

Jan. 3, 1950

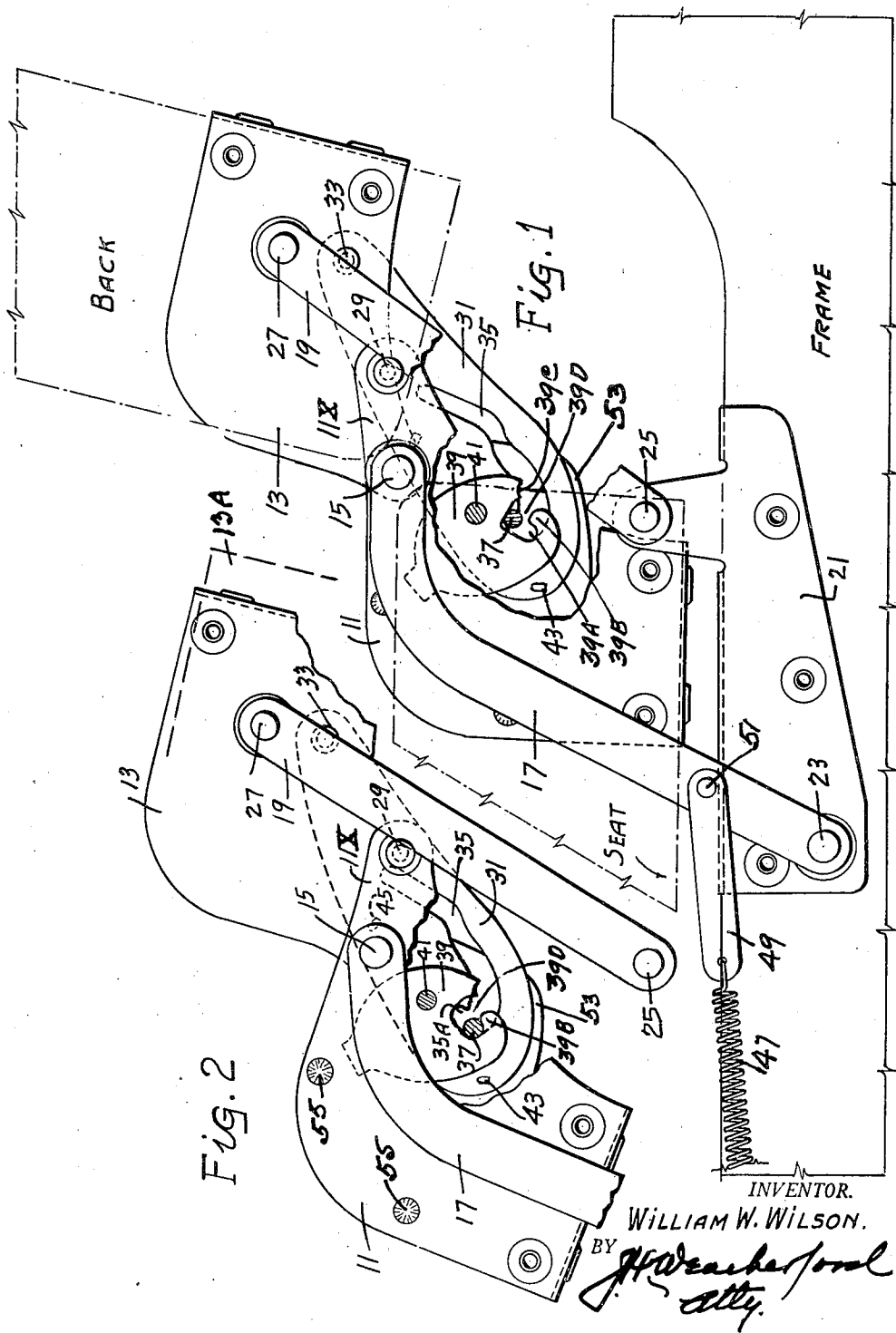
W. W. WILSON

2,493,096

SOFA BED

Filed Jan. 13, 1945

3 Sheets-Sheet 1



