SITTING SUPPORT AND METHOD FOR ERGONOMICALLY SUPPORTING A SITTING PERSON

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ABSTRACT
The invention relates to a sitting support, comprising a base and at least one upper part moveable relative to the base, wherein, by the or each upper part, a sitting surface is determined on which, during use, at least one ischium of a user rests, wherein, for said base and said at least one upper part, drive means are provided for reciprocally driving the respective upper part relative to the base part.
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RELATED APPLICATIONS

[0001] This application is a continuation of PCT application no. PCT/FR2005/000017, designating the United States and filed Jan. 13, 2005; which claims the benefit of the filing date of Dutch application no. NL 1025228, filed Jan. 13, 2004; both of which are hereby incorporated herein by reference in their entirety.

FIELD OF THE INVENTION

[0002] The invention relates to a sitting support. The invention particularly relates to a sitting support with which, during sitting, complaints of a user can be prevented and/or remedied.

BACKGROUND OF THE INVENTION

[0003] It is known that sitting on a chair can lead to various complaints in a user, for instance lower back complaints. In order to at least partly obviate this problem, special, ergonomically adapted chairs are used that are, nevertheless, particularly expensive and are usually only suitable for one user. Particularly also for people with a physical disability, individually adapted sitting supports are used that are expensive and regularly need to be adjusted.

SUMMARY

[0004] It is an object of the invention to provide a sitting support that actively contributes to the health and the wellbeing of the user during use.

[0005] A further object of the invention is to provide a sitting support that is easy to use and maintain and is particularly safe for the user.

[0006] A further object of the invention is to provide a sitting support that is universally applicable and can simply be used in different chairs, sofas and the like.

[0007] At least a number of these and other objects are achieved with a sitting support according to the invention.

[0008] In a sitting support according to the invention, on a base, at least one upper part is borne, on which the user can sit during use. The or each upper part can move relative to the base, in particular reciprocally driven with the aid of drive means. As a result, in the user, a movement of the pelvis relative to the spinal column is induced that has a stimulating effect on the user. Complaints such as lower backache, but also headache, stiffness, shoulder complaints, decubitus and other complaints can be prevented or remedied thereby, while, moreover, the blood perfusion to particularly the extremities is stimulated.

[0009] A sitting support according to the invention has the advantage that it can simply be taken along and can be placed on different chairs, which are at least understood to mean any piece of furniture, surface or other element suitable for seating that can carry a sitting person. This allows a user to use this sitting support anywhere. Here, what is particularly advantageous is a sitting support according to the invention that is provided with an electric drive, fed by batteries, an accumulator or similar power supply independent of the electricity grid. A further advantage of a sitting support according to the invention is that it is universally applicable, although, of course, an ergonomically shaped and/or individual top surface can be used.

[0010] Herein, a reciprocal movement is understood as at least comprising one rotating, at least pivotal movement and/or a translating movement, where a path is alternately traveled in opposite directions.

[0011] The reciprocal movement preferably has a frequency of less than 5 Hz, more in particular less than 2 Hz. It has been found that a low frequency is preferred, for instance less than 0.12 Hz, in particular 0.08 Hz or less.

[0012] In a first advantageous embodiment, one upper part is provided, pivotally about a central axle. Here, the user sits on the top surface and his or her pelvis is rotated. Here, it is preferred that the user rests his or her back against a backrest. Here, the pivotal angle is preferably settable and relatively small, for instance a few degrees with respect to the axial line.

[0013] In a second embodiment, the sitting surface is formed by two top surfaces driven in opposite directions, going back and forth so that the desired reciprocal movement is obtained. The movements of the top surfaces are preferably linear. Here, the stroke of each top surface relative to a middle position is relatively small, for instance a few centimeters.

[0014] During use, the user will rest on the or each top surface with his or her ischia. As a result of the reciprocal movement, a continuously varying sitting load can be obtained, in particular around the ischia.

