Dec. 12, 1950 A. LORENZ 2,534,176

COMBINED SOFA SEAT AND BED

Filed April 6, 1948 2 Sheets-Sheet 1

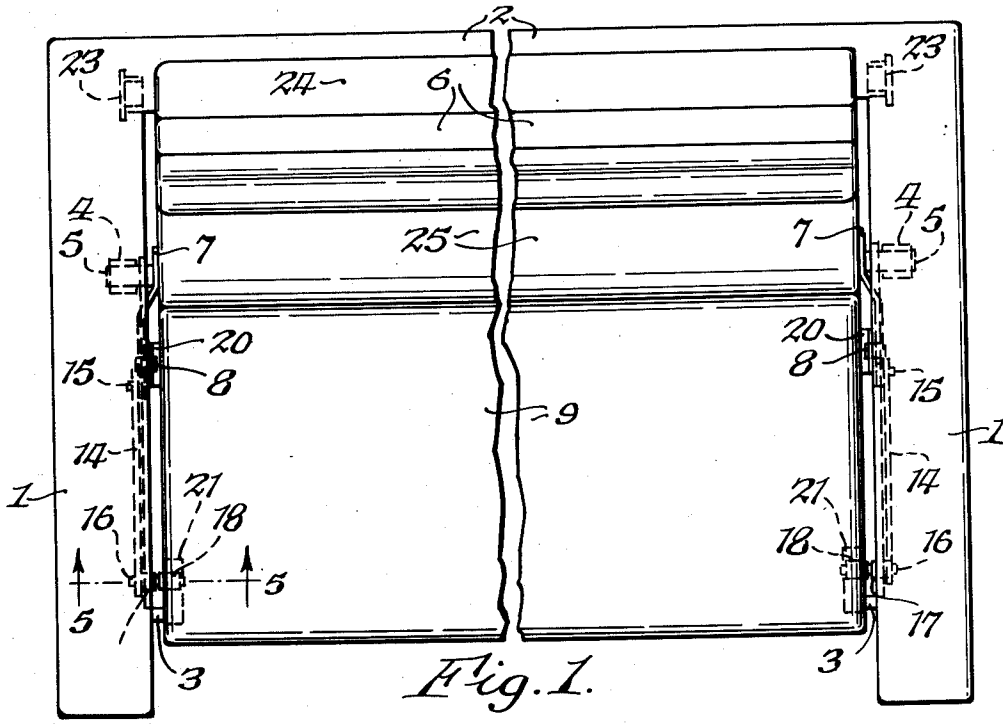


Fig. 1.

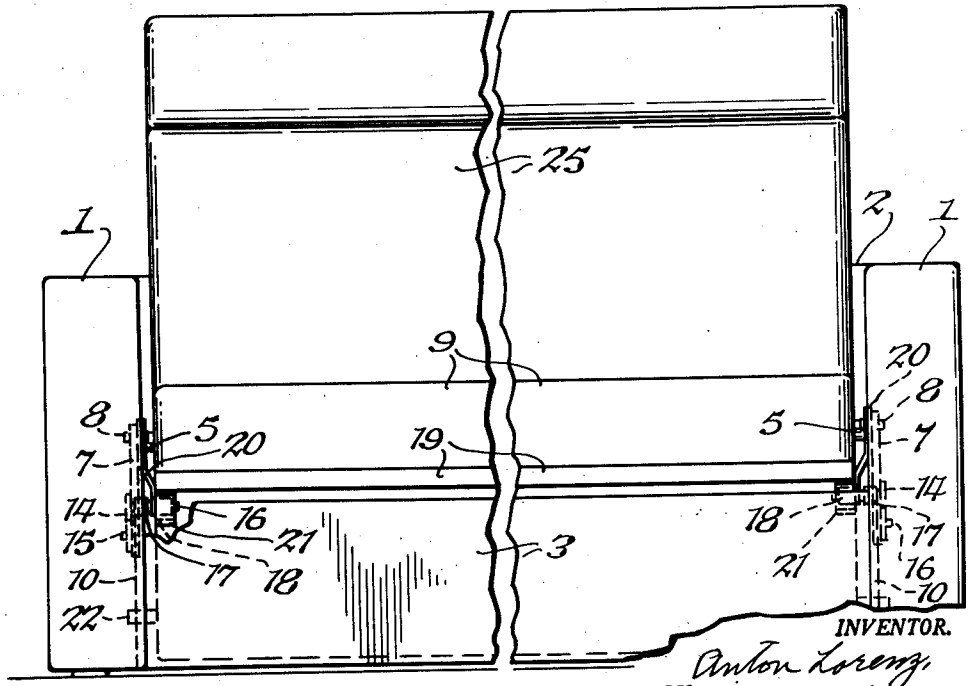


Fig. 2.