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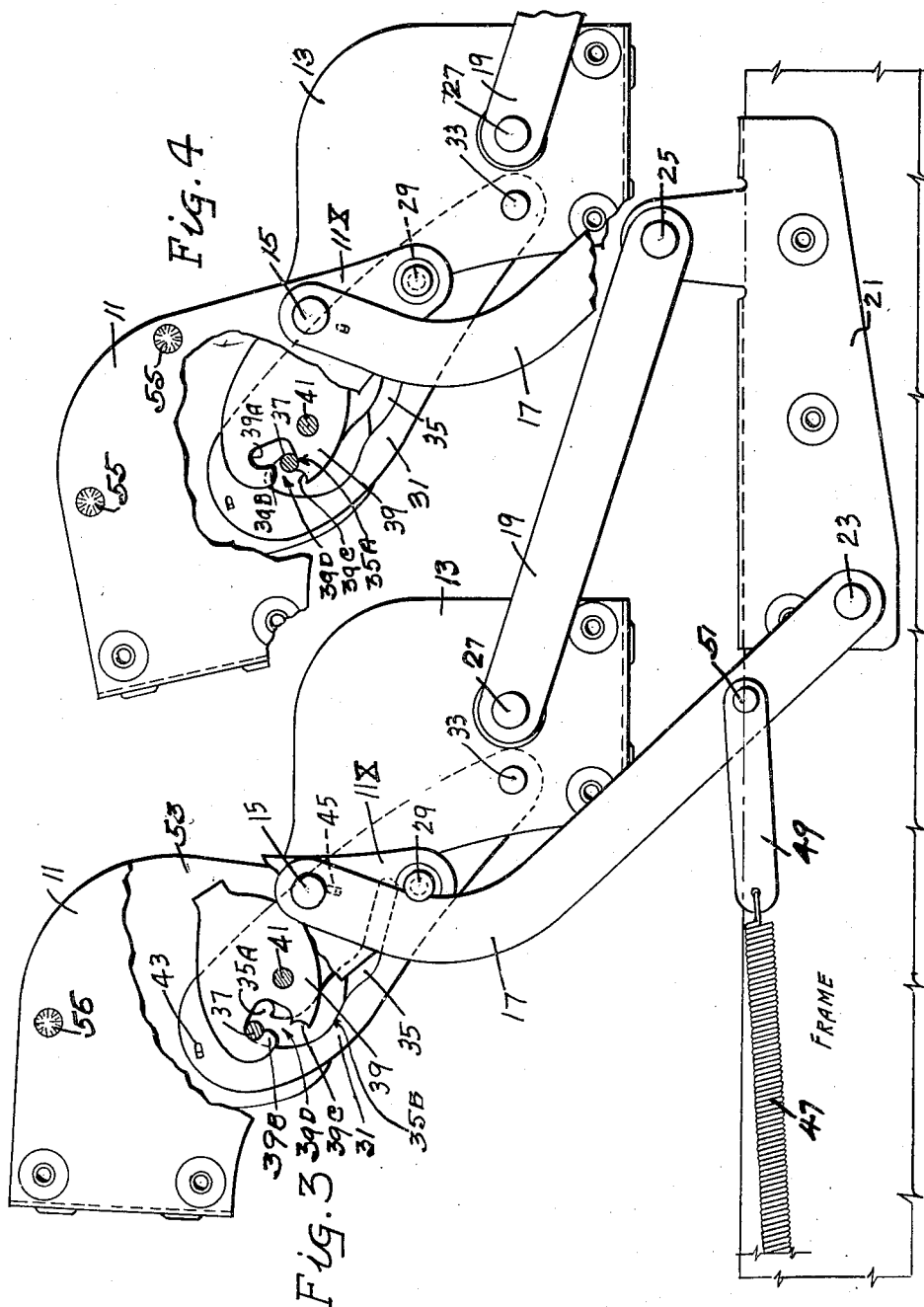
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INVENTOR.

WILLIAM W. WILSON.

