United States Patent [19]

Gerth

[11] **3,871,035**

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[54] **CHESTERFIELD BED MECHANISM**

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[52] **U.S. Cl.** **5/13,** 5/28

[51] **Int. Cl.** **A47c 17/14**

[58] **Field of Search** 5/13, 28, 29

[56] **References Cited**

UNITED STATES PATENTS

3,292,188	12/1966	Gerth	5/13
3,416,168	12/1968	Pokorny, Jr.	5/29
3,694,828	10/1972	Mikos	5/29

Primary Examiner—Casmir A. Nunberg

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[57] **ABSTRACT**

The foldable frame of the invention provides in the unfolded position a substantially horizontal mattress supporting member divided into a body portion supported by intermediate legs and an end portion having foot end legs. The body portion is itself divided into pivotably connected forward and rear portions, "forward" being in relation to the back support. An upwardly extending rear lever is pivotably connected at its lower end to the side of the chesterfield; the other end of the rear lever is movable in an arc below the back support. A swing lever is connected at a medial point to the other or upper end of the rear lever with the portion of the swing lever forward of said medial point extending upward to pivotably connect with the rear portion of the support member. Means are provided to maintain the rear portion of the support member in a fixed position when the frame has been extended. On manually lifting rearwardly the forward portion, means release the swing lever to rotate it downwardly and then rearwardly on the rear lever with the swing lever lowering the rear portion of the support member into a lower rearward position through the horizontal. Further means then rotate the swing lever until it adopts a substantially horizontal position with the rear portion of the support member substantially vertical and the forward portion is substantially horizontal but in a lower plane and rearwardly than in the extended position.

