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(54) **Mechanism for container beds**

Mechanismus für Behälterbetten

Mécanisme pour supports de récipient

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(73) Proprietor: **Gruppo Industriale Styling
Meccanismi
Brevettati Per Salotti e Materassi Srl
70022 Altamura (IT)**

(72) Inventor: **Patella, Giuseppe
70022 Altamura (BA) (IT)**

(74) Representative: **Petruzzello, Aldo
Racheli & C. S.p.A
Viale San Michele del Carso, 4
20144 Milano (IT)**

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**WO-A-00/36952 GB-A- 855 112
US-A- 4 258 445 US-A1- 2004 194 213**

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Description

[0001] The objective of the present finding is a mechanism for beds with a tiltable sleeping surface and the bed using such mechanism for its opening and closure. Usually, these beds, referred to as beds with a tiltable sleeping surface or container beds are used to exploit the volume that forms inside the base of the bed, on which the sleeping surface lies.

[0002] Known to the current art, are various embodiments of container beds. Some examples can be found in the US 6151738, GB 326224, FR 2563717 and CA 2487847 Patent texts. In most embodiments, the sleeping surface can be tilted with respect to its support base almost reaching a sub-vertical position with respect to the ground line. In other configurations, less common, the sleeping surface translates with respect to the base. In both cases, the objective is that of opening the filling compartment. However, all these embodiments have various drawbacks. For example, the sleeping surface of a container bed is usually lower - and hence more uncomfortable - with respect to the sleeping surface of a traditional bed, both in terms of its use and its remaking; furthermore, many movement mechanisms of the sleeping surface are not capable of avoiding inadvertent closures of the bed; the movement of the sleeping surface comprising a mattress, thus of considerable weight, is quite complex; lastly, there is no system for safe locking the sleeping surface. In order to find an idea to overcome all these drawbacks, a new design of the movement mechanism of the sleeping surface is required.

[0003] WO 00/36952 discloses an articulating bed frame for beds normally used in health structures such as hospitals, where said frame comprises a plurality of portions, hinged each other, which can be tilted to meet with patient's needs.

[0004] One of said portions remains always horizontal and is sliding on longitudinally extending siderails, so that the whole bed frame slides.

[0005] US 4 258 445 discloses an adjustable body support assembly comprising a plurality of portions, hinged each other, which can be tilted to meet with user's needs.

[0006] One of said portions remains always horizontal and is sliding on longitudinally extending siderails, so that the whole bed frame slides.

[0007] GB 855 112 discloses an adjustable bed supported by an adjustable frame comprising a plurality of portions, hinged each other, which can be tilted to meet with user's needs.

[0008] One of said portions remains always horizontal.

[0009] Thus, the objective of the present invention is to provide a new mechanism for beds with a tiltable sleeping surface capable of overcoming the abovementioned technical problems. This is attained by providing a mechanism with a tiltable sleeping surface (12), which is fixed onto the base (20) of the bed, and it is characterised in that comprises a first articulated quadrilateral (1, 2, 3, 4), a first abutment element (10) a shaped element (11) two

gas springs (8, 9) a second quadrilateral defined by the elements (1, 6, 7, 5, 15) with said element 7 made up of two portions slightly inclined with respect to each other and with said element (6) serving as a second abutment element, and two support elements (5, 15), as described in claim 1.

[0010] These and other advantages shall be observed in the detailed description of the invention with specific reference to drawings 1/4, 2/4, 3/4 and 4/4 in which preferred embodiments are represented strictly for exemplifying and non-limiting purposes. In particular:

- Fig. 1 represents a bed with its sleeping surface tilted and it identifies the main details of the mechanism providing the movement of the sleeping surface;
- Fig. 2 shows the bed of Fig. 1 in a closed configuration, that is with the sleeping surface laying on the base of the bed;
- Figures 3, 4 and 5 represent three steps for the movement of the sleeping surface;
- Fig. 6 shows the bed of the previous figures with the sleeping surface in a horizontal configuration but raised with respect to the base of the bed;
- Fig. 7 shows a convenient and detailed embodiment of the bed locking system in the configuration of figure Fig. 6;
- Fig. 8 is the same representation of Fig.6 with the mechanism provided with the locking system of Fig. 7;
- Lastly, Fig. 9 is a detail of the mechanism with special reference to the shaped element (11).

[0011] Referring to the abovementioned figures, the bed with a sleeping surface provided with the mechanism subject of the present finding, comprises a base (20) and a sleeping surface (12) which can move from a horizontal position in which it lies on said base (Fig. 2) to an almost sub-vertical position with respect to the base itself. Furthermore, as observable hereinafter, the sleeping surface can also be advantageously arranged at a horizontal position but at a given height with respect to the base, in such a manner to obtain a resting surface with a height not lower with respect to the height of the traditional fixed beds, and hence of easier access both in terms of its use and remaking. The mechanism for the movement of the sleeping surface comprises a first articulated quadrilateral (1, 2, 3, 4), a first abutment element (10), a shaped element (11), two gas springs (8, 9), a second quadrilateral defined by the elements (1, 6, 7, 5, 15) with said element 7 made up of two portions slightly inclined with respect to each other and with said element (6) serving as a second abutment element, two support elements (5, 15).

