March 25, 1941. D. KRAKAUER 2,236,351

LOCKING SOFA BED HINGE

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Fig. 1.

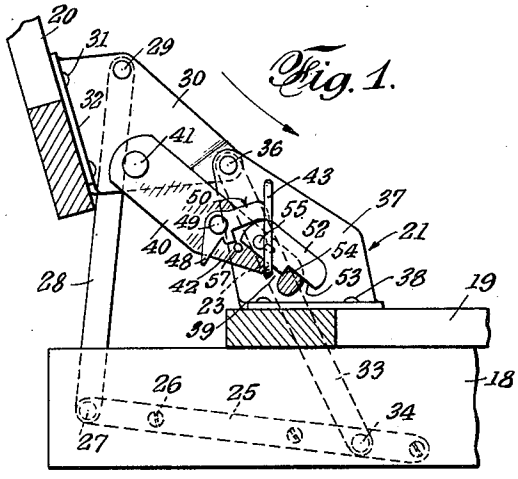


Fig. 2.

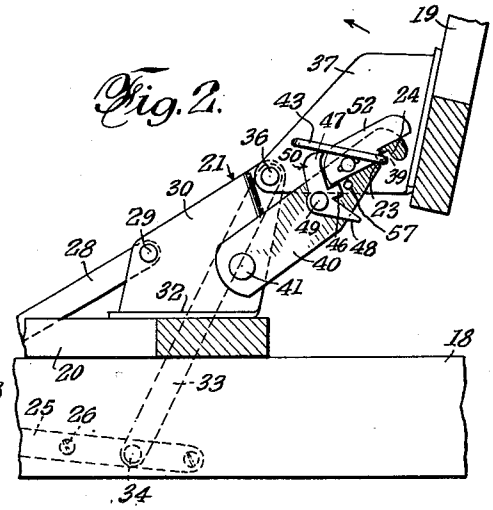


Fig. 3.

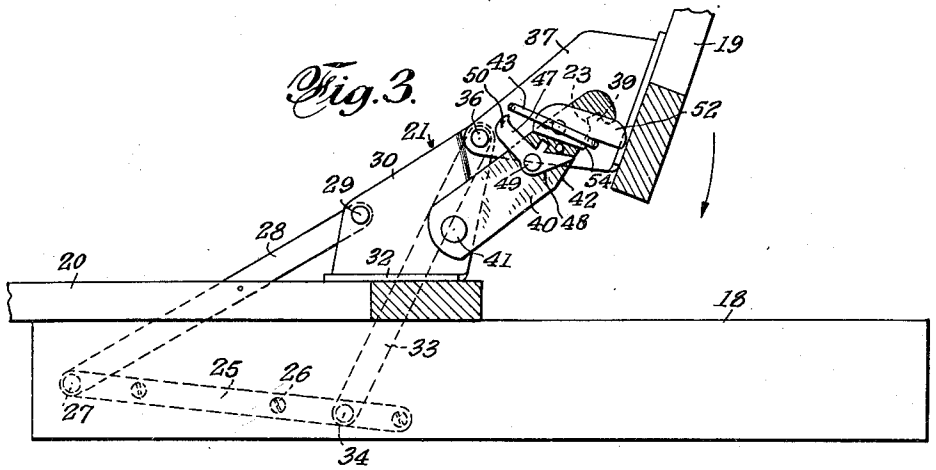
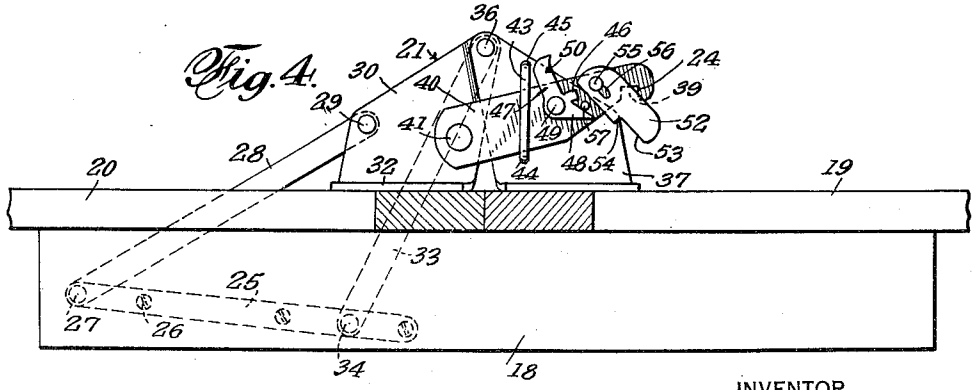


Fig. 4.



