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(54) **Mechanism for sofa-beds and the like**

(57) Mechanism for sofa-beds and the like, which comprises at least one bedspring (2) which is divided into three or more frames (3, 4, 5, 6) mutually pivoted two by two for folding the bedspring (2) into a base (1), wherein first levers (27) are pivoted between one or more legs (25) and an intermediate frame (5) which is in turn pivoted

between a first frame (4) and a front frame (6), a support (29) suitable for supporting a seat (30) being mechanically connected to the front frame (6) by means of second levers (31) and third levers (32) pivoted between the support (29) and the front frame (6), wherein the second levers (31), the third levers (32), the support (29) and the front frame (6) form an articulated quadrilateral.

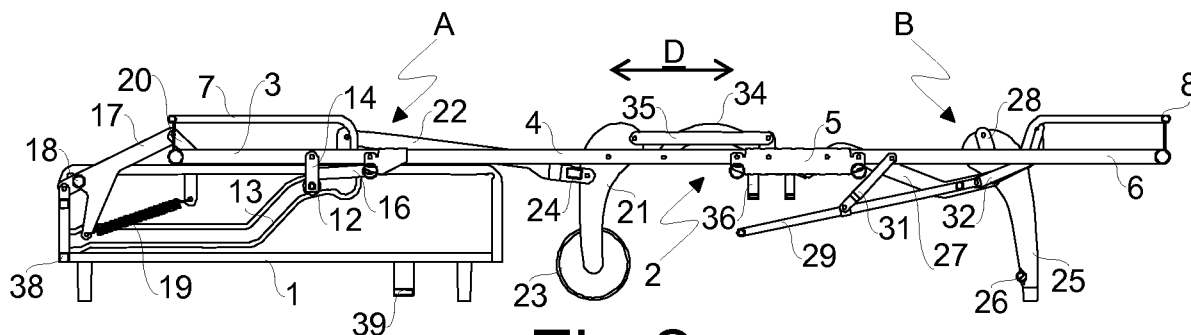


Fig.2

Description

[0001] The present invention relates to a mechanism for sofa-beds and the like, which can lift and extend a bedspring for mattresses divided into several frames which are mutually pivoted. The present invention also relates to a sofa- or chair-bed comprising said mechanism.

[0002] WO 2008/117318 discloses a mechanism for sofa-beds and the like, which comprises a bedspring which is divided into three frames mutually pivoted two by two for folding the bedspring into a base, wherein first levers are pivoted between two front legs and an intermediate frame which is in turn pivoted between a first frame and a front frame, a support suitable for supporting a seat being mechanically connected to the front frame by means of second levers and third levers pivoted between the support and the front frame.

[0003] Said known mechanism is relatively complex and does not allow to move the seat toward the front portion of the front frame when the bedspring is folded into the base, with consequent problems of overall dimensions of the sofa-bed, especially if the bedspring was divided into four or more mutually pivoted frames.

[0004] DE 10322838 discloses a mechanism comprising a bedspring divided into four frames, wherein a support suitable for supporting a seat is pivoted to the front legs, which are in turn pivoted to the front frame. Two levers pivoted to each other are also pivoted to a front leg and to the front frame, respectively, so as to form an articulated quadrilateral, however the movement of the seat is relatively limited since it depends only on the movement of the front legs.

[0005] US 2407864 discloses a mechanism comprising a bedspring divided into four frames, wherein first levers are pivoted between two front legs and an intermediate frame which is in turn pivoted between a first frame and a front frame. The front legs are pivoted to the front frame, while a support suitable for supporting a seat is mechanically connected to the front frame by means of second levers pivoted between the support and the front frame. The support is further hinged to second legs pivoted to the intermediate frame, so that also in this case the movement of the seat is relatively limited since it depends on the movement of the second legs and of the second levers.

[0006] It is therefore an object of the present invention to provide a mechanism which is free from said disadvantages. Said object is achieved with a mechanism, whose main features are disclosed in the first claim, while other features are disclosed in the remaining claims.