[0012] This mechanism represents an improvement with respect to the analogous known products, in that it allows the opening of the sleeping surface and also its arrangement at a horizontal position, but raised with respect to the base of the bed. As a matter of fact, the

trajectory of the sleeping surface is determined by the quadrilateral formed by the elements (1, 2, 3, 4) and having points (1', 2', 3', 4') serving as joints. The element (1) is made up of a plate for fixing the mechanism onto the wooden portion of the base (20). The improvement is represented by the fact that the element (1), L-shaped or of any other similar shape, is fixed only at point (1'). Hence, the element has the possibility to rotate anticlockwise until it brings the sleeping surface (12) back to the horizontal position (see figures 5 and 6). During the rotation the quadrilateral is rigid due to the abutment element (10). The rotation of the quadrilateral, under these conditions, is possible only if the gas spring (8) is compressed balancing the force of the weight of the entire mechanism of the sleeping surface and of the mattress.

[0013] The element (11) has a complex geometry, it is integrally joined to the element (1) and it has a double function: on one end it is bent at 90° and laying on the element (5) it serves as a support and block element during the rotation of the quadrilateral 1'-2'-3'-4'. On the other end, said element (11) is anchored to the second gas spring (9), whose function shall be described better hereinafter.

[0014] Considering the force exerted by the gas spring (9), the mechanism exploits its vertical component. During the movement, said spring rotates anticlockwise passing from a negative angle ($-90^\circ \div 0^\circ$, see Fig. 4) to a positive angle ($0^\circ \div 90^\circ$, see Fig. 6). Regarding the negative angles, the spring (9) exerts a downwards force and thus provides valid help in case the container bed is intended to be closed entirely (as in Fig. 2). In the absence of the spring (9), when closing the container bed completely, by lowering the front part of the sleeping surface (12), inadvertent raising of the rear part of the sleeping surface would occur.

[0015] When the spring (9) faces upwards (as in Fig. 6), it exerts its force raising the rear part of the sleeping surface (12). In this manner, the problem regarding inadvertent closure of the bed is overcome: as a matter of fact, in the absence of the spring (9), should the user lie on the sleeping surface at a position comprised between the joint (1') and the rear end of the sleeping surface, with the mechanism completely open, the user would encounter the problem of inadvertent closure of the bed in question, with evident exposure to injury.

[0016] Another extremely important component of the mechanism is the quadrilateral defined by the elements (1, 6, 7, 5, 15) with said element 7 being made up of two portions slightly inclined with respect to each other and by the joints (1', 7', 6', 7''). As observable in the attached drawings this quadrilateral draws its motion from the rotation of the quadrilateral (1', 2', 3', 4') moves the element (6) following a circular trajectory around the joint (7'). All this provides a valid support for the sleeping surface when the latter is at a horizontal position (Figures 6 and 8). The quadrilateral (1', 7', 6', 7'') is dimensioned in such a manner that, when the sleeping surface is inclined, the element (6) reaches a sub-horizontal position, while,

when the sleeping surface (12) is horizontal, the element (6) is at a vertical position. For the best operation of the mechanism, it should be observed that the angle formed by the element (6) with respect to the horizontal position is always positive, and this due to an abutment element interposed between the said elements (6) and (7).

[0017] A further characteristic of the present mechanism is the bed locking system with a sleeping surface at a horizontal and raised position. As observable in Fig. 7, fitted beneath the sleeping surface (12) is a plate (13) with a suitable shape which bears a pin (14) held by a return spring. When the bed is positioned in the completely open configuration the pin is removed from its idle position and it is fitted into a hole provided on the free end of the element (6). Alternatively to the hole, as shown in Fig. 7, a cylinder (6'') could be welded to the head of the element (6). Hence, once the pin (14) has been fitted into the cylinder it remains inside the same in that it is compressed by the action of the return spring. In this manner, the system is kept locked.

[0018] A further significant characteristic both for the improvement of the quality of the mechanism, and for simplifying the mounting operations of the bed is as follows: the elements (5) and (15) are integrally welded and joined to each other. In this manner, all the articulation points of the mechanism, alongside the coupling points of the gas springs are defined in an extremely accurate manner, in that their positioning is based on the limited machining tolerances typical of metal materials. Non-compliance with this method and fixing the mechanism with its articulation points directly on the base structure of the bed would jeopardise the accuracy of the mechanism, in that, as known, wood requires much larger machining tolerances with respect to metal. Additionally, operating according to the present teaching, the mechanism can be mounted independently and provided as a complete sub-group to the users requiring it for constructing beds.

[0019] Lastly, the element (11) is provided with a hole, for example a threaded hole, into which an element, for example a screw, is fitted integrally joining it to the element (5) thus preventing the rotation of the quadrilateral 1'2'3'4' around point 1'. In this manner, the operation of the bed is limited to raising the sleeping surface and not positioning it at a horizontal and raised position with respect to the base.

