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(54) **Sofa-bed**

(57) A sofa-bed (1) is disclosed comprising: a carrier structure (2); at least three main moving frames (6, 7, 8); at least one first and one second auxiliary frames (12, 13); and a kinematic control mechanism (10) for its operation. The sofa-bed (1) is further equipped with: elastic means (20) that realise a thrust to facilitate the passage from its closed position to its open position

when transforming it into a bed and that operate as cushioning means in the final phase of snapopening; elastic means (30) that recall the back when closing; holding means (40) that keep the sofa-bed (1) unmovably opened; a lever (50) that opens the auxiliary frames (12, 13); a pin (60) and a slotted member (70) that increase the functionalities of the sofa-bed (1).

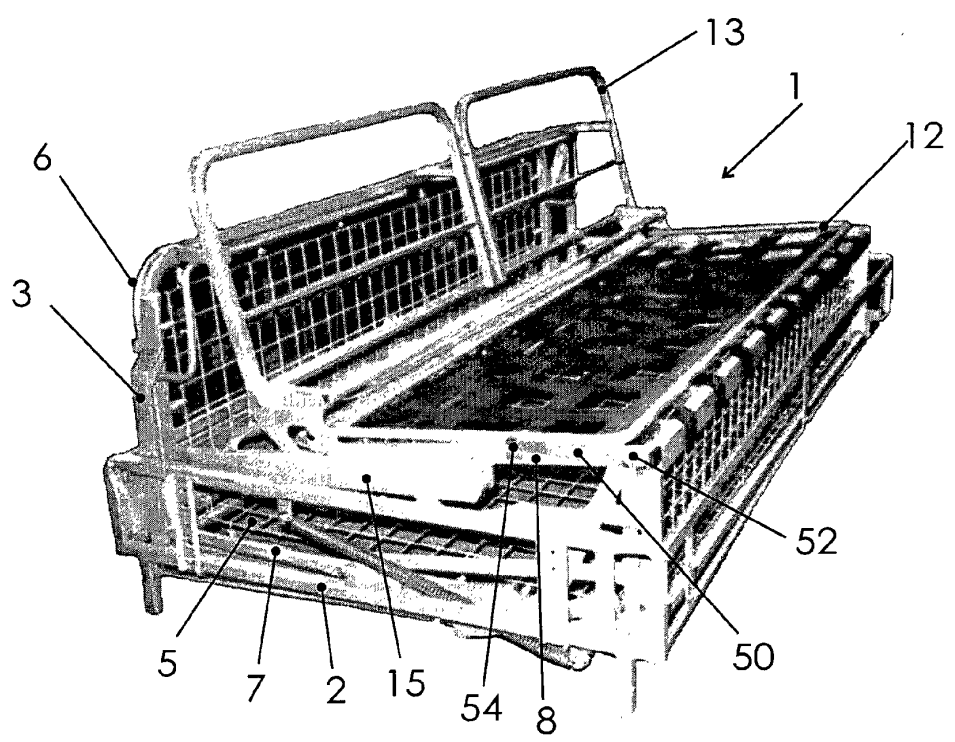


Fig. 1

EP 1 169 948 A1

Description

[0001] The present invention refers to an improved sofa-bed, in particular to a sofa-bed of the type in which the cushions of the back, when opening the sofa-bed as a bed, occupy a position that is located under the bed plane.

[0002] Sofa-beds of this type, that allow saving space and operations, not having to remove the cushions from the sofa itself, are known in the art (for example from document EP-A-0.808.590, that is the preamble of Claim 1). A sofa-bed is also known from document GB-A-386433 that has a fixed support frame with a support for the back adapted to receive vertical cushions.

[0003] Known sofa-beds of this type, though being easily assembled and with a reduced final encumbrance, have the major problem of being too heavy (having in fact to lift the sofa with all its cushions, both those for the back and those for the bottom), requiring high efforts for the user both when opening them, and when closing them. When the user is not a person that is physically strong, such opening and closing operations could be a serious problem, if not an unsolvable one.

[0004] Object of the present invention is solving the above prior-art problems, by providing a sofa-bed that allows an opening in its bed position and a new closure in its sofa position that require minimum efforts for being actuated, further dividing the opening phase into two sub-phases, in order to further reduce the necessary efforts.

[0005] A further object of the present invention is providing a sofa-bed that allows the opening and closing movement operations without damaging the fabric of the cushions contained therein, since they must necessarily be displaced with the sofa-bed with which they are integral.

[0006] The above and other objects and advantages of the invention, as will appear from the following description, are obtained by a sofa-bed as claimed in Claim 1. Preferred embodiments and non-trivial variations of the present invention are claimed in the dependent Claims.

[0007] The present invention will be better described by some preferred embodiments thereof, given as a non-limiting example, with reference to the enclosed drawings, in which:

- Figure 1 is a perspective view on an embodiment of the sofa-bed according to the present invention in its sofa position;
- Figure 2 is a side view of Fig. 1;
- Figure 3 is a side view showing a first part of the first opening phase of the sofa-bed in Fig. 1;
- Figure 4 is a side view showing a second part of the first opening phase of the sofa-bed in Fig. 1;
- Figure 5 is a perspective view of Fig. 4, that shows the open sofa-bed at the end of the first opening phase;

- Figure 6 is a side view showing a first part of the second opening phase of the sofa-bed in Fig. 1;
- Figure 7 is a side view showing a second part of the second opening phase of the sofa-bed in Fig. 1;
- Figure 8 is a side view showing a third part of the second opening phase of the sofa-bed in Fig. 1;
- Figure 9 is a side view showing the completion of the second opening phase of the sofa-bed in Fig. 1;
- Figure 10 is a perspective view of the sofa-bed in Fig. 9;
- Figure 11 is a detailed view showing two of the peculiar characteristics of the sofa-bed of the present invention;
- Figure 12 is a detailed view showing another of the peculiar characteristics of the sofa-bed of the present invention;
- Figure 13 is a detailed view showing another of the peculiar characteristics of the sofa-bed of the present invention; and
- Figure 14 is a detailed view of one of the characteristics of Fig. 11.

[0008] With reference to the Figures, a preferred but non-limiting embodiment of the sofa-bed 1 of the present invention is shown therein.

