Oct. 16, 1934. J. R. THOMAS 1,976,753

FOLDING BED

Original Filed Dec. 21, 1928 3 Sheets-Sheet 1

Fig. 1.

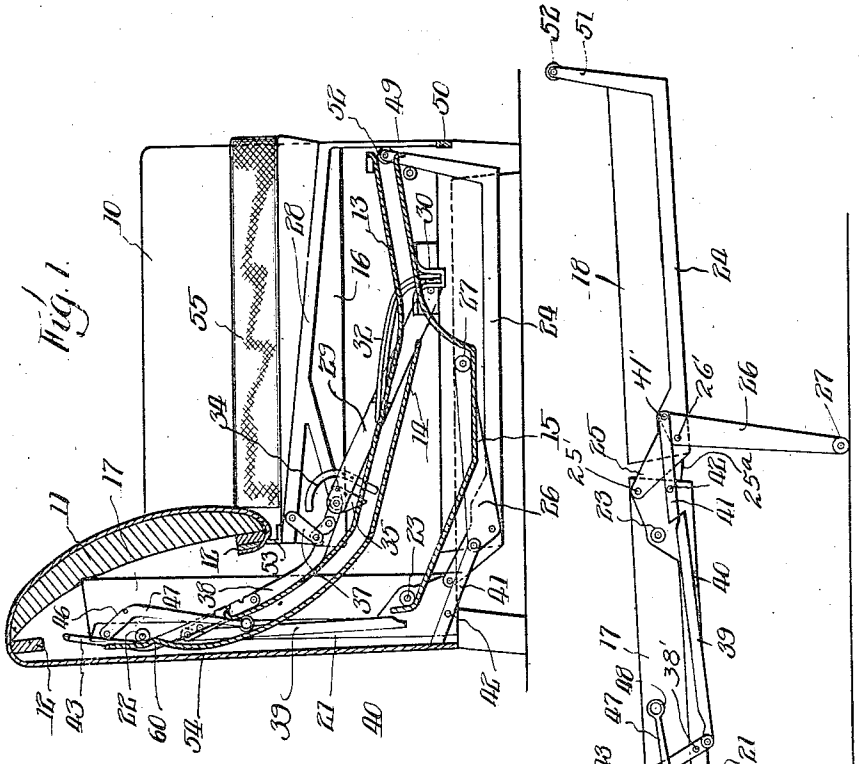
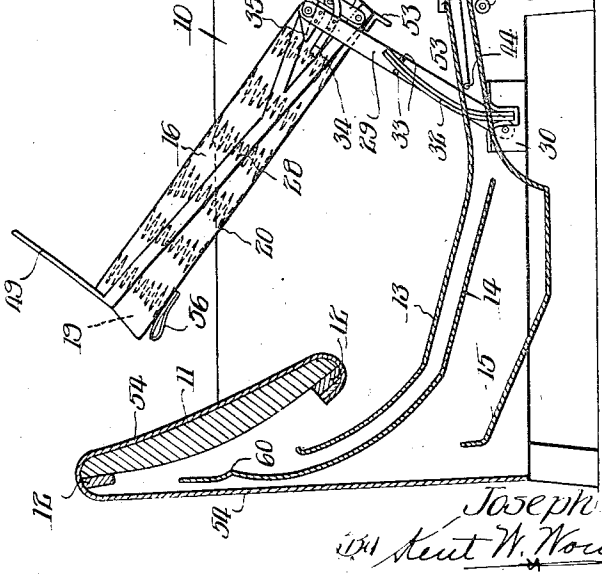


Fig. 2.