5 Claims, 8 Drawing Figures

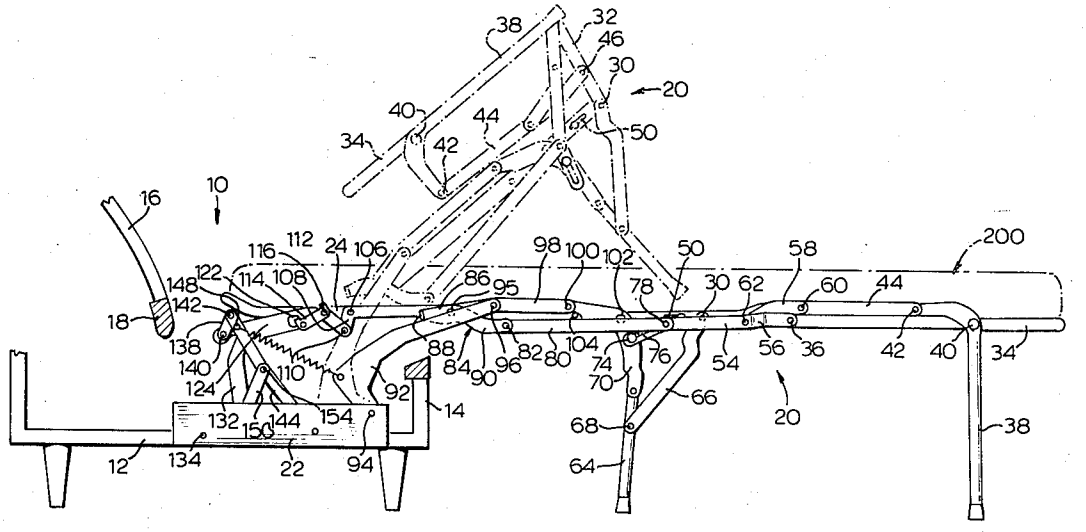


FIG. 3

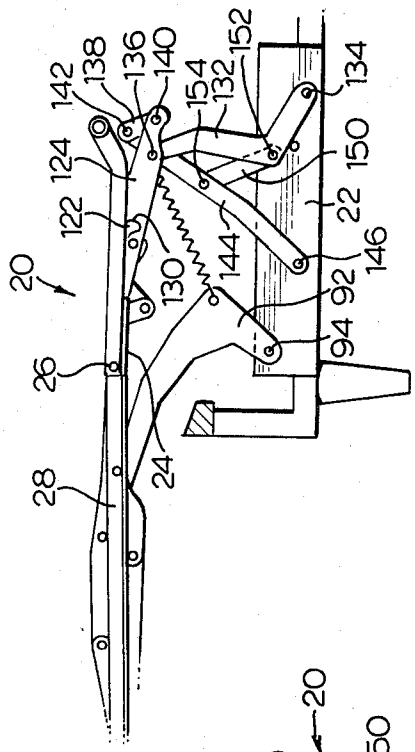


