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2,978,013

ADJUSTABLE BACKREST FOR CHAIR STRUCTURE

Filed Aug. 21, 1958

3 Sheets-Sheet 1

Fig. 1.

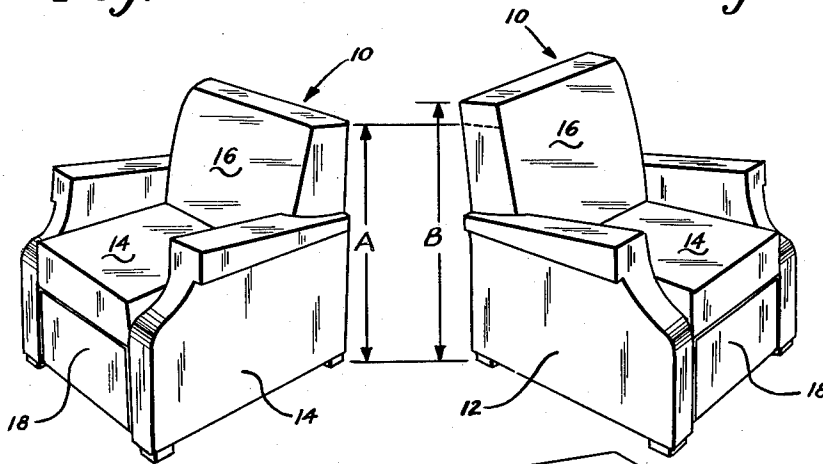


Fig. 2.

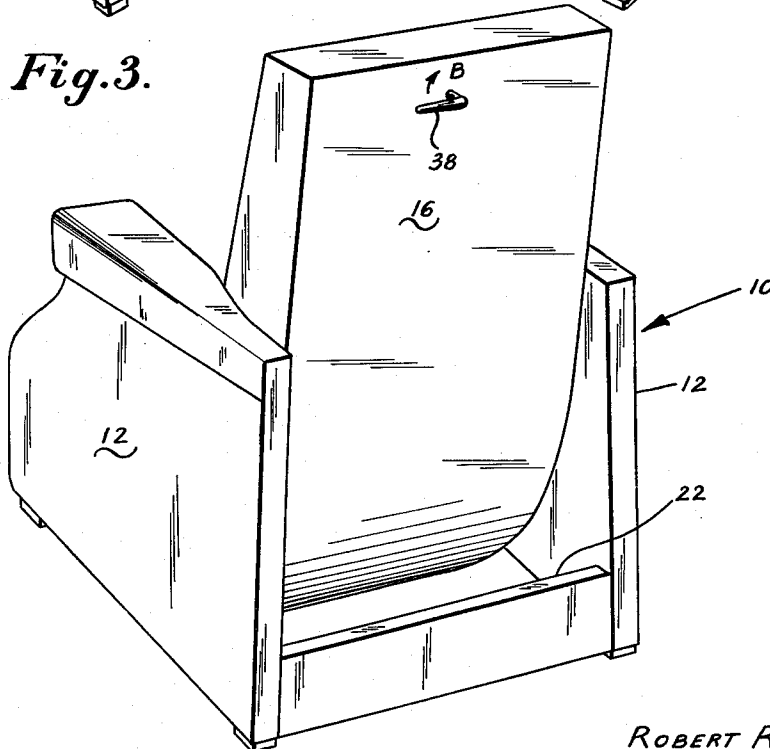


Fig. 3.

