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(54) **ROTARY DEVICE FOR A FOOT AND LEG REST**

DREHVORRICHTUNG FÜR EINE FUSS- UND BEINSTÜTZE

DISPOSITIF ROTATIF POUR REPOSE-PIEDS ET JAMBES

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Description

Background of the invention

[0001] The present invention concerns a rotary device for a furniture, such as a foot and leg rest, and a foot and leg rest with movable support element such as a cushion, for use together with a seating furniture such as a recliner, and especially a recliner wherein the seat of the chair moves as a function of the movement of the back, such as in a forward direction.

Prior art

[0002] Footrests are known from prior art with a joint between the base and support element in order to adapt the angle of the support element to the users legs of the part of the legs, which are to be supported. The support element in the known solutions may often be adjusted in advance and be locked by the help of a locking device, such as by the help of a stepwise bar. Such solutions demand that the user relieves the locking device and locks it again each time the position of the support element is to be altered or another user is to use the footrest.

[0003] Further, stools are available wherein the support element may be tilted in that the support element is connected to the base through a pivotal joint allowing a restricted tilting of the support element in relation to the base. The rotational axis of the joint is perpendicular to the seating direction in the horizontal plane, and is often positioned directly underneath the support element or within the support element cushion itself.

[0004] A conventional footrest with a tiltable cushion of this type is disclosed in US 3,554,600 wherein the movement of the cushion is restricted by transverse bars between the base legs of the footrest.

[0005] US 2,528,331 disclose another such a footrest, wherein the joint is spring loaded and may be locked. The mechanism of the joint is however bulky and difficult to hide, thus dictating the design of the footrest.

[0006] In 3,438,675 a footrest comprising curved sliding runners with an upwardly concave shape is disclosed for adapting the angle of the footrest to sole of the foot when sitting in a chair.

[0007] US 5,544,941 relates to a foot rest provided with a base, a tilt column and a foot platform. The foot platform can be tilted by means of two rail arrangements, where a bolt, nut and spring arrangement is provided through each rail arrangement. The tilting movement is limited by a longitudinal slot in flanges provided on each side of the top of the tilt column.

[0008] A disadvantage with such footrests arises when used together with a recliner chair wherein the seat moves as a function of the motion of the back of the chair, such as a Stressless® chair, supplied by Ekornes ASA, Ikomnes, Norway. The support elements on the known footrests do not move in the horizontal direction in a manner adapted to that of the seat surface of the mentioned chair. Thus, the user will experience an uncomfortable feeling of friction when his or her legs are moved horizontally forward and over the footrest in correlation with the seat of the chair. This will normally result in clothing, such as trouser legs, being pulled upwards, which is uncomfortable for the user. No footrests in prior art adapts to this combined tilting and horizontal forward directed movement of the user.

[0009] Other disadvantages with the above footrests is that the tilting devices are highly visible and thus does not leave the designer free to design the shape of the footrest, for example in adapting the shape to that of a belonging chair. Further, the tilting devices of prior art are subjected to dust and dirt entering the devices and the user is exposed to movable parts which may lead to squeezing of toes or fingers.

[0010] Therefore, there is a need for a foot and leg rest wherein the support element may be tilted with a movement that follows the chair, both in the vertical and especially the horizontal direction, in a simple manner, without the user having to leave the chair in order to operate handles or other actuation devices. The device should not dictate the design of the foot and leg rest and is preferably integrated in the footrest and not visible.

Short description of the invention

[0011] The purpose of the present invention is to provide a tilting device for a foot and leg rest which solves the above mentioned problems and satisfies the lacks of the former solutions.

[0012] The present invention thus concerns a rotary device for furniture, as defined in claim 1. Preferred features of the invention are set out in the dependent claims.

Description of the drawings

[0013]

Fig. 1 shows a side view of a foot and leg rest according to prior art.

Fig. 2 shows the foot and leg rest in fig. 1 in an alternative position.

Fig. 3 shows a side view of a foot and leg rest according to the present invention.

Fig. 4 shows the foot and leg rest in fig. 3 in an alternative position.

Fig. 5 shows a perspective, side view and section of the parts of the rotary device according to the invention.

Fig. 6 shows a side view of a recliner chair and a foot and leg rest according the present invention.

Detailed description

[0014] The invention will now be described in more detail by the example embodiment below together with the above-mentioned drawings. The examples are meant to provide a better understanding of the invention, and thus do not limit its scope, which is defined by the appended claims.

[0015] In the following description the terms "front" and "forward" are used for the direction the user looks toward when he or she is sitting with his or her back against the back of the chair in a normal manner. The terms "rear" and "backward" are used for the opposite direction, unless something else is especially given.

[0016] Further, the "support element" is meant to refer to the upper part of the foot and leg rest connected to the base which often is padded or has a cushion attached or ingrated.