[0007] Thanks to the articulated quadrilateral formed by the levers which connect the support of the seat to the front frame, the mechanism according to the present invention allows to move in the suitable manner the seat with respect to the front frame when the bedspring is folded, so as to arrange the seat in an optimal manner both in the day position and in the night position.

[0008] Furthermore, the movement of the seat is preferably synchronized with the movement of the front legs and/or of the bedspring thanks to particular lever systems, so as to simplify the use of the mechanism.

[0009] Thanks to the particular choice of the arrangement and of the pivoting points of the levers connected to the front legs, to the support and/or to the bedspring frames, the mechanism according to the present invention is relatively simple, smooth, compact and can be easily synchronized with the lever systems suitable for lifting the bedspring from the base for passing from the day position to the night position, and vice versa.

[0010] Further advantages and features of the mechanism according to the present invention will become clear to those skilled in the art from the following detailed and non-limiting description of an embodiment thereof with reference to the attached drawings, wherein:

- figure 1 shows a top view of the mechanism in the night, i.e. open, position;
- figure 2 shows section II-II of figure 1;
- figure 3 shows a side view of the mechanism of figure 1;
- figure 4 shows detail IV of figure 3;
- figure 5 shows a top view of the detail of figure 4;
- figure 6 shows the mechanism of figure 1 in a sofa-bed;
- figure 7 shows the mechanism of figure 2 during the closing;
- figure 8 shows the mechanism of figure 3 during the closing;
- figure 9 shows the mechanism of figure 5 during the closing;
- figure 10 shows the mechanism of figure 2 in the day, i.e. closed, position;
- figure 11 shows the mechanism of figure 3 in the day position; and
- figure 12 shows the mechanism of figure 5 in the day position, without the mattress.

[0011] Referring to figures 1 to 6, it is seen that the mechanism according to the present embodiment of the invention comprises in a known way a substantially parallelepiped-shaped base 1, in which at least one bedspring 2 divided into three or more frames 3, 4, 5, 6 mutually pivoted two by two can be folded. In particular, a rear frame 3 is pivoted to a first intermediate frame 4 and a second intermediate frame 5 is pivoted between the first intermediate frame 4 and a front frame 6. Rear frame 3 and front frame 6 are provided with parapets 7, 8, respectively, for containing a mattress 9 (shown with broken lines) which can be arranged on bedspring 2 and folded in the latter. Base 1 can be partially closed by one or two side walls 10 and/or by a rear wall 11 for hiding bedspring 2 folded in base 1.

[0012] Bedspring 2 is mechanically connected to base 1 by means of one or more first lever systems A suitable for lifting bedspring 2 from base 1 for passing from the

day position to the night position, and vice versa. First lever systems A are mechanically connected to base 1 by means of at least one pair of cursors 12, preferably provided with wheels, which run along guides 13 arranged along the sides of base 1. Cursors 12 are mechanically connected to bedspring 2 by means of first levers 14 pivoted to the sides of rear frame 3. Cursors 12 are mutually connected by a first crossbar 15. Second levers 16 are pivoted between first levers 14 and the sides of first intermediate frame 4, so that first levers 14, second levers 16, rear frame 3 and first intermediate frame 4 form an articulated quadrilateral. Guides 13 have a substantially horizontal rear portion and a front portion which bends upward starting from the rear portion. The depth of the rear portion of guides 13 is substantially equal to the depth of rear frame 3.

[0013] One or more third levers 17 are pivoted between base 1 and rear frame 3. In particular, a pair of third levers 17 are mutually connected by a second crossbar 18 and are pivoted to the rear portion of base 1 and to the rear portion of rear frame 3. Elastic means, in particular one or more springs 19, tend to rotate third levers 17 upward for lifting rear frame 3 from base 1. The pivoting point of third levers 17 to rear frame 3 is spaced from the plane of this frame by means of plates 20 fastened to the sides of rear frame 3.