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Fig. 5.

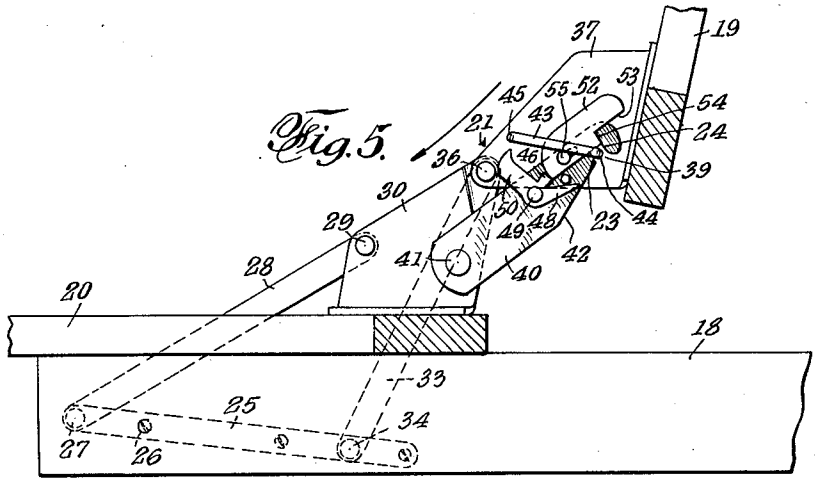


Fig. 6.

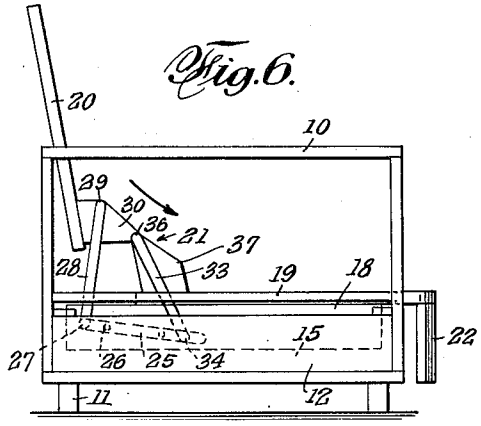


Fig. 7.

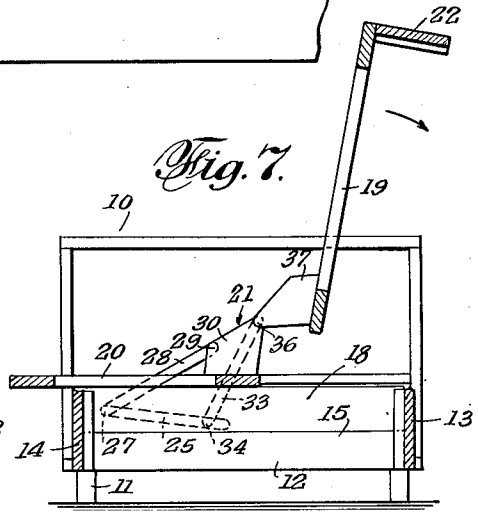
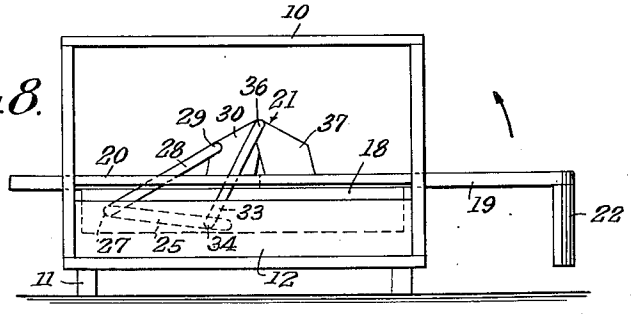


Fig. 8.



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Patented Mar. 25, 1941 2,236,351

UNITED STATES PATENT OFFICE

2,236,351

LOCKING SOFA BED HINGE

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Application January 4, 1940, Serial No. 312,321

10 Claims. (Cl. 5—47)

This invention relates to sofa beds and particularly to the type wherein a seat section is hinged to the back section and both sections are movable into the bed-forming positions thereof, which positions are different from the sofa-forming positions.