[0017] Further, the term "angle" refers to the angle between the normal position of the support element and a rotated position of the support element.

Example embodiment

[0018] As may be seen from Fig. 1 the footrest 1 according to prior art comprises a support element or cushion 100 connected to a base 200 through a rotational axis 300. The rotational axis is positioned about in the centre of both the vertical height and horizontal length dimensions of the support element. When the support element 100 is rotated to an end position by the angle α in relation to the initial position, as shown in Fig. 2, the support element is rotated a distance a. After rotation, the rear top edge 101 of the support element will be positioned essentially higher than the initial horizontal height. Simultaneously the front top edge of the support element 102 will be positioned considerably lower than the initial position and the front bottom edge 103 will be position lower than the rotational axis 300. This results in the height of the footrest being significantly different both in the front and rear in relation to the height of the seat of the chair, which is disadvantageous if the deflection is too large in relation to that of the chair.

[0019] In Fig. 3 a foot and leg rest 2 of the present invention is shown. The foot and leg rest 2 may have the same exterior parts as a known footrest, such as shown in Figs. 1 and 2, but the geometrical rotational axis 400 around which the support element 100 rotates, may be positioned in a much lower position in relation to the support element than what is formerly known. In the foot and leg rest of the present invention, the support element 100 is not associated with the base 200 in the rotational axis 400 per se, which is a virtual rotational axis.

[0020] The effect of the lower positioned rotational axis 400 is that the support element 100 by rotation moves further horizontally forward or backward in relation to the base 200 as shown in Fig. 4, and the rear top edge 101 is only slightly raised, in comparison to a known footrest. Even if the support element 100 alters the angle position by the same angle α as the footrest 1 in Fig. 2, the support element will be rotated in a distance b which is greater than a. It is also worth noting that with the present solution the front bottom edge 103 of the support element will still remain above the rotational axis 400.

[0021] By the horizontal forward movement of the support element, it may follow the same forward movement as the seat of a chair, and friction between the users legs and the support element is avoided. Thereby, the problem of a user being annoyed with friction against the topside surface of the support element 100 is solved e.g. when a chair of the above mentioned type Stressless® chair, supplied by Ekornes ASA, Ikornnes, Norway, is used.

[0022] When the user sits up from a resting position the support element 100 similarly follows back to the initial position of the foot and leg rest and the chair.

[0023] The above solution may be performed technically in different ways. According to the present invention, rotation is provided by the help of curved sliding rails as shown in detail in Fig. 5, positioned between the support element 100 and the base 200. The support element 100 is associated to the base 200 by the help of the rails and the curvature of the rails will dictate how low the virtual rotational axis is positioned in relation to the support element 100.

[0024] By an important curvature, the virtual rotational axis will be positioned higher and close to the support element, while by a moderate curvature the virtual rotational axis will be positioned low and further away from the support element. Thereby, with the solution according to the present invention, there are no limits as to how low the virtual rotational axis may be positioned, including outside of the foot and leg rest itself, for example such as below the level of the floor, if desired.

[0025] The rails may be mounted in the support element and the base in known manners, such as by the use of plugs 504 which may be locked by bolts or screws through holes 505, or by self-locking plugs 506 which may be snapped into corresponding fixings on the support element or base.

[0026] One embodiment of the glider rail is shown in Fig. 5. The glider rail comprises an inner rail 501, attached to the support element 100, which receives an outer rail 502, attached to the base 200, in order to glide in relation to each other. The support element and the base may alternatively be connected to either the inner rail 501 or the outer rail 502. according to the invention it is envisaged to use 2 sets of rails in a parallel arrangement, as the base 200 consists of two parallel legs connected to the support element 100 on the left and right top part of the legs. Alternatively the rails may be integrated parts of the interior frame, tablet or cushion of the support element 100. The corresponding rails may be integrated in the top parts of the base 200.

[0027] The rotary deflection of the support element 100 may be regulated by the help of stoppers, for example

placed on the gliding rails, and will stop the gliding of the rail parts 501 and 502 in relation to each other. Possibly, the stoppers may be a part of the base and the support element abutting each other in the end positions.

[0028] An advantage according to the present invention, is that the rails are visible as they are placed inside the support element 100. Thereby the rails are not exposed to dust or dirt or other outer influence, and the solution also provides an aesthetically good impression as seen in Fig. 6.

