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Fauteuil roulant

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(56) References cited:
**EP-A- 0 248 474 DE-A- 2 459 908
DE-A- 3 808 149 DE-A- 3 902 694
FR-A- 2 663 211 NL-A- 8 701 951**

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EP 0 566 192 B1

Description

The invention relates to a wheelchair provided with a driving frame supported by ground wheels and with a seating frame supported by said driving frame according to the pre-characterising part of claim 1.

Wheelchairs with tiltable seating frames as described in the pre-characterising part of claim 1 are known from EP-A-0248474 and FR-A-2663211. In said known structures the seating frame can be moved from one position to the other position and vice versa.

The possibility to tilt the seating frame of a wheelchair about an imaginary pivot axis extending perpendicularly to the longitudinal direction of the driving frame is of great importance to the user of the wheelchair. Said tilting makes it possible to effect a different pressure distribution over the contact surfaces between the occupant and the parts supporting the occupant, such as the headrest, the back, the seat, the calfrests and/or the footrests. Such a changing pressure distribution provides a better blood circulation and prevents unpleasant effects, such as becoming seat-sore and/or tiring rapidly.

A side effect of this kind of tilting is furthermore the greater ground clearance of the footrests, which tilt along with the seating part, in their backward-tilted position, since it will be easier to move the wheelchair over possible obstacles then.

The object of the invention is to obtain a wheelchair of the above kind, wherein the seating part can be tilted with respect to the driving frame by means of a simple, compact and lightweight construction, using comparatively little physical effort.

Especially for hand-propelled wheelchairs a lightweight and compact construction is of particular importance, with a view to easy transport of the wheelchair in a transport vehicle or the like.

According to the invention the object aimed at can be achieved by using the measures mentioned in the characterising part of claim 1.

When such a construction is used it will be possible, upon moving the seating frame with respect to the sliding members, to effect a tilting movement of the seating frame with respect to the driving frame, about an imaginary pivot point located some distance above the seat of the seating frame, which pivot point will at least substantially coincide with the centre of gravity of the occupant plus the seating frame in case of an appropriate selection of the construction, partly dependent on the weight of the seating frame and the weight and dimensions of the user, as a result of which only a minimal physical effort will be required for tilting a seating frame and for locking the seating frame safely in a desired position.

The invention will be explained in more detail hereafter with reference to the accompanying figures.

Figures 1 - 3 diagrammatically indicate the driving frame and the seating frame, with the mechanism for tilt-

ing the seating part into three different positions provided between the said two frames.

Figure 4 diagrammatically shows a seating frame with a person seated thereon.

For the sake of clarity the driving frame and the seating frame are shown as two plate-shaped members 1 and 2 respectively in Figures 1-3. It will be apparent, however, that the driving frame may be a conventional wheelchair frame supported by ground wheels, whilst the seating part 2 may be provided with a normal seat, a back, armrests, footrests and the like.

Two parallel pins 3 and 4 are journaled in the driving frame, in such a manner that said pins are rotatable with respect to the frame 1 about horizontal central axes extending perpendicularly to the longitudinal direction of the wheelchair. A hand lever 5 is secured to the pin 3, so as to be able to rotate the pin 3 about its central axis. Furthermore a cam plate 6 is secured to the pin 3, to which two studs 7 and 8 extending parallel to the pin 3 are secured. A sliding member 9 is furthermore pivotable about the pin 3. Said sliding member 9 is movably accommodated in a slotted hole 10 provided in the seating frame, the longitudinal axis of said slotted hole at least substantially extending in the longitudinal direction of the wheelchair.

Furthermore a further L-shaped lever 11 having an at least substantially vertical leg 12, seen in Figure 1, and an at least horizontal leg 13 joining the leg 12 at its upper end is pivotally mounted on the pin 3, at a point located about halfway between the ends of the long leg 12. A stud 14 extending parallel to the pin 3 is secured near the free end of the arm 13 of the further L-shaped lever 11. In the position shown in Figure 1 said stud is accommodated in a recess 16 provided at the bottom side of an arm 15. The arm 15 is coupled to the driving frame 1 so as to be pivotable about a pin 17 extending parallel to the pins 3 and 4. It will be apparent that in view of the fact that the stud 14 secured to the lever 11 is accommodated in the recess 16 of the arm 15, the further lever 11 is locked against rotation about the pin 3. As is furthermore apparent the point of the triangular upper part of the cam 6 abuts against the bottom side of the arm 15.

