April 24, 1962 A. J. KATZ 3,030,637

PULL-OUT BEDS

Filed Dec. 29, 1958 2 Sheets-Sheet 1

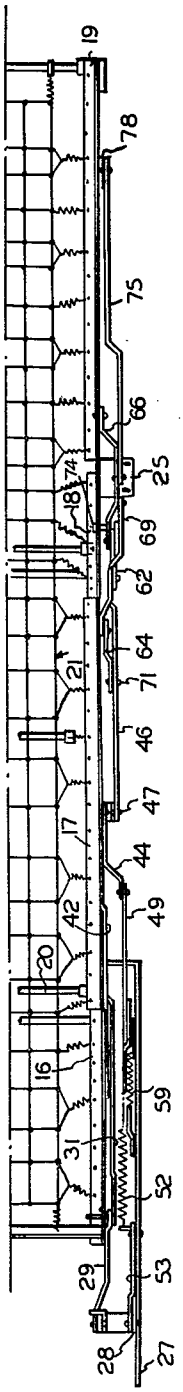


FIG. 2

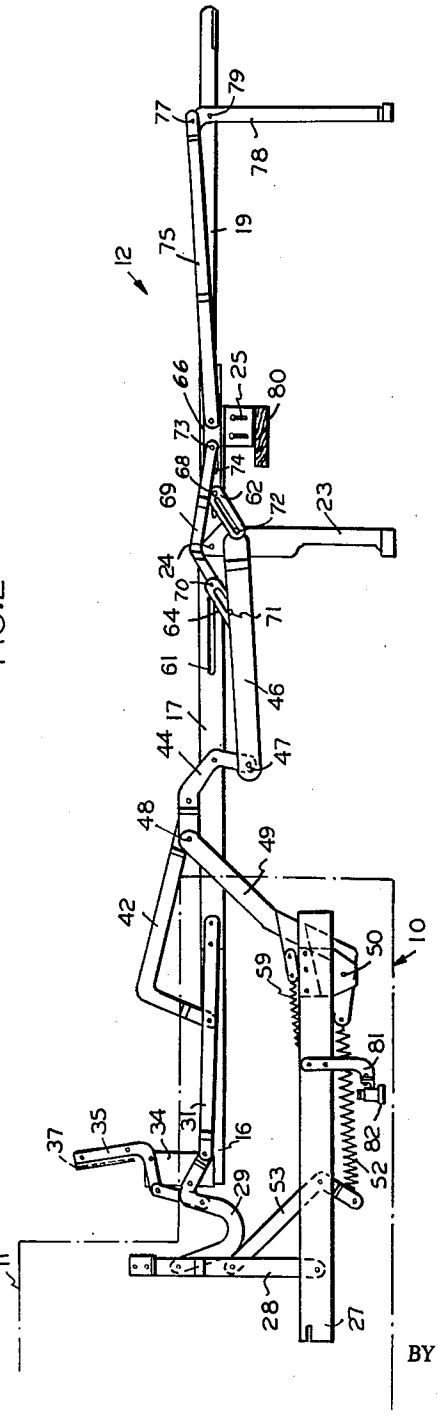


FIG. 1

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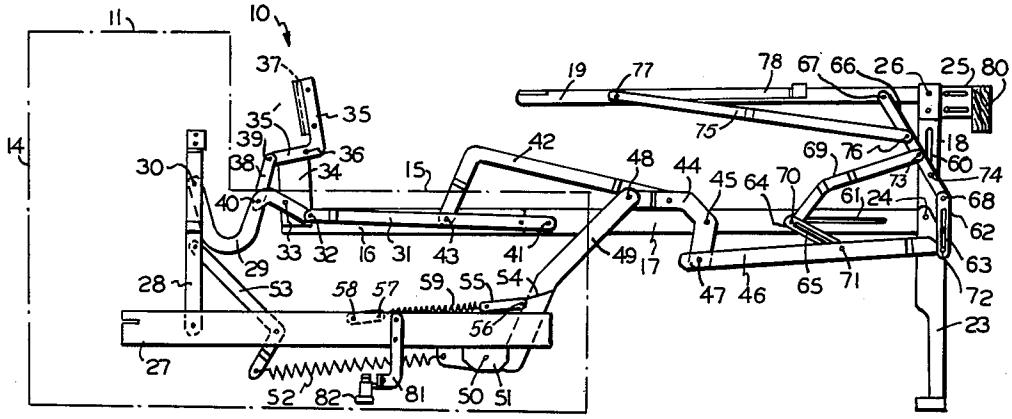


