

(19)



(11)

EP 1 876 092 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
09.01.2008 Bulletin 2008/02

(51) Int Cl.:
B63B 29/10^(2006.01) A47C 17/40^(2006.01)
A47C 17/165^(2006.01)

(21) Application number: **07111801.2**

(22) Date of filing: **05.07.2007**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK YU

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(30) Priority: **06.07.2006 FI 20065482**

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(54) **Convertible sofa-bed**

(57) The invention relates to a convertible sofa-bed, which comprises a frame structure (1), a seat part (2) and a backrest part (3), the backrest part (3) constituting at the same time a downwardly reclinable bed part such that the reverse side of the backrest part becomes the upper side of the bed part. The lower part of the backrest part (3) is mounted on bearings to the frame structure (1) to be turnable about one pivot axis (5), and the seat part (2) is mounted on bearings to the backrest part (3) in front of said pivot axis (5) and supported at both ends to the frame structure (1) with guide bars (6), such that the seat part (2) is arranged to adopt a substantially horizontal position beneath the bed part guided by a three-point support at the ends of the seat part (2) as the backrest part (3) is reclined downwardly to serve as the bed part. To make the mounting of the sofa-bed more simple and to make cleaning more simple the frame structure (1) is arranged for suspension on a vertical wall structure (4) to provide wall mounting for the convertible sofa-bed.

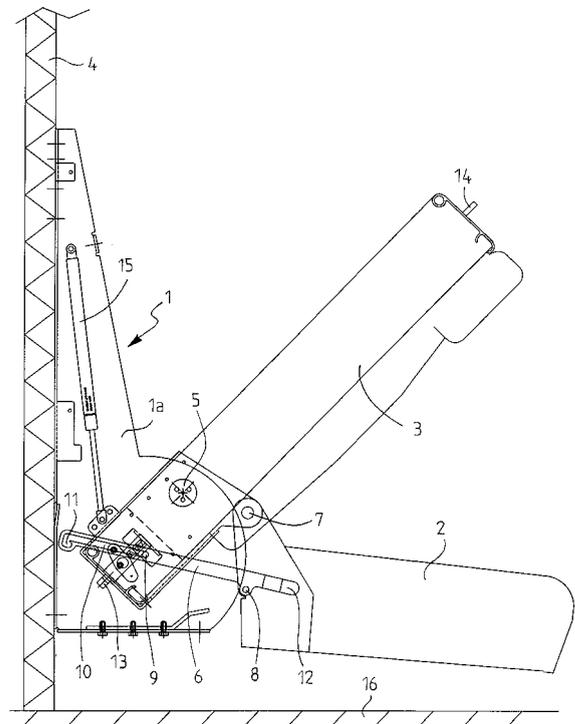


FIG. 2

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Description

BACKGROUND OF THE INVENTION

[0001] The invention relates to a convertible sofa-bed that comprises a frame structure, a seat part and a backrest part, the backrest part forming at the same time a downwardly reclinable bed part such that the reverse side of the backrest part becomes the upper side of the bed part, the lower part of the backrest part is mounted on bearings to the frame structure to be turnable about one pivot axis, the seat part is mounted on bearings to the backrest part in front of said pivot axis, the seat part is supported at both ends to the frame structure with guide bars, a first end of which is supported below the pivot point of the seat part and a second end is supported to the frame structure, whereby the seat part is arranged to adopt a substantially horizontal position beneath the bed part guided by a three-point support at the ends of the seat part as the backrest part is reclined downwardly to serve as the bed part. In particular the question is about a cabin sofa-bed of a passenger ship, but apart from the passenger ships the sofa-bed of the invention may also be employed in other applications, such as trains and rooms in buildings.

[0002] A convertible sofa-bed of this kind is known from NL 81263C. In ships, the known convertible sofa-bed is mounted on the cabin floor by means of a sturdy frame structure, whereby a mechanism, which enables a backrest part to be reclined to form a bed, is arranged inside the ends of the cabin sofa-bed that are steadily mounted on the cabin floor. This mechanism includes curved guide tracks in said ends and guide rollers in the backrest part which are to move along the guide tracks of the ends, when the backrest part is turned between bed and sofa positions.

