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(54) **Automatic lifting system for the supporting surface of a bed base**

(57) There is described a lifting system of the supporting surface of a bed base (1), which is capable of automatically raising the supporting surface (4) to a substantially horizontal raised position corresponding to that of the bed base (1), or to a raised and translated position with respect to that of the bed base (1).

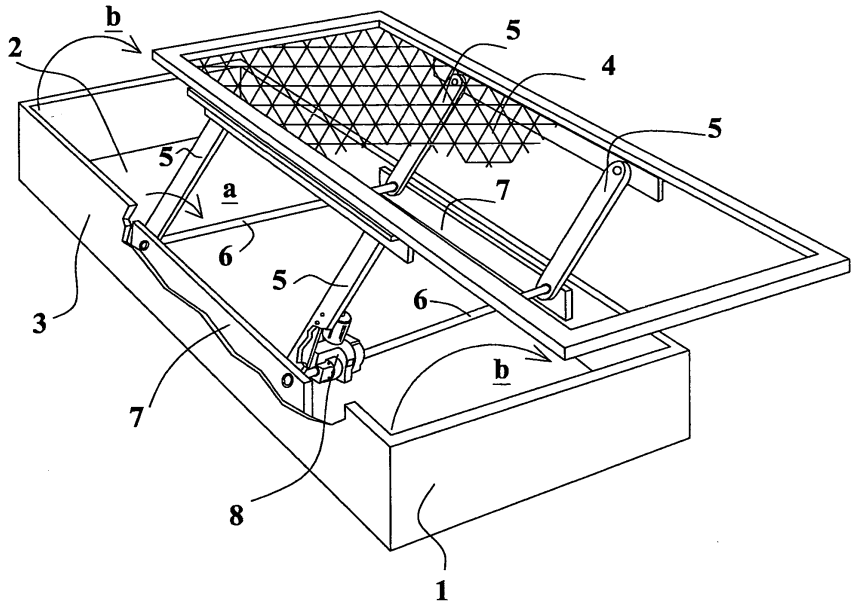

Fig. 1

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Description

[0001] The present invention refers to an automatic lifting system for the supporting surface of a bed base.

[0002] There exist in the prior art specific bed base structures (called "Sommier") which form an internal compartment under the supporting surface of the mattress, to be used as a store to contain objects. Instead, other structures, called "giroletto", are composed of vertical walls under the supporting surface, which characterize an open space below the supporting surface. The space in the bed base between the vertical walls can be empty or open, or can comprise another supporting surface below.

[0003] When idle the supporting surface of the mattress is in direct contact with the upper edge of the bed base, while to allow access to the inner compartment the supporting surface can be lifted manually by means of a system of mechanical arms with optional return springs, positioned at one end of the supporting surface, which allows the other end of the supporting surface to be lifted, tilting it in elevation.

[0004] There are also known other manual lifting systems of the supporting surface, also with mechanical arms and optional return springs, which allow a lifting movement that takes the supporting surface to a raised horizontal position, to facilitate tidying of the bed.

[0005] All said manual lifting systems of the supporting surface cause problems of difficulty of use, as normally a considerable manual force must be exerted, at least in the initial stage in which it is necessary to overcome the counteracting force of the return springs of the lifting system, both during opening and closing.

[0006] Moreover, in conventional systems with return springs the opening operation can be triggered suddenly and unexpectedly with consequent limits in terms of safety.

[0007] Therefore, the object of the present invention is to overcome all the aforesaid drawbacks and to indicate an automatic lifting system of the supporting surface of a bed base which is easy to use, safe and moderate in cost.

[0008] It is an object of the present invention a lifting system of a supporting surface with respect to a bed base, characterized in that said lifting system comprises means for automatic lifting of said supporting surface with respect to the bed base, suitable to automatically raise the supporting surface to a substantially horizontal raised position corresponding to that of the bed base.

[0009] It is another object of the invention a lifting system that is also capable of automatically lifting the supporting surface to a substantially horizontal and translated raised position with respect to that of the bed base.

[0010] It is another object of the invention a bed comprising said lifting system.

[0011] It is a particular object of the invention an automatic lifting system of the supporting surface of a bed base, as better described in the claims, which form an integral part of the present description.

[0012] Further objects and advantages of the present invention will be apparent from the detailed description below of an embodiment thereof (and variants thereof) and from the accompanying drawings provided purely by way of non limiting example, in which:

figure 1 shows a first variant of an embodiment of a bed base with a supporting surface with automatic lifting according to the present invention;
figure 2 shows a second variant of an embodiment of a bed base with a supporting surface with automatic lifting according to the present invention.