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Fig. 3.

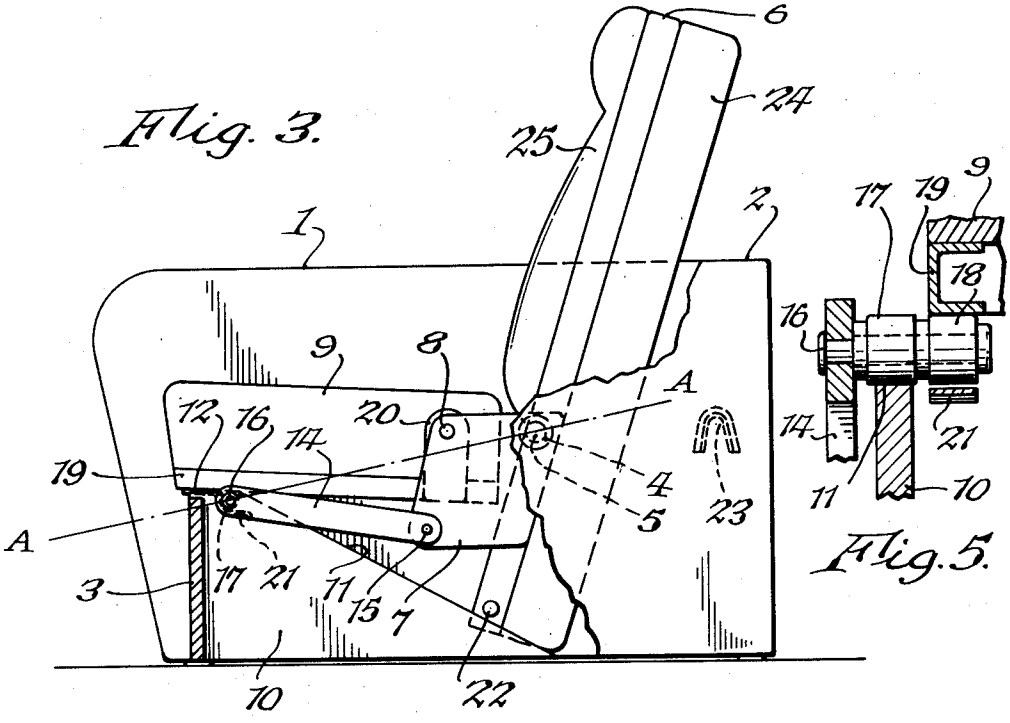


Fig. 5.

Fig. 4.

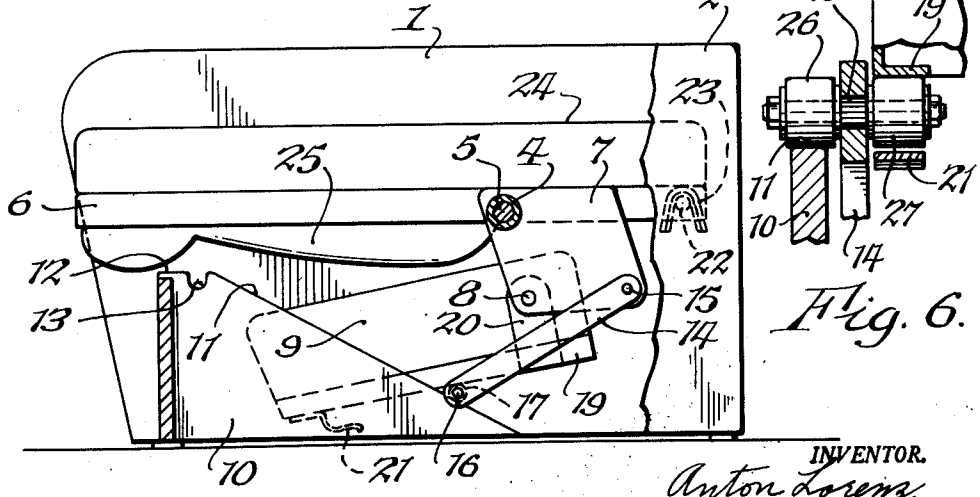


Fig. 6.

