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(54) Mechanism for sofa-beds and the like

(57) Mechanism for sofa beds and the like, which comprises a base (1) connected by means of one or more lever systems (A, B) to a bedspring which can support a mattress (2) and is divided into at least three frames (3, 4, 5) mutually pivoted two by two, so that when the bedspring is folded the front frame (3) and the rear frame (4) are substantially horizontal and perpendicular to the middle frame (5), characterized in that the base (1) comprises one or more front supports (12) to which at least one (5) of these frames (3, 4, 5) is pivoted, the pivoting point (13) of the supports (12) to said frame (5) being closer to the pivoting point (14) of the front frame (3) to the middle frame (5) than the pivoting point (15) of the rear frame (4) to the middle frame (5).

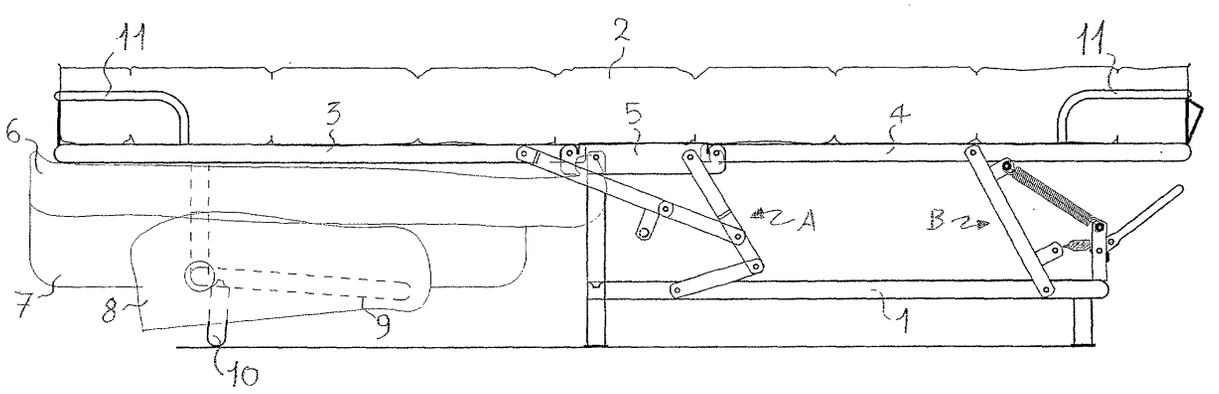

Fig.1

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Description

[0001] The present invention relates to a mechanism for sofa beds and the like, for instance chair beds or pouf beds, which closes therein and opens a folding bedspring suitable for supporting a mattress.

[0002] US 1543103, EP 628269 and EP 808590 disclose known mechanisms comprising a base connected by means of one or more lever systems to a bedspring which can support a mattress and is divided into at least three frames mutually pivoted two by two, so that when the bedspring is folded the front frame and the rear frame are substantially horizontal and perpendicular to the middle frame. The lever systems of these known mechanisms are rather complex, so that their manufacturing cost and their jamming risk are relatively high.

[0003] It is therefore an object of the present invention to provide a mechanism free from said disadvantages, i.e. a mechanism which is not only simple to be manufactured and used, but also smooth and reliable in the opening and closing movements. Said object is achieved with a mechanism, the main features of which are disclosed in the first claim and other features are disclosed in the subsequent claims.

[0004] Thanks to the pivoting of at least one frame to the base, the mechanism according to the present invention does not require the lever systems, generally complex, for supporting the central portion of the bedspring when the latter is open and especially when one or two persons lie down on the mattress. Furthermore, the lever systems for opening and closing the bedspring are simpler, and therefore cheaper to be manufactured and more reliable, than the lever systems of the known mechanisms which carry out the same function.

[0005] Thanks also to the particular structure of the mechanism according to the present invention, a seat, a back and/or a pair of armrests can be fixed onto the front frame in the closed position, so as to be hidden under it when the bedspring is open. The back, if provided with a folding frame and/or feet, can also act as a further support for the bedspring, when it is open.

