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Eakins

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[54] SOFA BED FOLDING FIXTURE

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[52] **U.S. Cl.** **5/13,** 5/29

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

[58] **Field of Search** 5/13, 17, 29

[56] **References Cited**

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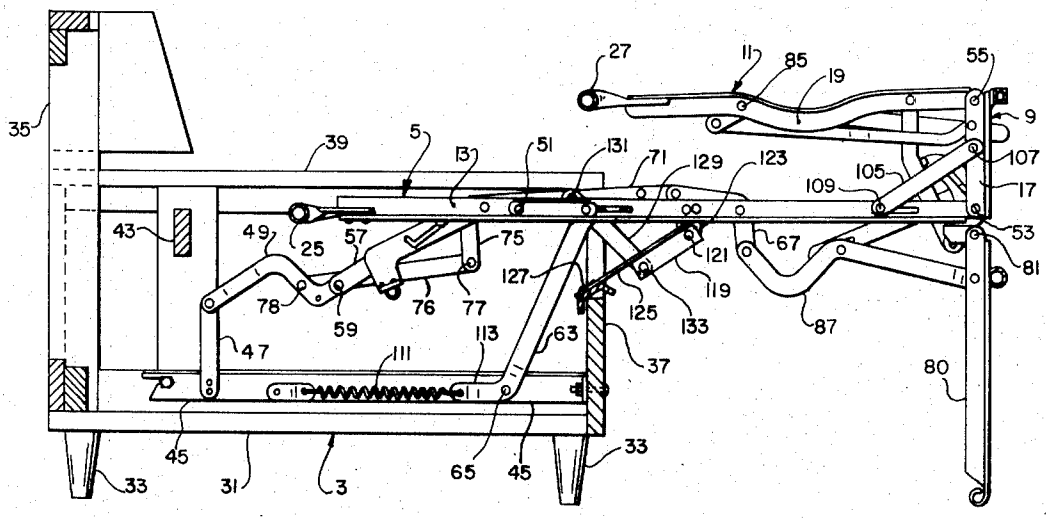
Primary Examiner—Casmir A. Nunberg

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[57] **ABSTRACT**

A folding fixture for a sofa bed having a plurality of sections pivotally connected together end-to-end with each section comprising a pair of bars at opposite sides of the fixture and with a bedspring for supporting a mattress extending between and connected to the side bars. The fixture is foldable so the sections along with the mattress and the bedspring may be disposed in the sofa in a retracted position wherein one of the sections constituting a body section extends generally horizontally bottomwise of the sofa. Means is provided extending between the side bars of the body section adjacent its rearward end for supporting the bedspring when the fixture is in its stated retracted position. This bedspring support means is carried by linkage means operable by the folding and unfolding of the fixture for moving the bedspring support means between a lowered retracted position permitting the bedspring to yield downward under the weight of a user when the fixture is unfolded for use as a bed and a raised position relative to the body section contiguous to the bedspring holding it up against downward yielding when the fixture is retracted for use as a sofa.