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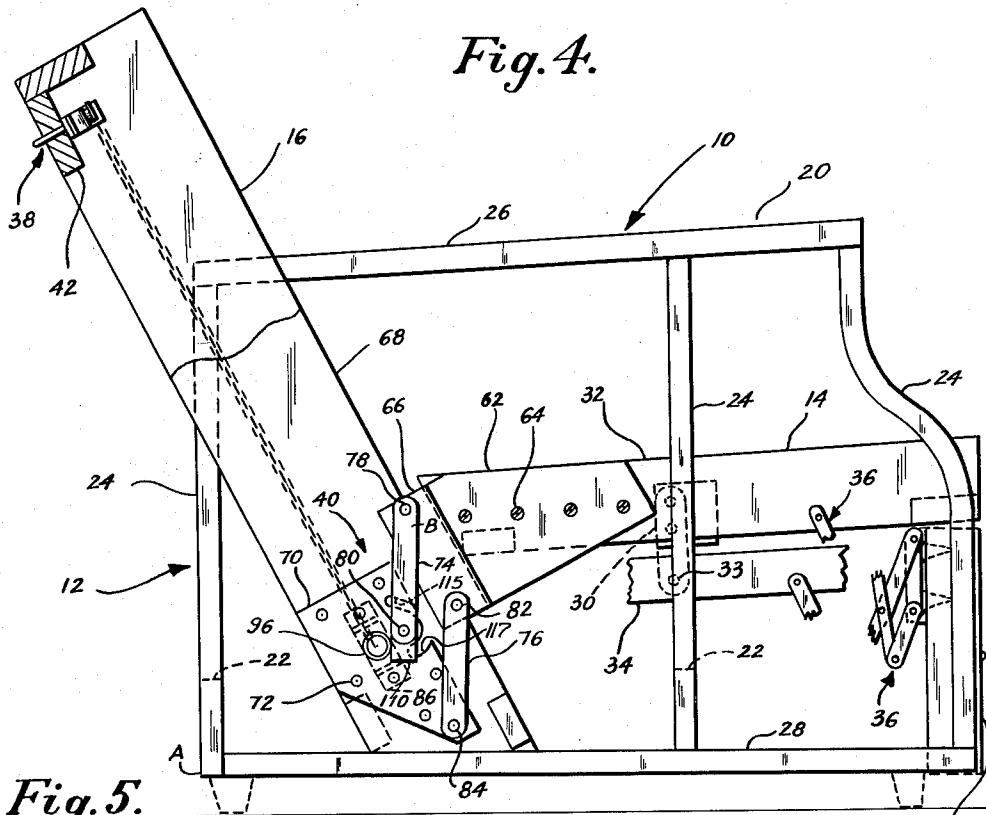


Fig. 5.

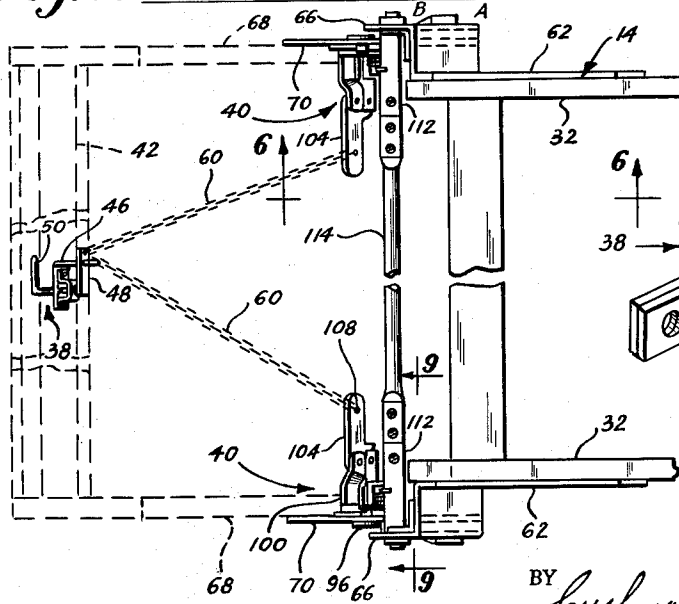
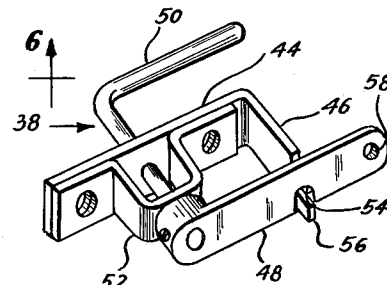


Fig. 10.



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Fig. 6.