[0003] Because the cabin floor is not nearly always straight, the first problem in said structure arises from the fact that if the glide tracks of the opposing ends are not completely aligned, it will be hard and cumbersome, sometimes even almost impossible, to turn the backrest part. Another considerable problem arises from the fact that as the sofa-bed frame forms a complex case-like structure on the cabin floor, cleaning is here very difficult or almost impossible. Consequently, with time dust and items rolling over the edges of the sofa/bed will accumulate under the sofa-bed.

[0004] Heavy and complex end structure resting against the floor also makes the mounting of the sofa-bed difficult due to required cabin floor levelling work, for instance. Options to shape the sofa-bed ends are also limited, because they have to incorporate said glide track arrangement.

SUMMARY OF THE INVENTION

[0005] The object of the present invention is to provide a convertible sofa-bed in which the above described

problems have been solved. This is achieved with a convertible sofa-bed in accordance with the invention, which is characterized in that a frame structure is arranged through frame parts to be secured to a vertical wall structure to provide wall mounting for the convertible sofa-bed.

[0006] The convertible sofa-bed of the invention may be mounted as a whole, for instance, on a cabin wall, when necessary by means of bracing rails or the like. This novel solution allows free design of the sofa-bed ends. The frame structure is simple, small and light.

[0007] When turning the backrest part to a bed part is made in the simplest manner about one axis without complicated glide track guidance, while the seat part is guided horizontally beneath the bed part with an efficient lever mechanism, inclination in opposing frame ends, for instance, does not affect at all the turning of the backrest part, but it will always turn with the same ease as planned.

[0008] In addition, the wall mounting, as such, of the convertible sofa-bed according to the invention facilitates essentially cabin floor cleaning under the sofa-bed, but further still, if in accordance with an embodiment of the invention, frame structure support of guide bars provided for seat part guidance is arranged to be glidable and lockable to a second extreme position such that in the sofa position of the convertible sofa-bed the seat part may be lifted up at least for a given angle towards the backrest part and locked in this position, cleaning will be easier still. In such a case, at the extremities of the guide bars, on the frame side, there may be, for instance, elongated guide slots with locking notches, and at the extremities of the guide bars, on the seat part side, there are lever handles, which extend beyond their supports and where-with the guide bars may be locked and released as the seat part is turned.

[0009] Preferred embodiments of the convertible sofa-bed of the invention are disclosed in claims 2 to 6.

LIST OF DRAWINGS

[0010] In the following, the invention will be described in greater detail by means of one preferred embodiment, with reference to attached drawings, in which

Figure 1 shows an end view of a convertible sofa-bed according to the invention in a sofa position,

Figure 2 shows an end view of a convertible sofa-bed according to the invention as a backrest part is being turned to a bed part,

Figure 3 shows an end view of the convertible sofa-bed of the previous figures, the backrest part turned to form the bed part, and

Figure 4 shows an end view of the convertible sofa-bed of the previous figures, the seat part turned up towards the backrest part.

DETAILED DESCRIPTION OF THE INVENTION

[0011] The main components of a convertible sofa-bed

shown in the drawings comprise a frame structure 1, a seat part 2 and a backrest part 3, the backrest part 3 simultaneously constituting a downwardly reclinable bed part such that the reverse side of the backrest part becomes the upper side of the bed part (Figure 3).

[0012] The frame structure 1 mainly consists of two vertical frame parts 1 a which are adjacent to the ends of the seat part 2 and the backrest part 3 and extend roughly to the height of the upper edge of the backrest part 3. These frame parts 1 a may be mounted to a cabin wall structure 4 directly or through support rails (not shown).

[0013] The lower parts of each end of the backrest part 3 are mounted on bearings to the frame parts 1 a of the frame structure 1 by means of support bearings or pivot pins 5, whereby the backrest part 3 is turnable about one common pivot axis passing through parts 5.

[0014] The seat part 2, in turn, is mounted on bearings to the backrest part 3 with slewing journals 7 in front of said pivot axis, i.e. support bearings or pivot pins 5, and supported to the frame parts 1a at both ends with guide bars 6, which are each supported at one extremity with a link 8 beneath the slewing journals 7 of the seat part 2 and at the other end to the frame parts 1a of the frame structure 1, and consequently as the backrest part 3 is being reclined downwardly to form a bed part, the seat part 2 adopts a substantially horizontal position beneath the bed part guided by the above-described three-point support of the ends of the backrest part 3 (Figures 2 and 3). The slewing journals 7 form a pivot axis that remains stationary as the seat part 2 is being turned, whereby the pivot axis is fixed and does not move in vertical or horizontal directions.

