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(54) **RECLINABLE SEATING**

NEIGUNGSVERSTELLBARER STUHL

CHAISE INCLINABLE

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(73) Proprietor: **Samson, Ilan**
London NW3 7DE (GB)

(72) Inventor: **ILAN, Samson**
London NW3 7DE (GB)

(74) Representative: **Messulam, Alec Moses**
A. Messulam & Co. Ltd.,
43-45 High Road
Bushey Heath, Bushey, Herts WD23 1EE (GB)

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US-A- 4 759 561	US-A- 4 790 599
US-A- 5 280 996	US-A- 5 427 433

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Description

[0001] The present invention relates a suspension device for use in reclinable seating, particularly seating in which the reclinable unit comprises a back rest and seat portion formed in fixed relation to one another e.g. as an integral unit. This reclinable unit may also comprise a leg support or footrest portion.

[0002] In a reclining armchair as described in U.S. Patent No. 4,790,599 there is a unitary seating element comprising a back rest, a seat and a footrest. This seating element is suspended from a base structure by a single pivot at each side, somewhat above the middle of the seating element, but lower than the arm rest level. FIGS. 2 and 3 of U.S. Patent No. 4,790,599 show such an arrangement in the upright and fully reclined states, respectively. FIGS. 1 and 2 of the present application schematically correspond to those drawings in the patent.

[0003] The problem with such an arrangement is the tendency of the chair, at least when occupied, to fall into either the upright or the fully reclined position because the combined centre of gravity, 5a and 5b, of the occupant and seating element is lower in these positions than in the intermediate position, 5c, as shown in FIG. 3 herein. Effort is needed to move out of these upright and fully reclined positions and elderly and handicapped people may not be able to emerge from the fully reclined position. The need to raise the centre of gravity when passing from the fully reclined to the intermediate position can be likened to a potential energy barrier which must be overcome in order for the occupant of the chair to rise from the fully reclined position. Thus, although the armchair described in U.S. Patent No. 4,790,599 allows the user to adopt a comfortable and beneficial position in which the individual's feet are raised above the level of his heart, its suspension may be somewhat difficult to operate especially by elderly and handicapped persons.

[0004] A reclining chair according to the preamble of independent claim 1 is disclosed in GB-A-574 307.

[0005] With a view to mitigating the foregoing disadvantages of the prior art, the present invention provides A reclining chair comprising a frame, a reclinable unit having a back and a seat that are fixed relative to one another, and a mechanism on each side of the reclinable unit for suspending the reclinable unit from the frame, said mechanism including a pair of swing links pivotally connected at the top to the frame at a first pair of spaced apart pivot points and interconnected through a rigid member at a second pair of pivot points closer together than the first pair pivot points, and said reclinable unit being rigidly connected to the rigid member preventing relative movement between the reclinable unit and the rigid member during pivotal movement of the reclinable unit, characterised in that the reclinable unit can pivot between an upright position and a reclined position, and the geometry of the mechanism suspending the reclin-

able unit from the frame is such that the combined centre of gravity of the reclinable unit and any occupant remains at a substantially constant height during movement of the reclinable unit between the upright and reclined positions.

[0006] The invention will now be further described, by way of example only and not of limitation, with reference to the accompanying drawings in which:

FIG. 1 diagrammatically shows an occupied well-known prior art reclining armchair in the fully upright position;

FIG. 2 shows the prior art armchair of FIG. 1 in a fully reclined position;

FIG. 3 diagrammatically shows the movement of the combined centre of gravity of the reclinable unit and occupant during movement of the known armchair between the positions of FIG. 2 and FIG. 1;

FIG. 4 shows a side view of an armchair incorporating a linkage mechanism according to the present invention;

FIG. 5 is a top plan view of the armchair of FIG. 4;

FIG. 6 diagrammatically shows the position of the linkage mechanism of the present invention when the armchair of FIG. 4 is in the fully upright position;

FIG. 7 diagrammatically shows the position of the linkage mechanism of the present invention when the armchair of FIG. 4 is in the intermediate position;

FIG. 8 diagrammatically shows the position of the linkage mechanism of the present invention when the armchair of FIG. 4 is in the fully reclined position;

FIG. 9 diagrammatically shows the linkage mechanism of FIG. 4 incorporating a locking member to hold the armchair in the upright position;

FIG. 10 is a view similar to FIG. 4 but showing another embodiment of a locking member;

FIG. 11 is a detail view of the locking mechanism shown in FIG. 10; and

FIGS. 12 and 13 are diagrammatic views of a portion of the locking mechanism showing it in the unlocked and locked positions, respectively.