BY

*J. H. Easterford*  
att'y

**Jan. 3, 1950**

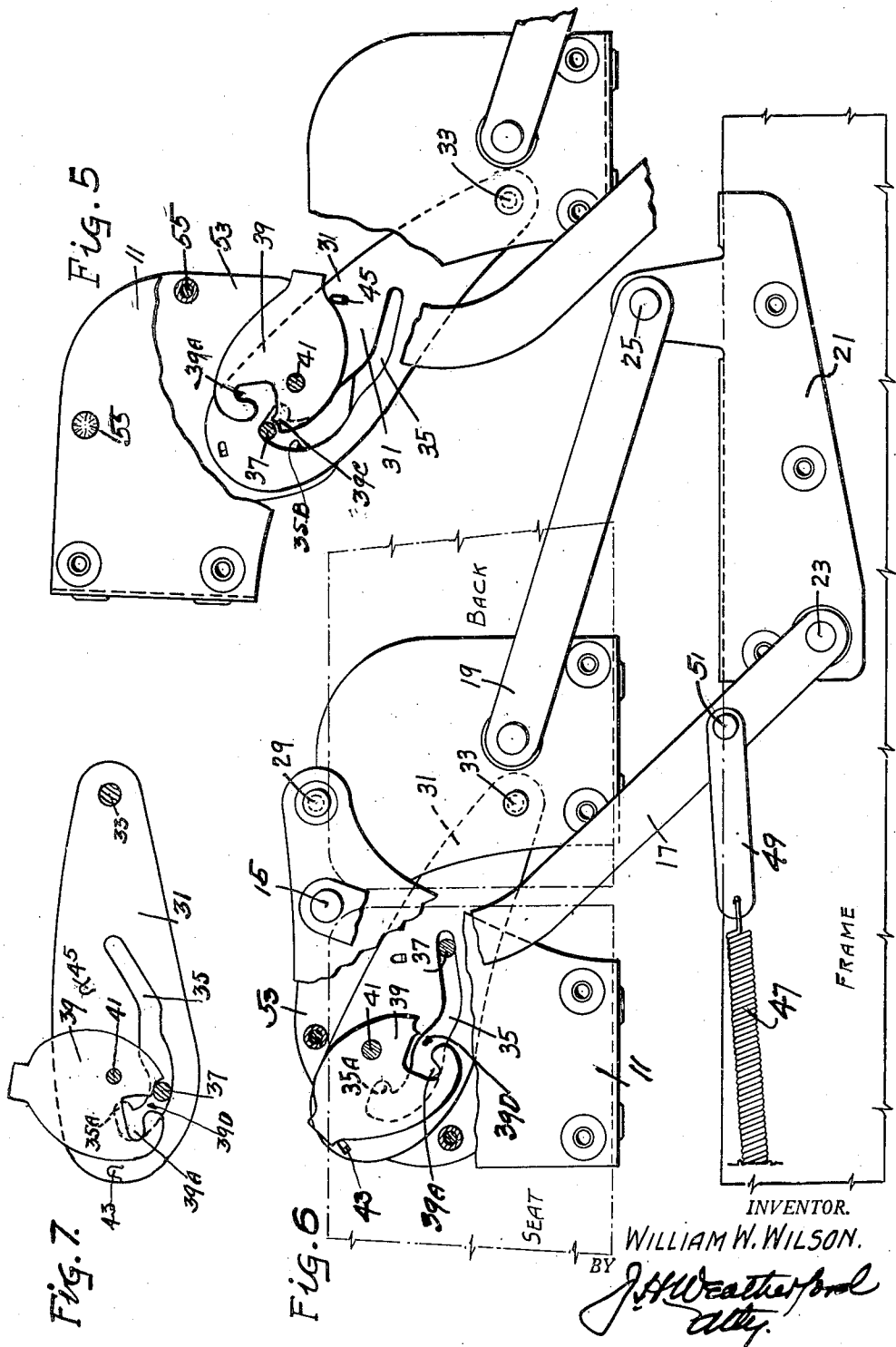
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Filed Jan. 13, 1945

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## UNITED STATES PATENT OFFICE

2,493,096

## SOFA BED

William W. Wilson, Memphis, Tenn.

Application January 13, 1945, Serial No. 572,592

11 Claims. (Cl. 5-47)

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This invention relates to sofa bed hinges and supports of that well known type in which brackets pivotally hinged together are secured respectively to the lower edge of the back and the rear edge of the seat, and the hinge is carried by a pair of upwardly extending swinging arms which are pivotally supported by attachment at their lower ends to a base member.

It further relates to bracing means and locking and tripping means therefor, carried by said bracing means, the bracing means being interposed between the seat and back brackets to establish their relative positioning when in sofa position, and to accomplish shift from sofa position to bed position and back to sofa position, and the locking and tripping means cooperating with their bracing means and brackets to effect locking or tripping in response to manual manipulation of the seat.

In present latch constructions it is possible by a forward shift of the back when in upright, or sofa, position to disengage the latch and undesirably release the back. Also it is not only possible, by over-travel, in raising the seat from bed position to effect unintentional latch disengagement and consequent return shift of the seat to bed position, but in usual latches it is extremely difficult to effect just the proper amount of seat raising, to effect the engagement of the latch which is necessary to accomplish shift of the back from bed position to sofa position, the trouble being accentuated by sag of one or the other and of the seat, and resulting failure of engagement of one or the other end, as the case may be. In addition, under excessive over-travel there is a tendency of the hinge joints to pass dead center and cause buckling of the hinge.

The objects of the invention are:

To provide means which will rigidly lock the back when in sofa position;

To provide means responsive to seat movement for unlocking said back and effecting shifts thereof;

To provide means for effecting an initial forward shift of the back, responsive to manual movement of the seat from sofa position;

To provide means for preventing over-travel movement of the seat under manual manipulation and shift from sofa to bed and vice versa; and for equally limiting the movement of the opposite ends of the seat;

To provide means for preventing movement of the hinge pivot of the seat and back brackets past dead center in seat manipulation to effect shift from seat to bed positions or vice versa;

To provide means which will limit displacement of the bracing members under seat shifting movements, and compel engagement of the trip and locking parts;

To provide a latch-trip which includes an

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abutment engaging hook substantially preventing unintentional trip release;

To provide a latch trip substantially locked against unintentional displacement;

To provide rugged and efficient hinging and latching means for a sofa bed.