4 Claims, 4 Drawing Figures



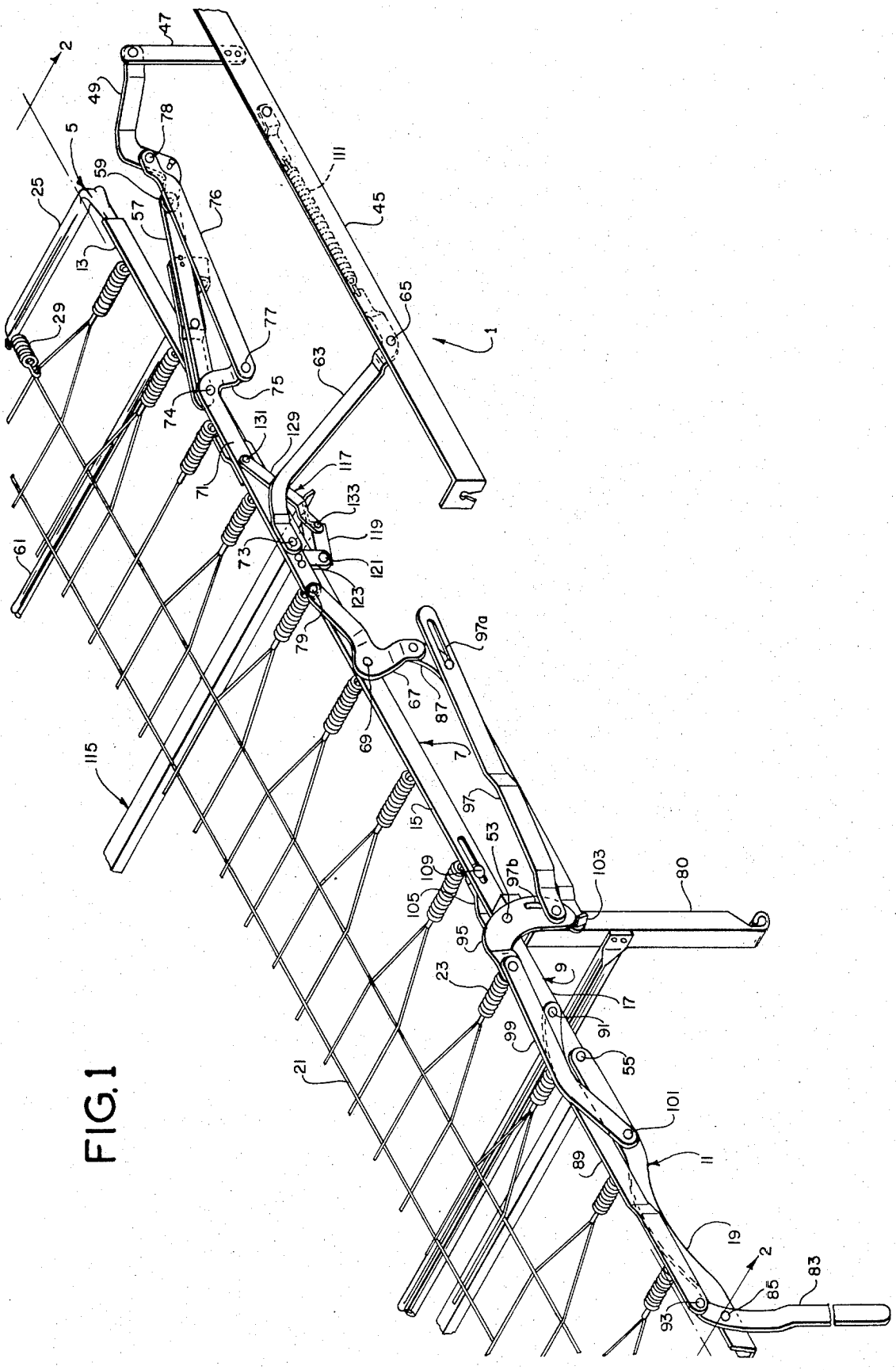

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FIG. 1

FIG. 2

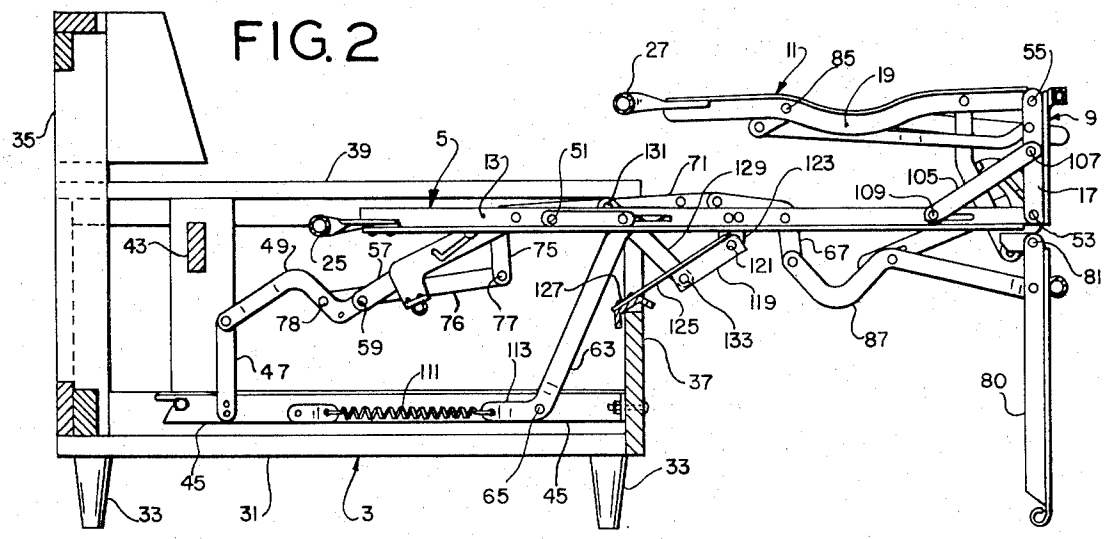


FIG. 3

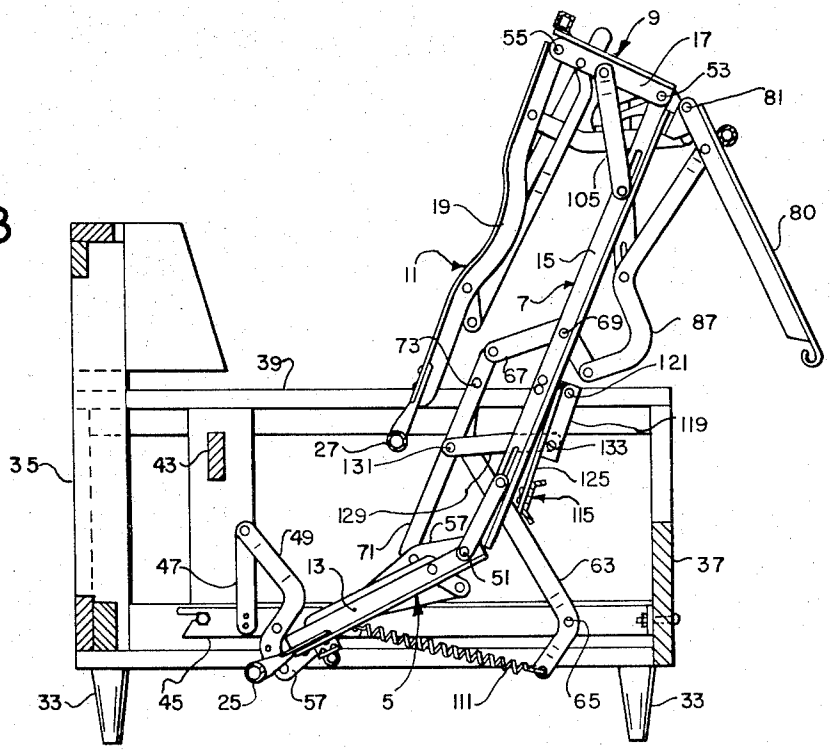
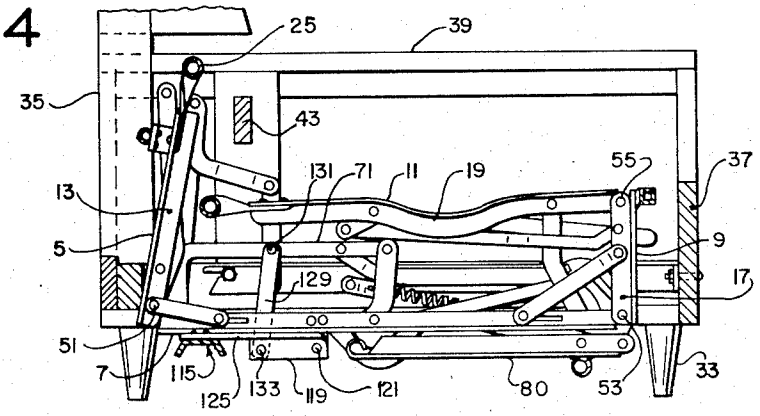


FIG. 4



SOFA BED FOLDING FIXTURE

BACKGROUND OF THE INVENTION

This invention relates to sofa beds, and more particularly to a folding fixture for a sofa bed.

