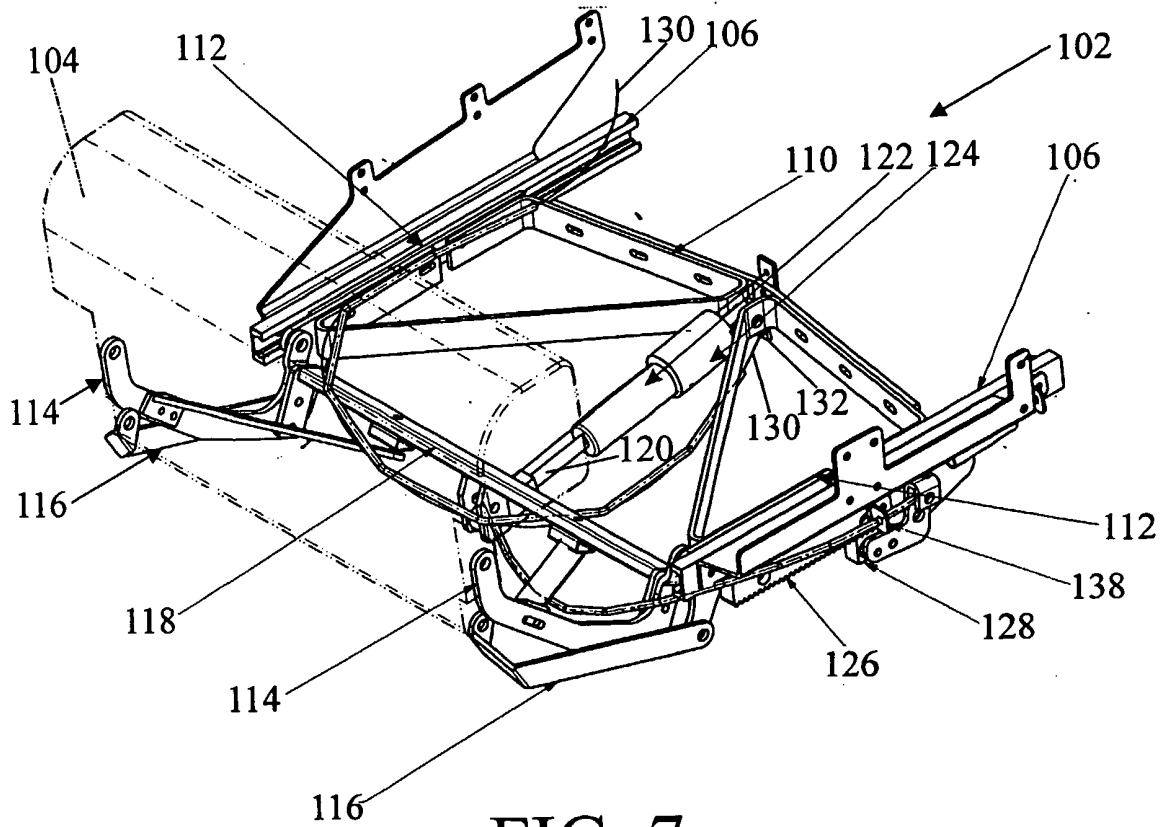


FIG. 7

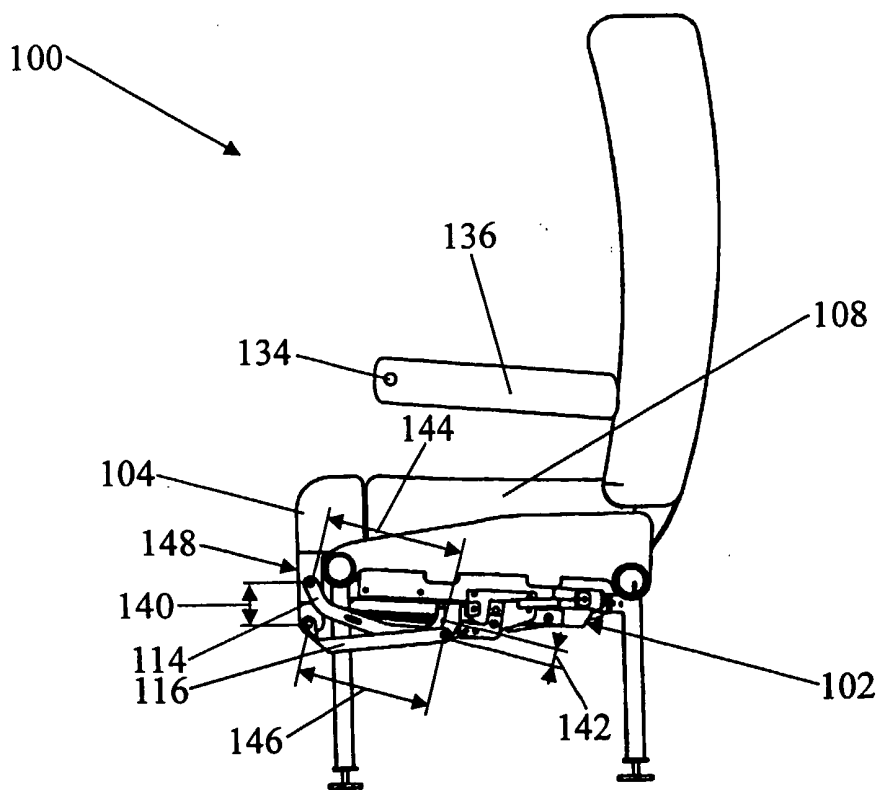


FIG. 8

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