[0006] Further advantages and features of the mechanism according to the present invention will be 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 side view of a chair bed comprising said mechanism in the open position;
- figure 2 shows a top view of the supporting structure of the mechanism of figure 1;
- figure 3 shows a partial and enlarged side view of a front lever system of the mechanism of figure 1;
- figure 4 shows a partial and enlarged top view of a front lever system of the mechanism of figure 1;
- figure 5 shows a partial and enlarged side view of a rear lever system of the mechanism of figure 1 in the closed position;
- figure 6 shows a partial and enlarged side view of a rear lever system of the mechanism of figure 1 in the open position;
- figure 7 shows a rear view of the supporting structure of the mechanism of figure 1 in the closed position; and
- figure 8 shows a side view of the chair bed of figure 1 in the closed position (without mattress).

[0007] Referring to figure 1 and 2, it is seen that the mechanism according to the present embodiment of the invention comprises in a known way a base 1 connected by means of one or more lever systems A, B to a folding bedspring which can support a mattress 2, so as to control the movement of the bedspring itself during the opening and closing movements. Said bedspring is suitably divided into at least three substantially rectangular frames mutually pivoted two by two. In particular, the present mechanism comprises a front frame 3 and a rear frame 4 mutually connected by means of a middle frame 5, so that when the bedspring is folded, frames 3 and 4 are substantially horizontal and perpendicular to the middle frame 5, so as to fold mattress 2 in two halves. In other embodiments of the present invention the front frame 3 and/or the rear frame 4 may be in turn divided into two or more frames for folding mattress 2 in more portions. A seat 6 and/or armrests 7 can be arranged onto the front frame 3, so as to be hidden under the bedspring when the latter is open, as in figure 1. Furthermore, also a back 8 can be fixed onto the front frame 3 by means of a folding frame 9 (shown with a broken line in figure 1) preferably provided with feet 10, so as to support the front frame 3 when the bedspring is open. The front frame 3 and/or the rear frame 4 can be provided with railings 11 for containing mattress 2.

[0008] Referring also to figures 3 and 4, it is seen that, according to the invention, base 1 comprises one or more front supports 12, for instance a pair of vertical bars (shown with a broken line in figure 4), to which at least one of frames 3, 4 or 5, in particular the middle frame 5, is pivoted. The pivoting point 13 of supports 12 to the middle frame 5 is closer to the pivoting point 14 of the front frame 3 to the middle frame 5 than the pivoting point 15 of the rear frame 4 to the middle frame 5, while the height of the front supports 12 is substantially equal to the distance between the pivoting point 13 of supports 12 to the middle frame 5 and the pivoting point 15 of the rear frame 4 to the middle frame 5.

[0009] The mechanism according to the present embodiment of the invention comprises a pair of front lever systems A which are arranged on both sides of base 1. Each front lever system A comprises in turn a first lever 16 pivoted to base 1 and a second lever 17 pivoted to the middle frame 5 close to the pivoting point 15 of the rear frame 4 to the middle frame 5. A third lever 18 is pivoted to the second lever 17 and to a fourth lever 19 pivoted to the front frame 3 close to the pivoting point 14 of the front frame 3 to the middle frame 5. A horizontal

bar 20 mutually connects the fourth levers 19 of the front lever systems A for synchronizing their movement.

[0010] Referring now to figures 5 and 6, it is seen that the mechanism according to the present embodiment of the invention also comprises a pair of rear lever systems B which are arranged on both sides of base 1. Each rear lever system B comprises in turn a fifth lever 21 pivoted to base 1 and to the rear frame 4. A first spring 22 is fixed to the fifth lever 21 and to base 1, in particular to a vertical member 23 fixed to a rear angle thereof, so as to facilitate the lifting of the rear frame 4 during the bedspring opening.

[0011] Referring also to figure 7, it is seen that a second spring 24 is fixed to the fifth lever 21 and to a handle 25 pivoted to base 1, in particular to the vertical member 23. Handle 25 is transversely arranged astride base 1, so that both second springs 24 of the rear lever systems B can be fixed thereto. The second spring 24 is fixed to the fifth lever 21 and to the handle 25 by means of hooks provided with a member 26, for instance cone-shaped, which can slide inside the spring itself. With this arrangement, spring 24 is pulled only when the sliding member 26 of each hook has reached an end of the spring, so that the latter exerts a pulling force only for a determinate rotation arc of handle 25. Thus, only when the rear lever system B is ending the closing movement of the bedspring, handle 25 is pulled forwards by the fifth lever 21 for being locked into a suitable seat 27 which is fixed to the rear frame 3 of the bedspring.