The invention is especially concerned with a folding fixture for a sofa bed of the type referred to in the art as a four-section rise-over fixture, although its principles may be applicable to other types of fixtures. As will be understood by those familiar with the art, a four-section rise-over fixture comprises a head section, a body section, an intermediate section and a foot section (the outer section) pivoted together end-to-end. When unfolded, the fixture extends horizontally forward from adjacent the back of the sofa over the front rail of the sofa, the foot, intermediate and body sections being supported on legs which unfold as the fixture is swung out of the sofa and unfolded. The fixture is adapted for folding over of the foot section on top of the body section and retraction of the entire fixture into the sofa with the head section extending upward within the back of the sofa, the body section extending generally horizOntally forward from the lower end of the head section, the intermediate section extending upward from the forward end of the body section immediately behind the front rail of the base of the sofa, and the foot section extending horizontally rearward from the upper end of the intermediate section. The foot section then constitutes a support for the seat cushion or cushions of the sofa. In extending the fixture for use as a bed, after removal of the seat cushion or cushions of the sofa, the intermediate section is pulled up from behind the front rail and the fixture is swung out over the front rail, rising over the front rail (hence the description of the fixture as a "rise-over" fixture) to extend the head section, and body section, after which the foot section and intermediate section are unfolded. It will be understood that the fixture comprises two suitable cross-connected opposite side assemblies with a bedspring structure extending therebetween for supporting a mattress, and that, in folding up the fixture, the mattress is correspondingly folded, and is retracted, in is folded condition, into the sofa along with the fixture.

Reference may be made to such U.S. Pat. Nos. as 3,239,851, 3,380,083 and 3,284,814 for a showing of four-section rise-over sofa bed fixtures such as above described.

Fixtures of the type above described are well known in the art and have now been on the market for a number of years. Generally, they require that some type of support means be provided extending across the fixture between the two opposite side assemblies forward of and adjacent the forward (lower) end of the head section (the rearward end of the body section) for supporting the bedspring structure, which is typically a wire mesh spring, to keep the wire mesh and the mattress supported thereby from sagging at the rearward end of the body section under the weight of a person or persons seated on the sofa when the fixture is in its retracted, folded condition within the sofa. Such a support means in the form of a tubular bar fixed at its ends to the side bars of the body section of the frame is shown (unnumbered) in FIGS. 1 and 2 of said U.S. Pat. No. 3,380,083. However, this has presented the problem that, when the fixture is extended, the stated wire mesh supporting means undesirably keeps the wire

mesh spring from yielding downwardly under the weight of a person lying on the mattress of the sofa bed, and this unyielding support of the mesh on the line of the supporting means across the bed is unfortunately felt through the mattress by the person to his discomfort.

SUMMARY OF THE INVENTION

Accordingly, among the several objects of this invention may be noted the provision of a folding fixture for a sofa bed of the class above described having means for supporting the bedspring against sagging across the bottom rear region of the bedspring when the fixture is folded and disposed in retracted position in the sofa, with this means being retracted downward away from the bedspring when the fixture is unfolded and extended from the sofa for use as a bed to allow the bedspring to yield under the weight of the user; the provision of a folding fixture with such means which covers and protects the front rail of the sofa frame from damage by excessive downward yielding of the bedspring when the fixture is unfolded for use as a bed; and the provision of such a fixture provided with such means in a simple, economical manner.

In general, a folding fixture of this invention comprises a plurality of sections pivotally connected together end-to-end, each of the sections comprising a pair of bars at opposite sides of the fixture. A bedspring spans the side bars of the sections and is connected at its sides to the side bars. The sections along with a mattress supported on the bedspring are adapted to be folded and disposed in the sofa in a retracted position wherein one section constituting a body section extends generally horizontally bottomwise within the sofa, another section constituting an intermediate section extends upward from the end of the body section at the front of the sofa, and a third section constituting a foot section extends generally horizontally rearward from the upper end of the intermediate section. Means is provided extending between the side bars of the body section adjacent its rearward end for supporting the bedspring when the fixture is in its retracted position within the sofa. This bedspring support means is mounted for up and down movement relative to the body section between a lowered retracted position relative to the body section spaced from the bedspring permitting the bedspring to yield downward, and a raised position relative to the body section contiguous to the bedspring holding it up against downward yielding. Linkage means is provided which is operable by the folding and unfolding of the fixture and connected to the bedspring support means for moving the latter to its raised position when the fixture is folded and disposed in its retracted position in the sofa and for moving the bedspring support means to its lowered retracted position when the fixture is unfolded out of the sofa.