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FOLDING BED

Original Filed Dec. 21, 1928 3 Sheets-Sheet 2

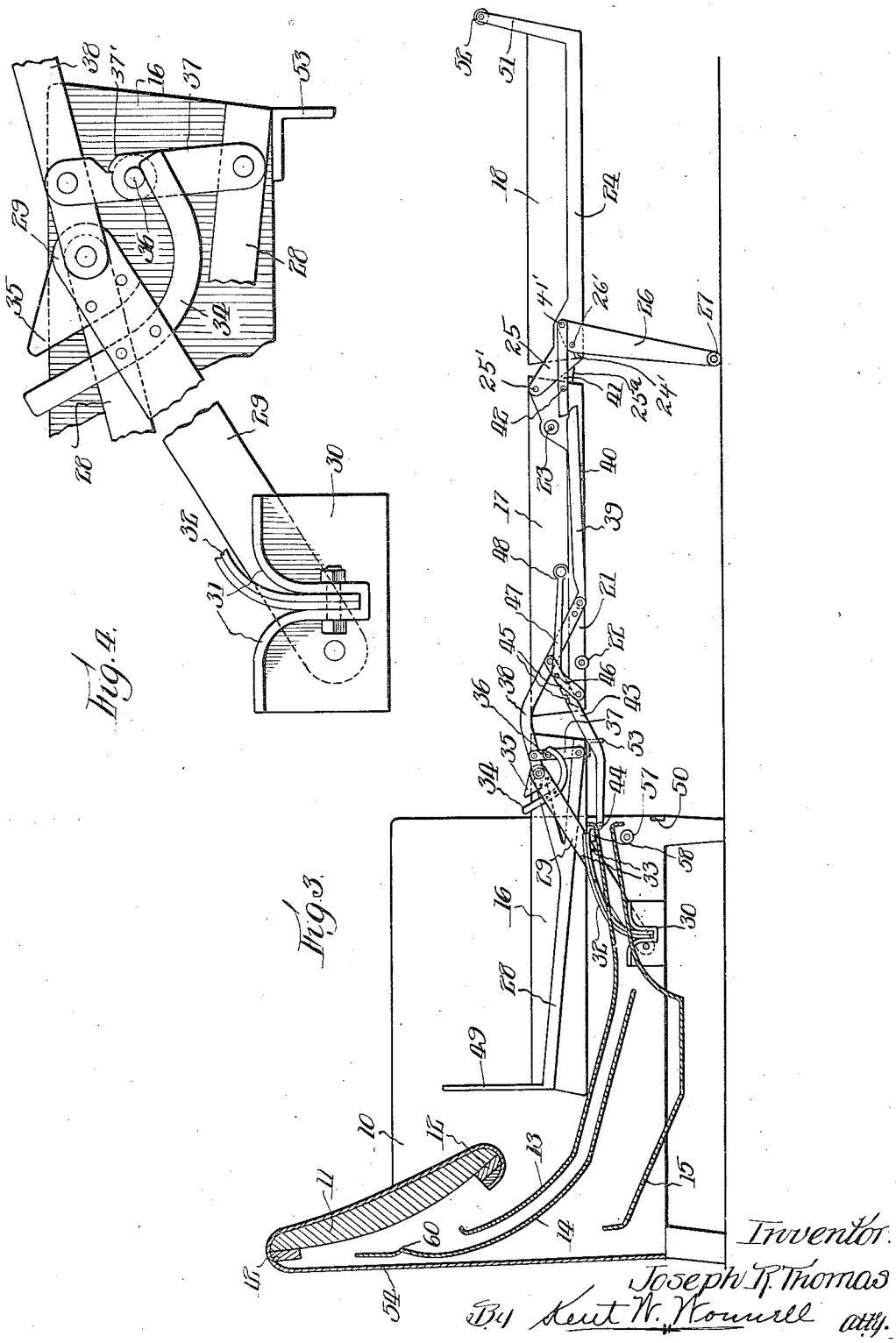


Fig. 4.

Fig. 3.

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Oct. 16, 1934. J. R. THOMAS 1,976,753

FOLDING BED

Original Filed Dec. 21, 1928 3 Sheets-Sheet 3

Fig. 6.