[0009] The sofa-bed 1 shown in the Figures is of the type with overturnable back without removing the cushions, and substantially comprises:

- a fixed carrier structure 2 that internally defines at least one housing space 5 and that has at least one rear vertical frame 3 arranged outside of a set of vertical cushions forming the sofa back 4;
- at least three main moving frames 6, 7, 8 in a consecutive and rotating engagement one with the other, where the moving frames 6, 7, 8 are adapted to be displaced with a roto-translating movement between a closed position, in which they are mutually bent one onto the other and are substantially arranged inside the housing space 5 and an open position in which the moving frames 6, 7, 8 are consecutively aligned one to the other outside of the housing space 5 in order to define a resting plane;
- at least one first auxiliary frame 12 with which a first horizontal set of cushions is associated, and at least one second auxiliary frame 13 with which a vertical set of cushions is associated that form the back of the sofa-bed 1;
- a kinematic control mechanism 10 operatively interposed at least between every moving frame and the following moving frame, where the kinematic control mechanism 10 has a first lever that forms an abutment foot 15 operatively engaged with the moving frame 8 and adapted to be overturned between a starting position, where the sofa-bed 1 is in a sofa configuration, in which the first lever is substantially parallel to the moving frame 8, and a final position in which it is substantially perpendicular to the mov-

ing frame 8, and comprising synchronisation means adapted to displace at least all the moving frames 6, 7, 8 from the closed position to the open position and vice versa.

[0010] In order to realise all the characteristics of the invention, the sofa-bed 1 of the above-mentioned type is realised so that the synchronisation means are adapted to displace the moving frames 6, 7, 8 from the closed position to the open position through a double working phase (respectively shown in Fig.s 1 to 5 as first phase and in Fig.s 6 to 10 as second phase), and from the open position to the closed position through a single working phase, since the phase shown in Fig.s 6 to 10 is automatically performed by suitable elastic means (described below).

[0011] Moreover, the sofa-bed 1 of the invention provides that the kinematic control mechanism 10 is equipped with elastic means 20 adapted to realise a thrust to facilitate the passage from the closed position to the open position when transforming said sofa-bed 1 into a bed: the elastic means 20 further operate as cushioning means in the final phase of snap-opening the sofa-bed 1.

[0012] In particular, the elastic means 20 are composed of at least one (and preferably two, one for each side) spring 20 hinged in 22 and 24 to the kinematic control mechanism 10. Such spring 20, after having facilitated the opening of the sofa-bed 1, is compressed during the last opening movement (Fig.s 8 and 9) thereby also performing the cushioning function.

[0013] The sofa-bed 1 of the invention is further equipped with elastic means 30 (that can be well seen in Fig. 12) connected to the abutment foot 15: such elastic means 30 operate as recalling element of the first and second auxiliary frames 12, 13 of the sofa back 4 when closing the sofa-bed 1 in its sofa position. In particular, the elastic means 30 are composed of at least one (and preferably two, one on each side) spring 30 hinged in 32 to the abutment foot 15.

[0014] As further functional characteristic, the sofa-bed 1 of the invention is further equipped with holding means 40 (that can be better seen in Fig. 14) adapted to keep unmovably open the sofa-bed 1 in its bed position after its opening. In particular, the holding means 40 are composed of at least one (and preferably two, one on each side) plate 40 secured to one (the central frame 7) of the moving frames 6, 7, 8: the plates 40 are equipped with at least one recess 42 adapted to abut against and to house the hinging screw stem 44 of a linkage 46 of the moving frame 7.

[0015] Moreover, the sofa-bed 1 of the invention is further equipped with at least one (and preferably two, one on each side) lever 50 respectively hinged in 52, 54 to the third moving frame 8 and the first auxiliary frame 12. Such lever 50 is adapted to prevent the rubbing of the moving frames 6, 7, 8 and the cushions for the back against the cushions for the bottom of the sofa-bed 1,

in order to prevent any wear for the cushions themselves.

[0016] Still more, the sofa-bed 1 of the invention is further equipped with at least one pin 60 connected to the kinematic control mechanism 10 and adapted to abut against a respective abutment foot 15 to keep the back abutted against the foot 15 when opening the sofa-bed 1 as a bed.

[0017] Finally, the sofa-bed 1 of the invention is further equipped with at least one slotted member 70 connected to the abutment foot 15 to keep the sofa-bed 1 suspended when opening it.

[0018] The operation of the sofa-bed 1 according to the present invention is shown in Fig.s 1 to 10, that respectively show the first opening phase (Fig.s 1 to 5) and the second opening phase (Fig. s 6 to 10) of the sofa-bed 1 itself; obviously, by performing in reverse the operations shown in Fig.s 10 to 1, the sofa-bed 1 is closed again, taking it back into its sofa position. Both opening and closing positions of the sofa-bed 1 of the present invention are performed in a simple and quick way and above all without any notable effort by a user, that is guided and facilitated in both operations by the presence of the elastic means 20 and 30.

Claims

1. Sofa-bed (1) of the type with overturnable back without removing cushions, comprising:
 - a fixed carrier structure (2) that internally defines at least one housing space (5) and that 'has at least one rear vertical frame (3) arranged outside of a set of vertical cushions forming a sofa back (4);
 - at least three main moving frames (6, 7, 8) in a consecutive and rotating engagement one with the other, said moving frames (6, 7, 8) being adapted to be displaced with a roto-translating movement between a closed position, in which they are mutually bent one onto the other and are substantially arranged inside said housing space (5) and an open position in which the moving frames (6, 7, 8) are consecutively aligned one to the other outside of said housing space (5) in order to define a resting plane;
 - at least one first auxiliary frame (12) with which a first horizontal set of cushions is associated, and at least one second auxiliary frame (13) with which a vertical set of cushion is associated that form the back of said sofa-bed (1);
 - a kinematic control mechanism (10) operatively interposed at least between every moving frame and the following moving frame, said kinematic control mechanism (10) having a first lever that forms an abutment foot (15) operatively engaged with said moving frame (8) and adapt-

ed to be overturned between a starting position, where the sofa-bed (1) is in a sofa configuration, in which said first lever is substantially parallel to the moving frame (8), and a final position in which it is substantially perpendicular to the moving frame (8), and comprising synchronisation means adapted to displace at least all said moving frames (6, 7, 8) from the closed position to the open position and vice versa;

characterised in that:

- said synchronisation means are adapted to displace said moving frames (6, 7, 8) from said closed position to said open position through a double working phase, and from said open position to said closed position through a single working phase; and **in that**
 - said kinematic control mechanism (10) is equipped with elastic means (20) adapted to realise a thrust to facilitate the passage from the closed position to the open position when transforming said sofa-bed (1) into a bed, said elastic means (20) further operating as cushioning means in the final phase of snap-opening the sofa-bed (1).
2. Sofa-bed (1) according to Claim 1, **characterised in that** said elastic means (20) are composed of at least one spring hinged (in 22 and 24) to said kinematic control mechanism (10).
 3. Sofa-bed (1) according to Claim 1, **characterised in that** it is further equipped with elastic means (30) connected to said abutment foot (15), said elastic means (30) operating as recalling element of said first and second auxiliary frames (12, 13) of said sofa back (4) when closing said sofa-bed (1) in its sofa position, preventing a second phase from being performed when closing.
 4. Sofa-bed (1) according to Claim 3, **characterised in that** said elastic means (30) are composed of at least one spring hinged (in 32) to said abutment foot (15).
 5. Sofa-bed (1) according to Claim 1, **characterised in that** it is further equipped with holding means (40) adapted to keep unmovably open said sofa-bed (1) in its bed position after its opening.
 6. Sofa-bed (1) according to Claim 5, **characterised in that** said holding means (40) are composed of at least one plate (40) secured to one (7) of said moving frames (6, 7, 8), said at least one plate (40) being equipped with a recess (42) adapted to abut against and to house the hinging screw stem (44) of a linkage (46) of one (7) of said moving frames (6, 7, 8).
 7. Sofa-bed (1) according to Claim 1, **characterised in that** it is further equipped with at least one lever (50) respectively hinged (in 52, 54) to said third moving frame (8) and said first auxiliary frame (12), said at least one lever (50) being adapted to prevent the rubbing of the moving frames (6, 7, 8) and the cushions for the back against the cushions for the bottom of the sofa-bed (1).
 8. Sofa-bed (1) according to Claim 1, **characterised in that** it is further equipped with at least one pin (60) connected to said kinematic control mechanism (10) and adapted to abut against a respective abutment foot (15) to keep said back abutted against said foot (15) when opening said sofa-bed (1) as a bed.
 9. Sofa-bed (1) according to Claim 1, **characterised in that** it is further equipped with at least one slotted member (70) connected to said abutment foot (15) to keep said sofa-bed (1) suspended when opening it.

