

[54] **FOLDING BED**

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[22] Filed: **June 2, 1972**

[21] Appl. No.: **259,121**

[30] **Foreign Application Priority Data**

June 11, 1971 Switzerland..... 8508/71

[52] U.S. Cl. 5/2 R, 5/136, 5/164 R

[51] Int. Cl. A47b 83/00

[58] Field of Search.....5/2 B, 2 R, 164 R, 164 B,
5/164 G, 164 E, 136, 146, 147, 313 R; 108/33,
32, 48, 40, 134; 297/14, 331, 332, 335;
248/240.1, 372, 376

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Primary Examiner—James C. Mitchell

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[57] **ABSTRACT**

A folding bed includes a bed frame pivotally mounted about a horizontal edge to pieces slidably guided along a pair of vertical uprights, an elbow lever pivotally joining each upright to the bed frame. Compression coil springs disposed along the uprights downwardly urge the sliding pieces to counterbalance the weight of the bed frame as it pivots between a vertical storage position and a horizontal use position. On one or both uprights, a piece of furniture such as a cabinet is pivotally mounted about a vertical axis between a position applied against the stored bed and a position in which the bed frame can be lowered.

17 Claims, 6 Drawing Figures

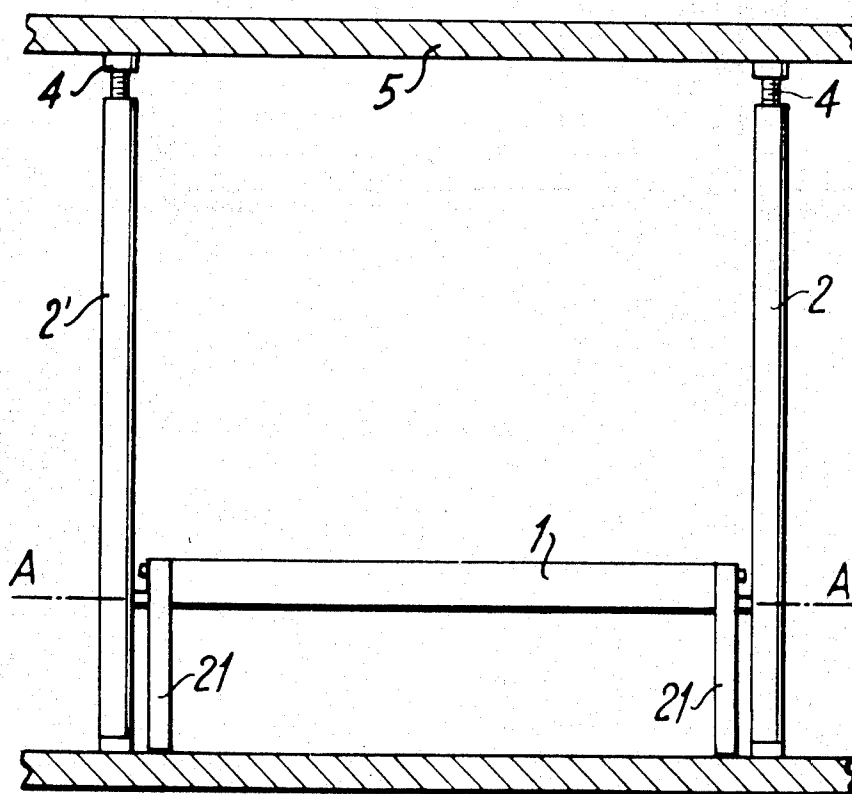


FIG. 1

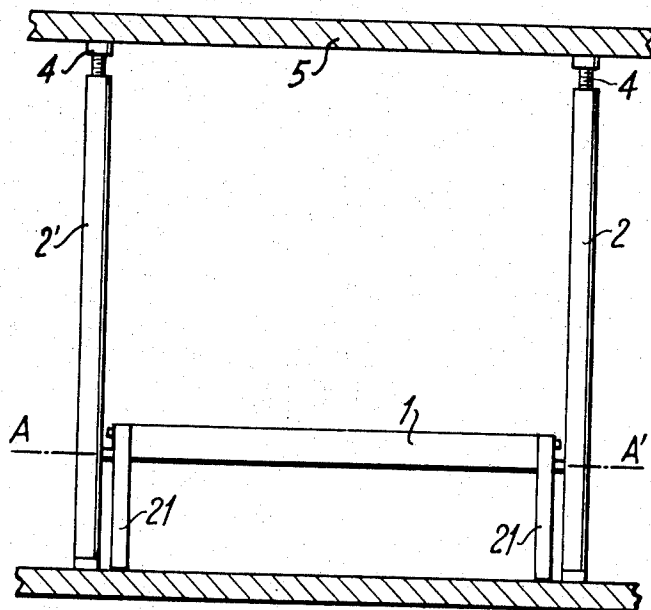
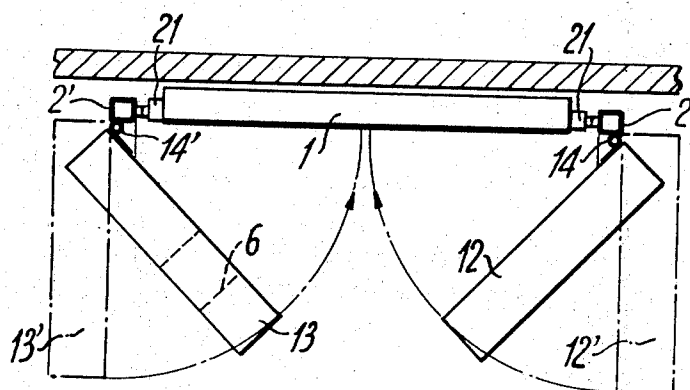


