(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 364 635 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
26.11.2003 Bulletin 2003/48

(51) Int Cl.[7]: **A61G 7/057**, A61G 7/008, A61G 7/053

(21) Application number: **03008564.1**

(22) Date of filing: **14.04.2003**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LU MC NL PT RO SE SI SK TR
Designated Extension States:
AL LT LV MK

(30) Priority: **22.05.2002 IT PD20020133**

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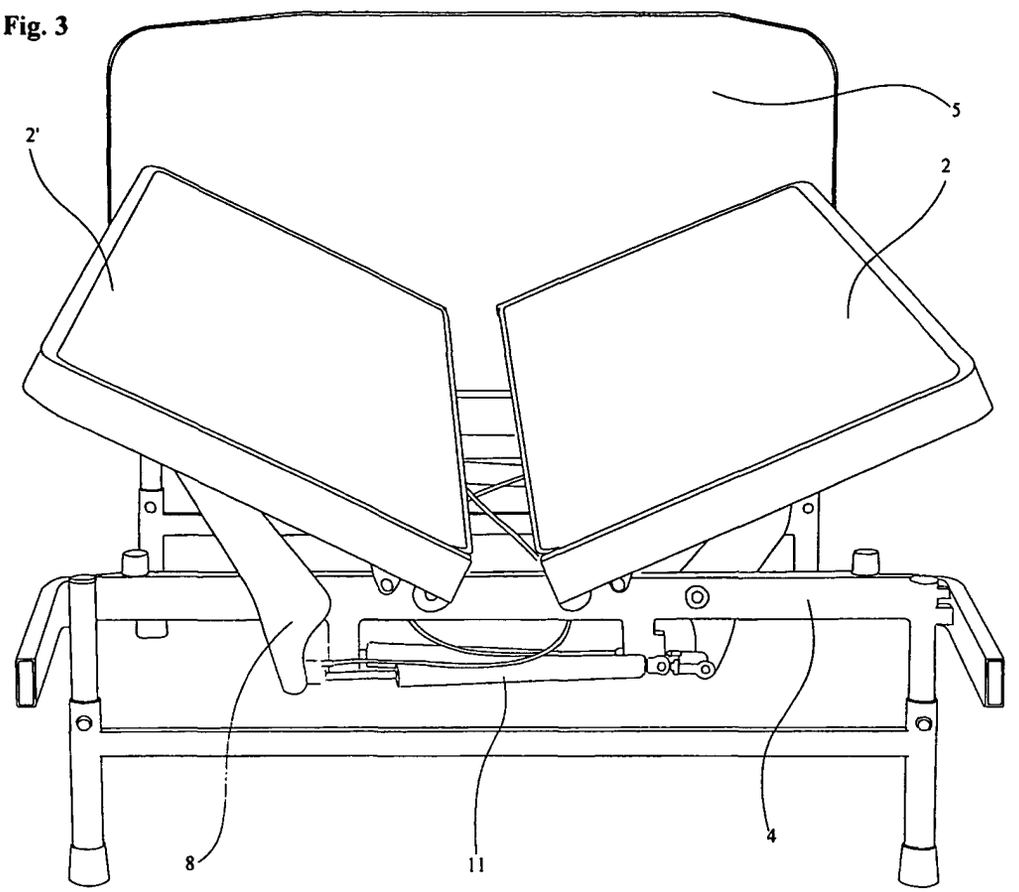
(54) Particularly articulated bed

(57) It is a particularly articulated bed consisting of one or more half-frames, hinged longitudinally, oscillating and which can be placed independently on one another, which can take on and keep the necessary inclination to assist the chronic bedridden sick person, facilitating his lateral positioning, the change of his leaning points, his positioning from lying on a bed to seated on it

Fig. 3



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Description

[0001] The field of the invention concerns beds, in particular beds for hospitals or nursing homes or for care of disabled, elderly, or non-self-sufficient people.

[0002] Many types of beds are in existence, for disabled, or elderly or ill persons; these beds have a movement of the frame, supporting the mattress, according to the task they have to comply with by this movement.

[0003] This frame consists generally of one or several half-frames, hinged each other or to an external bearing structure, or supported on said bearing structure by a motion on a coulisse or other kinematic mechanisms.

[0004] The main function of the hinge system, always transversal, that is, along the shortest axis of the bed (parallel to shortest side), is that to allow, once the half-frames are tilted, to let the patient take an inclination, more frequently an inclination concerning the bust, so as to help to fulfil his different necessities, in particular that of eating.

[0005] Evidently, by such a bed conception, which practically includes the greatest number of them, the legs remain lying outstretched on the rest of the mattress, even if the upper body of the patient inclines, so conforming to the inclination imposed by the half-frame. It would very advisable for these patients to eat in a more normal position, that is, the sitting position, with the legs lying downwards externally to the bed. However, due to the difficulty of rotating the patient on the bed, this is not possible, even with the help of a family member.

[0006] In fact, the necessary rotation to arrange the patient sitting on the bed with his legs hanging down out of the bed, requires to raise his bust first, and then to rotate the legs, still outstretched on bed, outside this latter, while rotating the pelvis at the same time. These operations, with the usual hospital beds, are carried out without the help of any aid (there is no accessory which helps in this operation), but the persons who nurse this patient, very often the family members (undoubtedly untrained for such operations).

[0007] There is also, very often, the requirement to have disabled persons sitting on bed first and then to raise them from bed to the stand up position, these disabled persons being able, however, once in the stand up position, to walk independently of the help of third persons. With the current beds, however elaborate and advanced they may be, this proves to be always very problematic, either to take the disabled person to the sitting position on the bed, with the feet hanging down out of the bed, so having to raise his bust first and then to rotate it in order to let the legs do down from bed and the feet rest on floor, or in particular to take the disabled person to the stand up position.

