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MULTIPLE POSITION RECLINING CHAIR

Filed Oct. 31, 1960

3 Sheets-Sheet 2

FIG. 4.

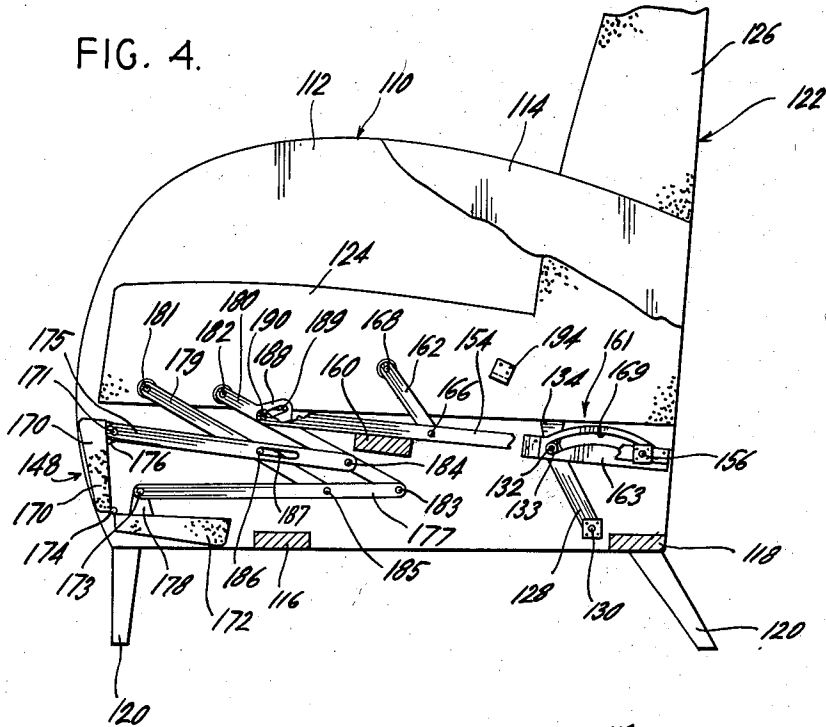
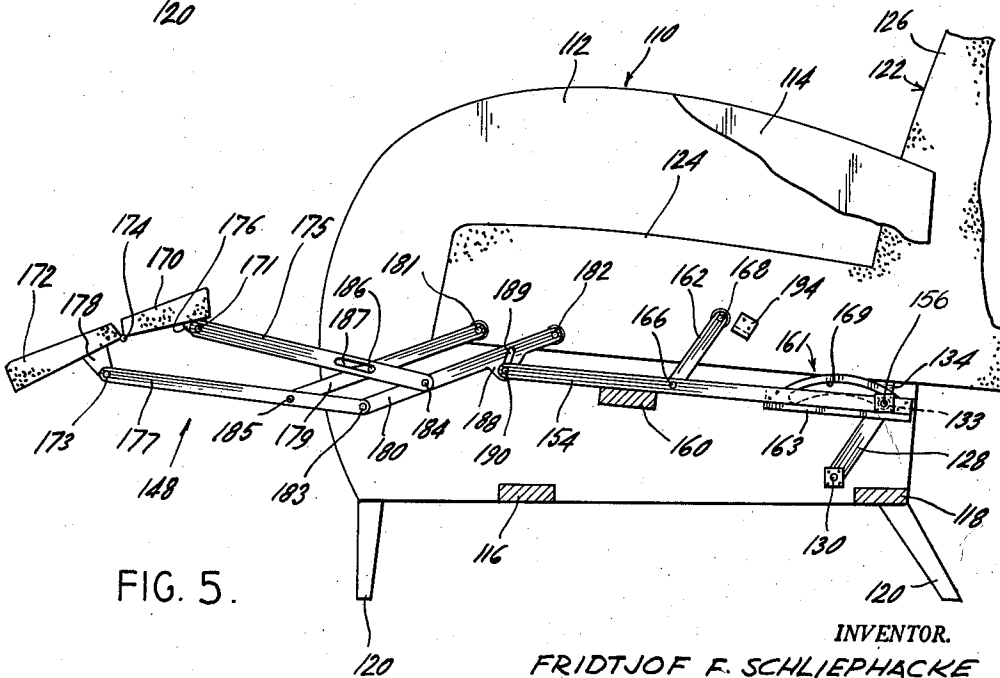


FIG. 5.



