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R. GOODMAN

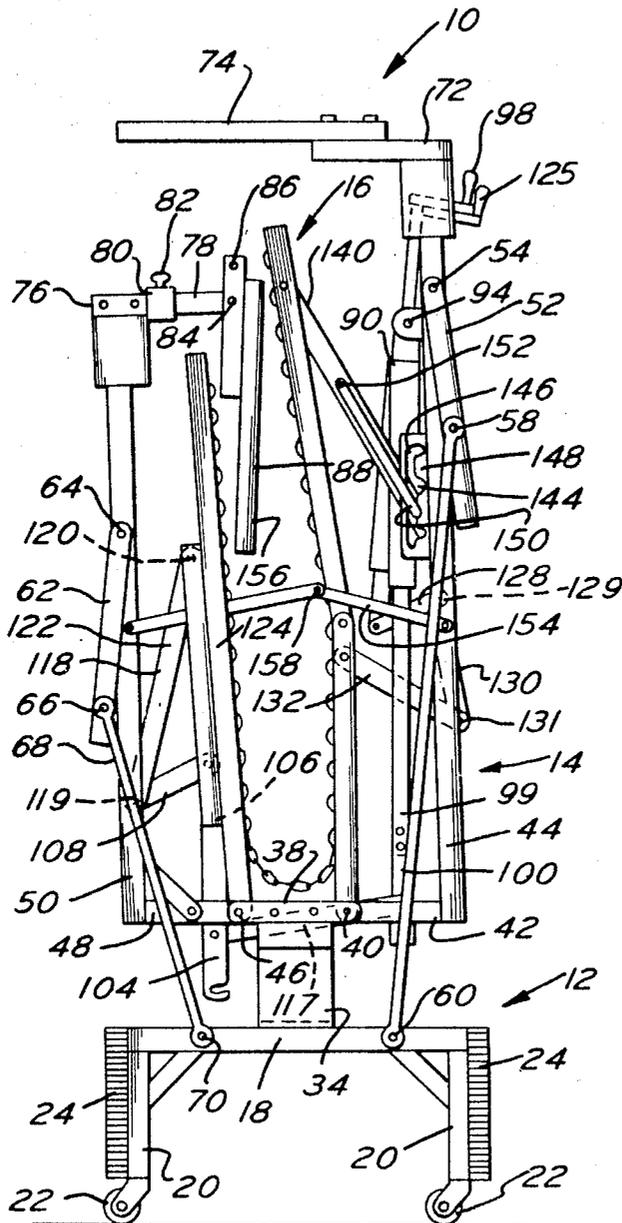
3,456,269

FOLDABLE BED WITH ADJUSTABLE CONTOUR BED SPRING

Filed Oct. 16, 1967

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FIG. 2



INVENTOR
ROBERT GOODMAN

BY *Arthur Jacobs*
ATTORNEY

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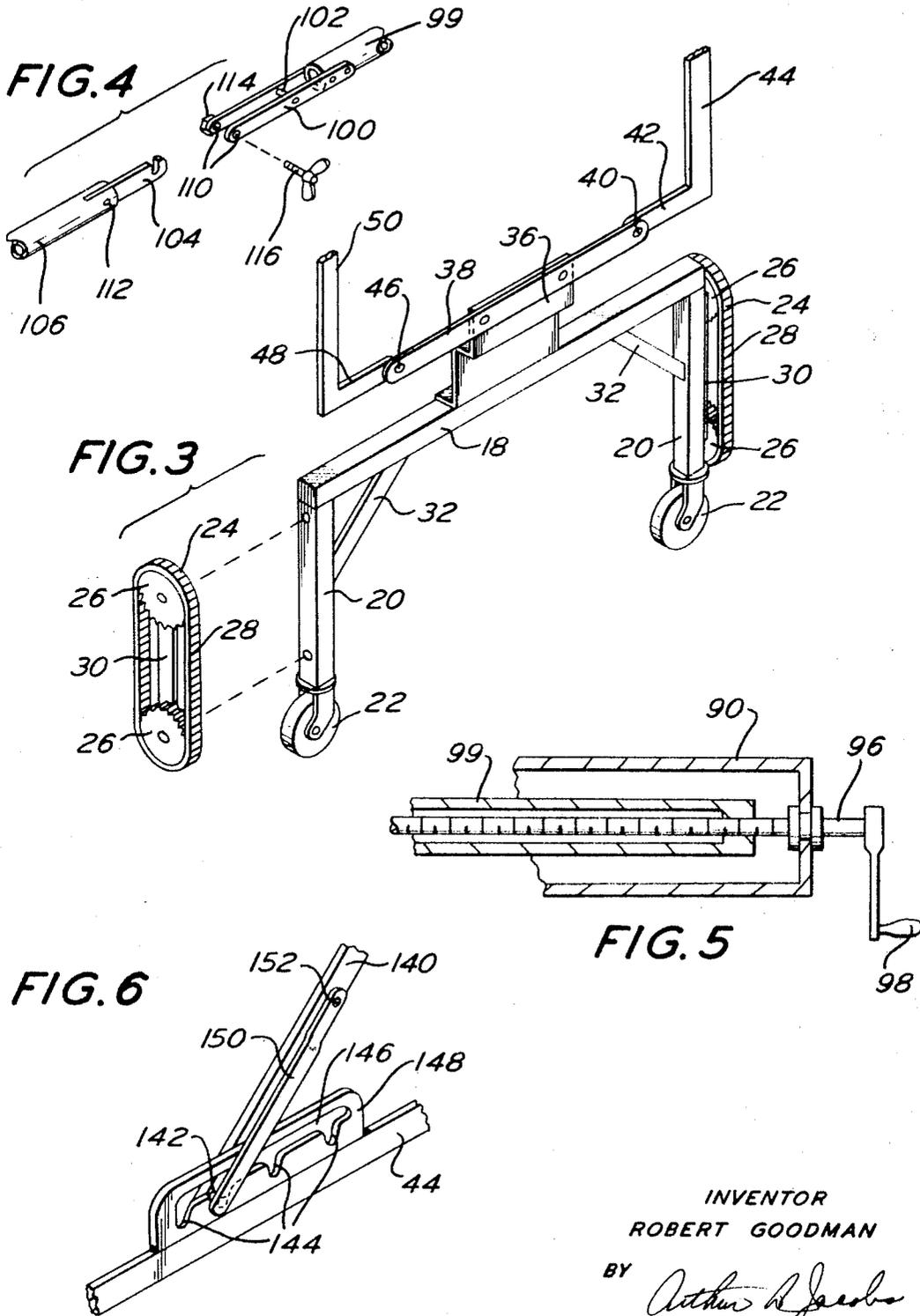
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INVENTOR
ROBERT GOODMAN

BY *Arthur H. Jacobs*
ATTORNEY

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FOLDABLE BED WITH ADJUSTABLE CONTOUR BED SPRING

Robert Goodman, 5325 Westminister Ave., Philadelphia, Pa. 19131
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9 Claims

ABSTRACT OF THE DISCLOSURE

A foldable bed which is provided with a variably adjustable contour-type multisectioned bed spring. The bed comprises a rigid center support frame to which is hinged connected two opposing bed frame portions. The support frame also supports one rigid section of the bed-spring, the adjacent sections being pivoted to the rigid section. Linkage connects the various individually pivoted sections of the bed spring to an adjusting means which is supported by one of the pivotal bed frame portions.

The entire bed is foldable from an open horizontal position, wherein the contour-type bed spring can be adjusted into a desired arrangement, to a closed vertical position wherein the bed frame portions, together with the corresponding sections of the bed spring, are in substantially parallel adjacency to each other and can be locked together to form a compact unit.

This invention relates to a foldable bed, and it particularly relates to a foldable bed which is provided with a variably adjustable contour-type bed spring frame.

Beds having contour-type springs which have separate sections that can be selectively adjusted to vary the inclination of the head or foot portion are being increasingly used, especially in hospitals and similar institutions. However, because of the complex linkages and other mechanisms required to provide this adjustability, these beds have, heretofore, been very bulky and difficult to move from one position or room to another. They have also been difficult to store, when not in use, or to ship from one place to another.

It is an object of the present invention to overcome the aforesaid difficulties by providing a bed which has a contour spring fully capable of being selectively adjusted but which is, in addition, capable of being easily and quickly folded into or unfolded from a compact position adapted for easy movement or storage.