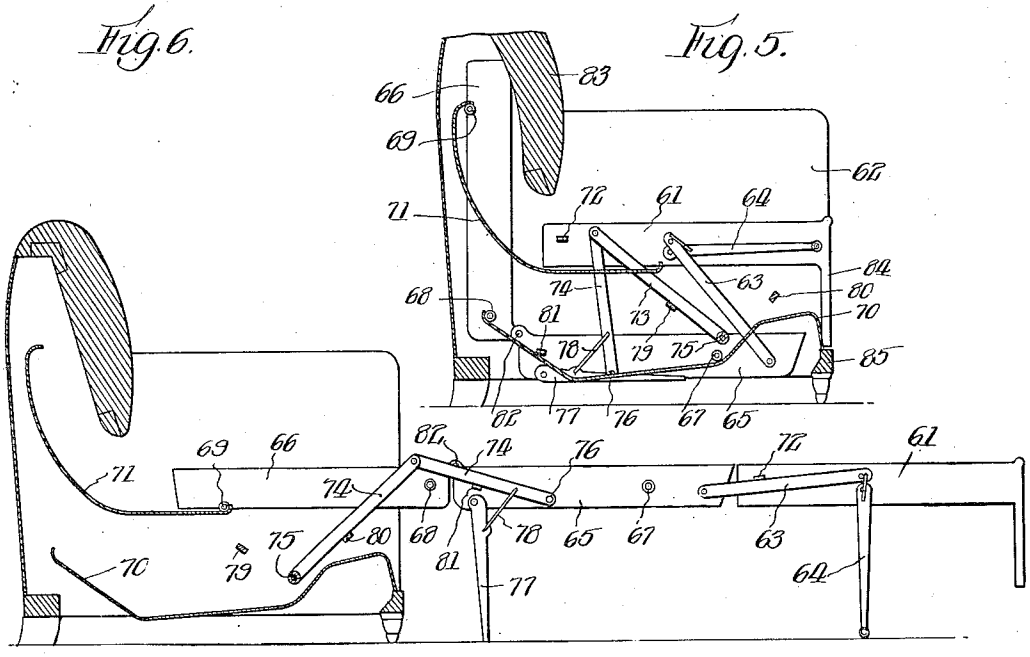


Fig. 5.

Fig. 8.

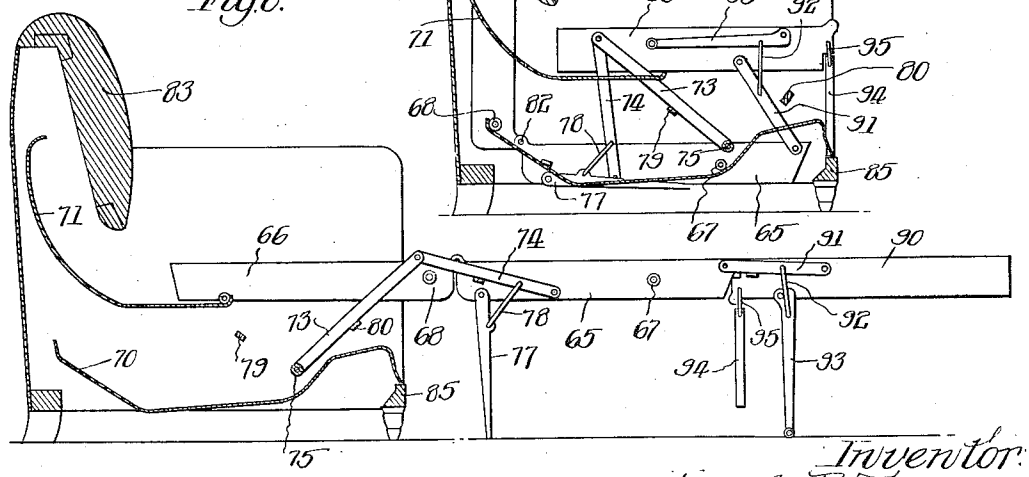


Fig. 7.

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UNITED STATES PATENT OFFICE

1,976,753

FOLDING BED

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Application December 21, 1928, Serial No. 327,493
Renewed December 2, 1931

25 Claims. (Cl. 5—12)

This invention relates in general to a folding chair and davenport structure and has more particular reference to a chair bed in which the sections are contained when folded below the seat and behind the back of the chair.

One of the principal objects of the invention is in the provision of a chair or sofa construction in which the seat is overturned and the bed sections are slidable outwardly from behind the back and under the seat. A further object of the invention is in the provision of a connected reversible seat structure which is overturned in sliding the other sections from below the seat and behind the back.

A still further object is in the provision of a fixed upholstered back which is engaged by a spring section and slidable behind it for adding to the resiliency of the back. Another object of the invention is in the provision of an improved spring counterbalance at each side of the frame for assisting in opening and cushioning the closing action of the seat section.

A further object is in the provision of a reversible seat structure and a stop for holding it in an inclined position. Other objects are: to provide an improved automatic folding leg; to provide a divided guide rail at the sides of the frame; to improve the mounting of a spiral spring bed section in the frame of a folding bed so that either side of the spring section may be used; and in general to produce the folding bed structure herein shown and described.

In the drawings, Fig. 1 is a sectional elevation of a folded chair bed constructed in accordance with the principles of this invention; Fig. 2 is a view of the bed in partially open position; Fig. 3 is a view of the bed in its distended open position; Fig. 4 is an enlarged detail of the spring operating mechanism; Figs. 5 and 6 are closed and open views respectively of a similar bed in which the seat is extended in advance of the other sections without overturning; and Figs. 7 and 8 are closed and open views of a similar bed in which the seat section is first overturned and is then pulled out in advance of the other sections.