[0007] As may be seen from FIG. 4, a reclinable armchair incorporating the present invention may comprise a base unit 1 and a reclinable unit 2 incorporating a backrest section, a seat section and a footrest section in fixed structural relationship to one another. As can be more clearly seen in FIG. 5, the base unit 1 incorporates two side members, the reclinable unit being suspended between the side members by means of two linkage mechanisms according to the present invention.

[0008] The centre of gravity levelling effect provided by the present invention can be achieved by linkage arrangement of four rigid members (links) in which two downwardly converging swing links 15, 16 are pivoted from pivots 22 and 23, respectively, which are attached to the upper part of base structure 1, pivot 23 being behind pivot 22 in the feet-to-head direction. The other end

of said links 15, 16 are pivotally connected to the ends of a further link or rigid member 14 at pivots 20,21.

[0009] The pivots 20 and 21 are closer together than pivot 22 and 23. At a point between pivots 20 and 21 on link 14, a downwardly extending member 13 is rigidly attached. The lower end of member 13 is rigidly attached to the reclining seating unit 2. The links 14, 15 and 16 with the base 1 between the pivots 22 and 23 form a four-bar linkage. The link 14 is generally disposed below the level of the pivots 22 and 23.

[0010] FIGS. 6, 7 and 8 show the position of the linkage mechanism members (links) 14-16 in the upright, partially reclined (intermediate), and fully reclined positions, respectively. The typical range of reclining movement is 30° - 60°. As seen in these diagrams, this arrangement leads to the movement of the centre of gravity 5 remaining approximately horizontal, as opposed to its movement as shown in FIG. 3 which shows the result of suspending the seating element 2 from a single fixed pivot axis 4, as in the armchair known from U.S. Patent No. 4,790,599 and shown in FIGS. 1-3. This effect arises because the pivot axis is (inevitably) lower than the centre of gravity.

[0011] It will be realized that the present invention cannot totally guarantee an absolutely horizontal movement of the centre of gravity 5 for all users, mainly because of differences in body build. However, the small amount of friction inevitably present in the system covers small residual imbalances and also a user will be able to optimise the balance of the chair by altering the fixed position of his body in the chair, e.g. by an adjustment of a centimetre or so forwards or backwards.

[0012] Furthermore, the small effort required on the user's part to rotate the reclining unit 2 between its various positions is not only acceptable but actually beneficial, as it allows the position to be changed only when desired.

[0013] An occupant can move the reclining armchair between positions by shifting his centre of gravity e.g. by moving his arms or slight forward leaning, or by exerting a force on the base unit 1 e.g. by pushing or pulling on arms of the chair (not shown) which may be affixed thereto.

[0014] Although it is important for the lengths of the links 14-16, the positions of pivots 22 and 23 relative to the frame and the position of the rigid member and the pivots 22 and 23 relative to the reclining unit to be accurately reproduced in chairs of a given design incorporating the mechanism of the present invention, it is envisaged that variations in their lengths and relative proportions will be required for different seating element 2 designs and different designs of base unit 1.

[0015] It is often desired to lock reclining chairs in the upright position. One way in which this may be achieved in chairs incorporating the mechanism of the present invention is shown in FIG. 9, where a rigid arm 34 is pivotally connected to the base 1 at 35. In the locked state, the arm 34 is rotated over pivot 35 so as to rest against

a point 33 (preferably an outwardly projecting element) on member 13. To unlock the chair, arm 35 is lifted clear (34a) of projecting element 34.

[0016] Another possible locking method involves the use of one or more oval or other non-circular cross-section members 43 affixed to and movable with the reclining unit 2 and running in a guide trough or between guide rails 40, 41 (FIG. 10). Rotation of the members 43 within the trough or between the rails e.g. by means of handle 44 (FIG. 11) moves the member(s) from a position in which the chair is free to move (FIG. 12) and a locking position (FIG. 13). In the locking position, the short axis of the oval 43 lies in the direction of the rails 40, 41. In the unlocked state the long axis of the oval 43 lies in the direction of the rails 40, 41. This mechanism allows the chair to be locked in any position and only one quarter turn of handle 44 is required to lock and release the chair.