FIG. 4

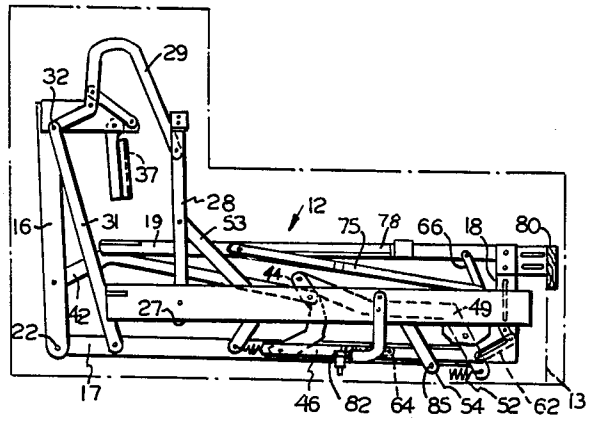


FIG. 5

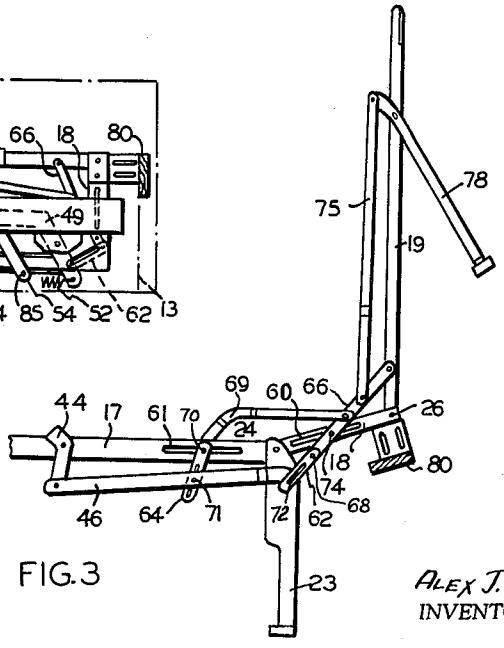


FIG. 3

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3,030,637

PULL-OUT BEDS

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1 Claim. (Cl. 5—13)

This invention relates to convertible or pull-out beds and more particularly to improvements in the pull out mechanism for such beds. Pull-out beds of the type contemplated herein, comprise a head section pivoted to a bed, couch or sofa frame, an intermediate or main section pivoted to the forward end of the head section, a comparatively short fold section pivoted to the forward end of said main section and a foot section pivoted to the forward end of said short fold section; said sections being movable into folded and fully collapsed condition into the frame.

One difficulty with the pull-out beds of the type herein considered, has been that the mattress which has to be folded with the bed sections when the bed is collapsed, has the tendency to open up the folded bed. Accordingly, an object of the present invention is to provide a highly improved and novel locking means which operates automatically to hold the folded foot and fold sections in closed relation with respect to the intermediate or main section when the bed is collapsed, so that the compressed mattress will be held and prevented from acting to open the folded bed.

Another object of this invention is to provide a novel and improved bed structure of the type described which embodies improved folding mechanism whereby the bed can be folded compactly into a sofa or couch frame of lesser depth than was heretofore possible.

Another object of this invention is to provide a novel and improved convertible bed of the character described, wherein the folding mechanism is below the top of the mattress when the bed is in extended condition so as not to interfere with comfortable sitting on the bed when same is extended.

A further object thereof is to provide a novel and improved pull-out bed which is so constructed that when the foot section is swung upwardly it will pivot about the front end of the fold section; automatically acting means being provided to prevent the fold section from swinging upward relative to the foot end of the intermediate section until the foot section is at a predetermined angle relative to the fold section. At such time, both the foot and fold sections must be swung together relative to the forward end of the intermediate main section to a position where the fold section is at right angles to said intermediate main section; said foot section then being above said main section and pitched somewhat downwardly to provide a proper angle for a seat pillow placed on said foot section after the bed is fully folded into the couch or sofa frame.

Another object of this invention is to provide a novel and improved folding bed of the character set forth, having means to prevent the foot section when the bed is in collapsed condition, from being swung upwardly relative to the fold section in an unfolding direction, the construction being such that said foot and fold sections will unfold together by swinging with respect to the foot end of the fold section.