[0015] In a particularly simple embodiment, the sitting support substantially consists of a dish-shaped base on which an upper part rotatable about a central axle is borne by a bearing. Particularly suitable for this are, for instance, cylindrical bearings or barrel thrust bearings between the base and the upper part. The upper part preferably comprises a plate with a sitting cushion thereon. The plate and the base may be provided with a suitable profiling for the bearing. Here, drive means are provided between the base and the upper part, preferably in a thus formed substantially closed space. Drive means having a simple design may for instance comprise an eccentric, driven by an electric motor, for obtaining reciprocal movements. On the bottom side, the base is preferably provided with friction-increasing means such as studs, rubber or different plastic feet or the like, for a stable placement on a seat. Operating means may be provided on or near the top side for switching on and off and optionally setting the pivotal angle, the movement frequency and the like.

[0016] In the alternative embodiment described with two upper parts moving relative to each other, a similar structure with base and upper parts can be chosen, wherein an eccentric can be used for the drive. Here, alternatively, a rotating disc or the like can also be used for the movement of the upper parts.

[0017] The invention further relates to a method for moving a sitting person. According to the invention, such a method is characterized by the measures according to claim 12.
Such a method has the advantage that a user can apply it to any chair, with chair needing to be given a broad interpretation. With this method, the sitting comfort of the user is enhanced and complaints such as back and neck complaints and headache are prevented or reduced, while, moreover, for instance the blood circulation can be stimulated and a positive effect against RSI can be obtained.

**BRIEF DESCRIPTION OF THE DRAWINGS**

In clarification of the invention, exemplary embodiments of a sitting support, assembly and method according to the invention will be further described with reference to the drawing. In the drawings:

- FIG. 1 shows, in disassembled condition, a sitting support according to the invention, in a first embodiment;
- FIG. 2 shows, in top plan view, an upper dish part of a sitting support according to FIG. 1;
- FIG. 3 shows, in perspective view, a drive device with accumulator for a sitting support according to the invention;
- FIG. 4 shows, in perspective view and top plan view, a bearing part for a sitting support according to FIG. 1;
- FIG. 5 shows, in cross-sectional view, a part of an edge of a sitting support according to FIG. 1, in which the bearing is shown;
- FIG. 6 shows, in top view, a sitting support according to FIG. 1;
- FIGS. 7A-C show three partial cross-sections according to lines A-A, B-B and C-C in FIG. 6;
- FIG. 8 schematically shows an eccentric of the drive device in an opening in the base;
- FIG. 9 schematically shows, in top plan view, an alternative embodiment of a sitting support according to the invention;
- FIG. 10 schematically shows a drive device for a sitting support according to FIG. 9;
- FIG. 11 shows, in side elevation view, a sitting support according to the invention on the seat of a chair with a user.

**DETAILED DESCRIPTION OF THE INVENTION**

In this description, identical or corresponding parts have identical or corresponding reference numerals. The exemplary embodiments shown are merely shown by way of illustration and should not be construed as being limitative in any manner.

- FIG. 1 shows, in disassembled condition, a sitting support 1 according to the invention. In the drawing, shown from bottom to top are a base 2 in the form of a lower dish 3, manufactured, for instance, from plastic, and an upper part 4. This upper part 4 is built up from an upper dish 5, for instance from plastic, with a stiffening plate 6 thereon, for instance from metal. On the stiffening plate 6, a sitting foam 7 is borne, covered by an upholstery 8. On the upper dish 5, a drive unit 9 is borne, and a control unit 10. An accumulator 11 is provided, preferably in the lower dish 3 which is connected, via a cable 12, with the drive unit 9 and/or the operating unit 10 and can be fed via the mains. Between the upper dish 5 and the lower dish 3, bearings 13 are included. An axle 14 is formed by a connecting bolt 15 and a nut 16 with which the upper dish 5 can be attached to the lower dish 3 so as to be rotatable, at least pivotable about the axle 14.

In FIG. 5, in cross-sectional side elevational view, a part of a sitting support 1 according to FIG. 1 is shown. Here, the different parts are clearly shown in assembled condition. On the bottom side of the lower dish 3, a number of friction-enhancing means 17 are provided in the form of rubber legs 18. Therewith, the sitting support 1 can be placed on the seat 19 of a chair 20, as schematically shown in FIG. 11. It is clear, that in the embodiment shown, the bearings 13 comprise barrel thrust bearings 21 and pivot bearings 22 for bearing the upper part 4 on the base 2 so that the upper part 4 can flexibly pivot about the axle 14.