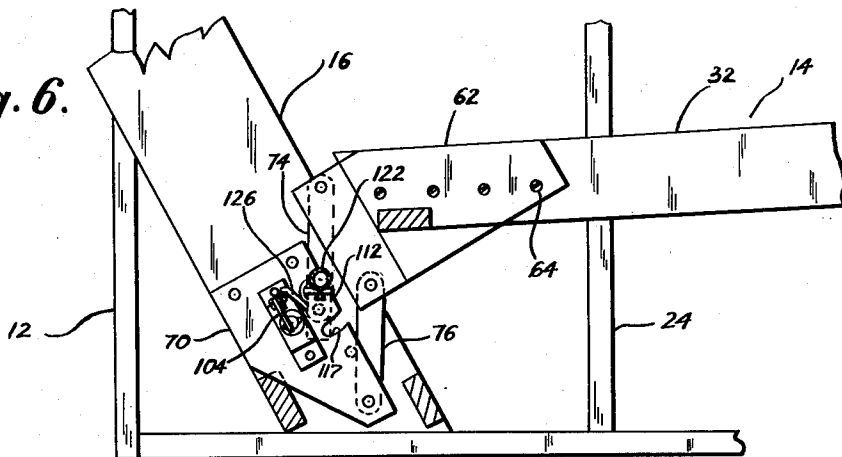


Fig. 8.

Fig. 7.

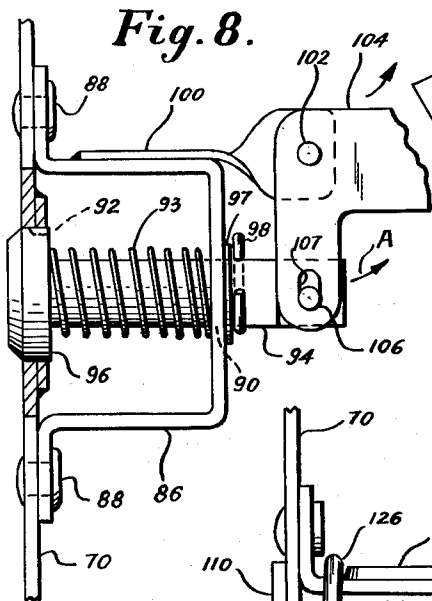
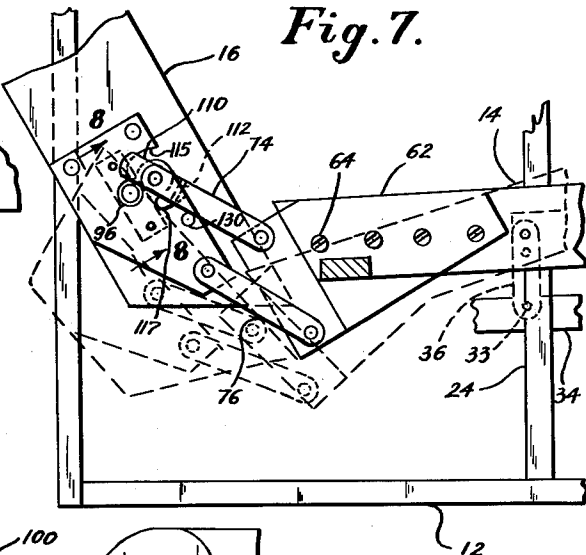
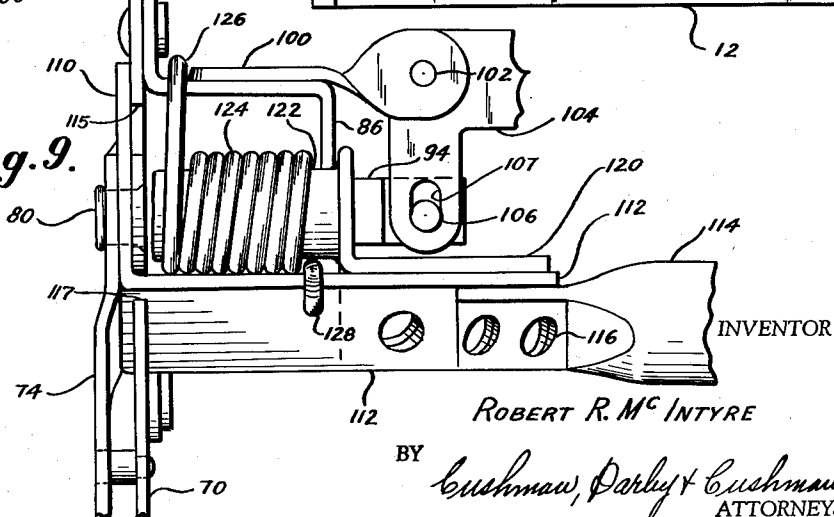


Fig. 9.



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ADJUSTABLE BACKREST FOR CHAIR STRUCTURE

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10 Claims. (Cl. 155—152)

The present invention relates generally to chairs and, more particularly, to new and useful improvements in reclining chairs.