[0014] One or more legs 21 are pivoted to the sides of first intermediate frame 4 for supporting bedspring 2 when it is open. Fourth levers 22 are pivoted between legs 21 and front frame 3, so that legs 21, fourth levers 22, rear frame 3 and first intermediate frame 4 form an articulated quadrilateral. The end of legs 21 is preferably provided with a wheel 23 for running on the same floor which supports base 1, so as to support bedspring 2 at least during a portion of its movement. Fourth levers 22 are mutually connected by a third crossbar 24. Distance D between the pivoting points of legs 21 and of second intermediate frame 5 to first intermediate frame 4 is substantially equal to the length of legs 21.

[0015] The mechanism according to the present embodiment of the invention further comprises one or more second lever systems B suitable for extending one or more further legs 25 for supporting bedspring 2 when it is extended. Due to the substantial horizontal symmetry of the mechanism according to the present embodiment of the invention, figure 2 and the subsequent figures show only one first lever system A and one second lever system B of pairs of first and second lever systems A and B arranged symmetrically on both sides of bedspring 2. Legs 25 of lever systems B are mutually connected by a first crossbar 26.

[0016] Legs 25 are pivoted to the sides of front frame 6, while first levers 27 of lever systems B are pivoted between legs 25 and second intermediate frame 5, so that legs 25, first levers 27, front frame 6 and second intermediate frame 5 form an articulated quadrilateral. The pivoting point of legs 25 to front frame 6 is spaced from the plane of this frame by means of plates 28 fas-

tened to the sides of front frame 6.

[0017] A support 29 suitable for supporting a seat 30 is mechanically connected to front frame 6 by means of second levers 31 and third levers 32 of lever systems B, which levers are pivoted between support 29 and front frame 6, so that second levers 31, third levers 32, support 29 and front frame 6 form an articulated quadrilateral. The pivoting point of third levers 32 to front frame 6 is spaced from the plane of this frame by means of plates 28. Fourth levers 33 of lever systems B are pivoted between legs 25 and third levers 32, so as to mutually synchronize the movements of legs 25 and support 29. In particular, first levers 27 and fourth levers 33 of lever systems B are pivoted to legs 25 at the same pivoting point.

[0018] Fifth levers 34 of lever systems B are pivoted between first levers 27 and first intermediate frame 4, so that first levers 27, fifth levers 34, first intermediate frame 4 and second intermediate frame 5 form an articulated quadrilateral. The pivoting point of first levers 27 to second intermediate frame 5 is comprised between the pivoting point of fifth levers 34 to first levers 27 and the pivoting point of legs 25 to first levers 27.

[0019] Sixth levers 35 of lever systems B are pivoted between second intermediate frame 5 and legs 21 of lever systems A, so that sixth levers 35, legs 21 of lever systems A, first intermediate frame 4 and second intermediate frame 5 form an articulated quadrilateral. Second intermediate frame 5 is provided with one or more brackets 36 for supporting a front wall 37 suitable for covering the front portion of base 1. The front portion of base 1 is open, namely is not provided with crossbars or other frontal connection members. The sides of base 1 are indeed mutually connected by rear crossbars 38 and/or by at least one lower crossbar 39.

[0020] Referring to figures 7 to 9, it is seen that for folding bedspring 2 into base 1 it is sufficient to rotate front frame 6 upward and toward base 1. The movements of first lever systems A and of second lever systems B are mutually synchronized, in particular by means of the mechanical connection between legs 21 of lever systems A and sixth levers 35 of lever systems B, so that frames 3, 4, 5, 6 of bedspring 2 rotate one with respect to the other and bedspring 2 runs along guides 13 toward the rear portion of base 1. During this movement, the ends of legs 21 of lever systems A rotate forward, thereby running on wheels 23, support 29 moves toward the front portion of front frame 6, while mattress 9 is folded in three portions, substantially parallel to rear frame 3, to first intermediate frame 4 and to front frame 6 of base 2.