FIG. 2



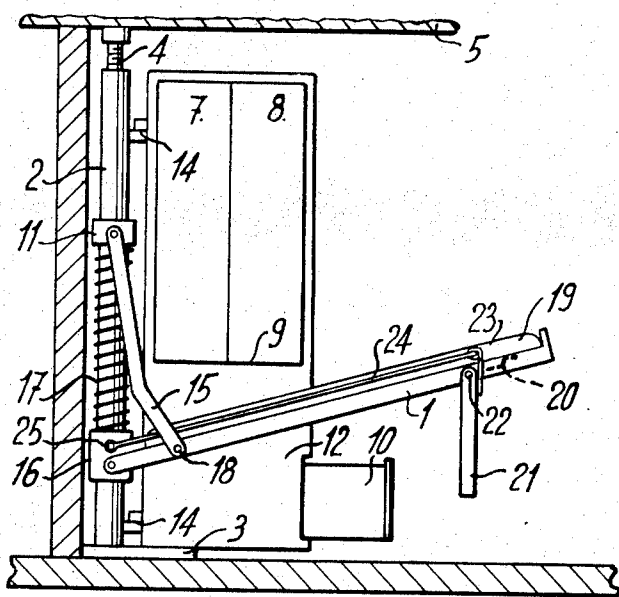


FIG. 3

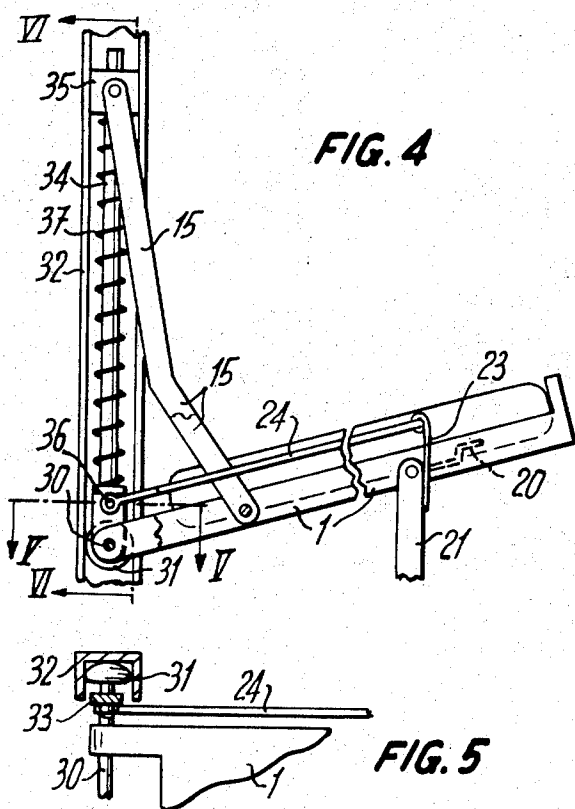


FIG. 4

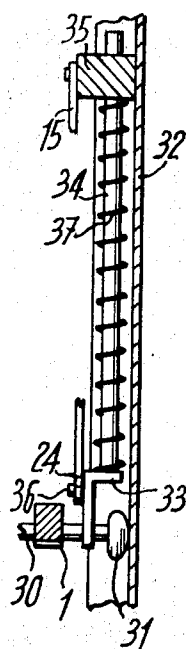


FIG. 5

FIG. 6

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FOLDING BED

The invention relates to folding beds and is particularly concerned with beds which may be folded to a vertical storage position.

Known folding beds of this type are generally incorporated in a wall cabinet whose sole purpose, apart from decoration, is concealment of the stored bed so that the only use of the piece of furniture is as a bed.

It is therefore an aim of the invention to provide additional possibilities of use of a folding bed of the above-mentioned type as a multi-purpose piece of furniture.

According to one aspect of the invention, there is provided a folding bed comprising a pair of fixed spaced-apart vertical uprights, a bed frame pivotally interconnected adjacent a horizontal edge thereof to the uprights for pivotal movement along a given trajectory from a vertical storage position to a horizontal use position, and at least one piece of furniture pivotally mounted about a vertical axis to one of the uprights for pivotal movement between a first position in which a face of the piece of furniture is applied against the bed frame in the vertical storage position thereof and a second position in which the piece of furniture lies out of said trajectory of the bed frame to permit movement of the bed frame between its vertical storage and horizontal use positions.