In recent years many types of reclining chairs have been developed whereby a foldable leg rest extends upwardly from beneath the chair as the chair is adjusted from a sitting position to a reclining position. With the advent of popularity of the reclining chair with the leg rest pivotally connected thereto, the chair manufacturers have found it most convenient to make a chair structure whereby the backrest and the seat of the chair are substantially a unitary structure so that their angle with respect to one another does not change when the chair is moved back and forth between a sitting and reclining position. One limitation of the present type reclining chair is that when the backrest and seat are moved to the sitting position and the leg rest disappears beneath the chair, the backrest extends higher than the conventional type of lounge chair and, thus, gives the chair a rather bulky, unsightly appearance in the living room. This condition also exists in reclining chairs of the type where the backrest changes its angle with respect to the seat when moved from one position to another, and to reclining chairs not provided with a disappearing type of foot rest.

An object of the present invention is to provide a reclining chair with a backrest which is adjustable between an extended and a retracted position. By having an adjustable backrest which may be retracted when the chair is in the sitting position, the chair assumes the configuration of the conventional lounge chair and has a much neater appearance. The utility of the chair is enhanced by providing a backrest that can be extended upwardly so that when the chair is in its reclining position, the occupant of the chair will have a head rest.

Another object of the present invention is to provide a chair structure whereby the backrest of the chair may be moved between a high and a low position without the angle of the backrest to the seat of the chair being substantially changed.

Another object of the present invention is to provide a mechanism for selectively adjusting the backrest of a chair with the seat which is easy to operate and which insures a positive lock of the backrest with respect to the seat in an extended and a retracted position.

Still another object of the present invention is to provide an adjusting mechanism for a backrest of a chair which is sturdy and which is simple and reliable in operation and which can be manufactured at relatively low cost.

A further object of the present invention is to provide a chair with a backrest which is adjustable to the seat of the chair, the mechanism for adjusting the backrest with the seat of the chair permitting easy upholstering of the chair so that no unsightly parts of the mechanism are visible.

Still another object of the present invention is to provide a reclining chair having a backrest and seat selec-

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tively movable between a sitting and reclining position and further having the backrest adjustable with respect to the seat.

Ancillary to the above object, it is a further object of the present invention to provide a mechanism for adjusting the backrest with respect to the seat of a reclining chair, the mechanism being totally supported by backrest and seat unit and not dependent upon the main supporting frame of the chair.

These and other objects of the present invention will appear more fully in the following specification, claims and drawings, in which

Figure 1 is a perspective view of the chair or the present invention showing the seat and backrest in a sitting position and the backrest adjusted to the retracted position;

Figure 2 is a perspective view similar to Figure 1 and showing the same chair in the sitting position, but with the backrest extended upwardly with respect to the chair seat;

Figure 3 is a perspective view of the chair of the present invention taken from the rear of the chair and showing the operating handle which controls the latch mechanism for adjusting the height of the backrest;

Figure 4 is a side view of the chair partly in section and with the upholstery removed, the view showing the backrest in the retracted or down position;

Figure 5 is a top elevational view of the adjusting mechanism of the chair of Figure 4, the supporting frame being omitted and the frame of the backrest being shown in dotted lines;

Figure 6 is a fragmentary view of the adjusting mechanism taken on the line 6—6 of Figure 5 and showing the backrest of the chair in the down position;

Figure 7 is a view similar to Figure 6 but showing the adjusting mechanism when the backrest of the chair is in the extended or up position with the seat and backrest still in the sitting position;

Figure 8 is an enlarged fragmentary view of the mechanism taken substantially on the line 8—8 of Figure 7;

Figure 9 is an enlarged fragmentary view of the mechanism taken substantially on the line 9—9 of Figure 5 but showing the mechanism when the backrest of the chair is in the extended position with respect to the seat; and

Figure 10 is an enlarged perspective view of the operating handle supported on the backrest of the chair.

Referring now to the drawings wherein like character and reference numerals represent like or similar parts and, in particular, to Figures 1—3, inclusive, there is shown a reclining chair generally indicated by the numeral 10. The reclining chair 10 includes a stationary supporting frame generally indicated at 12, a seat 14 and a backrest 16. Folded within and forming the front of the chair 10 is a leg rest 18, the leg rest being adapted to be extended when the seat 14 and backrest 16 are moved or tilted to a reclining position.