[0029] Fig. 6 shows an arrangement according to the present invention comprising a foot and leg rest 2 according to the present invention and a reclining chair 3. The chair 3 is of the type described above wherein the back of the chair 301 may be reclined in that it is hinged to the base of the chair (the base also comprising the armrests) in a rotational axis 302. The back of the chair is also hinged in its lower edge to the rear edge of the seat 303 of the chair 3, and the seat 303 is further attached through a gliding rotational axis 304 by provided by sliders on the gliding guides 305 of the base. When the back of the chair 301 is reclined as suggested by the arrow 10, the seat 303 will consequently move forward and somewhat upward as indicated by the arrow 11. This particular movement is adapted in the footrest 2 according to the present invention in that the support element 100 moves forward, simultaneously as the rear top edge of the support element 100 will move somewhat upward corresponding to the height of the front edge of the seat 303 of the chair 3, as indicated by the arrow 12. Thus, complete and continuous support is provided for both the feet and the calves of a person sitting in the chair and foot and leg rest, without straining edges of different heights e.g. blocking blood circulation in the users legs.

[0030] By the use of blocking devices (not shown) the foot and leg rest according to the present invention may be completely locked from movement in one or both directions. The blocking devices may be blocking pins between the inner and outer rails 501 and 502 or at the longitudinal ends of these. In the present embodiment the support element 100 comprises such blocking elements, one on each longitudinal end of the integrated rails 501 associated with the support element 100, which may be clicked into a locked position, obstructing the movement of the rail 502 associated with the support element 100 out of the rail 501. Alternatively the base 200 could comprise such blocking elements. Due to local safety regulations and for the security of the user the blocking elements may preferably be activated when the product is supplied to the customer. Since the rotary device is integrated in the foot and leg rest, it will not be obvious for the user that the support element 100 may rotate unless he or she knows about this function. By delivering the foot and leg rest locked to the user, the user must actively disengage the blocking elements and thereby take on the responsibility for the use of the tilting function.

[0031] An advantage in using the rotary device according to the present invention is that the horizontal and vertical deflection may be adapted independently of each other, and thus be adapted to any chair. The vertical deflection of the front and rear edge of the support element is adjusted by the positioning of the virtual rotational axis, while the horizontal deflection may be adjusted by the length of the rails and their stopping points. This possibility is not present in the rotary devices and footrests of the prior art.

[0032] The present invention is limited to the use of 2 parallel gliding rails. The rails may also be an integrated part of the base 200 and/or the support element 100.

[0033] The rotary device may also be provided with a returning system directing the support element 100 back to the initial position when the support element is not in use. The returning system may for example comprise a system of springs pulling and/or pushing the support element back to the initial position whatever direction the support element is rotated, and may for example be achieved by the help of spiral springs, leaf springs, torsion springs or an elastic material. The initial position in the example embodiment is a horizontal position, but any initial position may of course bed used.

[0034] Further, the angle deflection may differ in the forward and backward direction, with the result that the properties of the foot and leg rest will be directionally dictated. In the example embodiment the deflection is however the same in both directions for practical reasons, so that it is independent of what direction the foot and leg rest is used.

[0035] The foot and leg rest should further not be limited to be use as a foot and leg rest, but should also be adapted to sit on. In order to hinder a user from falling off when he or she sits down on the support element, the rotary device may comprise a locking device as mentioned above, or a load dependent locking device hindering rotation if the support element is loaded beyond a predetermined weight. The predetermined weight should of course be higher than the load of a couple of feet resting on the foot and leg rest, such as the weight of a user. In such a use the base or the foot and leg rest may preferably be turnable, that is, the foot and leg rest may is turned in the horizontal plane, such as by 360°.

[0036] In the case of the use of gliding rails, such load dependent locking may be achieved by a frictional pattern between the rails entering into action above a certain load, for example by two cooperating gliding rails being pressed against each other. Possibly such a frictional pattern may simply consist of one or several studs in one of the rails, which under load reaches into a corresponding groove in the corresponding rail. By the use of a conventional rotary joint, pressure sensitive locking devices hindering rotation at high loads may similarly be incorporated. Possibly the load dependant locking device may be adjustable in order to be adapted to the weight of the users, such as by a handle or a wheel guiding the triggering part of the locking device.

[0037] The rotary device, e.g. in the form of interlocking

rails as described above, may preferably be easy to assemble so that the user may connect the support element 100 to the base 200 by him- or herself without the use of tools. This minimizes the size of packaging as the support element for example may be placed between the two parallel uprising legs of the base. This may be achieved by a pre-assembled rotary device being attached to either the base 200 or the support element 100, and which then may be fitted by the user to the support element 100 or the base 200 respectively by the use of self-locking plugs. Alternatively the parallel legs of the base 200 may be somewhat flexible allowing the user to press the support element 100 into position in the base 200 so that the corresponding rails 501 and 502 snap into each other.

