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(54)

HEIGHT ADJUSTABLE BED BASE

- (57) The invention relates to a height adjustable bed base, comprising:

- a support frame for supporting a mattress or box-spring;

- a base frame;

- a first leg with one end rotatably driven around a first rotation axis arranged to and near the head end of the support frame and arranged with the other end of the first leg slidable to the base frame;

- a second leg with one end rotatably driven around a

second rotation axis arranged to and near the foot end of the support frame and arranged with the other end of the second leg slidable to the base frame, wherein the first and second rotation axes are parallel;

- a base actuator arranged between the base frame and the other end of the first leg for positioning the other end relative to the base frame; and

- a controller for controlling the rotatably driven first and second legs and for controlling the base actuator.

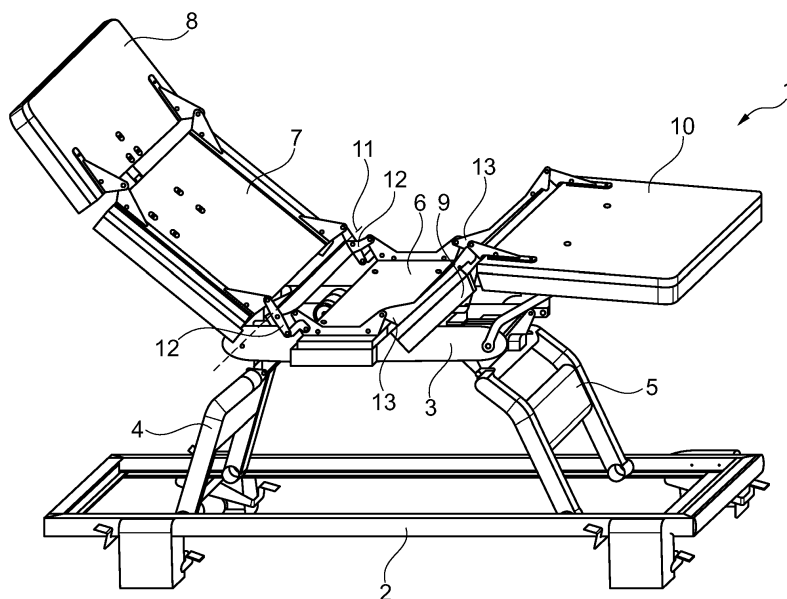


Fig. 1

Description

[0001] The invention relates to a height adjustable bed base, comprising:

- a support frame for supporting a mattress or box-spring;
- a base frame;
- a first leg with one end rotatably driven around a first rotation axis arranged to and near the head end of the support frame and arranged with the other end of the first leg slidable to the base frame;
- a second leg with one end rotatably driven around a second rotation axis arranged to and near the foot end of the support frame and arranged with the other end of the second leg slidable to the base frame, wherein the first and second rotation axes are parallel.

[0002] Such a height adjustable bed base is for example known from US 20010047547 or WO 2007058578.

[0003] US 20010047547 discloses a bed base having an adjustable support frame for a mattress. Two legs are hinged on either elongate side of the support frame. Actuators are arranged between the support frame and the legs, such that the angle of the legs relative to the support frame can be controlled. Furthermore, the free ends of the legs are provided with wheels, such that the legs can freely roll over the underground, when the angle of the legs is adjusted.

[0004] To prevent the bed base from rolling away, a break is provided at the foot end leg. When the bed base is controlled to a high position, the head end of the support frame will move away from for example a wall. According to this publication, this is of advantage when medical staff needs to attend to the person lying on the bed.

[0005] Also, when the head end of the adjustable support frame is tilted up, the head end will move away from the original position to a wall or the like.

[0006] Also WO 2007058578 discloses a similar bed base having an adjustable support frame for a mattress or the like, and a number of rotatable legs, which are rotated by actuators. Each leg is provided with a wheel at the free end, such that the legs can slide freely over the underground. As none of the wheels are blocked, the bed will move in an undetermined way when the bed base is moved between the high and low position. It could even be possible, that the bed base according to WO 2007058578 will only advance in one direction when the bed is moved a few times up and down, depending on the resistance the different wheels will have.

[0007] It is an object of the invention to provide a height adjustable bed base in which the above mentioned disadvantages are reduced.

[0008] This object is achieved according to the invention with a bed base according to the preamble, which is characterized by:

- a base actuator arranged between the base frame and the other end of the first leg for positioning the other end relative to the base frame; and
- a controller for controlling the rotatably driven first and second legs and for controlling the base actuator.