[0015] The support of the guide bars 6 in the frame parts 1 a is glidable and lockable to one extreme position such that in the sofa position of the cabin sofa-bed the seat part 2 may be lifted up at least for a given angle towards the backrest part 3 and locked to that position. This is implemented such that at the extremities of the guide bars 6, on the side of the frame parts 1 a, there are elongated guide slots 10 with locking notches 11 gliding in the support pins 9 of the frame parts 1a, and at the extremities of the guide bars 6, on the side of the seat part 2, there are lever handles 12 which extend beyond their links 8 and wherewith the guide bars 6 may be locked to the locking notches 11 and released therefrom as the seat part 2 is being turned (Figure 4). In the position of Figure 4 it is easy to clean the floor 16.

[0016] Locking of the backrest part 3 to the frame parts 1a in the bed position may be advantageously implemented with spring-action locking means 13 which may be used through wires, for instance, with a lever 14 arranged in the upper part of the backrest part 3.

[0017] In addition, in the implementation given as an example there are arranged, between the frame parts 1a and the backrest part 3, hydraulic dampers 15 that dampen the recline of the backrest part 3 and facilitate the same to be lifted upright.

[0018] If, for some reason, wall mounting of the described convertible sofa-bed is not sufficiently firm, it is possible to install adjustable support legs, for instance, between the frame parts 1 a and the cabin floor 16.

5 **[0019]** The above description of the invention is only intended to illustrate the basic idea of the invention. Thus, the invention is not restricted to the above-described example, but a person skilled in the art may implement the details thereof in a variety of ways within the scope of
10 the attached claims. In addition, it should be noted that, apart from ships, the convertible sofa-bed of the invention may also be used in other applications where seats and beds need to be arranged in a confined space. Thus, trains and even rooms in buildings with limited space may
15 be concerned.

Claims

- 20 1. A convertible sofa-bed that comprises a frame structure (1), a seat part (2) and a backrest part (3), the backrest part (3) forming at the same time a downwardly reclinable bed part such that the reverse side of the backrest part (3) becomes the upper side of the bed part, the lower part of the backrest part (3) is mounted on bearings to the frame structure (1) to be turnable about one pivot axis (5), the seat part (2) is mounted on bearings to the backrest part (3) in front of said pivot axis (5), the seat part is supported at both ends to the frame structure (1) with guide bars (6), a first end of which is supported below the pivot point (7) of the seat part (2) and a second end is supported to the frame structure (1), whereby the seat part (2) is arranged to adopt a substantially horizontal position beneath the bed part guided by a three-point support at the ends of the seat part (2) as the backrest part (3) is reclined downwardly to serve as the bed part, **characterized in that** the frame structure (1) is arranged through frame parts (1 a) to be secured to a vertical wall structure (4) to provide wall mounting for the convertible sofa-bed.
- 25 2. The convertible sofa-bed of claim 1, **characterized in that** the vertical wall structure is a wall structure of a ship cabin.
- 30 3. The convertible sofa-bed of claim 2, **characterized in that** the frame structure (1) and the frame parts (1 a) of the sofa-bed are arranged for direct mounting on the cabin wall structure (4).
- 35 4. The convertible sofa-bed of claim 2, **characterized in that** the frame structure (1) and the frame parts (1 a) of the sofa-bed are arranged for mounting on the cabin wall structure (4) by means of support rails.
- 40 5. The convertible sofa-bed of any one of the preceding claims, **characterized in that** support of the guide
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bars (6) in the frame structure is arranged to be glidable and lockable to a second extreme position such that in the sofa position of the convertible sofa-bed the seat part (2) may be lifted up at least for a given angle towards the backrest part (3) and locked **in that** position. 5

6. The convertible sofa-bed of claim 5, **characterized in that** at the extremities of the guide bars (6), on the side of the frame structure (1), there are elongated guide slots (10) with locking notches (11), and that at the extremities of the guide bars (6), on the side of the seat part (2), there are lever handles, which extend beyond their supports (8) and where-with the guide bars (6) may be locked and released as the seat part (2) is turned. 10 15