Other objects and features will be in part apparent and in part pointed out hereinafter.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a partial perspective view of a fixture of this invention in its completely unfolded position with the sofa frame omitted for clarity;

FIG. 2 is a longitudinal vertical section on line 2—2 of FIG. 1, the sofa frame being shown in section, and the fixture being partially folded;

FIG. 3 is a view corresponding to FIG. 2 showing the fixture in an intermediate position; and

FIG. 4 is a view similar to FIGS. 2 and 3 showing the fixture in its fully folded retracted position within the sofa frame.

Corresponding reference characters indicate corresponding parts throughout the several views of the drawings.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings, reference numeral **1** indicates in its entirety a four-section rise-over folding fixture of this invention for a sofa, the frame of which is indicated generally at **3**. The fixture has a head section **5**, an inner or body section **7**, an intermediate section **9** and an outer or foot section **11** pivotally connected together end-to-end. Each section comprises a pair of side bars at opposite sides thereof, these bars being angle-section bars each arranged with one of its legs extending vertically and its other extending inward from what amounts to the lower edge of the vertical leg. The side bars of the respective sections **5, 7, 9** and **11** are indicated at **13, 15, 17** and **19** in FIGS. **1–4**. A bedspring **21** for supporting a mattress (not shown) spans the side bars of the four sections. This bedspring, as is conventional, consists of a wire mesh attached at its sides to the horizontal legs of the angle-iron side bars by coil tension springs as indicated at **23**. The head section **5** has a crossbar **25** at its rearward end and the foot section has a crossbar **27** at its forward end, and the bedspring **21** is also attached at its ends to these crossbars by coil tension springs as indicated at **29**.

The sofa frame **3**, as herein illustrated, comprises a base **31** on legs **33**, a back frame structure **35**, a front rail **37** and end frames **39**. A member **43** extends horizontally between the end frames with its lower edge at an elevation somewhat above the elevation of the top edge of the front rail **37**.

The fixture **1** has at each side thereof a support **45** constituted by an elongate flat metal bar which is mounted in position extending horizontally on the inside of the respective end frame **39** of the sofa frame (it will be understood that there are two such bars **45**, one at each side of the fixture). Extending up from each bar **45** adjacent one end constituting its rearward end is a post **47**. An S-shaped arm **49** is pivoted for swinging movement on a horizontal axis extending in end-to-end direction in respect to the sofa at the upper end of the post.

The pivotal pin connection between the head section **5** and the body section **7** is indicated at **51**. The pivotal pin connection between the body section and the intermediate section **9** is indicated at **53**, and the pivotal pin connection between the intermediate section and the foot section **11** is indicated at **55**. A head section support link **57** interconnects arm **49** and the pivotal interconnection **51** between the head section **5** and the body section **7**. This link **57** is pin-connected to arm **49** at its free end as indicated at **59**. The side bars **13** of the head section are connected intermediate their ends by a crossbar **61** and this assembly constitutes a so-called TV head rest section adapted to be supported from the support links **57** in any suitable known manner. A second arm **63** is pivoted for swinging movement on the bar **45** at **65** about a horizontal axis parallel to and below and forward of the pivotal axis of the first arm **49**, pivot **65** being located adjacent the front end of bar **45**. A bell crank **67** is pivoted at **69** on the outside of bar **15** of the body section at about midway the length of the latter. A lever **71** is pivoted intermediate its ends at the upper end of arm **63** as indicated at **73**. Lever **71** is pivotally interconnected to link **57** at **74** adjacent its rearward end **75** which is angled down toward a connecting link **76** and is pivotally interconnected with the latter by a pin **77**. The rear end of link **76** is pivotally connected to arm **49** at **78**. The front end of lever **71** is pivotally interconnected with the upper end of bell crank **67** by a pin at **79**.