The means by which the foregoing and other objects are accomplished, and the manner of their accomplishment, will readily be understood from the following specification upon reference to the accompanying drawings, in which:

Fig. 1 is a side elevation of a sofa bed hinge and related parts in the positions occupied when the sofa bed is in sofa position.

Figs. 2 through 5 are side elevations of the hinge and parts in intermediate positions of the back and seat between sofa and bed positions; and

Fig. 6 is a side elevation of the hinge and parts in the positions occupied when the sofa bed is in bed position.

Fig. 7 is a side elevation of the latch and trip with the related pins in section.

Referring now to the drawings in which the various parts are indicated by numerals:

11 and 13 are brackets to which the seat and back are respectively secured, these brackets being hingedly connected by a pivot pin 15 to form the hinge for one end of the seat and back. As in usual and well known construction, there are similar pairs of brackets at the opposite end of these parts, which, being of similar conformation and identical in action, are not here shown.

The brackets are supported in usual manner by front and rear support arms 17 and 19, pivotally secured to a base member 21 by hinge pins 23 and 25 respectively, the rear arm 19 being supportingly secured to the back bracket 13 by a hinge pin 27, and the front arm 17 secured to and supporting the hinge pin 15. The seat bracket has a portion 11X which extends rearwardly beyond the pivot pin 15 and carries a blocking stud 29 which is positioned to seat against the arm 19 when the seat and back are in sofa position, whereby the back in such position is locked against forward movement. The arm 17 is arcuately curved or bowed between the pivot pin 15 and its supporting hinge pin 23 to clear the stud 29 during shifting movements from sofa to bed positions and vice versa, the curvature being such as to effect seating engagement (Fig. 3) of the stud and arm when the seat and back reach the limiting position of intermediate shift, and act to stop movement at such point and also to prevent buckling movement of the hinge.

A latch 31 is pivotally secured at one end to one of the brackets, as the back bracket 13, by a pivot pin 33, the latch having in its opposite end portion a longitudinally extending slot 35, closed at its ends, in which slot is slidably disposed a

pin or abutment 37 carried by the other bracket 11. The inner end of the slot preferably rather closely embraces the abutment pin and is disposed with such angularity relative to the length of the latch as to minimize latch swing about the pin 33. At its outer end the slot widens to increase abutment play and arcuately curves into substantially transverse relation to the latch and at its end is provided on its inner side with a seating notch 35A for the abutment pin, which notch increases the slot width and provides an abutment play of about twice abutment width.

Adjacent the outer end of the latch 31 is a trip 39 which is pivotally secured to the latch by a pivot pin 41 substantially concentric with the arcuately curved portion of the latch slot. The pivot center of the trip is below and rearward of its center of gravity and the swing of the trip about the pivot pin 41 being limited in opposite direction as by lugs 43 and 45 carried by the latch arm and which may be struck outward from the surface thereof.

Below and forwardly of the pivot pin 41, the trip is recessed to receive the abutment 37, this recess including a pin engaging notch 39A facing rearwardly, the lower side of the notch being formed by a tongue 39B, and the notch depth being sufficient to substantially entirely house the abutment. The rear side of the recess extends slightly below the tongue 39B, turns slightly forward and terminates in a forwardly and downwardly facing arcuate abutment seat 39C, which is positioned relatively to the pin 41 to clear the upper arcuate edge of the latch slot, the tongue and forward edge of the seat delimiting a throat 39D into the recess slightly in excess of the size of the abutment. Preferably the lower arcuate edge of the slot is so positioned relatively to the seat 39C that it holds the abutment on the seat during movement of the abutment about the pin 41.

47 is a tension spring connected at its rear end to the arm 17, preferably through a link 49 and pin 51. The forward end of the spring, though not here shown, is anchored to the sofa bed frame, and the spring is tensioned to assist shift of the seat and back from the sofa position shown in Fig. 1.

53 is a cover plate spaced from the bracket 11 to house the latch 31 and trip 39, the plate being secured to the bracket by rivets 55 and by the abutment pin 37, and in addition to housing the latch and trip, bracing the abutment pin.

The structure hereinabove described is built in right and left hand units, otherwise identical, and these units are secured respectively to the opposite ends of the seat and back, and of a suitable supporting frame.