Claims

1. Mechanism for beds with a tiltable sleeping surface (12), which can move from a horizontal position in which it lies on a base (20) to an almost sub-vertical position with respect to the base itself, the trajectory of the sleeping surface being determined by a mechanism having a first articulated quadrilateral formed by elements (1, 2, 3, 4) and having points (1', 2', 3', 4') serving as joints, the mechanism comprising a

first abutment element (10) and a gas spring (8); **characterised in that** it further comprises a second articulated quadrilateral, defined by elements (1, 6, 7, 5, 15) and by joints (1', 7', 6', 7''), for positioning the sleeping surface (12) at a horizontal position, but raised with respect to the base (20) of the bed, said element (1) being articulated to a fixed point (1') of element (15) with the possibility of rotating anticlockwise until the sleeping surface (12) reaches said raised horizontal position, said element (6) serving as an abutment element to provide a support for the sleeping surface (12) when at said raised horizontal position.

2. Mechanism according to claim 1, **characterised by** further comprising a shaped element (11) integrally joined to the element (1), bent at 90° at an end and laying on the element (5) to serve as a support and block element of the rotation of the first articulated quadrilateral (1, 2, 3, 4), while at the other end said element (11) is anchored to a gas spring (9).

3. Mechanism according to claim 1, **characterised in that** the elements (5, 15) are integrally joined to each other and the element (7) is made up of two portions slightly inclined with respect to each other.

4. Mechanism according to claim 1, **characterised in that**, during the rotation, said first articulated quadrilateral (1, 2, 3, 4) is rigid due to said abutment element (10) and **in that** the rotation of the first articulated quadrilateral (1, 2, 3, 4) is possible only by compressing said gas spring (8).

5. Mechanism according to claims 2, wherein said element (11) is provided with a hole fitted into which is an element which integrally joins it to the element (5) thus preventing the rotation of the first articulated quadrilateral (1, 2, 3, 4) around point (1').

6. Mechanism according to any of the preceding claims, **characterised in that** said gas spring (9) rotates anticlockwise passing from a negative angle to a positive angle.

7. Mechanism according to claim 6, **characterised in that** said gas spring (9), when positioned at a negative angle with respect to the horizontal position, exerts a downwards force, facilitating the complete closure of the bed.

8. Mechanism according to claim 6, **characterised in that** said gas spring (9), when positioned at a positive angle with respect to the horizontal position, exerts an upwards force, preventing inadvertent closure of the bed.

9. Mechanism according to claim 1, wherein said ele-

ment (7) moves said element (6) following a circular trajectory around the joint (7').

10. Mechanism according to claim 1, wherein said element (6) reaches a sub-horizontal position when the bed is closed or the sleeping surface is inclined and reaches a vertical position when the sleeping surface is horizontal and raised and by means of a plate (13) it serves as a support for the sleeping surface itself.

11. Mechanism according to claim 10, wherein the angle formed by the element (6) with respect to the horizontal position is always positive due to an abutment element interposed between said elements (6) and (7).

12. Mechanism according to one of the preceding claims, **characterised by** a bed locking system, with the sleeping surface at a horizontal and raised position.

13. Mechanism according to claim 12, wherein said locking system is obtained by locking the second articulated quadrilateral defined by the elements (1, 6, 7, 5, 15).

14. Mechanism according to claim 13, wherein said locking system comprises a plate (13) and a pin (14), held by a return spring, which is fitted into a hole provided on the free end of the element (6) or into a cylinder (6'') welded against the head of the element (6).

15. Mechanism according to one of the preceding claims, **characterised in that** the elements (5) and (15) are welded to each other.

16. Mechanism according to claim 15, wherein all the moveable elements are articulated to said elements (5) and (15).

17. Bed with a tiltable sleeping surface, comprising a base (20) and a sleeping surface (12), **characterised by** a mechanism for the movement of said sleeping surface according to any one of the preceding claims.

Patentansprüche

1. Mechanismus für Betten mit einer neigbaren Schlaf-
fläche (12), die aus einer horizontalen Position, in
der sie auf einer Basis (20) ruht, in eine nahezu sub-
vertikale Position mit Bezug auf die Basis selbst be-
wegt werden kann, wobei der Bewegungspfad der
Schlaffläche durch einen Mechanismus bestimmt
wird, der ein erstes Gelenkviereck aufweist, das
durch Elemente (1, 2, 3, 4) gebildet wird und Punkte

