Articulated mechanism for a bed

An articulated mechanism is described that allows to lift a net of a bed, or in general a support plane for a mattress, to a certain height from ground and/or in respect of a frame. In order to help lifting the frame without effort, the mechanism comprises two substantially parallel segments each hinged at their extremity to a side of the frame and at the other extremity to the support plane so as to constitute as a whole an articulated parallelogram; and motor means adapted to push the two segments making them rotate around the hinging points on the frame, thereby lifting the frame.
Description

[0001] The present invention regards an articulated mechanism for a bed. The mechanism allows to lift a net, or in general terms a support plane for a mattress, to a certain height from ground and/or with respect to a containment frame.

[0002] Mechanisms are known to raise the net or the slats of a bed in order to consent the comfortable access to the space below for the normal domestic cleansing. Also, beds are known having a containment chest/frame over which the net can be raised in order to take advantage of the inner space of the chest as normal store-room.

[0003] Clearly a lifting mechanism being not only simple to produce (low costs) but also little hard to operate is necessary. The net or the slats are manually lifted, and to reduce the effort needed usually the mechanism is endowed with variedly arranged gas or helical springs that servo-assist the lifting movement.

[0004] In every case, however, some disadvantages stay.

[0005] The gas springs compensate enough the weight of the net to be lifted, but not entirely, so a certain effort remains. Besides, for the manual driving the user must perform stoop a lot to grab the net. It is understood that for elderly users or disabled persons the demanded operation is almost impossible or however to be avoided.

[0006] The present invention has the principal object to present a mechanism of this type that solves the before-mentioned-problems.

[0007] This other objects are obtained by an articulated mechanism that allows lifting a net of a bed, or in general a support plane (12) for a mattress, to a certain height from ground and/or in respect of a frame (10), comprising

- two substantially parallel segments each hinged at an extremity thereof to a side of the frame and at the other extremity to the support plane, so as to constitute as a whole an articulated parallelogram;
- motor means adapted to push the two segments making them rotate around the hinging points on the frame, thereby lifting the frame.

[0008] By the motor means arranged this way, every kind of manual intervention is avoided, and the comfort of use is enhanced.

[0009] Preferably, the motor means comprise a linear actuator that is hinged to the frame and has a movable part hinged to one of the two segments so as to be able to move it, e.g. to push it. This solution is an easy and effective embodiment.

[0010] Preferably, the mechanism further comprises a linear actuator adapted to move the support frame making it rotate around a hinging point with one of the two segments. This allows a greater number of movements for the support plane.

[0011] Preferably, the second actuator constitutes one of the two segments, thereby limiting the number of pieces and increasing the integration.

[0012] The advantages of the invention will be clearer from the following description of a preferred embodiment, illustrated in the attached drawings where:

fig. 1 shows an axonometric view of a mechanism of the invention;
fig. 2 shows a cross-section side view of the mechanism of fig. 1 in a first position;
fig. 3 shows a cross-section side view of the mechanism of fig. 1 in a second position;
fig. 4 shows a cross-section side view of the mechanism of fig. 1 in a third position;
fig. 5 shows a cross-section side view of the mechanism of fig. 1 in a fourth optional position.

[0013] In fig. 1 a rectangular-plan frame 10 is shown to whose inside the mechanism of the invention is mounted on. The frame 10 is a kind of big chest that can serve for containing objects in a compartment VN under a net or support plane 12, once the net 12 is placed in a lowered rest position (fig. 2). The components of the mechanism described below may be mounted on both sides of the bed, or, for a lower cost variant, only on one. The side not equipped may mount a known passive servomechanism, a spring-operated one.

[0014] The mechanism of the invention is composed of two articulated segments 16, 20, arranged about parallel among each other, and hinged at their extremities to the net 12, through an angular bracket 22, and to a plate 14 fixed inside the frame 10.

[0015] The segment 16 is preferably constituted by a linear actuator, having a linearly movable piston 30 (but such segment could be for instance a telescopic sleeve operated externally). The segment 18 is constituted instead by a rigid metallic bar.