[0012] Finally, referring to figure 8, it is seen that during the use, for passing from the open position the closed position, i.e. from the night position to the day position, it is sufficient to rotate backwards the front frame 3, so as to arrange it over the rear frame 4. Due to the rotation of the front frame 3, the front lever systems A rotate downwards the middle frame 5, so as to move downwards and forwards the rear frame 4. The latter movement is guided by the rear lever systems B, which in the present embodiment comprise the sole fifth lever 21, but in other embodiments of the present invention may comprise more levers pivoted not only to each other but also to the levers of the front lever systems A. At the end of the closing of the bedspring, the latter can be firmly locked to handle 25 and back 8 can be rotated upwards, so as to obtain a complete chair.

[0013] The bedspring of the mechanism according to the present invention can be opened by carrying out in an inverse way the above described steps.

Claims

1. Mechanism for sofa beds and the like, which comprises a base (1) connected by means of one or more lever systems (A, B) to a bedspring which can support a mattress (2) and is divided into at least three frames (3, 4, 5) mutually pivoted two by two, so that when the bedspring is folded the front frame (3) and the rear frame (4) are substantially horizontal and perpendicular to the middle frame (5), **characterized in that** the base (1) comprises one or more front supports (12) to which at least one (5) of these frames (3, 4, 5) is pivoted, the pivoting point (13) of the supports (12) to said frame (5) being closer to the pivoting point (14) of the front frame (3) to the middle frame (5) than the pivoting point (15) of the rear frame (4) to the middle frame (5).

2. Mechanism according to claim 1, **characterized in that** the height of the front supports (12) is substantially equal to the distance between the pivoting point (13) of the supports (12) to said frame (5) and the pivoting point (15) of the rear frame (4) to the middle frame (5).

3. Mechanism according to one of the previous claims, **characterized in that** said frame pivoted to the front supports (12) is the middle frame (5).

4. Mechanism according to one of the previous claims, **characterized in that** one of said lever systems (A, B) is a front lever system (A) which is arranged beside the base (1) and comprises a first lever (16) which is pivoted to the base (1) and to a second lever (17) pivoted to the middle frame (5) close to the pivoting point (15) of the rear frame (4) to the middle frame (5).

5. Mechanism according to claim 4, **characterized in that** the front lever system (A) comprises a third lever (18) which is pivoted to the second lever (17) and to a fourth lever (19) pivoted to the front frame (3) close to the pivoting point (14) of the front frame (3) to the middle frame (5).

6. Mechanism according to claim 5, **characterized in that** a horizontal bar (20) mutually connects the fourth levers (19) of a pair of front lever systems (A) for synchronizing their movement.

7. Mechanism according to one of the previous claims, **characterized in that** one of said lever systems (A, B) is a rear lever system (B) which is arranged beside the base (1) and comprises a fifth lever (21) pivoted to the base (1) and to the rear frame (4).

8. Mechanism according claim 7, **characterized in that** a first spring (22) is fixed to the fifth lever (21), so as to facilitate the lifting of the rear frame (4) during the bedspring opening.

9. Mechanism according to claim 7 or 8, **characterized in that** a second spring (24) is fixed to the fifth lever (21) and to a handle (25) which is pivoted to the base (1), is transversely arranged astride the latter and can be locked into a seat (27) fixed to the

front frame (3).

10. Mechanism according to claim 9, **characterized in that** the second spring (24) is fixed to the fifth lever (21) and to the handle (25) by means of hooks provided with a member (26) which can slide inside the spring itself, so that the spring (24) is pulled only when the sliding member (26) of each hook has reached an end of the same spring.

11. Mechanism according to one of the previous claims, **characterized in that** a seat (6) and/or armrests (7) are arranged above the front frame (3), so that they are under the bedspring when the latter is open.

12. Mechanism according to one of the previous claims, **characterized in that** a back (8) is fixed onto the front frame (3) by means of a folding frame (9) provided with feet (10), so as to support the front frame (3) when the bedspring is open.