[0009] With the base actuator it is possible to move the first leg along the base frame. So, when the support frame is controlled up or down by rotating the legs, the base actuator is also controlled by the controller to ensure, that the other end of the first leg is positioned relative to the base frame to a desired position. This could for example be a position, in which the head end of the support frame moves away from an adjacent wall, which effect is described by US 20010047547, or it could be ensured that the support frame makes a clean vertical movement, without any horizontal shifts.

[0010] In a preferred embodiment of the height adjustable bed base according to the invention, the support frame has at least a middle section and a head end section, wherein the head end section is tiltable around a tilting axis relative to the middle section and wherein the tilting axis is parallel to the first and second rotation axes, further comprising a head end actuator controlled by the controller, said head end actuator being arranged between the head end section and the middle section.

[0011] When the head end of the support frame is tilted up, the head end will typically move away from an adjacent wall. However, by controlling at the same time the base actuator to pull the first leg back, the head end of the support frame can be maintained in the same horizontal position relative to said adjacent wall.

[0012] This is in particular of advantage, when two separate beds are placed next to each other and for example spouses lie in the beds. When one of the spouses controls the head end section of the support frame to tilt up, the tilted head end section will move forward, while the head end of the other bed remains in the same position. This will hinder the communication between the spouses. Now with the bed base according to the invention, the support frame is pulled back by the base actuator at the same time as the head end section is tilted up. This will ensure that the head ends of both beds and accordingly the heads of both persons, remain at the same level, such that communication is not hindered.

[0013] In a further embodiment of the height adjustable bed base according to the invention the first rotation axis is arranged to the middle section at least near the tilting axis of the head end section.

[0014] This positioning of the first rotation axis, allows for the first leg to move outwardly, when the bed base is lowered. This provides for a stable construction, especially at the low height at which a person steps out of bed or into bed.

[0015] In yet a further embodiment of the height adjustable bed base according to the invention the support frame further comprises a foot end section, wherein the

foot end section is tiltable around a tilting axis relative to the middle section and wherein the tilting axis of the foot end section is parallel to the first and second rotation axes, and wherein the second rotation axis is arranged to the middle section at least near the tilting axis of the foot end section.

[0016] Also, the tilting of the foot end section is preferably controlled by the controller. This allows for a synchronized movement of the separate actuator and parts of the bed base. For example, one can command the controller by a single command to position the bed base in a sitting position, in which the height of the bed base is adjusted, the head end section and foot end section are tilted and wherein the the other end of the first leg is pulled back by the base actuator to maintain the head end close to the wall.

[0017] In another embodiment of the height adjustable bed base according to the invention the tilting axis of the head end section is positioned in vertical direction above the top surface of the support frame.

[0018] Preferably, a rod system connecting the middle section with the head end section is provided.

[0019] The rod system allows for a virtual tilting axis positioned above the top surface of the support frame. Typically a mattress or a box-spring is arranged on the support frame. With the virtual tilting axis, it is possible to have the tilting axis near the top of the mattress, such that it is less compressed when tilting the head end section, then when the tilting axis is positioned below the mattress. This increases the comfort for the user of the bed.

[0020] In a further preferred embodiment of the height adjustable bed base according to the invention, the controller controls the base actuator to maintain the head end edge of the support frame, seen in vertical direction, at a substantially fixed position independent of the angles of the first leg, second leg and head end section.

[0021] These and other features of the invention will be elucidated in conjunction with the accompanying drawings.

Figure 1 shows a perspective view of an embodiment of a height adjustable bed base according to the invention.

Figure 2 shows a perspective view of the embodiment of figure 1 with some removed parts.

Figure 3 shows a perspective detailed view of the embodiment of figure 1.

Figure 4 shows a side view of the embodiment of figure 1.

Figure 1 shows a height adjustable bed base 1 according to the invention. The bed base 1 has a base frame 2 and a support frame 3.

[0022] A first leg 4 is rotatable arranged on the support frame 3. The free end of the first leg 4 can shift in horizontal direction within the base frame 2. A second leg 5 is also rotatable arranged on the support frame 3 and

with its free end shiftable in the base frame 2.

[0023] The support frame 3 has a middle section 6, a two part head section 7, 8 and a two part foot section 9, 10. The head section 7, 8 is tiltable around a virtual tilting axis 11 (see also figure 4) relative to the middle section 6. The virtual tilting axis 11 is provided by the rod system 12 with which the middle section 6 is connected to the head section 7, 8.

