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(54) Reclining chair

(57) The invention relates to a reclining chair (1) comprising:

- a support base (2);
 - a reclining frame (7) movable arranged to the support base (2) by a mechanism (6);
 - a seat (8) arranged to the reclining frame (7); and
 - a back (9) arranged to the reclining frame (7);
- wherein the mechanism (6) is positioned below the seat (8) and wherein the reclining frame (7) has a virtual reclining axis (18) positioned above the seat (8) and in front of the back (9).

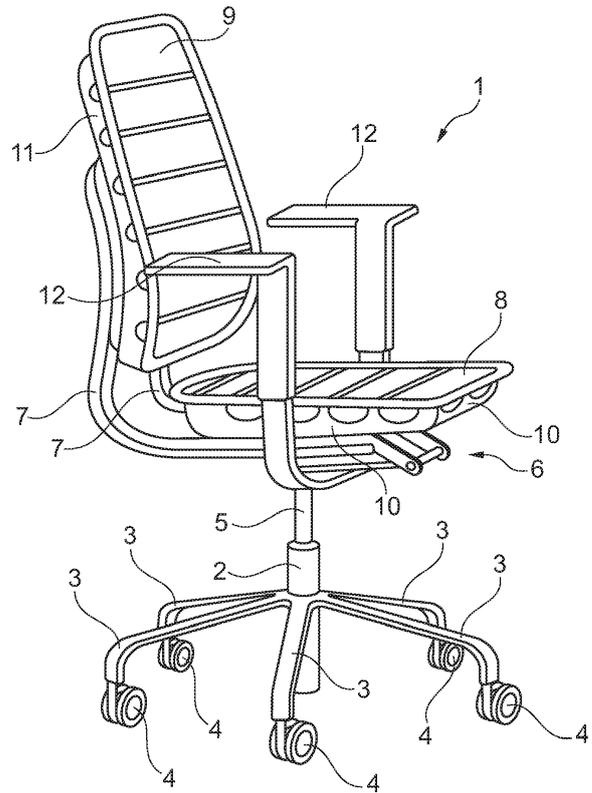


Fig. 1

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Description

[0001] The invention relates to a reclining chair comprising:

- a support base;
- a reclining frame movable arranged to the support base by a mechanism;
- a seat arranged to the reclining frame; and
- a back arranged to the reclining frame.

[0002] Such a reclining chair is for example known from WO 2008124070. In this publication a mechanism is shown with a physical reclining axis and a spring counteracting the reclining movement. The physical reclining axis is positioned underneath the seat of the chair. The spring is adjustable to the weight of the person sitting on the chair, in order to bring the reclining movement in balance. However, as soon as another person sits on the chair, the spring has to be readjusted to provide a comfortable reclining movement.

[0003] US 2007001499 describes a reclining lounge chair, in which the mechanism extends upward along the sides of the chair in order to provide a physical reclining axis, which is positioned above the seat and in front of the back, such that the physical reclining axis will coincide with the center of gravity of the person sitting in the chair. Because the mechanism has to extend along the sides of the chair to provide the reclining axis above the seat, the design freedom is impaired.

[0004] It is an object of the invention to reduce the above mentioned disadvantages.

[0005] This object is achieved according to the invention with a reclining chair according to the preamble, which is characterized in that the mechanism is positioned below the seat and in that the reclining frame has a virtual reclining axis positioned above the seat and in front of the back.

[0006] Because the mechanism is provided below the seat, it will not interfere with the sides of the chair or substantially impair the design freedom for the chair. Having a virtual reclining axis provided by the mechanism makes it possible to have the virtual reclining axis to be closer to the center of gravity of a person sitting in the chair. By bringing the reclining axis closer to the center of gravity, the means for balancing the chair can be smaller or even be left out.

[0007] In a preferred embodiment of reclining chair according to the invention the virtual reclining axis has a substantially fixed vertical distance to the support base and is movable in a horizontal direction.

[0008] By having the virtual reclining axis at a fixed height in respect to the support base, a predictable reclining movement of the chair is possible. This contributes to the comfort of the chair.