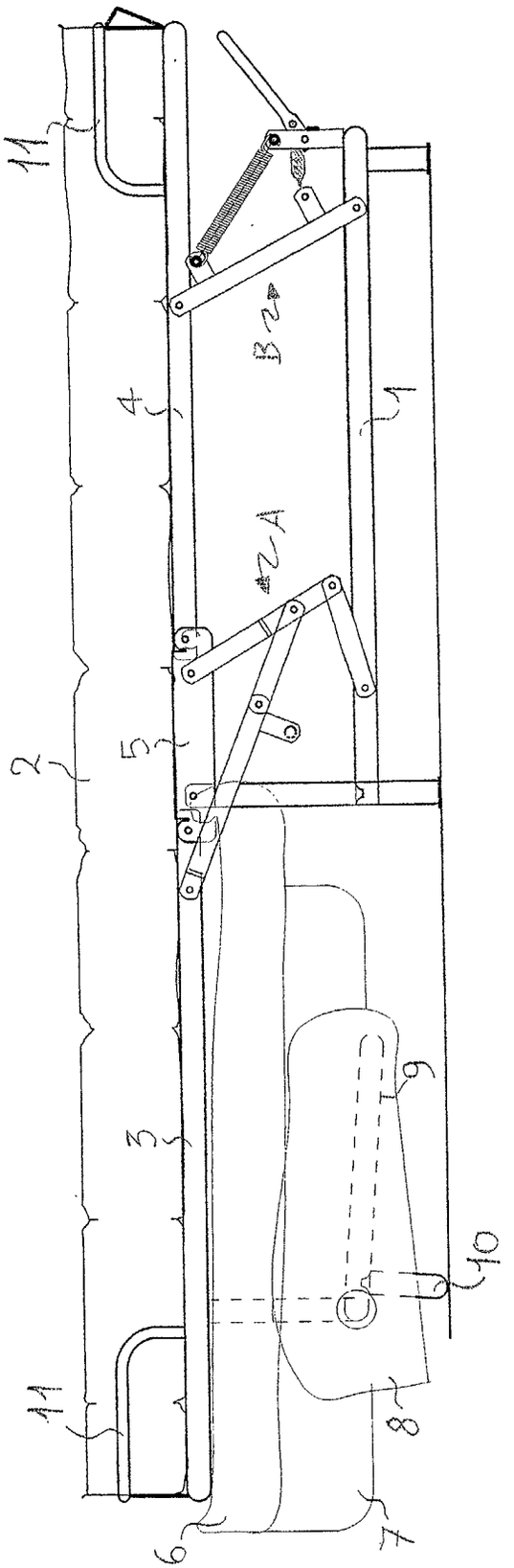


Fig.1

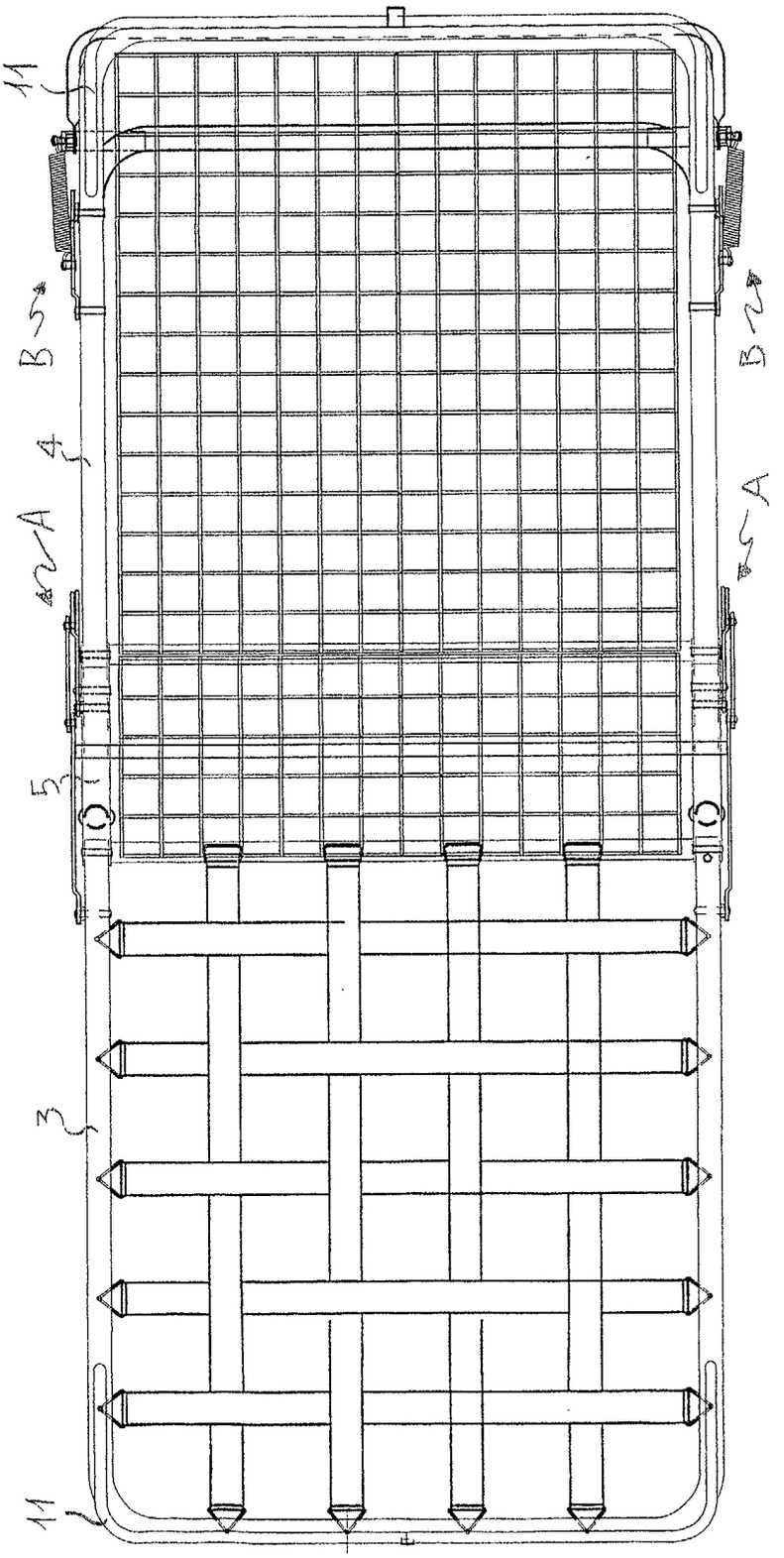


Fig.2