One end of a coupling rod 19 is pivotally coupled to the bottom end of the arm 12 of the further lever 11 by means of a pin 18 extending parallel to the pin 3. The other end of said coupling rod 19 is pivotally coupled to an arm 21 by means of a pin 20 extending parallel to the pin 18, and that in a point about halfway between the two ends of the arm 21.

The arm 21 is secured to the pin 4 with one end. One end of a further coupling rod 23 is pivotally coupled to the bottom end of the arm 21 remote from the pin 4, by means of a pin 22 extending parallel to the pin 4. The other end of the coupling rod 23 extending to the front from the pin 22 is pivotally coupled to the seating frame 2 by means of a pin 24 extending parallel to the pin 22.

A sliding block 25 is freely pivotable about the pin 4. Said sliding block 25 is accommodated in a slotted hole

26 provided in the seating frame 2. Said slotted hole 26 is located ahead of the slotted hole 10, seen in the intended direction of movement of the wheelchair according to the arrow A, whilst, as will be apparent from Figure 1, the longitudinal axis of said slotted hole 26 includes an obtuse angle with the longitudinal axis of the slotted hole 10, said obtuse angle being $\pm 160^\circ$ in the illustrated embodiment.

When mounted in the wheelchair the slotted holes will generally slope upwards in opposite directions from their lowermost points.

The position of the various parts with respect to each other shown in Figure 1 will correspond with the position in which parts of the seat 27 (Figure 4) forming part of the seating frame 2 occupy a position for normal driving of the wheelchair. From this position it is possible to tilt the seat slightly backwards. For this purpose the hand lever 5, which is initially located beside the seat and which extends at least substantially in horizontal direction, is slightly pivoted upwards, whereby the cam 6 connected to the hand lever 5 via the pin 3 is pivoted along to the position shown in Figure 2. It will be apparent that said pivoting of the cam 6 by means of the point of the cam 6 abutting against the bottom side of the arm 15 will cause the arm 15 to pivot from the position shown in Figure 1, against the action of a spring (not shown), to the position shown in Figure 2. In this position the arm 15 is pivoted to such an extent that the stud 14 secured to the further lever 11 is clear of the arm 15, the locking of the pivoting motion of the further lever 11 effected by the arm 15 thus being released.

In this position shown in Figure 2 also the stud 8 abuts against the right-hand side of the vertical leg 12 of the further lever 11. Upon further pivoting of the pin 3 and the cam 6 by means of the hand lever 5 to the position shown in Figure 3, the further lever 11 is caught by the stud 8 secured to the cam 6 and, seen in the Figures, pivoted anti-clockwise to the position shown in Figure 4, in which the hand lever 5 extending upwards in that position will be located near the back 28 of the seating frame.

As a result of this pivoting of the further lever 11 the coupling rod 19 is moved to the right, seen in the Figures, which will result in pivoting of the arm 21 about the pin 4. As a result of this anti-clockwise pivoting of the arm 21 about the pin 4, the coupling rod 23 and the seating frame 2 coupled thereto will be moved to the right as well. This movement will cause the seating frame 2 to move with respect to the sliding members 9 and 25, said sliding members thus making a relative movement within the slotted holes 10 and 26. As a result of the above-described movement the seating frame will make a slight tilting motion about a horizontal pivot axis extending perpendicularly to the plane of the drawing and consequently also perpendicularly to the longitudinal direction of the wheelchair.