FIG. 1

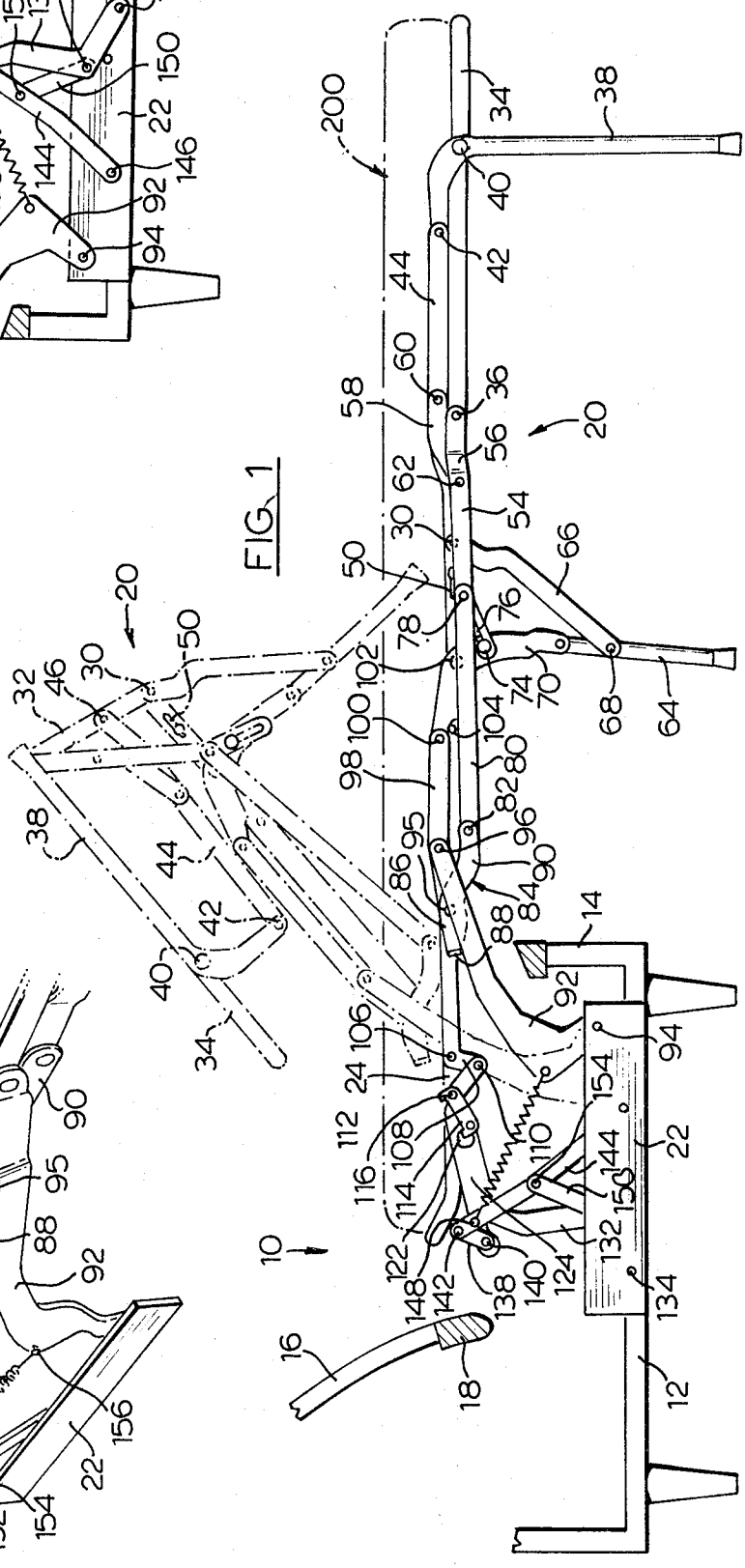
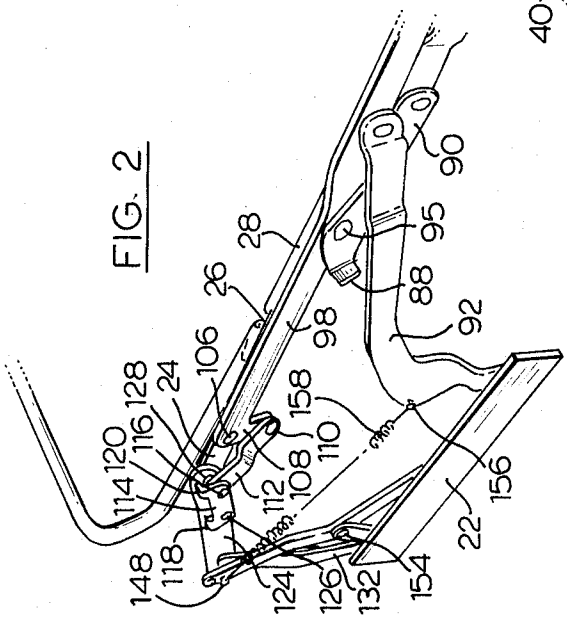