[0009] In a further preferred embodiment of the reclining chair according to the invention the virtual reclining axis is positioned in a zone, which corresponds with the

standard deviation of the center of gravity for persons sitting in the reclining chair.

[0010] Having the virtual reclining axis substantially at the same position as the center of gravity of a person, the effort for balancing the chair is reduced. If the virtual reclining axis is furthermore kept at a fixed height no potential energy is lost by the person sitting on the chair, while moving forward and backward, as the center of gravity of the person will stay at the same height. This contributes to a better comfort of the chair and eliminates the need to readjust a spring or other balancing means when another person sits in the chair.

[0011] In yet another preferred embodiment of the reclining chair according to the invention, the mechanism comprises:

- a base with a first hinge;
- a first rod connected with an end to the first hinge;
- a second rod hingedly connected to the other end of the first rod; and
- a bearing attached to the first rod at a distance of the first hinge to slidably support the second rod.

[0012] This mechanism according to the invention ensures that the second rod will rotate around a virtual axis, as long as the rotation of the first rod is limited.

[0013] Preferably the first rod is fixed to the support base, while the second rod is fixed to the reclining frame. The bearing is preferably arranged near the center of gravity of a person, when seen in vertical direction. the bearing could be a roller bearing. Such a bearing can take the weight of the person, while still providing a sliding or rolling movement with low friction. A sliding bearing could also be used if some additional friction is desired. This additional friction could be used to make the chair less nervous.

[0014] Another embodiment of the reclining chair according to the invention, further comprises spring means for urging the reclining frame to a desired position. The reclining movement of a chair according to the invention, does not need much energy. As a result a small imbalance of an empty chair will result in tilting of the chair to the front or to the back. For example a sweater hanging on the back will already cause the chair to recline. To ensure a single predetermined position of the chair, when not in use, a small spring can be provided, which urges the chair to the predetermined position.

[0015] In yet another preferred embodiment of the reclining chair according to the invention, the leading edge of the seat is flexible to tilt downwards.

[0016] Because the reclining frame and accordingly seat and back will rotate along the virtual reclining axis, the leading edge of the seat will move up, when the chair is reclined backwards. This upward movement of the leading edge of the chair could result in an undesired pressure to the legs of the person sitting in the chair. To prevent this undesired pressure, the leading edge is flexible, such that it is easily pushed downward, when the

chair is reclined backward.

[0017] Preferably the support base is height adjustable to accommodate persons of different height.

[0018] These and other features of the invention, will be elucidated in conjunction with the accompanying drawings.

Figure 1 shows a perspective view of an embodiment of a reclining chair according to the invention.

Figure 2 shows a cross sectional view of the chair along the line II-II as shown in figure 3.

Figure 3 shows a front view of the chair according to figure 1 in backward reclined position.

Figure 4 shows a cross sectional view similar to figure 2 in a forward reclined position.

[0019] Figure 1 shows a reclining chair 1 according to the invention. This reclining chair 1 has a support base 2, with five legs 3, which are each provided at the end with wheels 4. The support base 2 furthermore has a gas spring 5 for height adjustment.

[0020] A reclining mechanism 6 is arranged at the top of the gas spring 5. A reclining frame 7 is also attached to the mechanism 6, which enables the frame 7 to recline relative to the support base 2.

[0021] Attached to the reclining frame 7 are the seat 8 and back 9. The seat 8 and back 9 are provided with spring elements 10, 11 respectively to provide comfort for the user. Height adjustable armrests 12 are arranged extending along the sides of the seat 8.

[0022] Figure 2 shows a cross sectional view of the chair 1 according to figure 1 in a backward reclined position.

[0023] The mechanism 6 has a base 13 with a first hinge 14. This base 13 is fixedly attached to the top of the gas spring 5 (see figure 3) and also provides a mounting base for the armrests 12.

[0024] A first rod 15 is connected to the first hinge 14. This first rod 15 is in turn hingedly connected to a second rod 16, which is fixed to the reclining frame 7. The free end of this second rod 16 is supported by a roller bearing 17, which is attached to the base 13.

[0025] The mechanism 6 provides a virtual reclining axis 18 for the reclining frame 7. Due to the design of the mechanism 6 the virtual axis 18 is positioned above the seat 8 and in front of the back 9.

