Jan. 13, 1953 E. G. KRAKAUER 2,624,889

COUCH HINGE

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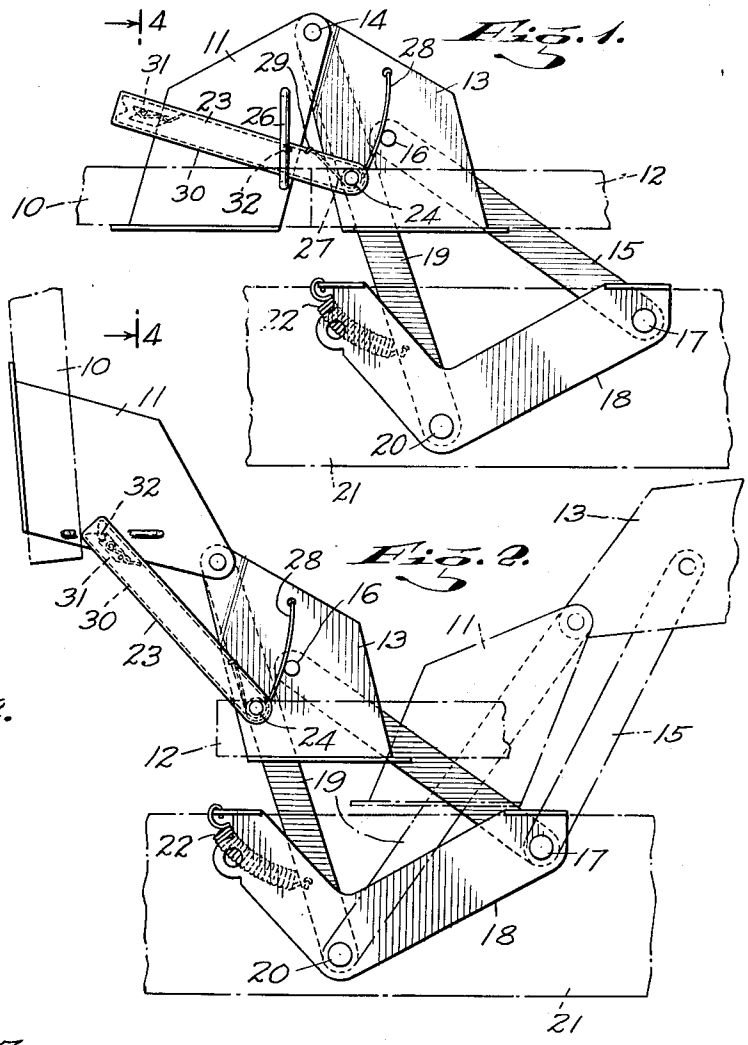


Fig. 1.

Fig. 2.

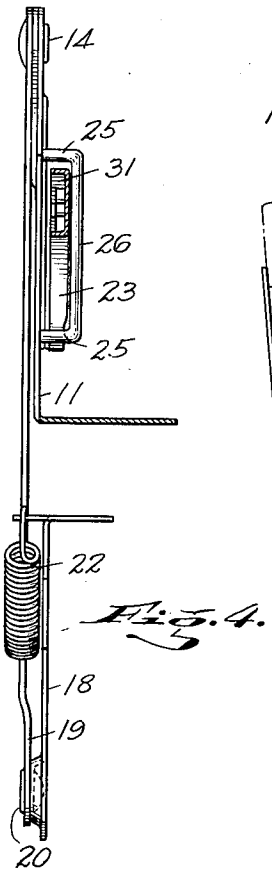


Fig. 4.