The means heretofore used for connecting the back and the seat has been found objectionable to the extent that it fails to lock the back properly in its sofa-forming position. Consequently, if the user should incidentally exert a forward pull upon the back as for example in moving the sofa bed about, such pull unlocks the connecting means to permit the back unexpectedly to drop down out of control with resulting likelihood of damage or injury.

Another disadvantage is that the user frequently does not know whether or not the seat has been locked to the back when moving the seat from its bed-forming position to its intermediate position in which position it is at substantially right angles to the back. Should the user lift the seat too far, the connecting means becomes unlocked though the user thinks it is locked, so that the seat owing to its weight, falls unexpectedly out of control back into the bed-forming position from which it has been lifted.

The present invention therefore contemplates the provision of a locking sofa bed which may be easily manipulated by unskilled persons without danger of the seat or back becoming accidentally unlocked and falling out of control.

The invention further contemplates the provision of a sofa bed in which the seat and the back become automatically locked in their proper relative positions, for later movement as a unit, when the seat is lifted into its intermediate position.

The invention further contemplates the provision of a hinge which maintains the back and seat locked in their substantially perpendicular relative positions, said hinge being releasable only after the parts have been moved from the sofa-forming position to the intermediate position as a unit and then being releasable only by a deliberate and intentional action of the user to permit the seat to be dropped into the bed-forming position.

The invention further contemplates the provision of stop means for engaging the releasing pawl of the hinge at the proper time to cause automatic locking of the hinge when the parts are moved from the bed-forming position to intermediate position, said stop means being arranged so as to be otherwise, and at other times, inoperative.

The various objects of the invention will be clear from the description which follows and from the drawings, in which,

Fig. 1 is a fragmentary side elevation partly in section of an end part of the sofa bed frame, the seat and the back, showing the parts, including the hinge, in the sofa-forming position thereof.

Fig. 2 is a similar view of the same in the intermediate position and after the seat and back have been swung as a unit in the direction of the arrow of Fig. 1 out of the sofa-forming position.

Fig. 3 is a similar view of the same showing the positions assumed by the parts after the hinge has been unlocked by a slight rearward movement of the seat in the direction of the arrow of Fig. 2 and then moved slightly downwardly toward the bed-forming position in the direction of the arrow of Fig. 3.

Fig. 4 is a similar view of the same showing the positions assumed by the parts when the seat has moved to the bed-forming position in the direction of the arrow of Fig. 3.

Fig. 5 is a similar view of the same showing the positions assumed by the parts when the seat has been moved back from the position of Fig. 4 to the intermediate position of Fig. 5.

Fig. 6 is a side elevation of a sofa bed embodying my invention showing the frame parts in the sofa-forming position, the usual upholstery being omitted for the sake of clarity.

Fig. 7 is a similar view of the same, showing the parts in the intermediate position wherein the back is down and the seat up and wherein access may be had to the storage compartment.

Fig. 8 is a similar view of the same showing the parts in the bed-forming position.

In the practical embodiment of the invention shown by way of example, the sides or arms 10 of the sofa bed are provided with suitable legs 11 resting on the floor. Between the sides extends the storage compartment 12, preferably closed at its bottom, and which comprises the front rail 13, the rear rail 14 and the pair of similar end rails 15. Each end of each of said end rails extends partway up from the bottom of the storage compartment and is fixed between a pair of suitable uprights secured to the inner faces of the front and rear rails at corresponding points. The uprights of each pair are spaced a sufficient distance apart to permit the carrier rails 18, one of which is secured to and

depends from each end edge of the seat frame 19, to be readily dropped into the corresponding groove therefor provided between the upper parts of said uprights. This construction allows the entire seat and the parts secured thereto to be easily inserted into and removed from the frame of the sofa bed during assembly or for other purposes. The back 20 is suitably hinged to the carrier rails 18 of the seat 19 as by means of a pair of suitable hinges each arranged at one end of the back and each designated generally by the numeral 21.

The connecting hinge, shown particularly in Figs. 1 to 5 inclusive, permits the movement of the seat and back together with the upholstery, springs, cushions or mattresses carried thereby into the various positions shown in Figs. 6 to 8. In the position of Fig. 6, which is the normal or sofa-forming position of the parts, the back 20 is in its back-forming position and the seat 19 is in its seat-forming position. The back, however, cannot be moved by pressure exerted thereupon but can be moved only by lifting the front edge of the seat 19 as by means of the front panel board 22, whereupon the seat and the back may be swung as a unit into the intermediate position shown in Fig. 7 wherein the back is down in its horizontal or bed-forming position and the seat is in a raised or intermediate position preliminary to the swinging of the seat down into the bed-forming position thereof shown in Fig. 8.