[0016] As a whole, the segments 16, 18 form an articulated parallelogram.

[0017] On the bar 18 there is hinged the movable piston 40 of a second linear actuator 20, which is hinged on the plate 14.

[0018] The segment or actuator 16 is set about in the middle of the side of the frame 10, while the bar 18 is arranged beside it and is placed closer to the back of the frame. Between the bar 18 and the back of the frame 10 there is arranged the actuator 20.

[0019] The mechanism operates with the following configurations and operational phases:

I) With the net in lowered position (fig. 2), the said segments are lowered maximally on the frame 10. The pistons 30, 40 of the actuators 16, 20 are now retracted.

II) The net 12 can then be brought in lifted position of bed-remaking (fig. 3), in which it is parallel to the frame 10 and to the ground. The actuator 20 is operated and its piston 40 lengthens, so as to push the
bar 18 which therefore lifts pushing upwards the net 12 (arrow A). During and at the end of the displacement, the net 12 is nearly horizontal thanks to the parallelogram structure of the segments 16, 18; this allows a user U to comfortably remake the bed without stooping.

III) From the preceding position the net 12 can be lifted further, to bring it in a position of easy access for the user U to the compartment VN, see fig. 4. The actuator 16 is operated, whose piston 30 is pushed to the outside and makes to rotate the net 12 (arrow B) on the bar 18. All the other members may stay still, or a contemporaneous withdrawal of the bar 18 may be coordinated through the actuator 20 (as in fig. 3) to make to lower the back of the net 12 and to gain a great inclination for the same net 12. In fact, the inclination of the net 12 being equal, it would take a longer piston for the actuator 16 (and therefore a greater cost and encumbrance). Besides, the whole mechanism moves away from the user U, disappearing more inside the frame 10 and leaving more space to work in the compartment VN. This synchronism between the two actuators 16, 20 is therefore very advantageous.

[0020] To bring the net 12 to the original state, the sequence of positions is run backwards (from III to I).

[0021] An improvement of the invention consists in an optional position of the net 12 in the sequence of lifting/lowering from I to II. For nets or slats being very thick and/or very deeply boxed in the frame 10, the lifting movement alone produced by the actuator 20 might not be able to extract them enough from the frame 10. It is possible that the net 12, above all its extremity part 12s that must climb over the anterior edge of the frame 10 (see reference 50), could bump against it and/or doesn’t succeed in going beyond the step of the seat in the frame 10 it is housed in. To solve the drawback, before or contemporarily activating the actuator 20 to pass to the phase II, the actuator 16 is also operated (see fig. 5) to slightly tilt the net 12 in respect to a horizontal plane (see movement pointed out by the arrow S). The extremity 12s of the net 12 therefore lifts enough above the edge 50 to avoid its opposition.

[0022] In the described example and in all the possible variants of the invention the mechanism may advantageously include an electronic unit to control and/or to program the driving of the actuators, e.g. a microprocessor system. Said unit is used for driving the actuators with a planned sequence of phases, e.g. the described ones.

[0023] To facilitate the control of the mechanism, it may include a vocal recognition device adapted to recognize vocal commands of a user and to translate them in control instructions for the electronic unit and then for the actuators.

[0024] Preferably, a memory element is provided in which program instructions and/or operational parameters (e.g. response times, timings, motion speeds, etc) for and/or of one or every actuator are stored.

[0025] Preferably, there is arranged a control apparatus adapted to send electronic commands inputted by a user to the unit, to ease the man-machine interaction. Such apparatus may comprise wireless transmission means (e.g. infrared transmission means) to communicate data and/or instructions to the electronic unit, and/or the control apparatus may be a keyboard-module housed in a part of the bed or in a wall.

Claims

1. Articulated mechanism that allows to lift a net of a bed, or in general a support plane (12) for a mattress, to a certain height from ground and/or in respect of a frame (10), characterized by comprising

- two substantially parallel segments (16, 18) each hinged at an extremity thereof to a side of the frame and at the other extremity to the support plane so as to constitute as a whole an articulated parallelogram;
- motor means (16, 20) adapted to push the two segments making them rotate around the hinging points on the frame, thereby lifting the frame.