[0021] Referring to figures 10 to 12, it is seen that when bedspring 2 is folded in base 1, rear frame 3 and second intermediate frame 5 are arranged in a substantially vertical position above first intermediate frame 4, while front frame 6 and support 29 are arranged in a substantially horizontal position above first intermediate frame 4, in turn arranged in a substantially horizontal position. Legs 21 of lever systems A are rotated and arranged in a sub-

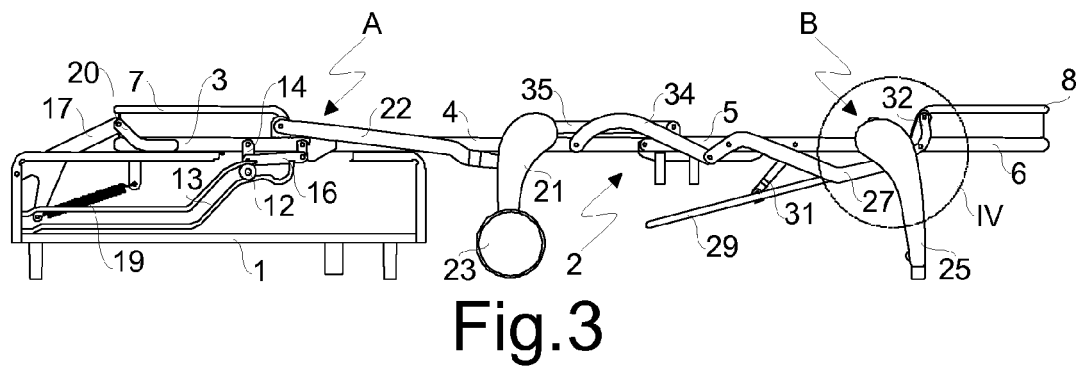