In the intermediate position of Fig. 7, the seat is maintained in its raised position by the hinge 21 so that access may be had to the storage compartment 12. In the position of Fig. 8, the back and seat are in relatively coplanar positions so that the upper faces of the upholstery or mattresses thereon are at the same level and the sofa bed may conveniently be used as a bed.

The hinge controlling the above-described movement of the parts will now be described. Said hinge is best shown in Figs. 1 to 5 inclusive, and comprises the fixed member 25 shown in the form of a bar secured to the outer face of the carrier rail 18 by suitable means such as the screws or bolts 26. Pivoted to the fixed member or bar at one end as 27 is the link 28, the other end of which is pivoted as at 29 to the rear hinge member 30 which is secured to the back 20 by any suitable means such as the screws or bolts 31 passing through the flange 32 of said hinge member and into the back. A second link 33 is pivoted at its lower end as 34 to the fixed bar 25 and at its upper end is mounted on the hinge pin 36 which pivots the rear hinge member 30 to the front hinge member 37. Said front hinge member is secured to the seat 19 as by the screws or bolts 38 passing through a flange of the member and into the seat frame.

It will thus be seen that when the hinge members 30 and 37 are held against relative movement, the seat and back pivot on the links 28 and 33 and the bar 25. The seat and back may consequently be moved as a unit without changing the relative positions thereof. During such movement the links 28 and 33 swing about the pivots 27 and 34 at the lower ends thereof and about the pivots 29 and 36 at their upper ends. In other words, during the movement of the seat and back from the position of Fig. 1 or 6 to the position of Fig. 2 or 7, there is no relative movement of the hinge members 30 and 37 which swing as a unit, but there is relative movement of the links 28 and 33.

When the seat is moved into its bed-forming position (Figs. 4 and 8) from the position of Fig. 2 or 7, the hinge member 37 is unlocked from the hinge member 30, whereby it and the seat secured thereto move relatively to the hinge member 30 which does not change its position. Nor do the links 28 and 33 change their positions during the movement of the seat 19 from the position of Figs. 2 and 7 to that of Figs. 4 and 8. Means are therefore provided on the hinge, first to lock the back 20 and seat 19 together during the movement of these parts from the position of Fig. 1 to that of Fig. 2 and also to prevent movement of the back unless the seat is lifted, and second, to unlock or release the hinge members 30 and 37 from each other for relative movement from the position of Fig. 2 to that of Fig. 4, on proper manipulation.

Said means includes the main plate-like locking member 40 suitably pivoted near its left end, as viewed in Figs. 1 to 4, on the pivot 41 carried by the hinge member 30. Said locking member 40 is provided with an inwardly and forwardly inclined lower edge 42 leading to the locking notch or recess 39 which is arranged near the free end of the main locking member. The free end or right-hand portion of said locking member passes through the space defined by the legs and cross bar of the U-shaped bail 43 which is secured to the hinge member 37 by means of its legs 44, 45. The locking member 40 moves back and forth through the bail 43 (Figs. 3 and 4) and swings on its pivot 41 between the legs of said bail when permitted to do so on the relative movement of the hinge members 30 and 37, or in other words, on the opening and closing of the hinge.

The weight of the locking member serves to urge the shoulder or edge 23 of the notch 39 therein into contact with the leg 44 of the bail 43 in the normal positions of the parts wherein the hinge members 30 and 37 are locked against relative movement.

Carried by the free end portion of said main locking member 40 in a position to close or to expose the locking notch 39 at the proper time is the auxiliary locking member or pawl 52. Said pawl is provided with a corner notch 53 providing a shoulder 54, and is pivotally mounted on the main locking member 40 by means of the pivot pin 55 through the longitudinal slot 56 in the pawl. A stop pin 57 on the locking member 40 adjacent the lower edge of the pawl serves to limit the extent of the swinging movement of said pawl about its pivot and also serves as a stop for the detent lever 50 which is pivoted to the locking member 40 as at 49, and is provided with arms 47 and 48 and with the intermediate projection 46.