Claims

1. A rotary device for furniture (2), especially a foot and leg rest adaptable to be sat on, comprising a support element (100) comprising a first pair of curved sliding rails (501) and a base (200) comprising a second pair of curved sliding rails (502) complimentary to the first set of sliding rails (501), the sliding rails (501, 502) being curved upwards in relation to a horizontal plane, allowing rotation of the support element (100) in relation to the base (200) through a geometrical horizontal rotational axis (400), the geometrical rotational axis (400) is a virtual axis positioned in a vertical distance below the support element (100) providing horizontal movement of the support element (100) in addition to rotation, the first pair of rails (502) are placed inside the support element (100), **characterized in that** the base (200) comprises two parallel legs on which the second pair of sliding rails (502) are arranged in parallel.

2. A rotary device according to claim 1, **characterized in that** the geometrical rotational axis is positioned below the bottom lower edge of the support element (100) in a rotated position of the element.

3. A rotary device according any preceding claims, **characterized in that** the rotary device is integrated in the support element (100), being not visible for the user.

4. A rotary device according to any preceding claims, **characterized in that** the rotary device comprises stopping devices limiting the rotational deflection of the support element (100) in relation to the base (200).

5. A rotary device according to any preceding claim, **characterized in that** the rotary device is spring loaded guiding the support element (100) to an initial position, preferably by the aid of springs or an elastic material, more preferably springs chosen from spiral springs, leaf springs, torsion springs.

6. A rotary device according to any preceding claim, **characterized in that** the rotary device comprises at least one locking device, locking the support element (100) in a position in relation to the base (200), or preventing deflection in one rotational direction, for thereafter to be deactivated

7. A rotary device according to claim 6, **characterized in that** the locking device is load sensitive and locks the rotary device at seat loads above a predetermined weight limit, preferably the sensitivity of the locking device is adjustable.

8. A foot and leg rest (2) comprising a support element (100), a base (200) comprising two paralell legs connected to the support element (100) and a rotary device connecting the support element (100) to the base (200), **characterized in that** the foot and leg rest (2) comprises a rotary device according to any of the claims 1-7.

9. A foot and leg rest (2) according to claim 8, **characterized in that** the base (200) comprises a turning or rotary device for rotation of the foot and leg rest (2) 360° in the horizontal plane.

Patentansprüche

1. Drehvorrichtung für Möbel (2), insbesondere eine Fuß- und Beinstütze, die geeignet ist, um sich darauf zu setzen, umfassend ein Trägerelement (100), umfassend ein erstes Paar gekrümmte Gleitschienen (501) und eine Basis (200), umfassend ein zweites Paar gekrümmte Gleitschienen (502), die komplementär zu dem ersten Satz Gleitschienen (501) sind, wobei die Gleitschienen (501, 502) in Relation zu einer horizontalen Ebene nach oben gekrümmt sind und die Drehung des Trägerelements (100) in Relation zu der Basis (200) durch eine geometrisch horizontale Rotationsachse (400) zulassen, die geometrische Rotationsachse (400) ist eine virtuelle Achse, die in einer vertikalen Entfernung unterhalb des Trägerelements (100) positioniert ist und eine horizontale Bewegung des Trägerelements (100) zusätzlich zur Drehung bereitstellt, das erste Paar Schienen (501) ist innerhalb des Trägerelements (100) platziert, **dadurch gekennzeichnet, dass** die Basis (200) zwei Füße umfasst, auf denen das zweite Paar Gleitschienen (502) parallel angeordnet ist.

2. Drehvorrichtung gemäß Anspruch 1, **dadurch gekennzeichnet, dass** die geometrische Rotationsachse unterhalb der unteren Kante des

Trägerelements (100) in einer gedrehten Position des Elements positioniert ist.

3. Drehvorrichtung gemäß einem der voranstehenden Ansprüche,
dadurch gekennzeichnet, dass die Drehvorrichtung in das Trägerelement (100) integriert ist und für den Nutzer nicht sichtbar ist.

4. Drehvorrichtung gemäß einem der voranstehenden Ansprüche,
dadurch gekennzeichnet, dass die Drehvorrichtung Stoppvorrichtungen umfasst, die die drehende Ableitung des Trägerelements (100) in Relation zu der Basis (200) begrenzt.

5. Drehvorrichtung gemäß einem der voranstehenden Ansprüche,
dadurch gekennzeichnet, dass die Drehvorrichtung abgefedert ist und das Trägerelement (100) zu einer ursprünglichen Position führt, bevorzugt mithilfe von Federn oder einem elastischen Material, weiter bevorzugt mit Federn, die ausgewählt sind aus Spiralfedern, Blattfedern, Torsionsfedern.

6. Drehvorrichtung gemäß einem der voranstehenden Ansprüche,
dadurch gekennzeichnet, dass die Drehvorrichtung wenigstens eine Verriegelungsvorrichtung umfasst, die das Trägerelement (100) in einer Position in Relation zur Basis (200) verriegelt oder die Ableitung in einer Drehrichtung verhindert, um anschließend deaktiviert zu werden.