The term "piece of furniture" is herein used to designate articles such as cupboards, cabinets, dressers, wardrobes, closets, sideboards, chests of drawers, and book shelves or other types of shelving units, all adapted for the storage of items other than the bed, and articles with other functions, for example armchairs, sofas, tables and so on, to the exclusion of dummy furniture, door panels and the like whose sole purpose, apart from decoration, is concealment and/or storage of the bed.

Moreover, in known folding beds of this type, the weight-compensating means are formed either by counterweights, or by relatively complex, heavy and bulky spring and lever systems. Difficulties are therefore encountered in providing a simple folding bed which, in its vertical storage position, takes up the least possible space.

It is therefore an aim of the invention to provide a folding bed of the above type in which the mechanism for pivotally mounting the bed and the weight compensating means are of simple construction and provide an efficient counterbalancing effect while being of a relatively small bulk, so that the overall bulk of the bed can be reduced to a minimum.

According to another aspect of the invention, there is therefore provided a folding bed comprising a pair of fixed spaced apart supports and a bed frame pivotally interconnected adjacent a horizontal edge thereof to the supports by a mechanism including, for each support: a piece vertically slidably guided by the support, means pivotally connecting said one edge of the bed frame to the sliding piece, an arm pivotally connected to the support and to the bed frame about the axis parallel to and spaced apart from said edge, and elastic means for compensating the weight of the bed frame during pivotal movement thereof between a vertical storage position and a horizontal use position, said compensating means including a compression coil

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spring downwardly urging each of said sliding pieces.