[0017] Optional provisions of various known types can be included for arresting the reclining unit. Also or alternatively, additional friction can be introduced into the pivots or by way of the upholstery.

[0018] The supporting member and links 13-16 of the linkage mechanism may be formed from any suitable material, but they must be strong enough to bear the weight of the reclining unit 2 and an occupant. Steel is a possible manufacturing material.

Claims

1. A reclining chair comprising
 - a frame (1),
 - a reclining unit (2) having a back and a seat that are fixed relative to one another, and
 - a mechanism on each side of the reclining unit (2) for suspending the reclining unit from the frame (1),
 - said mechanism including a pair of swing links (15,16) pivotally connected at the top to the frame (1) at a first pair of spaced apart pivot points (22,23) and interconnected through a rigid member (14) at a second pair of pivot points (20,21) closer together than the first pair pivot points (22,23), and
 - said reclining unit (2) being rigidly connected to the rigid member (14) preventing relative movement between the reclining unit (2) and the rigid member (14) during movement of the reclining unit (2),
 - characterised in that**
 - the reclining unit (2) can pivot between an upright position and a reclined position, and
 - the geometry of the mechanism suspending the reclining unit from the frame is such that the combined centre of gravity (5) of the reclining unit and any occupant remains at a substantially constant height during movement of the reclining unit between the upright and reclined positions.

2. A reclining chair as claimed in claim 1, wherein said rigid member (14) is a third link of which the mid-portion is connected by a downwardly extending second rigid member (13) to the reclinable unit (2).
3. A reclining chair as claimed in claim 1 or 2, wherein the reclinable unit (2) additionally includes a foot-rest.
4. A reclining chair as claimed in any preceding claim, wherein means are providing for locking the reclinable unit (2) relative to the frame in any desired position.

Patentansprüche

1. Liegesessel, umfassend einen Rahmen (1) eine verstellbare Einheit (2) mit einer Rückenlehne und einer Sitzfläche, die relativ zueinander feststehend sind, und einen Mechanismus auf jeder Seite der verstellbaren Einheit (2), um die verstellbare Einheit am Rahmen (1) aufzuhängen, wobei dieser Mechanismus ein Paar Schwenkverbindungen (15, 16) einschließt, die an der Oberseite des Rahmens (1) auf drehbare Weise mit einem ersten Paar beabstandeter Drehpunkte (22, 23) verbunden sind und an einem zweiten Paar Drehpunkte (20, 21), die näher zusammen liegen als das erste Paar Drehpunkte (22, 23), durch ein starres Element (14) miteinander verbunden sind, und wobei diese verstellbare Einheit (2) mit dem starren Element (14) starr verbunden ist, wodurch die relative Bewegung zwischen der verstellbaren Einheit (2) und dem starren Element (14) während der Bewegung der verstellbaren Einheit (2) verhindert wird, **dadurch gekennzeichnet, daß** die verstellbare Einheit (2) zwischen eine aufrechte Position und eine geneigte Position gedreht werden kann, und die Geometrie des Mechanismus, der die verstellbare Einheit am Rahmen aufhängt, derart ist, daß der kombinierte Schwerpunkt (5) der verstellbaren Einheit und eines Insassen während der Bewegung der verstellbaren Einheit zwischen der aufrechten Position und der geneigten Position auf einer im wesentlichen konstanten Höhe bleibt.
2. Liegesessel nach Anspruch 1, wobei das starre Element (14) ein drittes Verbindungselement ist, dessen mittlerer Abschnitt durch ein nach unten verlaufendes zweites starres Element (13) mit der verstellbaren Einheit (2) verbunden ist.
3. Liegesessel nach Anspruch 1 oder 2, wobei die ver-

stellbare Einheit (2) außerdem eine Fußstütze umfaßt.

4. Liegesessel nach einem der obigen Ansprüche, wobei Mittel vorgesehen sind, um die verstellbare Einheit (2) relativ zum Rahmen in jeder gewünschten Position zu arretieren.