Fig.3

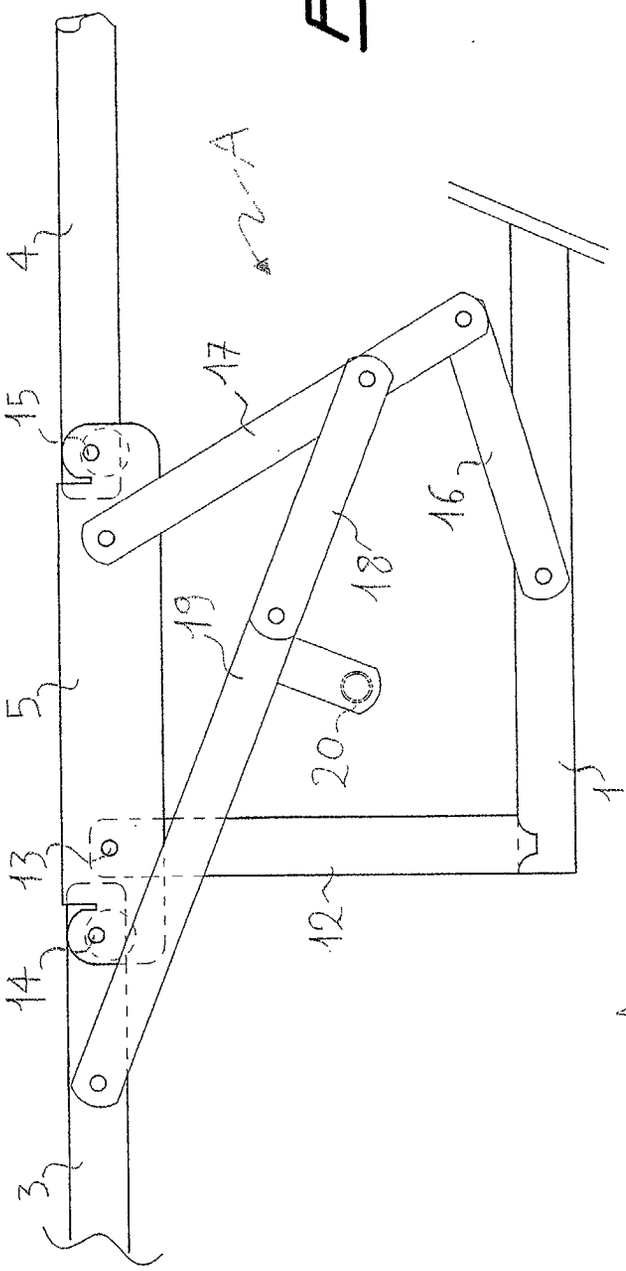


Fig.4

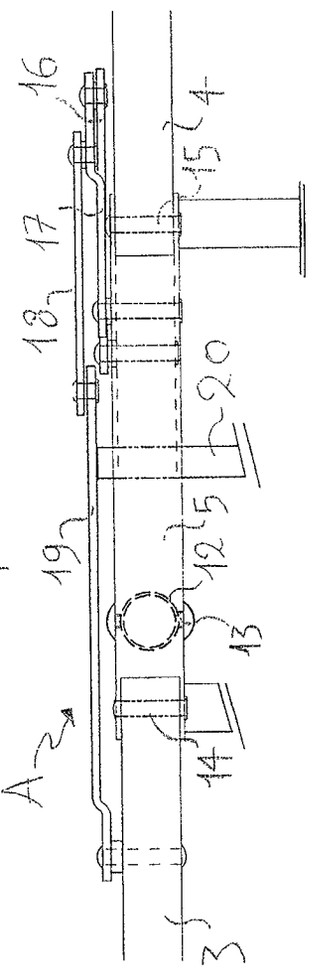