FIG. 2



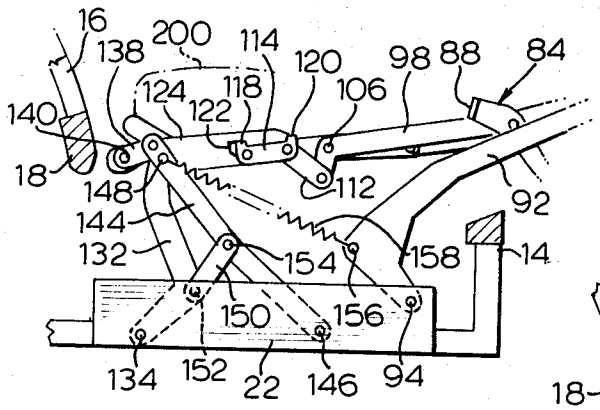


FIG. 4

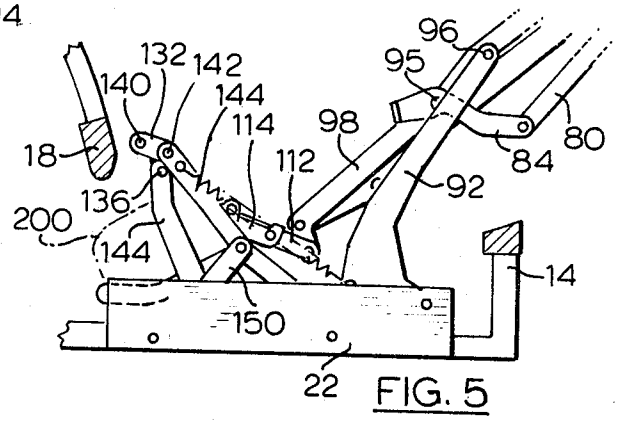


FIG. 5

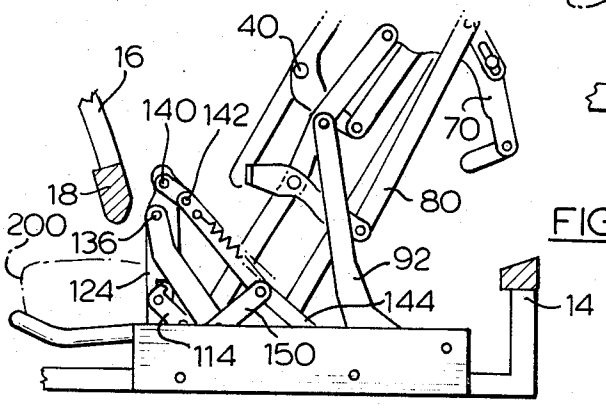


FIG. 6

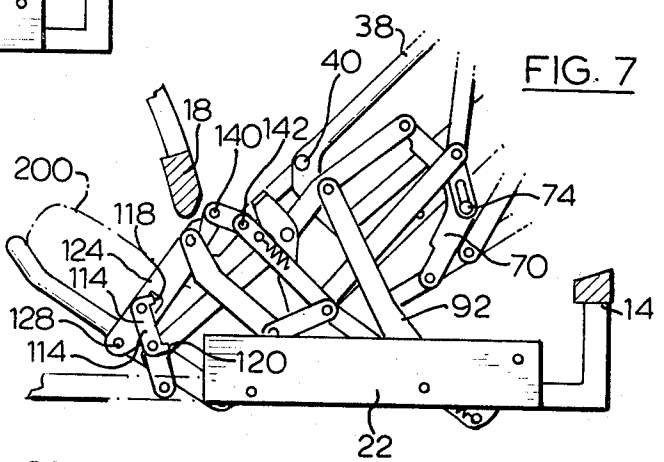


FIG. 7

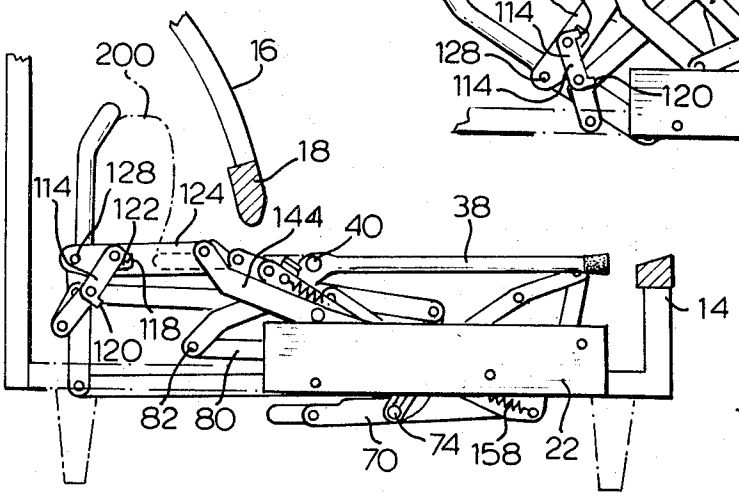


FIG. 8

CHESTERFIELD BED MECHANISM

FIELD OF THE INVENTION

This invention relates to chesterfield bed mechanisms of the kind which include a serially connected multi section foldable structure designed in its folded condition to be accommodated within a recess located behind the front rail of a chesterfield. The folded structure contains a folded mattress; after removal of the seat cushions positioned above the mattress the structure may be unfolded to extend over the front rail of the chesterfield to provide a structure with the floor engaging foot and intermediate legs to support the unfolded mattress thereby converting the chesterfield into a bed.

PRIOR ART

Various foldable structures have been developed for the purpose of converting a chesterfield into a bed but to facilitate their accommodation when folded it is usual for the recess behind the seat rail to extend below and behind the back support. This provides for the rear part of the folded structure to be located below and behind the back support. To achieve this result the folded structures in use have linkages so arranged that on unfolding, the rear portion pivots downwardly around the back support after which it rises to extend outwardly over the chesterfield rail until it provides a substantially horizontal support with floor contacting legs.

