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(54) **Chair with stand-up position**

(57) The invention relates to chair comprising a support, a seat, a back support and a foot rest, which by means of a first hinge is connected to the seat via a, in use horizontally orientated hinge axis, wherein the foot rest by means of a second hinge is connected to the

support via a, in use horizontally orientated hinge axis and wherein the foot rest is connected with an actuator for the hinging movement of the foot rest around the second hinge axis. The first hinge is provided with a locking device, which locks the first hinge in a predetermined position.

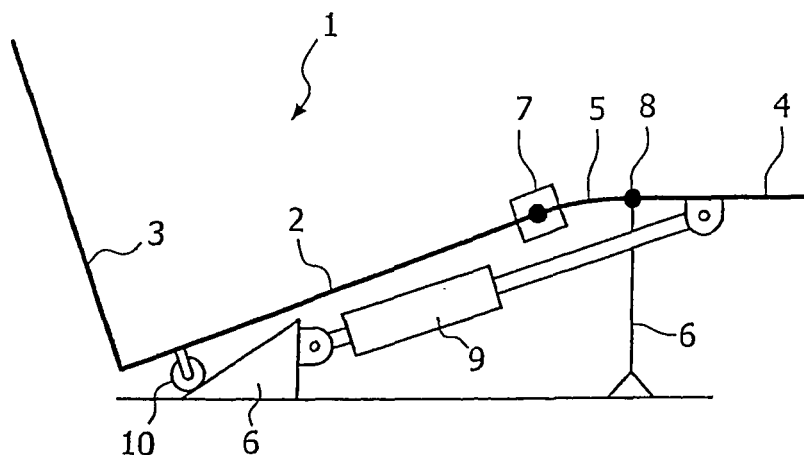


FIG. 1

Description

[0001] The invention relates to a chair with a stand-up position, and in particular to a chair comprising a support, a seat, a back support and a foot rest, which by means of a first hinge is connected to the seat via a, in use horizontally orientated, hinge axis wherein the foot rest by means of a second hinge is connected to the support via a, in use horizontally orientated, hinge axis and wherein the foot rest is connected with an actuator for the hinging movement of the foot rest around the second hinge axis.

[0002] Such chairs are known. An example of such a chair is the Doge-Modulair, available from Doge Collection at Oisterwijk, the Netherlands.

[0003] However, the known chairs have the drawback that the mechanism for obtaining the various positions of the chair is rather complex and consequently costly. For example to adjust the position, three actuators are needed and three electromotors. In addition, a complicated guide system is required to enable the chair's seat, back support and foot rest to move synchronously. Moreover, the stand-up position of the existing chairs is realised by merely tilting in the first instance the seat, and usually also the back support and the foot rest. This movement, however, insufficiently follows the movement made by the human body when rising, and therefore affords insufficient support for this movement. For a better support, the seat should not only tilt, but should simultaneously also lift and move forward.

[0004] It is an object of the present invention to provide a chair of the sort described in the preamble that is, however, of a much simpler construction than the existing chairs.

[0005] This objective is achieved with a chair that possesses the features of claim 1. In this way it is possible to provide a chair that can be adjusted to various positions while requiring only one actuator. The first hinge locks in a particular position, for example, when the foot rest and the seat are approximately at right angles to each other, so that a further tilting of the foot rest in the direction under the seat causes the seat to be tilted upward into a stand-up position.

[0006] If at the second hinge the foot rest of this chair is bent in the direction perpendicular to the second hinge axis, towards the seat, or if between the first and the second hinge the foot rest is curved in the direction perpendicular to the first and second hinge axis, towards the seat, then if the portion of the foot rest under the second hinge is in a vertical position, the hinge axis of the second hinge will be located in front of the front side of the seat. If, in any case from this position, the first hinge locks and the actuator subsequently move the foot rest to the stand-up position, then the seat will not only tilt but will simultaneously lift as a unit, and thus follow the natural movement of the rising human body.

[0007] In a constructively simple, but very effective embodiment, the actuator is a linear actuator that engages the foot rest below the second hinge. The actuator then

rests on the support. By moving the point of application of the actuator further away from the second hinge, a more favourable torque for the movement into the stand-up position is obtained.

[0008] Although it is possible to drive the actuator manually, a drive by electromotor is a considerable convenience for the user.

