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(54) **Automatic tilting of a support surface on a support device**

Automatisches Neigen einer Trägeroberfläche auf einer Trägervorrichtung

Inclinaison automatique d'une surface de support sur un dispositif de support

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Description

[0001] The invention relates to a movement device for mounting in a support device and a support device which entails that at least one part of the device actively moves in a continuously predetermined fashion. The pattern of the movement occurs independently of the movement of the user. The movements entail that the muscles of the user are continuously activated changing the muscle strain of the user, which again entails that the user does not get tired and sore as quickly as usually. The invention further relates to a support device, such as a bed or a chair comprising such a movement device.

Background

[0002] Chairs, such as office chairs, car seats, sofas etc., where both seat and back part can move in various dimensions, have been known for a long time. The intention of such chairs is to increase the wellbeing and to reduce tiredness of the user sitting on the chair. In some chairs it is the movement/weight of the user that induces the springs to contract whereby the back and/or the seat of the chair moves accordingly. If the user leans back, then the back part of the chair gives in and moves according to the movement of the user to a certain degree. Also, if the user tips to one side of the seat so that most of the weight is positioned on one side of the seat, then the seat part gives in and moves according to the users movement to a certain degree.

[0003] Also, some chairs have incorporated adjustment means, where the user can adjust the seat and back portions of the chair using the adjustment means. The movement/weight of the user can also induce the adjustment means to expand or contract whereby the back and/or the seat of the chair moves accordingly.

[0004] A chair with a movement device described in WO 2010/043955A3.

[0005] Beds are also known to have movement systems such as spring systems and elevation systems, where the movements of the systems are induced by the user, either by the movement/weight of the user that induces the springs to contract or by the user adjusting the elevation of the bed by influencing the adjustment means.

[0006] Drawbacks of solutions as mentioned above are that the movements, besides the adjustment, are induced by the user. The user has to activate the muscles to induce movement of the chair or bed. However, some users sit or lay very still while for example working in front of a computer screen, watching TV or driving the car. If you sit or lay very still for a long time, you will eventually get tired and sore.

Object and description of the invention

[0007] The object of the present invention is to solve the above mentioned problems.

[0008] This is obtained by a movement device for

mounting in a support device according to claim 1.

[0009] The tilting movements being along a change in muscle activity of the user sitting on the sitting device or lying on the lying device which increases the blood flow in the body and are therefore beneficial to people with tendency to sit or lie still for long hours. Due to the slightly tilting automatic movements, the user does not notice - or only vaguely notices - these active patterns of movements.

[0010] The tilting of said at least one support surface occurs independently of the movement of the user. The tilting is a continuous movement induced by the actuating means, and not under influence of the user.

[0011] The support surface can be any surface that supports the user.

[0012] The actuating means can e.g. be hydraulic/pneumatic, electrically or motor driven, but any suitable actuating means can of course be used to tilt the support surface.

[0013] In an embodiment said movement device comprises actuating means for tilting two support surfaces of said support device, said tilting of said two support surfaces being a cyclic movement, the cycle time of said two support surfaces being different from each other.

[0014] In an embodiment the cycle time of the one support surface is twice the cycle time of the second support surface.

[0015] In an embodiment said movement device comprises actuating means for tilting the lumbar back part of said support device.

[0016] In an embodiment said movement device comprises actuating means for tilting the seat part of said support device, said tilting being a sideways tilting.

[0017] The active and automatic movement of a support device being a lying device is advantageous in that the lying device can be especially beneficial for bedbound people who have to lie still in the bed for a long time. The active and automatic movement brings along a significant change in muscle activity, entailing less muscle fatigue of the user, which increases the blood flow in the body and also induces greater comfort by entailing a reorganization of the strain and burden in the body of the person. Therefore the movement device is obvious to implement into hospital and nursing beds.

Brief description of the drawings

[0018]

Figure 1a and b show the concept of the invention.