A further object of this invention is to provide a novel and improved folding bed of the kind described, having means permitting the head section to be swung downwardly and backwardly about its axis of swing on the couch or sofa frame, thereby moving the main section with the fold and foot sections over the footboard at bottom region at the front of the sofa or couch frame

and deep into such frame; highly improved automatically acting locking means being provided to lock the folded fold and foot sections to the intermediate or main frame section as it is called.

Another object thereof is to provide a novel and improved pull-out bed structure of the kind set forth, which is easy to operate and which has positive locking action for locking the folded foot and fold sections to the main or intermediate section when the bed is fully collapsed or folded into its couch or sofa frame.

A further object of this invention is to provide a pull-out bed structure of novel and improved construction, affording a head board or pillow rest which automatically assumes its required position on the bed when the bed structure is extended to use condition and which automatically folds to lie substantially parallel with and within the confines of the head section when the bed is fully collapsed.

Another object of this invention is to provide a novel and improved pull-out bed structure of the character mentioned, affording it to assume a substantially unfolded condition by operating a foot pedal when the bed is fully collapsed.

Still a further object of this invention is to provide a novel and improved pull-out bed structure of the character described, which is reasonable in cost to manufacture, easy to manipulate, practical, inexpensive and efficient in carrying out the purposes for which it is designed.

Other objects and advantages will become apparent as this disclosure proceeds.

The invention accordingly consists of the features of construction, combinations of elements, arrangement of parts and their functional relationships hereinafter described.

In the accompanying drawings forming part of this specification, similar characters of reference indicate corresponding parts in all the views.

FIG. 1 is a side view of a pull-out bed embodying the teachings of this invention, and illustrating the same in fully extended or unfolded use condition.

FIG. 2 is a top plan view thereof along one side of the bed; the other side being identical to the one shown in this view, except that one is right and the other is left. A specific description of the side shown will therefore suffice for both sides.

FIG. 3 is a partial side view of the structure shown in FIG. 1, showing the foot section in raised position.

FIG. 4 is a side view of the structure as shown in FIG. 1, illustrating the condition existing when the bed is further folded so that the foot section is over the main section with the short fold section upright.

FIG. 5 is a side view as shown in FIG. 1, showing the structure in its fully collapsed condition after the head section has been swung on the sofa or couch frame, to assume a downwardly and upright position thereby bringing the remainder of the bed structure within and in a low position in said sofa or couch frame.

In the drawings, the numeral **10** designates generally a pull-out or sofa bed embodying this invention. The same comprises a sofa or couch frame **11** and a foldable or collapsible bed **12** mounted thereon and collapsible or foldable thereinto. The couch or sofa frame may be of wood or any other suitable material and consists of a rear wall **14** and side walls **15** forming an enclosure within which the bed folds when collapsed.

Referring to FIG. 1, each side rail of the bed comprises the head section rail part **16**, the main or intermediate section rail part **17**, the short fold rail part **18** and the foot section rail part **19**. Each of these rail parts is a piece of angle iron having one flange vertical extending upwardly from its other flange which is horizontal and inward of the bed structure. Opposite parts of the side

rails are connected by suitable cross bars as 20 at appropriate places and a spring structure indicated generally by the numeral 21 is mounted to span the side rails in well known fashion to rest a mattress on. Abutting ends of the said rail parts are nested so that the rail parts of the head sections and those of the short-fold sections are outward. The adjacent ends of rail parts 16 and 17 are secured in pivotal relation by the rivet 22, thus determining the axis of swing of the head section in relation to the intermediate or main section of the bed. The adjacent ends of the rail parts 17 and 18 and the upper end of a leg 23 are pivotally secured by a rivet 24, thus determining the axis of swing of the fold section in relation to the main or intermediate section of the bed. The adjacent ends of the rail parts 18 and 19 and a bracket 25 which is along the rail part 18, are all pivotally joined by the rivet 26, thus determining the axis of swing of the foot section in relation to the short-fold section. Adjacent rail parts are suitably fashioned at their ends to permit their relative swinging movements, as is well known in folding bed construction.