[0013] The same reference numbers and letters in the figures identify the same elements or components.

[0014] In the figures, the number 1 indicates a bed base, preferably of parallelepiped type which comprises an internal compartment 2, especially to contain objects, delimited by vertically extending perimeter walls 3. The space in the bed base between the vertical walls can also be empty or open, or can comprise another supporting surface below it.

The number 4 indicates a supporting surface for a mattress, not shown. The supporting surface can be of any known type, for example comprising an elastic base or wooden slats, single or double, of any dimension or thickness and of any material, also with springs.

[0015] In a normal closed position, the supporting surface rests on the upper edge of the bed base. It must then be possible to take the supporting surface to a raised position without considerable physical effort, substantially for the following purposes:

- to allow access to the internal compartment 2 of the bed base 1;
- to facilitate operations to tidy the bed;
- to facilitate cleaning operations if the bed base has no bottom and the floor is accessible, once the supporting surface is raised;
- to lift the supporting surface together with the mattress, and if necessary also the person lying on top, for example to assist a disabled or bedridden person.

Preferably the raised position must be substantially horizontal.

[0016] Therefore, in accordance with the present invention an automatic lifting system is inserted between the bed base and the supporting surface.

[0017] The lifting system substantially allows two types of lifting of the supporting surface: a first type of raising and translation with respect to the bed base; a second type of raising only in a position corresponding to that of the bed base.

[0018] An example of embodiment of the first type of lifting system with raising and translation is shown in figure 1.

[0019] There is provided a system with parallel arms

5, for example two or more parallel arms for each opposed side of the bed base 1: the arms are pivoted at one end thereof inside two opposite lateral walls 3 of the bed base, and at the other end thereof at the internal edge of the supporting surface 4.

[0020] The length of the arms 5 and the pivot points thereof at the ends are such that in the idle position the supporting surface 4 is correspondingly resting on the bed base 1.

[0021] Preferably, in the internal compartment 2 there are provided horizontal bars 6 which transversely join the lower ends of the opposed parallel arms 5.

[0022] Preferably on the internal parts of the walls 3 there are also provided two reinforcing section bars 7, to which the lower ends of the arms 5 and the horizontal bars 6 are pivoted.

[0023] There is provided an electric motor 8, fitted directly to the junction between the ends of a horizontal bar 6 and of an arm 5. The electric motor 8 is capable of imparting a raising motion of the arms 5 by rotating according to the direction of the arrow a in figure, so as to make the supporting surface 4 perform a raising and translating movement according to the direction of the arrow b.

[0024] The electric motor 8 can be fastened to the wall 3 of the bed base or to the reinforcing section bar 7 so as to exert leverage thereon for rotation of the arm 5. Otherwise, it can be fastened to the horizontal bar 6 so as to exert leverage thereon; in this case, the bar 6 does not rotate together with the arm 5, but is fixed on the walls 3 or on the reinforcing section bars 7.

[0025] The lifting system can be installed so that translation of the supporting surface can take place in any of the horizontal directions with respect to the position of the bed base.

[0026] An example of embodiment of the second type of lifting system with raising only is shown in figure 2.

[0027] There is provided a system of arms of the pantograph type, comprising two pairs of crossed arms 9' and 9", one pair for each opposed side of the bed base 1. The crossed arms are mutually pivoted in the central point: one arm, for example 9", has a lower end pivoted in a fixed manner to the inside of two opposite lateral walls 3 of the bed base, and an upper end pivoted in a sliding manner to the internal edge of the supporting surface 4; the other arm, for example 9', has a lower end pivoted in a sliding manner inside the two opposed lateral walls 3 of the bed base, and an upper end pivoted in a fixed manner to the internal edge of the supporting surface 4.

[0028] The sliding ends of the arms of the pantograph slide inside appropriate guides 7' fastened to the inside of the two opposite lateral walls 3 of the bed base and to the internal edge of the supporting surface 4.

[0029] The length of the arms 9', 9" is such that when idle the supporting surface 4 is correspondingly resting on the upper edge of the bed base 1.

[0030] Preferably, in the internal compartment 2 there are provided two horizontal bars 6' which transversely join the lower ends of the pairs of opposed crossed arms.

[0031] Also in this second variant there is provided an electric motor 8', fitted directly to the junction between the ends of a horizontal bar 6' and an arm 9' or 9". Also in this case, the electric motor 8' is capable of imparting a raising motion of the arms 9', 9" according to the direction of the arrows c in figure 2, so as to cause the supporting surface 4 to perform a raising movement.