Figure 2 shows the lumbar back movements of the chair.

Figure 3 shows the seat movements of the chair.

Figure 4 shows a movement device for mounting in a support device according to the present invention,

Figure 5 a, b, c and d show the movement device as illustrated in figure 4 mounted in different types of support devices.

Description of embodiments

[0019] All the figures show an office chair. However, it is important to stress that the movement device of the present invention can be mounted on every kind of sitting device such as sofas, car seats, office chairs and easy chairs, just to mention a few, and also in lying devices, such as sofas or divas. The office chair on the figures only illustrates one embodiment of a device wherein the movement device can be implemented.

[0020] Figure 1a and b show the concept of the invention. A movement device according to the invention is implemented in a chair. Figure 1a shows that the movement device entails that the back portion of the chair moves constantly in a predetermined fashion (101). The back portion is in this embodiment tilting backwards and forwards but it could be any other pattern of movement such as eg. sideways movements. Figure 1b shows a chair where the movement device entails that the seat of the chair is moving in a predetermined fashion (103). In this embodiment the seat is tilting sideways, but again it could be any other pattern of movement such as tilting forwards and backwards. In these figures the movement device entails that either or both the back part or/and the seat part of the chair is moving. However, it is not necessarily the back part and the seat part that are controlled, any other support surfaces of a support device could also be controlled by the movement device. The pattern of the movement occurs independently of the movement of the user. The automatic, active movements are very modest and weak, so that the user does not notice - or only vaguely notices - these active patterns of movements. The movements entail that the muscles of the user are continuously activated changing the muscle strain of the user, which entails that the user does not get tired and sore as quickly as usually.

[0021] Figure 2 shows a chair 201 with a seat portion 203 and a back portion. The back portion is divided into two parts; a lumbar back part 205 and an upper back part 207. Here, it is only the lumbar back part 205 that changes the angle in respect to the seat position 203 when the back actively moves in predetermined movements caused by the movement device, whereas the upper back part 207 continues to be positioned in a predetermined angle in respect to the seat position 203 - and therefore also in respect to a vertical upright position of the back part. The angle between the upper back part 207 and the seat portion 203 is in one embodiment 10 degrees. In order for the angle between the upper back part and the seat portion to be constant, a four-link mechanism (a parallelogram) 211 connects the seat and the upper part of the back. The split 209 between the upper part and the lumbar part of the back is in one embodiment positioned 20 cm above the height of the upper side of

the seat. In one embodiment the lumbar back portion actively moves in a tilting mode backwards and forwards. In an embodiment the actual amplitude should be chosen considering that upholstery of the support device might absorb a part of the movement. The actuating means of the movement device (not shown on the figure) can be hydraulic/pneumatic, actuator or motor driven, but any suitable actuating means can of course be used to tilt the support surface.

[0022] Figure 3 shows a chair 301 with a seat portion 303 and a back portion. The seat actively moves in predetermined movements, caused by the movement device. In one embodiment the seat is moving from side to side. This constant sideway seat tilt movement 311, performed by the movement device, changes the condition of the supporting structure in the seat, which entails a reorganization of the strain and burden in the body of the person sitting on the chair. This induces greater comfort and less muscle fatigue.

[0023] In one embodiment, where both the lumbar back portion and the seat move, the combined movements mimic "figure eight" movements. In one embodiment the cycle time of the seat portion is twice the cycle time of the lumbar portion to counteract repeated symmetry that can be negative for the user. The cyclic figure eight movements bring along a significant change in muscle activity of the user which increases the blood flow in the body. This is especially beneficial to people with tendency to sit still for long hours.

[0024] The chair can, besides these constant, predetermined active movements implemented by the movement device, also have the possibility of voluntary movements, these movements being independent of the automatic movements. These voluntary movements, e.g. tilting the back backwards by pressing the weight back or tilting the seat forward by pressing the legs down towards the ground, are linked to the pattern of the movements of the user and therefore dependent on the movements of the user sitting on the chair.