With an appropriate construction of the mechanism for effecting the pivoting or tilting motion, which mechanism is provided between the driving frame and the

seating frame, the tilting axis about which said motion takes place will at least substantially be located near the mass centre 29 defined by the weight and dimensions of the combination of seating frame and user. The position of said imaginary pivot or tilting axis can be influenced by changing the distance between the pins 3 and 4; this will take place in dependence on the size and the body weight of the wheelchair user. Furthermore it is possible to influence the initial position from which the seating part is to be tilted by suitably selecting the position of the slotted holes with respect to the horizontal and the point of attachment of the coupling rod 23 to the seating frame 2 by means of the pin 24.

As is furthermore apparent from Figure 3, in the final position shown in Figure 3 the pivot point 18 between the arm 12 of the further lever 11 and the coupling rod 19 has been moved through the dead centre, in which the arm 12 and the coupling rod 19 are in line. This results in a certain amount of locking of the seating frame with respect to the driving frame in its backward-tilted position.

The seating part can be returned from the backward-tilted position to the position shown in Figure 1 again by pivoting the hand lever 5 clockwise, seen in the Figures.

In view of the fact that the imaginary axis about which the seating frame with the user seated thereon will be located at least substantially at the mass centre of the combination of seating part and user, only a relatively small amount of force is required for tilting the seating part with the user seated thereon.

Claims

1. A wheelchair provided with a driving frame (1) supported by ground wheels and with a seating frame (2) supported by said driving frame (1), wherein said seating frame (2) is supported by two sliding members (9, 25) connected to and pivotable with respect to the driving frame (1) about horizontal pivot axes (3, 4) extending perpendicularly to the longitudinal direction of the driving frame (1), and accommodated in two slotted holes (10, 26) provided in the seating frame (2), said slotted holes (10, 26) lying one behind the other when seen in the longitudinal direction of the driving frame (1), whereby the longitudinal axis of the foremost slotted hole (26) includes an obtuse angle with the longitudinal axis of the other slotted hole (10), the arrangement being such that the seating frame (2) can be moved from a first position, wherein the sliding members (9, 25) are located at one end of said slotted holes (10, 26) to a second position wherein the sliding members (9, 25) are located at an opposite end of said slotted holes (10, 26), characterised in that a hand lever (5) is pivotable about the pivot axis (3) of the one sliding member (9), said hand lever (5) being coupled, by means of a coupling rod (19), to an arm (21) which at one end is pivotable

about the other pivot axis (4) and at its other end is coupled to the seating frame (3) by means of a further coupling rod (23), and that means (14, 16; 10, 18, 19) are provided for locking the seating frame (2) with respect to the driving frame (1) in the first and in the second position.

2. A wheelchair according to claim 1, characterized in that the hand lever (5) cooperates with a further lever (11), which is also pivotable about the pivot axis (3) of the one sliding member (4) and which is coupled to said coupling rod (9) whereby the hand lever (5) is pivotable through a certain angle with respect to said lever (11), so as to disengage a locking mechanism, which locks the lever (11) in the first position of the seating frame (2) prior to the lever (11) being caught by the hand lever (5).
3. A wheelchair according to claim 1, characterized in that said lever (11) is retained between two projections, which are secured to a cam (6) secured to the hand lever (5), by means of which a arm (15) locking the lever (11) can be pivoted from the locking position to a non-locking position.
4. A wheelchair according claim 2 or 3, characterized in that the pivot point (18) between the lever (11) and the coupling rod (19) is moved through a dead centre by moving the seating frame (2) from the first to the second position for locking the seating frame in said second position.