An embodiment of the invention and a modification thereof will now be particularly described, by way of example, with reference to the accompanying schematic drawings, in which:

FIG. 1 is a diagrammatic front elevational view of a bed according to the invention with the bed shown in FIG. 1 frame in the horizontal use position.

FIG. 2 is a plan view of the bed with the bed frame in the vertical storage position.

FIG. 3 is a schematic side elevational view showing the pivotal interconnection of the bed frame and an upright.

FIG. 4 is a partial side elevational view showing a varied form of pivotal interconnection of the bed frame and an upright.

FIG. 5 is a cross-section taken along line V—V of FIG. 4; and

FIG. 6 is a cross-section taken along line VI—VI of FIG. 4.

With reference to FIG. 1, the folding bed comprises a pair of tubular spaced-apart fixed supports in the form of vertical uprights 2 and 2', as well as a rectangular bed frame 1 pivotally interconnected adjacent to a horizontal edge thereof to the uprights 2, 2' about an axis A-A' lying substantially in the general plane of the bed frame. The width of the bed frame 1 along said horizontal edge is less than the distance between the uprights 2 and 2', so that the bed frame 1 may adopt a vertical storage position between the uprights 2 and 2', as shown in FIG. 2.

Each upright 2, 2' is provided at its upper end with a threadably secured extensible stop 4 adapted to be screwed so that it can be brought with a jack-like action into engagement with a horizontal abutment in the form of a ceiling 5.

As shown in FIG. 2, two pieces of furniture in the form of cabinets 12 and 13 are pivotally mounted to the uprights 2 and 2' respectively by means of vertical hinges 14 and 14', so that they may be pivotally moved between one position in which rear faces thereof apply against the bed frame 1 in the vertical storage position and another position (shown in broken lines and designated by 12', 13') in which they are out of the trajectory of the bed frame 1 during movement thereof between its vertical storage and horizontal use positions.

The cabinet 13 has a hatch-like opening 6 extending through the front and rear faces thereof, so that it is accessible through its front face when the cabinet is applied against the vertically stored bed frame 1 and through its rear face when the cabinet is in position 13'.

As shown in FIG. 3, the cabinet 12 has two panels 7 and 8 hinged on the rear face thereof about a horizontal axis 9. When the two cabinets are arranged with their rear faces perpendicular to the plane of the uprights 2, 2', one or both of the panels 7 and 8 may be pivoted to a horizontal position and supported by its free edge resting on a projection, not shown, on the rear face of cabinet 13, for example formed by a pull-out piece. In this position, the bed frame 1 remains in its vertical storage position, concealed by a panel on its underneath face. The horizontal panels 7 and 8 are located at such a height that they form a table-like working surface constituting, with the cabinets 12 and 13, a bureau, dressing table or similar item of furniture.

On the vertical outer end face of the cabinet 12 is provided a drawer 10 which is accessible and can be pulled out when at least one of the cabinets 12 and 13 is opened out. When the two cabinets are folded together, this drawer 10 comes to face the vertical outer end face of the cabinet 13. The latter could also be equipped with a similar drawer, for example incorporating a bar unit.

FIG. 3 shows a first embodiment of the mechanism pivotally interconnecting the bed frame 1 onto the uprights 2 and 2'. Each upright 2, 2' is formed by a metallic tube provided with a horizontal foot member 3 protruding perpendicular to the general plane of the two uprights. Each upright carries a fixed collar 11 to which one end of an arm 15 is pivotally connected, the other end of arm 15 being pivotally connected to a side of the bed frame 1 about an axis 18 parallel to and spaced apart from said horizontal edge thereof. The said horizontal edge of the bed frame 1 is pivotally connected to a sliding piece in the form of a sleeve 16 slidably mounted on each upright below a compression coil spring 17 tending to urge it downwardly. The force of this spring 17 is chosen to compensate for the movement of the bed frame 1 about its axis 18, this movement being due to the weight of the bed frame 1 and the mattress 19 and bedding carried thereby.