- (1', 2', 3', 4') aufweist, die als Gelenke dienen, wobei der Mechanismus ein erstes Anschlagelement (10) und eine Gasfeder (8) umfasst;
- dadurch gekennzeichnet, dass** er des Weiteren ein zweites Gelenkviereck umfasst, das durch Elemente (1, 6, 7, 5, 15) und durch Gelenke (1', 7', 6', 7'') definiert wird, um die Schlaffläche (12) in einer horizontalen, aber mit Bezug auf die Basis (20) des Bettes angehobenen Position zu positionieren, wobei das Element (1) zu einem Fixpunkt (1') des Elements (15), mit der Möglichkeit der Drehung entgegen der Uhrzeigerrichtung, geknickt wird, bis die Schlaffläche (12) die erhöhte horizontale Position erreicht, wobei das Element (6) als ein Anschlagelement dient, um in der erhöhten horizontalen Position eine Stütze für die Schlaffläche (12) zu bilden.
2. Mechanismus nach Anspruch 1, **dadurch gekennzeichnet, dass** er des Weiteren ein geformtes Element (11) umfasst, das integral mit dem Element (1) verbunden ist und an einem Ende um 90° gebogen ist und auf dem Element (5) liegt, um als ein Stütz- und Blockelement der Drehung des ersten Gelenkvierecks (1, 2, 3, 4) zu dienen, während das Element (11) am anderen Ende an einer Gasfeder (9) verankert ist.
 3. Mechanismus nach Anspruch 1, **dadurch gekennzeichnet, dass** die Elemente (5, 15) integral miteinander verbunden sind und das Element (7) aus zwei Abschnitten besteht, die relativ zueinander ein wenig geneigt sind.
 4. Mechanismus nach Anspruch 1, **dadurch gekennzeichnet, dass** das erste Gelenkviereck (1, 2, 3, 4) während der Drehung aufgrund des Anschlagelements (10) starr ist, sowie **dadurch**, dass die Drehung des ersten Gelenkvierecks (1, 2, 3, 4) nur durch Zusammendrücken der Gasfeder (8) möglich ist.
 5. Mechanismus nach Anspruch 2, wobei das Element (11) mit einem Loch versehen ist, in das ein Element eingepasst ist, welches es integral mit dem Element (5) verbindet, wodurch die Drehung des ersten Gelenkvierecks (1, 2, 3, 4) um den Punkt (1') herum verhindert wird.
 6. Mechanismus nach einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** sich die Gasfeder (9) entgegen der Uhrzeigerrichtung dreht und dabei von einem negativen Winkel zu einem positiven Winkel übergeht.
 7. Mechanismus nach Anspruch 6, **dadurch gekennzeichnet, dass** die Gasfeder (9), wenn sie in einem negativen Winkel mit Bezug auf die horizontale Position positioniert ist, eine abwärts gerichtete Kraft ausübt, die das vollständige Schließen des Bettes erleichtert.
 8. Mechanismus nach Anspruch 6, **dadurch gekennzeichnet, dass** die Gasfeder (9), wenn sie in einem positiven Winkel mit Bezug auf die horizontale Position positioniert ist, eine aufwärts gerichtete Kraft ausübt, die ein unbeabsichtigtes Schließen des Bettes verhindert.
 9. Mechanismus nach Anspruch 1, wobei das Element (7) das Element (6) entlang eines kreisförmigen Bewegungspfades um das Gelenk (7') herum bewegt.
 10. Mechanismus nach Anspruch 1, wobei das Element (6) eine subhorizontale Position erreicht, wenn das Bett geschlossen ist oder die Schlaffläche geneigt ist, und eine vertikale Position erreicht, wenn die Schlaffläche horizontal und erhöht ist; wobei es mittels einer Platte (13) als eine Stütze für die Schlaffläche selbst dient.
 11. Mechanismus nach Anspruch 10, wobei der Winkel, der durch das Element (6) mit Bezug auf die horizontale Position gebildet wird, aufgrund eines Anschlagelements, das zwischen den Elementen (6) und (7) angeordnet ist, immer positiv ist.
 12. Mechanismus nach einem der vorangehenden Ansprüche, **gekennzeichnet durch** ein Bettverriegelungssystem, wenn sich die Schlaffläche in einer horizontalen und erhöhten Position befindet.
 13. Mechanismus nach Anspruch 12, wobei das Verriegelungssystem durch Verriegeln des zweiten Gelenkvierecks, das durch die Elemente (1, 6, 7, 5, 15) definiert wird, erhalten wird.
 14. Mechanismus nach Anspruch 13, wobei das Verriegelungssystem eine Platte (13) und einen Stift (14) umfasst, der durch eine Rückholfeder gehalten wird und der in ein Loch eingepasst ist, das am freien Ende des Elements (6) angeordnet ist, oder in einen Zylinder (6'') eingepasst ist, der an den Kopf des Elements (6) geschweißt ist.
 15. Mechanismus nach einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** die Elemente (5) und (15) miteinander verschweißt sind.
 16. Mechanismus nach Anspruch 15, wobei alle beweglichen Elemente an den Elementen (5) und (15) angelenkt sind.
 17. Bett mit einer neigbaren Schlaffläche, das eine Basis (20) und eine Schlaffläche (12) umfasst, **gekennzeichnet durch** einen Mechanismus für die Bewegung der Schlaffläche nach einem der vorangehenden Ansprüche.