Revendications

1. Siège ou chaise inclinable comprenant une armature (1), une unité inclinable (2) ayant un dossier et une assise qui sont fixes l'un par rapport à l'autre, et un mécanisme de chaque côté de l'unité inclinable (2) pour suspendre l'unité inclinable sur l'armature (1), ledit mécanisme comprenant une paire de bielles ou de liens pivotant(e)s (15, 16) relié(e)s de façon pivotante au niveau de la partie supérieure à l'armature (1) au niveau d'une première paire de points de pivotement espacés l'un de l'autre (22, 23) et reliées l'une à l'autre par l'intermédiaire d'un élément rigide (14) au niveau d'une seconde paire de points de pivotement (20, 21) plus proches l'un de l'autre que les points de pivotement de la première paire (22, 23), et ladite unité inclinable (2) étant reliée de façon rigide à l'élément rigide (14) empêchant le mouvement relatif entre l'unité inclinable (2) et l'élément rigide (14) au cours du mouvement de l'unité inclinable (2), **caractérisé en ce que** l'unité inclinable (2) peut pivoter entre une position verticale et une position inclinée, et la géométrie du mécanisme suspendant l'unité inclinable à partir de l'armature est telle que le centre combiné de gravité (5) de l'unité inclinable et d'un occupant quelconque reste à une hauteur sensiblement constante au cours du mouvement de l'unité inclinable entre les positions verticale et inclinée.
2. Siège inclinable selon la revendication 1, dans lequel ledit élément rigide (14) est une troisième bielle ou lien dont la partie médiane est reliée par un second élément rigide s'étendant vers le bas (13) à l'unité inclinable (2).
3. Siège inclinable selon la revendication 1 ou 2, dans lequel l'unité inclinable (2) comprend en outre un repose-pied.
4. Siège inclinable selon l'une quelconque des revendications précédentes, dans lequel des moyens sont fournis pour verrouiller l'unité inclinable (2) par rapport à l'armature dans une position souhaitée quelconque.