Although the present invention is particularly adapted for a folding bed structure of the chair bed type, it may also be used for a wider type of seat, such as a sofa or davenport without changing the structure or method of operation.

In a coil spring folding bed, it is difficult to dispose of the folding sections and still produce a seat which is sufficiently low or close to the floor. Particularly is this true of the present type of folding sofas or chairs which include a loose cushion for the seating surface.

The present invention overcomes this objection by providing an invertible seat section and by sliding the other sections one below the seat and the other in a vertical position at the back of the frame, engaging the rear of a fixed and upholstered back in such a manner that the coil springs of this vertical section engage the back at the rear thereof, adding the resilience of the springs of this section to the back and pressing the back forwardly.

Referring more particularly to the drawings, a pair of side frames 10 are connected at the back by fixed cross pieces 12 upon which an upholstered back 11 is mounted. This back may sag loosely from cross pieces 12 as shown in Fig. 3, but when engaged by the upright bed section the back will be distended, as shown in Fig. 1.

At the insides of the frame 10 are guide rails 13, 14, and 15, a portion of the latter extending below the other two and the rail 14 terminating at its lower end at a distance from the lower rail 15. The upper ends of the rails 13 and 14 extend upwardly behind the back 11 and together these rails form a guide for sliding, guiding and retaining the bed sections within the frame. The bed comprises a seat section 16, a middle section 17, and an outer section 18. Each section comprises a coil spring frame mounted in marginal or end frames so that both ends of the coil springs 19 in one of the sections, as seat section 16, are free and may be utilized for spring movement, the coil spring section being usually covered or enclosed by a fabric cover or container 20.

Supporting the middle bed section 17 is a frame 21 which carries rollers 22 and 23 at each end for engagement in the guideways and supporting the outer bed section 18 is a frame 24 having an extension 25 directly pivoting it on a pin 25′ at the ends of the frame 21 for moving the frames together, the frames being held in alignment by the butt 25^a on the extension 25. The frame 24 carries a pivoted leg 26 at each end limited in its supporting position by a stop 24′ on the frame 24, and having a roller 27 at its free end for engaging the guide rails 13 and 15 when the leg is folded.

The seat section has a frame 28 pivotally mounted at the outer end of a lever 29 at each side of the frame 10, each lever being pivoted at its lower end to the frame adjacent a spring supporting block 30 which has opposite curved surfaces 31 for engaging spring blades 32. The

outer ends of the blades 32 are confined between projections 33 so that the blades operate to counter-balance the weight of the seat section in raising it and to cushion the movement of the section in closing it. Secured to the outer end of each lever 29 is a guide 34 and a projection 35 for engaging a projection 36 on a jointed jackknife link 37 the ends of which are pivoted to the frame 28 and one link having an extending projection 37' for engaging the other and limiting their movement in one direction, and a lever 38 which is pivoted to the seat frame or outer end of the lever 29, the other end of the lever 38 being pivoted near one end on a pin 38' to the middle bed section 21 and forming the only connection between these two bed sections. The guide rails 34 control the overturning movement of the seat section 16 and the projections 35 prevent the seat section from lunging forward at a certain point in the overturning movement of the seat section.

To operate the legs 26, a bar 39 is pivoted to the free end of each lever 38 at the ends of the middle section 17 and the bar is held in place by a projection 40 at the end of the frame so that the free end of each bar engages the end of a lever 41 pivoted intermediate its ends at 42 to the frame 21 and connected at its other end by a pivot 41' to the upper end of the adjacent leg 26.

In order to hold the seat section in an inclined position, as shown in Fig. 2, a lever 43 is pivoted at one end to each of the levers 38 and has a projection 44 at the other end for engaging the guide rail 13. Intermediate the ends are notches 45 adapted to be engaged by a projection 46 carried by a lever 47 pivoted at one end to the frame 21 and movable into locking engagement with the notches 45 by means of a handle 48 at the free end. The engagement of the projection 46 with the notches 45 prevent the continued unfolding movement of the levers 38 and therefore lock the seat section in any selected inclined position. As the extension of the bed is not complete the outer sections will be inclined, as shown in Fig. 2.

Carried by the seat section is a front board 49 which engages a front cross rail 50 when the bed is closed and may form a head or foot rest when the bed is open. At the outer end of the bed, forming an extension of the frame 24, are projections 51 which carry a cross rail 52, preferably in the form of a handle by means of which the sections may be folded or unfolded.