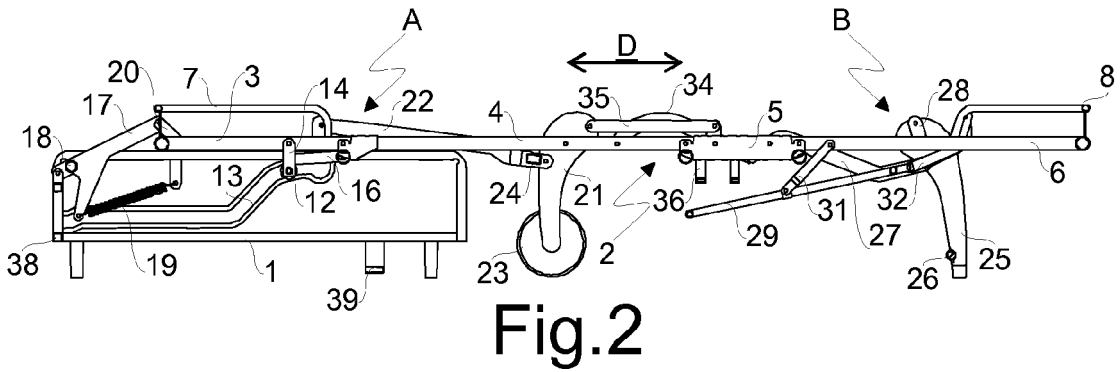
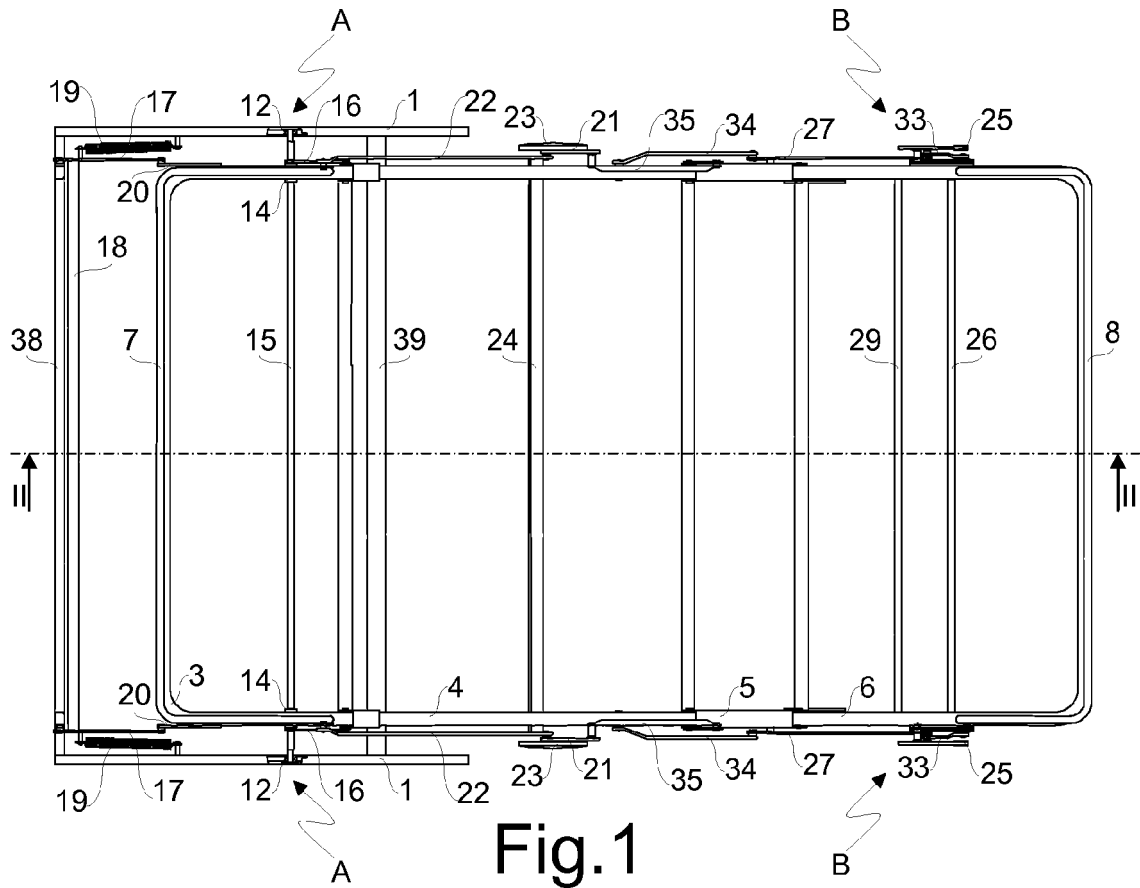
stantially horizontal position with the ends provided with wheels 23 turned forward, while legs 25 of lever systems B are arranged in a substantially horizontal position with the ends turned backward. Front wall 37 covers the front portion of base 1, seat 30 is arranged above support 29 and a back 40 can be supported on seat 30 and/or on rear wall 11 of base 1. Rear wall 11 is preferably shaped for housing at least partially rear frame 3 of bedspring 2.