[0025] The chair can also be adjusted by the user. These adjustments include adjustment of the stiffness of the spring, adjustment of the height of the seat position and adjustment of the depth of the seat. All of the adjustments, both regarding the user adjustable movements and the active and automatic movements performed by the movement device, can be linked to person identification, e.g. via RFID tags or via a personal ID card with the user specific adjustment loaded thereon, so that the chair automatically adjusts these features after identification of the user.

[0026] The chair can be regulated and adjusted before the first time the chair is used. This user specific pre-adjustment of the chair itself and the movement device can be conducted via a software program that takes body characteristics, height, weight and age of the user in consideration. The chosen adjustment is loaded to a personal ID card. In connection with or instead of the pre-adjustment conducted by a software program, an occupa-

tional therapy adjustment can also take place, where an occupational therapist in cooperation with the user finds the correct adjustments of the chair. These adjustments can e.g. via wireless communication be coded on a personal ID card so that the chair automatically adjusts to the user after identification of the user via e.g. loading the personal ID card into a computer. Instead, the user identification could be performed via RFID technology where the user identifies him- or herself.

[0027] Figure 4 illustrates a movement device according to the present invention for mounting in a support device. The movement device 401 comprises a lower back part 403 e.g. for mounting below a seat part of a chair and a second higher back part 405 e.g. for mounting behind the back rest of a chair. In this embodiment of the movement device 401 the actuating means for tilting this support surface is connected to the two bars 407, 409 and tilts the two bars. The two bars are mounted below the support surface and therefore the tilting of the bars results in tilting of the support surface. The two bars could be tilting either simultaneously whereby the seat is solely tilted from side to side or the tilting could be asynchronous whereby the seat is twisted.

[0028] Further, the higher back part 405 comprises a support parallelogram and by pushing the end 413 forwards and backwards, the surface 411 being mounted to the higher back part of e.g. a chair is tilting back and forth, whereby the higher back part tilts.

[0029] In the illustrated embodiment the movement device comprises two tilting parts, but in other embodiments the movement device could consist solely of one device, e.g. either 403 or 405.

[0030] The actuating means could be either hydraulic/pneumatic, electrically or motor driven, but any suitable actuating means can of course be used to tilt the support surface.

[0031] When the movement device 401 is mounted in a chair as shown in figure 5a, then 403 is the part of the movement device that controls the movements of the seat, and 405 is the part of the movement device that controls the lumbar back part movements.

[0032] In figure 5b an alternative is illustrated where a movement device 401 is mounted on a support surface on a resting chair,

[0033] In figure 5c an alternative is illustrated where a movement device 401 is mounted on a support surface on a car seat.

[0034] In figure 5d an alternative is illustrated where a movement device 401 is mounted on a support surface on a bed.

Claims

1. A movement device for mounting in a sitting device (201) for supporting a user, said sitting device comprises a seat part (203) and a back portion divided into two parts; a lumbar back part (205) and an upper

back part (207), said movement device includes actuating means configured for tilting said lumbar back part and said seat part where said tilting of said lumbar back part and said seat part occurs in continuous predetermined patterns of movements, **characterised in that** said movement device further include a four-link mechanism (211) connecting said upper back part and said seat part configured for imparting a constant angle of said upper back part with respect to said seat part during said movements.

2. A movement device according to claim 1, where said movement device comprises a lower back part for mounting below said seat part and a second higher back part comprising said four-link mechanism for mounting behind the back portion.
3. A movement device according to claim 1 or 2, where said continuous predetermined pattern of movements are cyclic and mimic "figure eight" movements.
4. A movement device according to claim 3, where the cycle time of the seat portion is twice the cycle time of the lumbar portion.
5. A sitting device, such as a chair, comprising a seat part and a back portion divided into two parts; a lumbar back part and an upper back part, comprising a movement device according to any one of claim 1 to 4.
6. A sitting device according to claim 5, where said tilting of said seat part being a sideways tilting.
7. A sitting device according to claim 5 or 6, where said sitting device can identify the user by person identification and thereby adjust according to the identified user.