A folding leg **80** is pivoted at **81** on the side of body section **7** adjacent its front end and a folding leg **83** is pivoted on a pin at **85** on the outside of the side bar **19** of foot section **11** adjacent its front end for supporting the body section **7**, the intermediate section **9** and the foot section **11** when unfolded. A link **87** interconnects the lower end of bell crank **67** and leg **80** for folding and unfolding the latter. A link **89** is interconnected between the outside of side bar **17** of intermediate section **9** at **91** and the upper end of leg **83** at **93** for folding and unfolding leg **83**.

Means is provided for locking the foot section **11** down against the expansionary tendency of the folded mattress (not shown) when the fixture **1** is folded into the sofa frame **3** (as shown in FIG. **4**). This means comprises a bell crank **95** pivoted at **53** between the body and intermediate sections on the outside of side bar **17**. A link **97** has a pin and slot connection **97a** at one end with link **87**, and a pin and slot connection **97b** at the other end with bell crank **95**. A link **99** interconnects the upper end of bell crank **95** and the foot section **11** at **101**. The bell crank **95** has a lateral ear **103** at its lower end engageable with link **99** as appears in FIG. **4**. The arrangement is such that when the fixture is folded into the sofa, the bell crank **95** acts via link **99** to pull the foot section toward the body section.

A link **105** has a pin connection **107** with the side bar **17** of the intermediate section **9** and a pin and slot connection at **109** with the side bar **15** of body section **7**. A counterbalance spring **111** is connected between a lower end extension **113** of arm **63** and bar **45**.

In accordance with this invention, means generally indicated at **115** extends between the side bars **15** of body section **7** adjacent the rearward end thereof for supporting bedspring **21** against downward yielding when the fixture **1** is in its fully retracted position within the sofa as appears in FIG. **4**. This bedspring support means comprises a generally downwardly facing channel bar mounted for up and down movement relative to the body section **7** between a lowered retracted position (as shown in FIGS. **1** and **2**) relative to the body section spaced from the bedspring **21** permitting the bedspring to yield downward under the weight of a person or persons reclining on the mattress when the fixture is unfolded, and a raised position (as shown in FIG. **4**) relative to the body section **7** contiguous to the bedspring holding it up against downward yielding under the weight of a person sitting on the sofa when the fixture is folded in the sofa frame. As generally indicated at **117**, linkage means is provided operable by the folding and unfolding of the fixture and connected to channel bar **115** for moving the

latter to its raised position when the fixture is folded and disposed in its retracted position in the sofa and for moving the channel member to its lowered retracted position when the fixture is folded out of the sofa.

Linkage means **117** comprises a pair of pivot arms **119**, one at each side of the fixture, carrying the channel member **115** at their free ends for swinging movement between its raised and lowered positions. Each arm **119** is pivoted at one end as indicated at **121** on a lug **123** secured to the outside of the respective side bar **15** of the body section **7** forward of pivot **73**, this lug extending down below the side bar **15**. Arm **119** is formed from an angle iron, with one leg in a vertical plane, and with an extension **125** of its other leg at its end away from the pivot **121**. The channel member **115** is secured at its ends as indicated at **127** to the bottom of the extensions **125** of arms **119**, and is thus swingable up and down relative to the body section **7** about the axis of the pivot pins at **121**. Linkage means **117** further comprises a pair of links **129**, one at each side of the fixture, each linking the lever **71** and the arm **119** at its respective side of the fixture, the pin connections of the link **129** to the lever **71** and arm **119** being indicated at **131** and **133**, respectively.