A particularly advantageous multi section foldable structure is described in U.S. Pat. No. 3,292,188 granted to the present inventor. This structure provides an easy and low glide pattern by jack knifing the intermediate leg pair with a simple locking assembly for the head section when the mattress supported thereon has been unfolded. In common with others on folding the structure is adapted so that the rear portion passes under the back support to finally locate itself in the recess behind the back support.

In recent years there has been a trend for chesterfields to be less bulky with seats positioned closer to the floor; the trend has been dictated principally by increased apartment living. To achieve lower seats the lower edge of the back support and its contained stuffing bar around which the fabric is turned must also be positioned closer to the floor than hitherto. In a chesterfield bed, such positioning of the stuffing bar to provide lower seats reaches a point wherein existing folding structures are not capable on unfolding of both clearing the back support and the floor.

Accordingly it is an object of the present invention to provide a foldable frame which will enable chesterfield beds to be constructed with seat levels lower than hitherto possible.

It is a further object of the invention to adapt the foldable frame described in U.S. Pat. No. 3,292,188 so that, while it retains its easy glide pattern and locking assembly, it also is capable of providing the requisite pivoted movement around the lower edge of the back support when it is as little as 12 inches from the floor.

SUMMARY OF THE INVENTION

In summary the foldable frame of the invention provides in the unfolded position a substantially horizontal mattress supporting member divided into a body portion supported by intermediate legs and an end portion having foot end legs. The body portion is itself divided into pivotably connected forward and rear portions, "forward" being in relation to the back support. An upwardly extending rear lever is pivotably connected at its lower end to the side of the chesterfield; the other end of the rear lever is movable in an arc below the back support. A swing lever is connected at a medial point to the other or upper end of the rear lever with the portion of the swing lever forward of said medial point extending upward to pivotably connect with the rear portion of the support member. Means are provided to maintain the rear portion of the support member in a fixed position when the frame has been extended. On manually lifting rearwardly the forward portion, means release the swing lever to rotate it downwardly and then rearwardly on the rear lever with the swing lever lowering the rear portion of the support member into a lower rearward position through the horizontal. Further means then rotate the swing lever until it adopts a substantially horizontal position with the rear portion of the support member substantially vertical and the forward portion is substantially horizontal but in a lower plane and rearwardly than in the extended position.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described in relation to the accompanying drawings in which:

FIG. **1** is a side elevation of the present chesterfield bed mechanism in open or bed position relative to a chesterfield frame and also the mechanism partially collapsed as indicated by dotted line.

FIG. **2** is a perspective view of a portion of the mechanism shown in FIG. **1.**

FIG. **3** is an opposite side elevation of the mechanism shown in FIG. **1.**

FIG. **4** is a side elevation showing for greater clarity the rear portion of the mechanism prior to folding.

FIGS. **5, 6** and **7** are side elevations, looking from the outside of the chesterfield illustrating the folding action of the mechanism.

FIG. **8** is a side elevation showing the mechanism fully folded.

It will be appreciated that while only one folding frame is illustrated on one side of the chesterfield, a similar frame will be located on the other side; both frames are connected by springs not shown on which rests a mattress **200.**

It will also be appreciated from the description that while the folding frame illustrated in the drawings includes many of the members described and illustrated in the above mentioned U.S. Pat. No. 3,292,188, the members hereafter described and constituting the improvement which enables the frame described in the above mentioned U.S. Patent to be adapted to provide lower seat levels, may also be adapted to other folding frames.

The chesterfield frame which constitutes the carcass of the piece of furniture known as a chesterfield sofa or simply as a chesterfield is collectively designated **10.** For the purpose of describing the invention, only the side member **12** and front rail **14** of the chesterfield is shown in FIG. **1** along with the back support **16** and associated stuffing bar **18** which defines the lower edge of the back support.