[0008] These movements are very problematic because the patient has no other help but that of the person who is nursing him, and who by his only physical sytrength takes him sitting first and then standing up, without any helping by the patient who cannot by any means use his hands to lift himself.

[0009] For the chronic bedridden sick persons, who cannot even move, the big problem is that of bedsore, which are originated by the keeping of the tissues under compression without blood supply and by the lack of perspiration which brings about the maceration of tissues.

[0010] For these latter sick persons, and for the mentioned diseases, many types of beds, of cushions and other have been studied; the problem however cannot surely be considered as solved.

[0011] A type of bed which tries to positively answer this problem, is equipped with the inclination of its whole structure, following a longitudinal axis (that is, parallel to one of the longer sides); however, the inclination of the whole structure of the bed on one side or the other, by compelling the sick to rest on a side or on the other, originates a high discomfort situation and, unless the inclinations are rather considerable (which this kind of sick does not abosolutely like), does not help the decompression of tissues and helps very little the perspiration.

[0012] In fact, the inclination of the whole structure of the bed on a side, originates a single inclined plane which causes for the patients a feeling of unsafety.

[0013] Also to wash a non self-sufficient person who is bedridden there are always many problems, especially to have him taking a sidewise position.

[0014] There is presently no solution to this problem, and you must normally have recourse to two operators, either to have the patient taking a different posture or to wash him.

[0015] The aim of the invention explained in the description of this patent is to supply a solution to all abovementioned problems.

[0016] It concerns a framework, to which two half-frames are hinged, next to its internal longitudinal side; said half-frames are therefore longitudinally hinged, on the bearing structure, symetrically with respect to a central axis, parallel to the longer side.

[0017] Said half-frames represent the resting plane of the mattress; they can be moved in an oscillatory way, individually and independently on one another, can take on a L-shaped or V-shaped configuration and can be stopped at any of the inclination they may take on, by means of special block devices.

[0018] The bearing structure of the bed, adjustable in height or not, reclining etc. may be said framework itself , or may support it.

[0019] Said framework, which articulates these two half-frames with said possibility of motion, allows to assist the chronic bedridden sick person or the general patient, thanks to the possibility of positioning him on one side, of turning him often for cleaning, to change the resting points and avoid bedsore, to change position and avoid macerations, to have him seated to eat, to improve his breathing, to train him to balance while remaining seated, for the physical wellbeing; to let him change from seated to stand-up position with a mini-

mum help; and by using special lateral side rails, the transfer from seated to stand up position can autonomously be made by the patient himself.

[0020] Instead of directly hinging the half-frames on the base structure, or on said framework, it is preferred to articulate said half-frames in such a way that, instead of a rotation referred to the base structure or to the framework, a rototranslation of them is possible, always referred to the base structure or the framework, with a rotation axis of the half-frame located, according to requirements, on the upper edge of the mattress resting on said half-frames, and so keeping the edge of the mattress itself, which can be of particular type, only stressed by rotation, or, with this rotation axis placed at a higher level, next to the seat of the head of the femur (cotylloid cavity of the iliac bone) of the patient, so as to have the minimum sliding between surface of the mattress, which is and is kept reclined, and patient's back, resting on this part of the mattress.

[0021] The particular type of mattress which is preferred to be coupled to the invention is composed by a pair of half-mattresses, sewed each other along the internal upper edge, in such a way that the linking of the half-mattresses keeps the surface continuity of the mattress plane without any humps, so avoiding any stretch stresses when they are relatively inclined, and avoiding any sliding between mattress and each frame (or, by the little extent which may be possible because of a moderate abundance of cloth at the mutual sewing point which allows, besides rotation, also the reciprocal translation).

[0022] To keep the mattress adherent to its frame, one or more velcro straps are provided, integral with the lower surface of each half-mattress, which hold back and trap the half-frame, consisting of a perforated wire mesh surface, when said velcro straps are coupled to a connecting velcro strap, placed on the opposite side (to that where the mattress is resting) of the wire mesh half-frame. The possibility of changing the axis of rototranslation of the half-frames is granted by the possibility of using different kinetic mechanisms, coulisses, connecting rods, etc. differently configured.

[0023] To help the operator who must lift the half-frame, an advantageous system is provided, composed by a gas pump operating on a lever arm hinged to the frame, which works with the opposite arm, sliding within a seat, integral with the half-frame and arranged on its lower surface, so producing a push upwards.

[0024] To loosen or to free the motion of the half-frames, you will effectively operate on a mechanical control, arranged on the external lower edge of each single half-frame, whose transmission, generall mechanical, operates on the vent valve of the gas pumps.

[0025] All these kinetic mechanisms and movements can evidently be automated by hydraulic, electric etc. servocontrols. The procedure to take a person from lying position on the mattress on normal longitudinal arrangement, to seated position on it, with feet hanging down outside the bed, is carried out by rotating said persons from longitudinal to transversal to bed, by means of a particular sheet, if needed, which is placed under the person, to help the seizing and to reduce the attrition. The part of half-frame, where the bust is resting, is then raised to have the person seated on the bed with feet hanging down outside it, or resting on floor. The bed can profitably be coupled to side rails, whose frames can rotate around a vertical axis, so permitting to place them and hold them rotated by 90° on the mattress or by 90° towards outside of the bed, so as to perform as an armrest to the side of a seated person or, if rotated outside, to help in the stand-up phase and in supporting the standing position.

Short description of drawings.

[0026] Fig. 1 shows the bed as per invention in an axonometrical view from the top, with the half-frames flat on horizontal plane.