In the normal or sofa-forming position of the parts, as shown in Figs. 1 and 6, the back 20 is locked to the seat 19 in a position substantially perpendicular thereto and against movement by any force exerted on the back and can be moved only by raising the front edge of the seat 19. In this position, the leg 44 of the bail has entered the notch 39 and rests against the rear edge or shoulder 23 of said notch. The pawl 52 also rests against the bail leg 44 owing to its tendency to swing in a clockwise direction about its pivot 55 under the influence of gravity, said pawl also having moved downwardly and toward the right because of the provision of the slot 56, so that the pin 55 is at the extreme left end of said slot. The shoulder 54 of the pawl is below and to the right of the bail leg 44 so that said

shoulder cannot be brought to the left of said leg and hence the parts are adequately locked together. The upper arm 47 of the lever 50 being heavier than the lower arm 48 thereof, said lever is in its inoperative position, that is, its arm 48 has been swung away from the stop pin 57 in a clockwise direction, the projection 46 moved to the left of the pawl, and the upper arm 47 is in contact with the left end of the pawl.

Consequently, if the top edge of the back is pulled forwardly about the pivot 36 of the hinge, all that can happen is that the hinge member 30 and the locking member 40 are slightly raised since they also move slightly about the pivot 36. On raising said members 30 and 40 slightly, the bail leg 44 contacts with the front edge 24 of the notch 39 whereupon further movement of the back is prevented. No rearward or counter-clockwise movement of the back 20 can occur since such movement would tend to bring the shoulder 23 of the notch 39 in even firmer contact with the bail leg 44. No pivotal movement of the pawl 52 in a clockwise direction about its pivot can occur since its lower edge is already in contact with said bail leg 44.

However, if the front edge of the seat 19 is raised, the bail leg 44 moves slightly in the notch 39 into contact with the notch shoulder 24 but no further, and the locking member 40 remains effective to hold the hinge members 30 and 37 against further relative movement. Continued movement of the seat in a counter-clockwise direction about the pivot 36 therefore causes the back 20 to move with the seat in a counter-clockwise direction into the position of Fig. 2 and until the seat is in the intermediate inclined position there shown. In said position, the hinge members 30 and 37 have not moved relatively to each other, but, owing to the provision of the slot 56 in the pawl 52, said pawl under the influence of its weight, has moved back slightly while its lower edge still remains in contact with the bail leg 44, ready to be moved to the left of the bail leg to unlock the parts on proper manipulation of the seat. The lever 50 remains inoperative but is shifted counter-clockwise by the movement of the pawl so that it is out of balance, but prevented from further movement by contact of the upper edge of the projection 46 with the lower edge of the pawl 52. In this position the lever does not interfere with the unlocking operation.

Now if it is desired to move the seat relatively to the back into the position of Fig. 4, the seat is again moved slightly rearwardly or in the direction of the arrow of Fig. 2 about the hinge pivot 36 sufficiently to release the locking member 40 (Fig. 3). On such movement, the bail 43 moves in the notch 39 of the locking member until the bail leg is far enough to the right to pass the shoulder 54 and to afford room for the pawl 52 to drop clockwise by gravity with its edge 53 in engagement with the bail leg 44. On movement of the seat now in reverse or clockwise direction, said bail leg travels with the pawl in the notch 39 to a point outwardly beyond the line of the inclined edge 42 of the locking member 40, and is carried completely out of the notch and along the inclined edge 42 whereby the hinge member 37 is completely released from the hinge member 30 and swings relatively thereto, the locking member at this time passing further through the bail 43 into the position of Fig. 4.

On the clockwise movement of the pawl 52 as it releases the bail leg 44 from the notch 39 of the locking member, the pawl moves out of contact with the upper edge of the projection 46 of the lever 50 and the lever, already unbalanced, swings in a counter-clockwise direction under the weight of the arm 47 thereof until its arm 48 engages the stop 57, said lever remaining in contact with the stop thereafter and until the parts have been moved back to the initial sofa-forming position of Fig. 1.