The chesterfield bed mechanism secured to the side member **12** is collectively designated **20** and, apart from said securement, it is composed of a plurality of

sections, specified hereunder, which are serially connected. The description of the parts involves the use of the words "forward" and "rear;" these words unless otherwise specified refer to the position of the parts leading outward from the back support **16** when the mechanism is in the extended or bed position as shown in FIG. **1.**

The mechanism **20** is fixedly secured to the side member **12** of the chesterfield by means of a base plate **22** bolted to the side member **12.**

The mechanism **20** includes a plurality of angle support sections pivotably connected, namely a rear angle section **24** connected at **26** to a forward angle or body section **28** in turn connected at **30** to an end angle section **32.** One end of a tubular member **34** is secured at **36** to the forward end of the end angle section **32.** A foot end leg **38** is medially connected at **40** to the tubular member **34** which provides for containment of the mattress **200** which lies on springs, not shown secured to the plurality of support sections **24, 28** and **32** by well known means such as hooks located in holes in these sections.

A set of members all pivotally, and in some cases slidably connected to others as further specified extend along the foldable mechanism when considered in the extended or bed position of the accompanying FIG. **1** and certain of these members will be given specific names for greater particularity hereafter.

In the extended position the upper portion of the front end floor contacting leg **38** beyond its connection point **40** is sharply curved rearwardly to be substantially parallel to the tubular member **34.** The rear end of the front leg **38** is connected at **42** to the end of an arm **44** and the other end of the latter is pivoted at **46** to the end angle section **32.**

One end of a snubbing bar not shown is pivotably and slidingly connected through a slot **50** to the forward section **28;** the snubbing bar spans connection point **30** and is pivotably connected to the end angle section **32.**

A radius bar **54** is pivotably connected at **36** to the end section **32.** Rearwardly adjacent to the connection point **36,** the radius bar **54** is sharply angulated to provide an outward projection **56.** A further snubbing bar **58** is pivotably secured to the arm **44** at **60** and extends past the projection **56** for pivotal securement to the radius bar **54** at **62.**

In the bed position the bar **58** bears on the projection **56,** and in conjunction with the bar **48,** is part of a system to prevent collapse of the forward section along with other members described hereunder.

The mechanism **20** provides an intermediate floor engaging leg **64.** The lower end of a brace **66** is pivotably connected at **68** to the leg **64.** The upper end of the brace **66** is connected at **30** to the forward angle section **28.**

The lower end of an angulated swing lever or boomerang link **70** is pivotably connected to the upper end of the intermediate leg **64.** The swing lever **70** has a headed pin **74** positioned slightly below its rearward angulation. The rear end of the radius bar **54** has a slot **76** and the pin **74** rides therein.

Medially of its ends the radius bar **54** has secured thereto at **78** one end of a tension bar **80** which extends rearwardly to pivotably connect at **82** with the forward end of a bell crank, generally denoted by the numeral **84,** comprising a locking arm **86** which has an outwardly projecting shoulder **88** and an operating arm **90.** The bell crank **84** and tension bar **80** provide the novel locking assembly described in the aforesaid U.S. Pat. No. 3,292,188 for the mechanism in the bed position. More particularly the shoulder **88** is adapted to bear against the upper edge of a main lever **92** pivotably connected at its lower end at **94** to the base plate **22.** The bell crank **84** is pivoted at **95** to a main link **98.**

The upper end of the main lever **92** is connected at **96** to the main link **98** the connection **96** being forwardly of connection **94.** The forward end of the main link **98** is connected at **100** to the rear end of the swing lever **70** in turn connected at **102** to the vertical flange of the forward angle section **28.** A pin **104** projects outwardly of the forward angle section and bears against the swing lever **70** to act as a stop when the mechanism is in the bed position.