In Figure 1, the reclining chair of the present invention is shown with the backrest in a retracted or low position. When the backrest is in this position, the external configuration of the chair appears similar to the configuration of a conventional lounge chair. However, the conventional lounge chair cannot be used as a reclining chair as there is no means of supporting the occupant's head when the chair is in the reclined position.

In Figure 2, the reclining chair of the present invention is shown with the backrest in the extended or elevated position. In this position, the backrest extends upwardly above the seat a sufficient distance to provide a head rest for the occupant of the chair when the chair is either in the sitting position or in the reclining position.

As shown in Figure 1, A represents the distance from

the top of the backrest 16 and the floor, whereas in Figure 2, B represents the distance between the top of the backrest and the floor. As is clearly apparent from observation of Figures 1 and 2 which show the chair of the present invention in the sitting position, it is now obvious that the chair can be converted from the conventional lounge chair into a high-back sitting chair or a reclining chair. The mechanism, which will be described in detail later in the specification, for adjusting the backrest 16 with respect to the seat 14 is capable of providing a differential in height of the backrest of approximately 6 to 8 inches.

Referring now to Figure 4, the supporting frame 12 of chair 10 includes the usual framework comprising side assemblies 20 connected together by cross members 22. Suitable vertical members 24 are connected to upper and lower brace members 26 and 28, respectively. The entire supporting frame 12 is suitably upholstered and provides the arm structure for the chair 10 and the housing for the seat 14 and backrest 16.

Seat 14 and backrest 16 are substantially a unitary structure in that once the backrest 16 is adjusted with respect to the seat 14 and the chair is moved to a reclining position, the seat and the backrest move as a unit. In order that the seat 14 and the backrest 16 can tiltably move with respect to the supporting frame 12, a pivotal connection between the supporting frame and the seat and backrest unit is provided. For purposes of illustration only, the pivotal connection between the seat and backrest unit and the seat frame for one side of the chair 10 is shown in dotted lines in Figure 4 and includes a link 30 connected to one of the side members 32 of the seat 14, the link 30 being pivotally connected, as indicated at 33, to a horizontal side brace member 34 of the supporting frame 12. Of course, any suitable means known in the art for pivoting or tiltably moving the seat and the backrest 14 and 16, respectively, to the supporting frame 12 may be used and the invention is not intended to be limited to the means specifically disclosed.

Figure 4 also discloses the foot rest 18 in the stored position. As is well known in the art, the foot rest 18 may be operated by a suitable cross linkage mechanism generally indicated at 36, the linkage being broken away for purpose of clarity. Since the linkage 36 does not form part of the present invention, it has not been shown in detail and, of course, any suitable linkage connected between the foot rest 18 and seat 14 and supporting frame 12 which will cause the foot rest 18 to extend outwardly and upwardly when the chair is tilted about the pivot 33 from a sitting to a reclining position would come within the scope of the present invention so far as the combination is shown.

The mechanism for adjustably moving backrest 16 between an extended and retracted position includes an operating handle mechanism generally indicated at 38, mounted in the upper portion of the backrest and a latch mechanism generally indicated at 40 operatively connected to the handle mechanism 38. The handle mechanism 38 which is mounted on a cross brace 42 in the frame of the backrest 16 includes a mounting bracket 44 having an inwardly extending extension 46 and an operating arm 48 connected to a handle 50 as shown in Figures 5 and 10. The bracket 44 is provided with a stirrup-shaped element 52 which provides the bearing surface for the shaft of the handle 50 and the arm 48. Arm 48 intermediate its ends is provided with a cut-out 54 which is adapted to be received in an extension 56 of the inwardly extending leg 46. The outer end of arm 48 is provided with a hole 58 for receiving and attaching the ends of connecting means 60 such as flexible chains, wires, rods, metal bands or the like which are used to operate the latch mechanism 40 so that the backrest 16 may be moved from one position to another position.

The latch mechanism 40 is duplicated on either side of the backrest 16 and seat 14 and, therefore, the description

of one side only of the latch mechanism will be sufficient for the present description of the same. Latch mechanism 40 includes a plate element 62 rigidly secured to the side member 32 of the seat 14 by means of bolts or screws 64. The plate element 62 is provided with an end portion 66 which extends rearwardly of the seat 14 and which is offset, if necessary. As evident from Figure 5, the distance between the offset end portions 66 of the oppositely disposed plates 62 is greater than the width of the frame of backrest 16.