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COMBINED SOFA SEAT AND BED

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17 Claims. (Cl. 5—43)

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This invention relates to combination sofa-beds which may be converted for use selectively as either sofa seats or beds, as desired.

An object of the invention is to improve and simplify the construction and operation of sofa-beds.

Another object is to provide an improved sofa-bed which will be comfortable and properly proportioned as a sofa seat with slightly reclining back rest, which may be converted by a simple manipulation into a regular bed ready for immediate use; which will remain in either adjusted position against unintentional displacement; which will have the seat at a normal sofa level when converted or adjusted for use as a sofa and have the bed at the usual bed level when converted or adjusted for use as a bed; which will require a minimum of effort to convert it for use as a bed or sofa seat, and which will be relatively simple, durable, compact, practical and inexpensive.

Other objects and advantages will appear from the following description of one embodiment of the invention and the novel features will be particularly pointed out hereinafter in connection with the appended claims.

In the accompanying drawing:

Fig. 1 is a plan of a device embodying the invention and converted for use as a sofa seat;

Fig. 2 is a front elevation of the same;

Fig. 3 is an end elevation of the same, with a portion broken away to show parts otherwise hidden;

Fig. 4 is an end elevation similar to Fig. 3, but with the device inverted for use as a bed;

Fig. 5 is a sectional elevation of the same, the section being taken approximately along the line 5—5, Fig. 1; and;

Fig. 6 is a sectional elevation similar to Fig. 5 but illustrating a modification in the construction.

In the illustrated embodiments of the invention, the sofa bed includes a main frame formed of a pair of spaced parallel side or end members 1 connected by a rear cross member 2, and a front cross rail 3 disposed beneath the seat at the front. The inside faces of the side or end elements carry pivot bearings 4 which rockably support alined bearing studs 5 carried on opposite sides or ends of the bed frame 6. The studs 5 are located between the rear edge and the middle width of the bed frame 6 and preferably a little nearer the middle point than the rear edge. The frame 6 rocks between a generally upright, but slightly rearwardly tilted or reclining position

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shown in Figs. 1 to 3, in which it serves as the back rest of a sofa seat, and a generally horizontal position in which it serves as a bed, as shown in Fig. 4.

The ends of the frame 6 are provided with fixed, forwardly extending arms or plates 7, one at each end of the bed frame, and extending downwardly from studs 5. These plates 7 extend forwardly from the frame 6 when the frame 6 is upstanding and forwardly of the studs 5. Each plate 7 is hinged by a pin 8 to the rear part of the frame of a cushion seat 9, which is disposed between the plates 7 and forwardly of the frame 6. Arranged at each end of the main frame, but adjacent the inside faces of the side or end elements 1 are two inclined rails 10, one at each end. The higher ends of the rails are foremost and terminate at the cross element 3, and the upper or track surface 11 of each rail extends first forwardly as a horizontal part 12 and then rearwardly and downwardly at an inclination of about 30 degrees. The horizontal part 12 of the track surface has an upwardly opening notch 13 immediately adjoining the start of the downwardly inclined portion 11.

A link 14 is hinged by pin 15 to each plate 7, below the hinge pin 8 when the frame 6 is upstanding. Each link 14 extends forwardly, and at its front or free end it carries a laterally extending stud 16 (Fig. 5). Each stud extends over the adjacent rail 10 and carries a broad roller 17 which rolls upon the track surface 11 of the adjacent rail 10 and drops into the notch 13 when it moves into a position above the open face of the notch. Each stud 16 also has another roller 18 which is disposed beyond the rail 10, and at one side thereof, and rollingly supports the bottom of the seat frame 19 of the seat 9. Thus, the seat is supported at each end partly by the hinge pins 8 and partly by resting upon the roller parts 18. Since the roller parts 18 are supported by the inclined rails, the forward part of the seat is supported by the links 14 as the latter are guided up and down the track surfaces 11.