The main link **98** extends rearwardly and is connected at **106** to the rear angle section **24.** The rear end of the main link **98** is sharply angulated downwardly beyond **106** to form an elbow **108** which is connected at **110** to one end of an upwardly and rearwardly extending short swing link **112.** A downwardly and rearwardly extending long swing link **114** is connected at **116** to the other end of the short swing link **110.**

The long swing link **114** has a pair of inwardly extending spaced apart arms **118** and **120,** see more particularly FIG. **2.** The arm **118** is located in a medial slot **122** provided in a rear swing lever **124.** The long swing link **114** is pivotally connected at **126** adjacent the slot to the rear swing lever **124.** The forward end of the rear swing lever **124** is connected at **128** to the rear end of the rear angle section **22.** The slot **122** has an arcuate edge **130.**

The lower end of an angulated rear lever **132** is pivotably connected at **134** to the base plate **22.** The rear lever **132** at its angulation forms a rearwardly disposed included angle as illustrated in FIG. **3** and the upper end is pivotably secured at **136** to the rear swing lever **124.** One end of a short link **138** is pivotably secured at **140** to the rear end of the rear lever **132.** The other end of the short link **138** is secured at **142** to one end of a long link **144,** see FIG. **4,** the other end of which is pivotably connected at **146** to the base plate **22,** see FIG. **3.** The long link **144** has an outwardly extending headed pin **148** adjacent connection point **140.**

One end of a cross brace **150** is secured at **152** to the rear lever **132.** The other end of the cross brace **150** is secured at **154** to the long link **144.**

The main lever **92** has an outwardly projecting headed pin **156;** a spring **158** is secured on the pins **156** and **148.** The swing links **112** and **114** in their over centre position illustrated in FIG. **4** constitute a lock in conjunction with the spring **158** for the rear angle section **24.**

FOLDING OPERATION

In practice the folding action of the mechanism **20** from the extended position shown in FIG. **1** is smoothly continuous but on analysis it can be divided into two discernible stages. In the first stage the tubular member **34** is manually lifted and this releases the lock provided by the bell crank **86** and tension bar **70.** Then the end angle section **32** pivots upwardly until it is practically normal to the forward angle section **28** while both the front end leg **38** and tubular member **34** rotate anticlockwise. Due to the combined action of the arm **44,** and the linkage with the radius bar **54,** the front end leg **38** and tubular member **34** finally lie in the same plane

which is their finally folded position with respect to the end angle section **32**, see dotted position in FIG. **1**. In the remaining folding operation the above mentioned members move as one unit in fixed relation to the forward angle section **28**.

In the second stage the manual pressure on the mechanism is upward and then rearwards. Means by way of movement of the main link **98** causes the rear swing lever **124** to rotate downwardly and then rearwardly through the vertical, taking with it the rear angle section **24** which has been forced to pivot with respect to the forward angle section **28**, see FIG. **6**.

More particularly this involves the use of the main lever **92** the upper end of which in the extended position is connected at **96** to the main link **98** in a position which is forward with respect to the pivotal connection at **94** of the main lever **92** to the base plate **22**. The first movement of the main link **98** is pivotal about its connection point **96** causing the rear end of the main link **98** to drop. The elbow **108** pivotally moves the short swing link **112** clockwise or forwardly and this changes its overcentre position with respect to the long swing link **144** towards one in line, see FIG. **5**. Arm **120** will then bear on the upper edge of the short swing link **122** so that the main link **98** acts through the short swing link **122** and long swing link **144** on the swing lever **122**. The in line position of the long swing link **144** and short swing link **122** remains unchanged through the remainder of the folding operation but to accommodate the pivotal action of the rear swing lever **122** on the rear angle section **24**, the arm **118** moves along the arcuate edge **130** of the medially located slot **122**.