Attached to a side brace 68 of backrest 16 at its lower end is another plate element 70. The element 70 is rigidly attached to the member 68 by means of screws or bolts 72 or the like. There are two elements 70 oppositely disposed to each other and attached to the side braces 68.

A pair of links 74, 76 is provided on each side of the seat and backrest and interconnects the seat and backrest to one another. In more detail, the links 74, 76 of one pair of links are pivotally connected to adjacent plates 62 and 70 in substantially parallel relationship to one another provided on each side of the chair. Referring specifically to Figures 4, 6, and 7, link 74 is pivotally connected at one end to plate element 62 as indicated at 78, and at its other end to the plate element 70, as indicated at 80. Link 76 on the other hand is pivotally connected at one end to the plate 62 as indicated at 82, whereas it is pivotally connected at its other end to the plate 70 as indicated at 84. The pivot points 78 and 82 are in substantial longitudinal alignment with the longitudinal axis of the backrest 16, whereas the pivot points 80 and 84 are also in substantial longitudinal alignment with the longitudinal axis of the backrest 16. Consequently that portion of plate 70 between pivot points 80 and 84 acts as a link which is parallel to a link defined by that portion of plate 62 between the previously mentioned pivot points 78 and 82.

By having a parallel linkage between the backrest 16 and the seat 14, the backrest 16 remains at a substantially fixed angle to the seat 14 when it is moved between the retracted and extended positions as shown in Figures 6 and 7, respectively. It is, of course, within the scope of the present invention that the linkage connection between the seat 14 and backrest 16 may be varied slightly so that the backrest 16 can assume a slightly different angle with respect to the seat 14 if such is desired. However, it has been found to be most desirable to maintain the angle between the seat 14 and the backrest 16 substantially constant even though the chair is moved from a sitting position to a reclining position.

Each of the latch mechanisms 40 is capable of locking the backrest in either the extended or the retracted position so that there will be no play between the backrest and the seat in these positions. To accomplish this, plate element 70 as shown in Figures 8 and 9 is provided with a stirrup-shaped bracket 86 rigidly secured thereto by rivets 88. This stirrup-shaped bracket 86 is provided with an aperture 90 which is in axial alignment with an aperture 92 in the plate element 70. A pin element 94 having a head 96 extends through the apertures 90 and 92. A stop member including a washer 97 and a cotter key 98 limit the outward extension of the head 96 of pin element 94 through the aperture 92 in plate element 70. A coil spring 93 interposed between the head 96 and the stirrup-shaped bracket 86 normally urges pin element 94 outwardly through the plate 70 to the position indicated in Figure 8.

Welded to bracket 86 is an element 100 which provides a pivot mounting for an L-shaped bell crank 104 at the pivot point 102. Bell crank 104 pivots on an axis perpendicular to the longitudinal axis of pin element 94. One end of the bell crank 104 is loosely connected to the inner end of pin element 94 by a rivet or bolt indicated at 106 fitting in an elongated slot 107. The other end of bell crank 104 is connected to the flexible chain 60 as in-

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licated at 108 in Figure 5. Upward movement of the flexible chain 60 by rotation of the handle 50 will cause movement of the bell crank 104 in the direction of the arrow A in Figure 8 about the pivot 102. This movement will cause the pin element 94 to be moved toward the right left of Figure 8 to a position where it is substantially flush with the plate 70 or even retracted within the aperture of the plate 70.

Referring now to Figures 4 and 7, it will be noted that when the head 96 of pin element 94 is in the extended position disclosed in Figure 8, it will be in the path of movement of an outwardly extending end portion 110 of link 74. As shown in Figure 4, when the head 96 extends into the path of movement of the end portion 110 of link 74, the backrest 16 cannot be moved upwardly with respect to the seat 14. In Figure 7 the backrest 16 has been moved to the upward position by first withdrawing the head 96 of pin element 94 out of the path of movement of the end portion 110 of link 74. The end portion 110 will pass over the head 96 and when the head 96 is again free to extend outwardly of the plate 70, it will be on the other side of the end portion 110 and will not permit the backrest 16 to be retracted or lowered. The provision of the pin element 94 extending into the path of movement of the link in predetermined positions of the backrest 16 provides a positive stop so that there can be no slippage of the backrest 16 with respect to the seat 14, regardless of whether the chair is in a sitting or reclining position.