[0022] It is sufficient to carry out said operations in an inverse manner for opening the mechanism according to the present invention. The levers of lever systems A and/or B can have different shapes, also non-rectilinear.

[0023] Possible modifications and/or additions may be made by those skilled in the art to the hereinabove disclosed and illustrated embodiment while remaining within the scope of the following claims.

Claims

1. Mechanism for sofa-beds and the like, which comprises at least one bedspring (2) which is divided into three or more frames (3, 4, 5, 6) mutually pivoted two by two for folding the bedspring (2) into a base (1), wherein first levers (27) are pivoted between one or more legs (25) and an intermediate frame (5) which is in turn pivoted between a first frame (4) and a front frame (6), a support (29) suitable for supporting a seat (30) being mechanically connected to the front frame (6) by means of second levers (31) and third levers (32) pivoted between the support (29) and the front frame (6), **characterized in that** the second levers (31), the third levers (32), the support (29) and the front frame (6) form an articulated quadrilateral.
2. Mechanism according to the previous claim, **characterized in that** the legs (25) are pivoted to the front frame (6).
3. Mechanism according to the previous claim, **characterized in that** the legs (25), the first levers (27), the front frame (6) and the intermediate frame (5) form an articulated quadrilateral.
4. Mechanism according to the previous claim, **characterized in that** the pivoting point of the legs (25) to the front frame (6) is spaced from the plane of this frame by means of plates (28) fastened to the sides of the front frame (6).
5. Mechanism according to one of the previous claims, **characterized in that** when the bedspring (2) is folded into the base (1) the support (29) moves toward the front portion of the front frame (6).
6. Mechanism according to one of the previous claims, **characterized in that** fourth levers (33) are pivoted between the legs (25) and the third levers (32).
7. Mechanism according to the previous claim, **characterized in that** the first levers (27) and the fourth levers (33) are pivoted to the legs (25) at the same pivoting point.
8. Mechanism according to one of the previous claims, **characterized in that** the pivoting point of the third levers (32) to the front frame (6) is spaced from the plane of this frame by means of plates (28) fastened to the sides of the front frame (6).
9. Mechanism according to one of the previous claims, **characterized in that** fifth levers (34) are pivoted between the first levers (27) and the first frame (4), so that the first levers (27), the fifth levers (34), the intermediate frame (5) and the first frame (4) form an articulated quadrilateral.
10. Mechanism according to the previous claim, **characterized in that** the pivoting point of the first levers (27) to the intermediate frame (5) is comprised between the pivoting point of the fifth levers (34) to the first levers (27) and the pivoting point of the legs (25) to the first levers (27).
11. Mechanism according to one of the previous claims, **characterized in that** sixth levers (35) are pivoted between the intermediate frame (5) and further legs (21) pivoted to the first frame (4).
12. Mechanism according to the previous claim, **characterized in that** the sixth levers (35), the further legs (21), the first frame (4) and the intermediate frame (5) form an articulated quadrilateral.
13. Mechanism according to one of the previous claims, **characterized in that** said first frame (4) is a first intermediate frame (4) and said intermediate frame (5) is a second intermediate frame (5), wherein a rear frame (3) is pivoted to the first intermediate frame (4), so that when the bedspring (2) is folded in the base (1) the rear frame (3), the second intermediate frame (5) and the front frame (6) are arranged above the first intermediate frame (4).
14. Sofa- or chair-bed, **characterized by** comprising a mechanism according to one of the previous claims.