The seat frame 19 may have upwardly extending lugs 20 on which are provided the pivot studs or hinge pins 8. When the frame 6 is in its upstanding position, shown in Fig. 3, the links 14 will have their forward ends at the tops of the rails 10 and their rollers 17 received in the notches 13. By proper positioning of the hinge pins 8 and the notches 13, the seat may be given any desired degree of rearward inclination as shown in Fig. 3. A rearwardly and downwardly extending hook 21 (see Fig. 4) is provided on

the under face of the forward part of the seat 9 at each end thereof, so as to depend from the seat frame 19 downwardly and rearwardly. When the seat is in its normal position shown in Fig. 3, each hook 21 will be slightly below the adjacent roller part 18, as shown in Figs. 3 and 5. When one desires to disengage the rollers 17 from the notches 13, one merely lifts the forward edge of the seat, and the hooks 21, which are moved vertically thereby, will lift the roller parts 18 and thereby lift studs 16 and roller part 17 above the notches 13, and then, when the upstanding frame 6 is pulled forwardly, that is, rocked counterclockwise (in Fig. 3) the seat will be pulled rearwardly and the rollers 17 will be pulled off the free ends of the hooks 21, over and upon the inclined track surfaces 11.

As the frame 6 continues its rocking movement toward the Fig. 4 position, the rollers 17 will roll down the inclined track surfaces 11 into the positions shown in Fig. 4. The rear of the seat will thus be lowered and pulled rearwardly by the pins 8, shown in Fig. 4, as the forward part of the seat is guided downwardly and rearwardly to place the seat in the position shown in Fig. 4, in which the entire seat 9 is below the then horizontal frame 6. During this swinging movement of frame 6, a pin 22 at each end thereof, but adjacent the lower edge thereof, will move upwardly and rearwardly and engage beneath and enter the notch of an inverted U-shaped flange 23 provided on the inside faces of each end or side element 1. This limits the rocking movement of the frame 6 beyond a horizontal position and before the under face of the frame 6 engages with the upper edge of the cross member 3 or rails 19.

Carried on and secured to the rear face of the frame 6 when it is upstanding, but on the upper face when the bed frame is horizontal, is a mattress 24. The sheets, blankets and other bedding may be provided on the mattress and confined thereon by straps, or a slip cover or spread, or in any other suitable manner, so that the bed may be made up while the frame 6 is horizontal, and will remain in made-up condition after the frame 6 has been swung rearwardly into its upstanding position shown in Fig. 3. The mattress 24 may rest upon and be confined to suitable springs provided within the frame 6, as usual in swinging beds, and when the frame 6 is upstanding, this bedding on the rear face thereof is largely concealed from casual observation. Preferably, a slip cover is provided over the bedding after the bed is made up so as to further conceal the appearance of the bedding and protect it from dust. The forward face of the upstanding frame 6, in the portion above the studs 5, is suitably upholstered by padding 25, as usual in the upstanding or back rests of upholstered chairs or sofas.

In the use of a sofa-bed constructed in this manner, let it be assumed that the frame 6 is upstanding and that the bedding on the rear face of the frame 6 is made up ready for occupancy and concealed by a suitable slip cover. The seat 9 will be firmly supported forwardly of the frame 6 and the end elements 1, the seat 9 and the upholstery 25 on the forward face of the frame 6, comprise a sofa with its seat 9 at the normal sofa-seat level. At this time the rollers 17 on the forward ends of the links 14 are engaged in the notches 13, and the seat and back of the sofa are rigid and held against movement. If now one desires to convert this unit into a bed, one merely lifts the forward edge of the seat 9 upwardly

with one hand, and with the other hand pulls the upper edge of the frame 6 forwardly.

The lifting of the seat 9 lifts the rollers 17 from the notches 13 and holds them elevated, so that as the frame 6 moves forwardly at its upper edge, the seat 9 will be moved downwardly and rearwardly, during which the rollers 17 will be guided by the hooks 21 over upon the inclined track surfaces 11. The seat 9 is therefore guided downwardly and rearwardly beneath the horizontal frame 6, as shown in Fig. 4. One then merely removes the slip cover or spread and the bed is ready for use. The studs 5 are sufficiently near the rear edge of the frame 6, when that frame is horizontal, so that one in using the bed will not be likely to shift the center of gravity of the bed and person together rearwardly of the stud 5. Thus, no matter where on the bed one may rest, the combined center of gravity of the person and bed will be forwardly of the studs 5, and the bed will remain in horizontal position without the necessity of locks to hold it horizontal. One may use locks if desired, but they are unnecessary when the studs 5 are sufficiently near the rear edge of the frame 6 when the latter is horizontal.