Another object of the present invention is to provide a bed of the aforesaid type which is simple in construction, inexpensive to manufacture and yet sturdy and efficient.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following description when read in conjunction with the accompanying drawings wherein:

FIG. 1 is a side elevational view of a bed embodying the present invention, shown in its open, operative position.

FIG. 2 is a side elevational view of the bed of FIG. 1 in folded position.

FIG. 3 is an enlarged, fragmentary, perspective view of the support frame of the bed of FIGS. 1 and 2.

FIG. 4 is an enlarged, exploded perspective view showing the detachable connection between portions of the piston actuating the head portion of the bed spring.

FIG. 5 is an enlarged, fragmentary, sectional view of one of the actuating mechanisms.

FIG. 6 is an enlarged, perspective view of the mechanism for changing the angle of the foot section.

Referring now in greater detail to the various figures of the drawings wherein similar reference characters refer to similar parts, there is shown a bed, generally designated 10, comprising a support frame, generally designated 12, an intermediate bed frame, generally designated 14, and a bed spring, generally designated 16.

The support frame 12 comprises a pair of parallel horizontal angle bars 18, one on each side of the bed (only one being shown in the drawings). Each bar 18 is provided with a leg 20 at opposite ends. Each leg 20 is provided with a castor 22 at the bottom and also with a so-called "stair-climber" 24. Each "stair-climber" 24 comprises a pair of sprockets 26 (best shown in FIG. 3) over which is positioned an endless caterpillar treaded belt 28. The sprockets 26 are mounted on a support bar 30 which is bolted or otherwise connected to the respective leg 20. Brace bars 32 extend between the legs 20 and bar 18.

Rigidly connected to the upper face of each 18 is a vertical bracket 34 having an offset upper portion 36. Attached to the upper end of each offset bracket portion 36 is a horizontal bar 38 having its outer ends extending horizontally from the bracket portion 36. The opposed horizontal bars 38 form a horizontal frame portion. Pivoted to one of these outer ends, as at 40, is a 90° offset portion 42 of a frame bar 44. The two frame bars 44 (there being one on each side of the bed, although only one is shown in the drawings) constitute the foot portion of the bed frame 14. The two oppositely disposed frame bars 44 are connected by cross-rods (not shown).

Pivoted to the opposite end of bar 38, as at 46, is a 90° offset portion 48 of a frame bar 50. There are two frame bars 50, one on each side of the bed (although only one is shown), these bars being connected by cross-rods (not shown). The bars 50 constitute the head portion of the intermediate frame 14.

A leg 52 is pivoted at 54 to each bar 44. A link 56 is pivoted at one end, as at 58, to the lower portion of each leg 52 and at the other end, the link is pivoted, as at 60, to the respective bar 18 of the support frame 12. A similar leg 62 is pivoted at one end, as at 64, to each bar 50, and at its lower portion, is pivotally connected, as at 66 to a link 68. The link 68 is pivotally connected at its opposite end, as at 70, to the corresponding bar 18 of the support frame 12.

At its free end, each bar 44 is provided with a bracket 72 which combine to support a foot board 74. Similarly, each bar 50 is provided with a bracket 76 at its free end. Each bracket 76 includes a post 78 having a slidably adjustable collar 80 with a set screw 82 to hold it in vertically adjusted positions at its free end, the post 78 is pivotally connected, as at 84, to a bar 86 supporting a head board 88. The collar 80 is used to engage around the bar 86 when the head board 88 is in vertical position (as in FIG. 1) to clamp it in that position and prevent inadvertent pivoting around pivot 84.

Positioned on the bar 44 are a pair of cylinders 90 and 92, each being individually pivotally connected between bracket ears 94. As best seen in FIG. 5, extending into cylinder 90 is a partially threaded shaft 96 having a rotatable handle 98 at one end. The threaded portion of shaft 96 is threadedly engaged with a tubular shaft 99 which extends out of the cylinder 92. The shaft 99 has a fork 100 at its outer end (as best seen in FIG. 4), and this fork has a transverse pin 102 extending between its tines. As is readily seen from the drawings, when the handle 98 is rotated, it moves the tubular shaft 99 longitudinally. In general, this mechanism is substantially the same as that shown in U.S. Patent No. 3,277,736.