In the retracted position of the fixture **1**, as shown in FIG. **4**, the body section **7** extends generally horizontally bottomwise within the sofa, the intermediate section **9** extends upward from the forward end of the body section **7** at the front of the sofa immediately in back of the front rail **37**, and the foot section **11** extends generally horizontally rearward from the upper end of the intermediate section. The head section **5** extends up from the rear end of the bottom section **7** in the back of the sofa. The two levers **71** at the opposite sides of the fixture occupy a raised position relative to the body section **7** (see FIG. **4**) and thus hold the links **129** pulled up to hold up the channel member **115** in its raised position relative to the body section **7** extending across the body section **7** just below the bottom flanges of the angle-iron side bars **15** of the bottom section contiguous to the bedspring **21** holding up the bedspring against downward yielding. In this regard, it will be understood that when the fixture is folded into the sofa (along with the mattress supported on the bedspring), the sofa cushion or cushions are applied to the top of the foot section for seating on the sofa. The channel member **115**, in its stated raised position, supports the bedspring against sagging across the bottom rear region of the bedspring under the weight of a person or persons seated on the sofa.

When the fixture is unfolded and extended from the sofa for use as a bed, as shown in FIGS. **3** and **4**, the levers **71** at opposite sides of the fixture act via the links **129** to swing the arms **119** downwardly with respect to the bottom section **7**, thus swinging the channel member **115** downwardly away from the bottom section **7** and bedspring **21**. This action of the levers **71** results from the unfolding of the head section **5** and the body section **7**. The arrangement is made such that the channel member **115** swings downwardly to the lowered retracted position of FIG. **2** overlying the upper edge of the front rail **37** to protect it from sagging of the bedspring. It will be understood that in the fully extended position of the fixture, the sections **5**, **7**, **9** and **11** will be horizontally aligned, and that legs **80** and **83** will be fully unfolded for supporting the sections. On refolding of the fixture and its retraction into the sofa, the channel member **115** is automatically returned to its FIG. **4** raised position relative to the bottom section **7** by the action of the levers **71**.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As various changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What is claim is:

1. A folding fixture for a sofa bed comprising a plurality of sections pivotally connected together end-to-end, each of said sections comprising a pair of bars at opposite sides thereof, a bedspring spanning the said side bars of said sections and connected at its sides to said side bars, said sections along with a mattress supported on the bedspring being adapted to be folded and disposed in the sofa in a retracted position wherein one section constituting a body section extends generally horizontally bottomwise within the sofa, another section constituting an intermediate section extends upward from the forward end of the body section at the front of the sofa, and a third section constituting a foot section extends generally horizontally rearward from the upper end of the intermediate section, and means extending between the side bars of the body section adjacent its rearward end for supporting the bedspring when the fixture is in its retracted position within the sofa, said means being mounted for up and down movement relative to said body section between a lowered retracted position relative to said body section spaced from the bedspring permitting the bedspring to yield downward, and a raised position relative to said body section contiguous to the bedspring holding it up against downward yielding, and linkage means operable by the folding and unfolding of the fixture and connected to said bedspring support means for moving said support means to its raised position when the fixture is folded and disposed in its retracted position in the sofa and for moving said bedspring support means to its lowered retracted position when the fixture is unfolded out of the sofa.

2. A folding fixture as set forth in claim **1** wherein said sofa comprises a frame having a front rail over which said fixture rises as it is unfolded from its retracted position within the sofa, and wherein said bedspring support means overlies said front rail when said fixture is unfolded and the bedspring support means is in its lowered retracted position.

3. A folding fixture as set forth in claim **2** wherein said bedspring support means is a downwardly facing channel member.

4. A fixture as set forth in claim **1** wherein said fixture has at each side thereof

a support adapted to be mounted in the base of a sofa at a respective side of the base,

a first arm pivoted for swinging movement on the support on a horizontal axis extending in end-to-end direction in respect to the sofa,

a head section support link interconnecting said first arm and the pivotal interconnection between the head section and the body section,

a second arm pivoted for swinging movement on the support on a horizontal axis parallel to and below and forward of the axis of said first arm,

a bell crank pivoted on the side of the body section,

a lever pivoted intermediate its ends at the upper end of said second arm having one end constituting its rearward end pivotally interconnected with said head section support link and its other end constituting its front end pivotally interconnected with one end of the bell crank,

and wherein said linkage means comprises

a pivot arm pivotally connected to said body section side bar intermediate the ends of the latter and extending rearwardly therefrom carrying said bedspring support means, and

a link interconnecting said lever and said pivot arm.

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