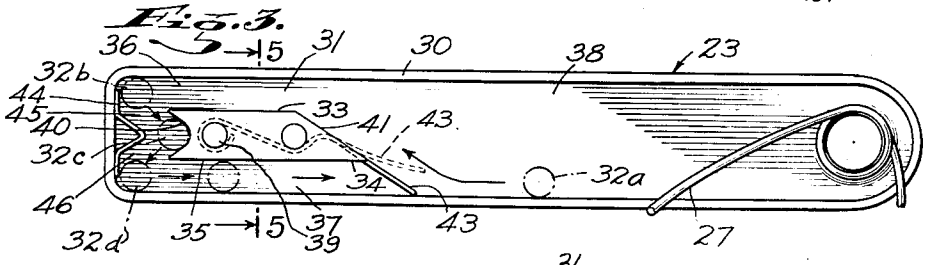


Fig. 3.

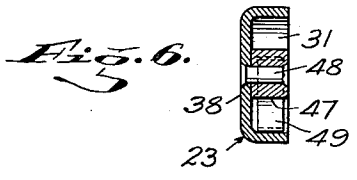


Fig. 6.

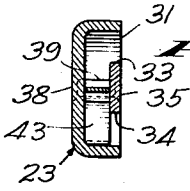


Fig. 5.

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COUCH HINGE

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3 Claims. (Cl. 5—57)

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This invention relates to sofa bed or couch hinges of the general type shown for example in Patent No. 2,201,903, dated May 21, 1940, and relates particularly to the releasing and locking structures thereof which permit the back and seat of a couch to move as a unit and also relatively to each other when desired in changing from the seat-forming to the bed-forming positions of the parts, and vice versa.

Such structures have heretofore been made primarily of pawls of various shapes carried by a main plate-like locking member and acting under the influence of gravity to effect the releasing or locking operations. Should the parts become rusted as time goes by, or should foreign matter enter or accumulate near the pivots of the pawls, the force of gravity then becomes insufficient to produce the required movement and the hinge ceases to function properly.

The present invention therefore contemplates the elimination of auxiliary locking and releasing members such as pawls acting by gravity, in such hinges, and the limitation of the locking and releasing parts to a single grooved member moving relatively to and pivoted to one of the hinge members.

The invention further contemplates the provision of a single locking member pivoted to one of the hinge members and a control pin fixed to the other hinge member and movable in a generally W-shaped groove in the locking member and adapted to be releasably held at a selected position in the groove thereby to lock the hinge members and the couch seat and back to which they are respectively attached, in an intermediate position thereof between the seat-forming and the bed-forming positions or in the seat-forming position.

The invention further contemplates the provision of a yieldable guard for the exit end of the groove in the locking member, whereby the control pin of the hinge may leave the groove when the guard yields to the pressure of the pin, but cannot reenter the groove at said exit end, and the pin is thereby compelled to move in the groove in a predetermined manner on the manipulation of the seat and back to which the hinge members are attached.

The invention further contemplates the provision of a simple releasable and lockable couch hinge, made of a minimum number of parts, positive in its action in any position in which the hinge may be mounted in an article of furniture, economical to manufacture and dependable in its operation.

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

Fig. 1 is a side elevational view of my improved hinge as it appears applied to the seat and back of a couch, said seat and back being shown in

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dash-dot lines in the bed-forming positions thereof.

Fig. 2 is a similar view of the hinge, seat and back in the intermediate positions thereof into which they are moved preparatory to releasing the seat for movement into the bed-forming position, or preparatory to moving the parts into their normal or seat-forming positions, the seat-forming position of the hinge being shown in dash-dot lines.

Fig. 3 is an elevational view of the locking member in a reversed or upside down position as compared with the positions thereof in Figs. 1 and 2.

Fig. 4 is a vertical sectional view of the hinge on an enlarged scale and taken on the line 4—4 of Fig. 1.

Fig. 5 is a vertical sectional view of the locking member taken on the line 5—5 of Fig. 3.

Fig. 6 is a similar view of the member showing a modified form of the groove-forming parts thereof.