Revendications

1. Mécanisme pour lits avec une surface de couchage inclinable (12), capable de passer d'une position horizontale, dans laquelle il s'appuie sur sa base (20), vers une position presque subverticale par rapport à la base même, la trajectoire de la surface de couchage étant déterminée par un mécanisme comportant un premier quadrilatère articulé, formé par des éléments (1, 2, 3, 4) et comportant des points (1', 2', 3', 4') servant de joints, le mécanisme comprenant un premier élément de butée (10) et un ressort à gaz (8) ;
caractérisé en ce qu'il comprend en outre un deuxième quadrilatère articulé, défini par des éléments (1, 6, 7, 5, 15) et par des joints (1', 7', 6', 7''), pour positionner la surface de couchage (12) dans une position horizontale, mais relevée par rapport à la base (20) du lit, ledit élément (1) étant articulé vers un point fixe (1') de l'élément (15), avec la possibilité de tourner dans le sens contraire des aiguilles d'une montre, jusqu'à ce que la surface de couchage (12) atteigne ladite position horizontale, ledit élément (6) servant d'élément de butée, pour fournir un support à la surface de couchage (12) lorsqu'elle se trouve dans ladite position horizontale relevée.
2. Mécanisme selon la revendication 1, **caractérisé en ce qu'il** comprend en outre un élément façonné (11) intégralement relié à l'élément (1), courbé de 90° à une extrémité et s'appuyant sur l'élément (5) pour servir d'élément de support et de blocage à la rotation du premier quadrilatère articulé (1, 2, 3, 4), tandis qu'à l'autre extrémité, ledit élément (11) est ancré dans un ressort à gaz (9).
3. Mécanisme selon la revendication 1, **caractérisé en ce que** les éléments (5, 15) sont intégralement reliés l'un à l'autre, et l'élément (7) est constitué de deux portions légèrement inclinées l'une par rapport à l'autre.
4. Mécanisme selon la revendication 1, **caractérisé en ce que**, pendant la rotation, ledit premier quadrilatère articulé (1, 2, 3, 4) est rigide du fait dudit élément de butée (10), et **en ce que** la rotation du premier quadrilatère articulé (1, 2, 3, 4) est possible seulement par compression dudit ressort à gaz (8).
5. Mécanisme selon la revendication 2, dans lequel ledit élément (11) est pourvu d'un trou, dans lequel est placé un élément le reliant intégralement à l'élément (5), empêchant ainsi la rotation du premier quadrilatère articulé (1, 2, 3, 4) autour du point (1').
6. Mécanisme selon l'une quelconque des revendications précédentes, **caractérisé en ce que** ledit ressort à gaz (9) tourne dans le sens contraire des aiguilles d'une montre, passant d'un angle négatif à un angle positif.
7. Mécanisme selon la revendication 6, **caractérisé en ce que** ledit ressort à gaz (9), lorsqu'il est positionné en un angle négatif par rapport à la position horizontale, exerce une force descendante facilitant la fermeture complète du lit.
8. Mécanisme selon la revendication 6, **caractérisé en ce que** ledit ressort à gaz (9), lorsqu'il est positionné en un angle positif par rapport à la position horizontale, exerce une force ascendante empêchant la fermeture involontaire du lit.
9. Mécanisme selon la revendication 1, dans lequel ledit élément (7) déplace ledit élément (6) sur une trajectoire circulaire autour du joint (7').
10. Mécanisme selon la revendication 1, dans lequel ledit élément (6) atteint une position subhorizontale lorsque le lit est fermé ou que la surface de couchage est inclinée, et atteint une position verticale lorsque la surface de couchage est horizontale et relevée, et au moyen d'une plaque (13), il sert de support à la surface de couchage elle-même.
11. Mécanisme selon la revendication 10, dans lequel l'angle formé par l'élément (6) par rapport à la position horizontale est toujours positif, du fait d'un élément de butée intercalé entre lesdits éléments (6) et (7).
12. Mécanisme selon l'une des revendications précédentes, **caractérisé par** un système de verrouillage de lit, avec la surface de couchage dans une position horizontale et relevée.
13. Mécanisme selon la revendication 12, dans lequel ledit système de verrouillage est obtenu en verrouillant le deuxième quadrilatère articulé défini par les éléments (1, 6, 7, 5, 15).
14. Mécanisme selon la revendication 13, dans lequel ledit élément de verrouillage comprend une plaque (13) et un goujon (14), maintenu par un ressort de rappel placé dans un trou prévu à l'extrémité libre de l'élément (6) ou dans un cylindre (6'') soudé contre la tête de l'élément (6).
15. Mécanisme selon l'une des revendications précédentes, **caractérisé en ce que** les éléments (5) et (15) sont soudés l'un à l'autre.
16. Mécanisme selon la revendication 15, dans lequel tous les éléments mobiles sont articulés auxdits éléments (5) et (15).

17. Lit avec une surface de couchage inclinable, comprenant une base (20) et une surface de couchage (12), **caractérisé par** un mécanisme pour le mouvement de ladite surface de couchage, selon l'une quelconque des revendications précédentes.