Patentansprüche

1. Rollstuhl, versehen mit einem Fahrradrahmen (1), der von Bodenrädern getragen wird, und einem Sitzrahmen (2), der von diesem Fahrradrahmen (1) gestützt wird, wobei dieser Sitzrahmen (2) gestützt ist von zwei verschieblichen Elementen (9, 25), die verbunden sind mit und schwenkbar sind gegenüber dem Fahrradrahmen (1) um horizontale Schwenkachsen (3, 4), die sich senkrecht zu der Längsrichtung des Fahrradrahmens (1) erstrecken, und aufgenommen sind in zwei Längsschlitzen (10, 26), die in dem Sitzrahmen bereitgestellt sind, wobei diese Längsschlitze (10, 26) hintereinander liegen in Blickrichtung der Längsrichtung des Fahrradrahmens (1), wobei die Längsachse des vorderen Längsschlitzes (26) einen stumpfen Winkel mit der Längsachse des anderen Längsschlitzes (10) einschließt, wobei die Anordnung so ist, daß der Sitzrahmen (2) von eine erste Stellung, in der die verschieblichen Elemente (9, 25) an einem Ende dieser Längsschlitze (10, 26) angeordnet sind, zu einer zweiten Stellung gebracht werden kann, in der die verschieblichen Elemente (9, 25) an dem gegenüberliegenden Ende dieser Längsschlitze (10, 26) angeordnet sind, dadurch gekennzeichnet, daß ein Handhebel (5) schwenkbar ist um die

Schwenkachse des einen verschieblichen Elements (9), wobei dieser Handhebel (5) mittels einer Kupplungsstange (19) mit einem Arm (21) gekuppelt ist, der an einem Ende um die andere Schwenkachse (4) schwenkbar ist und an seinem anderen Ende verbunden ist mit