The upholstery 8 has been pulled over the foam 7 and fixed with a drag cord 23 below the edge of the stiffening plate 6. Subsequently, the stiffening plate 6 has been fixed on the upper dish 5, for instance by clamping pins 24 or in a different suitable manner.

FIG. 3 shows the drive unit 9 with the control unit 10 and the accumulator 11. The drive unit 9 comprises a motor 25 and a drive wheel 26, placed eccentrically on an axle 27. Suitable transmission has been provided between the motor 25 and the axle 27, for instance a sprocket transmission, worm wheel or the like. In FIG. 8, it is schematically shown how the drive wheel 26 has been placed in a recess 28 in the lower plate 3. The drive unit 9 itself is attached to the upper dish 5, with the drive wheel 26 reaching through an opening 29. Consequently, upon rotation of the drive wheel 26 about the axle 27, the upper dish 3 and hence the upper part 4 will be pivoted through a small angle α relative to a middle position, symbolically indicated with the line M-M in FIG. 6. Preferably, the angle α is small, for instance less than 20°, more in particular less than 10°. In the embodiment shown, this angle is for instance smaller than 5°, in particular approximately 2.5°. Naturally, this angle depends on inter alia the eccentricity of the drive wheel and its size and its position relative to the axle 14. Optionally, its design can be settable, for instance by settable of the eccentricity and/or the possibility of moving the drive unit 9 relative to the axle 14.

In FIG. 2 shows, in top plan view, the arrangement of the drive unit 9 and control unit 10, and of the accumulator 11. Furthermore, three paths 30 for the barrel thrust bearings 21 can be seen here. These paths 30 each include an angle of for instance approximately 100°, so that three sets 31 of barrel thrust bearings 21, as shown in more detail in FIG. 4, can be placed therein and can only travel a limited path.

The control unit 10 is designed for switching the motor 25 on and off, and, optionally, for setting the frequency for the reciprocal movement by setting the speed of rotation of the drive wheel 26, at least of the motor 25 or of the transmission ratio. The reciprocal movement P is shown in FIG. 6 by arrow P and is the pivotal movement back and forth through the angle α.

FIG. 4 shows a set 31 of barrel thrust bearings 21. In the set 30, a strip 32 is included, bent through a bending
radius matching those of the paths 30. In the form shown, each strip comprises eight radially extending pins 33 on which, each time, one barrel thrust bearing is placed. The pins are split and provided with a widening 34 at their ends. The bearings 21 can simply be pressed over the pins such that they are confined between the strip 32 and the widening 34. Optionally, the bearings 21 can be confined between two strips bent complementary, as schematically indicated at the top of FIG. 4, in broken lines.

[0039] As appears from FIG. 5, the paths 30 are provided in the lower dish 3 and upper dish 5 and each formed such that the barrel thrust bearings 21 are confined therein secured against lateral displacement.

[0040] In FIGS. 7A-C, three parts of cross-sections are shown, from which the profilings of the edges of lower dish 3 and upper dish 5 are given. In FIG. 7A, a handle 60 is visible for taking up and taking along the sitting support in a simple manner. It clearly appears from FIG. 7 that the space between the lower dish 3 and the upper dish 5 is substantially closed off. FIG. 1 shows that the accumulator can be placed from the bottom side into a recess 36 in the base 2, which can be closed off by a cover plate 37. FIG. 5 shows a further cover plate 38 below the bolt 15 so that the bottom side is relatively flat. The drive unit 9 and control unit 10 have been arranged near a longitudinal edge of the sitting support 1, as shown in FIG. 6, while the sitting cushion (foam 7 and upholstery 8) are formed there around. Preferably, these are situated at the front so that they are easily reachable.