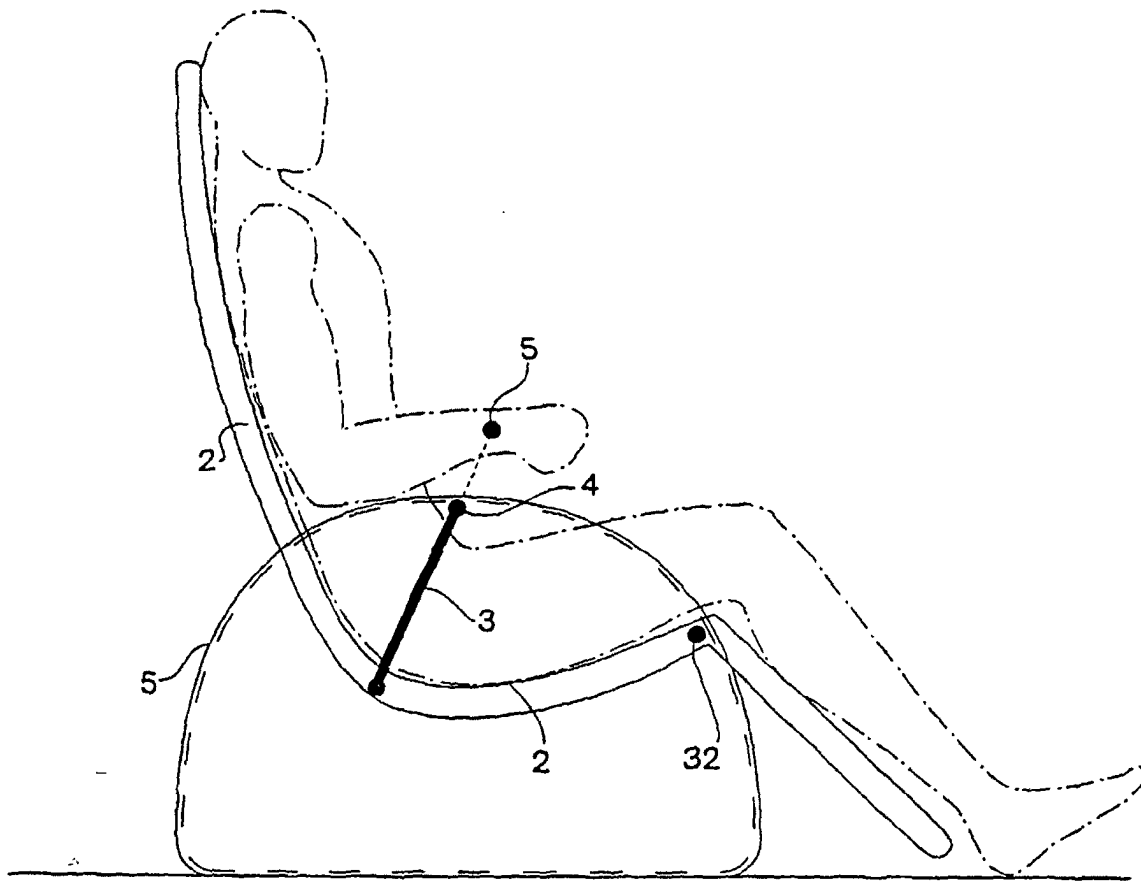


Fig. 1
(PRIOR ART)

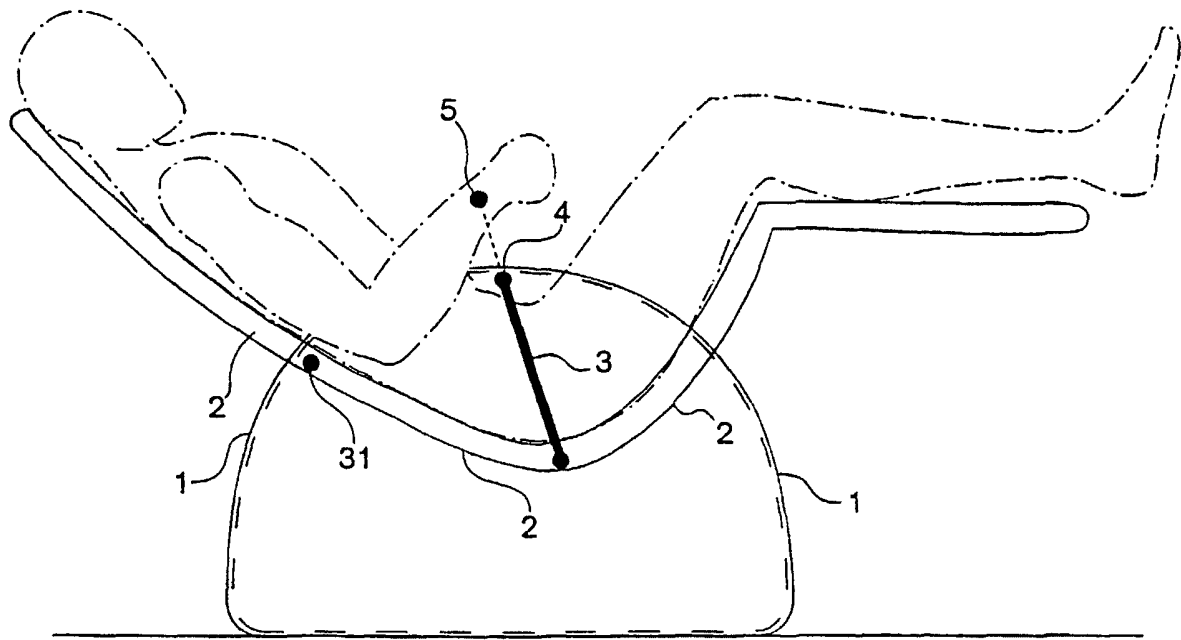


Fig. 2
(PRIOR ART)