As earlier mentioned in the specification the latch mechanism generally indicated at 40 is provided on both sides of the chair 10, and is substantially identical in construction except, of course, the elements making up the latch mechanisms are of opposite configuration. To further insure stability in the arrangement just described for raising and lowering the backrest 16 with respect to the seat 14, the latch mechanism 40 on one side of the chair 10 is interconnected with the latch mechanism 40 on the other side of the chair. To accomplish this stability, the link 74 of each of the latch mechanisms 40 is provided with an extension 112, the extension 112 extending transversely inwardly of the backrest 16. The extensions 112 of each of the links 74 are interconnected by means of a stabilizer bar 114 shown in Figures 5 and 9. The stabilizer bar 114 is connected to the inner ends of each of the extensions 112 by means of bolt and nut assemblies 116. Since it is desirable to have the extension 112 closely positioned to the pivot 80 of the link 74, plate element 70 is provided with arcuate open ended slots 115 and 117 (Figs. 4, 6 and 7) to receive the extension so that the link may have the desired pivotal movement between upper and lower position of the backrest.

To assist the person changing the backrest from the lower or retracted position to the upper position shown in Figure 7, means are provided for counter-balancing the weight of the backrest. To accomplish the counter-balancing of the weight of the backrest, an L-shaped bracket 120 is rigidly secured to the extension 112 of each of the links 74 by the bolt assemblies 116 previously described. The L-shaped brackets 120 support a post element 122 having a longitudinal axis in alignment with the axis of the pivot 80 between the link 74 and the plate 70. Post 122 supports a coil torsion spring 124, the coil torsion spring having one end 126 engaging a portion of the bracket 86 mounted on the plate 70 and the other end 128 engaging the extension 112. When the backrest is moved from the upper position disclosed in Figure 7 to the lower position disclosed in Figure 6, the torsion spring 124, best shown in Figure 9, will be wound up so that it will store energy, and normally tend to urge the seat back toward the upper or extended position. In the view shown in Figure 9, the spring 124 is in its relaxed position and the backrest 16 of the chair will be in the upper position as shown in Figure 7. Movement of the backrest 16 downwardly would cause the link

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74 to pivot in such a manner that the extension 112 of the link would act against the end 128 of the spring 124 to cause the spring to wind about the post 122 as the extension 112 moves from the position shown in Figure 7 to the position shown in Figure 6. The strength of the spring depends upon the weight of the backrest and the amount of effort desired for raising the backrest from the lower position to the upper position.

The operation of the adjusting mechanism heretofore described is substantially as follows: When the chair 10 is in the position shown in Figures 1 and 6, the backrest is in a lower or retracted position and the chair assumes the configuration of the conventional lounge chair. When it is desired to raise the backrest 16 to the position shown in Figure 2 so that the occupant of the chair will have a head rest and the chair can be used either in the sitting position or the reclined position shown in dotted lines in Figure 7, the person using the chair merely needs to move the handle 50 in the direction of the arrow B in Figure 3. Movement of the handle 50 will cause the end of the arm 48 to be moved upwardly and consequently the flexible chains 60 will pivot the bell cranks 104 in the direction A of Figure 8. This will withdraw the head 96 of pin element 94 out of the path of the end portion 110 of link 74.

Movement of the head 96 of the pin element 94 out of the path of the end portion 110 of lever 74 will permit the back of the chair to be swung upwardly to the position shown in Figure 7. The torsion spring 124 operatively connected between the plate 70 and the lever 74 is loaded when the backrest 16 is in the lower position so that consequently it will assist the person changing the elevation of the backrest by helping to overcome the weight of the backrest. When the person has moved the backrest to the upper position as shown in Figure 7, the end portion 110 of link 74 will have passed over the retracted head 96 so that the head can again be extended outwardly by spring 93 and prevent downward movement of the backrest 16. A stop member 130 provided on plate 7 prevents further upward movement of the backrest.

During the movement of the backrest 16 from the lower position to its upper position, the link 76 acts as a guide link so that the backrest maintains substantially the same angle with respect to the seat throughout its movement from one position to another position. Of course, if it is desired, the lengths of the links 74 and 76 may be varied and their pivotal arrangement with respect to each other may be varied so that the angle of the backrest 16 with respect to the seat 14 in the two positions may be slightly varied. However, as disclosed the pivot points of the links 74 and 76 form the corners of a parallelogram so that the seat and backrest of the present disclosure have the same angle with respect to each other throughout the movement of one with respect to each other.