The numeral 27 denotes an elongated plate member which is securely mounted on the inner surface of the side wall of the sofa or couch frame 11. This member 27 is positioned horizontally and extends spaced inwardly somewhat, from the sofa frame back wall 14, to the forward end of the head section rail part 16, but is below said head section part. Said member 27 carries an upward post 28 which extends above the level of the bed proper. A scythe-shaped flat bar 29 is positioned with its U-form substantially upright and has its distal end pivotally secured at 30 near the upper end of said post 28, while its "handle" end is pivotally joined to one end of a link 31 by the rivet 32. This part 29 is pivoted by a rivet 33 at the juncture of its U-shape, onto the upright plate 34 which is secured to the vertical flange of the head section rail part 16 at the head end of said section. Said plate 34 extends to about the horizontal plane through the axis afforded at 30, and is along said vertical flange of the rail 16. A bell-crank 35 is pivotally mounted at its bend near the forward end of said plate 34, by the rivet 36; one arm of said bell crank extending towards the post 28 and its other arm 35' slanting a bit upwardly towards said post and serving with its companion at the other side of the bed, to mount a horizontal head board 37 across and over the bed structure. One end of a link 38 is pivotally secured to the rearward distal end of the bell-crank 35 at 39, while the other end of said link is pivotally secured by a rivet 40 to the member 29, at a point therealong which is downward and rearward of the pivot 33.

The other end of the link 31 is pivotally joined at 41 to the main section rail part 17, a comparatively short distance from the pivot 22, in the direction towards the foot section. The numeral 42 designates a link along the bed, having a downwardly directed portion whose distal end is pivotally joined at 43 to the vertical flange of the head section rail part 16, which pivotal connection is about the same distance towards the head end of the bed from the pivot 22 as the pivot 41 is from said pivot 22 towards the foot end. The numeral 44 denotes an arcual bell-crank pivotally mounted at 45 to the vertical flange of the intermediate or main section rail part 17, at about the mid-point of said rail part. This bell crank 44 has a downward arm whose distal end is pivotally joined to one end of the link 46 by the rivet 47 and a horizontal arm which is above the pivot 45 and extends towards the head end of the bed, the distal end of which is pivotally joined by a rivet 48 to the upper end of a L-shaped lever 49 which extends downwardly across the inner face of the mounting plate 27, where it is pivotally joined by the rivet 50 to a small plate 51 which is fixed to said mounting plate, extending downwardly therefrom. The horizontal leg of said L-shaped lever 49 extends towards the head section and at its distal end has attached thereto one end of a stressed coil spring 52, the other end of which spring is attached to the downward end of a brace 53 which joins the plate member 27 and the post 28; said brace extending downwardly towards the foot end of the bed structure. The L-shaped lever 49 has a tine 54 extending from its upright leg, above and spaced from its horizontal leg. One end of a link 55 is pivoted to said tine 54 by a rivet 56. One end of a link 57 is pivotally mounted to the mounting plate 27 by the rivet 58. A stressed coil spring 59 has its ends respectively attached to the other ends of the links 55 and 57.

There is a slot 60 along the vertical flange of the short-fold rail part 18 and there is a slot 61 along the vertical flange of the main section rail part 17, extending toward the head of the bed from a comparatively short distance from the junction 24 of such rail parts with the leg 23. A link 62 has a lengthwise slot 63, and a link 64 has a lengthwise slot 65. There is a link 66 pivotally secured at one end to the foot section rail part 19 by the rivet 67, a comparatively short distance away from the pivotal juncture 26, while the other end of said link 66 is pivotally joined to one end of the slotted link 62 at 68. The numeral 69 denotes a link along the bed, whose end portion nearest the head section, is directed slanting downwardly towards the head section and the distal end of said portion is pivotally secured to one end of the slotted link 64 by a pin 70 which extends through the slot 61 in the main section rail part 17; such pin being engaged in and slidable along said slot 61.

A bit away from the middle of the link 46 towards the foot section, there is fixed the pin 71 which extends into, and is engaged by and is slidable along the slot 65 in the link 64. The other end of the link 46 is pivotally joined near the top of the leg 23, below the pivot 24 and away therefrom towards foot section, by the pin 72 which extends through the slot 63 of the link 62, in which slot said pin is engaged and is slidable therealong. The other end of the link 69 is pivotally joined at 73 to about mid-section of the link 66. Intermediate the pivotal connections 68, 73, there is a pin 74 fixed on the link 66, and such pin extends through, is engaged by and is slidable along the slot 60 in the short-fold section rail part 18. One end of a link 75 is pivotally joined to the link 66 at 76, which is intermediate the pivotal connections 67 and 73. The other end of said link 75 is pivotally secured at 77 to the top end of the leg 78 which is at the foot end of the bed structure, a bit above the pivotal connection 79 of said leg to the foot section rail part 19. A board 80 spans the brackets 25 to which it is secured and is adapted to stand edgewise on the top edge of the usual front bottom board 13 of the sofa frame 11, when the bed structure 12 is fully collapsed, as will be explained.