[0009] The user's convenience is further increased if the actuator can be adjusted to a number of predetermined positions, with the positions comprising at least a sitting position wherein the seat is substantially horizontal, and a stand-up position wherein the seat extends upwards from the first hinge at a predetermined angle, and a relax position wherein the foot rest is substantially horizontal, and the seat extends downwards from the first hinge at a predetermined angle.

[0010] In an embodiment that is particularly comfortable for the user, the chair according to the invention is adjustable to any position between the relax position, the sitting position and the stand-up position.

[0011] In positions wherein the first hinge is not in a locking position, it is possible to bring the seat into a position that is comfortable for the user and constructively simple by supporting the seat via a roller on a sloping rail that is part of the support.

[0012] An extra adjustment feature for the convenience of a user is obtained by making the slope of the rail adjustable.

[0013] By embodying the chair according to the invention such that the foot rest, the seat and the back support, or at least one of these three, comprises a tubular frame, composed of a telescopic tube for adjusting one or several dimensions, a construction is obtained whose dimensions may be very readily adapted to the current wishes.

[0014] The present invention will now be further elucidated by way of a description of a preferred exemplary embodiment of the invention, and with reference to the appended drawings, in which:

Fig. 1 is a cross-sectional schematic side-view of a chair according to the invention in the relax position; Fig. 2 is a schematic side-view of the chair of Fig. 1 in a position in which the first hinge locks; Fig. 3 is a schematic side-view of the chair of Fig. 2 in a normal sitting position; Fig. 4 is a schematic side-view of the chair of Fig. 2 in the stand-up position; and Fig. 5 is an enlarged detail of Fig. 3.

[0015] Figs. 1-5 show cross-sectional side-views of a chair 1 according to the present invention, comprising a seat 2, a back support 3 and a foot rest having a straight portion 4 and a curved portion 5. The seat 2 is connected with the foot rest 4, 5 by means of a first hinge 7. Hinge 7 has a horizontal hinge axis and is provided with a locking device, which is not shown. This locking device stops the hinging action of the hinge 7 from a particular angle, as will be further explained below. The locking device

may be formed, for example, by a stop pin or any other suitable means in accordance with the art.

[0016] The chair 1 is further provided with a support 6, of which the schematic illustrations in Figs. 1-4 only show two components. The foot rest 4, 5 is connected with the support 6 by means of a second hinge 8. Further provided between support 6 and foot rest 4, 5 is the actuator 9. In this embodiment the actuator 9 is a linear actuator in the form of a ball circulating screw, driven by an electromotor. It is also possible to use other suitable actuators. At the lower side of the seat 2 there is further provided a wheel which, when the chair 1 is in certain positions, rotatingly rests on a guide strip that is part of the support 6.

[0017] How the chair operates will now be described with reference to the Figs. 1-5.

[0018] Fig. 1 shows the chair in the relax position. In this position the actuator 9 is in its most extended, screwed out position and the straight portion 4 of the foot rest 4, 5 is substantially horizontal. The seat 2 extends from the foot rest 4, 5 towards the back support 3 downward, and the seat 2 rests via the wheel 10 on the guide rail of the support 6.

[0019] When the actuator is operated causing the same to shorten, the foot rest 4, 5 pivots around the second hinge 8 into a more vertical position and the seat 2 and the back support 3 will be moved forward and upward until the position shown in Fig. 2 is reached. In this position the locking device of the first hinge 8 is activated. When actuator 9 is shortened further, the foot rest 4, 5 pivots the portion 4 into a substantially vertical position while as a consequence seat 1 pivots into a substantially horizontal position, as shown in Fig. 3.

[0020] Further shortening of the actuator 9 moves the chair 1 into the stand-up position, illustrated in Fig. 4. The seat is tilted, aiding the user in rising from the chair.

[0021] Fig. 5 further shows that when moving the chair 1 from the sitting position shown in Fig. 3 to the stand-up position shown in Fig. 4, the seat is not only tilted but also lifted. Fig. 5 shows an enlarged detail of the foot rest 4, 5 and the seat 2, in the same position as shown in Fig. 3. A broken arc line represents the path travelled by the first hinge 7 and thus the starting position of seat 2 when the chair is moved from the sitting position of Fig. 3 into the stand-up position of Fig. 4. Fig. 5 then clearly shows that in addition to a tilting movement, the seat in its entirety also makes an upward and forward movement over the distance h indicated in Fig. 5.

[0022] This chair 1 embodying the invention provides a stand-up chair that follows the rising movement natural to the human anatomy in an excellent manner, while this chair is realised using only one actuator and remarkably few extra components. It will be understood that apart from the described embodiment numerous changes may be made without departing from the scope of the present invention as described in the appended claims.