In use, shift of the seat accomplishes the movement of the parts, the hinge structures at both ends being concurrently moved by the seat shift. The following description, however, for clarity, has been confined to the movements of one only of the hinge structures as typical.

When the sofa bed is in seating position the parts are positioned as shown in Fig. 1 with the blocking stud 29 solidly seated against the rear support arm 19 and with the pin 37 engaged in the seating notch 35A.

When it is desired to convert the sofa bed from seating position to bed position, shift of the seat is undertaken, accomplishing movement of the parts and causing positioning of the trip seat 39C in the path of pin 37, such positioning occurring at substantially the outer limit of movement

of the seat section, for engagement by the pin 37, such engagement holding the abutment pin clear of the latch notch and accomplishing unlatching as desired.

It is found that the operation of the parts may be effected by initially shifting the seat forwardly with a minimum of initial upward movement being imparted thereto. Under such condition the spring 47, coupled to the arm 17, acts not only to assist in counter-balancing the sofa bed for shift, but also cooperates with the weight of the back supported by the back bracket to maintain the parts in close coupled relation, so that during such shift the pin 37 remains in the seating notch 35A and the parts are moved from the position shown in Fig. 1 to the position shown in Fig. 4. During such shift the trip 39 is restrained against gravity urged movement about its pivot 41 by the engagement of the abutment pin 37 with the side of the notch 39A nearest the pivot 41.

It will be seen that in the position of Fig. 4, the trip is disposed for gravity urged movement upon release to position the seat 39C in alinement with the pin 37 for engagement thereby, the stop 45 being preferably provided to insure accurate positioning. However, if it is desired to return to the seating position of Fig. 1, this may be done by simply reversing the movement of the parts without releasing the pin imposed restraint on the trip. If shift to bed position is desired, the seat section is raised from the position of Fig. 4 to the position shown in Fig. 5, the pin 37 being thereby moved into engagement with the end of the slot 35. The trip is released from the previous restraint, and moves under gravity to position the trip seat 39C in alinement with the path of the pin 37. Unlatching is then accomplished by lowering the seat section pin 37, moving into engagement with trip seat 39C and being thereby held clear of the latch notch 35A.

Upon shift from the position of Fig. 4 to that of Fig. 5 the stud 29 is brought into engagement with arm 17 and effectively serves to insure against movement of the parts to a position in which the hinge may buckle under the weight of the sections.

If, from the seating position shown in Fig. 1, the front of the seat is lifted upwardly the seat bracket 11 is shifted to the position shown in Fig. 2 and the abutment pin 37 is carried by the bracket solidly against the front end of the latch slot 35 and into the notch of the trip 39 immobilizing the trip relatively to the latch and the abutment.

This seat lifting also shifts the blocking stud 29, about the hinge pin 15 as a center, downward along the forward edge of the rear supporting arm 19 and cams the back bracket 13 from its initial position 13A, shown by the heavy dotted lines in Fig. 2, slightly forward and moves the back correspondingly forward, destroying the inertia of the parts and imparting an initial movement to them.

Continuing the movement of the seat forward and upward from this position, the stud 29 moves away from and unlocks the supporting arm 19, the movement being continued until the seat bracket 11 reaches the limiting position of intermediate shift, shown in Fig. 3, and the back bracket with the back carried thereby is pulled by cooperative action of the abutment 37 and the end of the slot 35 in the latch into substantially horizontal position and is stopped by contact (not shown) with the frame rearward of the

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base member 21, and movement of the seat bracket and seat is stopped by the latch. During this entire movement the trip 39 continues immobilized relatively to the latch and abutment 37, the depth of the trip notch 39 rendering it substantially impossible to accidentally disengage the trip. Concurrently with these movements the stud 29 has moved from the position shown in Fig. 2 to the position shown in Fig. 3 and into contact with the front supporting arm 17, this latter contact additionally stopping bracket movement and blocking downward movement of the hinge pin 15 across the line of centers of the abutment pin 37 and the rear support-arm pin 27, and preventing buckling of the hinge, it being here noted that it is possible for the latch pivot pin 33 to be moved at this time by upward movement of the seat bracket 13 toward alignment between the latch abutment pin and the support arm pin, sufficiently to otherwise allow such buckling movement.

From the limiting position of intermediate shift movement thus reached, the seat and seat bracket are shifted reversely from the position of Fig. 3 downward, shifting the abutment pin 37 from the trip notch 39A into engagement with the latch notch 35A and stopping the movement of the seat bracket in the position shown in Fig. 4. In this movement, the abutment pin 37 disengages from the notch 39A of the trip, unlocks the trip, and allows the heavier upper end of the trip to shift the trip until the back of the recess in the trip engages the abutment pin 37, and stops the movement of the trip preventing at this time engagement of the trip seat 39C and abutment and making it possible, if desired, still to return to seat position, but so positioning the end of the tongue 39B relatively to the abutment that subsequent outward movement of the abutment will force completion of the trip movement even though it might otherwise hang or be sluggish.