[0027] Fig. 2 shows the bed as per Fig.1, where the half-frame is partially rotated.

[0028] Fig.3 shows the bed as per Fig.1, without mattress, where both half-frames are rotated upwards.

[0029] Fig. 4 is a flat front view of the kinetic mechanisms of the bed as per invention, when the half-frames are on horizontal position.

[0030] Fig. 5 is a flat front view of the kinetic mechanisms of the bed as per invention, with a raised half-frame.

[0031] Fig. 6 is a flat front view of the kinematic mechanisms of the bed as per invention, with both half-frames partially raised. Fig. 7 shows the bed as per Fig.2 equipped with side rails. Fig. 8 shows the bed as per invention equipped with side rails opportunely arranged towards inside of the bed projection. Fig. 9 shows the bed as per invention equipped with lateral side rails with a pair of them opportunely arranged towards outside of the bed projection.

[0032] With reference in particular to figures from 1 to 3.

[0033] It appears that the mattress is composed by a pair of half-mattresses 1 and 1' lying respectively on a pair of half-frames 2 and 2'.

[0034] Said half-mattresses 1 and 1' are sewed each other next to their longitudinal, upper and internal edge 3, so as to keep the surface continuity of a normal mattress and have a minimum stress (or even no stress when they are relatively inclined to each other, with the planes defined by their upper surface coinciding along the seam axis.

[0035] The half-frames 2 and 2' are supported in an oscillating way, by means of kinematic mechanisms for their movement, on a base bearing structure 4.

[0036] Generally, the base structure 4 is fitted with head panel 5 and foot panel (this latter not shown on drawings). An example of kinematic mechanisms of the half-frames 2 and 2' is shown in detail on figures 4, 5 and 6.

[0037] To base structure 4 and to each half-frame there are hinged the connecting rods 6 and 7 which force the half-frame to a roto-translatory motion referred to base structure 4.The axis of this motion is easy to be modified, by opportunely choosing the connecting rods 6 and 7.

[0038] In order to facilitate the operator who must raise the half-frame, a kinematic mechanism has been arranged, composed by lever 8 with two arms, hinged to the base structure, which pushes the half-frame 2 or 2' upwards, with an arm having on its end a bushing 9, sliding within a rail 10 integral with the half-frame, the opposite arm receiving a force from a gas pump 11, preloaded during the horizontal realignment of the half-frame.

[0039] With reference in particular with figures 7 and 9.

[0040] The bed as per invention has been equipped of particular lateral rails 12, which assist and emphasize the possibility of this bed to take a person, who was previously lying on the same bed, to seated position, to keep him seated and, in case, to lift him from bed to a stand-up position later on.

[0041] These side rails 12 appear like tubular blocks, arc shaped, hinged on their ends to the external profile of the bed. This hinge 13, with possibility of lock 14 of these ends in vertical position, permits, whenever they are not necessary, to rotate them with a 180° rotation downwards, on an position diametrally opposite to the vertical working position, to the bottom. On one of the two vertical posts of the vertical rails 12, a tubular element 15 appears externally coaxial arranged, coupled in a rotary way; this tubular element supports a wing 16, overhanging.

[0042] This wing 16 can rotate around the post to which it is freely hinged, but there is the possibility of stopping the position by means of a locking device 17.

[0043] Said wing 16 looks, in the coplanar alignment position, within arc 12, like the classic, mobile side rails, usually fitted in the number of 4 to the lateral longitudinal edges of the bed.

[0044] You may have an ideal continuation from one side rail 12 to the other, when said wing 16 is set, always on alignment with the tubular section bar 12, arc shaped, but rotated to occupy the space included between two contiguous side rails 12.

[0045] In the position of the wing 16 orthogonal to the previous ones, within the vertical projection of the bed, the same can be very useful as armrest and as lateral restraint (either for half-frame 2 on horizontal position, where the patient is seated, or for the half-frame 2' on reclined position, to which the patient's back is resting).

[0046] A final arrangement of the wing 16, coplanar to the previous described, but external to vertical projection of the bed, can effectively offer a grip and support element for a patient who would, from seated position, change to the stand-up position.

[0047] Any other solution, even in an improved way, which uses the teachings of this invention, does not fall outside the patent.

Claims

1. Particularly articulated bed including a bearing structure, supporting a mattress, **characterized in that** between the supporting structure (4) of the mattress (1, 1') and the mattress (1, 1') itself, there are one or more half-frames (2, 2'), generally a couple arranged symetrically, longitudinally hinged (with axis parallel to the longer side of the bed) and can be rotated individually and independently one from the other.

2. Particularly articulated bed according to claim 1, **characterized in that** said half-frames (2, 2') can be blocked in any of the positions they take on, preferably by a stopping device.

3. Particularly articulated bed according to claim 1, chacterized in that said half-frames (2, 2') are oscillating, by means of a hinge device, composed by a coupling of two connecting rods (6, 7), which permits the rototranslation of each individual half-frame (2, 2').

4. Particularly articulated bed according to claim 1, chacterized in that each half-frame (2, 2') is in combination with a half-mattress (1, 1'), covering the whole or most of the surface of the corresponding half-frame (2, 2'), which makes up the bottom, on which the mattress (1, 1') is resting.

5. Particularly articulated bed according to previous claim **characterized in that** said half-mattresses (1, 1') are fixed to each half-frame (2, 2') by means of one or more velcro straps, one being integral with the half-mattress (1, 1') and the other holding the half-frame (2, 2') between the two velcro straps, when it couples with the first strap.