To convert this unit back into a sofa, one merely makes up the bed on the upper face of frame 6, reapplying a slip cover, or by other fastening means securing the bedding in position, and then the forward edge of the frame 6 is swung upwardly and rearwardly into the Fig. 3 position. During this movement the seat 9 is guided upwardly and forwardly, and the rollers 17 reengage in the notches 13 to lock the frame 6 in its upstanding position and provide a firm support for the forward part of the seat 9.

It will be noted that when the frame 6 is upstanding, as shown in Fig. 3, the hinge pins 8 are disposed somewhat above a theoretical, flat plane which passes through the axes of the alined studs 16 of the forward ends of the links 14 and the axes of the alined studs 5 which rockably support the frame 6. Since the plates 7 are fixed to the frame 6 for movement therewith, the pins 8 which pivotally connect the plates 7 to the rear of the seat 9, can move circularly, counterclockwise in Fig. 3, to carry them and the rear part of the seat downwardly from the positions shown in Fig. 3 to those shown in Fig. 4 only when the studs 16 are released from the notches 13. When studs 16 are within notches 13, they act through links 14 to anchor the pins 15 of plates 7 against rotation with plates 7 counter-clockwise in Fig. 3. Hence, by lifting the front part of the seat 9, the pins 16 will be lifted from notches 13, which allows plates 7 to rotate with frame 6 into the positions shown in Fig. 4. Thus lifting of the front part of the seat automatically releases both front and rear parts of the seat as well as frame 6 for movement into the Fig. 4 positions.

In the embodiment of the invention shown in Fig. 6, the stud 16 extends from both faces of the link 14 and at one face of the link carries a roller 26 that rides on the rail 10, and at the other face of the link carries a special roller 27 that rollingly supports the lower edge of the frame 19 of the seat 9. The construction and operation are otherwise the same, as explained in connection with the construction illustrated in Figs. 1 to 5.

It will be observed that with this combination sofa and bed, one may have a relatively wide bed with normal spring and mattress com-

fort, and with its bed surface at the normal bed level, as shown in Fig. 4, and also have a sofa with its seat at the normal and most comfortable level when the unit is converted for use as a sofa. The conversion of this unit between bed and sofa seat is very simple, requires a minimum of effort, and the frame 6 is automatically held in its adjusted positions. The operation of the unit is so simple and easy that even a relatively small child may quickly learn to convert the unit into a bed or sofa. A sofa-bed of this type does not require placement against a wall, and since it is entirely self-contained, it may be shifted to any part of the room, which facilitates cleaning beneath and behind it. The inclination of the track surface 11 is made relatively small, so that the effort required to move the rollers 17 or 26 up and down the inclined track surfaces will be relatively small.

It will be understood that various changes in the details, materials and arrangements of parts, which have been herein described and illustrated in order to explain the nature of the invention, may be made by those skilled in the art within the principle and scope of the invention, as expressed in the appended claims.

I claim:

1. A sofa-bed comprising a pair of side elements, means connecting said side elements to form a main frame, a bed frame pivoted to the rear part of said main frame on an axis extending in a direction between said side elements, located intermediate the longitudinal edges of the bed frame, and rockable on said axis between an upstanding sofa position and a bed position in which it is generally horizontal with its rear face uppermost, a seat hinged at its rear portion to said bed frame forwardly of said axis and the front face of the bed frame when that frame is upstanding, track means inclined downwardly and rearwardly from adjacent the forward part of said seat and having an upwardly opening notch in its surface adjacent its upper end, a link hinged at its rear end to said bed frame below and forwardly of said axis and below said hinged connection between said seat and bed frame, and at its forward end carrying a roller riding on said track means, said roller entering said notch when said bed frame is upstanding, the forward part of said seat resting on and supported by the forward end of said link, and riding up and down said track means with said roller, as said bed frame is swung on said axis between its upstanding position and its horizontal bed position.