In the practical embodiment of the invention shown by way of example, and as is illustrated in Patent 2,330,059, the seat 10 is secured to one member 11 of the hinge while the back 12 is secured to the other hinge member 13, the hinge members 11 and 13 being hinged together by the pivot 14. The control and back support bar 15 is pivoted at its upper end 16 to the hinge member 13 and at its lower end 17 is pivoted to and adjacent an end of the support member 18. The other control bar 19 is pivoted at its upper end to the hinge pivot 14 and at its lower end is pivoted to the support 18 by the pivot 20, the support being suitably secured to the couch frame 21. In Figs. 1 and 2 hereof, the seat, back and frame are indicated by dash-dot lines.

It will be understood that a set of parts, each consisting of a support 18, a suitable spring as 22 secured to the bar 19 and to the support 18, hinge members 11 and 13, and control bars 15 and 19, is arranged at each end of the couch. It will further be understood that in moving the seat and back from the normal seat-forming dash-dot line positions of Fig. 2 to the bed-forming positions of Fig. 1, the seat and back are first locked together to move as a unit to the intermediate position indicated by the full line positions of the hinge members in Fig. 2 thereby to carry the back only into a horizontal or bed-forming position thereof, in which position of the hinge, the seat is raised, whereafter the seat is unlocked from the back and lowered into the position thereof shown in Fig. 1. It will also be understood that in changing from the bed-forming position of Fig. 1 to the dash-dot line position of Fig. 2, the seat is first raised to the intermediate position of Fig. 2 and locked, and the thus locked-together seat and back finally swung into the seat-forming positions.

With the above-described usual operation of hinges of the present type in mind, the description of the novel locking member 23 may now proceed. Said member is pivoted as at 24 to the hinge member 13 and passes and swings between the legs 25 of the U-shaped bail 26 which is secured to the hinge member 11. Urging the member 23 to rotate about its pivot in a counterclockwise direction as viewed in Figs. 1 and 2, is the spring 27 having a part thereof intermediate the ends thereof coiled about the pivot 24 and having one end 28 thereof anchored to the hinge member 13 and the other end part 29 anchored to the locking member. Preferably, said locking member is of generally U-shaped cross section, having a front wall 38 provided with a rearwardly extending peripheral flange 30 serving as the outer wall of the longitudinally extending guide or cam groove 31 at one end part of the locking member and receiving therein the control pin or roller 32. The control member 32 projects from the hinge member 11 into the locking member inside of the flange 30 and behind the front wall 38 and is designed to enter and leave and to be guided by the walls of the groove 31, thereby to control the relative movements of the hinge members without the necessity for the use of pawls or the like devices.

The groove 31 is of peculiar shape, preferably generally W-shaped. It is closed at its front by the front wall 38 and the inner and outer walls thereof may be formed in a variety of different ways. In the form shown in Figs. 3 and 5, the opposite longitudinally extending walls 33 and 34 of a separate member 35 of lesser width than and arranged inside of the member 23 in inward spaced relation to the flange, cooperate with the corresponding parts of the flange 30 to form the preferably, though not necessarily, parallel longitudinally extending parts 36 and 37 of the groove, the member 35 being secured to the locking member 23 in lateral spaced relation to the front wall 38, as by means of suitable rivets 39 or in any other suitable manner. One end 40 of the member 35 is concave or of reentrant form to receive the pin 32 for the purpose soon to be described, while the other end 41 is inclined to form a guide surface leading to the entrance end of the longitudinally extending part 36 of the groove. The blade spring 43 is biased toward that part of the flange 30 forming the outer wall of the opposite longitudinally extending part 37 of the groove and is suitably secured in place as by securing the end thereof to a rivet 39 (Figs. 3 and 5), the spring thereby normally closing the exit end of the groove part 37 but being mounted to yield away from said part under the opening pressure of the pin 32, thereby to permit the pin to pass the spring, as shown by the dotted lines of Fig. 3.