The pin 102 is adapted to be releasably engaged by a hook 104 pivotally connected to the end of a link or

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shaft portion 106 which is, in turn, pivotally connected to one end of a crank 108. Any feasible type of detachable locking means may be used to hold the hook 104 engaged with the fork 100. The locking means shown in FIG. 4 comprises aligned openings 110 in the tines of the fork and a similar opening 112 in the hook 104. A nut 114 is attached to one of the tines and a bolt 116 is insertable within the aligned holes and threadedly engageable with the nut 114. In order to keep the shaft 99 and link 106 connected even when the hook 104 is disengaged from the fork 100, a link 117 is pivoted, at one end, to the shaft 99 and, at the other end, to link 106.

The crank 108 includes a rigidly connected offset portion 118 and is pivoted on a fixed pivot pin 119. The crank portion 118 is provided, at its free end, with a roller 120 that is movable in a track 122 attached to the underside of the head section 124 of the bed springs 16.

When the fork 100 is engaged with the hook 104, if the handle 98 is rotated in one direction, it will cause the shaft 99 and link 106 to move to the right (as viewed in FIG. 1). This will cause the crank 108 to rotate clockwise and act, through the crank portion 118, to move the head section 124 around its pivotal connection with the bars 38, toward the raised position indicated in dotted outline. Reverse rotation of the handle 98 will, of course, cause the head section 124 to move back toward the horizontal position.

The cylinder 92 is part of an identical mechanism as the cylinder 90 and is similarly actuated by handle 125. The shaft 126, identical to shaft 99, is pivotally connected to a crank 128 pivoted on a fixed pivot pin 129 and integral with an offset portion 130. The crank portion 130 is pivotally connected, at 131, to a link 132. The link is pivotally connected, at 133, to the intermediate foot section 134 which is pivotally connected to the bars 38.

The foot section 136 is pivotally connected at 138 to the intermediate foot section 134, and, adjacent the free end of the foot section, is pivotally connected a link 140. This link 140 has a lateral lug 142 at its lower end which is adapted to be selectively engaged in any one of a plurality of notches 144 formed in a slot 146 provided in a plate 148 fixed to the bar 44 (as best shown in FIG. 6). By means of this construction, the angle of the foot section 136, when in the raised position, can be selectively varied merely by inserting the lug 142 in a desired notch 144. In order to slidably retain the lug in the slot 146 a metal arm 150 is riveted or otherwise secured at 152 to the link 140, and extends to a position overlying the lug 142, to which it is likewise secured, as by welding or the like.

In operation, when the handle 125 is rotated in one direction, it will pull the shaft 126 to the right (as viewed in FIG. 1) and this, in turn, will cause the crank 128 to rotate clockwise. This will cause the link 132 to rotate counterclockwise around the pivot 131 toward a position where the link 132 is aligned with crank portion 130. This movement causes the intermediate foot section 134 and foot section 136 to be raised toward the inclined positions shown in dotted outline.

When the bed is in the open position, as shown in FIG. 1, the handles 98 and 125 are actuatable to raise and lower the foot and head sections of the bed spring in the manner described above. However, when it is desired to move the bed to another room or floor or out of the building, or if it is desired to store the bed in a compact position, the bed spring 16 is brought to the full horizontal position (as shown in full line in FIG. 1), set screws 82 are released, the collars 80 are pulled down to release the bars 86, and the bars 86 are pivoted to the position shown in FIG. 2. The bars 44 and the bars 50, forming the opposite portions of the frame 14, are then pivoted around their respective pivots 40 and 46 until they assume the vertical positions shown in FIG. 2. As the bars 44 and 50 pivot, the links 56 and 68 assume a new position and while doing so, they act to pivot the legs 52 and 62 into

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a closed position, as shown in FIG. 2. With the bed in the folded position of FIG. 2, a pair of locking bars 154 and 156, one pivoted to the bar 44 and the other to the bar 50, are engaged at 158 (see FIG. 2) to hold the bed in folded position. This engagement may be by means of a pin and slot connection or any other standard type of connection.

If the folded bed is to be moved over a flat surface, it is rolled along on the casters 22. But if it is necessary to pass over an obstruction or to go up or down a stairway, the folded bed is inclined so that its weight is borne by the caterpillar treads 28. This permits easy handling and moving of the folded bed.

It is to be understood that although manual actuating means, in the form of handles 98 and 125, are illustrated, electric motor, hydraulic, pneumatic or any other feasible drive means may be substituted within the scope of the present invention.