7. Drehvorrichtung gemäß Anspruch 6,
dadurch gekennzeichnet, dass die Verriegelungsvorrichtung lastsensibel ist und die Drehvorrichtung bei Sitzlasten oberhalb einer vorbestimmten Gewichtsgrenze verriegelt, die Sensibilität der Verriegelungsvorrichtung ist bevorzugt einstellbar.

8. Fuß- und Beinstütze (2), umfassend ein Trägerelement (100), eine Basis (200), umfassend zwei parallele Füße, die an das Trägerelement (100) angeschlossen und, und eine Drehvorrichtung (2), die das Trägerelement (100) an die Basis (200) anschließt, **dadurch gekennzeichnet, dass** die Fuß- und Beinstütze (2) eine Drehvorrichtung gemäß Anspruch 1 - 7 umfasst.

9. Fuß- und Beinstütze (2) gemäß Anspruch 8,
dadurch gekennzeichnet, dass die Basis (200) eine Dreh- oder Rotationsvorrichtung zum Drehen der Fuß- und Beinstütze (2) um 360° in der horizontalen Ebene umfasst.

Revendications

1. Dispositif rotatif destiné à un meuble (2), et, plus particulièrement, repose-pieds et repose-jambes adaptable afin de pouvoir s'asseoir dessus, qui comprend un élément de support (100) qui comprend une première paire de rails coulissants incurvés (501), et une base (200) qui comprend une seconde paire de rails coulissants incurvés (502) complémentaires au premier groupe de rails coulissants (501), les rails coulissants (501, 502) étant incurvés vers le haut par rapport à un plan horizontal, afin de permettre la rotation de l'élément de support (100) par rapport à la base (200) à l'aide d'un axe de rotation horizontal géométrique (400), l'axe de rotation géométrique (400) étant un axe virtuel positionné à une distance verticale au-dessous de l'élément de support (400), assurant ainsi un mouvement horizontal de l'élément de support (100) en plus de sa rotation,
la première paire de rails (502) étant placée à l'intérieur de l'élément de support (100), **caractérisé en ce que** la base (200) comprend deux jambes parallèles sur lesquelles est disposée en parallèle la seconde paire de rails coulissants (502).

2. Dispositif rotatif selon la revendication 1,
caractérisé en ce que l'axe de rotation géométrique est positionné sous le bord inférieur de l'élément de support (100) dans une position tournée de l'élément.

3. Dispositif rotatif selon l'une quelconque des revendications précédentes,
caractérisé en ce que le dispositif rotatif est intégré à l'élément de support (100), et n'est pas visible pour l'utilisateur.

4. Dispositif rotatif selon l'une quelconque des revendications précédentes,
caractérisé en ce que le dispositif rotatif comprend des dispositifs de butée qui limitent la déformation par rotation de l'élément de support (100) par rapport à la base (200).

5. Dispositif rotatif selon l'une quelconque des revendications précédentes,
caractérisé en ce que le dispositif rotatif est chargé par ressort et guide l'élément de support (100) dans une position initiale, de préférence à l'aide de ressorts ou d'un matériau élastique, et de préférence de ressorts choisis parmi des ressorts à spirale, des ressorts à lames, et des ressorts de torsion.

6. Dispositif rotatif selon l'une quelconque des revendications précédentes,
caractérisé en ce que le dispositif rotatif comprend au moins un dispositif de blocage, qui bloque l'élément de support (100) dans une position par rapport

à la base (200), ou qui empêche toute déviation dans un sens de rotation, afin d'être ensuite désactivé.

7. Dispositif rotatif selon la revendication 6, **caractérisé en ce que** le dispositif de blocage est sensible à la charge et bloque le dispositif rotatif en cas de charge supérieure à une limite de poids prédéterminée, et, de préférence, la sensibilité du dispositif de blocage est réglable.

8. Repose-pieds et repose-jambes (2) qui comprend un élément de support (100), une base (200) qui comprend deux jambes parallèles reliées à l'élément de support (100), et un dispositif rotatif qui relie l'élément de support (100) à la base (200), **caractérisé en ce que** le repose-pieds et repose-jambes (2) comprend un dispositif rotatif selon l'une quelconque des revendications 1 à 7.

9. Repose-pieds et repose-jambes (2) selon la revendication 8, **caractérisé en ce que** la base (200) comprend un dispositif tournant ou rotatif destiné à faire tourner le repose-pieds et repose-jambes (2) à 360° sur le plan horizontal.