2. A sofa-bed comprising a pair of side elements, means connecting said side elements to form a main frame, a bed frame pivoted to the rear part of said main frame on an axis extending in a direction between said side elements, located intermediate the longitudinal edges of the bed frame, and rockable on said axis between an upstanding sofa position and a bed position in which it is generally horizontal with its rear face uppermost, a seat hinged at its rear portion to said bed frame forwardly of said axis and the front face of the bed frame when that frame is upstanding, track means inclined downwardly and rearwardly from adjacent the forward part of said seat and having an upwardly opening notch in its surface adjacent its upper end, a link hinged at its rear end to said bed frame below and forwardly of said axis and below said hinged connection between said seat and bed frame, and at its forward end carrying a roller

riding on said track means, said roller having a diameter less than the width of said notch and entering said notch when said bed frame is upstanding, the forward part of said seat resting on and supported by the forward end of said link, and riding up and down said track means with said roller, as said bed frame is swung on said axis between its upstanding position and its horizontal bed position, said seat having a hook at its forward end engaging beneath said roller and lifting it from said notch when the forward end of the seat is raised.

3. A sofa-bed comprising a pair of side elements, means connecting said side elements to form a main frame, a bed frame pivoted to the rear part of said main frame on an axis extending in a direction between said side elements, located between the longitudinal edges of the bed frame, and rockable on said axis between an upstanding sofa position and a bed position in which it is generally horizontal with its rear face uppermost, a seat hinged at its rear portion to said bed frame forwardly of said axis and the front face of the bed frame when that frame is upstanding, track means inclined downwardly and rearwardly from adjacent the forward part of said seat, a link hinged at its rear end to said bed frame below and forwardly of said axis and below said hinged connection between said seat and bed frame, and at its forward end carrying a roller riding on said track means, the forward end of said seat resting on and supported by the forward end of said link and riding up and down said track means with said roller as the bed frame is swung from upstanding sofa position forwardly and downwardly into horizontal bed position.

4. The sofa-bed substantially as set forth in claim 3, in which said hinged connection between the rear part of the seat and said bed frame is above a theoretical line joining said roller and said axis, to form a toggle connection, when the bed frame is upstanding and the roller is at its forwardmost position.

5. A combination sofa-bed comprising a pair of side elements and connecting means forming a main frame, a bed frame pivoted to said main frame on an axis parallel to and between the longitudinal edges of the bed frame, for rocking action between an upstanding sofa position and a horizontal bed position in which the top thereof becomes the rear face when upstanding, a seat hinged at its rear to said bed frame forwardly of said axis when the bed frame is upstanding, track means on said main frame extending from a high level adjacent the forward part of said seat rearwardly and downwardly to a low level, link means hinged at one end to said bed frame also forwardly of and lower than said axis and below said seat hinge when the bed frame is upstanding, and at its forward end riding on said track means at the high level thereof when the bed frame is upstanding, and at the low level when the bed frame is horizontal, the seat hinge being disposed above a theoretical line joining the area of contact of the link means with said track means and said axis when the bed frame is upstanding and passing downwardly past said line when the bed frame is moved towards bed position, the forward part of said seat being supported by the forward end of said link means and riding down and up said track means with said link means.

6. The sofa-bed substantially as set forth in claim 5, and roller means at the forward end of the link means to ride on said track means, said track means having an upwardly opening notch

at its high level into which said roller means drops to hold said bed frame in its said upstanding position.

7. The sofa-bed substantially as set forth in claim 5, and roller means at the forward end of the link means to ride on said track means, said track means having an upwardly opening notch at its high level into which said roller means drops to hold said bed frame in its said upstanding position, and said seat having at its forward part a hook engaging beneath said roller means, when the forward part of the seat is lifted, to lift the roller means from said notch and release said bed frame for movement into bed position.

8. A sofa-bed comprising a main frame, a bed frame pivoted to said main frame on an axis between and parallel to the longitudinal edges of the bed frame, for rocking between an upstanding sofa position and a horizontal bed position, a rail adjacent each end of said main frame and each extending from a high level adjacent the forward edge of said main frame downwardly and rearwardly to a low level, a seat hinged adjacent its rear edge to said bed frame forwardly of said axis when the bed frame is upstanding, a link at each end of said seat hinged to said bed frame forwardly and lower than said axis and below said seat hinge when the bed frame is upstanding, and riding at its forward end on said rails at said high level when said bed frame is upstanding, said seat at its forward part supported by the forward parts of said links.

9. The sofa-bed substantially as set forth in claim 8, said rails having upwardly opening notches at said high levels and said forward ends of said links having rollers riding on said rails and entering said notches when the bed frame is upstanding.