Patentansprüche

1. Bewegungsvorrichtung zum Montieren in einer Sitzvorrichtung (201) zum Tragen eines Benutzers, welche Sitzvorrichtung ein Sitzteil (203) und ein in zwei Teile geteiltes Rückenteil; ein lumbales Rückenteil (205) und ein oberes Rückenteil (207) aufweist, welche Bewegungsvorrichtung Betätigungsmittel aufweist, welche zum Kippen des lumbalen Rückenteils und des Sitzteils ausgebildet sind, wobei das Kippen des lumbalen Rückenteils und des Sitzteils in kontinuierlichen, vorgegebenen Bewegungsmustern erfolgt, **dadurch gekennzeichnet, dass** die Bewegungsvorrichtung ferner einen das obere Rückenteil und das Sitzteil verbindenden Vierlenker-Mechanismus (211) aufweist, welcher zum Gewähren eines konstanten Winkels des oberen Rückenteils bezüg-

lich des Sitzteils während der Bewegungen ausgebildet ist.

2. Bewegungsvorrichtung nach Anspruch 1, wobei die Bewegungsvorrichtung ein unteres Rückenteil zum Montieren unter dem Sitzteil und ein zweites höheres Rückenteil aufweist, welches den Vierlenker-Mechanismus zum Montieren hinter dem Rückenteil aufweist.
3. Bewegungsvorrichtung nach Anspruch 1 oder 2, wobei das kontinuierliche, vorgegebene Bewegungsmuster zyklische und simulierte "Achtknoten"-Bewegungen sind.
4. Bewegungsvorrichtung nach Anspruch 3, wobei die Zykluszeit des Sitzteils die doppelte der Zykluszeit des lumbalen Teils ist.
5. Sitzvorrichtung, wie beispielsweise ein Stuhl, umfassend ein Sitzteil und ein in zwei Teile geteiltes Rückenteil; ein lumbales Rückenteil und ein oberes Rückenteil, umfassend eine Bewegungsvorrichtung nach einem der Ansprüche 1 bis 4.
6. Sitzvorrichtung nach Anspruch 5, wobei das Kippen des Sitzteils ein seitliches Kippen ist.
7. Sitzvorrichtung nach Anspruch 5 oder 6, wobei die Sitzvorrichtung den Benutzer durch Personidentifikation identifizieren kann und sich dadurch entsprechend dem identifizierten Benutzer einstellen lässt.

Revendications

1. Dispositif de déplacement pour le montage dans un dispositif de siège (201) pour supporter un utilisateur, ledit dispositif de siège comprenant une partie d'assise (203) et une portion de dos divisée en deux parties; une partie de dos lombaire (205) et une partie de dos supérieure (207), ledit dispositif de mouvement comprenant des moyens d'actionnement configurés pour incliner ladite partie de dos lombaire et ladite partie de d'assise, ladite inclinaison de ladite partie de dos lombaire et de ladite partie de d'assise se produisant dans des séries ininterrompues de mouvements prédéterminés, **caractérisé en ce que** ledit dispositif de déplacement en outre comprend un mécanisme de quatre liaisons (211) reliant ladite partie de dos supérieure et ladite partie d'assise et configuré pour impartir un angle constant de ladite partie de dos supérieure par rapport à ladite partie d'assise lors desdits mouvements.
2. Dispositif de déplacement selon la revendication 1, où ledit dispositif de déplacement comprend une partie de dos inférieure à monter au-dessous de ladite

partie d'assise et une deuxième partie de dos plus haute comprenant ledit mécanisme de quatre liaisons à monter derrière la portion de dos.