In reversing the movement of the parts to arrange the sofa bed from the position of Fig. 4 to that of Fig. 5, the seat 19 is first lifted, swinging the hinge member 37 about the pivot 36 and carrying the bail leg 44 into the notch 39, said bail leg simultaneously swinging the pawl 52 in a counter-clockwise direction about its pivot 55 and permitting said pawl to drop back only to a limited extent to the position of Fig. 5 on said pivot pin owing to the provision of the slot 56. It is for the purpose of preventing the pawl from dropping back to the position of Fig. 2 that the lever 50 is provided. Said lever being in contact with the stop 57 and remaining in such contact until the position of Fig. 1 is reached on the reverse movement of the parts, the projection 46, (as shown in Fig. 5) engages the left end of the pawl 52 and prevents the pawl from dropping back into the position of Fig. 2 in which unlocking of the parts is possible if the seat is moved too far rearwardly. It will be remembered that in the reversing movement, the seat 19 is lifted to arrange it in the intermediate position. Should the parts be carried slightly past that position, were it not for the lever 50 the parts would become unlocked similarly to the unlocking action disclosed in Figs 2 and 3. The seat might then drop out of the hands of the user and fall with a crash out of control back to the position of Fig. 4 in an undesirable manner.

The lever 50 by preventing return of the pawl to the position of Fig. 2 eliminates any such possibility and insures locking of the parts, since the shoulder 54 of the pawl is maintained by the lever projection 46 to the right of the bail leg 44 and cannot be moved behind said leg to effect unlocking. The parts being now in their relatively locked positions, dropping of the seat 19 swings the back 20 upwardly into the initial position of Fig. 1 while the seat 19 assumes its normal horizontal position.

It will be seen that by the provision of said slot 56, it becomes impossible for the shoulder 54 of the pawl to drop behind the bail leg 44 to unlock the parts relatively to each other from the position of Fig. 1 thereof but that said slot permits the parts to be relatively unlocked after reaching the position of Fig. 2 and when it is desired to drop the seat into a horizontal position.

It will also be seen that when the parts are moved from bed-forming to sofa-forming position, through the intermediate position, automatic unreleasable locking of the parts in the intermediate position is insured so that the seat cannot fall out of control should the operator accidentally attempt to move the seat too far.

It will therefore be seen that I have provided a comparatively simple structure well adapted to carry out the purposes of the invention and to meet the requirements of practical use.

While I have shown and described certain specific embodiments of my invention, I do not wish to be understood as limiting myself thereto, but intend to claim the invention as broadly as

may be permitted by the state of the prior art and the scope of the appended claims.

I claim:

1. In a sofa bed having a back and seat movable into a bed-forming position and into a normal sofa-forming position, means for hingedly connecting the back and seat together for movement as a unit out of the sofa-forming position and into an intermediate position on the manipulation of the seat and also for movement relatively to each other from the intermediate position to a bed-forming position, means carried by said connecting means for locking the connecting means during movement of the seat and back from the sofa-forming position, means including a pawl slidable to a release position for releasing said locking means to permit movement of the seat from said intermediate position to the bed-forming position, and means automatically operative to lock the connecting means and thereby to lock the back and seat together unreleasably on movement of the seat from the bed-forming position to a position corresponding to said intermediate position when the seat reaches said corresponding position, said last mentioned means comprising a movable stop member carried by the locking means and movable on said last mentioned movement of the seat into the path of the pawl and preventing the pawl from sliding to the release position thereof until the seat and back are first swung as a unit out of said corresponding position and the stop member is thereby moved out of the path of the pawl.

2. In a sofa bed having a back and seat movable into a bed-forming position and into a normal sofa-forming position, releasable locking means hingedly connecting the back and seat together for movement as a unit and without relative movement out of the sofa-forming position and into an intermediate position on the manipulation of the seat, said means being operative to prevent movement of the back by force exerted upon the back, releasing means comprising a slotted pawl pivotally and slidably mounted on the locking means for releasing the locking means to permit the seat to be moved from said intermediate position relatively to the back into the bed-forming position, and means including a member carried by the locking means and automatically interposed in the path of the pawl for rendering said releasing means inoperative when the seat is moved from the bed-forming position thereof to a position corresponding to the intermediate position thereof and thereby to lock said locking means when the seat reaches said corresponding position.

3. In a sofa bed having a back and a seat movable as a unit out of the sofa-forming position and also movable relatively to each other, a hinge pivotally connecting said back and seat, said hinge comprising a first hinge member secured to the back, a second hinge member secured to the seat and pivoted to the first member, a locking member having a notch therein pivoted to one of the hinge members and extending toward the other, a bail secured to the other hinge member and having a leg arranged to enter and leave the notch of the locking member on the relative movement of said hinge members, an auxiliary release pawl having a longitudinal slot therein, a pivot passing through the slot and into the locking member adjacent its notch, said slot permitting longitudinal movement of the pawl into and out of its releasing position, and a stop member carried by the locking member and automatically movable into a position in the path of the pawl to limit the movement of the pawl toward its releasing position when the seat is moved relatively to the back out of the bed-forming position thereof and into a position intermediate the bed-forming and sofa-forming positions thereby to lock the seat to the back in said intermediate position.