From the position shown in Fig. 4, if the seat is to be shifted to bed position, the seat is raised, shifting the seat bracket 11 to the position shown in Fig. 5, which it will be noted is identical with the bracket position shown in Fig. 3, since the movement of the bracket is positively limited by engagement of the abutment pin 37 with the end of the slot 35 in the latch arm 31. This movement however moves the abutment pin outward and away from the back of the trip recess, completes the unlocking of the trip, and allows the trip to further shift by gravity, or by contact with the tongue 39B forces the shift against the stop 45, and aligns the trip seat 39C in the return path of the abutment 37. It will be seen that during such trip shift, the throat of the trip passes the pin, or, in other words, the pin passes through the throat of the trip in moving to the extreme position. The seat and seat bracket 11 are then shifted downward from the positions of Fig. 5, the abutment engaging the trip seat 39C and being held thereby clear of the latch notch 35A, and turning the trip around the pin 41. During movement through the arcuate portion of the slot, the abutment is confined in the seat 39C so that the trip is compelled to shift, until the trip has been turned enough to overbalance it and cause it to further complete its shift by gravity to the position shown in Fig. 6, with the recess throat 39D facing rearwardly and aligned with the latch slot 35, trip movement being stopped by the lug 43. Movement of the abutment

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through the latch slot is continued until the seat is brought to the bed position of Fig. 6.

To shift from bed position (Fig. 6) back to sofa position, the seat is raised, turning the seat bracket 11 about the hinge pin 15 and moving the abutment pin 37 along the slot 35 in the latch. It will be seen that the tongue 39B extending toward the pin 41 projects into the slot 35 in the path of pin 37, and is engaged by the abutment pin 37 as the pin is moved along the slot. The trip is turned by this engagement until the throat 39D is positioned to receive the pin. The pin 37 then passes through the throat 39D into the recess of the trip and against the top of the recess, turning the trip until the abutment pin seats in the notch 39A of the trip and until the abutment pin reaches the end of the slot 35 in the latch and further movement of the seat and seat bracket is stopped by the end of the slot, this being again the limiting intermediate position shown in Fig. 3.

From the position shown in Fig. 3, to return to seat position the seat and seat bracket 11 are again lowered, the abutment pin 37 moving from the trip notch 39A and the end of the latch slot into engagement with the seating notch 35A of the latch 31, as shown in Fig. 4, and the movement is continued, the abutment pin through the latch pushing the back from the horizontal bed position, of Fig. 6, through the seat and back position shown in Fig. 2, to upright seating position, as shown in Fig. 1, and by direct latch action holding it in such position, and notch engagement of the latch and abutment not only making accidental dislodgement of the latch substantially impossible, but opposite notch action of the trip, making it actually impossible. Also the final seat movement between the seat and back positions of Fig. 2 and Fig. 1, through the blocking pin 29, completes the locking of the back against movement, either accidental or otherwise. It will be noted that during this movement the trip is restrained from turning to position the trip seat 39C and abutment pin engagement by the engagement of the pin with the side of the notch 39A adjacent the pivot 41 and that the trip seat can only be permitted to turn for such abutment engagement by a reversal of the movement of the parts which will move the pin into the portion of the notch remote from pivot 41 releasing the trip to turn by gravity and thereby move the trip seat 39C for unlatching as previously described.

It will be understood that the frame bracket carrying the swinging arm structure through which the seat and back are supported, is disclosed in my pending application, Serial No. 552,244, which issued as Patent No. 2,435,936 on Feb. 10, 1948, and that the bracing latch arm and trip are in part disclosed in my pending application, Serial No. 538,984, which is now abandoned.

It will be understood that the latch 31 braces between the seat and back brackets and holds the back against forward movement from such position, but even if it were displaced the back would be so held by blocking pin and arm cooperation. It will be again emphasized that the latch cooperates directly with the abutment pin, rather than through the trip, to effect shifting movement from seat to intermediate position and to limit such movement, but that such limiting is also accomplished independently through bracket and arm cooperation.

I claim:

1. In a sofa bed shiftable at option from seating position to an intermediate position and

thence reversely to bed position and vice versa; a seat, a back, and a supporting frame, means respectively hinging opposite ends of said seat and back together, and supporting means therefor; each said hinging means comprising a seat bracket and a back bracket secured respectively to said sections, and a pin hinging said brackets together, front and rear support arms swingingly secured at their lower ends to said frame and at their upper ends respectively to said hinge pin, and to said back bracket, said seat bracket extending rearwardly of said hinge pin, and carrying a stud positioned to seat against said rear arm when the structure is in seating position, said front arm extending forwardly from said hinge pin to clear said seat bracket during shift of said seat and back away from said seating position, and being downwardly bent to engage said seat bracket and limit said shift.