3. Dispositif de déplacement selon la revendication 1 ou 2, où lesdites séries ininterrompues de mouvements prédéterminés sont cycliques et imitent des mouvements "en forme de huit".
4. Dispositif de déplacement selon la revendication 3, où le temps cyclique de la portion d'assise est deux fois le temps cyclique de la portion lombaire.
5. Dispositif de siège, tel qu'une chaise, comprenant une partie d'assise et une portion de dos divisée en deux parties; une partie de dos lombaire et une partie de dos supérieure, comprenant un dispositif de déplacement selon l'une quelconque des revendications 1 à 4.
6. Dispositif de siège selon la revendication 5, où ladite inclinaison de ladite partie d'assise est une inclinaison latérale.
7. Dispositif de siège selon la revendication 5 ou 6, où ledit dispositif de siège permet d'identifier l'utilisateur par l'identification de la personne et de ce fait ajuster en fonction de l'utilisateur identifié.

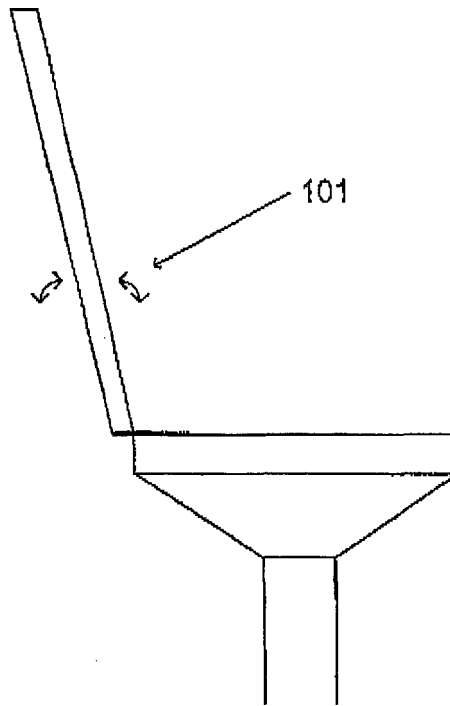


Fig. 1a

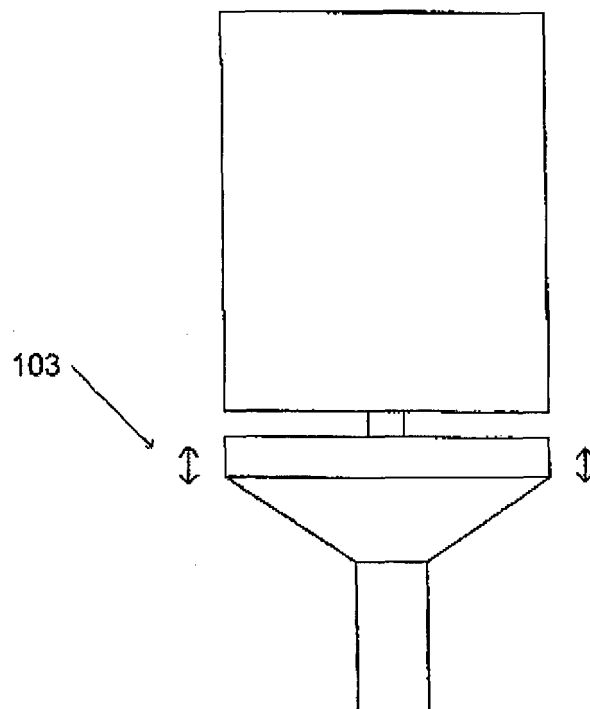


Fig. 1b

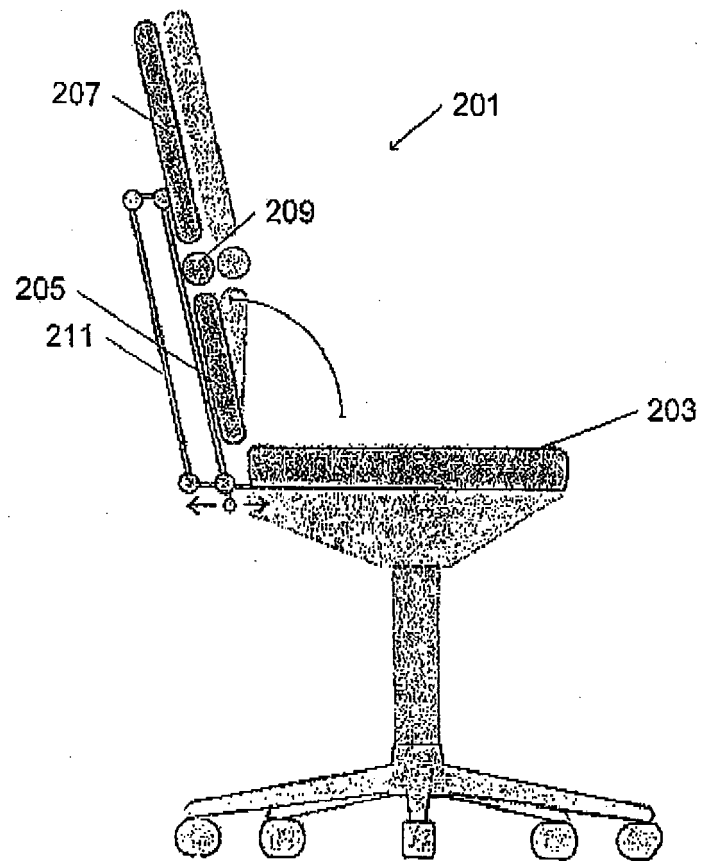


Fig. 2

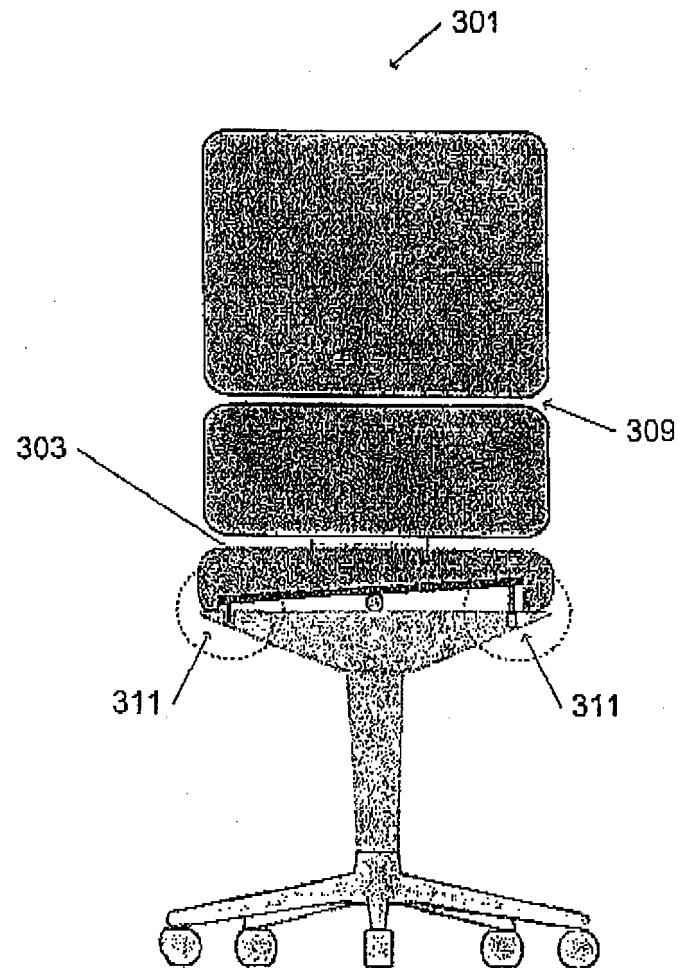