Secured to the inner end of the seat frame 28 is an angle bar 53 adapted to engage the lower cross rail 12 when the bed sections are folded, as shown in Fig. 1, and to confine and hold the bed sections in place by such engagement. In unfolding the bed the seat section is first raised at its outer end which depresses the inner end, disengaging the bar 53 from the cross piece 12.

This structure is suitably upholstered and covered so that no part of the operating mechanism is visible when the sections are folded, and a fabric cover 54 may even be extended over the rear of the frame and over the upholstered back 11, and a loose cushion or cushions 55 may be placed upon the seat section 16 to cover any space between the lower end of the back 11 and the seat section and to form a more satisfactory seat. Between the seat and the outer bed sections in their folded positions there is a considerable space for the storage of bed clothes which is easily accessible by simply lifting up the seat section and even if the compartment is more than full it will only compress the springs of the bed sections to include them.

In operation, assuming the structure to be folded, the loose cushion or cushions 55 are first removed. The seat section is grasped at its outer edge and raised upwardly by means of a fabric strap 56 or any other suitable means which disengages the rail 53 from the cross bar 12, the seat section swinging about the axis of levers 29. This uncovers the handle or cross bar 52 of the outer section which is then grasped and pulled outwardly, moving the outer and middle sections 18 and 17 upon their rollers 27, 22 and 23 which are in engagement with the guide rails 13, 14 and 15.

As the bed sections are moved outwardly, the seat section 16 is turned over about levers 38 and 29, and as they approach the position indicated in Fig. 2, the projection 36 of the jointed link 37 engaging the guide 34 controls the operation of the seat section, first straightening out the jointed link 37 from its partially folded position, as shown in Fig. 1, to its straight line position as shown, in Fig. 2, and causing the gradual lowering movement of the seat section as the other sections are pulled outwardly, until the levers 29 engage frame limit stops 58.

In the completely extended position shown in Fig. 3 the sections are in horizontal alignment, the projection 36 is in contact with the guide rail 34 and in folding the bed an inward push or slight raising movement at the end of the outer section pulls the upper end of the lever 38 about its pivot, causing the inner end of the seat section 16 to be pulled upwardly about the upper end of the lever 29. The continued inward sliding movement of the middle and outer sections 17 and 18 engages the rollers 22 and 23 of the middle section with the guide rails 13, 14 and 15, and the continued movement of the levers 38 and 29 toward each other rotates the seat section 16 about the end of the lever 29 as controlled by the engagement of the projections 36 with the guide rails 34. When the seat reaches a vertical position, it would tend to flop over forwardly were it not for the engagement of the projections 36 with the projections 35 at the ends of the levers 29 which limits and controls the overturning movement of the seat. The rotative movement of the levers 38 about their pivots in folding the sections fold the legs 26, which cause the rollers 27 to engage between the guide rails 13 and 15.

In the inward movement of the sections, the guide rails 13 and 14 incline upwardly at the rear so that when the outer rollers 23 of the middle section reach the space between the lower ends of the guide rails 14 and the guide rail 15, the rollers 23 will drop through the openings and will continue upon the lower guide rails 15 until they reach the stops at the ends of the rails. Likewise the rollers 27 at the ends of the legs 26 will drop through the opening following the lower guide rails 15, thereby supporting the middle section in a vertical position at the back of the frame and the outer section below the seat and behind the foot board 49 which is carried by the seat frame and folded downwardly thereover.

In its closed position the resilient portion of the middle bed section 17 engages the rear of the upholstered back 11 and presses it outwardly, as clearly shown in Fig. 1, so that the resiliency of the back upholstering is increased by the resiliency of the middle bed section 17 which also causes the back to assume a more bulging posi-

tion and provide sufficient space in the back for containing the middle bed section.

To assist the movement of the sliding sections, a pair of rollers 57 may be mounted one at each side of the frame below or at one side of the guide rail 15 to engage the edges of legs 26 and the under sides of the frames 21 and 24 as they are moved into and out of the frame. Near the top of each guide rail 14 is a projection 60 which assists in holding the section 17 in place by the engagement of roller 22 thereover.