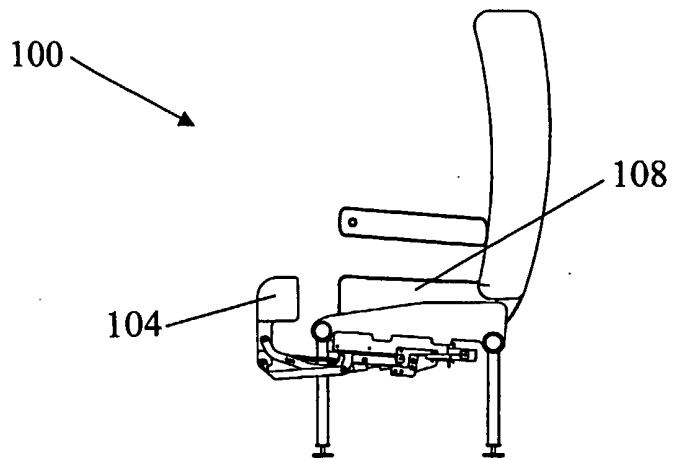


FIG. 9

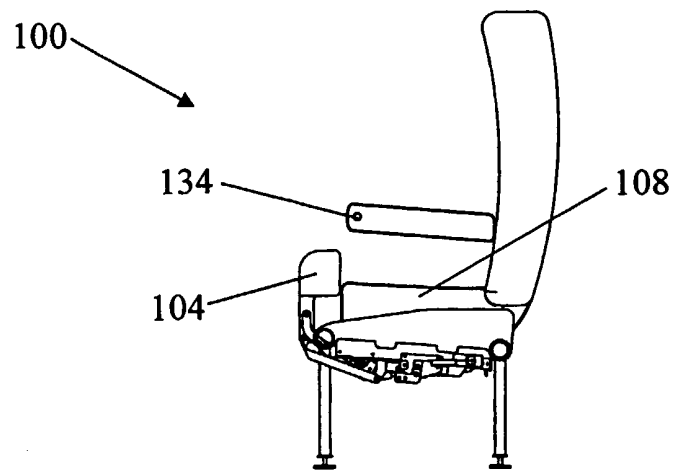


FIG. 10

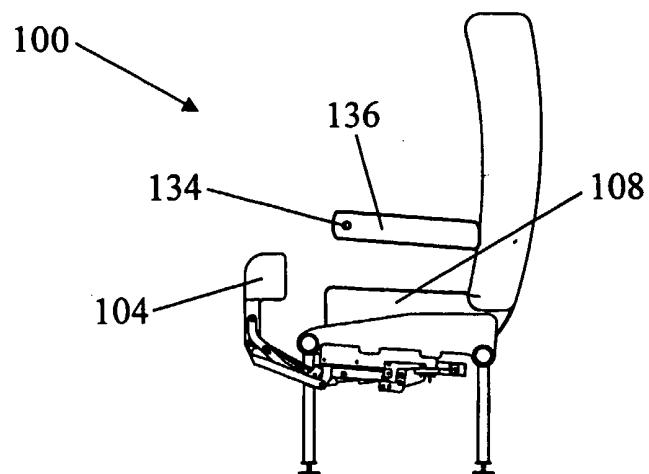


FIG. 11