Fig.5

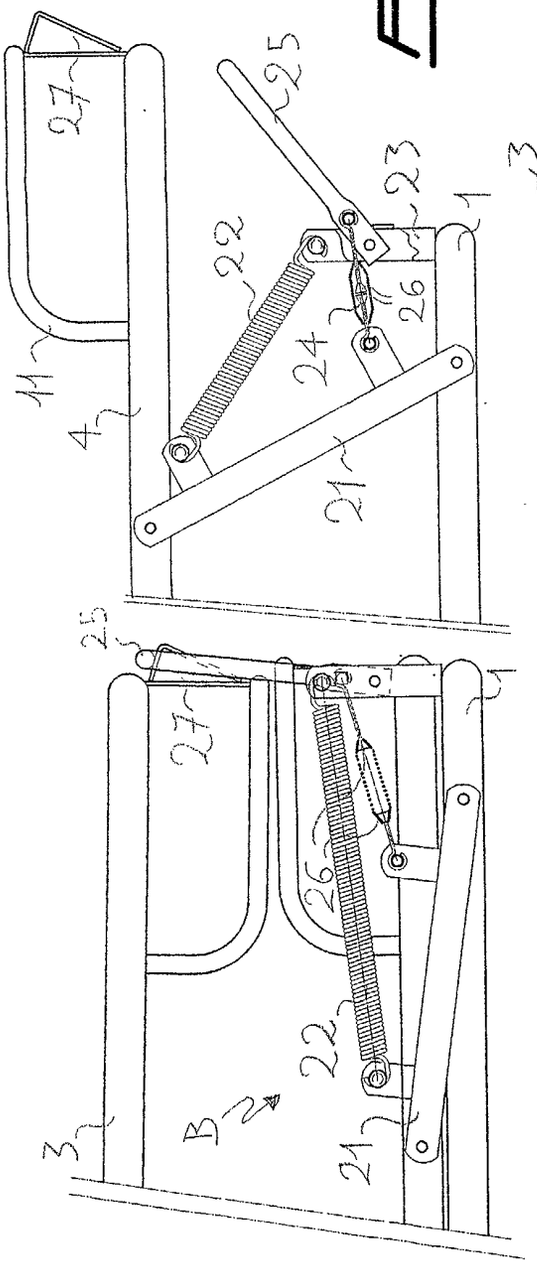
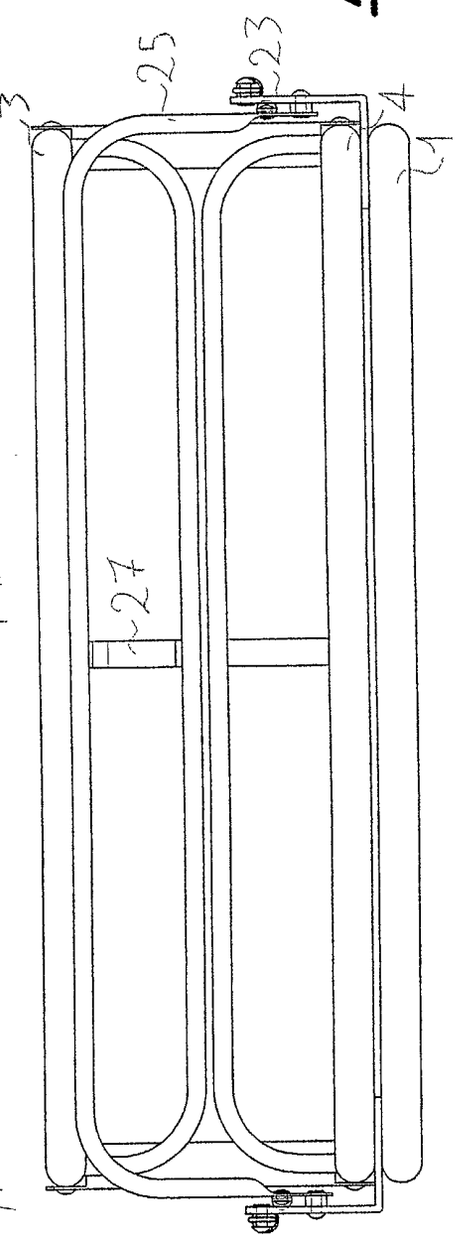