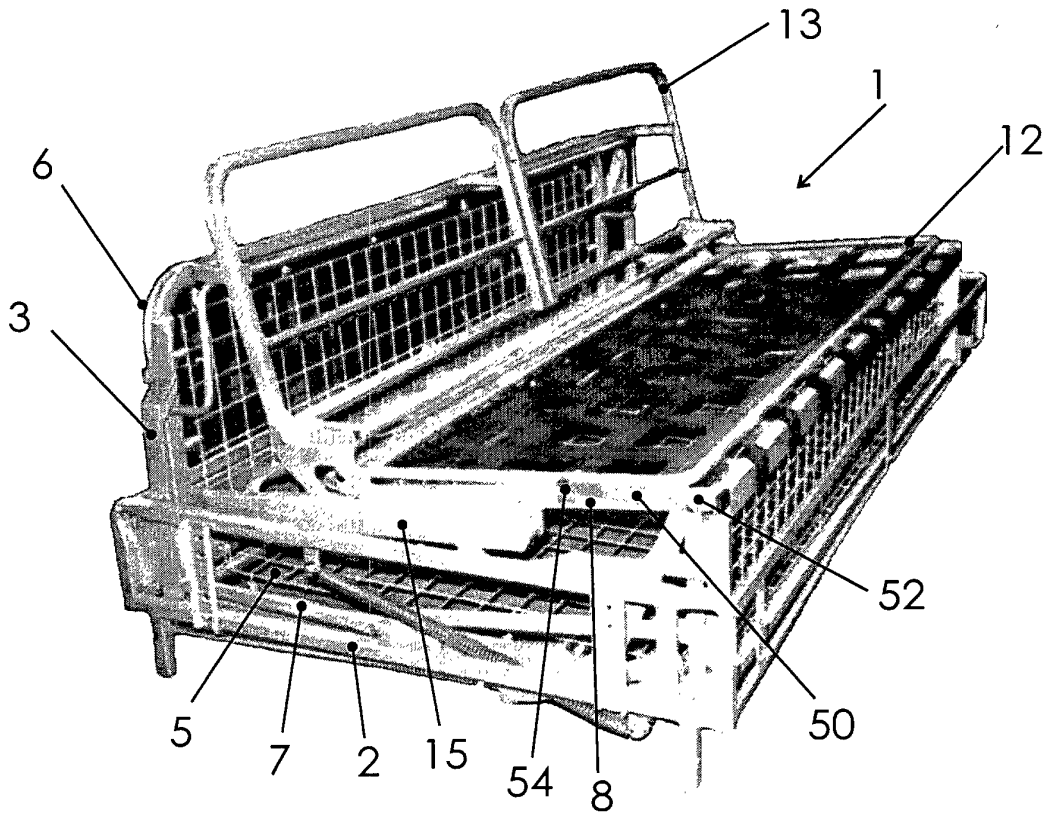


Fig. 1

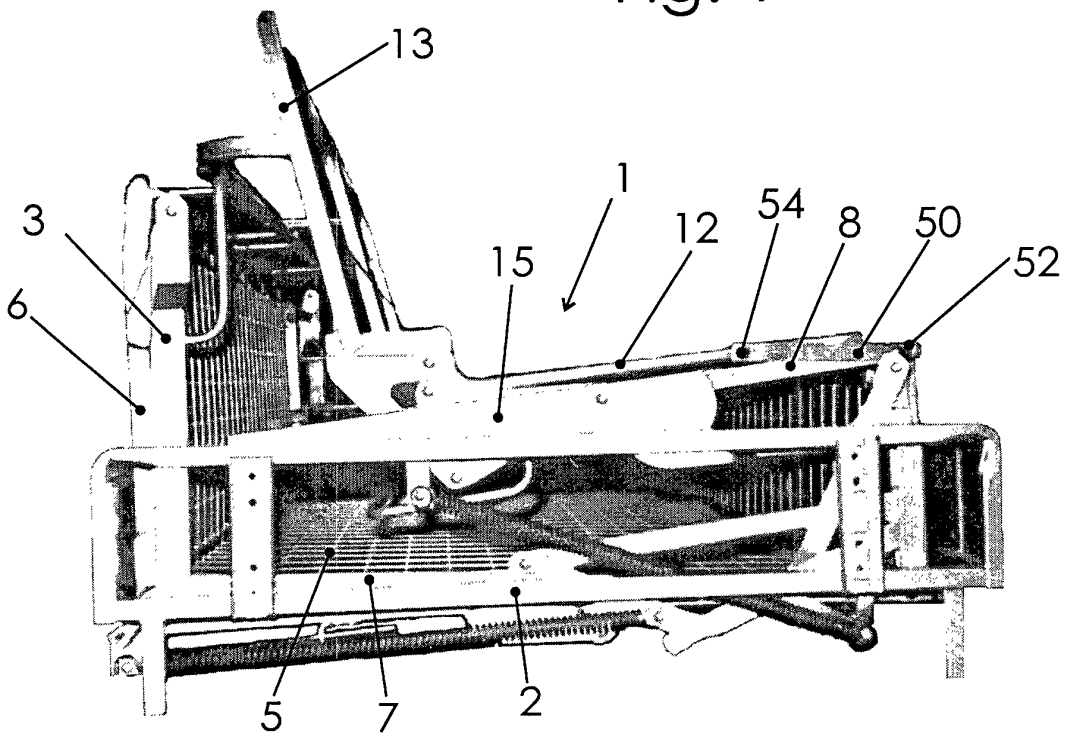
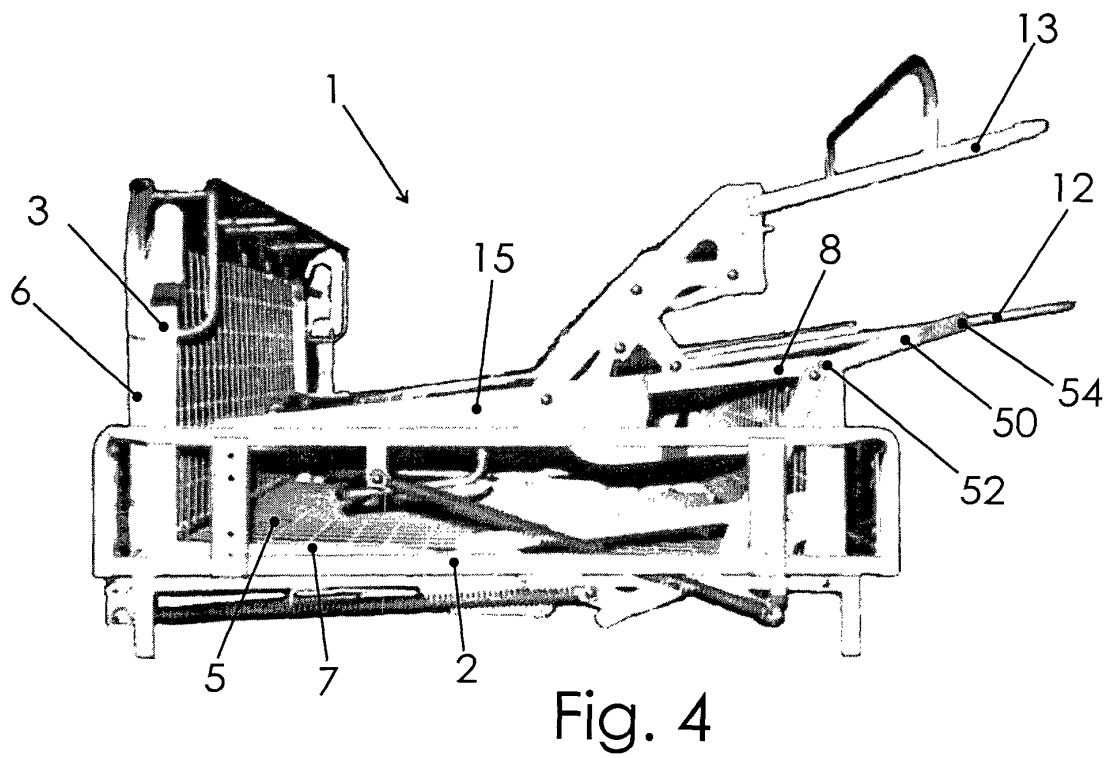
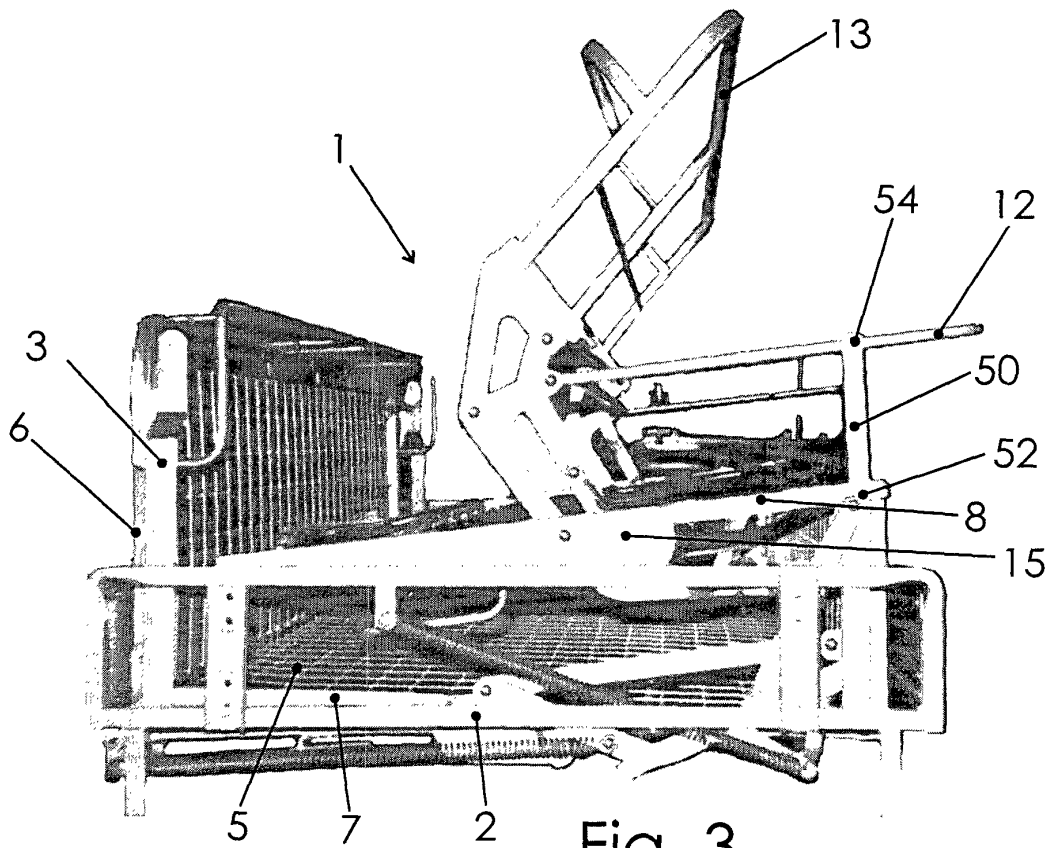