dem Sitzrahmen (2) mittels einer weiteren Kupplungsstange (23), und weiter dadurch gekennzeichnet, daß Mittel (14, 16; 10, 18, 19) vorgesehen sind, um den Sitzrahmen (2) gegenüber dem Fahrradrahmen (1) in der ersten und zweiten Stellung zu verriegeln.

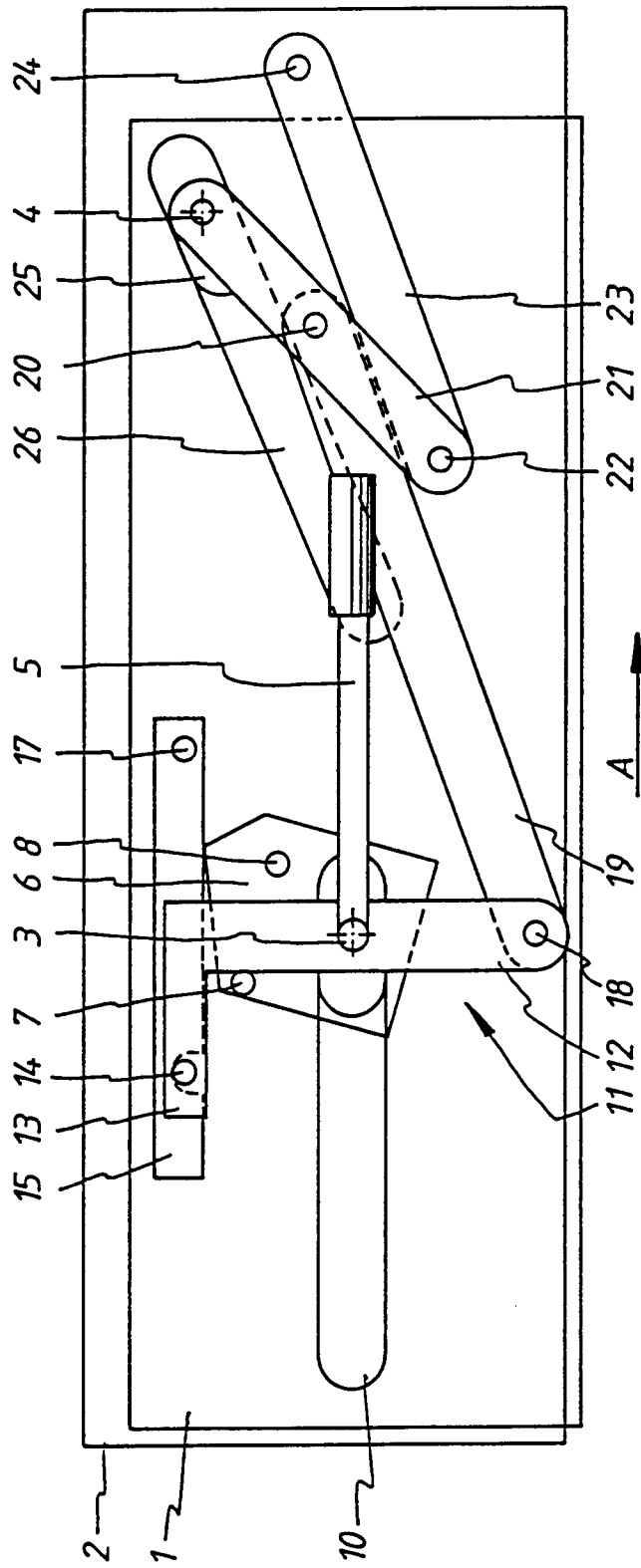
2. Rollstuhl nach Anspruch 1, dadurch gekennzeichnet, daß der Handhebel (5) zusammenwirkt mit einem weiteren Hebel (11), der ebenfalls um die Schwenkachse (3) des einen verschieblichen Elements (4) schwenkbar ist und der gekuppelt ist mit dieser Kupplungsstange (9), wodurch der Handhebel (5) um einen gewissen Winkel schwenkbar ist gegenüber diesem Hebel (11), um so einen Verriegelungsmechanismus zu öffnen, der den Hebel (11) in der ersten Stellung des Sitzrahmens (2) arretiert, ehe der Hebel (11) von dem Handhebel (5) erfaßt wird.
3. Rollstuhl nach Anspruch 1, dadurch gekennzeichnet, daß dieser Hebel (11) zwischen zwei Vorsprüngen gehalten wird, die mit einen **Nocken** (6) verbunden sind, die mit dem Handhebel (5) verbunden ist, wodurch ein Arm (15), der den Hebel (11) arretiert, verschwenkt werden kann von der Arretierstellung zu einer nicht-arretierenden Stellung.
4. Rollstuhl nach Anspruch 2 oder 3, dadurch gekennzeichnet, daß der Drehpunkt (18) zwischen dem Hebel (11) und der Kupplungsstange (19) durch einen Totpunkt bewegt wird, indem der Sitzrahmen (2) von der ersten zur zweiten Stellung bewegt wird, um den Sitzrahmen in dieser zweiten Stellung zu arretieren.