6. Particularly articulated bed according to claim 4, **characterized in that** said half-mattresses (1, 1') are sewed each other along the internal longitudinal edge (3), with some abundant cloth if required.

7. Particularly articulated bed according to claims 3 and 4, **characterized in that** the rotation axis of each half-frame (2, 2') is placed on the seam axis (3) of the two half-mattresses (1, 1').

8. Particularly articulated bed according to claim 3, **characterized in that** the rotation axis of each half-frame (2, 2') is placed next to the seats of the head of the femur (cotylloid cavity of the iliac bone) of the patient, so as to keep the contact between patient's

back and surface of the mattress as close as possible, with no sliding.

9. Particularly articulated bed according to claim 1 **characterized in that** to help the operator in the back up operation of the half-frame (2 or 2'), there is a piston (11) which actuates an arm of a lever of an element (8) with two lever arms, hinged on the frame (4), on which the other arm helps the back up of the frame (2 or 2').

10. Particularly articulated bed according to previous claim **characterized in that** to keep the half-frame (2, 2') reclined in a required position, you must operate on a vent valve of the piston (11) clearance space (11), generally, by closing the vents, the movement is stopped.

11. Procedure to have a person who is lying on a bed, seated on it, **characterized by** the use of the bed as claimed under claim 1, carried on by the following steps: by a rotation of the patient on the bed, taking him from longitudinal to transversal position referred to the bed, and with the legs which stretch outside the bed; by the rotating upwards the half-frame (2 or 2') on which the bust of the patient is resting, up to the required inclination, in any case so as to identify the final position as the seated position.

12. Procedure to have a person seated according to the previous claim, **characterized in that** the person to be rotated is placed by most of his weight on a sheet and the rotation, from longitudinal to transversal to bed, of the person, is carried out with the rotation given to the sheet itself.

13. Procedure to have a person seated according to the previous claim, **characterized in that** the sheet shows a low friction coefficient compared to the underlying surface, and compared to which the relevant rotation movement takes place.

14. Bed to take a person who is lying on it, to the seated position on the bed itself, by means of the procedure claimed under claim 11, chacterized in that of having at least a half-frame (2, 2') hinged longitudinally (along an axis parallel to longer side of the bed).

15. Bed to take a person who is lying on it to the seated position on the same bed, according to claim 14, **characterized in that** of being equipped with side rails (16), hinged vertically and rotating by 90° (within the vertical projection of the bed) so as to be placed close to the seated person to restrain and/or to support him.

16. Bed to take a person, who is lying on it, to the seated position on the bed itseld, according to claim 14, **characterized in that** it has side rails (16) vertically hinged and rotating by 90° (externally to vertical projection of the bed) so as to supply the patient who wants to raise himself, a grip range to push hard and raise, and to keep leaning on it once standing up.

17. Particularly articulated bed and procedure to have a person seated on a bed according to all previous claims and according to what described and illusttrated as an example according to a preferential solution