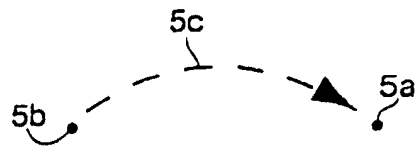


Fig. 3

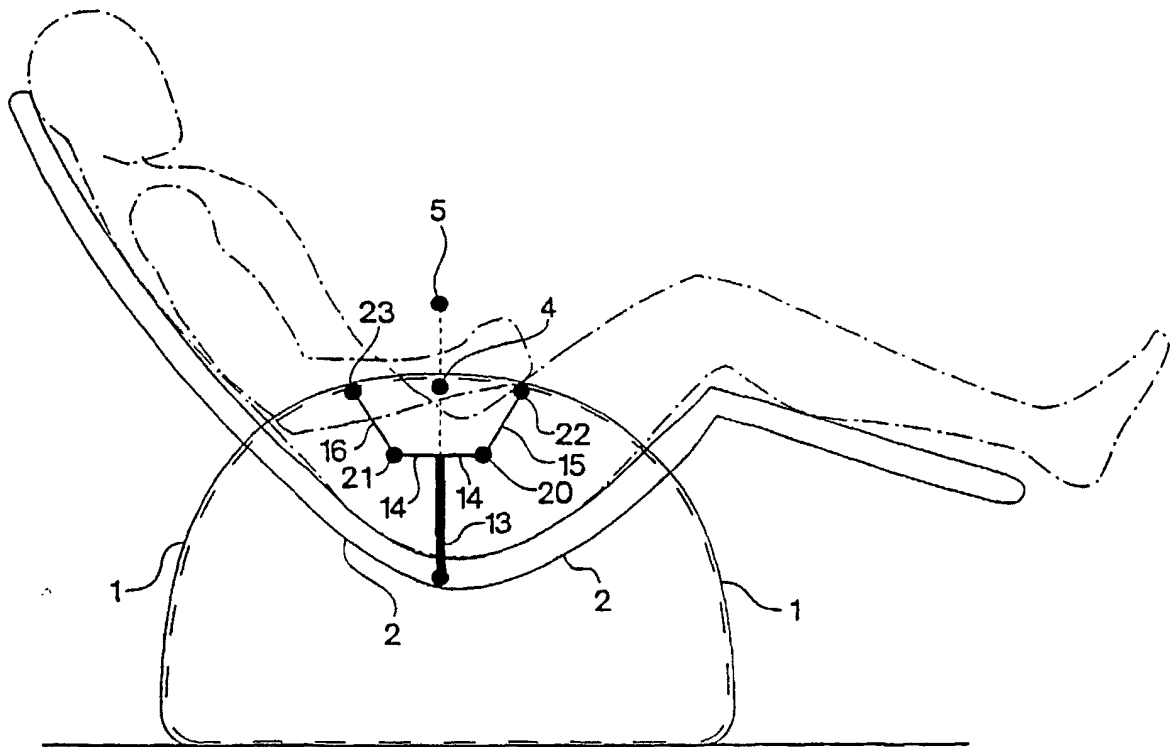


Fig. 4

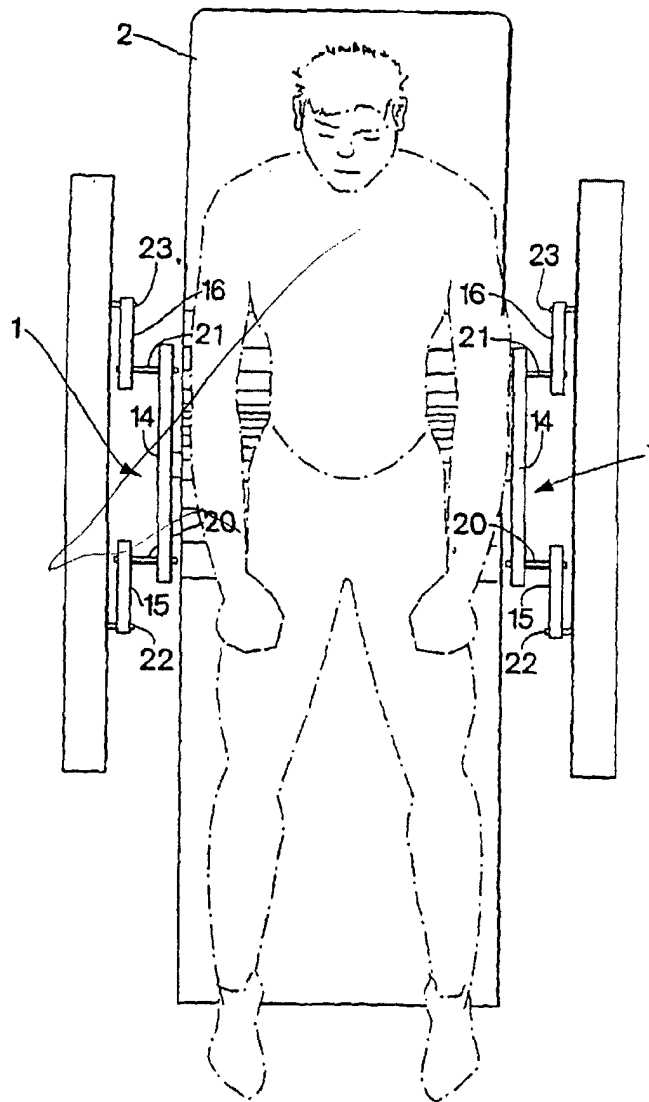


Fig. 5

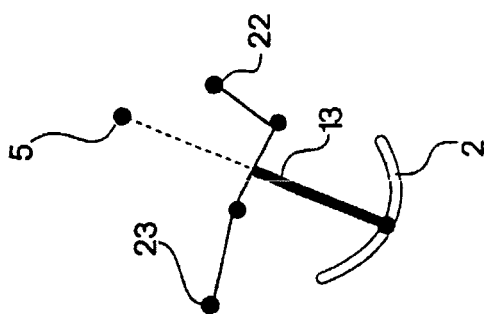


