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(11) **EP 2 243 399 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
27.10.2010 Bulletin 2010/43

(51) Int Cl.:
A47C 17/22 *(2006.01)*

(21) Application number: **10159762.3**

(22) Date of filing: **13.04.2010**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO SE SI SK SM TR
Designated Extension States:
AL BA ME RS

(30) Priority: **20.04.2009 IT MI20090650**

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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 an intermediate frame (5) is pivoted between a first frame (4) and a front frame (6), one or more legs (21) being pivoted to the first frame (4) for supporting the bedspring (2) when it is open, while when the bedspring (2) is folded in the base (1) the legs (21) are arranged with the ends turned forward.

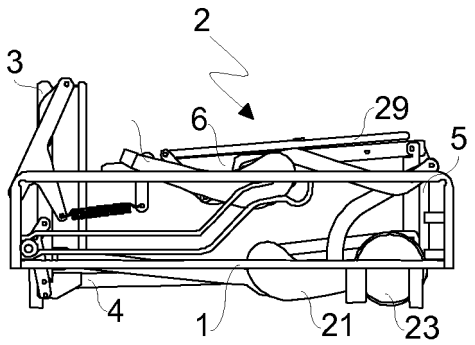

Fig.11

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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] US 1543103, GB 373254, GB 391570, FR 916688, EP628269, EP 808590, EP 1190649, EP 1316278 and WO 2008/117318 disclose mechanisms for sofa-beds and the like, which comprise a bedspring which is divided into three or more frames mutually pivoted two by two for folding the bedspring into a base, wherein an intermediate frame is pivoted between a first frame and a front frame. When the bedspring is open, it is supported by the base and by two legs fixed or pivoted to the front frame.

[0003] For improving the stability of the open bedspring, GB 771259, GB 777347, DE 10121763, US 4800598 and US 4918770 disclose mechanisms wherein two further legs are pivoted to the first frame for supporting the bedspring when it is open. When the bedspring is folded in the base the legs are arranged in a substantially horizontal position with the ends turned backward, so that it is necessary to create a space in the base under the bedspring for allowing the rotation of the legs forward and downward when the bedspring is opened, with consequent problems of overall dimensions and relative complexity of the lever systems.

[0004] 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.

[0005] Thanks to the particular arrangement and to the particular movement of the legs pivoted to the first frame, the mechanism according to the present invention is relatively simple and compact.

[0006] Furthermore, the legs support in a stable manner the bedspring not only when it is open, but also when it is closed, since they can rest on the floor at least during a portion of the movement of the bedspring.

[0007] The legs are preferably provided with wheels and/or the bedspring is preferably provided with cursors with wheels which run along particular guides of the base, so as to make the mechanism movement smooth, thereby further decreasing its complexity.

[0008] The base is preferably connected to the bedspring by means of particular rear levers which allow to fold in an advantageous position the rear frame of the bedspring, when it is divided into at least four frames, so as to further decrease the overall dimensions of the mechanism and thus of the sofa-bed.

[0009] The mechanism can further support a mobile front wall which covers the front portion of the base for improving the aesthetics of the sofa-bed also when the front portion of the base is open for the movement of the legs.

[0010] The stability and the smoothness of the mechanism are further improved by particular levers which connect the bedspring frames to each other, to the legs, to the base and/or to the cursors.

[0011] 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.

[0012] 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.

[0013] 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.

[0014] 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.

[0015] 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.

[0016] 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.

[0017] 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 fastened to the sides of front frame 6.

[0018] 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.

[0019] 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.

[0020] 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.

[0021] 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.

[0022] 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 substantially 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.

[0023] 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.

[0024] 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 an intermediate frame (5) is pivoted between a first frame (4) and a front frame (6), one or more legs (21) being pivoted to the first frame (4) for supporting the bedspring (2) when it is open, **characterized in that** when the bedspring (2) is folded in the base (1) the legs (21) are arranged with the ends turned forward.

2. Mechanism according to the previous claim, **characterized in that** the distance (D) between the pivoting points of the legs (21) and the intermediate frame (5) to the first frame (4) is substantially equal to the length of the legs (21).

3. Mechanism according to one of the previous claims, **characterized in that** the end of the legs (21) is provided with a wheel (23) for running on the same floor which supports the base (1), so as to support the bedspring (2) at least during one portion of its movement.

4. Mechanism according to one of the previous claims, **characterized in that** the front portion of the base (1) is open.