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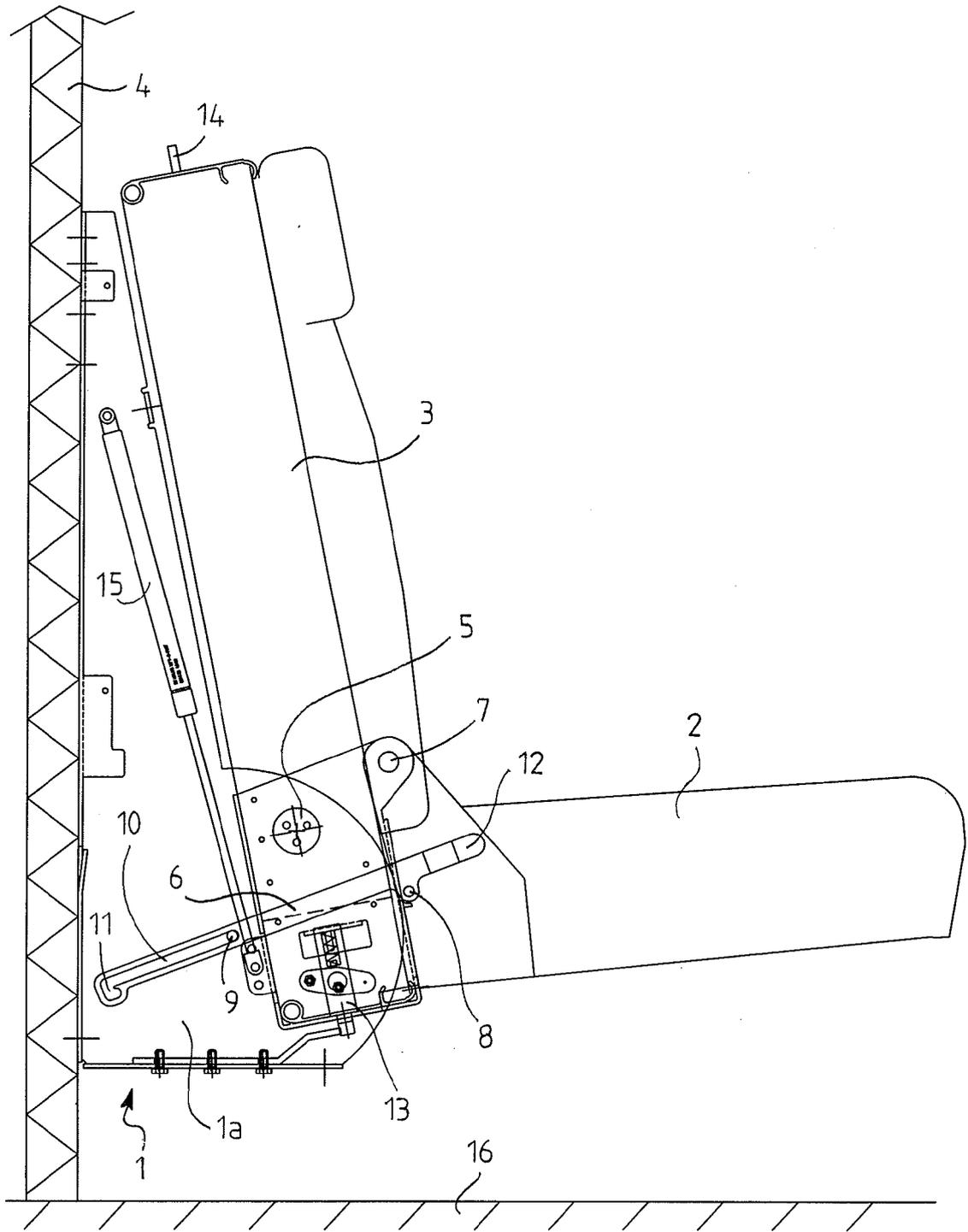