When the bed is in extended condition as shown in FIG. 1, the slotted links 62 and 64 extend downwardly sloped towards the head section. The pin 72 is at the very lower end of the slot 63 in link 62. The pin 71 is intermediate the ends of the slot 65 in link 64. The pin 70 is at the very end of the slot 61 which is towards the foot of the bed. The pin 74 is at the very end of the slot 60 which is towards the foot end of the bed.

Referring now to FIG.1, it is evident that only upon the application of an upward force to the pin 74, would the short-fold section bordered by the rail parts 18, swing upwardly about the pivot 24. So upon getting hold of the foot end of the bed structure and lifting such end, the foot section will swing to the vertical position as shown in FIG. 3, and up to nearly the very last of such movement, the short-fold section will remain horizontal because of the absence of an upward force at the pin 74. Upon the bed structure assuming the condition shown in FIG. 3, the pin 74 will have moved toward the head end of the slot 60, the pin 72, because of movement of the link 62, will be intermediate the ends of the slot 63,

the pin 70 will have moved to a position intermediate the ends of the slot 61 because of movement of the link 69, which link 69 also moves the link 64 and hence the pin 71 will be at the very upward end of the slot 65.

The next step in the folding of the bed structure 12, is to swing the foot section of the bed from its vertical position shown in FIG. 3, to lie over the main section as shown in FIG. 4, where in passing horizontal position, the foot section can be moved no further downward beyond a predetermined plane which slopes downwardly towards the head-end of the bed. In bringing the bed structure from its condition shown in FIG. 3 to that of FIG. 4, the slotted link 64 was swung counterclockwise due to the movement of the link 69, so that the pin 70 is at the very head-ward end of the slot 61 and the pin 71 is at the very end of the slot 65, farthest from the pin 70. Also, the slotted link 62 has shifted to vertical position so that the pin 72 will be at the very end of the slot 63, farthest from the pivotal connection 68, and the pin 74 will be at the very end of the slot 60, nearest to the pivotal connection 24. Thus is determined the plane at which the foot section will stop. Also, the mattress (not shown) on the bed spring 21, will be folded at the short-fold section, and any upward force then exerted by the folded mattress attempting to unfold, will of course have to be countered by the action of the hand on the board 80, which is taken hold of, lifted and pushed towards the head-end of the bed and given a twist movement to avoid the unfolding action of the mattress which is aided by using the second hand to hold down the foot section of the bed. The lifting and pushing force applied to said board 80, will cause the bed structure 12 to assume fully collapsed condition as shown in FIG. 5. The movement of the bed structure towards the sofa frame 11, caused the turn of the member 29 about the pivot 30 and the turn of the member 49 about the pivot 50, thereby bringing the head section of the bed structure to a substantially upright position, rearwardly of the post 28 into the sofa frame, thereby lowering the remainder of the bed structure to its rest position within the confines of the sofa frame.

The long arm of the lever 49 will have been swung towards the sofa frame to substantially horizontal position, whereupon the relatively strong coil spring 52 is considerably stressed, the leg 23 was lifted to be against the main section rail part 17, by the shifting of the link 46 towards the sofa frame, whereupon the slotted link 62 is held against the pin 72. The slotted link 62, pulling against the pin 72, maintains the pin 74 against movement and holds the foot section of the bed structure from upward swinging movement, while the slotted link 64, with pin 70 bearing against the end of the slot 61 was swung clockwise by the shifting of the link 46, towards the sofa frame, until it came to rest in horizontal position along the main rail part 17, with pins 70 and 71 in contact with the respective slot ends they are shown in contact with in FIG. 4. Hence, in its position shown in FIG. 5, said slotted link 64 positively locks the bed structure from unfolding, because the positions of the pins 70 and 71 are fixed and so the link 64 is maintained against movement. Pin 74 is held against movement thereby, so the foot section of the bed structure is kept from upward swing movement. However, while the slotted link 64 has been swung from its position shown in FIG. 4 to that in FIG. 5, the pin 71 did ride in the slot 65, towards the pin 70. This offered the pin 70 some opportunity for movement along the slot 61, and ordinarily, the pin 74 would have been freed for movement along the slot 60. This however, was prevented by action of the slotted link 62 which in its movement from its position in FIG. 4 to that in FIG. 5, was continuously pulled on by the pin 72, thereby causing a pull on the link 66, and hence the pin 74 remained fixed until locked by the positioning of the slotted link 64 in final position shown in FIG. 5.