A reentrant end part is provided in the groove to join the outer ends of the groove parts 36 and 37 and to attain the desired locking action in the intermedate and seat-forming positions of the parts. In the form shown in Fig. 3, the reentrant part is formed by the separate strip 44, having converging sides meeting at an apex and substantially parallel to the corresponding respective sides of the concavely recessed end edge 40 of the member 35, and spaced outwardly therefrom sufficiently to permit the pin 32 to move in the directions of the arrows of Fig. 3 in the inclined groove parts in order to rest in the recess at the end of said groove part 45, and at the beginning of the groove part 46.

The apex of the strip 44 projects toward and to a point close enough to the concave end edge 40 to prevent the pin 32 from moving vertically past the extremities of said end edge, whereby said pin is forced to move to the bottom of the recess in an inclined path, and to leave the recess in a differently inclined path as shown by the arrows of Fig. 3, instead of moving vertically, as viewed in Fig. 3, through the groove parts 45 and 46 from the end of the groove part 36 to the groove part 37.

In the form shown in Fig. 6, the groove-forming member 47 is in contact with the rear face of the wall 38 of the locking member, and is there secured in any suitable manner as by the rivet 48 or by welding or the like, and has a reentrant and an inclined end edge similar to the respective end edges of the member 35. The blade spring 49, however, may be considerably shorter than the spring 43, and is secured directly to the inclined edge of the member 47 as by welding or the like to form a yieldable door-like member normally closing the exit from the groove 37.

In the bed-forming position of the hinge, the pin 32, as shown in Fig. 1, is at the top part of the flange 30 and is considerably to the right of the spring 43 and of the groove 31. In Fig. 3, this position of the pin 32 is shown by dash-dot lines at 32*a*, it being remembered that the locking member is shown reversed or upside down in Fig. 3. To change from the bed-forming position, the seat 10 is first raised to swing the hinge member 11 in a clockwise direction as viewed in Fig. 1 into the intermediate position of Fig. 2. The pin 32 during the raising of the seat, moves along the flange 30 until it strikes the inclined part of the blade spring 43. Said spring cannot yield in the direction in which the pin is moving at this time, but instead is pressed by the pin toward the left in the direction to close the end of the groove part 37. The pin is consequently deflected by the spring and forced to move along the inclined edge 41 of the member 35 into the groove part 36 until it strikes the left end of said part and reaches that position thereof indicated by the dash-dot lines shown at 32*b*, where the pin is halted temporarily and further lifting movement of the seat 10 is prevented.

When the lifting pressure upon the pin 32 ceases, as it will because the operator is apprised of the fact that the seat can be lifted no further when he notes the impact of the pin on the flange 30, the spring 27 becomes effective to swing the locking member 23 slightly in a counter clockwise direction as viewed in Fig. 2 to carry the pin 32 to the bottom of the recess 45 and into the dash-dot line locking position thereof indicated at 32*c*, where the pin is halted and rests until it is deliberately removed from the recess. In that position, the hinge members 11 and 13 and the corresponding parts 10 and 12 are locked together for movement as a unit. When the seat is now lowered, the locked parts 10, 11, 12 and 13 are carried by the arms 15 and 19 to the dash-dot line seat-forming positions of Fig. 2, in which the parts remain locked.

In changing from the seat-forming position to the bed-forming position of Fig. 1, the locked parts are first moved to the full line intermediate position of Fig. 2, after which the seat is released and dropped into its horizontal position. To perform the releasing operation, the seat 10 is first lifted from the locked position thereof, thereby carrying the pin 32 through the inclined slot part 46 to the position thereof indicated at 32*d*, where

the pin is temporarily halted until the lifting action on the seat is discontinued. When the seat is dropped, the pin **32** moves along the groove part **37** to the exit end thereof where it strikes the free end of the blade spring **43** and bends said end out of the path of the pin to return approximately to the position thereof indicated at **32***a*, the spring returning to the groove-closing position after the pin has passed.

It will be seen that the spring **43** acts in the manner of a door, opening one way only to compel the pin to travel only in a predetermined path. It will also be seen that by providing a cam groove through which the pin must travel in its operating cycle, dependable and certain releasing and locking are attained with a minimum number of parts and wear, and that the intended purposes of the invention are fully attained.