It should be noted that the mattress 19 is prevented from sliding along the bed frame 1, when the latter is inclined, by means of one or a plurality of hooks 20 on the upper face of the bed frame 1, sufficiently spaced inwards from its lateral edges to enable bedding to be folded under the mattress 19, said hooks 20 cooperating with hooking elements of the mattress. In this manner, the bed frame 1 can be pivoted to its vertical storage position when the bed is made without the necessity of providing straps to hold the bedding in place.

Towards its free horizontal edge, the bed frame 1 carries two legs 21 pivotally mounted about pins 22, the upper end of these legs each having a protruding spring blade 23 riveted at its lower part to the leg 21. The upper end of the blade 23 is bent to form a passageway for an elbow-shaped end of a rod 24 the other end of which is pivoted at 25 to the sleeve 16. Since the sleeve 16 is held in a constant alignment, rod 24 forms one side of a deformable parallelogram linkage system which holds the legs 21 parallel to the sleeve 16, i.e., vertical, during pivotal movement of the bed frame 1. The spring blade 23 is useful as a security device in case the user inadvertently placed his hand, for example, between the base of the bed frame 1 and a leg 21 during raising of the bed frame. In this case, the "closing" movement of the leg 21 would be interrupted, without injury to the user, by bending of the blade 23 to allow movement of the rod 24.

FIG. 4 shows an embodiment of a varied form of mechanism for pivotal interconnection of the bed frame 1 with the uprights 2, 2', in which the bed frame 1 carries, along and protruding from a horizontal edge thereof, a shaft 30 provided at each end with a roller 31 engaged within facing channels of uprights 32 in the form of facing section bars having a U-shaped cross-section. The edges of each roller 31 lie between the opposite flanges of the uprights 32, while the part facing the central web of the upright is convexly dished. Each end of the shaft 30 engages in a bracket 33 integral with a vertical rod 34 whose upper end is slidably guided in a block 35 fixed in each channel. As for the example

of FIG. 3, an elbow shaped arm 15 is pivotally connected between the block 35 and the bed frame 1. In this case, the rod 24, adapted to maintain the legs 21 vertical, is pivotally mounted about a pin 36 of the bracket 33. Also, a compression spring 37 is confined between bracket 33 and block 35 so as to compensate for the weight of the bed frame as described in connection with the first embodiment.

It should be noted that the just-described interconnection system enables the bed frame to be received between the two uprights, or between a frame including two vertical sides forming these uprights. Moreover, the bed frame 1, which may be relatively thin, may be placed with the mattress, also relatively thin, coming practically into contact with the wall of a room in which the bed is placed, so that the overall volume taken up is minimal although the compensation mechanism includes only a single spring on either side, and which enables an adequate counterbalancing of the bed frame 1 (and its bedding) at all angles, with the employment of a relatively low force. Moreover, in the vertical storage position, the centre of gravity of the combined bed frame and mattress lies behind the pivoting axis, and thus tends to hold the bed in the storage position, this action complementing that of the springs in their most relaxed position.

To employ the folding table formed by panels 7 and 8, it is preferable to place the cabinets 12 and 13 perpendicular to the plane of the raised bed frame. However, when the bed frame 1 is in the horizontal use position, the cabinets 12 and 13 may advantageously be further pivoted away from one another, for example disposed at about 120° to one another, to facilitate access to the bed, in particular for changing the sheets. It is also advantageous to provide a locking device, for example with notches and/or embossments, enabling the cabinets to be fixed in desired angular positions.

Numerous modifications may be made to the described embodiments, for example it would be possible to provide only a single pivoting piece of furniture. The piece or pieces of furniture could additionally take diverse forms, for example as panels pivotally mounted on hinges 14, 14' and carrying a piece of furniture such as a bar, book-shelves, cupboard, armchair, sofa or couch. The bed could also be pivoted along one of its side edges, rather than along the head or foot end.