It is therefore evident that the cooperation of the pin 74 with the slot 60 in the short-fold section, positively accomplishes the swing of the short-fold section without movement of the main section of the bed structure bounded by the rail parts 17. The pin 71, in cooperation with the slot 65 in the link 64, together with the pin 70 in cooperation with the slot 61, accomplish locking of the bed structure when the latter is in fully collapsed condition as shown in FIG. 5, so that the foot and short-fold sections stay put, and the link 62 in cooperation with the pin 72, maintains the collapsed condition of the foot and short-fold sections as shown in FIG. 5, during such interval that the bed is made to assume fully collapsed condition from that shown in FIG. 4 to that of FIG. 5, while the locking action of the slotted link 64 becomes temporarily ineffective.

If the board 80 is made of suitable width and properly positioned on the brackets 25, it will come to rest atop the usual front board 13 of the sofa frame, for support of the collapsed bed structure. As alternative or additional support therefor, the bed structure can come to rest on a cross bar 85, spanning the tines 54.

It is to be noted that upon collapsing the bed structure, movement of the member 29, caused the head rest 37 to be swung downward and lie vertically, and the main section of the bed structure rests on the inner arm of the foot-pedal lever 82.

To open the bed structure, a downward force applied by foot on the outward end of the foot pedal 82, will lift the folded bed structure sufficiently to cause the member 29 to turn and aided by the tensed spring 52 which becomes free to act, the bed will partially open to a condition where the head section has assumed nearly horizontal position, so that then, upon pulling the board 80, the bed is brought to the condition shown in FIG. 4, whereupon the foot section of the bed is gotten hold of and swung until the bed assumes fully extended condition as shown in FIG. 1. The spring 52 is now untensed while the weaker spring 59 becomes tensed to serve as an aid to ease the next closing of the bed.

This invention is capable of numerous forms and various applications without departing from the essential features herein disclosed. It is therefore intended and desired that the embodiment shown herein be deemed illustrative and not restrictive and that the patent shall cover all patentable novelty herein set forth; reference being had to the following claim rather than to the specific description herein to indicate the scope of this invention.

I claim:

A pull out bed comprising a bed frame, a collapsible bed consisting of a head section, means to connect said head section at its rear end to the frame, an intermediate section pivoted at its rear end to the front end of the head section, a fold section pivoted at its rear end to the front end of the intermediate section, a foot section pivoted at its rear end to the front end of the fold section, a leg pivoted at the front end of the intermediate section; each of said intermediate and fold sections having a slot therealong, a lever pivoted intermediate its ends to the intermediate section; the slot in the intermediate section being between the pivotal connections of said lever and leg with the intermediate section, a first link connecting one arm of said lever with the leg, linkage means connecting the other arm of said lever, the head section and the frame, operating upon movement of the bed within the confines of the frame, to move said first link towards the frame, a second link pivotally connected at one end thereof to the foot section, a third link pivotally connected at one end thereof to the second link intermediate the ends of said second link, a first slotted link; the pivotal connection of said first link with the leg, including a first pivot pin extending into the slot in the first slotted link; the other end of the second link being pivotally connected to the first slotted

link; a second pivot pin etxending from the second link into the slot in the fold section; such second pivot pin being intermediate the pivotal connections of the third link and the first slotted link with the second link, a second slotted link pivotally connected to the other end of the third link; such pivotal connection including a third pivot pin extending into the slot in the intermediate section, a fourth pivot pin extending from the first link intermediate the ends of the first link, into the slot of the second slotted link; the respective lengths of said slots and their positions along the intermediate and fold sections and of the slots in the slotted links, being such that when the foot section is positioned over the intermediate section, whereupon the fold section and the first slotted link are upright and the second slotted link slants downwardly towards the said leg, the second pivot pin contacts the lower end of said slot in the fold section, the third pivot point contacts the end of the slot in the intermediate section which is farthest from the juncture of the intermediate and fold sections, the first pivot pin contacts the lower end of said slot in said first slotted link and the fourth pivot pin contacts the end of the slot in said second slotted link which is nearest the leg, and upon movement of the bed into fully collapsed condition within the frame, the second slotted link will assume the position where it is substantially in alignment with the slot in the intermediate section and rearwardly along said intermediate section whereupon the fourth pivot pin contacts the end of the slot in the second slotted link which is farthest from the junction of the intermediate and fold sections and the third pivot pin contacts the end of the slot in the intermediate section which is farthest from the juncture of the intermediate and fold sections.

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