During the downward movement of the rear swing lever **122**, the rear angle section **24** starts to pivot with respect to the forward angle section **28**. This is accomplished by the connection of the main link **98** at its rear end to the rear angle section **24** and at its forward end to the rear end of the boomerang link **70** which is in turn connected medially at **95** to the forward angle section **28**. Thus in effect the main link **98** spans in pivotal relationship the pivoted rear angle section **24** over the forward section **28**. Rear arcuate movement of the main lever **92** causes its connection point **96** to initially move upwards and this causes the span to shorten; to accommodate this change, the forward angle section **28** and rear angle section pivot into a V-formation. Due to the combined action of the rear swing lever **122** and the rotation of the boomerang the included angle between the rear angle section **24** and the forward section decreases and meanwhile the pivotal action of the lower end of the rear swing lever **122** clearing the floor takes the rear angle section **24** under the back support. At the same time the pivotal action of the boomerang link takes the intermediate leg **64** into the storage position.

Linkage means come into effect on the swing lever **120** passing the vertical which enables the rear angle section **24** to further rotate into the stored position with respect to the forward angle section **28**. This is accomplished by the combined effect of the short link **138**, the long link **144** and brace **150** in conjunction with the rear lever **132**.

During the movement described above, i.e., the swing lever **122** moving downwardly and rearwardly, the short link **138** swings forwardly and downwardly with the result that the rearwardly placed connection at **140** of the short link **138** with the swing lever **122** moves forwardly of the connection at **136** of the rear lever **132** to the swing lever **122**. Hence the short link **138** with the long link **144** has an effective rear radial movement on the pivotal connection of the long link **144** at **146** as compared with the radial movement of the rear lever **124**. Hence the medial connection of the latter to the rear swing lever **124** causes it to pivot upward primarily around the short link **138**. Both the rear lever **124** and the long link **144** rotate rearwardly in their connections to the base plate **22** to lie closely together as shown in FIG. **8**.

What is claimed is:

1. In a chesterfield bed frame having a back support and a side with a seat recess extending under and behind said back support, a mechanism foldable into said recess, said mechanism in its bed position providing a mattress supporting member forward of said back support, said support member being divided into a rear section and forward section pivotably connected, said mechanism having a main lever pivotably connected at one end to said frame, said main lever in the bed position extending upwardly and forwardly with respect to said back support, an upwardly extending rear lever pivotably connected at its lower end to said frame at a position rearward of said main lever; a swing lever medially pivoted to the upper end of said rear lever, said swing lever in the bed position extending forwardly for pivotal connection to said rear section, main link means rearwardly pivotably connected to said rear section and forwardly pivotably connected to said forward section, said main link means being medially pivotable on the upper end of said main lever to lower the rear end of said main link means and rotate said swing lever downwardly and rearwardly through the vertical about said rear lever thereby pivoting said rear section under said back support and linkage means operable with said rear lever to further rotate said swing lever upwardly behind said back support to store said rear section.

2. A foldable frame according to claim **1** wherein said main link means is angulated downwardly rearward of its connection to said rear section to provide an elbow, means pivotably connecting said swing lever to said elbow, a spring below said means connecting said main lever and said rear lever, said means with said spring constituting a lock to maintain said rear section in support position with said main section.

3. A foldable frame according to claim **2** wherein said means comprise a short swing link pivotably connected at one end to said swing lever, a long swing link pivotably connected to the other end of said short link, said long swing link being pivotably connected to said elbow, said short link and long link in the bed position having an over centre position with respect to said rear section.

4. A foldable frame according to claim **1** in which said elbow on lowering of said link means changes from an over-centre position to one substantially in line, and wherein said swing lever has an arcuate slot, said short swing link having first and second spaced apart arms, said first arm being located on said arcuate slot, said second arm, on changing to said in line position, bearing against the edge of said long swing link with said first arm riding on said arcuate slot while said swing lever rotates downwardly.

5. A foldable frame according to claim **1** wherein said linkage means consist of an upwardly extending long link the lower end of which is pivotally connected to

said frame, a short link pivotably connected at one end to said long link, the other end of said short link being pivotably connected to the end of said swing lever opposed to the end of its connection to said rear section, a brace member pivotably secured at one end to a medial point on said rear lever and at the other end to a medial point on said long link, said short link, long link, brace and rear lever cranking said swing lever upwardly behind said back support.

* * * * *