Fig. 6

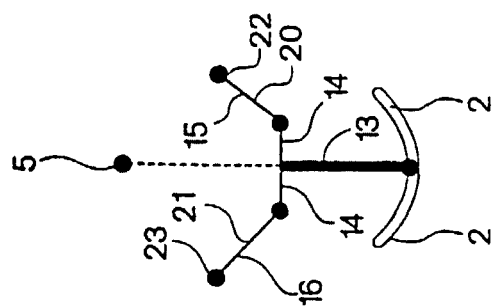


Fig. 7

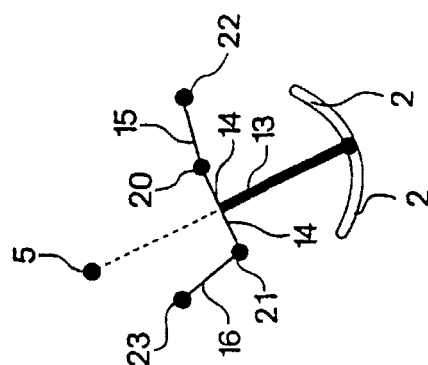


Fig. 8

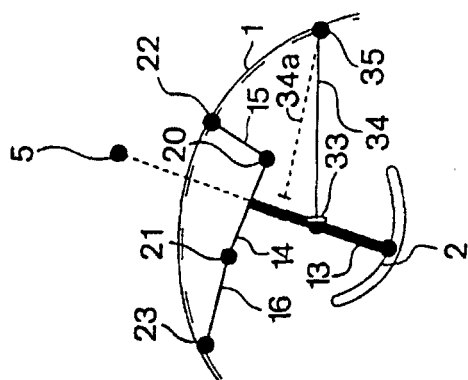


Fig. 9