Instead of mounting the seat section so that it is inverted at the rear of the other sections, a seat section 61, as shown in Figs. 5 and 6, may be mounted in a frame 62 so that it swings outwardly upon levers 63 in advance of the sections, the outward movement unfolding a supporting leg 64, and the other sections 65 and 66 being mounted on rollers 67, 68, and 69 which engage guide rails 70 and 71. The outward movement of the seat section raises the section 65 by the engagement of levers 63 with fixed stops 72 at the rear of the seat section which extends the connected links 73 and 74, one having a fixed pivot 75 with the frame at each side thereof and the other having a pivoted connection 76 with the bed section 65 so that in unfolding a leg 77 pivoted at each side of the section 65 is positively unfolded by a link 78 extending between it and one of the connected links 74. A fixed stop 79 in the frame engages the other connected link 73 in one limiting position, and a fixed stop 80 engages the same link in the other limiting position, and the bed section 65 carries a fixed stop 81 which engages the other connected link 74 in the other position to hold the bed sections 65 and 66 uprightly at their joint.

Connecting the sections 65 and 66 is a hinge 82 and when extended this side of the rear bed section is supported by its connection with the middle section 65 and the inner end of the section 66 is supported by its rollers 69 in engagement with the stops at the ends of the guide rails 71.

In the folding movement of this construction, the rear section 66 moves backwardly to an upright position where its upper edge engages and distends an upholstered back 83, the supporting rollers 68 and 69 engaging different guide rails and the lower section 65 engaging only the guide rail 70 with its projections 81 and rollers 67. The seat section is supported at its rear side by engagement with the guide rails 71 and at its front by a front board 84 which rests upon lower cross pieces 85.

In another form of the invention as shown in Figs. 7 and 8, the rear and middle sections are similar in construction and operation to those shown in Figs. 5 and 6, but a seat section 90 is mounted for overturning movement by means of links 91 at each side connected at one end to the lower section 65 and at the other end the seat section 90 and having a link 92 for connecting it to a leg 93 pivoted at the upper side of the seat so that when the seat is inverted, as shown in Fig. 8, the leg will swing downwardly therefrom. To permit the overturning movement of the seat 90 a front board 94 is mounted by means of a loose hinge or links 95 so that it will swing about the ends of the seat from the position shown in Fig. 7 to the position shown below the seat in Fig. 8. In this construction the seat section is inverted about the upper end of the levers 91 as a pivot and the sections 65 and 66 are pulled outwardly to unfold the bed as explained in connection with Figs. 5 and 6. In this form of the invention the seat section is supported by engagement with the guide rail 71 by the side links 91 and by the front board 94 which engages the cross rail 85.

As thus disclosed, the structure of the seat mounting may be varied without materially changing the operation of the other sections which are stored at the back and below the seat and are drawn outwardly or are uncovered for outward movement by the movement of the seat section. The sections in each case are guided by fixed rails at the sides of the frame and the movement is continuous and automatic when started.

It is obvious that other changes may be made in the construction, operation and arrangement of the parts.

I claim:

1. A folding bed comprising a frame with a loose upholstered back, a plurality of folding bed sections connected for joint operation and including a seat section having means mounting it in the frame invertibly to use opposite surfaces thereof, and a pair of said connected sections having means for mounting one slidably below the seat and means for supporting another section upwardly at the back of the frame, the back section being supported in its folded position in contact with the under side of the upholstered back to distend it.

2. In a folding seat bed, a frame, guide rails at the insides of the end frames, a plurality of bed sections, some of them connected for joint operation and having projections for engaging said rails to guide them into and out of the frame, and an invertible seat section comprising a lever at each end pivotally mounting the seat section in the frame, another lever at each end pivotally connecting the seat section with the next bed section, and means between the two levers at each end and the frame for automatically inverting the seat section and placing it into and out of alignment with the other sections in folding and unfolding the bed.

3. In a seat bed of the class described, a frame having an upholstered back fitting loosely between cross pieces, a plurality of bed sections and means for mounting them foldably in the frame, one section having means guiding it upwardly at the rear of the frame and into contact with the rear side of the upholstered back for distending it when the sections are folded within the frame.

4. In a folding bed of the class described, a frame, an upholstered back extending loosely between fixed cross pieces adjacent the rear of the frame, a plurality of bed sections having means for mounting them foldably within the frame, one of the sections having a resilient bed surface and means for guiding it uprightly at the rear of the frame until the resilient portion of the section engages the rear side of the upholstered back and supports and distends it.

5. In a folding bed of the class described, a frame having guide rails at the insides of the ends, a plurality of connected sections foldable in the frame, some of the sections having projections for engaging the guide rails to store one of the sections at the rear of the frame in a vertical position and another connected section at the bottom of the frame in a substantially horizontal position, and a third section connected to the others and to the frame and inverted by the movement of the other sections in sliding into and out of the frame.