Fig. 1

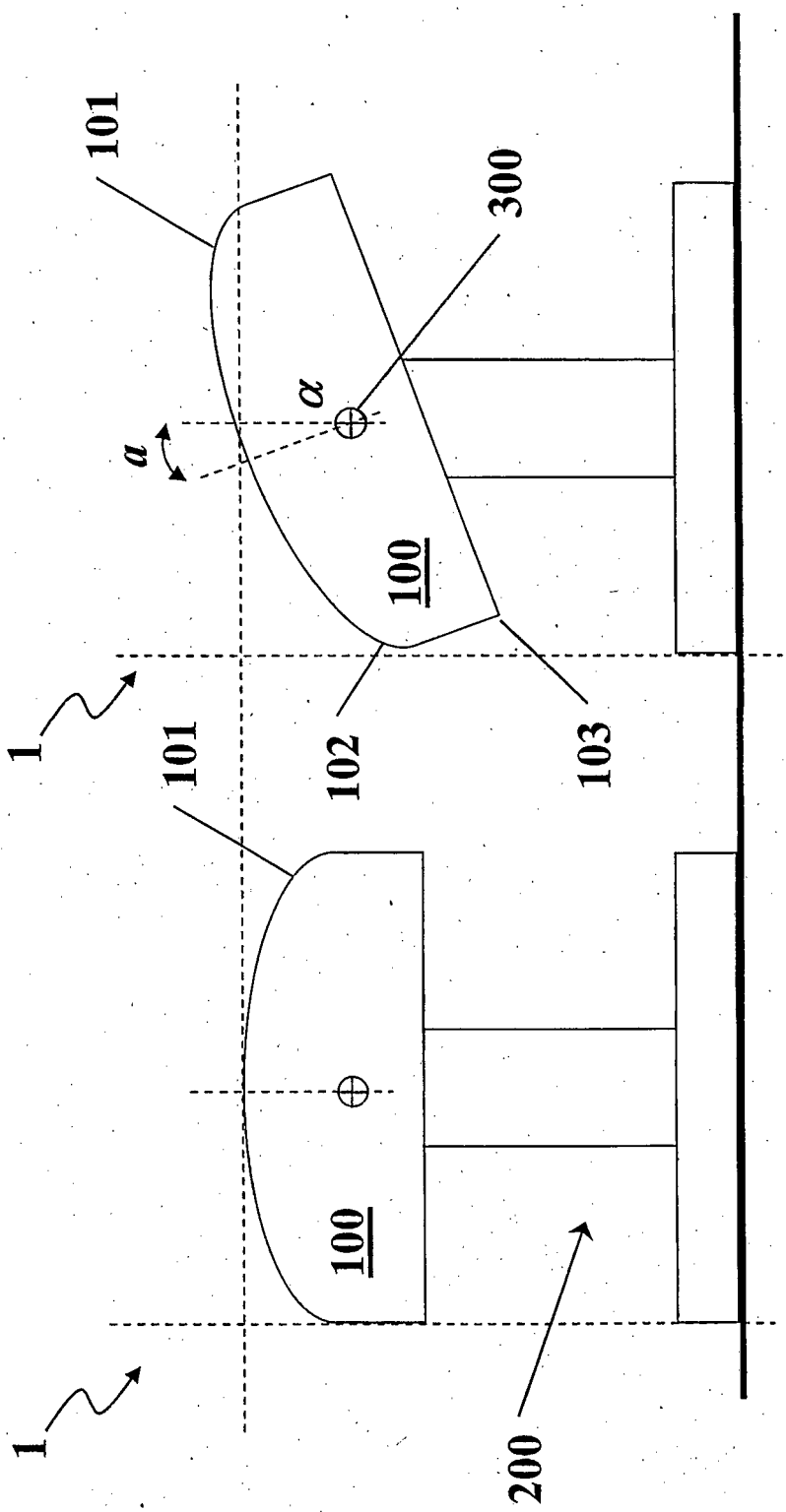


Fig. 2

Fig. 4

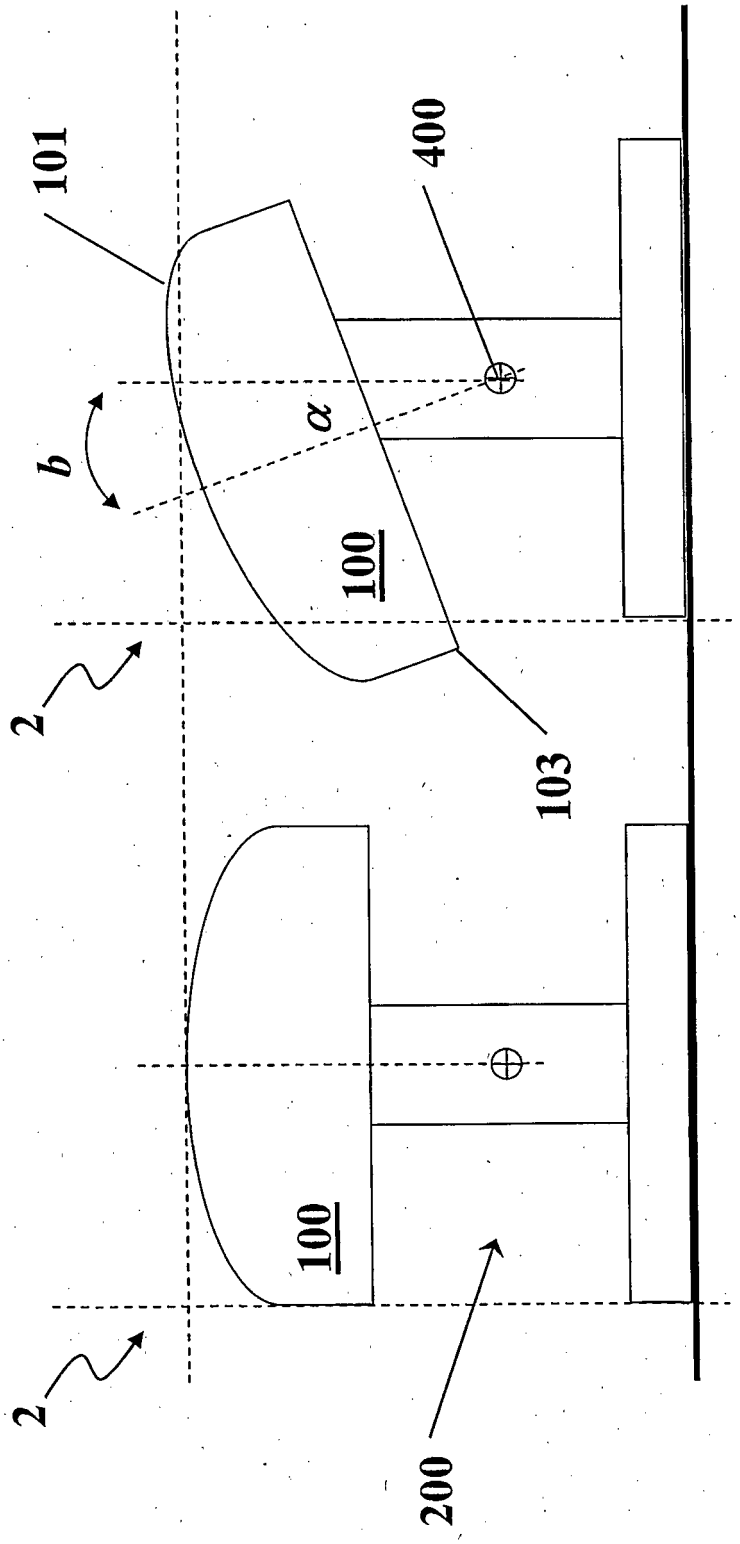