The invention claimed is:

1. A foldable bed comprising a support means, a bed frame and a bed spring, said bed frame having oppositely-disposed frame portions that are pivotally connected to said support means and are pivotally movable from an extended horizontal position wherein they are horizontally aligned with each other to a folded vertical position in substantial parallelism to each other, said bed spring being supported by said support means and having a plurality of sections including a head section and a foot section, said sections being pivotally connected to each other, and being movable relative to each other while said bed frame remains stationary actuating means on said bed frame, said actuating means being operatively connected to said bed spring sections to move said sections around their respective pivots, and said bed spring being foldable into oppositely-disposed portions together with corresponding oppositely-disposed frame portions.

2. The bed of claim 1 wherein said actuating means includes a shaft assembly having at least two shaft portions that are detachably connected to each other, one of said shaft portions being operatively connected to a drive means and the other of said shaft portions being operatively connected to a bed frame section.

3. The bed of claim 1 wherein one of said bed spring sections is a foot section, a link pivotally connected to said foot section and to said bed frame, and means for varying the pivotal attachment of said link to said bed frame to vary the angular position of said foot section when it is moved around its pivotal connection to its adjacent bed spring section.

4. A foldable bed comprising a support frame, a bed frame and a multi-section bed spring, each section of which is pivotally connected to the sections adjacent thereto, said support frame including a support frame portion, to opposite sides of which are pivotally connected offset ends of a pair of oppositely-disposed bed frame sections, said bed frame sections being pivotally movable from an open position wherein they are linearly aligned with each other to a closed position wherein they are in substantial parallelism with each other, said support frame portion also constituting an intermediate section of said multi-section bed spring, two sections of said bed spring being pivotally connected to said support frame portion, one on each of two opposite sides thereof, an actuating means on said bed frame, connecting means operatively connecting said actuating means to said bed spring to pivot the sections of said bed spring relative to said bed frame while said bed frame remains stationary, around their respective individual pivotal connections, to and from a linearly aligned position parallel with said bed frame when said bed frame sections are linearly aligned, and said bed spring being foldable around its pivotal connections with said support frame portion into substantially parallel portions simultaneously with the corresponding movement of said bed frame sections.

5. The bed of claim 4 wherein said multi-section bed

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spring comprises a head section pivotally connected to one side of said support frame portion, an intermediate foot section pivotally connected to the opposite side of said support frame portion, and a foot section pivotally connected to said intermediate foot section, said connecting means comprising linkage connected between said actuating means and said head section and intermediate foot section, said actuating means and linkage being constructed and arranged to move said head section and intermediate foot section around their respective pivoted connections with the support frame portion individually, and brace means pivotally connecting said foot section to said bed frame, said brace means having an adjustable pivotal connection with said bed frame to selectively vary the angular position of the foot section when said foot section is moved away from its linearly aligned position.

6. The bed of claim 4 wherein said actuating means comprises two separate linearly movable shafts, one shaft being operatively connected to the head section of the bed spring and the other shaft being operatively connected to the intermediate foot section, one of said shafts comprising two shaft sections, one shaft section being operatively connected to a drive means and the other shaft section being operatively connected to the corresponding bed spring section, said two shaft sections being releasably connectable when said bed frame sections are linearly aligned in the open position and being separable when said bed frame sections are in substantial parallelism with each other in the closed position.

7. The bed of claim 4 wherein said support frame is provided with legs, roller means on said legs, and at least two legs being provided with climbing means, said climb-

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ing means comprising a rotational endless caterpillar track.

8. The bed of claim 4 wherein said bed frame is provided with a head board assembly at one end and a foot board assembly at the opposite end, at least one of said assemblies comprising a post having a bar pivotally connected thereto, said bar being pivotally movable from a position in alignment with said post to a position angular thereto, and locking means for releasably locking said bar to said post when it is in alignment with said post.

9. The bed of claim 4 wherein each bed frame section is provided with at least one leg pivotally connected thereto, and linkage connecting said legs to said support frame, said linkage being constructed and arranged to move said legs to an open support position when said bed frame sections are linearly aligned and to a collapsed position adjacent the corresponding bed frame sections when said bed frame sections are in substantial parallelism.

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CASMITR A. NUNBERG, Primary Examiner

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