[0041] FIGS. 9 and 10 show an alternative embodiment, in which two upper parts 4A, 4B are borne on a base 2. In FIG. 10, the upper parts 4A, 4B have been taken away in order to make the drive unit 9 visible. In this embodiment, the upper parts 4A, 4B move substantially linearly in the directions P, while each time, it holds that, if the lower part 4A moves forwards, the right upper part 4B moves backwards and vice versa, so that reciprocal movements are obtained. For this purpose, a motor 26 is provided, driving a disc 40 about an axle 41. On this disc, eccentrically, a rod 42 is pivotally connected by a first end 43. A pivot arm 44 is placed on a central axle 45 such that the pivot arm can pivot about the axle 45, approximately in the plane of the drawing. The two ends 46A, 46B of the pivot arm are attached against the bottom side of the left and right upper part 4A, 4B, respectively. The second end 47 of the rod 42 is attached to the pivot arm 44, at a distance from the axle 45. Hence, through rotation of the disc 40, the pivot arm 44 will start a reciprocal pivotal movement through an angle α, so that the movement back and forth of the two upper parts 4A, 4B is obtained over a distance D. The upper parts 4 are borne on the base 2 by suitable means, for instance slide bearings or roller bearings to which end, on the bottom of the base 2, suitable rails 48 may have been provided. In this embodiment as well, the stroke D can be set, if desired. Preferably, the stroke D is relatively small, for instance less than 15 cm, more in particular less than 10 cm. Preferably, the stroke D is less than 5 cm, for instance between approximately 0.5 and 2 cm.

[0042] Preferably, a sitting support is relatively light and small in size so that it can easily be taken along, for instance in a case. The height H is preferably less than 20 cm, in particular less than 10 cm, more in particular between 0.5 and 8 cm, so that, within a normal range of adjustment of a chair and, optionally, arm rests and/or back rest thereof, an ergonomically correct sitting height can be obtained with the sitting support on the seat. Preferably, the length L and width B are smaller than 60 cm, more in particular smaller than 50 cm and preferably between 20 and 45 cm, so that it fits on a seat. However, these sizes are not limiting in any manner.

[0043] As shown in FIG. 11, during use, a user 50 sits on the sitting support 1, while his or her ischial rest on the upper part 4, as indicated in FIGS. 6 and 9 by means of circles 52. The sitting support rests on the seat 19 of the chair 20 or any other suitable support, for instance a wheelchair, sofa, armchair or the like. When the sitting support 1 is switched on, the desired reciprocal movement will be obtained, so that the pelvis of the user will be pivoted back and forth, approximately through the angle α. Preferably, the user then sits with his or her back against a rest 53 of the chair 20, so that the pivotal movement of the pelvis will occur relative to the lower back, at least the lumbar part thereof. Thus, a method is used which improves the sitting comfort and which is ergonomically justified.

[0044] It has appeared that this is particularly stimulating for the user, that complaints can be prevented and/or constricted such as, for instance, lower back complaints but also circulatory problems, upper back complaints, RSI complaints, headaches and similar complaints directly or indirectly linked to the locomotor apparatus of the user. It has further appeared that a low frequency of movement is then advantageous, for instance less than 0.12 Hz, for instance between 0.04 and 0.08 Hz, although, naturally, other frequencies can also be used.

[0045] In the sitting support 1, a contact switch 54 can be provided with which the drive unit 9 is switched off if a user sits down on it and is switched off when the weight is removed.

[0046] Naturally, the invention is by no means limited to the embodiments shown and described. Many variations thereon are possible within the framework of the invention as outlined by the claims. For instance, a sitting support according to the invention may have a different structure, for instance with the drive unit in the space between lower and upper dish, its form can be chosen to be different, as can the construction, a different sitting cushion can be used, for instance a separate sitting cushion that is borne on the upper dish and is easily exchangeable and/or cleanable and can be attached with, for instance Velcro®. Also, the top surfaces can be formed differently, depending on, for instance, the wishes of the user. The sitting support can also be driven in a different manner, for instance by means of a linkage mechanism or similar mechanisms known to a skilled person. The drive can also be positioned elsewhere, for instance below, next to or above the base. These and many similar variations and alternatives are understood to fall within the framework of the invention as outlined by the claims.

1. A sitting support, comprising a base and at least one upper part movably relative to the base, wherein, on the at least one upper part, a sitting surface is determined on which, during use, at least one ischium of a user rests, wherein, for said base and said at least one upper part, drive means are provided for reciprocally driving the respective upper part relative to the base part.
2. The sitting support according to claim 1, wherein the drive means are provided for rotation of the at least one upper part relative to said base.