2. In a sofa bed shiftable at option from seating position to an intermediate position and thence to bed position and vice versa; a seat, a back, a supporting frame, and means respectively hinging the opposite ends of said seat and back together; each said hinging means comprising a seat bracket and a back bracket secured respectively to said sections, and a pin hinging said brackets together, front and rear support arms swingingly secured at their lower ends to said frame and at their upper ends respectively to said pin, and to said back bracket, said seat bracket extending rearwardly of said hinge pin, and carrying a stud positioned to seat against said rear arm when said structure is in seating position.

3. In a sofa bed manually shiftable at option into seating or bed positions, a seat, a back, and a supporting frame, means at opposite ends of said seat and back hinging them together, and supporting means therefor; each said hinging means comprising a seat bracket and a back bracket secured respectively to said sections, and pivot means hinging said brackets together, front and rear support arms pivotally carried at their lower ends by said frame and pivotally secured at their upper ends respectively to said pivot means, and to said back bracket, said seat bracket having a portion extending rearwardly of said hinge pivot, and a stud carried thereby, positioned to seat against said rear arm when the structure is in seating position, said front arm extending forwardly from said hinge pin to clear said stud during shift of said seat and back away from said seating position, and being downwardly bent to engage said stud and limit said shift.

4. Hinge and support means for the opposite ends of the seat and back sections of a sofa bed, manually shiftable from seat or bed positions to an intermediate position and back to bed or seat positions; said means each including a seat bracket and a back bracket pivotally secured together, and support arms, a latch pivotally secured to one of said brackets and an abutment carried by the other thereof, said latch being longitudinally slotted to slidably embrace said abutment, said slot adjacent the free end of said arm curving arcuately upward and terminating in transverse relation to said arm, and at said terminus being notched on its inner side to establish an outwardly facing abutment socket and permit limited longitudinal shift of said abutment, a trip pivotally attached to said arm, the pivot center of said trip being rearward and below its center of gravity, said trip below and forwardly

of said center being upwardly slotted and the forward side of said slot recessed to establish an abutment socket facing toward said center, said trip, rearwardly of said slot, extending into the top of said latch slot and terminating in an abutment seat, and means carried by said latch respectively limiting the rearward and forward swings of the top of said trip to align said trip abutment seat in the path of downward movement of said abutment from intermediate position to bed position, and the entrance of said trip slot with said latch slot in bed position.

5. In a sofa bed including a seat section, and a back section hinged together, and means for shiftablely supporting said sections; means at opposite ends of said sections effecting said hinging, each said hinging means comprising brackets secured respectively to said sections, and pivot means hinging said brackets together, an abutment pin carried by one of said brackets, a latch pivotally secured at one end to the other said bracket, said latch having a portion slidably supported by said abutment, said portion at its outer end curving arcuately upward and terminating in an outwardly facing seat, said latch continuing outwardly above said seat in excess of abutment width, and thence downwardly to establish an abutment engaging portion facing said seat; a trip pivotally secured to said latch substantially at the center of curvature of said portion, said trip center being below and rearward of its center of gravity, said trip being recessed below and forward of said center to establish a rearwardly facing hook for engagement by said abutment in movement along said latch portion, and rearwardly of said recess terminating at its lower end in an abutment receiving seat clearing said arcuate latch portion; and means for limiting opposite turning movement of said trip under gravity action, to position said trip hook or said trip seat, as the case may be, in abutment engaging positions responsive to shifting movement of said abutment carrying bracket.

6. In a sofa bed including a seat section, and a back section hinged together, and means for shiftablely supporting said sections; means at opposite ends of said sections effecting said hinging, each said hinging means comprising brackets secured respectively to said sections, and pivot means hinging said brackets together, an abutment pin carried by one of said brackets, a latch pivotally secured at one end to the other said bracket, said latch having a portion slidably supported by said abutment, said portion at its outer end curving arcuately upward and terminating in an outwardly facing seat, said latch continuing outwardly above said seat in excess of abutment width, and thence turning downwardly to establish an abutment engaging portion facing said seat, a trip pivotally secured to said latch substantially at the center of curvature of said end portion, said trip center being below and rearward of its center of gravity, said trip being recessed below and forward of said center to establish a rearwardly facing hook, spaced from said center for engagement by said abutment in outward movement along said latch portion, means for limiting turning movement of said trip to effect hook positioning, said trip rearwardly of said recess terminating at its lower end in an abutment receiving seat clearing said arcuate latch portion, and means for limiting opposite turning movement of said trip to position said

trip seat, in abutment engaging position by return shifting movement of said abutment carrying bracket.