[0026] Furthermore, the virtual axis 18 will move along a substantially horizontal path 19, when the frame 7 is rotated around the virtual reclining axis 18. This is made clear by comparing figure 2 with figure 4, which is the same cross sectional view, but in a forward reclined position. Also the movement of the first rod 15 and second rod 16 is made clear.

[0027] A small gas spring 20 is arranged between the base 13 and the second rod 16 to urge the chair 1 in the forward reclined position as shown in figure 4.

[0028] The seat 8 and back 9 is provided with segments, which are connected to the springs 10, 11 respec-

tively. This ensures that the seat 8 and back 9 will form optimally to the person sitting on the chair. The segments, in particular the segment bordering the leading edge 21 of the seat 8 can easily tilt and bend downward, to compensate for the upward movement of the leading edge 21, when the chair 1 is reclined backward, such that the pressure on the legs of the person is relieved.

10 Claims

1. Reclining chair comprising:

- a support base;
- a reclining frame movable arranged to the support base by a mechanism;
- a seat arranged to the reclining frame; and
- a back arranged to the reclining frame;

characterized in that

the mechanism is positioned below the seat and **in that** the reclining frame has a virtual reclining axis positioned above the seat and in front of the back.

25 2. Reclining chair according to claim 1, wherein the virtual reclining axis has a substantially fixed vertical distance to the support base and is movable in a horizontal direction.

30 3. Reclining chair according to claim 1 or 2, wherein the virtual reclining axis is positioned in a zone, which corresponds with the standard deviation of the center of gravity for persons sitting in the reclining chair.

35 4. Reclining chair according to any of the preceding claims, wherein the mechanism comprises:

- a base with a first hinge;
- a first rod connected with an end to the first hinge;
- a second rod hingedly connected to the other end of the first rod; and
- a bearing attached to the first rod at a distance of the first hinge to slidingly support the second rod.

45 5. Reclining chair according to claim 4, wherein the first rod is fixed to the support base, while the second rod is fixed to the reclining frame.

50 6. Reclining chair according to claim 4 or 5, wherein the bearing is a roller bearing.

55 7. Reclining chair according to any of the preceding claims, further comprising spring means for urging the reclining frame to a desired position.

8. Reclining chair according to any of the preceding

claims, wherein the leading edge of the seat is flexible to tilt downwards.

9. Reclining chair according to any of the preceding claims, wherein the support base is height adjustable. 5

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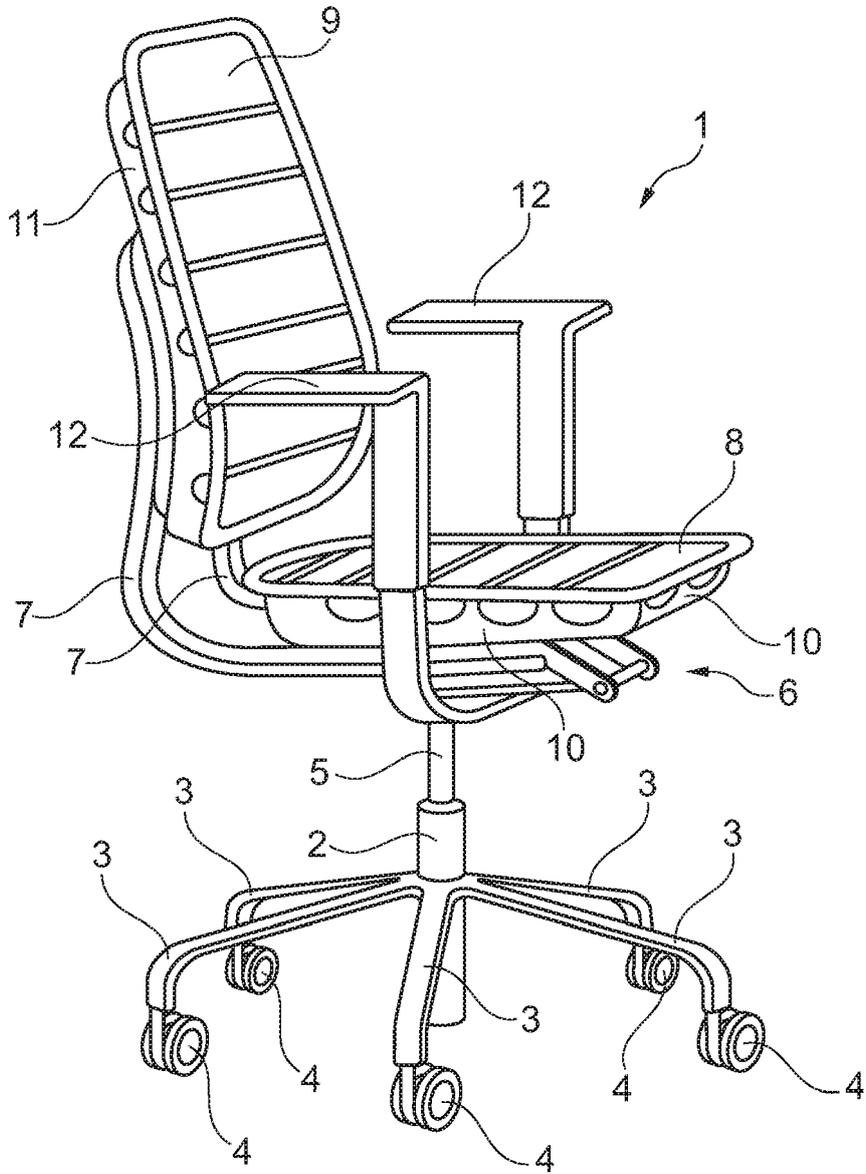