When the backrest 16 is in the position shown in Figure 7, the chair may be used as a recliner and the seat 14 and backrest 16 may be pivoted as a unitary structure about the pivot 33. Upon pivoting of the seat and backrest as a unitary structure to a reclining position, the leg rest 18 moves outwardly and upwardly.

The lowering of the back rest from the position shown in Figure 7 to the position shown in Figure 6 merely requires movement of the handle 50 again in the same direction B as shown in Figure 3. This causes retraction of the heads 96 of pin elements 94 so that the backrest may be lowered by swinging it downwardly.

The terminology used in the specification is for the purpose of description and not limitation, the scope of the invention being defined in the claims.

I claim:

1. In combination with a chair having a supporting frame, a seat and backrest tiltably supported in said frame, a mechanism for adjustably supporting the back-

rest in selective extended and retracted positions with respect to the seat comprising: a parallel linkage swingably connecting said backrest to said seat and including a pair of links, each being pivotally connected to the seat and backrest, one of said links having a free end portion extending beyond its pivotal connection to the backrest, a pin element supported in said backrest for transverse movement with respect thereto into the path of movement of said free end portion of one of said links, said pin element being capable of engaging said free end portion of one of said links first on one side to lock said backrest with respect to said seat in one of its extended and retracted positions and then on the other side to lock said backrest with respect to said seat in the other of its positions, operating means carried by said backrest to withdraw said pin element from the path of the free end portion of said link so said backrest can be moved from one position to another position, and means resiliently urging said backrest toward extended position.

2. The combination of claim 1 wherein said parallel links are substantially equal in length whereby said backrest has an angular relationship with said seat which is maintained substantially constant throughout movement of said backrest with respect to said seat.

3. The combination of claim 1 including spring means normally urging said pin element into the path of the free end portion of one of said links.

4. The combination of claim 1 wherein said means resiliently urging said backrest toward extended position includes a torsion spring mounted on one of the pivotal axes in said backrest of one of said links, said torsion spring having one end operatively connected to the link on which axis it is mounted and its other end operatively connected to said backrest whereby weight of said backrest is effectively counterbalanced.

5. In a chair, a supporting frame, a backrest and seat tiltably mounted in said frame, a pair of plates fixedly connectable respectively to opposite sides of the backrest adjacent its lower end, a second pair of plates fixedly connectable respectively to opposite sides of the seat adjacent its rear end, a first pair of parallel links each being pivotally connected at its ends respectively to one backrest plate and the adjacent seat plate, a second pair of parallel links oppositely disposed from said first pair of links, each link of said second pair of parallel links being pivotally connected at its ends respectively to the other backrest plate and the other seat plate, said first and

second pairs of links providing a swingable connection between the backrest and the seat whereby the seat may be selectively moved from extended to retracted position, a stabilizer bar extending transversely of the backrest and connected to one link of said first pair of links and to the oppositely disposed link of the second pair of links, and means to selectively lock said backrest in extended and retracted positions, said last mentioned means cooperating with one link of each pair of links to prevent movement of the respective links of said pairs of links when said backrest is in a selected position with respect to said seat.

6. The chair of claim 5 including spring means to counterbalance weight of the backrest when moving the same from a retracted to an extended position.

7. The chair of claim 6 wherein said spring means includes a torsion spring mounted on the pivotal axis of one of said links to one of said backrest plates and operatively connected at one of its ends to the backrest plate and operatively connected at its other end to the link on which pivotal axis it is mounted.

8. The chair of claim 5 wherein said locking means includes a pair of pin elements oppositely mounted respectively on said backrest plates, said pair of pin elements being movable transversely of said backrest into the path of movement of oppositely disposed links of each of said pair of links.

9. The chair of claim 8 including operating means carried by said backrest for withdrawing said pin elements from respective engagement with the oppositely disposed links of said pairs of links.

10. The chair of claim 9 wherein said operating means includes a handle mounted in said backrest, a pair of bell cranks, one being pivotally connected to one of said pins and the other being pivotally connected to the other of said pins, and flexible connecting means connecting said handle to both of said bell cranks.

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