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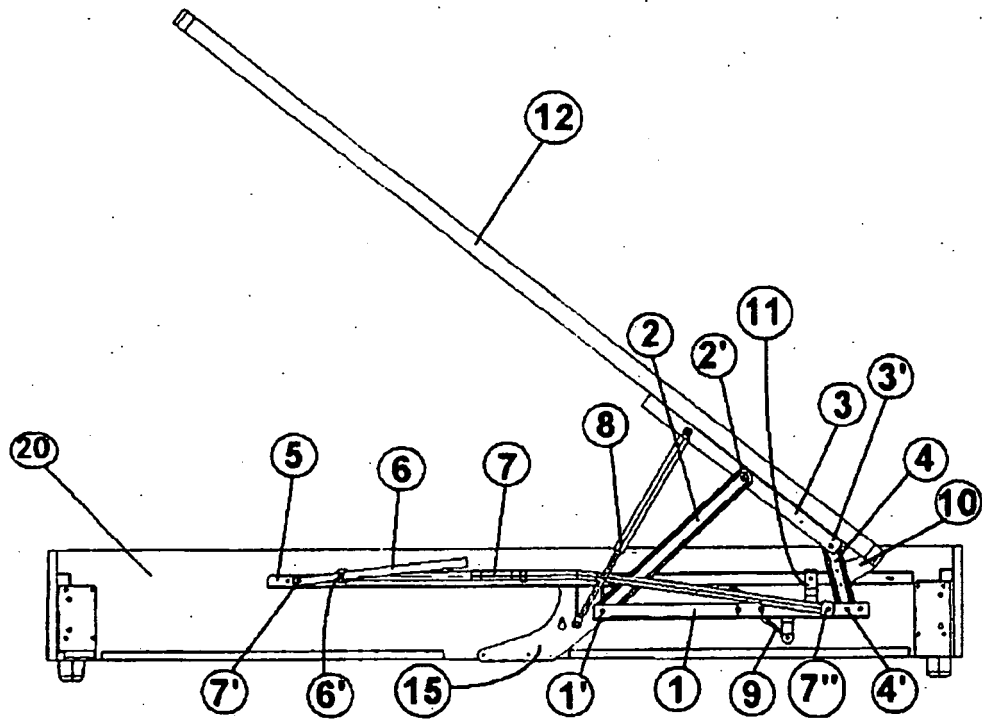