10. The sofa-bed substantially as set forth in claim 8, said rails having upwardly opening notches at said high levels and said forward ends of said links having rollers riding on said rails and entering said notches when the bed frame is upstanding, said links also having rollers at their forward parts on which said seat rides.

11. The sofa-bed substantially as set forth in claim 8, said rails having upwardly opening notches at said high levels and said forward ends of said links having rollers riding on said rails and entering said notches when the bed frame is upstanding, said seat having a lifter engaging beneath each roller that rides on a rail for lifting that roller from its notch when the forward part of the seat is lifted, to release the bed frame for movement into said bed position.

12. The sofa-bed substantially as set forth in claim 8, said rails having upwardly opening notches at said high levels and said forward ends of said links having rollers riding on said rails and entering said notches when the bed frame is upstanding, the seat hinge being disposed above a theoretical plane joining the axes of said rollers and said axis of said bed frame, when the bed frame is upstanding, and descending through that plane when the bed frame is rocked from sofa position into bed position.

13. The sofa-bed substantially as set forth in claim 8, and said seat hinge being disposed above a theoretical plane containing said axis and the points of support for the forward ends of said links, when the bed frame is upstanding and descending therefrom through said plane when said bed frame is rocked from upstanding position into bed position.

14. A sofa-bed comprising a main frame, a bed

frame pivoted thereto for rocking on a horizontal axis located between the longitudinal edges of the bed frame, plates extending forwardly from the ends of the bed frame, a seat hinged at its rear part to the forwardly projecting parts of said plates, a link at each end of said bed frame, each hinged at one end to said plate below said seat hinge and extending forwardly therefrom, a forwardly and upwardly inclined rail in a plane parallel to and adjacent each link, the free end of each link having a part riding on the adjacent rail, by which the forward ends of said links are supported and guided upwardly and downwardly as the bed frame is rocked on said axis, the forward ends of said links being beneath and supporting the forward part of said seat.

15. A sofa-bed comprising a main frame, a bed frame pivoted thereto for rocking on a horizontal axis located between the longitudinal edges of the bed frame, plates extending forwardly from the ends of the bed frame, a seat hinged at its rear part to the forwardly projecting parts of said plates, a link at each end of said bed frame, each hinged at one end to said plate below said seat hinge and extending forwardly therefrom, forwardly and upwardly inclined rails at the ends of said bed frame beneath, and supporting the forward ends of said links and guiding them upwardly and downwardly as the bed frame is rocked on said axis, the forward ends of said links being beneath and supporting the forward part of said seat, the seat hinge being disposed above a plane containing said axis and the points of support between the forward ends of the links and said rails.

16. A sofa-bed comprising a main frame, a bed frame pivoted thereto for rocking on a horizontal axis located between the longitudinal edges of the bed frame that extend between the ends of the main frame, a seat articulately hinged at its rear part to said bed frame, forwardly of the horizontal axis when the bed frame is upstanding, link elements articulately connected to the bed frame below said axis and extending beneath the forward part of the seat, inclined tracks rising forwardly beneath the seat and forwardly of the bed frame when the latter is upstanding upon which the forward ends of said elements ride, and having upwardly opening depressions therein at their upper ends in which the forward ends of said elements engage when the bed frame is upstanding, and an interconnection between the forward part of the seat and the forward parts of said link elements for lifting the elements when the forward part of the seat is lifted to disengage the elements from said depressions, and releasing the elements for movement down said tracks when the bed frame is rocked in a direction to lower the rear part of said seat and pull said elements rearwardly.

17. A sofa bed comprising a main frame, a bed frame hinged thereto for rocking about a horizontal axis between an upstanding position and an approximately horizontal position, a seat disposed forwardly of the bed frame when the latter is upstanding and articulately hinged at its rear part to said bed frame forwardly of said axis when the bed frame is upstanding, inclined track means descending rearwardly from beneath the front part of said seat, means acting between the front part of said seat and said track means for supporting the seat at its forward part and guiding it down and then up as the bed frame is rocked forwardly at its upper end into its hori-

zontal position and backwardly respectively, and an interconnection between said track means and said supporting means for releasably holding the bed frame in its upstanding position and releasable by lifting said supporting means, said forward part of said seat having a depending and rearwardly opening hook engaging beneath said supporting means for fitting it and releasing it from said track means when the forward part of the seat is lifted.

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