Fig. 1

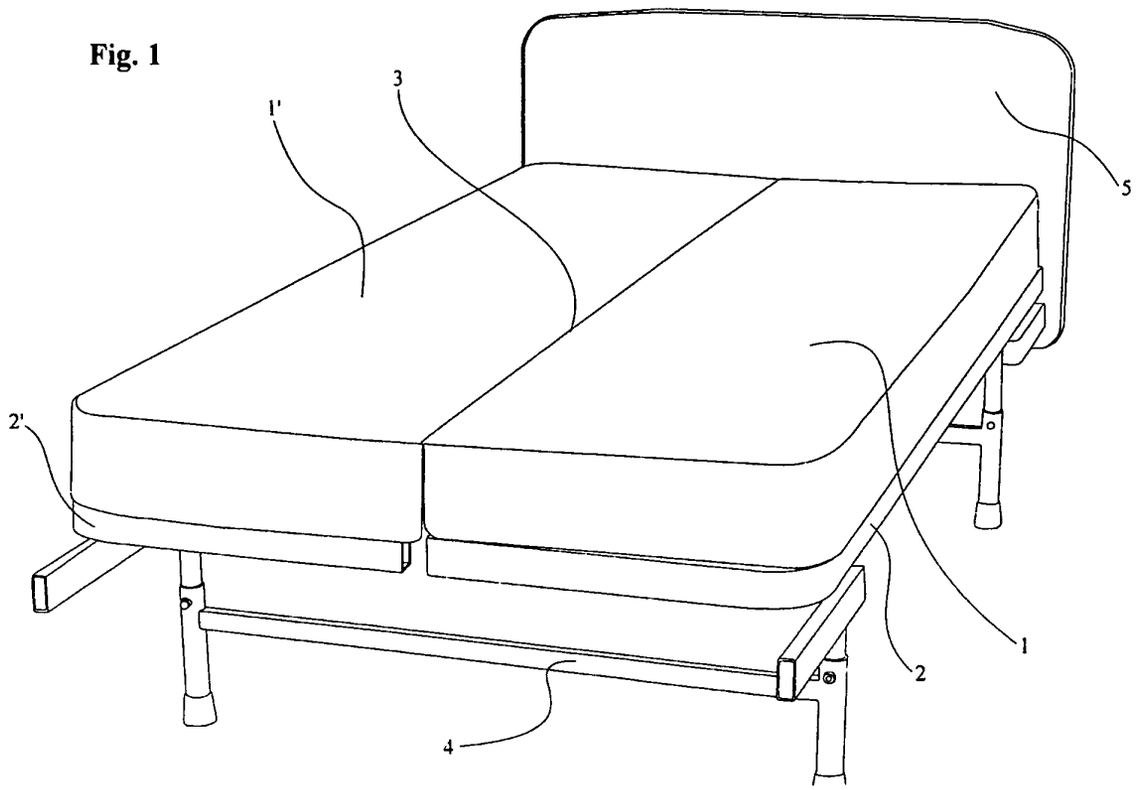


Fig. 2

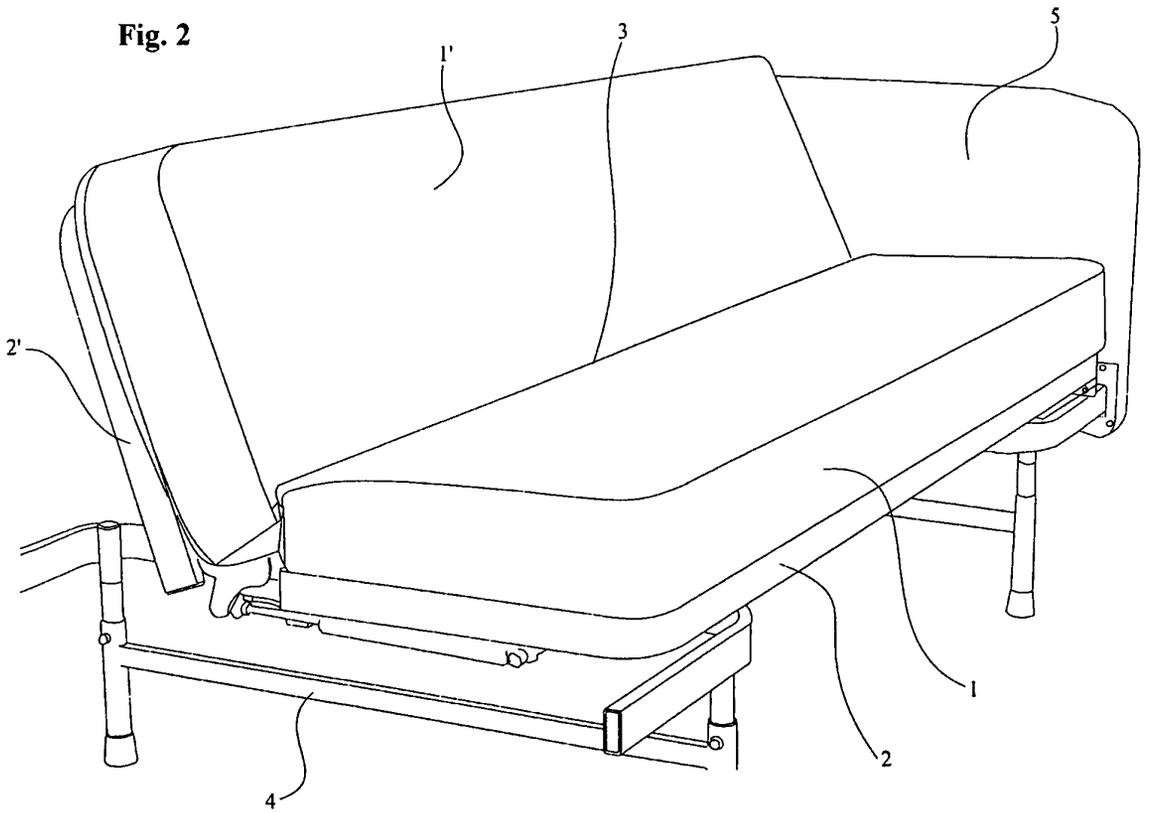
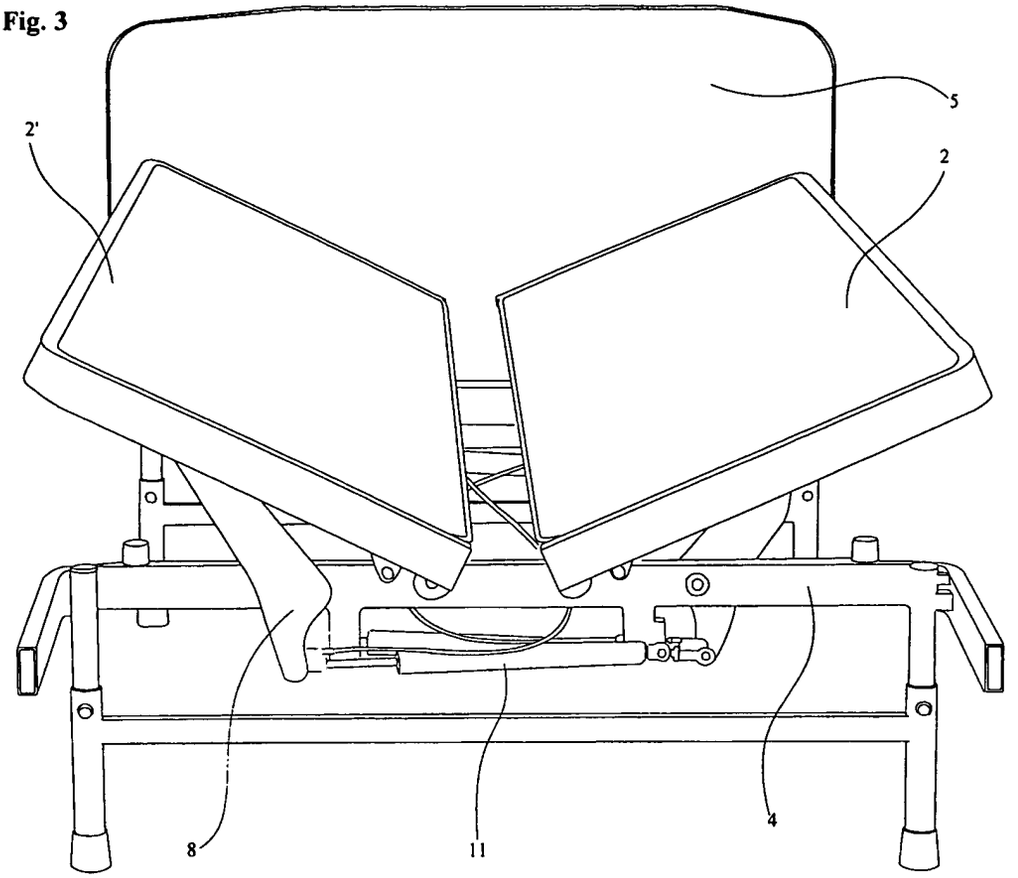