[0032] The electric motor 8' can be fastened to the wall 3 of the bed base or to the guide 7' so as to exert leverage thereon to raise the arms of the pantograph. Otherwise, it can be fastened to the horizontal bar 6' so as to exert leverage thereon; in this case the bar 6' does not rotate together with the arm of the pantograph to which it is fastened, but is fixed on the walls 3 or on the guide 7'.

[0033] In both variants of figures 1 and 2, the electric motor can be controlled by a remote control with or without wires, or by an electric push button in a suitable position, for example concealed in the bed base.

[0034] There can be several motors 8 at the vertices of the lifting system, for example one for each point in which the arms are pivoted to the bed base.

[0035] Alternatively to the electric motor, there can be provided a system with electrically controlled hydraulic or pneumatic cylinders, suitably connected on one side to the bed base and on the other to the arms of the lifting system, or a system with telescoping arms or telescoping guides.

[0036] Variants to the non-limiting example described are possible, without however departing from the scope of protection of the present invention, including all equivalent embodiments for those skilled in the art.

[0037] The advantages deriving from application of the present invention are apparent.

[0038] The main advantages consist in the ease of use in the raising operations of the bed to allow complete accessibility of the internal compartment and to allow easy access at a suitable height to tidy the bed.

[0039] The lifting system overcomes the drawbacks linked to the sudden ascent or descent of conventional systems, for example in conventional systems with return springs.

[0040] The lifting system allows the supporting surface to be taken to a raised position without appreciable physical effort, substantially for the following purposes:

- to allow access to the internal compartment 2 of the bed base 1;
- to facilitate operations to tidy the bed;
- to facilitate cleaning operations if the bed base has no bottom and the floor is accessible, once the supporting surface is raised;
- to lift the supporting surface together with the mattress, and if necessary also the person lying on top, for example to assist a disabled or bedridden person.

[0041] From the description given above, those skilled

in the art are able to produce the subject of the invention without introducing further constructional details.

Claims

1. Lifting system of a supporting surface with respect to a bed base, **characterized in that** said lifting system comprises means for automatic lifting (8, 9', 9") of said supporting surface (4) with respect to the bed base (1), able to automatically raise the supporting surface to a substantially horizontal raised position corresponding to that of the bed base

2. Lifting system as claimed in claim 1, **characterized in that** said automatic lifting means (8, 9', 9") of said supporting surface (4) with respect to the bed base (1) are also suitable to automatically lift the supporting surface to a substantially horizontal and translated raised position with respect to that of the bed base.

3. Lifting system as claimed in claim 2, **characterized in that** said automatic lifting means (8, 9', 9") comprise:

   - a system of arms of the pantograph type (9', 9") connected between said bed base and said supporting surface;
   - at least one electric motor (8) connected to said system of pantograph arms, suitable to determine automatic raising of said arms, carrying said supporting surface to said raised position.

4. Lifting system as claimed in claim 3, **characterized in that** said pantograph system comprises:

   - two pairs of crossed arms (9', 9"), one pair for each opposed side of the bed base, the length of said arms being such that when idle the supporting surface (4) is correspondingly resting on the upper edge of the bed base (1).
   - sliding guides (7) for the sliding ends of the crossed arms, said guides being fastened to the inside of opposite lateral walls (3) of the bed base and to the internal edge of the supporting surface (4).

5. Lifting system as claimed in claim 4, **characterized in that** said pantograph system also comprises horizontal bars (6") that transversely join the opposed pairs of crossed arms connected to said bed base.

6. Lifting system as claimed in claim 4 or 5, **characterized in that** said at least one electric motor (8') is connected to said side wall (3) or to said sliding guide (7') so as to exert leverage thereon to raise the arms of the pantograph, or said at least one electric motor (8') is connected to said horizontal bar (6') so as to exert leverage thereon.

7. Lifting system as claimed in claim 2, **characterized in that** said automatic lifting means (8, 9', 9") comprise:

   - a system of parallel arms (5) connected between said bed base and said supporting surface;
   - at least one electric motor (8) connected to said system of parallel arms, suitable to determine automatic raising of said arms, carrying said supporting surface to said raised and translated position.

8. Lifting system as claimed in claim 7, **characterized in that** said system with parallel arms comprises two or more parallel arms (5) for each opposed side of the bed base (1), said arms being pivoted at one end thereof to the inside of two opposite lateral walls (3) of the bed base, and at the other end thereof to the internal edge of the supporting surface (4), the length of said arms (5) and the pivoting points thereof at the ends being such that in the idle position the supporting surface (4) is correspondingly resting on the bed base (1).