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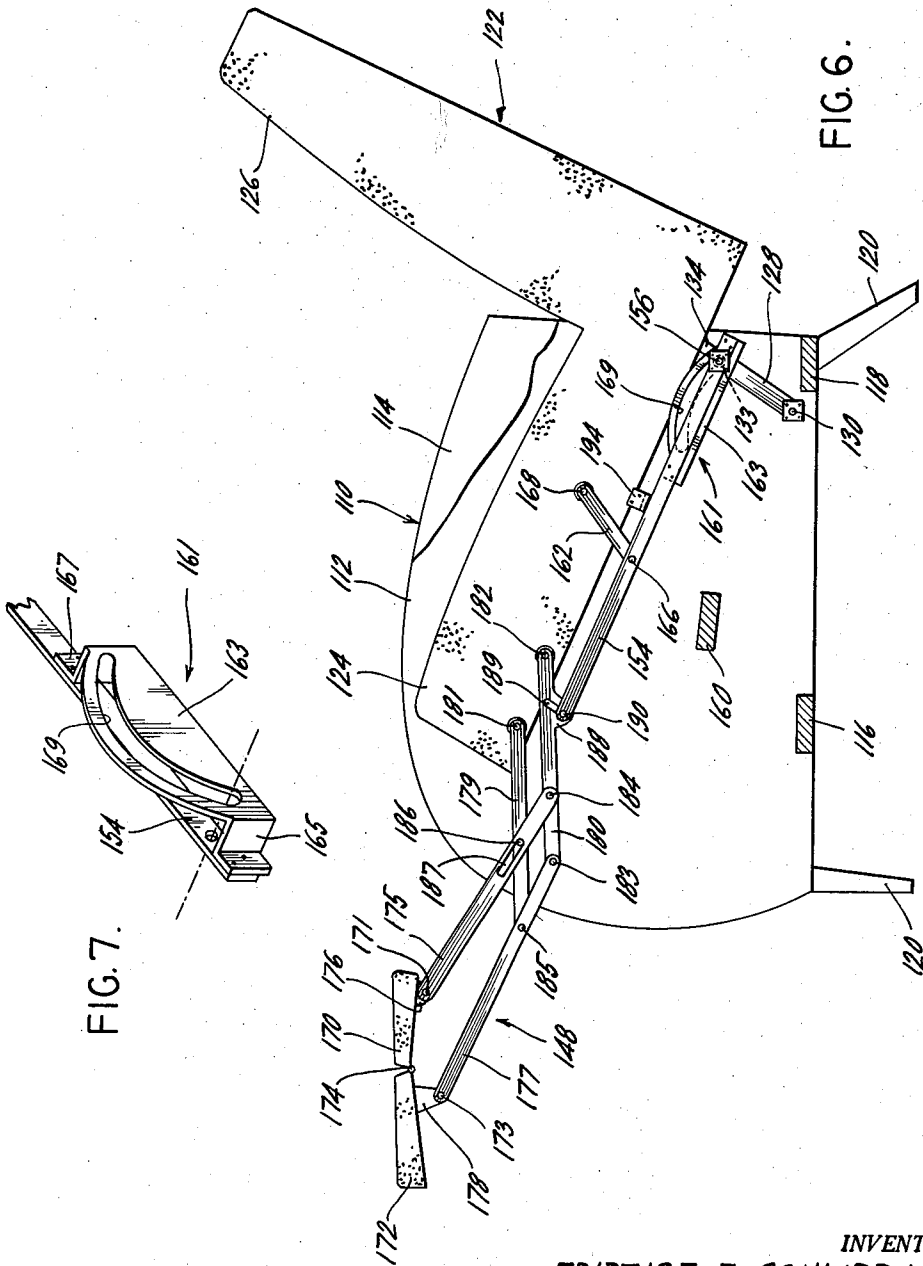


FIG. 6.