Fig. 2



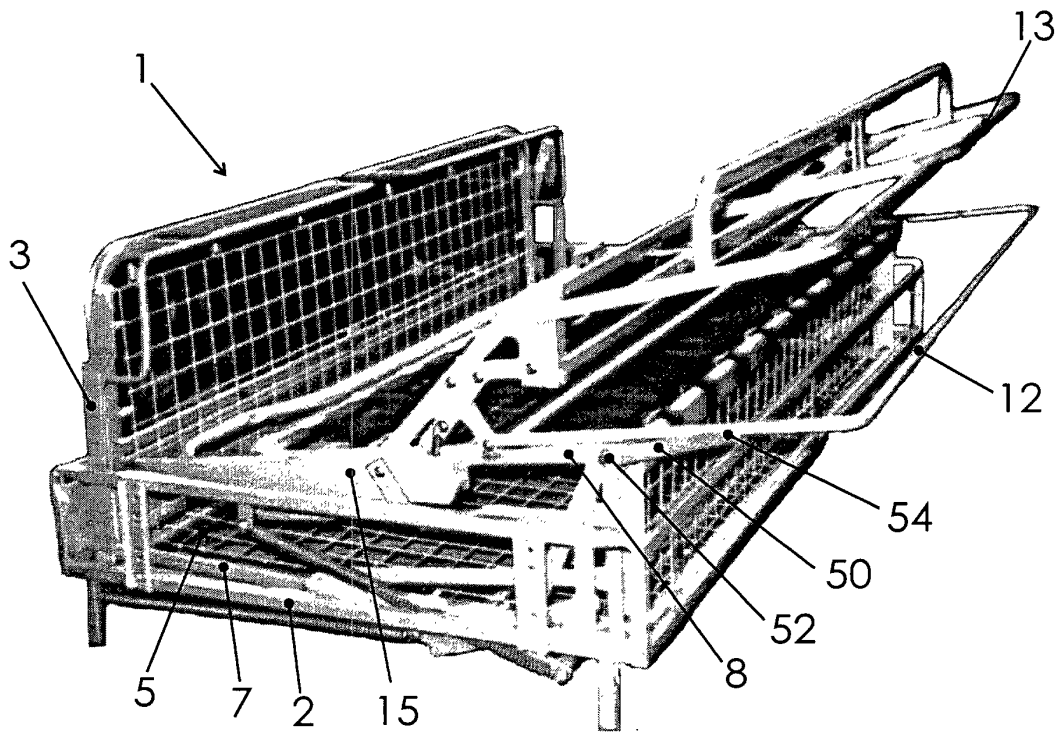


Fig. 5

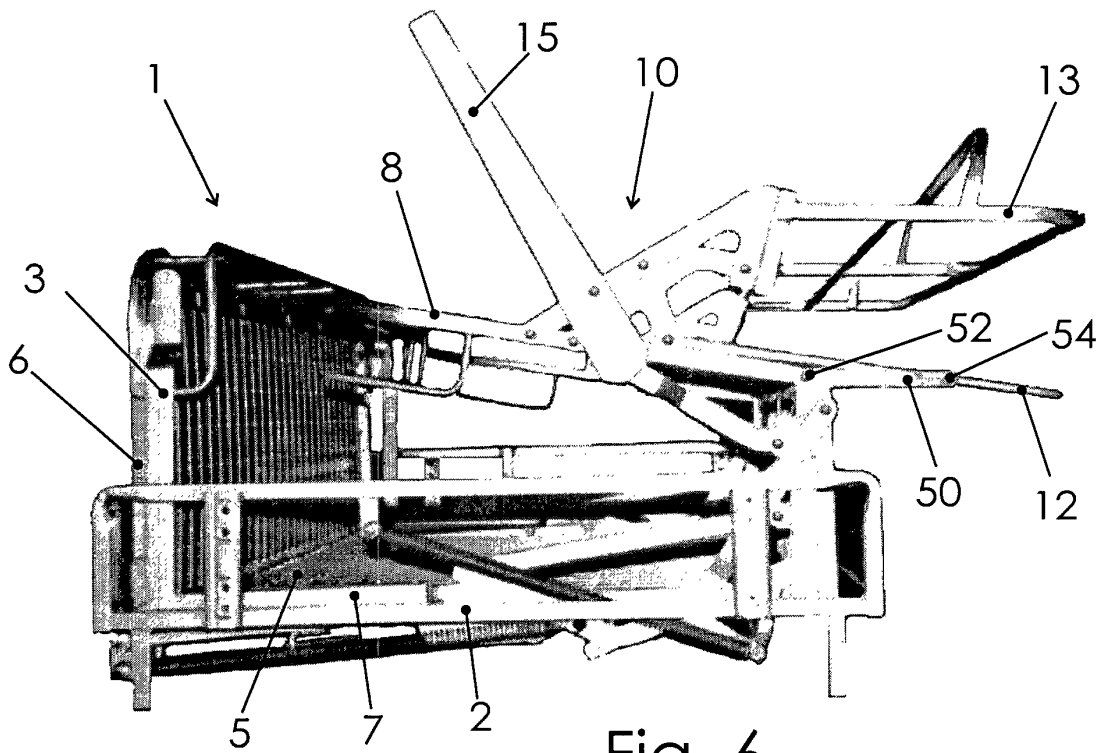


Fig. 6

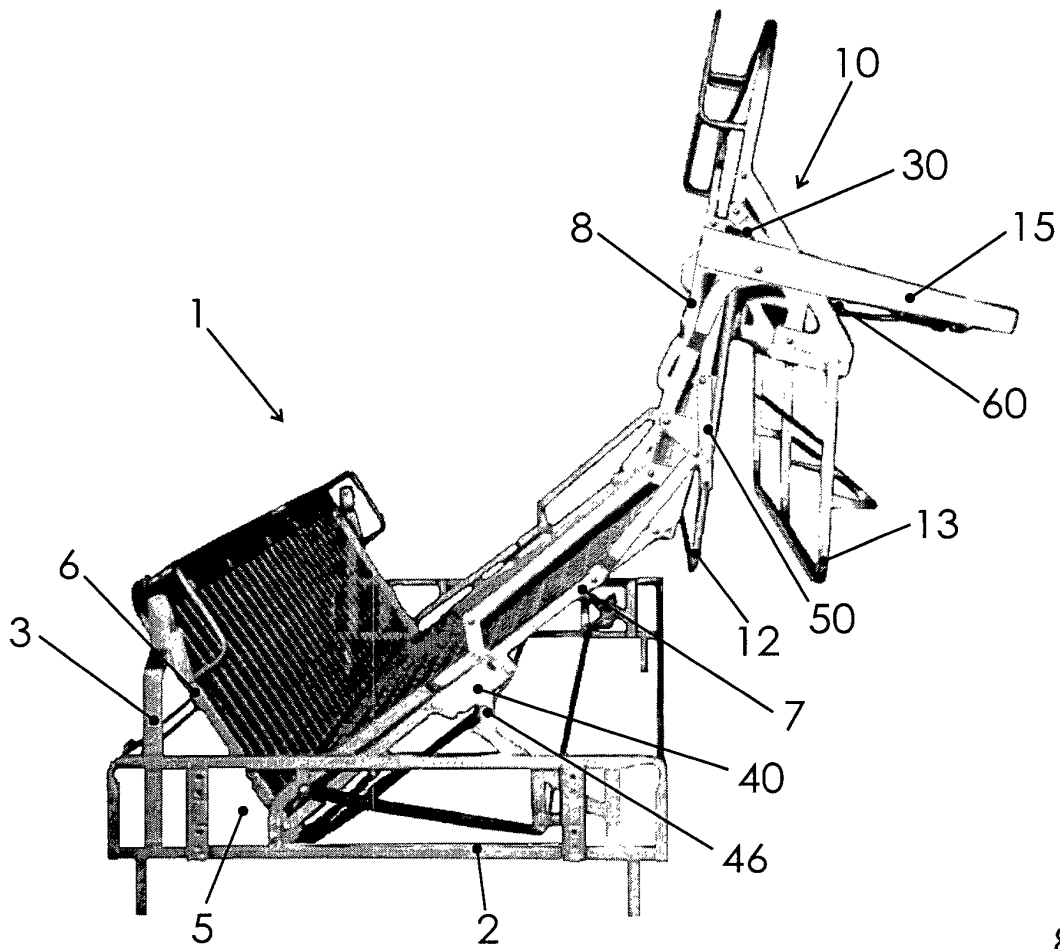


Fig. 7

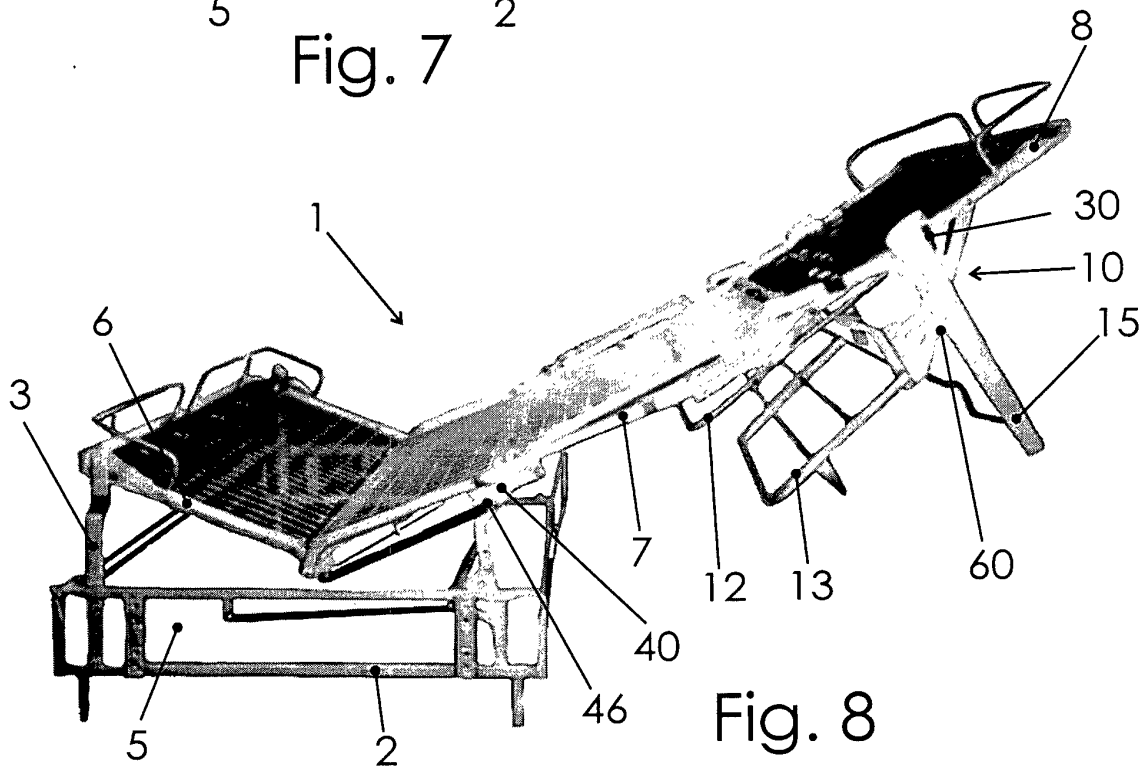


Fig. 8

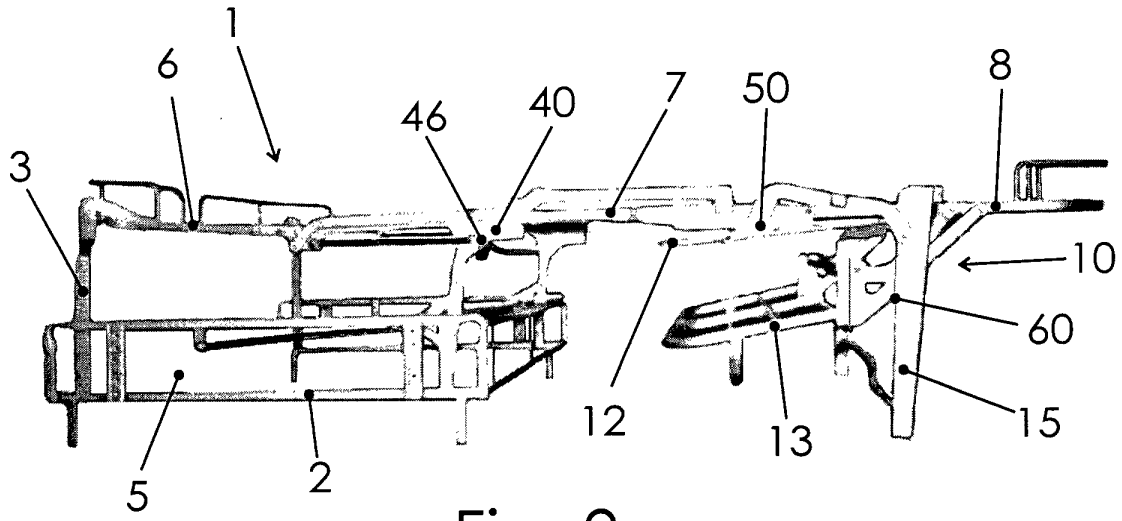


Fig. 9

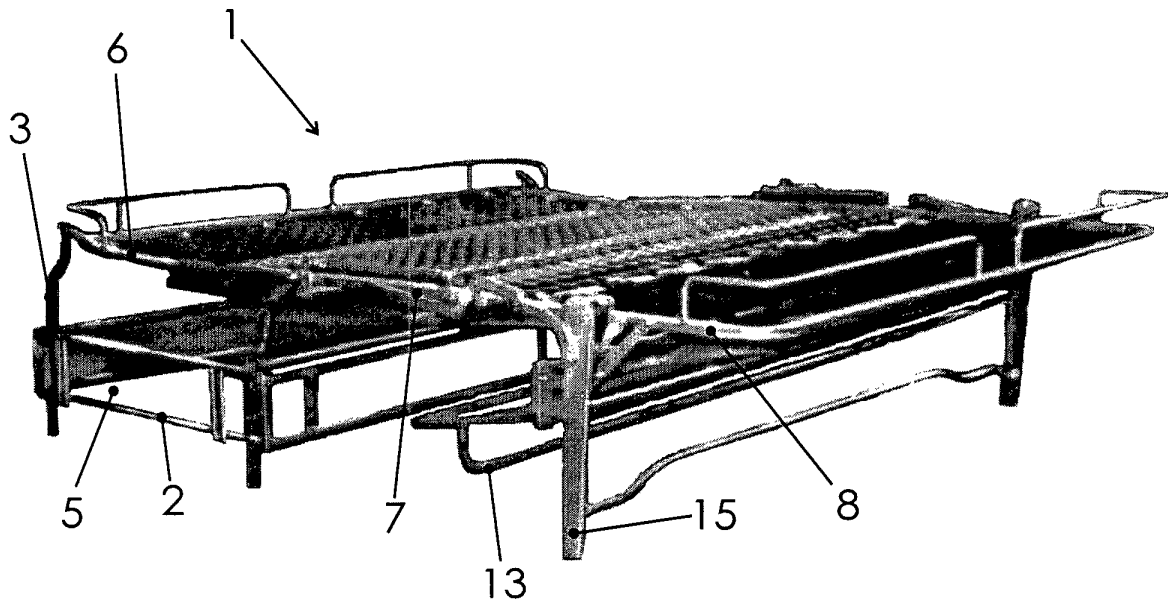


Fig. 10

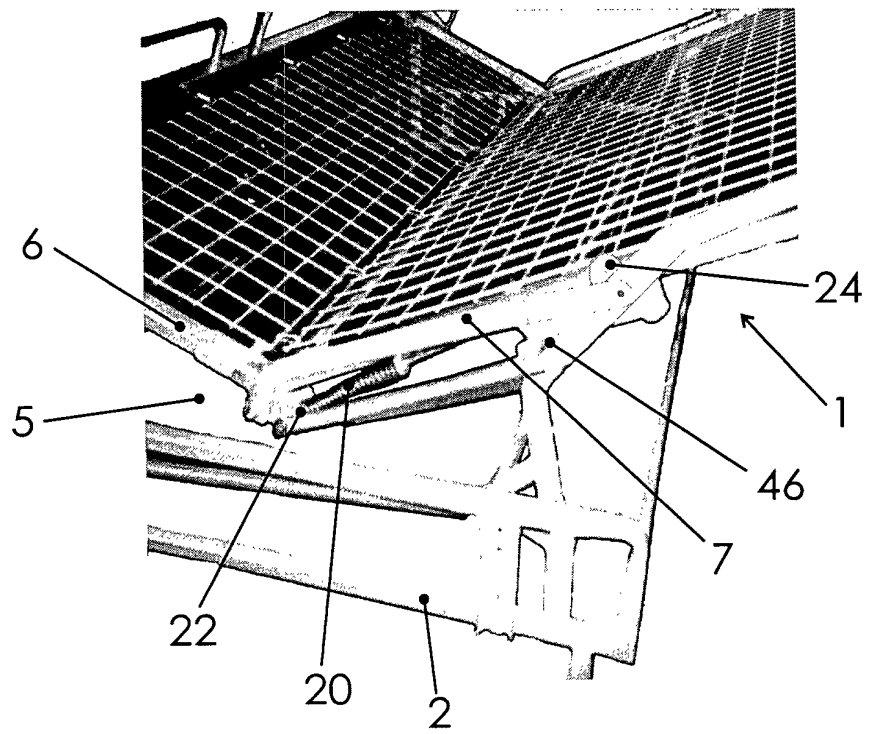