9. Lifting system as claimed in claim 8, **characterized in that** said system of parallel arms also comprise horizontal bars (6) which transversely join the ends of the opposed parallel arms connected to said bed base.

10. Lifting system as claimed in claim 8 or 9, **characterized in that** said at least one electric motor (8) is connected to said lateral wall (3) so as to exert leverage thereon to raise the parallel arms, or said at least one electric motor (8) is connected to said horizontal bar (6) so as to exert leverage thereon.

11. Lifting system as claimed in claim 2, **characterized in that** said automatic lifting means (8, 9', 9") comprise:

    - a system of lifting arms connected between said bed base and said supporting surface;
    - a system with hydraulic or pneumatic cylinders, or with telescoping arms or telescoping guides, electrically controlled, connected on one side to the bed base and on the other to said system of lifting arms.

12. Lifting system as claimed in any one of claims 3 to 11, **characterized in that** said at least one electric motor (8) is controlled by a remote control with or without wires, or by an electric push button, preferably concealed in the bed base.

13. Bed comprising a bed base and a supporting surface, **characterized in that** it comprises a lifting system of said supporting surface as claimed in any one of the preceding claims.

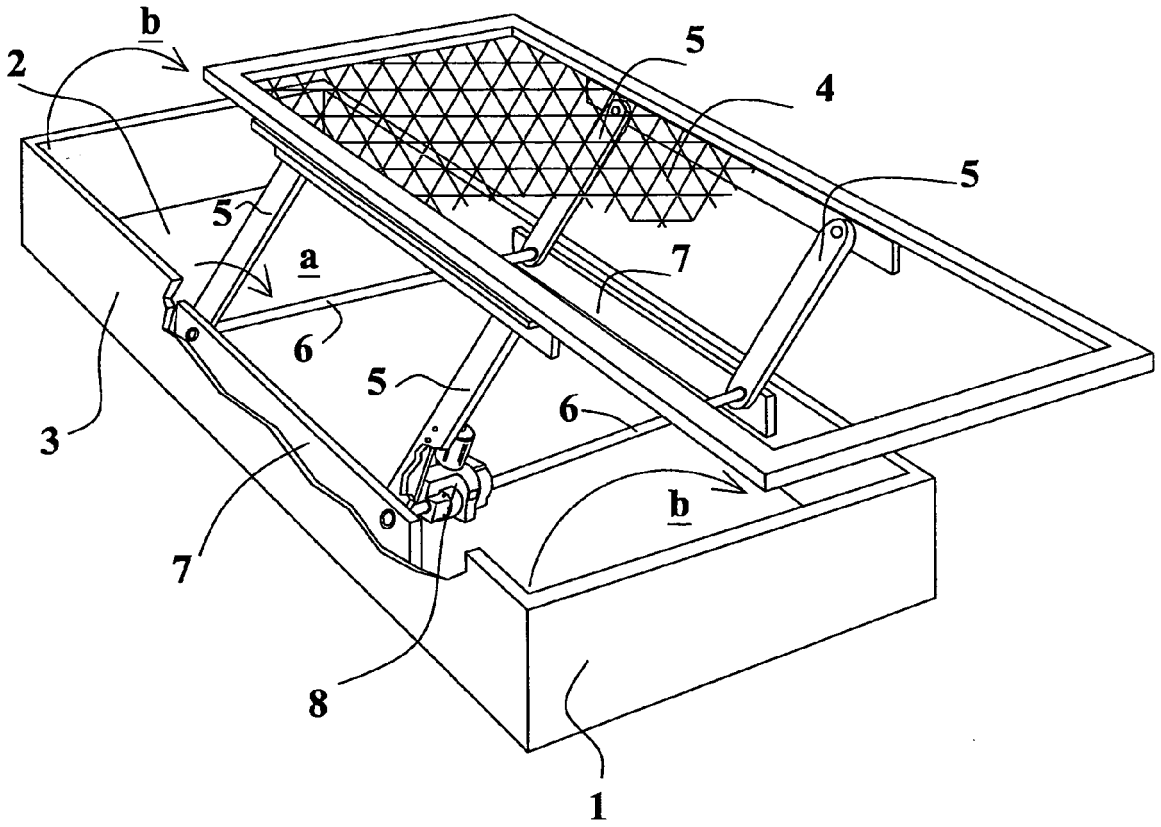

Fig. 1

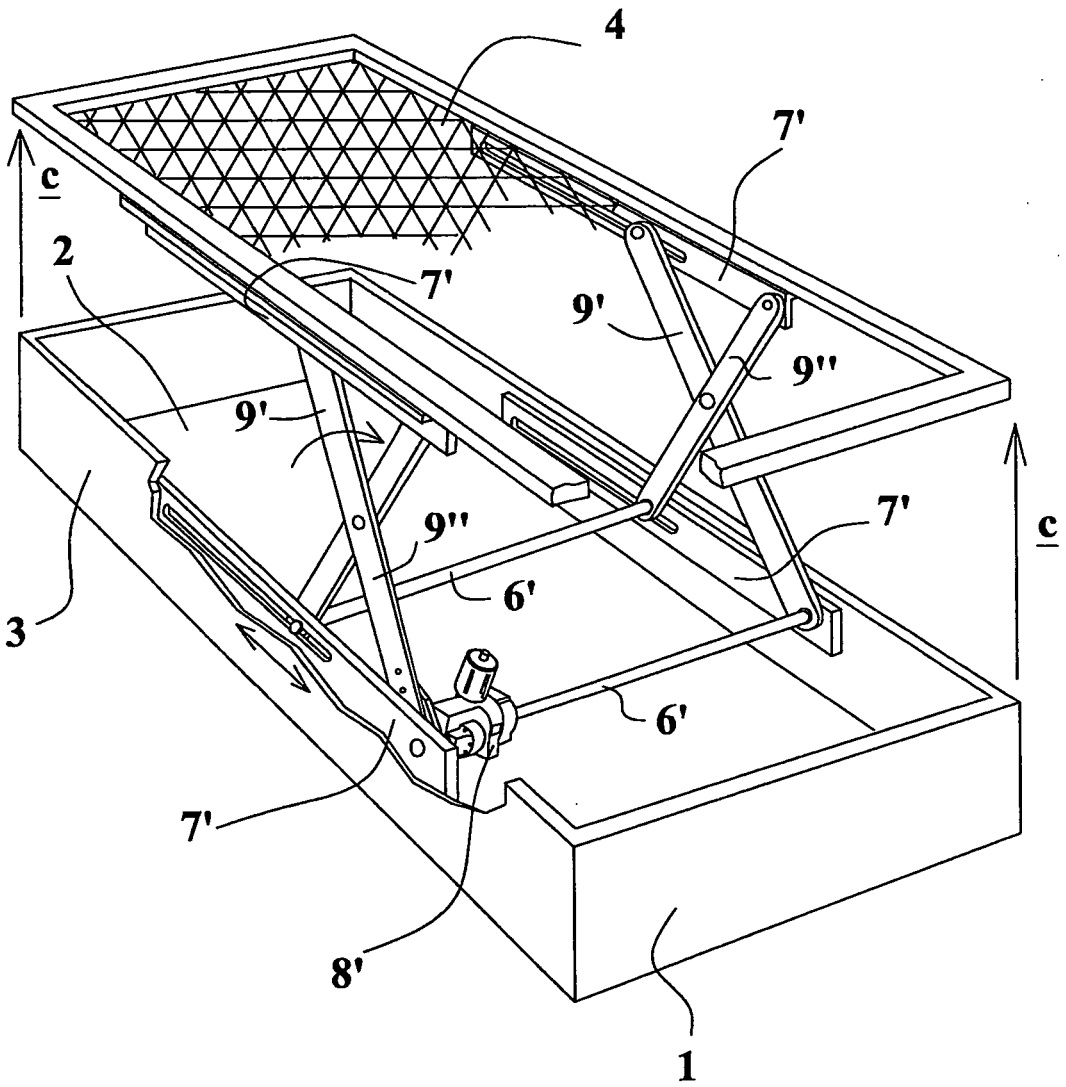

Fig. 2

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 08 42 5249

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 5 687 437 A (GOLDSMITH) 18 November 1997 (1997-11-18) * column 9, lines 44-55 * * column 13, lines 14-45 * * figures 2,5 * -----	1,2, 7-10,12, 13	INV. A47C17/86 A47C19/00
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X	US 2005/251915 A1 (ELIZONDO) 17 November 2005 (2005-11-17) * paragraph [0020]; claim 1; figures * -----	1,2,11, 13	
			TECHNICAL FIELDS SEARCHED (IPC) A47C A47B B66F A61G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	15 September 2008	Kis, Pál

CATEGORY OF CITED DOCUMENTS

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 08 42 5249

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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15-09-2008

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