Fig.6

Fig.7



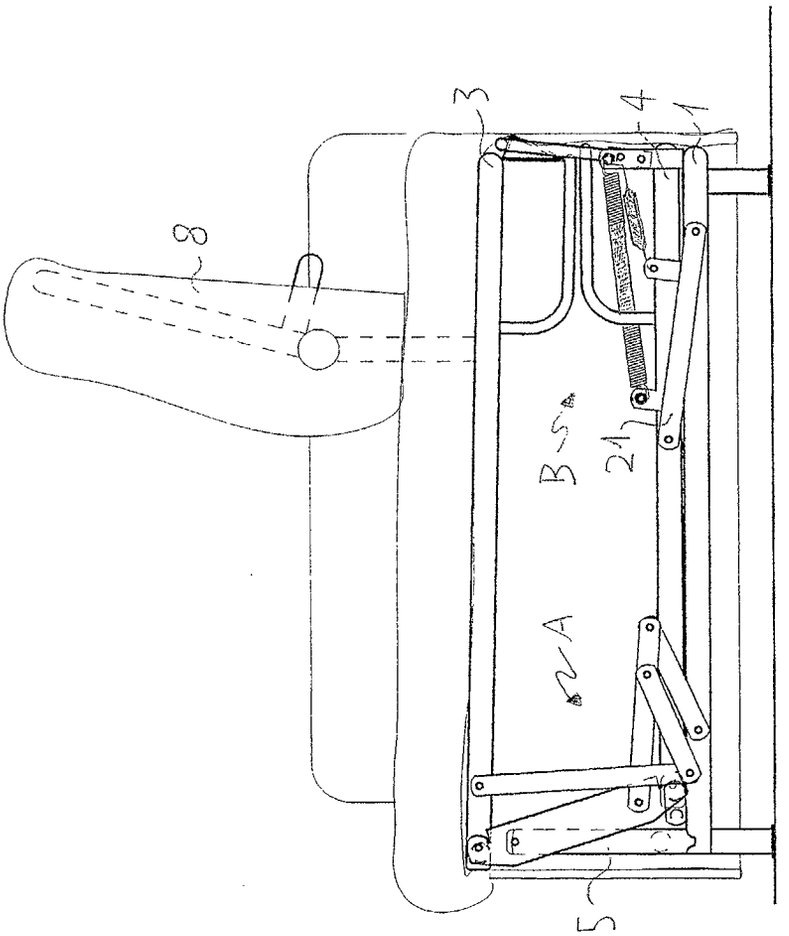


Fig.8

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EUROPEAN SEARCH REPORT

Application Number
EP 01 83 0741

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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	4 April 2002	Joosting, T

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