Fig. 1

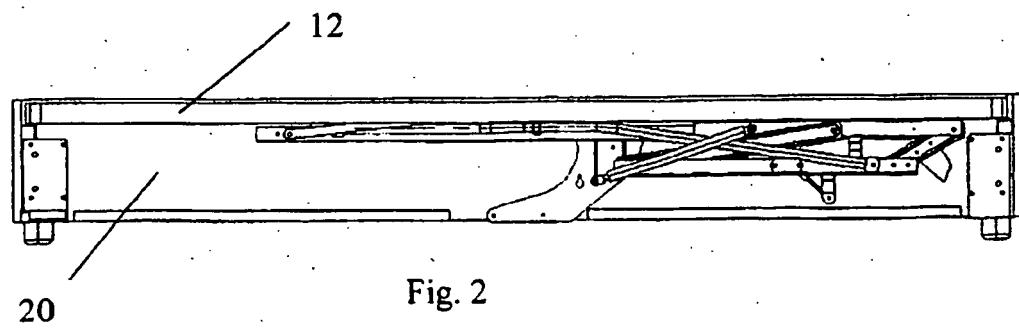
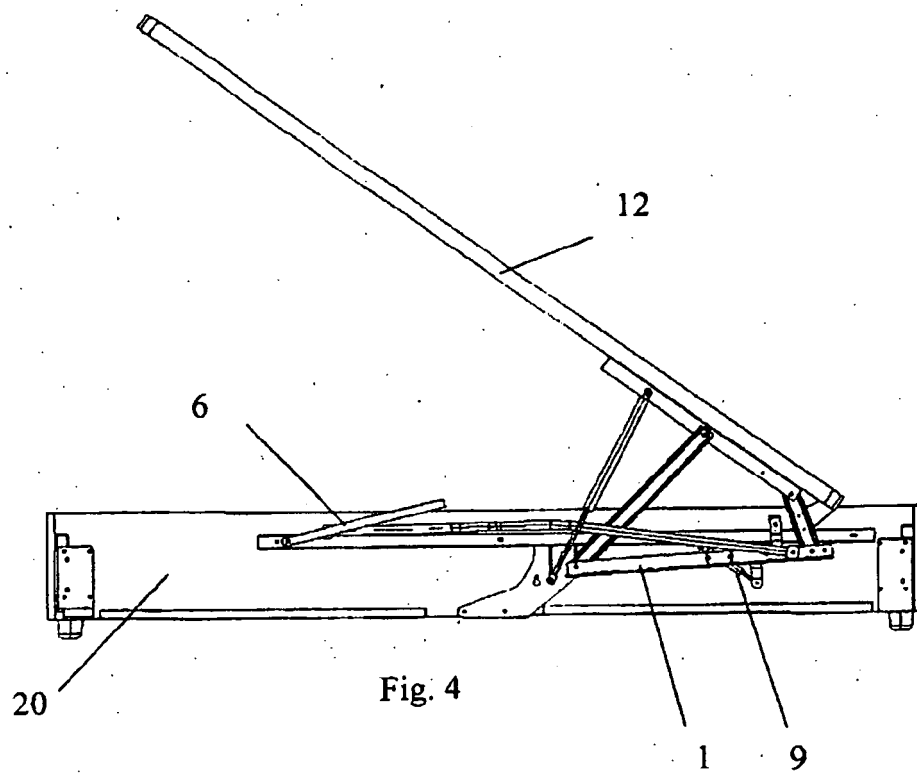
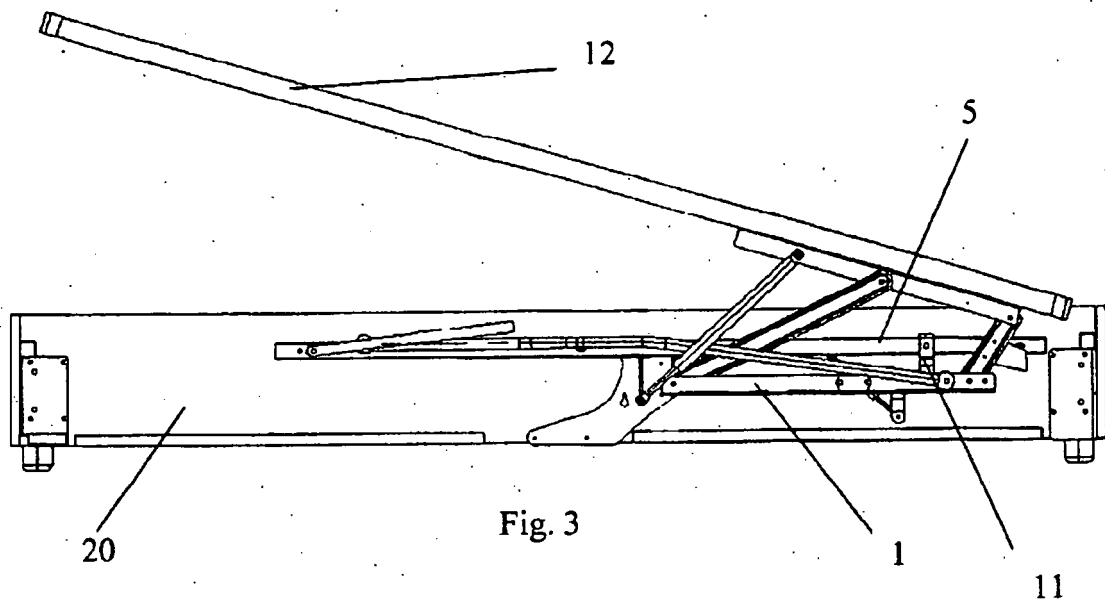
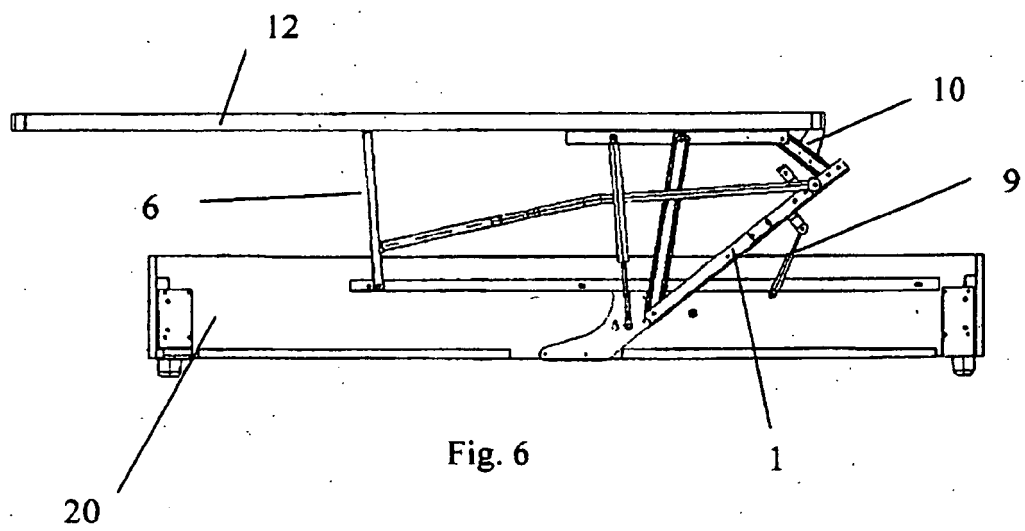
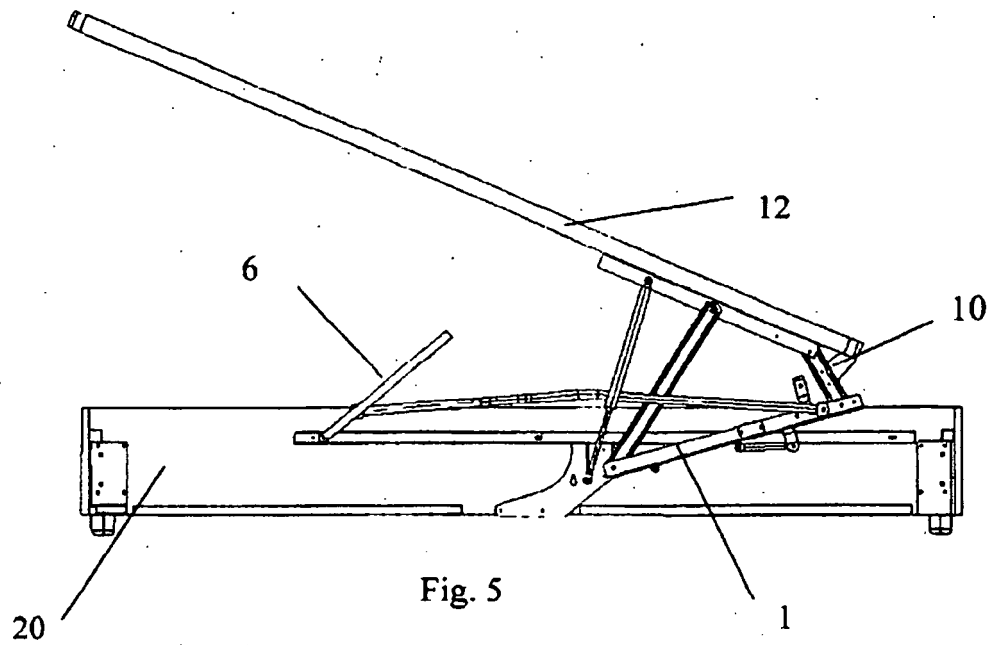