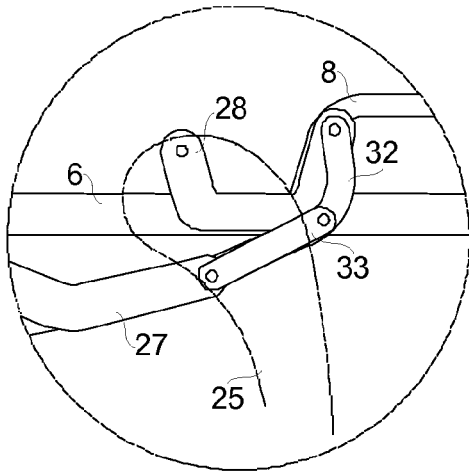


Fig.4

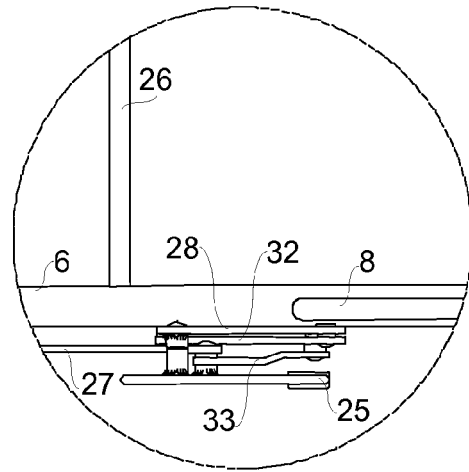


Fig.5

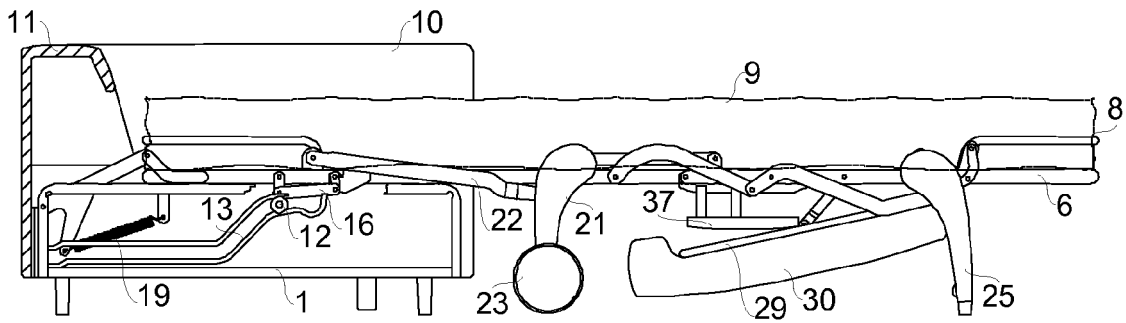


Fig.6

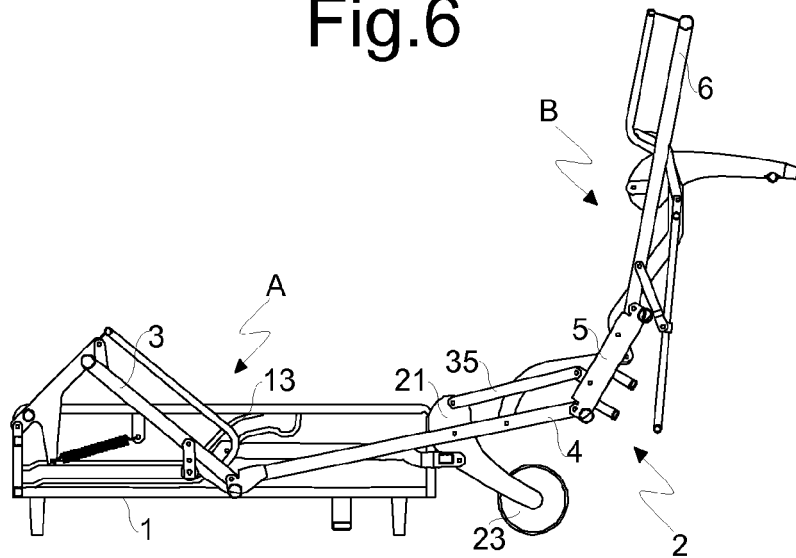


Fig.7

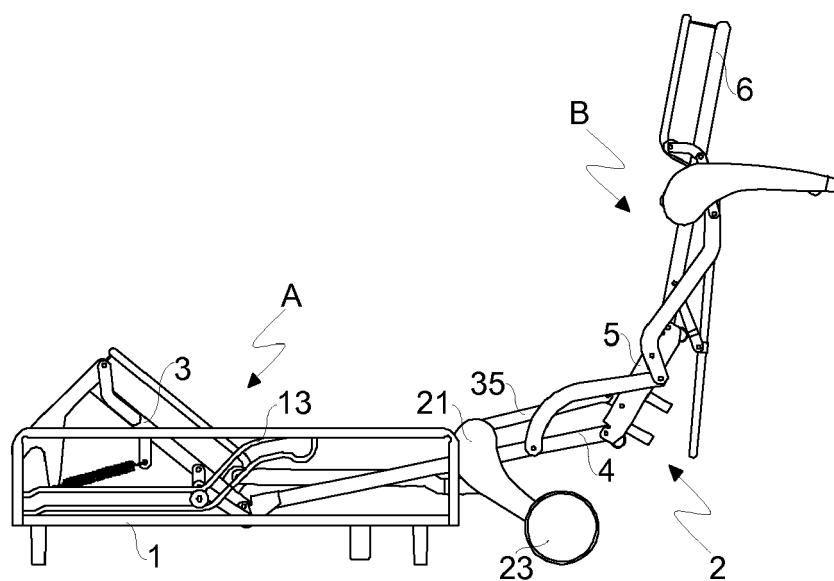


Fig.8

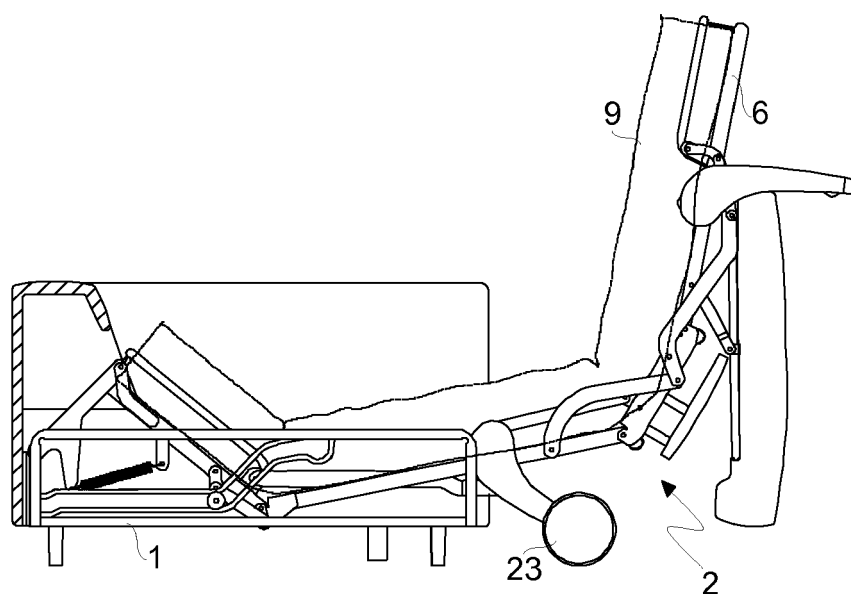


Fig.9

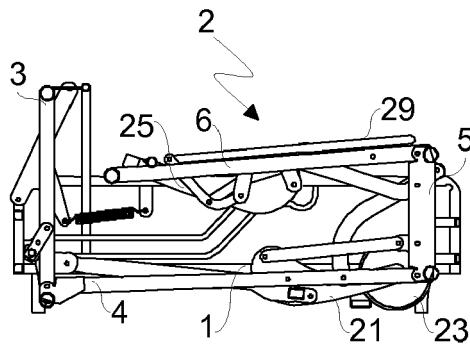


Fig.10

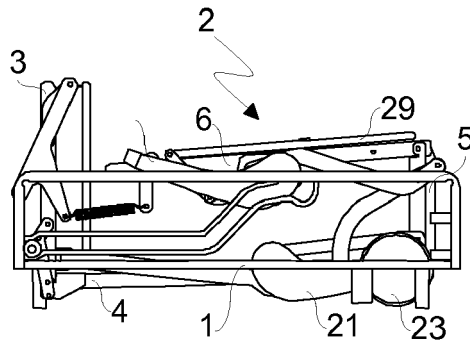


Fig.11

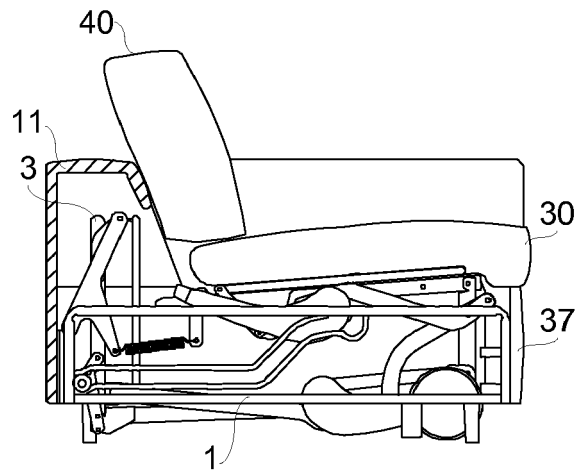


Fig.12



EUROPEAN SEARCH REPORT

Application Number
EP 10 15 9765

DOCUMENTS CONSIDERED TO BE RELEVANT			
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 14 September 2010	Examiner MacCormick, Duncan
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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