5. Mechanism according to the previous claim, **characterized in that** the intermediate frame (5) is provided with one or more brackets (36) for supporting a front wall (37) suitable for covering the front portion of the base (1).

6. 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).

7. Mechanism according to one of the previous claims, **characterized in that** the bedspring (2) is mechanically connected to the base (1) by means of at least one pair of cursors (12) which run along guides (13) arranged along the sides of the base (1).

8. Mechanism according to the previous claim, **characterized in that** the guides (13) have a substantially horizontal rear portion and a front portion which bends upward starting from the rear portion.

9. Mechanism according to the previous claim, **characterized in that** the depth of the rear portion of the guides (13) is substantially equal to the depth of the rear frame (3).

10. Mechanism according to one of claims 7 to 9, **characterized in that** the cursors (12) are mechanically connected to the bedspring (2) by means of first levers (14) pivoted to the rear frame (3).

11. Mechanism according to the previous claim, **characterized in that** second levers (16) are pivoted between the first levers (14) and the first intermediate frame (4).

12. Mechanism according to the previous claim, **characterized in that** the first levers (14), the second levers (16), the rear frame (3) and the first intermediate frame (4) form an articulated quadrilateral.

13. Mechanism according to one of claims 6 to 12, **characterized in that** the one or more third levers (17) are pivoted between the base (1) and the rear frame (3).

14. Mechanism according to one of claims 6 to 13, **characterized in that** fourth levers (22) are pivoted between the legs (21) and the rear frame (3).

15. Mechanism according to the previous claim, **characterized in that** the legs (21), the fourth levers (22), the rear frame (3) and the first intermediate frame (4) form an articulated quadrilateral.

16. Mechanism according to one of the previous claims, **characterized in that** the legs (21) are mechanically connected to one or more lever systems (B) suitable for extending one or more further legs (25) pivoted to the front frame (6).