3. The sitting support according to claim 2, wherein a rotational axis is provided about which the at least one upper part can rotate relative to the base, wherein, preferably, the drive means are arranged and/or blocking means are provided for limiting the angle through which said at least one upper part can rotate, which angle is preferably limited to less than 20°.

4. The sitting support according to claim 1, wherein at least two upper parts are provided, formed and placed next to one another such that each of the upper parts can support an ischium of a user during use, wherein the drive means are provided for moving the upper parts relative to one another and relative to the base in a reciprocal, particularly substantially translating manner.

5. The sitting support according to claim 4, wherein the two upper parts are located on both sides of an axial line, wherein the drive means are arranged for reciprocally moving the upper parts substantially parallel to said axial line, in directions opposite to each other.

6. The sitting support according to claim 4, wherein the drive means are arranged and/or blocking means are provided for limiting the freedom of movement of the upper parts, such that the upper parts can make a stroke relative to one another that is smaller than 15 cm.

7. The sitting support according to claim 1, wherein the drive means have an electrical design and wherein a battery or accumulator is provided for power supply of the drive means.

8. The sitting support according to claim 1, wherein the base is dish-shaped and is provided with friction-enhancing means on a bottom side, wherein the or each upper part is borne on an opposite top side, substantially by bearing means provided between the base and the or each upper part, all this such that, between the or each upper part and the base or between two parts of the or each upper part, a substantially closed inner space is determined, wherein, between the base and the or each upper part and/or in said inner space, the drive means are provided and wherein, on or near the top side, operating means are provided for operating the drive means.

9. The sitting support according to claim 1, wherein the or each upper part bears a cushion.

10. The sitting support according to claim 1, wherein, in assembled condition, the sitting support has a height that is smaller than 10 cm, has a width smaller than 60 cm, and has a length smaller than 60 cm, all this such that it is placeable and transportable on the seat of a chair, in particular a desk chair, preferably in a case.

11. An assembly of a chair and a sitting support according to claim 1, wherein the sitting support is placed on a seat of the chair, such that a user can sit on the chair on the sitting support.

12. A method for moving a sitting person, wherein, on the seat of a chair, a sitting support is placed, which sitting support provides a reciprocal pivoting of the pelvis of the user during sitting, which pivoting substantially takes place about an axle including an acute angle with a vertical axis.

13. The method according to claim 12, wherein said pivoting is effected by a rotating surface of the sitting support, wherein the back of the user rests against a backrest of the chair.

14. The method according to claim 12, wherein said pivoting is obtained by two surfaces of the sitting support translating relative to each other.

15. The sitting support according to claim 3, wherein, the rotational angle of the drive means and/or blocking means is limited to less than 10°.

16. The sitting support according to claim 3, wherein, the rotational angle of the drive means and/or blocking means is limited to less than 5°.

17. The sitting support according to claim 6, wherein the drive means are arranged and/or blocking means are provided for limiting the freedom of movement of the upper parts, such that the upper parts can make a stroke relative to one another that is smaller than 10 cm.

18. The sitting support according to claim 6, wherein the drive means are arranged and/or blocking means are provided for limiting the freedom of movement of the upper parts, such that the upper parts can make a stroke relative to one another that is smaller than 5 cm.

19. The sitting support according to claim 10, wherein, in assembled condition, the sitting support has a height that is between 0.5 and 8 cm, has a width smaller than 50 cm, and has a length smaller than 50 cm.

20. The sitting support according to claim 10, wherein, in assembled condition, the sitting support has a width between 20 and 45 cm, and has a length between 20 and 45 cm.

21. A portable sitting support for providing motorized movement of a pelvis of a user comprising:

a sitting surface operatively connected to a motorized pivot mechanism;

a control unit and power supply for controlling the movement of the motorized pivot mechanism; and

the motorized pivot mechanism configured to pivot the sitting surface about a central axis through an angle of less than about 20 degrees.

22. The portable sitting support of claim 22 wherein the sitting surface comprises two independent sections operatively connected to the motorized pivot mechanism with the motorized pivot mechanism configured to simultaneously pivot each independent section in a lateral direction and opposite to the respective independent section.

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