2. Mechanism according to Claim 1, in which the motor means comprise a first linear actuator (20) that is hinged to the frame and has a movable part (40) hinged to one of the two segments (18) so as to be able to move it.

3. Mechanism according to Claim 1 or 2, comprising a second linear actuator (16) adapted to move the support frame making it rotate around a hinging point with one (18) of the two segments.

4. Mechanism according to Claim 3, in which the second actuator constitutes one of the two segments.

5. Mechanism according to Claims 3 or 4, comprising an electronic unit for controlling and/or programming the driving of the actuators.

6. Mechanism according to Claim 5, in which the electronic unit is adapted to drive the actuators with the sequence of phases of:

(i) operating the second actuator so that only an extremity of the support frame is lifted over the edge of the frame;
(ii) operating the first actuator to lift the support frame as far as to bring it horizontal to a certain height with respect to the frame.

7. Mechanism according to Claim 6, in which the elec-
Electronic unit is adapted to drive the actuators after the phases (i) and (ii) with the further phase of

(iii) operating the second actuator to tilt the support frame making it rotate around the hinging point with one of the two segments, so as to further uncover a compartment inside the frame.

8. Mechanism according to Claim 7, in which the electronic unit is adapted to drive the first actuator during phase (iii) to draw back the segment driven by it and to make it lower towards the frame, so that the composition of the movement with that in phase (iii) increases the opening above the compartment inside the frame.

9. Mechanism according to one of Claims 6 to 8, comprising a vocal recognition device to recognize vocal commands of a user and to translate them in control instructions for the electronic unit and then for the actuators.

10. Mechanism according to one of Claims 5 to 9, comprising a memory element in which program instructions and/or operational parameters for and/or of one or every actuator are stored.

11. Mechanism according to one of Claims 5 to 10, comprising a control apparatus adapted to send electronic commands inputted by a user to the unit.

12. Mechanism according to Claim 11, in which the control apparatus comprises wireless transmission means to communicate data and/or instructions to the electronic unit.

13. Mechanism according to Claim 11 or 12, in which the control apparatus is a keyboard-module housed in a part of the bed or in a wall.
### DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document with indication, where appropriate, of relevant passages</th>
<th>Relevant to claim</th>
<th>CLASSIFICATION OF THE APPLICATION (IPC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>DE 89 10 487 U1 (DEWERT) 7 December 1989 (1989-12-07) * claims 1,4; figure 2 *</td>
<td>1-3</td>
<td>INV. A47C17/86 A47C19/00</td>
</tr>
<tr>
<td>X</td>
<td>FR 2 757 756 A (ONIRIS SA) 3 July 1998 (1998-07-03) * pages 3,4; figures *</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>DE 94 18 386 U1 (FOERDERVEREIN INST FUER MEDIZINTECHNIK) 23 February 1995 (1995-02-23) * figures *</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>EP 1 374 741 A (OGGIONI &amp; C S R L) 2 January 2004 (2004-01-02) * columns 2,3; figures *</td>
<td></td>
<td>A47C A61G F16H</td>
</tr>
</tbody>
</table>
ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO. EP 08 42 5586

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

03-02-2009

<table>
<thead>
<tr>
<th>Patent document cited in search report</th>
<th>Publication date</th>
<th>Patent family member(s)</th>
<th>Publication date</th>
</tr>
</thead>
<tbody>
<tr>
<td>JP 10023944 A</td>
<td>27-01-1998</td>
<td>NONE</td>
<td></td>
</tr>
<tr>
<td>FR 2757756 A</td>
<td>03-07-1998</td>
<td>NONE</td>
<td></td>
</tr>
<tr>
<td>DE 9418386 U1</td>
<td>23-02-1995</td>
<td>NONE</td>
<td></td>
</tr>
</tbody>
</table>

For more details about this annex: see Official Journal of the European Patent Office, No. 12/02