Claims

1. A chair (1) comprising a support (6), a seat (2), a back support (3) and a foot rest (4,5), which by means of a first hinge (7) is connected to the seat (2) via a, in use horizontally orientated hinge axis, wherein the foot rest (4,5) by means of a second hinge (8) is connected to the support (6) via a, in use horizontally orientated hinge axis and wherein the foot rest (6) is connected with an actuator (9) for the hinging movement of the foot rest (4,5) around the second hinge axis, **characterised in that** the first hinge (7) is provided with a locking device, which locks the first hinge in a predetermined position.
2. A chair (1) according to claim 1, **characterised in that** at the second hinge (8), the foot rest (4,5) is bent in the direction perpendicular to the second hinge axis, towards the seat (2).
3. A chair (1) according to claim 1 or 2, **characterised in that** between the first (7) and the second hinge (8), the foot rest (5) is bent in the direction perpendicular to the first and second hinge axis, towards the seat (2).
4. A chair (1) according to one of the claims 1 to 3, **characterised in that** the actuator (9) is a linear actuator (9) that engages the foot rest (4,5) below the second hinge (8).
5. A chair (1) according to one of the claims 1 to 4, **characterised in that** the actuator (9) is provided with a drive comprising an electromotor.
6. A chair (1) according to one of the claims 1 to 5, **characterised in that** by means of the actuator (9), the chair can be adjusted to a number of predetermined positions, wherein the positions comprise at least a sitting position, wherein the seat (2) is substantially horizontal, a stand-up position wherein the seat (2) extends upwards from the first hinge (7) at a predetermined angle, and a relax position wherein the foot rest (4,5) is substantially horizontal, and the seat (2) extends downwards from the first hinge (7) at a predetermined angle.
7. A chair (1) according to claim 6, **characterised in that** by means of the actuator (9), the chair is adjustable to any position between the relax position, the sitting position and the stand-up position.
8. A chair (1) according to one of the claims 1 to 7, **characterised in that** in positions wherein the first hinge (7) is not in a locking position, the seat is supported via a roller (10) on a sloping rail that is part of the support (6) .

9. A chair (1) according to claim 8, **characterised in that** the slope of the rail is adjustable.

10. A chair (1) according to one of the claims 1 to 9, **characterised in that** the foot rest (4,5), the seat (2) and the back support (3), or at least one of these three, comprises a tubular frame, composed of a telescopic tube for adjusting one or several dimensions.

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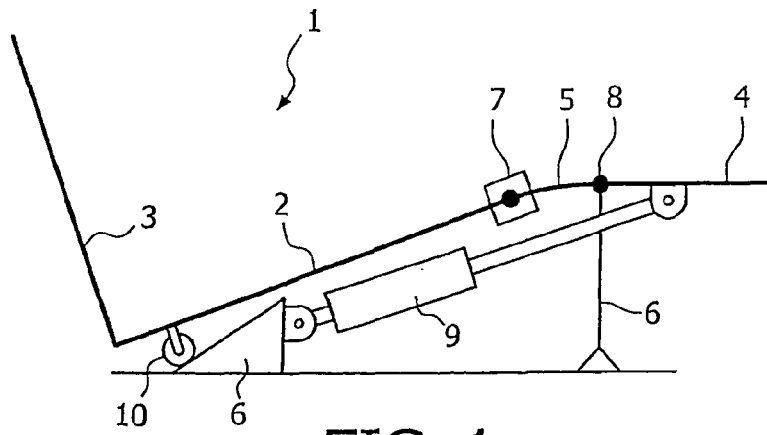