Fig. 11

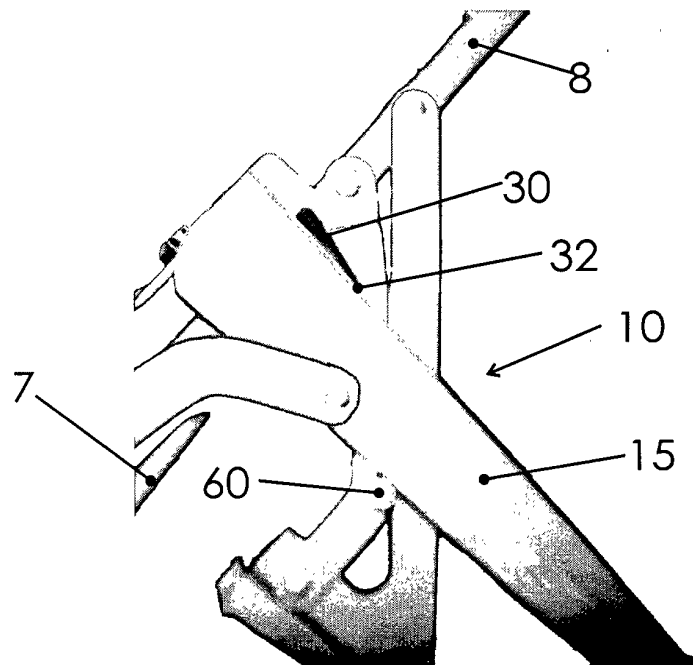


Fig. 12

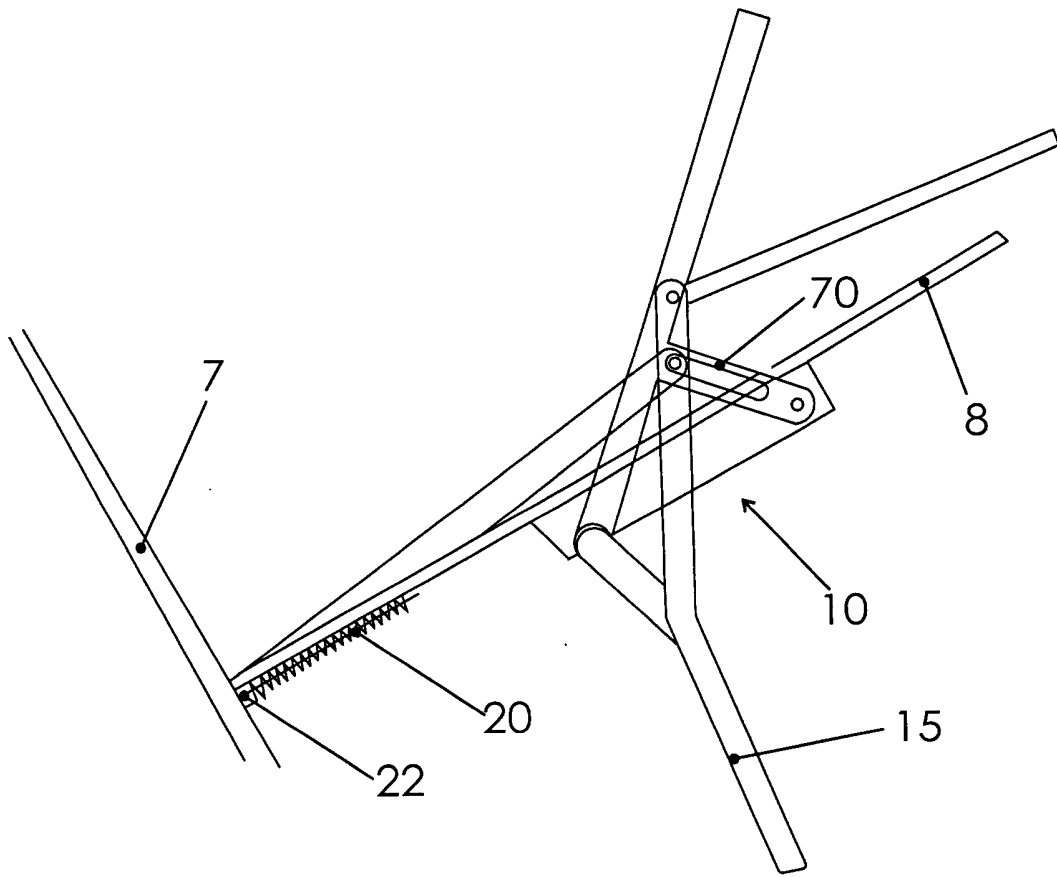


Fig. 13

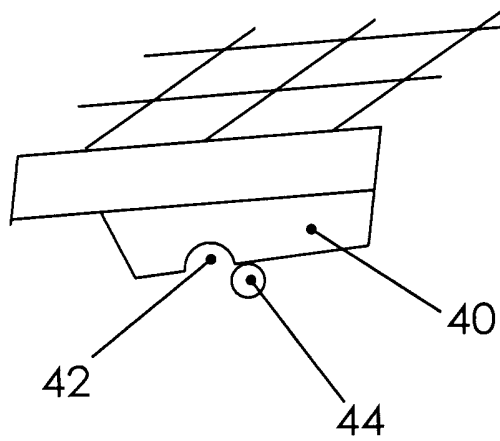


Fig. 14



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EUROPEAN SEARCH REPORT

Application Number
EP 01 11 2431

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
Y	FR 1 392 662 A (JEAN GRANDE) 30 June 1965 (1965-06-30)	1,5	A47C17/20 A47C17/22
A	* column 2, last line - column 3, line 4; claim 1; figure 1 *	2-4,6-9	
Y	US 1 543 103 A (HEALE JOSEPH M) 23 June 1925 (1925-06-23)	1,5	
A	* column 3, line 35-38; figures *		
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A	* the whole document *		
A	EP 0 868 870 A (STEMA S R L) 7 October 1998 (1998-10-07)	1-9	
	* abstract; figures *		
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			A47C
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
THE HAGUE		9 October 2001	Amghar, N
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EP 01 11 2431

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09-10-2001

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