Fig. 1

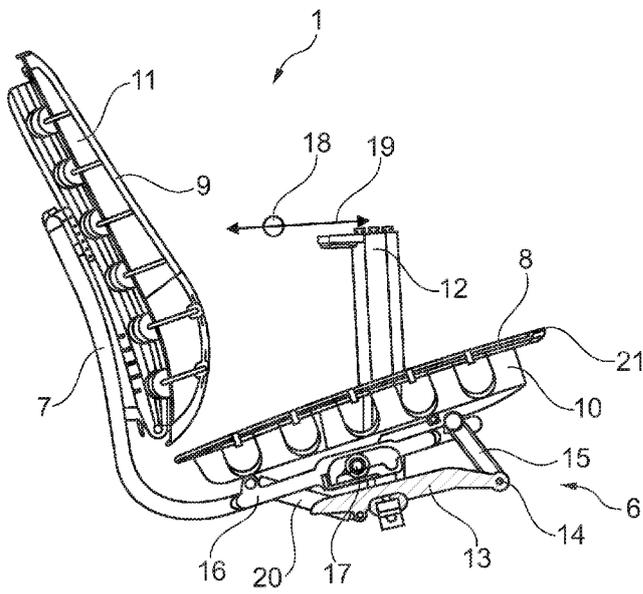


Fig. 2

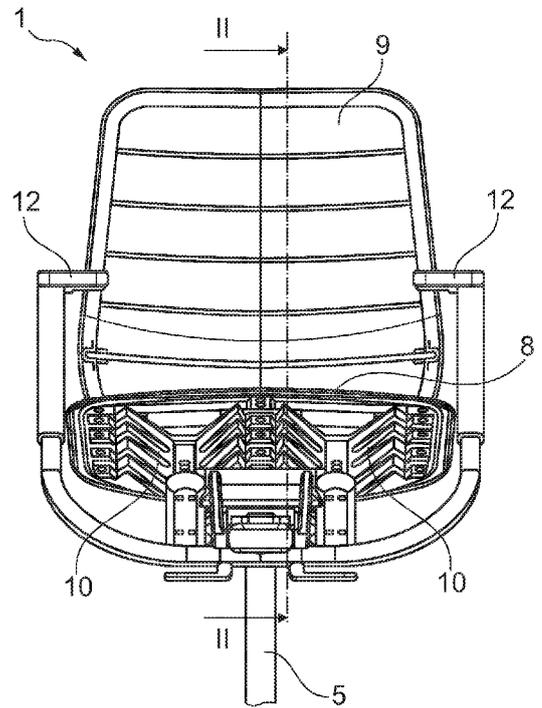


Fig. 3

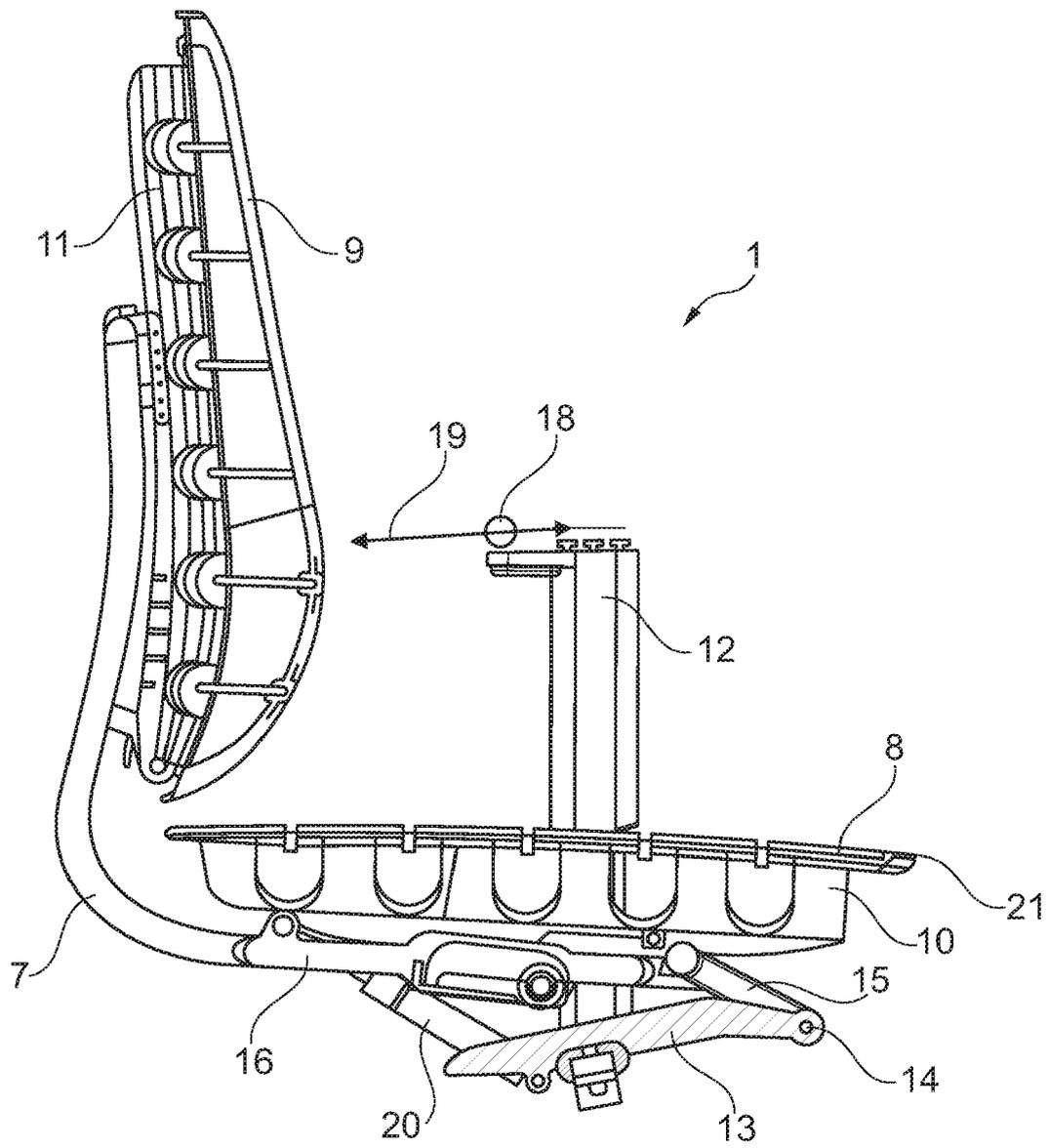


Fig. 4



EUROPEAN SEARCH REPORT

Application Number
EP 11 17 7573

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			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		23 January 2012	Kus, Slawomir
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 11 17 7573

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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