Fig. 3



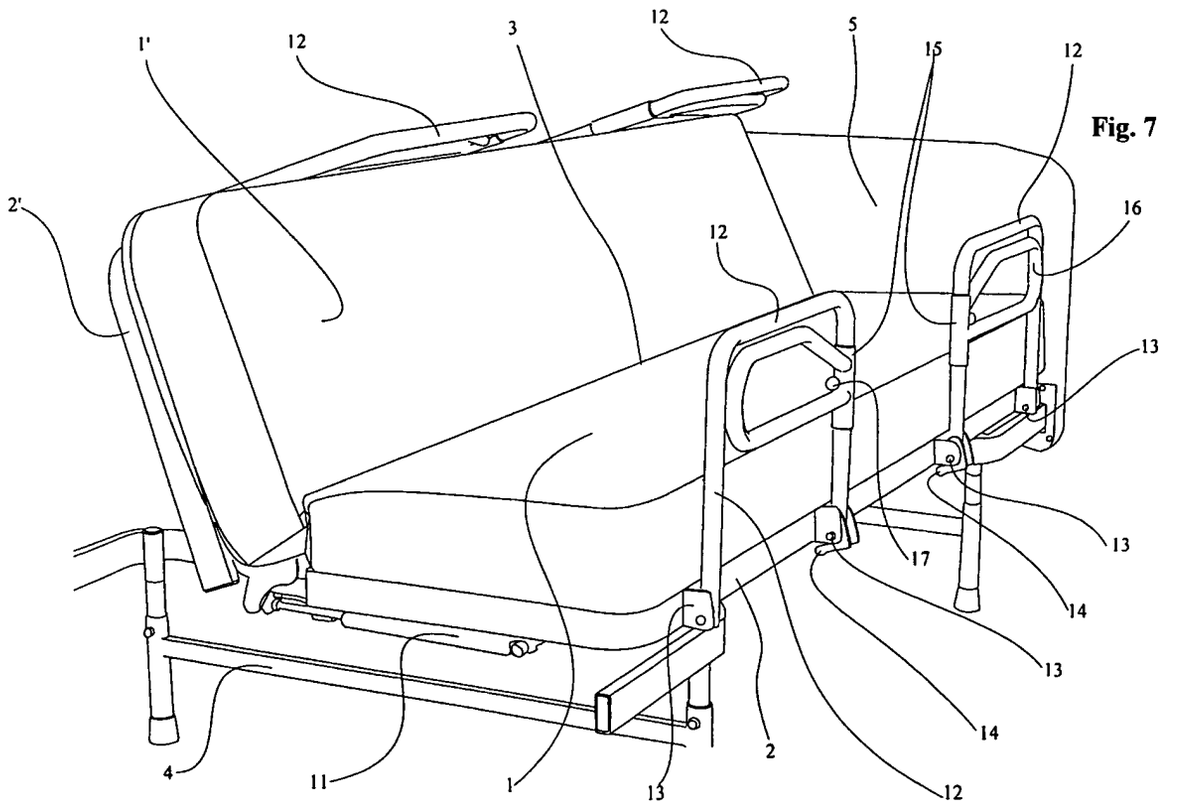


Fig. 7

Fig. 4

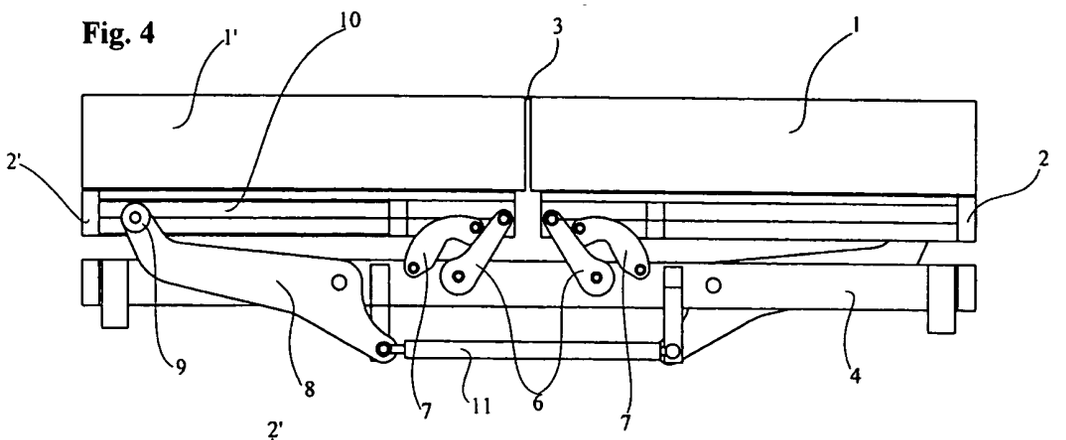


Fig. 5

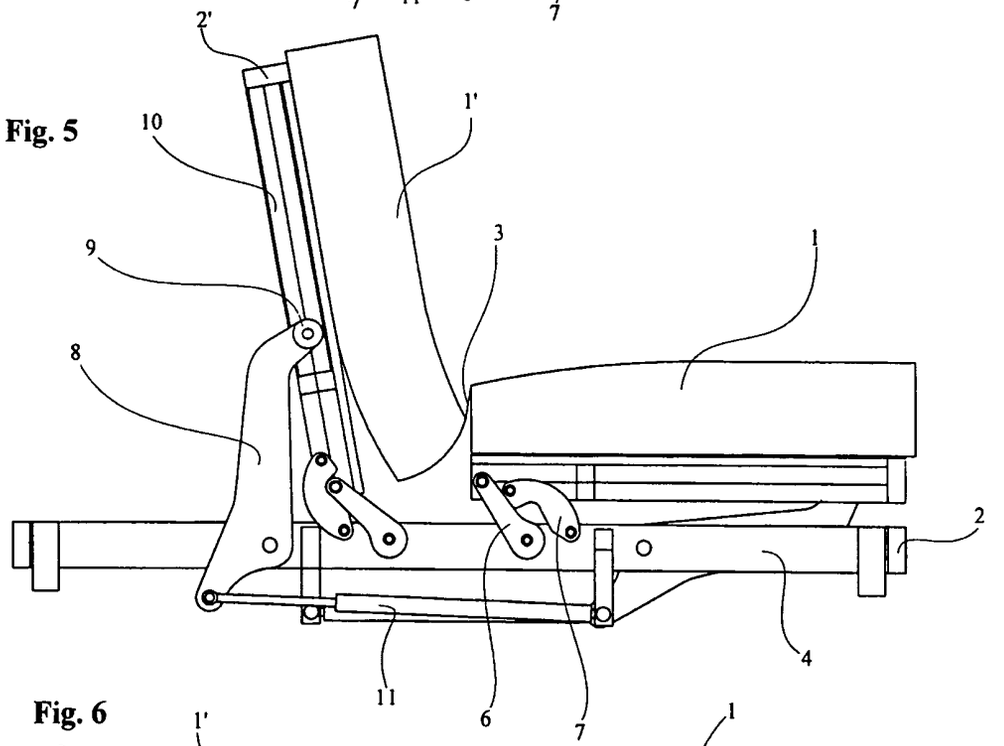


Fig. 6

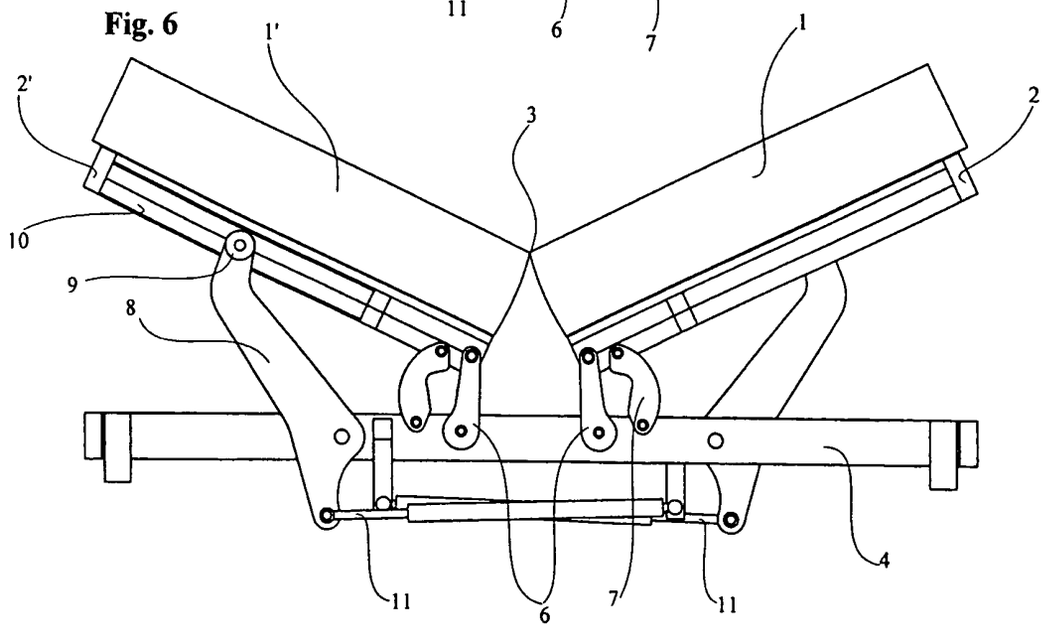


Fig. 8