[0024] The two part foot section 9, 10 is tiltable around an axis 13 with which the foot section 9, 10 is arranged to the middle section 6.

[0025] Figure 2 shows the embodiment 1 with the middle section 6, one part 7 of the head section and one part 9 of the foot section removed. This provides a good view on the actuators 14, 15, 16, 17 arranged in the support frame 3.

[0026] A first actuator 14 is provided between the support frame 3 and the first leg 4 to position the leg 4 in a desired angular position.

[0027] A second actuator 15 is provided between the support frame 3 and the second leg 5 to position the leg 5 also in a desired angular position.

[0028] Furthermore, a third actuator 16 is arranged to tilt the head section 7,8 and a fourth actuator 17 is arranged to tilt the foot section 9, 10.

[0029] Figure 3 shows a detailed view of the first leg 4. The free end 18, which can slide in horizontal direction in the base frame 2, is provided with a motor 19. This motor 19 engages on a toothed rack 20 and allows for a controlled shift of the free end 18 relative to the base frame 2. And as a result the horizontal position of the support frame 3 relative to the base frame 2 can be controlled.

[0030] The base frame 2 is furthermore provided with wheels 21, which can be lifted up by operating the levers 22, such that the feet 23 of the base frame 2 are positioned on the floor and a stable support of the bed base 1 is obtained.

[0031] Figure 4 shows the bed base 1 in its lowest position and with the head section 7, 8 and foot section 9, 10 tilted into a sitting position. The head section 7, 8, the middle section 6 and the foot section 9, 10 is provided with a box-spring 24, on which a mattress 25 is arranged.

[0032] Due to the rod system 12 between the middle section 6 and the head end section 7, 8, a virtual tilting axis 11 is provided, such that this tilting axis 11 is positioned between the box-spring 24 and the mattress 25. This ensures that the top of the mattress 25 is less compressed together in this sitting position, which contributes to the comfort of the user.

[0033] Furthermore, it is clear from this figure, that the free end 18 of the first leg and the free end 26 have some clearance x_1, x_2 to the ends of the base frame 2. Accordingly, the support frame 3 can even in the lowest position of the bed 1 be moved in horizontal position relative to the base frame 2. This allows for positioning the head end 7, 8 closer to a wall W, when the head end 7, 8 is tilted up.

[0034] The movement of the different parts of the bed base is controlled via the actuators 14, 15, 16, 17 and the motor 19 by a control unit. This allows for simultaneous actuation of the different actuators 14, 15, 16, 17 and motor 19, such that the bed base is brought in a fluid motion into a desired position.

Claims

1. Height adjustable bed base, comprising:

- a support frame for supporting a mattress or box-spring;
- a base frame;
- a first leg with one end rotatably driven around a first rotation axis arranged to and near the head end of the support frame and arranged with the other end of the first leg slidable to the base frame;
- a second leg with one end rotatably driven around a second rotation axis arranged to and near the foot end of the support frame and arranged with the other end of the second leg slidable to the base frame, wherein the first and second rotation axes are parallel;

characterized by

- a base actuator arranged between the base frame and the other end of the first leg for positioning the other end relative to the base frame; and
- a controller for controlling the rotatably driven first and second legs and for controlling the base actuator.

2. Height adjustable bed base according to claim 1, wherein the support frame has at least a middle section and a head end section, wherein the head end section is tiltable around a tilting axis relative to the middle section and wherein the tilting axis is parallel to the first and second rotation axes, further comprising a head end actuator controlled by the controller, said head end actuator being arranged between the head end section and the middle section.
3. Height adjustable bed base according to claim 2, wherein the first rotation axis is arranged to the middle section at least near the tilting axis of the head end section.
4. Height adjustable bed base according to claim 2 or 3, wherein the support frame further comprises a foot end section, wherein the foot end section is tiltable around a tilting axis relative to the middle section and wherein the tilting axis of the foot end section is parallel to the first and second rotation axes, and where-

in the second rotation axis is arranged to the middle section at least near the tilting axis of the foot end section.

5. Height adjustable bed base according to any of the claims 2 - 4, wherein the tilting axis of the head end section is positioned in vertical direction above the top surface of the support frame.
6. Height adjustable bed base according to claim 5, comprising a rod system connecting the middle section with the head end section.
7. Height adjustable bed base according to any of the preceding claims, wherein the controller controls the base actuator to maintain the head end edge of the support frame, seen in vertical direction, at a substantially fixed position independent of the angles of the first leg, second leg and head end section.