Revendications

1. Fauteuil roulant comportant un châssis d'entraînement (1) porté par des roues au sol et un châssis d'assise (2) porté par ledit châssis d'entraînement (1), dans lequel ledit châssis d'assise (2) est porté par deux éléments coulissants (9, 25) reliés au châssis d'entraînement et susceptibles de pivoter par rapport au châssis d'entraînement (1) autour d'axes de pivotement horizontaux (3, 4) s'étendant perpendiculairement à la direction longitudinale du châssis d'entraînement (1), et logés dans deux fentes oblongues (10, 26) prévues dans le châssis d'assise (2), lesdites fentes oblongues (10, 26) étant agencées l'une derrière l'autre en regardant dans la direction longitudinale du châssis d'entraînement (1), l'axe longitudinal de la fente oblongue la plus en avant (26) formant un angle obtus avec

l'axe longitudinal de l'autre fente oblongue (10), l'agencement étant tel que le châssis d'assise (2) peut être déplacé d'une première position dans laquelle les éléments coulissants (9, 25) sont situés à une extrémité desdites fentes oblongues (10, 26) 5
jusque dans une seconde position dans laquelle les éléments coulissants (9, 25) sont situés aux extrémités opposées desdites fentes oblongues (10, 26), caractérisé en ce qu'un levier à main (5) est susceptible de pivoter autour d'un axe de pivotement (3) du premier élément coulissant (9), ledit lever à main (5) étant relié au moyen d'une biellette (19) à un bras (21) qui, à une extrémité est susceptible de pivoter autour de l'autre axe de pivotement (4) et à l'autre extrémité est relié au châssis d'assise (2) au moyen d'une autre biellette (23), et en ce que des 10
moyens (14, 16 ; 10, 18, 19) sont prévus pour bloquer le châssis d'assise (2) par rapport au châssis d'entraînement (1) dans les première et seconde positions. 15
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2. Fauteuil roulant selon la revendication 1, caractérisé en ce que le levier à main (5) coopère avec un second lever (11) qui est également susceptible de pivoter autour de l'axe de pivotement (3) du premier élément coulissant (9) et qui est relié à ladite biellette (19), à l'occasion de quoi le levier à main (5) peut être pivoté d'un certain angle par rapport audit levier (11) de manière à désengager un mécanisme de blocage qui bloque le levier (11) dans la première position du châssis d'assise (2) avant que le lever (11) ne soit entraîné par le levier à main (5). 25
30
3. Fauteuil roulant selon la revendication 1, caractérisé en ce que ledit levier (11) est maintenu entre deux ergots solidaires d'une came (6) fixée au levier à main (5), au moyen de laquelle un bras (15) bloquant le levier (11) peut être pivoté d'une position de blocage jusqu'à une position de déblocage. 35
40
4. Fauteuil roulant selon la revendication 2 ou 3, caractérisé en ce que le point de pivotement (18) entre le levier (11) et la biellette (19) est déplacé au-delà d'un point mort en déplaçant le châssis d'assise (2) de la première position jusqu'à la seconde position afin de bloquer le châssis d'assise dans ladite seconde position. 45
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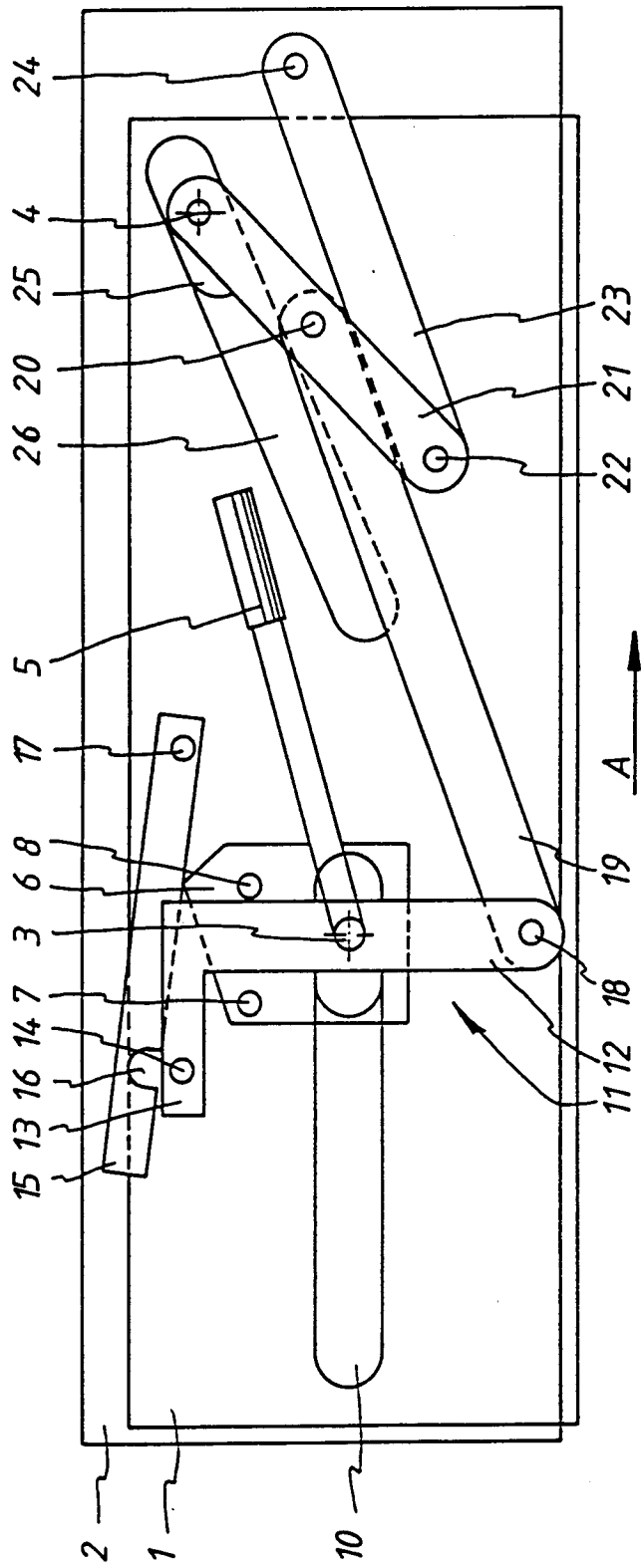