4. In a sofa bed having a back and a seat, a hinge joining said seat and back, means cooperating with the hinge to support the seat and back for pivotal movement as a unit from a sofa-forming position to an intermediate position, means carried by the hinge for locking the hinge against relative movement of the parts thereof during said pivotal movement, releasing means to unlock the hinge for relative movement of the parts thereof and of the seat relatively to the back from said intermediate position to a bed-forming position, said releasing means comprising a pawl pivotally and slidably mounted on the locking means for movement into a releasing position and into an inoperative position, and means carried by the locking means for limiting the sliding movement of the pawl toward its releasing position when the seat is moved from the bed-forming position to a position corresponding to the intermediate position.

5. In a sofa bed having a back and a seat normally arranged in a sofa-forming position, means for hingedly connecting said back and seat, means for locking said connecting means to lock the back and seat together for movement as a unit from the sofa-forming position to an intermediate position, means for unlocking the seat from the back to permit movement of the back from the intermediate position to a bed-forming position after said movement of the back and seat as a unit, and means for rendering the unlocking means inoperative to unlock the seat from the back when the seat is moved back to the intermediate position from the bed-forming position thereof whereby the seat is automatically locked to the back on reaching said intermediate position at the end of its said movement from its bed-forming position.

6. In a sofa bed having a back and a seat, a hinge comprising a pair of hinge members pivoted together and connecting said back and seat, means connected to the hinge for supporting the back and seat for swinging movement as a unit from a sofa-forming position to an intermediate position, means for locking the hinge against relative movement of the members during said swinging movement, said locking means for the hinge including a relatively fixed element on one of the members, and a relatively movable element on the other member cooperating with the fixed element to unlock the locking means on slight movement of the seat relatively to the back in a given direction after the end of said swinging movement, said seat being then movable relatively to the back to a bed-forming position, said movable element moving when the back is in the sofa-forming position to a position in which it is inoperative to unlock the locking means on attempted movement of the back by force exerted directly thereupon out of the sofa-forming position thereof, said locking means being automatically operative to lock the seat to the back at the end of the movement of the seat out of the bed-forming position and into said intermediate position and means arranged to engage the movable element to render the movable element in-

operative to unlock the locking means at the end of said last-mentioned movement.

7. In a hinge of the character described provided with a pair of hinge members, a notched locking member and a movable release pawl carried by the locking member, a stop member carried by the locking member and adapted to be arranged in the path of the pawl for preventing movement of the pawl into its release position on movement of one of the hinge members relatively to the other into a given position, said stop member being inoperative on the movement of the hinge members in relatively fixed relation as a unit into said position.

8. In a hinge of the character described having hinge members movable into a final position and into an intermediate position, a pivoted locking member on one of the hinge members, a releasing pawl for the locking member movable into a position to release the locking member, and means including a stop on the locking member movable into the path of the pawl when the hinge members are moved relatively from the final position thereof to said intermediate position and thereby preventing releasing movement of the pawl.

9. In a hinge of the character described, a pair of hinge members pivoted together, a locking member carried by one of the hinge members and adapted to lock against the other, a slotted releasing pawl slidably mounted on the locking member and slidable to a release position adapted to permit release of the locking member, and a stop lever automatically interposable into the path of the pawl on predetermined relative movement of the hinge members to prevent sliding of the pawl into the release position thereof.

10. In a sofa bed hinge, a pair of hinge members pivoted together, means including a locking member for locking said hinge members together for movement as a unit from an initial position to a different predetermined position thereof and from said predetermined position back to said initial position, a releasing pawl having a slot therein pivoted to and movable on the locking member to unlock the hinge members on the movement of one of said hinge members relatively to the other after the hinge members have been moved from the initial position to said predetermined position, and means for rendering the releasing pawl inoperative temporarily to unlock the hinge members after said one hinge member has been moved back to said predetermined position relatively to the other hinge member and until the locked hinge members are first moved to said initial position, and then to said predetermined position, said last mentioned means comprising a stop lever pivoted to the locking member and interposed into the path of the pawl after said one hinge member has been moved relatively to the other hinge member back to said predetermined position.

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