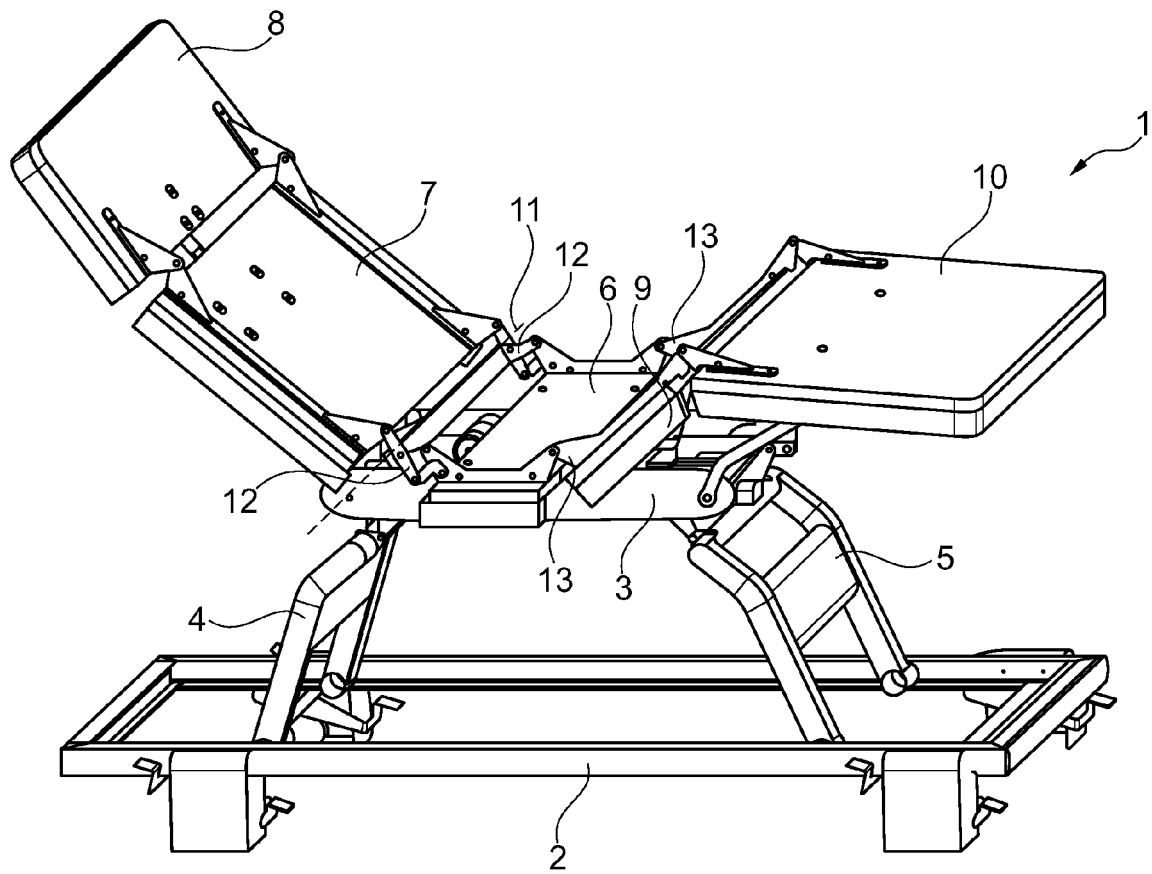


Fig. 1

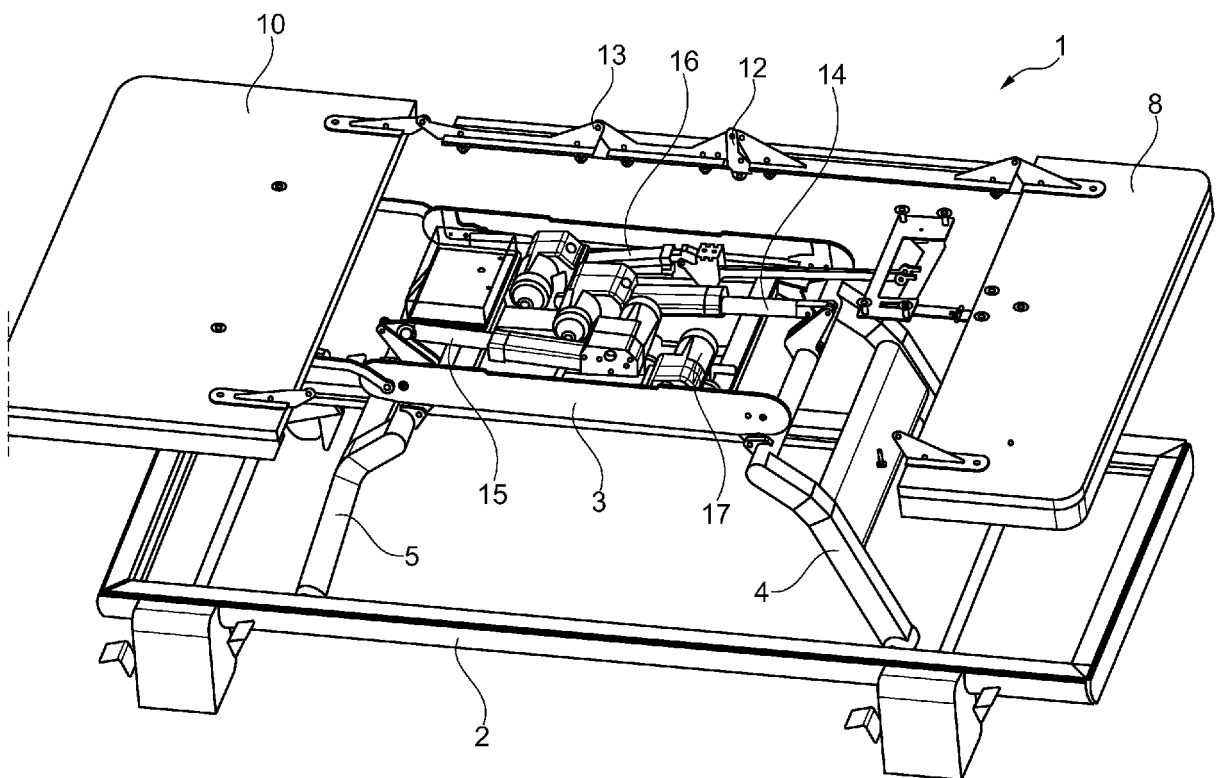


Fig. 2

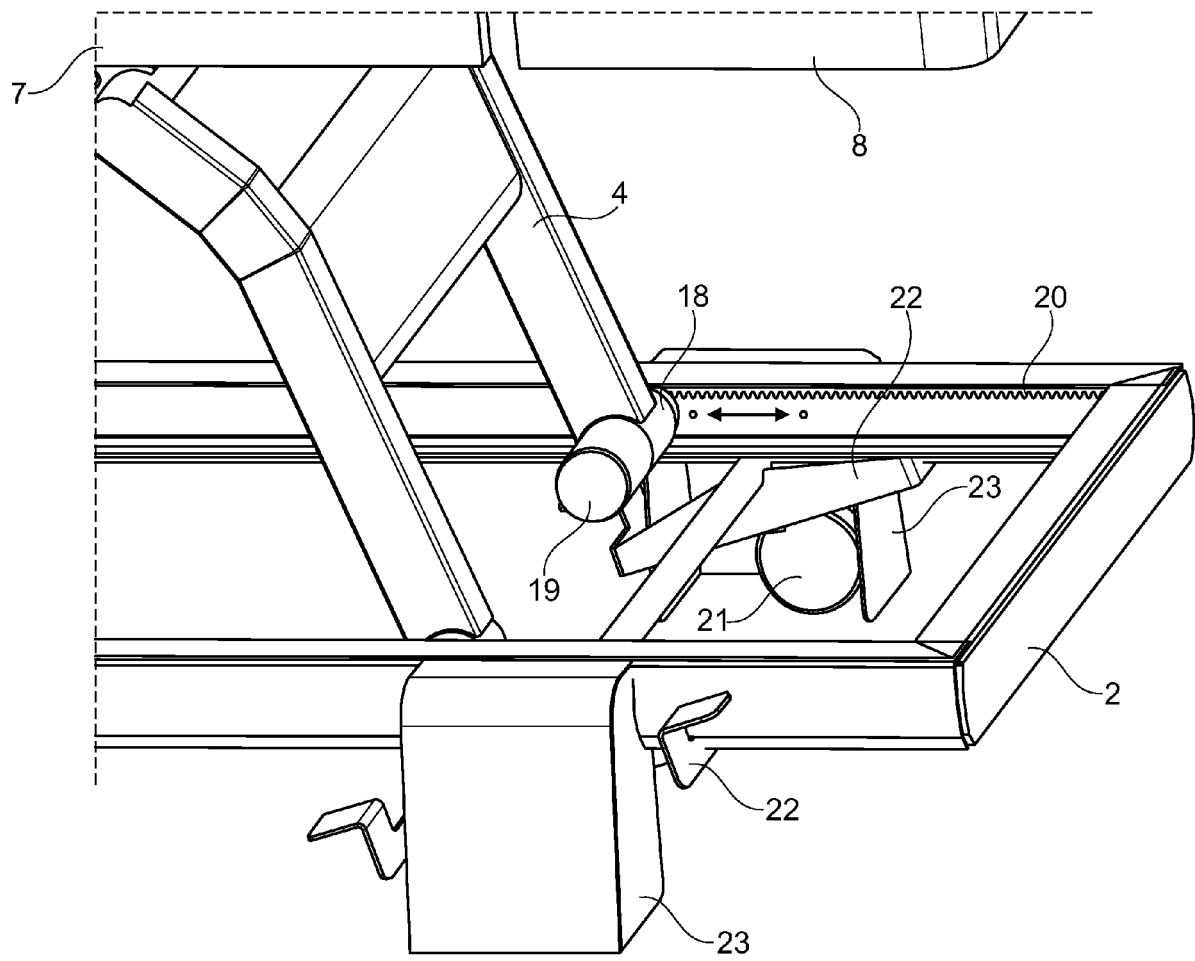


Fig. 3

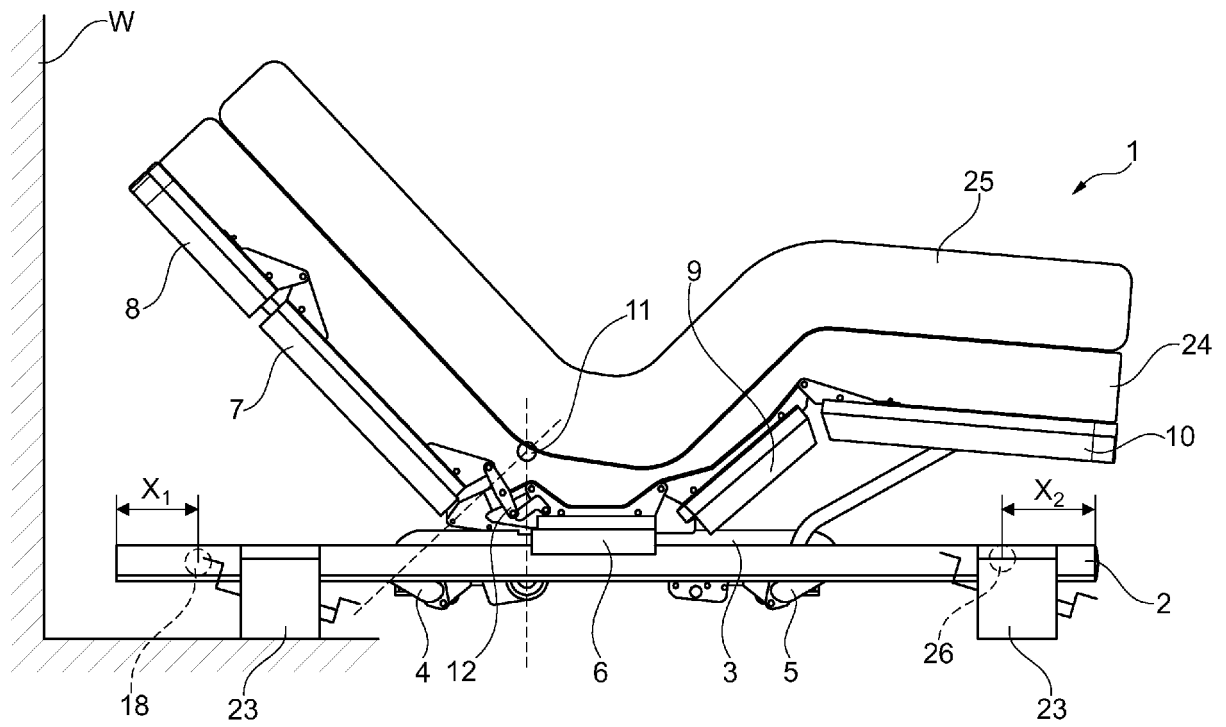


Fig. 4



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Application Number
EP 15 18 1466

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Place of search The Hague		Date of completion of the search 16 February 2016	Examiner Mammeri, Damya
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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