FIG. 1

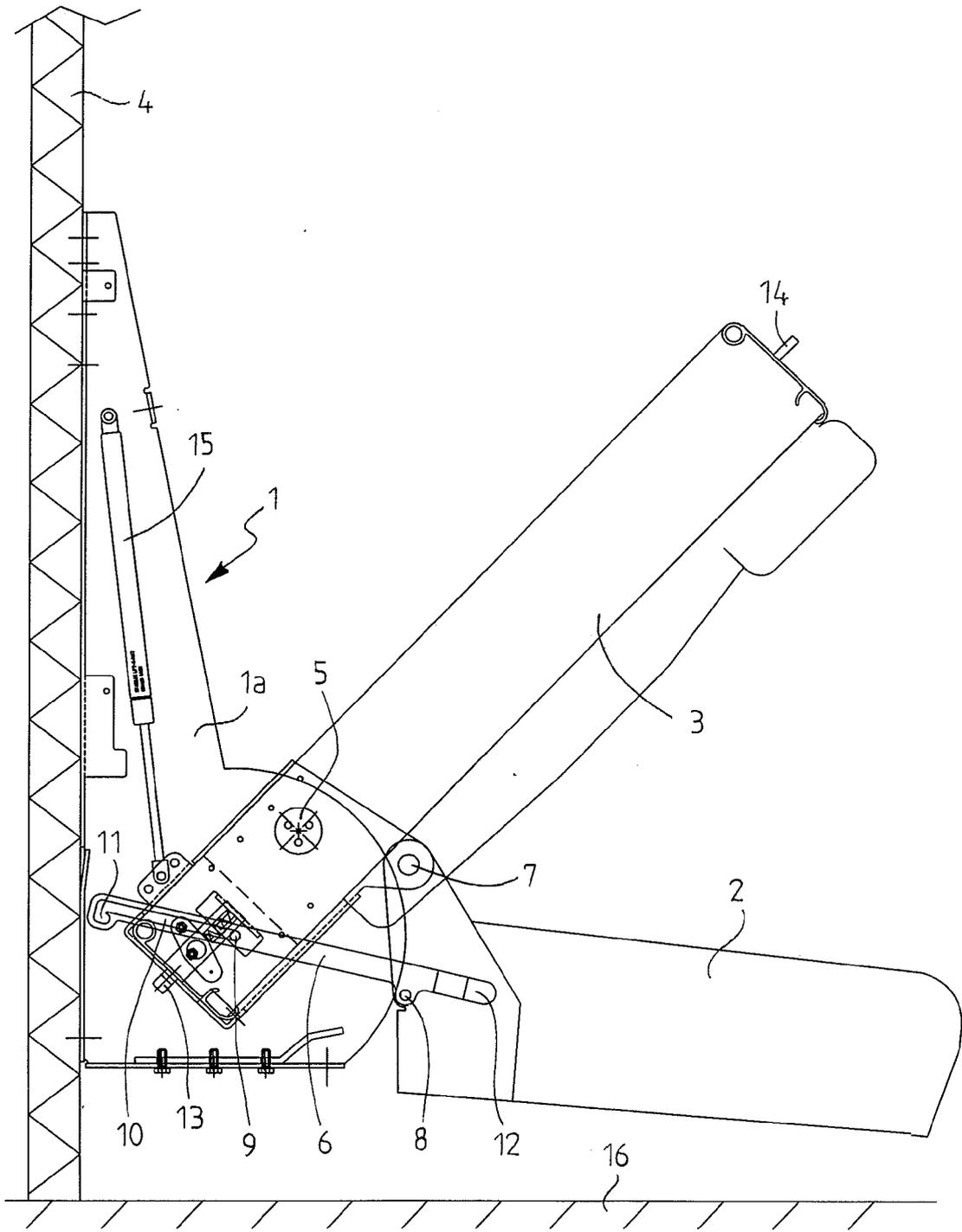


FIG. 2

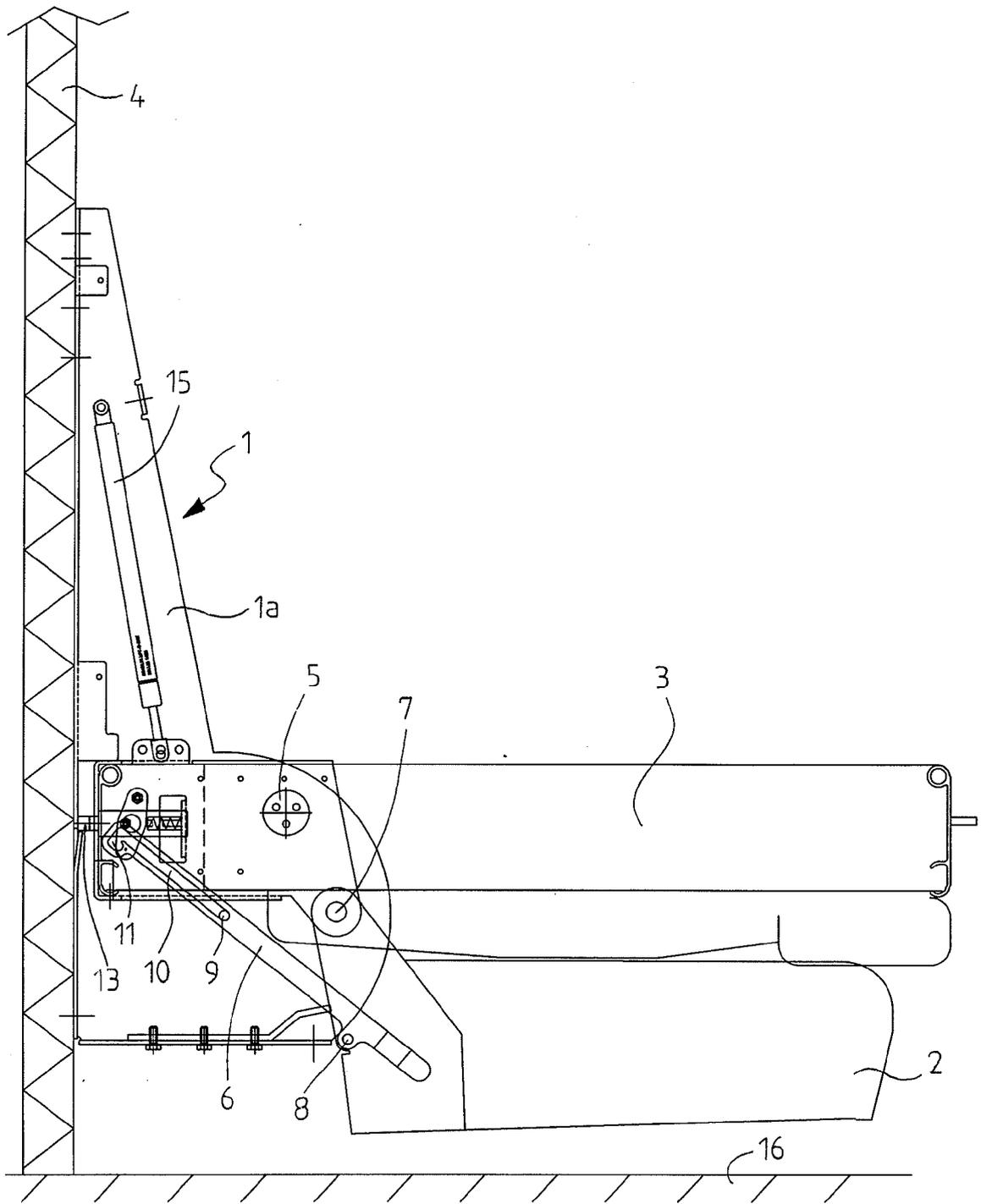


FIG. 3



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	US 2003/121099 A1 (LIM JERRY [SG] ET AL) 3 July 2003 (2003-07-03) * paragraphs [0008] - [0012], [0026] - [0038]; figures 1-9,11-15 *	1-4	INV. B63B29/10 A47C17/40 A47C17/165
X	US 5 652 978 A (WIIG SELMER [US]) 5 August 1997 (1997-08-05) * column 3, line 27 - column 6, line 60; figures 1-12 *	1-4	
A	EP 1 053 704 A (COVAREL GUY [FR]) 22 November 2000 (2000-11-22) * paragraphs [0012] - [0036]; figures 1-7 *	1-4	
			TECHNICAL FIELDS SEARCHED (IPC)
			B63B A47C B62D B61D B60P B60N
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		16 October 2007	Kus, Slawomir
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons</p> <p>& : member of the same patent family, corresponding document</p>			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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16-10-2007

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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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