It is clear that the folding table could consist of a single panel which, instead of being hinged to the rear face of a cabinet, could be hinged to the bottom of the bed frame. When both cabinets are provided with a drawer on their end faces, one of these drawers can advantageously be adapted for storage of the bedding, for example for pillows, and the drawer could additionally include a compartment forming a bar.

We claim:

1. A folding bed comprising a bed frame and two uprights, two arms attaching the frame to the uprights, each arm hinged at one end to the bed frame and at the other end to an upright, resilient means, compensating for the weight of the bed frame to facilitate its movement from a horizontal position to a vertical folded position, a vertically movable component on each of said uprights and movable therealong during the movement of the bed frame, a fixed component attached to each upright, said bed frame hinged to each of said movable and fixed components, said resilient means comprising, two vertically arranged compression coil springs the

lower end of each of which bears on one of said vertically movable components, and the upper end of each of which bears on one of said fixed components attached to the associated upright.

2. A bed in accordance with claim 1 wherein each vertically movable component is forcibly guided along its associated upright.

3. A bed in accordance with claim 1 wherein each spring is guided with reference to its associated upright.

4. A bed in accordance with claim 1 wherein each vertically movable component has a hinge connection for one end of a longitudinal rod extending towards the free end of the bed frame parallel to one of its edges, the other end of said rod hinged to a resilient member attached to a folding leg so that the assembly comprising the bed frame, the vertically movable component, the rod and the leg constitutes a parallelogram linkage serving to hold the leg in a vertical position during the movements of the bed frame.

5. A bed in accordance with claim 1 wherein the dimension of the bed frame between the uprights is less than the distance between said uprights, the hinge axis of the bed frame to said vertically movable components lying substantially in the plane defined by the bottom of the bed frame.

6. A bed in accordance with claim 1 wherein the hinged arms are crank shaped and are connected to the associated uprights above the vertically movable components.

7. A bed in accordance with claim 1 wherein said vertically movable components each include a bracket, a rod integral with said bracket and sliding in at least one guide, the associated coil spring fitted around said rod.

8. A bed in accordance with claim 7 wherein the uprights comprise bars having a U-shaped cross-section, each said bracket, rod and guide for the rod being housed inside the associated profiled section bar.

9. A bed in accordance with claim 8 wherein each bracket includes a roller mounted thereon and vertically guiding it by bearing against the opposed flanges

of the associated bar of U-shaped cross-section.

10. A bed in accordance with claim 9 wherein each roller is disposed between the bracket and the base of said bar, the face of the roller which is turned towards the base of the said bar being convex.

11. A bed in accordance with claim 1 wherein at least one piece of furniture is hinged about a vertical axis to one of said uprights in such a manner as to be pivotable from one position in which it bears against the bed frame in the raised position thereof into another position in which it is moved away from the bed frame to enable the latter to be lowered into a position for use.

12. A bed in accordance with claim 11 in which the piece of furniture has a hatch opening from its opposite faces in such a manner as to be accessible both from its front face when it bears against the bed frame in the raised position of the latter and from its rear face when it is moved away from the bed frame.

13. A bed in accordance with claim 11 in which the two uprights form part of rigid metal framework including a foot extending from each upright perpendicular to the plane thereof, said framework further including at its upper part jack-like extensible stops which can be screwed out to bear against a ceiling.

14. A bed in accordance with claim 11 which includes a folding table, the platform of which, when the table is in the folded position, is arranged parallel with the bottom of the raised bed frame.

15. A bed in accordance with claim 14 in which the table is hinged to the bottom of the piece of furniture.

16. A bed in accordance with claim 14 in which each vertical upright has a pivoting cabinet mounted thereon, the folding table comprising two platforms juxtaposed and hinged along the same axis to the bottom of one pivoting cabinet.

17. A bed in accordance with claim 16 in which one cabinet has at least one drawer opening from the face thereof which is opposite the other cabinet when both are folded back against the raised bed frame.

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