17. Sofa- or chair-bed, **characterized by** comprising a mechanism according to one of the previous claims.

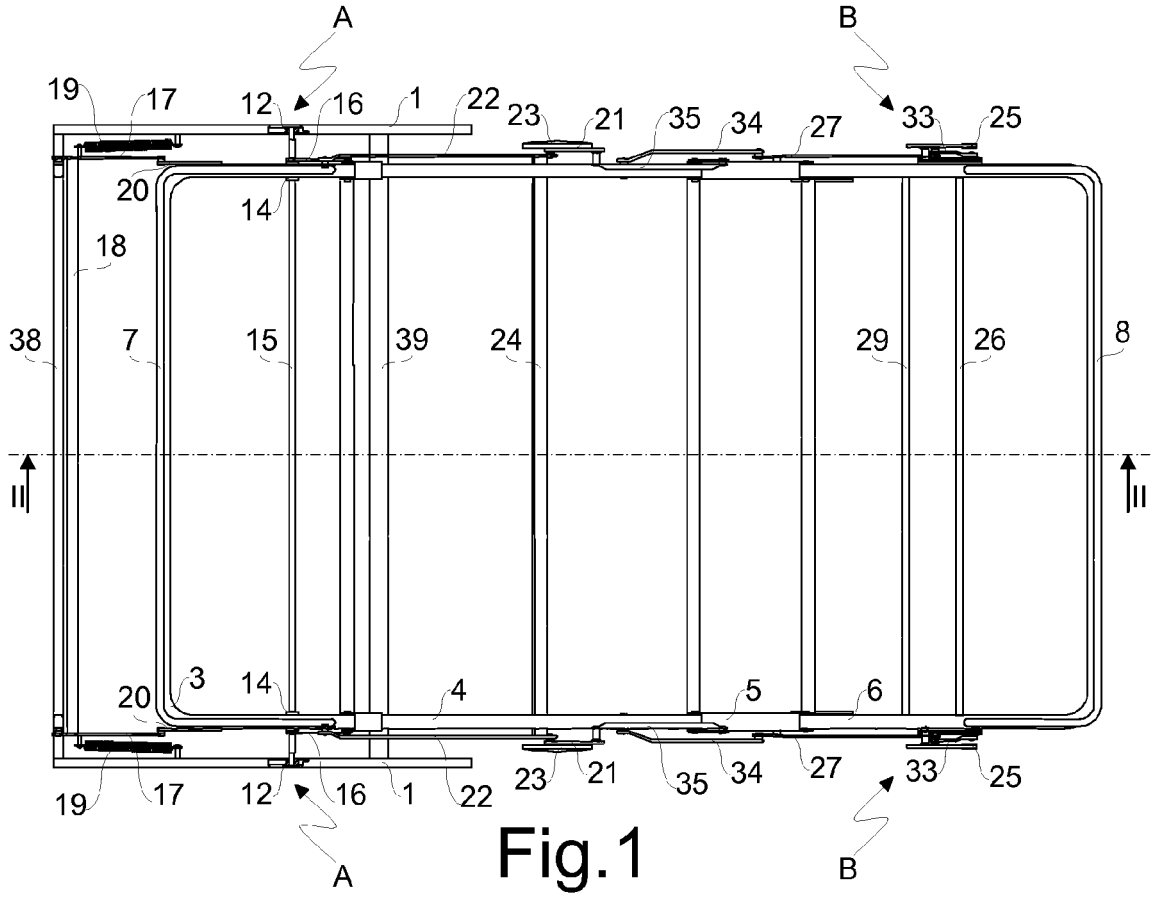

Fig.1

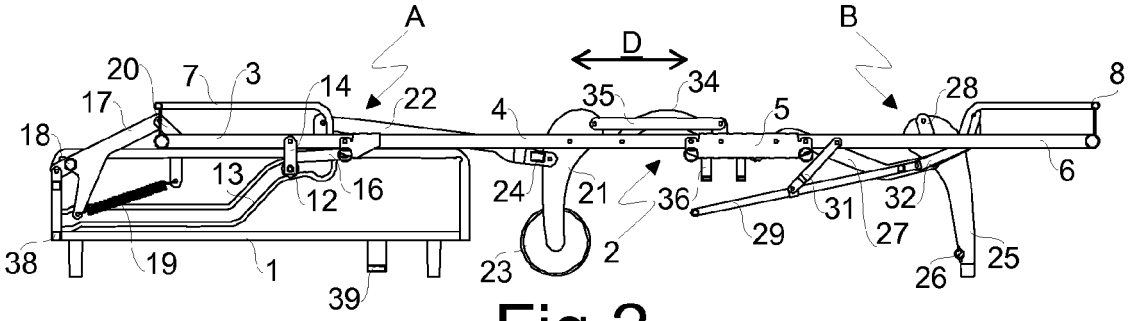

Fig.2

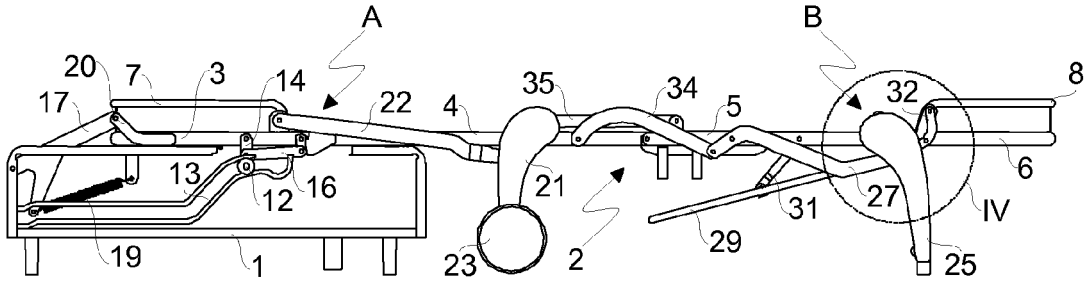

Fig.3

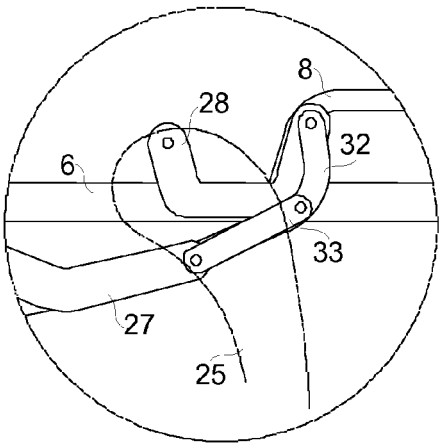

Fig.4

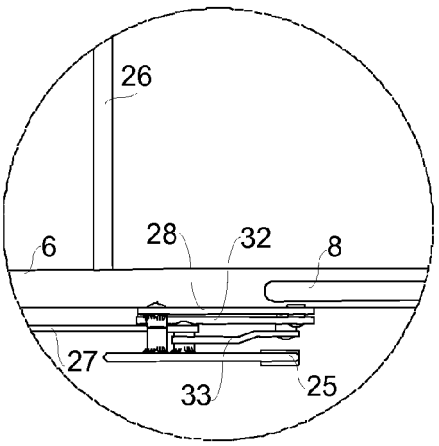

Fig.5

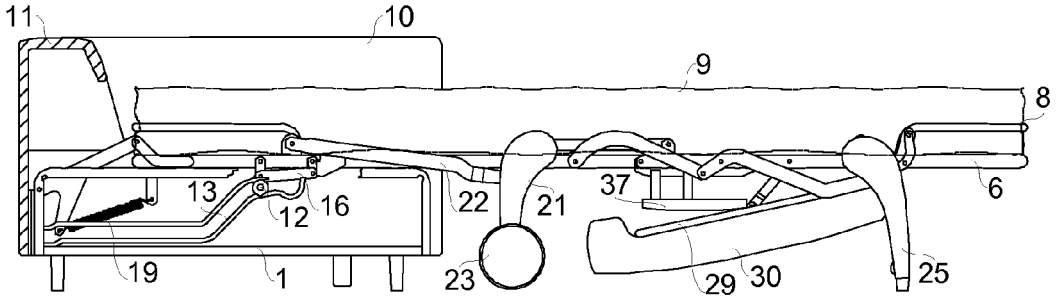

Fig.6

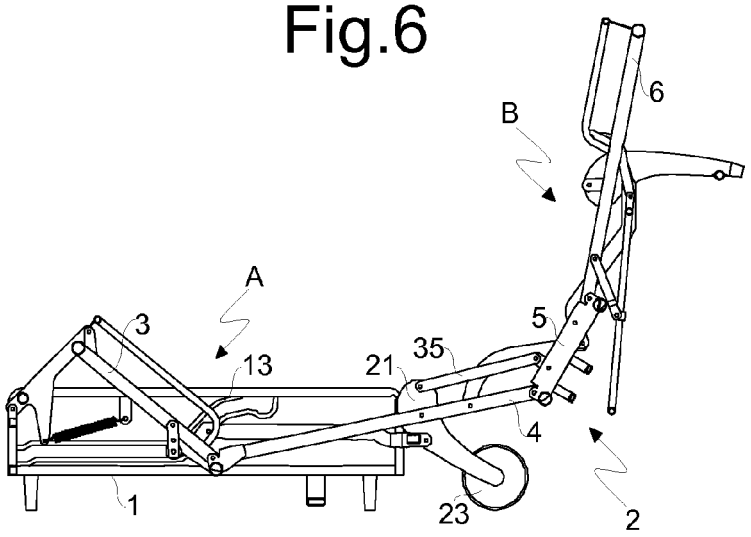

Fig.7

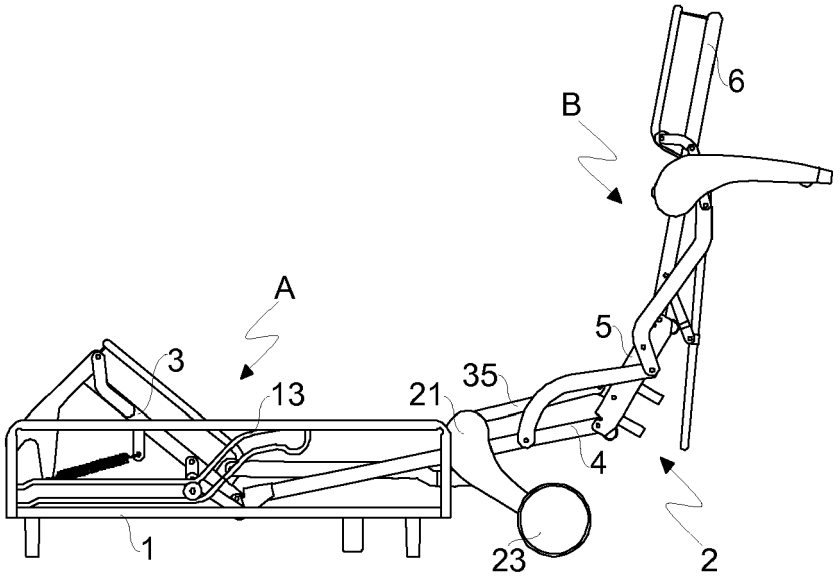

Fig.8

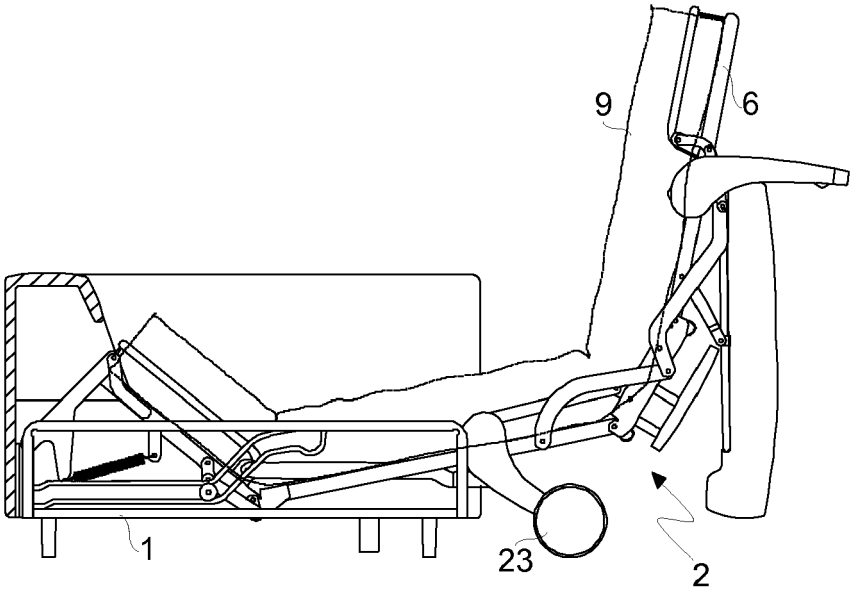

Fig.9

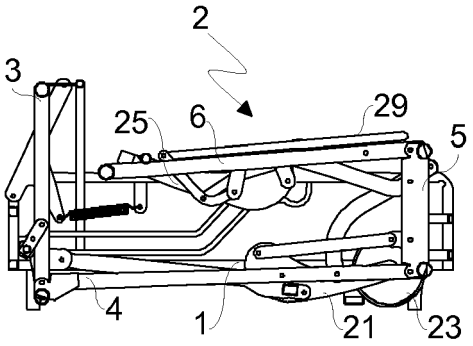