Fig. 3

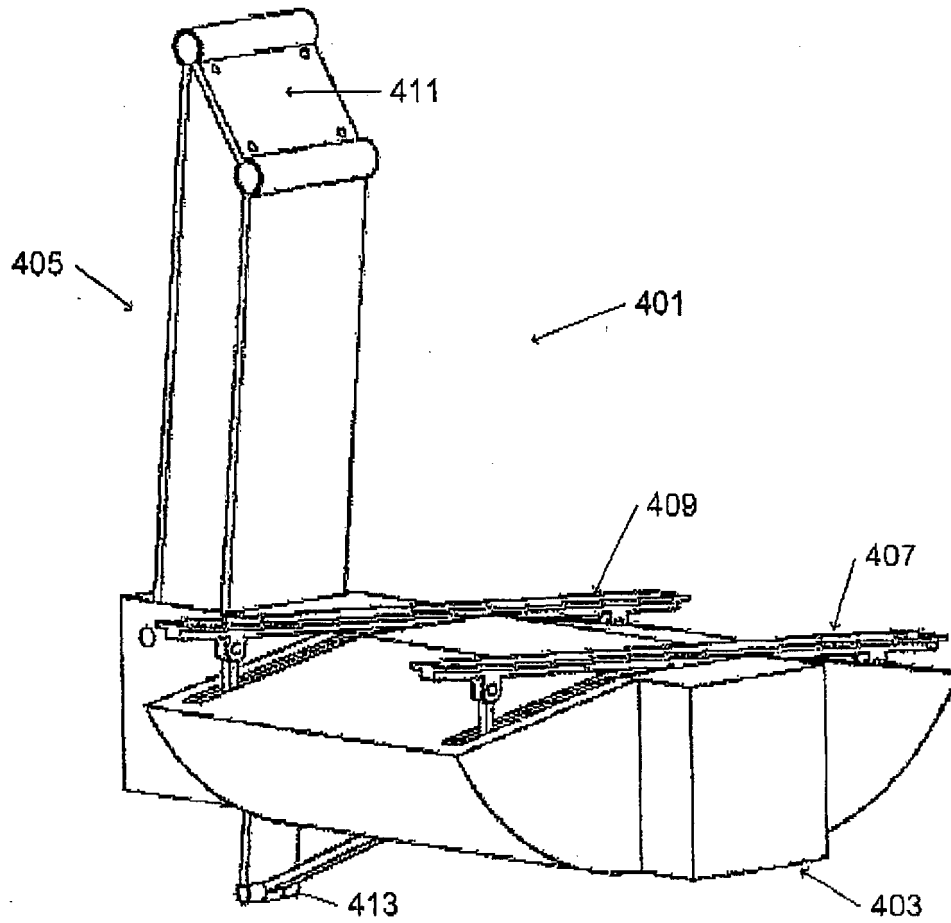


Fig. 4

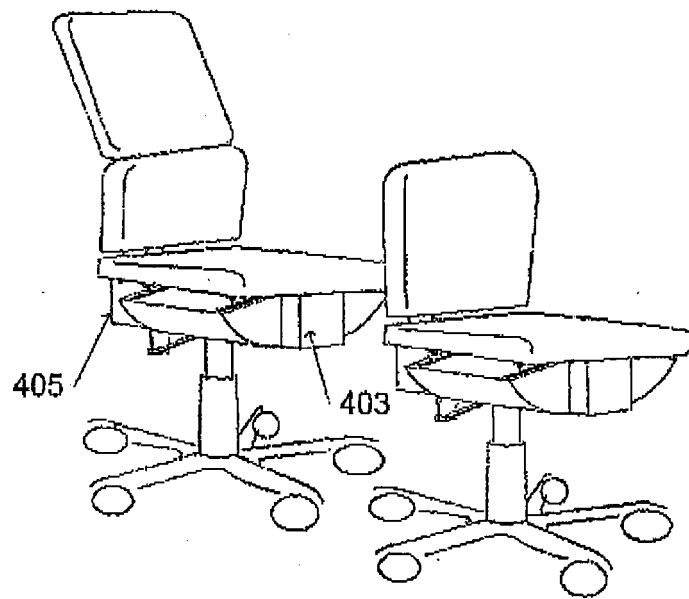


Fig. 5a

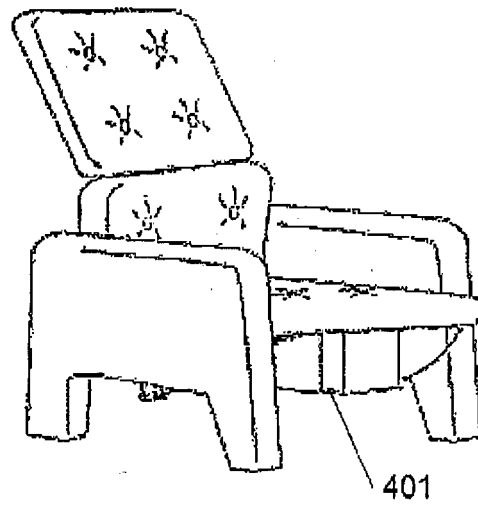


Fig. 5b

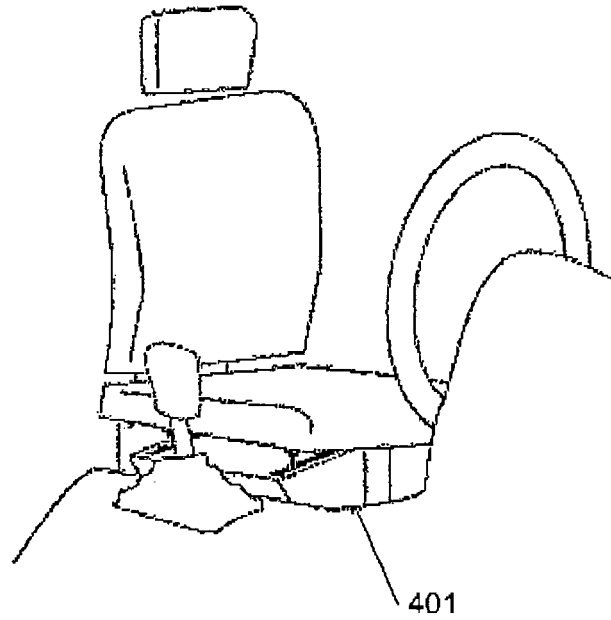


Fig. 5c

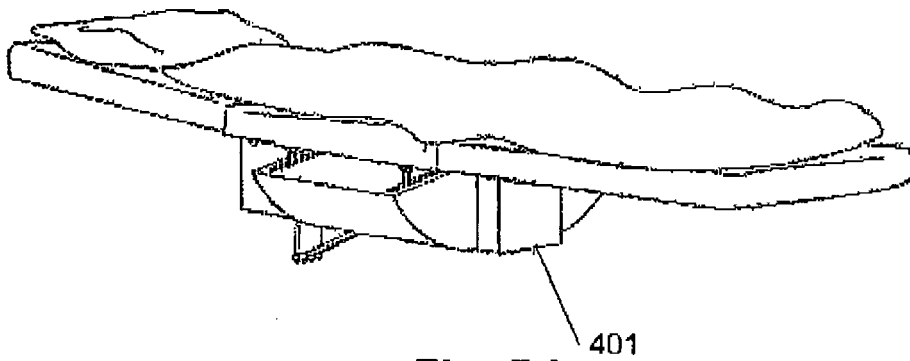


Fig. 5d

REFERENCES CITED IN THE DESCRIPTION

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