6. In a bed of the class described, a frame and guide rails at the ends, two of the guide rails extending upwardly toward the back and the

lower one terminating at a distance above the third guide rail which is at the bottom of the frame, a plurality of connected bed sections, two of which have projections at the ends for engaging the guide rails, one of the sections having two projections at each end, one engaged between the two upper guide rails and the other adapted to pass between the second and the lower guide rail to engage the latter only and to hold this section in a vertical position at the rear of the frame.

7. In a folding bed of the class described, a frame having two supporting rails at each end of the frame, one of the rails terminating at a distance from the other, a plurality of connected bed sections movable in the frame and having projections for engaging the rails, the projections of one section engaging both of the rails at each end for guiding it into a vertical position in the frame and another section having projections for engaging the lower rails only for holding it in a horizontal position adjacent the bottom of the frame.

8. In a folding bed, a seat frame, a plurality of connected sections having means for mounting them foldably in the frame, means attached to the frame for guiding two adjacent sections into a vertical position at the rear of the frame and to a horizontal position at the bottom of the frame respectively, and a seat section having levers connecting it to the frame and to one of the other sections for inverting it in the folding and extending movements of the sections, and a leaf spring mounted in the frame and engaging the lever which supports the seat section in the frame tending to raise the lever and to cushion its return in unfolding and folding movements of the seat section.

9. In a folding bed of the class described, a seat frame, a plurality of bed sections having means for mounting them foldably in the frame, means for mounting one of the sections for bodily lifting and rotative movement, said means comprising a lever pivoted at its ends to the frame and said section, and a leaf spring having a fixed mounting at one end in the frame adjacent the end of the lever mounted therein, and the free ends of the leaves engaging between opposite projections intermediate the ends of the lever and tending to return the lever to an intermediate position from both sides thereof whereby the movement of the seat is cushioned in one direction and assisted in the other direction.

10. In a bed of the class described, a seat frame having a fixed cross piece at the lower end of the back, a plurality of connected sections having means for mounting them foldably in the frame, one of the sections having means for guiding it at the back of the frame behind the cross piece and another section having means for guiding it at the bottom of the frame below the cross piece, and a seat section having means mounting it at the sides of the frame for swinging and inverting movement therein, and a cross piece carried by the seat frame at its inner end for engagement below the cross piece of the frame in the folded position of the sections and holding the said sections behind the cross piece and at the bottom of the frame by such engagement.

11. In a folding bed structure of the class described, a seat frame, a plurality of sections having means for mounting them foldably therein, means for mounting one of the sections for pivoted and overturning movement as the sections are extended, said means comprising a lever connecting the overturning section with the next adjacent section, a pivoted leg carried by the third section, a lever extending from the upper end of the leg and pivoted to the adjacent section, and a member pivoted to the end of the lever connecting the sections making contact with the free end of the lever connected to the supporting leg whereby the extending movement of the sections will cause the lever connected to the inverting section to operate the supporting leg.

12. In a seat bed, a frame with a fixed back extending forwardly to provide a space behind it, a sectional folding bed having one section constituting a seat, another section disposed below the seat, and another section movable into the space behind the back and extending vertically above the seat section, the back having an upholstered portion engaged and distended by the vertically extending section in its folded position, and means connecting the sections and between certain of the sections and the frame for folding the sections within the frame and for extending them into horizontal alignment to form a bed, with the section below the seat disposed in position between the other two sections.

13. In a seat bed, a frame with a fixed back extending forwardly to provide a space behind it, a sectional folding bed, one section being movable into the space behind the back, a seat section and another section disposed below the seat, the back having an upholstered portion engaged and distended by the section which is movable behind the back, means connecting the sections and extending between certain of the sections and the frame for extending the sections to form a bed with the lower section in position between the other two sections, and with the seat section inverted outwardly.

14. In a seat bed, a frame with a fixed back extending forwardly to provide a space behind it, a sectional folding bed, one section being movable into the space behind the back, the back having an upholstered portion engaged and distended by the section movable behind the back another section constituting a seat, and another section disposed below the seat, means connecting the sections and extending between certain of the sections and the frame for folding them within the frame and for extending the sections into horizontal alignment to form a bed, with the lower section in position between the other two sections and with the seat section swung into alignment without inverting it.