Fig.10

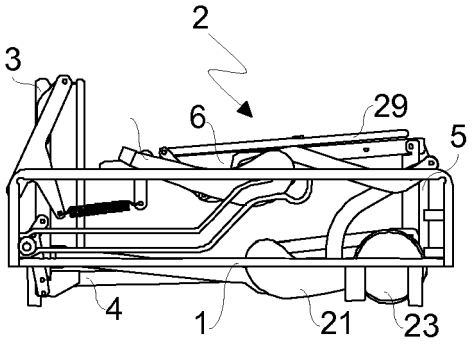

Fig.11

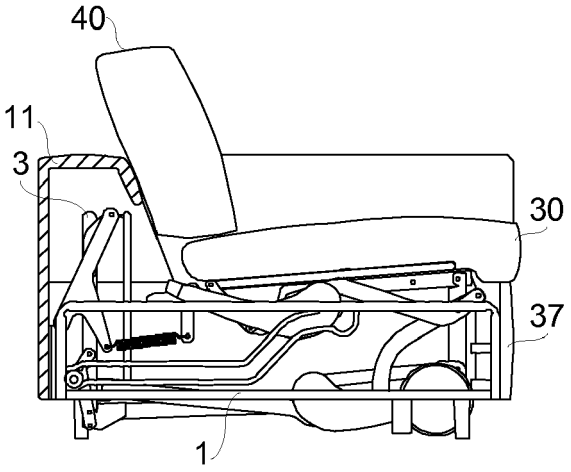

Fig.12

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EUROPEAN SEARCH REPORT

Application Number
EP 10 15 9762

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	GB 771 259 A (BEBRY BEDDING CORP) 27 March 1957 (1957-03-27) * page 1, line 84 - page 3, line 122 * * figures 1-4 *	1,3-6, 13,17	INV. A47C17/22
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A	DE 101 21 763 A1 (SEDAC MECOBEL S A [BE]) 7 November 2002 (2002-11-07) * abstract; figures *	1-14	
A	US 2 407 864 A (LOUIS ARZT) 17 September 1946 (1946-09-17) * figures *	1-14	
			TECHNICAL FIELDS SEARCHED (IPC) A47C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	14 September 2010	MacCormick, Duncan

CATEGORY OF CITED DOCUMENTS

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14-09-2010

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 771259 A	27-03-1957	NONE	
GB 777347 A	19-06-1957	NONE	
DE 10121763 A1	07-11-2002	NONE	
US 2407864 A	17-09-1946	NONE	

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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