7. In a sofa bed including a seat section, and a back section hinged together, each said hinging means comprising members secured respectively to said sections, and means hinging said members together, an abutment carried by one of said members, a latch pivotally secured at one end to the other thereof, said latch being longitudinally slotted to slidably receive said abutment, said slot at its outer end curving arcuately upward and terminating in transverse relation to said latch, the inner side of said slot being notched to provide an abutment seat and permit limited longitudinal shift of said abutment, a trip pivotally secured to said latch substantially at the center of said curvature, said trip center being below and rearward of its center of gravity, said trip being recessed below and forward of said center to establish a rearwardly facing notch, spaced for engagement by said abutment in outward movement along said latch, and rearwardly of said recess terminating at the lower end in an abutment receiving seat clearing the radially inner side of said slot, and means for limiting opposite turning movement of said trip to position said trip hook or said trip seat, as the case may be, in abutment engaging positions by shifting movement of said abutment carrying bracket.

8. A sofa bed structure, including a frame, a seat and a back, and means at opposite ends of said structure hinging said seat and back together, and swingingly supporting said seat and back from said frame for shift from seat position to bed position and return, each said means including a pair of brackets, secured respectively to said seat and back, and a pivot hinging said brackets together, a pair of supporting arms hingedly secured at their upper ends to said pivot and one of said brackets and at their lower ends to said frame, one of said brackets extending beyond said hinge and carrying means engaging said arms respectively in opposite positions of shift, to limit shifting movement of said seat and back.

9. In a sofa bed including a coupled seat and back shiftable from and to seating and bed positions; hinge means secured to opposite ends of said seat and back, each said hinge means including a pair of brackets hinged together, means shiftablely supporting said brackets, an abutment carried by one said bracket, a latch pivotally secured at one end to the other said bracket, and extending into supported relation by and adapted for engagement with said abutment under seat manipulation, and a trip pivotally attached to said latch adjacent its supported end, said trip having a downwardly open notch with one side thereof facing its pivot center and indented to form a recess engageable with said abutment by shift manipulation of said seat, and being biased to disengage therefrom by further manipulation of said seat, said latch being characterized by a longitudinal slot closed at its ends in which said abutment is slidably disposed, said slot adjacent its supported end being spaced from said trip pivot to guide said abutment into said trip notch, and arcuately curved upwardly around said trip pivot to maintain abutment engagement in said trip recess and to establish an abutment engaging shoulder, said shoulder being recessed of depth to establish an abutment seat therein allowing disengagement of said abutment from

said trip recess and release of said trip by biasing action.

10. In a sofa bed manually shiftable to and from seating and bed position and including a seat member and a back member hinged together, and latch means inter-connecting said seat and back; said latch means including a latch member pivotally hinged at its rear end to one of said members, and a cooperative abutment carried by the other thereof, in which said latch member forwardly of its pivot end is slotted to slidably receive said abutment, and adjacent its forward end pivotally carries a trip member, which includes a slot-overlying portion having a radial notch open at its rear side and radially inner end for abutment reception, said latch slot adjacent and rearward of said trip pivot being positioned in said latch for alinement with said notch opening for guiding said abutment into said notch, and extending toward the outer end of said latch arcuately around said trip pivot to displace said latch and trip and effect engagement of said abutment with the radially outer portion of said trip notch to immobilize said trip relatively to said abutment, said slot terminating transversely across said latch, to establish an outwardly facing abutment engaging shoulder, the said shoulder being rearwardly indented to form an abutment seat and allow disengagement of said abutment from said trip notch.

11. In a sofa bed manually shiftable to and from seating and bed position and including a seat and a back hinged together, and latch means interconnecting said seat and back; said latch means including a latch member pivotally hinged at one end to said back, and a cooperative abutment carried by said seat, in which the opposite end of said latch member is slidably supported by contact of a latch edge with said abutment, and pivotally carries a trip member having a portion adapted to extend below the abutment supported edge of said latch member, in facing relation to the pivoted end of said latch member, said portion being radially notched and having a rearwardly facing opening into said notch, for shifting engagement by said abutment member in movement away from said latch member pivot, said latch edge being arcuately curved around said trip pivot to maintain abutment engagement in said latch notch and establish a shoulder for abutment engagement, said shoulder being rearwardly notched to establish an abutment seat of depth to receive said abutment during retrogressive shift thereof whereby disengagement of said abutment from said trip notch may be effected.

WILLIAM W. WILSON.

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