While certain specific embodiments of the invention have herein been shown and described, various obvious changes may be made therein without departing from the spirit of the invention, as defined in the appended claims.

I claim:

1. In a hinge of the character described, a pair of hinge members, a pivot connecting said members for relative rotation into a locked position and into a released position, means supporting the members for rotary and longitudinal movement of the members as a unit while in the locked position thereof, a locking member locking the hinge members against relative movement, said locking member having a flat front wall and a continuous flange depending from the entire periphery of the front wall, the rear of the locking member being open between the sides of the flange, a pivot passing through the front wall and through one of the hinge members, a spring on the pivot engaging and urging the locking member positively in a locking direction, a groove-forming member secured to the front wall of the locking member in inward spaced relation to the flange and having opposite side edges respectively parallel to the adjacent sides of the flange and to each other to provide a pair of spaced parallel grooves therebetween, the groove-forming member having a concave indent in one end thereof, a groove-determining member having a triangular projection secured to the inner surface of the flange adjacent the indent and cooperating with the indent to provide inclined end groove portions between the pair of parallel grooves, a pin fixed to the other of the hinge members and passing through the open rear of the locking member and arranged at all times within the flange, the pin riding along the inner surface of the flange beyond the parallel grooves on the relative movement of the hinge members and in the released position of the hinge members, the pin being arranged at the inclined end portions of the groove during the movement of the hinge members as a unit while in the locked position thereof, and a yieldable member carried by the groove-forming member in position normally to close the inner end of one of the parallel grooves.

2. In a hinge of the character described, a pair of hinge members pivoted together and rotatable as a unit about a distant center and also rotatable relatively to each other, a spring-pressed locking member of U-shaped cross section and U-shaped longitudinal section and having a front wall and a continuous and uninterrupted flange depending from the entire periphery of the front wall, a pivot for the locking member passing through one end part of the front wall and into one of the hinge members, a spring coiled about the pivot and having an arm engaging the flange, said locking member having a groove therein provided with an open entrance end, with a reentrant portion at the other end and with an exit at the end thereof remote from the reentrant portion, means normally closing the exit end and yieldable under pressure thereon in a given direction to open said exit end, and a pin fixed to and projecting from the other hinge member and at all times within the locking member and held within the locking member by said flange, the pin entering the groove through said entrance end, moving positively in the groove and leaving the groove through said exit on relative movement of the hinge members, said pin being operative releasably to lock the hinge members when in the reentrant part of the groove thereby to permit the hinge members to be moved bodily and as a unit from one position to another position in spaced relation to said one position and in approximately 90° turned relation thereto.

3. In a hinge of the character described, a pair of hinge members pivoted together for relative rotation into a locked position and into a released position, a locking member pivoted to one of the hinge members and having a guide groove therein, said locking member having a flat front wall and a flange depending from the entire periphery of the front wall, a pin projecting from the other hinge member, said pin entering the groove and being moved positively in the groove by said other hinge member when said hinge members are rotated relatively to and away from each other toward and from the locked position of the hinge members, said pin leaving the groove when the hinge members are rotated toward each other into the released position of the hinge members, said pin being at all times within the flange of the locking member, a member yieldable under the pressure of the pin and having a free end normally closing one end of the groove to permit the pin to leave the groove and to pass the yieldable member on the rotation of the hinge members toward each other, said yieldable member being inclined to the walls of the groove to direct the pin toward the other end of the groove on the rotation of the hinge members away from each other, said other end of the groove having a reentrant locking portion adapted to receive and releasably lock the pin therein, a pivot pin hinging the locking member to said one of the hinge members, and a spring coiled about the pivot pin and engaging the flange and urging the locking member to rotate positively about the pivot pin in a given direction relatively to the first-mentioned pin whereby the locking member is operative to lock the hinge members together when the first-mentioned pin is in the reentrant portion of the groove.

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