Fig 2

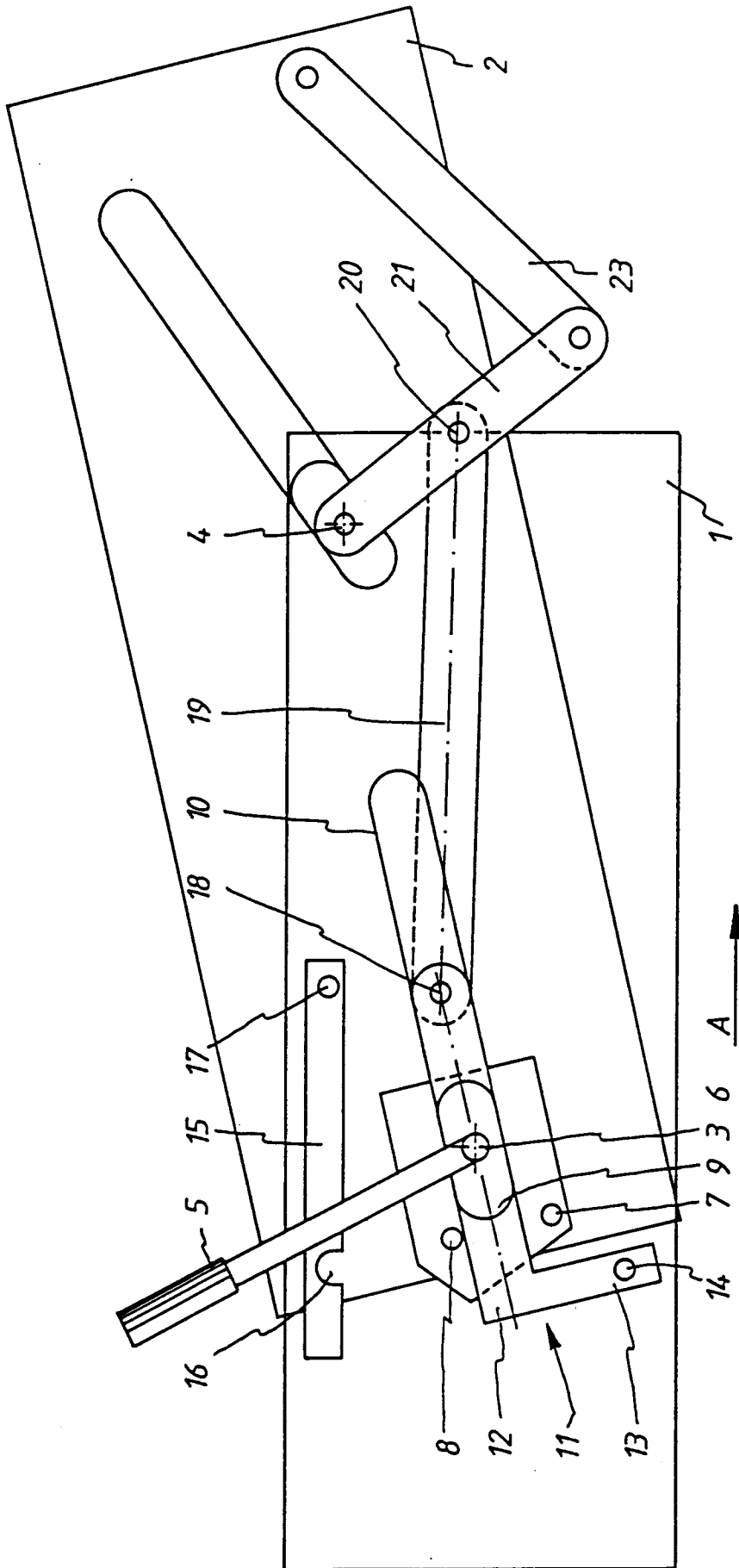