FIG. 1

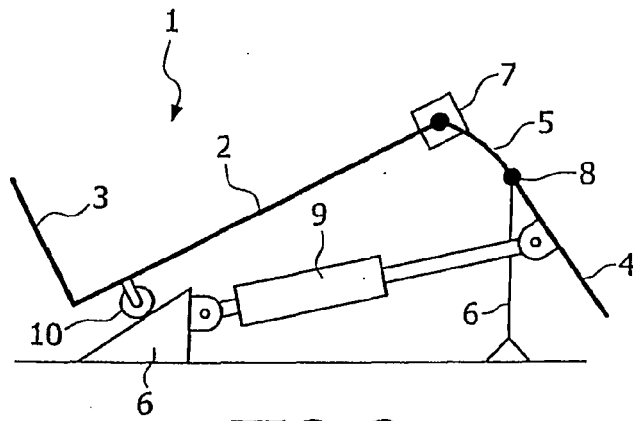


FIG. 2

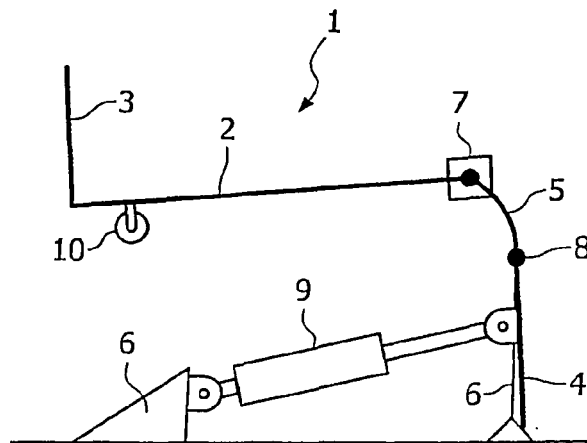


FIG. 3

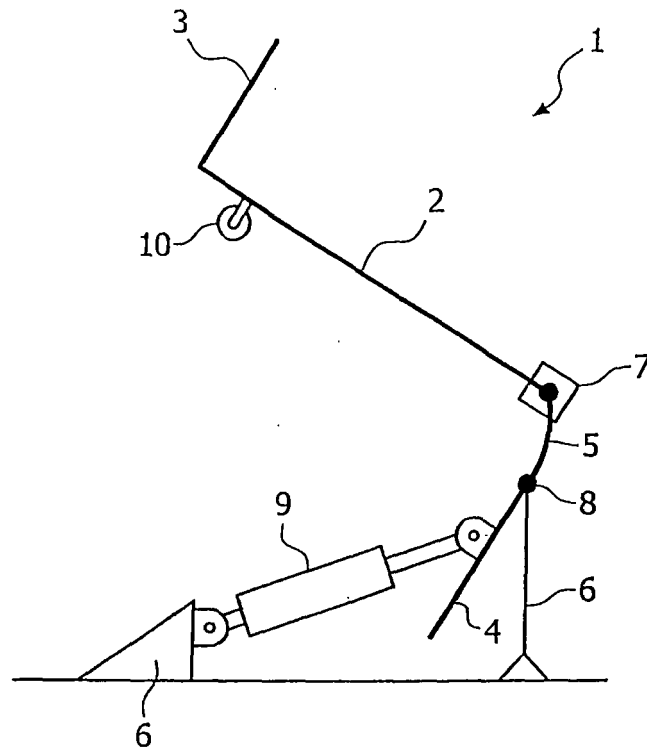


FIG. 4

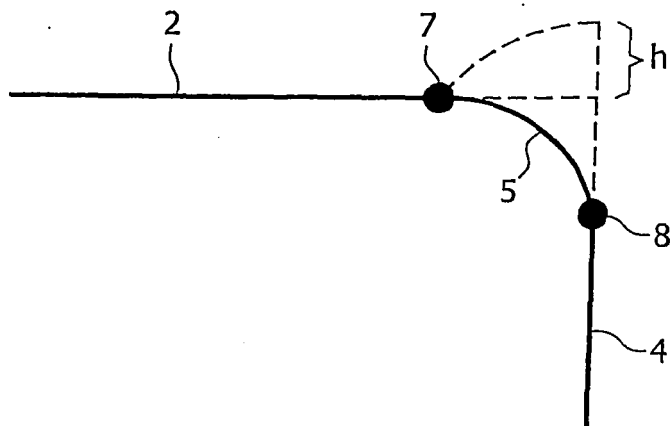


FIG. 5



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 07 10 6605

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	DE 20 2004 000048 U1 (LIN CHENG HSIEN [TW]) 18 March 2004 (2004-03-18) * paragraph [0015] * * figure 5 *	1	INV. A61G5/14 A47C23/20
A	WO 97/46144 A (HAWORTH INC [US]; THOLE DOUGLAS M [US]) 11 December 1997 (1997-12-11) * page 7, line 20 - page 8, line 12 * * figure 5 *	1	
			TECHNICAL FIELDS SEARCHED (IPC)
			A47C A61G
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 16 August 2007	Examiner Ong, Hong Djien
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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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 07 10 6605

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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16-08-2007

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DE 202004000048 U1	18-03-2004	GB 2409808 A	13-07-2005
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