Fig. 3

Fig. 5

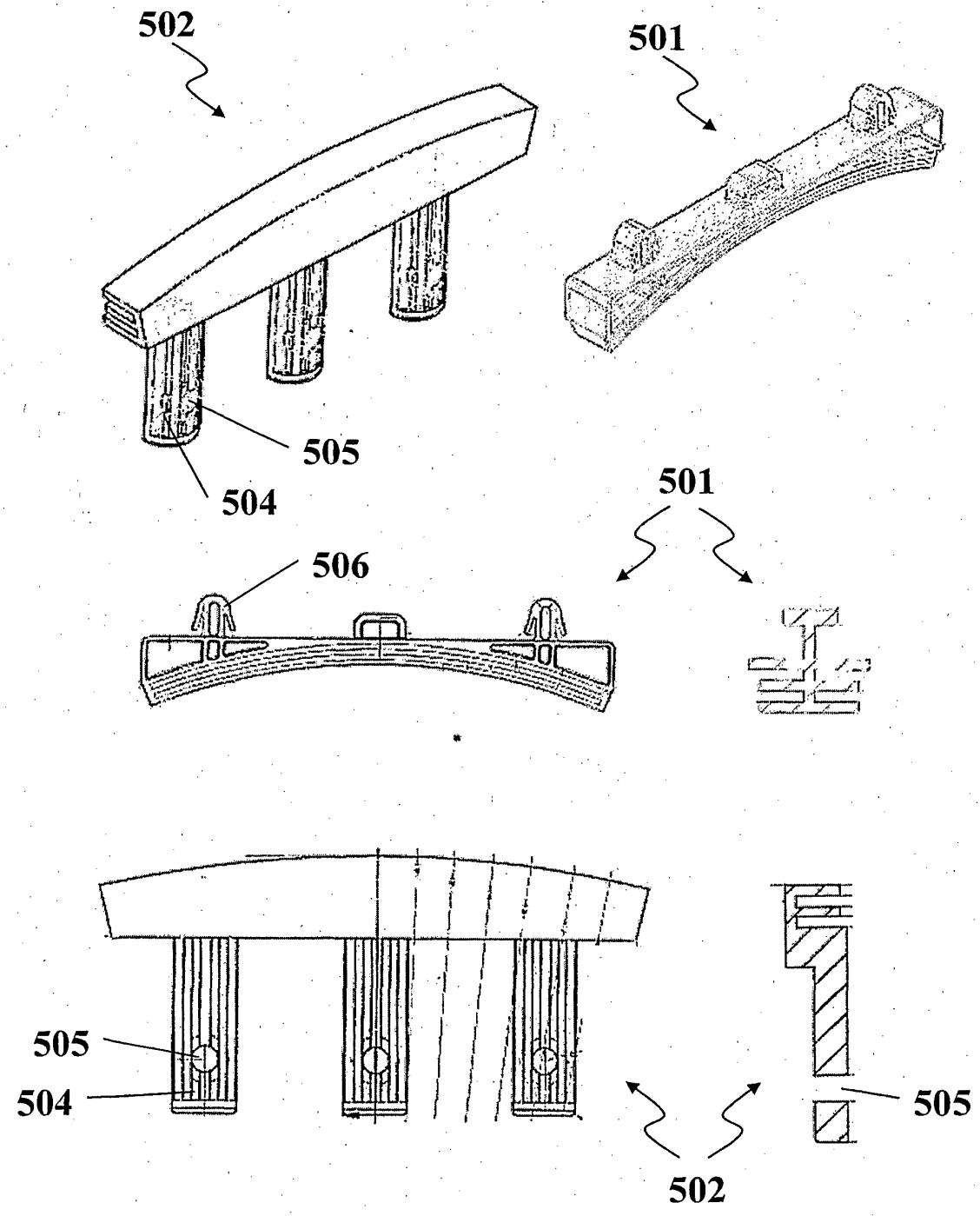
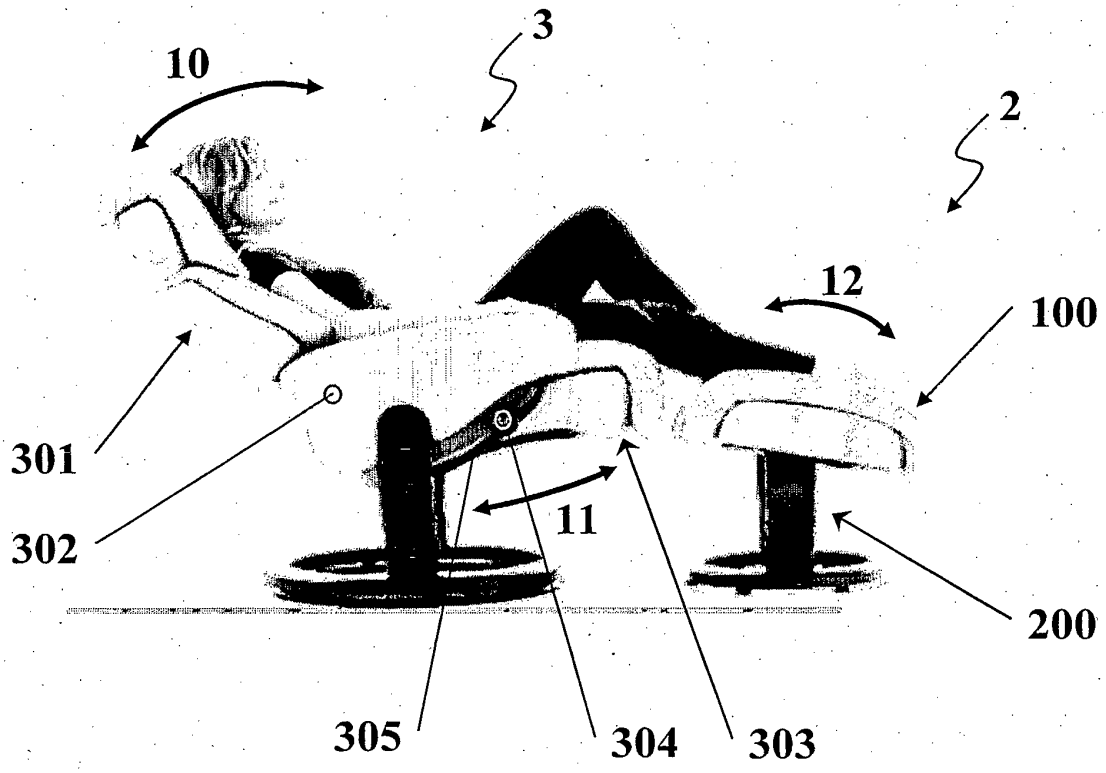


Fig. 6



REFERENCES CITED IN THE DESCRIPTION

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