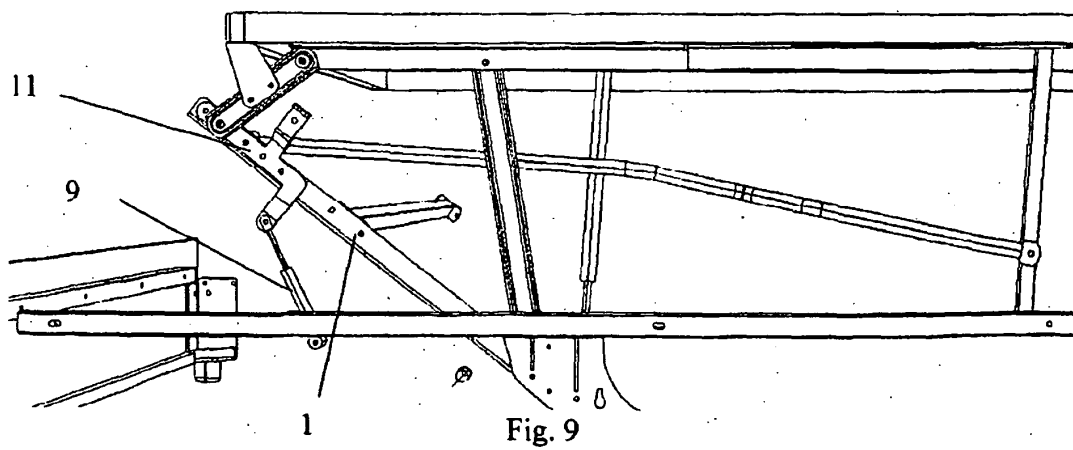
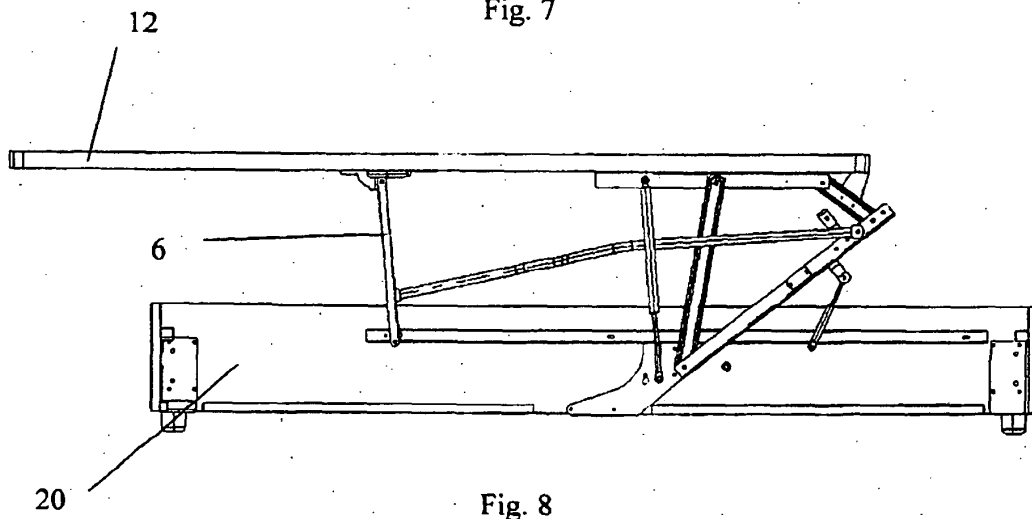
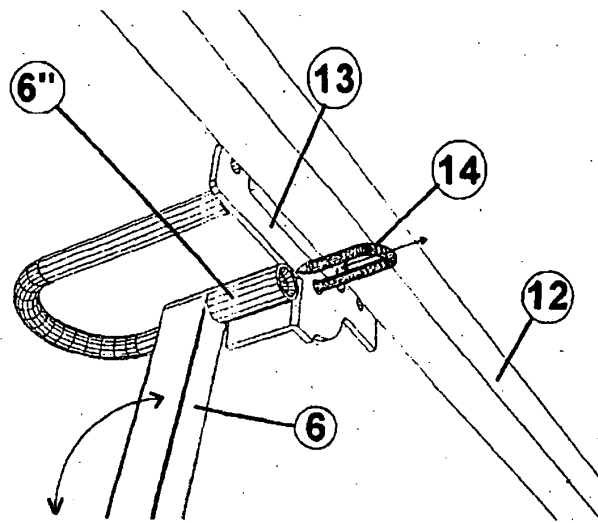


Fig. 2







REFERENCES CITED IN THE DESCRIPTION

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