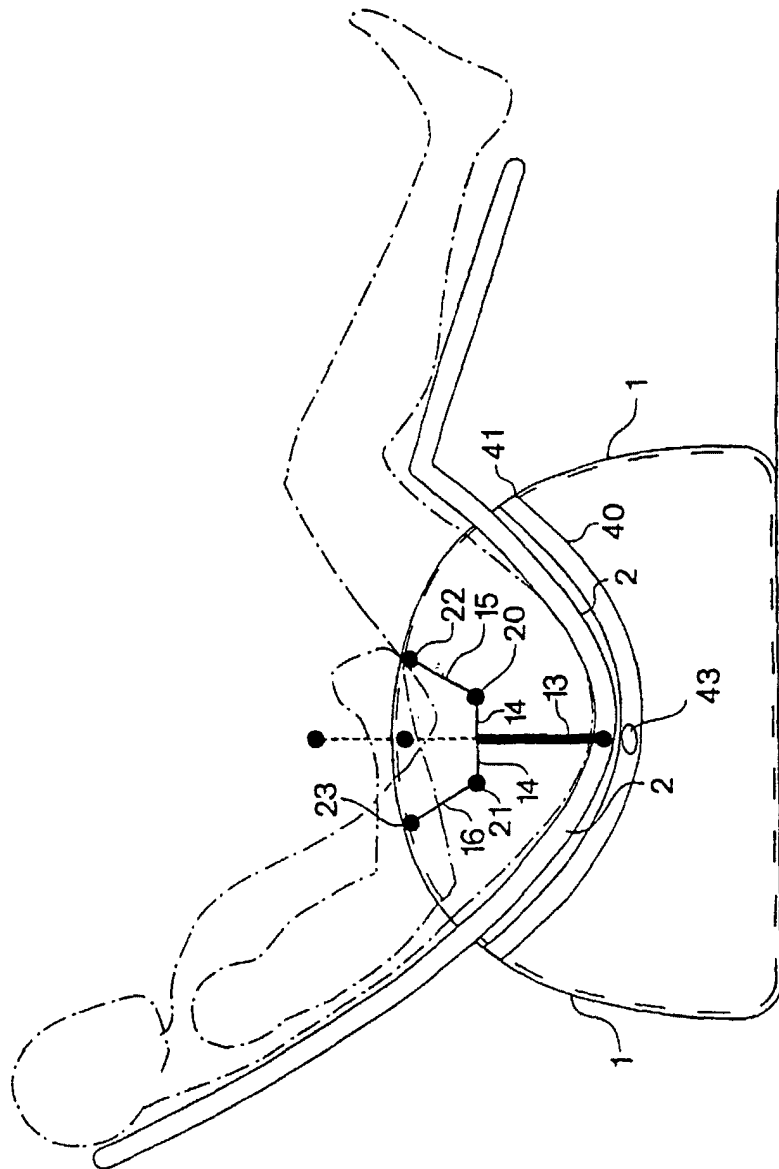


Fig. 10

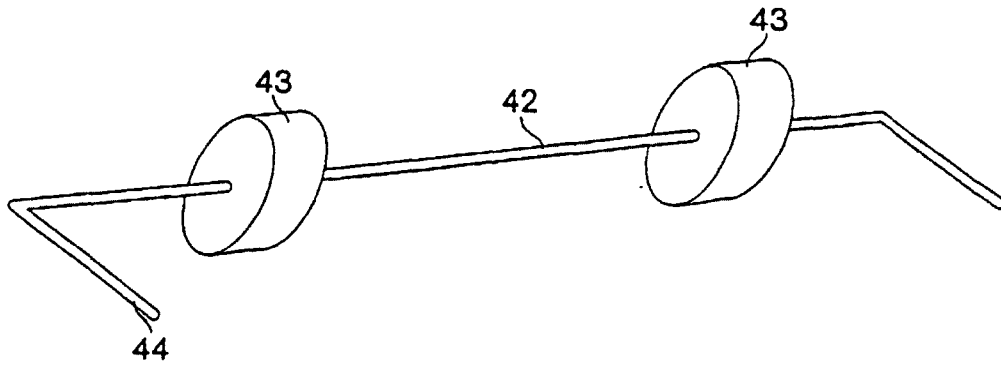


Fig. 11

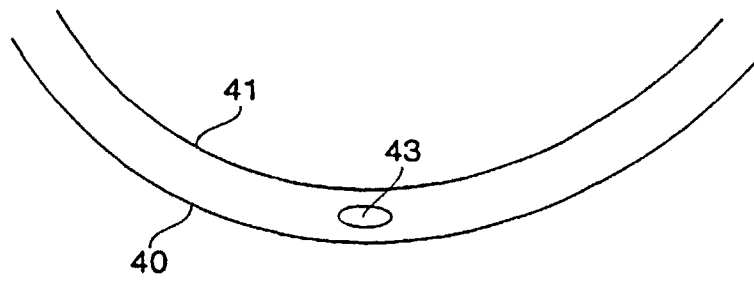


Fig. 12

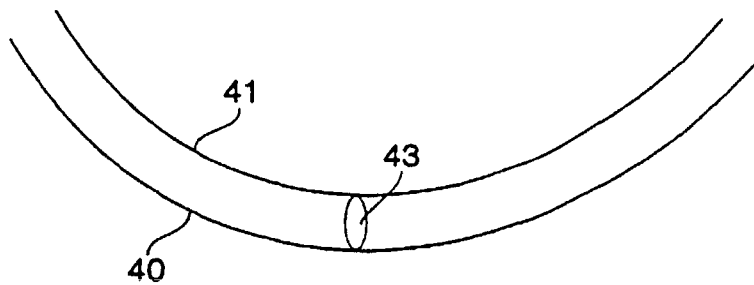


Fig. 13