15. In a seat bed, a frame with a fixed back extending forwardly to provide a space behind it, a sectional folding bed comprising an upper and lower section foldable in the frame, and another section disposed at the rear of the other two and extending vertically above them into the space behind the back, supporting rails at each end of the bed and projections from certain of the sections engaging the rails in folding and unfolding the sections, means connecting the sections and extending between certain of the sections and the frame for folding the sections within the frame and for extending them into horizontal alignment to form a bed with the lower section in position between the other two sections.

16. In a seat bed, a frame with a fixed back extending forwardly to provide a space behind it, a sectional folding bed having upper, lower and rear sections foldable within the frame, the rear section extending vertically behind and above the other two into the space behind the back, supporting rails as each end of the frame and pro-

jections from certain of the sections engaging the rails for folding and unfolding the sections, means connecting the sections and extending between certain of the sections and the frame for folding the sections therein and for extending them into horizontal alignment to form a bed, and with the upper section inverted outwardly in aligning it with the other sections.

17. In a seat bed, a frame with a fixed back extending forwardly to provide a space behind it, a sectional folding bed having upper, lower and rear sections foldable within the frame, the rear section extending vertically behind and above the other two into the space behind the back, supporting rails at each end of the bed and projections from certain of the sections to engage the rails in folding and unfolding the sections, means connecting the sections and extending between certain of the sections and the frame for folding the sections therein and for extending them into horizontal alignment to form a bed, and with the upper section swung into alignment with the other sections without inverting it.

18. In a seat bed, a frame with an upholstered back extending forwardly to provide a space behind it, a sectional folding bed having upper, lower and rear sections disposed within the frame, the rear section extending vertically behind and above the other two and into the space behind the back and engaging and distending the upholstered portion of the back, co-operating supporting means at the ends of the frame and at the ends of certain of the sections for supporting and guiding the sections, means connecting the sections and extending between certain of the sections and the frame for folding the sections within the frame and for extending them into horizontal alignment to form a bed with the upper section inverted outwardly into alignment with the other sections.

19. In a seat bed, a frame with an upholstered back extending forwardly to provide a space behind it, a sectional folding bed having upper, lower and rear sections disposed within the frame, the rear section extending vertically behind and above the other two and into the space behind the back to engage and distend the upholstered portion of the back, co-operating supporting means at the ends of the frame and at the ends of certain of the sections for guiding and supporting them, means connecting the sections and extending between certain of the sections and the frame for folding the sections within the frame and for extending them into horizontal alignment to form a bed and with the upper section swung into alignment with the other sections without inverting it.

20. In a seat, bed, a frame with an upholstered back extending forwardly to provide a space behind it, a sectional folding bed having upper, lower and rear sections disposed within the frame, the rear section when folded extending vertically behind and above the other two and into the space behind the back and engaging the back for distending it, co-operating means at the ends of the frame and certain of the sections for supporting and guiding them, means connecting the sections and extending between certain of the sections and the frame for folding the sections within the frame and for extending them into horizontal alignment to form a bed and with the rear section disposed in alignment at the rear of the other sections and in front of the upholstered back in forming a bed.

21. In a seat bed of the class described, a frame having a yieldable upholstered back, a plurality of foldably connected bed sections extensible into alignment to form a bed and means for mounting them in the frame, one section having means to position it at the rear of the frame in distending engagement with the back.

22. In a folding bed of the class described, a frame, a yieldable upholstered back, a plurality of bed sections having means for mounting them foldably in the frame and extensible into alignment to form a bed, one of the sections having a resilient surface and means for positioning it uprightly at the rear of the frame with the resilient surface engaging the rear of the back for adding its resilience thereto.

23. In a folding bed of the class described, a frame having an upholstered back and two supporting rails at each end, one above the other; a plurality of connected bed sections movable in the frame having means for engaging the rails, and extensible into alignment to form a bed; and the said means of one section engaging both rails at each end of the frame for positioning the section vertically in the frame and with its upper end in distending engagement with the under side of the back.

24. In a seat bed of the class described, a frame having a yieldable upholstered back rigidly attached thereto at the top and bottom, a plurality of foldably connected bed sections extensible into alignment to form a bed and means for mounting them in the frame, one section having means to hold it in upright position at the rear of the frame and carrying a resilient bed portion for yieldingly supporting the back when it is pressed rearwardly.

25. In a folding bed of the class described, a frame, a yieldable back fixed to the frame at the top and bottom, a plurality of bed sections having means for mounting them foldably in the frame and extensible into alignment to form a bed, one of the sections having a resilient bed portion and means for positioning and holding it uprightly at the rear of the frame with the resilient portion disposed directly at the rear of the back to additionally support it when the back is pressed rearwardly.

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