Fig 3

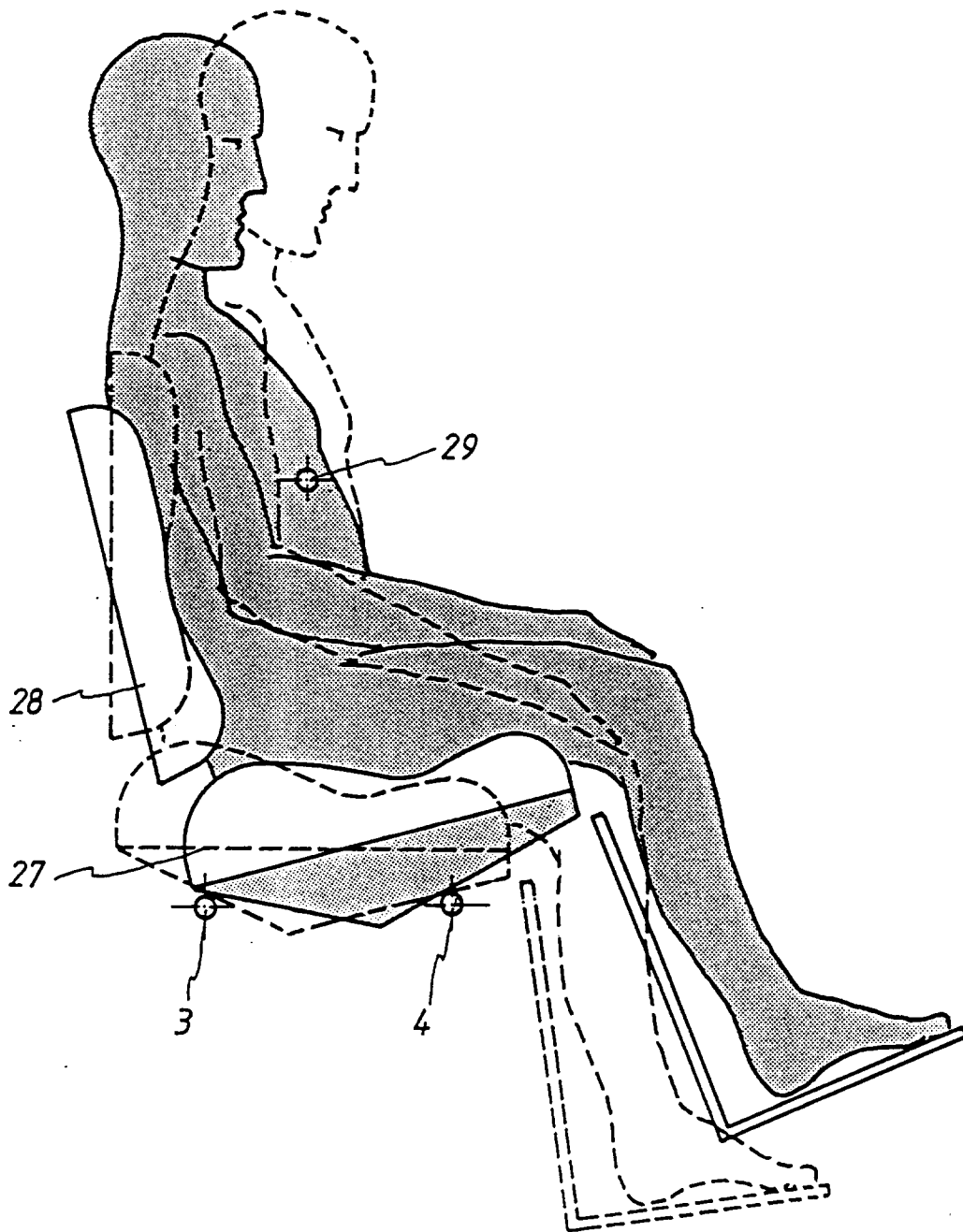


Fig 4