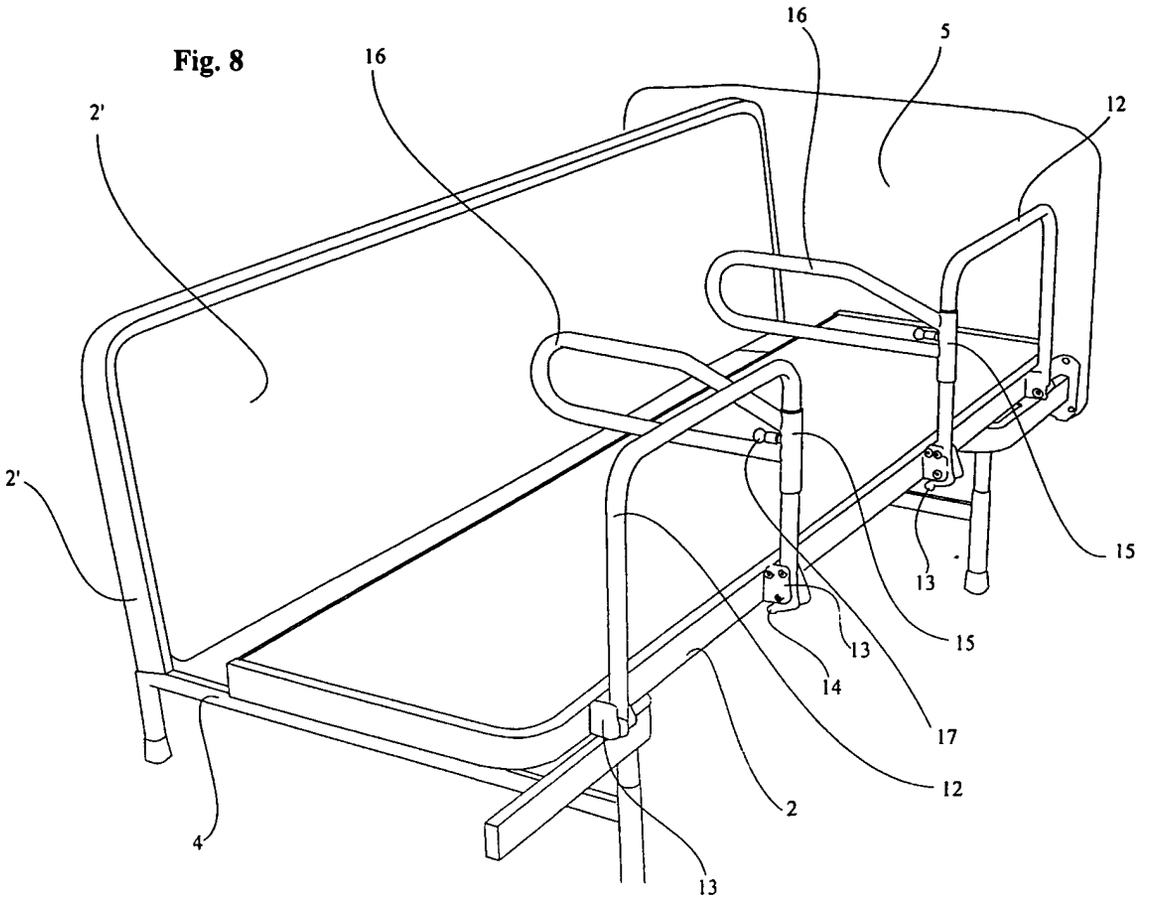

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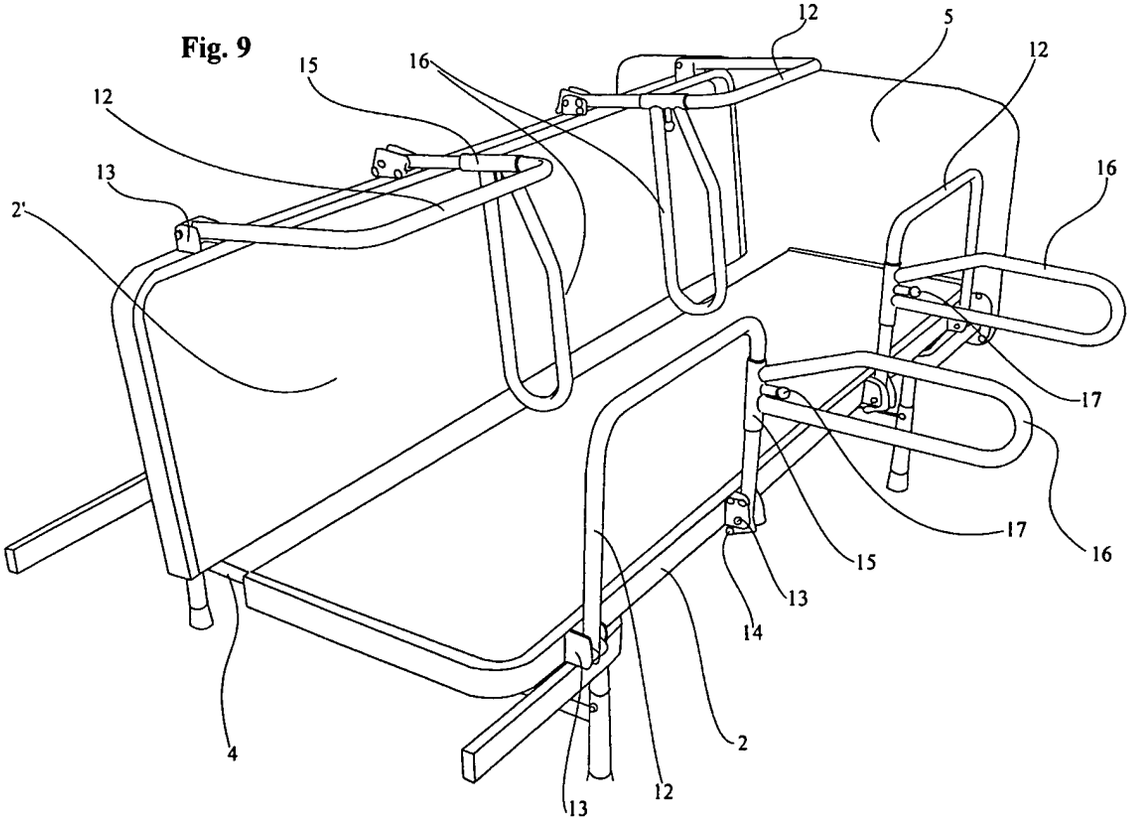
Fig. 9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EUROPEAN SEARCH REPORT

Application Number
EP 03 00 8564

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Y		12,13, 15,16	

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	6 October 2003	Ong, H.D.

CATEGORY OF CITED DOCUMENTS

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