FIG. 7.

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MULTIPLE POSITION RECLINING CHAIR

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3 Claims. (Cl. 297—88)

The present invention relates to improvements in multiple position reclining chairs, and is particularly directed to novel and improved control means for producing the multiple position movement in chairs of this type.

Multiple position reclining chairs of the type disclosed herein are characterized by their ability to be moved through separate motion phases to an intermediate position and to a fully-tilted or reclined position. In the intermediate position, the seat and back-rest are slightly tilted but are still in an "active" sitting position suitable for viewing television, reading, sewing, or the like, yet the leg-rest is fully extended to a position to support the occupant's legs comfortably in an outstretched position. In the fully-tilted or reclining position, the seat and back-rest are inclined to a greater degree so as to support the occupant's body in a position of optimum repose for greater relaxation. The leg-rest in this position is still maintained in proper extended, leg-supporting position.

In multiple position chairs previously devised, it has been known to employ a leg-rest actuating link mounted on the support frame to move the leg-rest to its extended position during the first motion phase. As the leg-rest and its mounting linkage was moved rearwardly with the seat, the stationary actuating link would provide a pushing force thereon to raise the leg-rest. During the second motion phase, however, the seat would turn about a particular center of rotation and the actuating link would turn about a different center of rotation so that it would move relative to the seat and further actuate the leg-rest. The leg-rest would then assume a different extended position in the fully-tilted position of the chair than it assumed in the intermediate position of the chair.

It is an object of the present invention to provide a multiple position reclining chair in which a leg-rest actuating link is so mounted that in the intermediate position the center of rotation of the body-supporting unit is substantially concentric therewith. The actuating link and the seat therefore turn about concentric centers of rotation during the second motion phase and the leg-rest is maintained at the same extended position relative to the seat.

Another object of the invention resides in the provision of a multiple position chair of the character described in which suitable guide means are provided for association with a slotted sequencing means for first permitting relative motion between the leg-rest and the seat member to obtain the extended position of the leg-rest and then for permitting concurrent pivotal action of the seat and back-rest member together with the leg-rest about a single center of rotation.

In accordance with the invention herein, the chair body-supporting unit is mounted on the support frame by front guide means and a rear guide link which operate in unison during the first motion phase to move the unit rearwardly to a slightly-tilted intermediate position. A leg-rest is also carried by the seat and an actuating link is pivotally mounted on the support frame and operatively connected to the leg-rest to raise the latter to extended leg-supporting position during the first motion phase as the leg-rest is carried rearwardly with the seat. The pivotal mount of the actuating member is so located that in the intermediate position it is concentric with the pivotal connection of the seat with the rear guide link. During the second motion phase, the seat

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turns about its pivotal connection with the rear guide link and the actuating link turns about its concentric pivotal mount so that both the seat and actuating link turn through the same path and there is no movement of the leg-rest relative to the seat.

The chair also includes sequencing means which includes a pin or roller forming a part of one of the guide means and a slot slidably receiving the pin. The pin-and-slot constrain the seat movement such that the body-supporting unit must first complete the first motion phase before beginning its movement through the second motion phase.

Additional objects and advantages of the invention will become apparent during the course of the following specification when taken in connection with the accompanying drawings, in which:

FIG. 1 is a side elevational view, with parts broken away to show other parts in section, of a reclining chair incorporating control means constructed in accordance with the invention, the chair being shown in an upright sitting position and the leg-rest thereof in its retracted position;

FIG. 2 is an elevational view similar to FIG. 1, but with the frame of the chair omitted, and showing the body-supporting unit in its intermediate position and the leg-rest in extended position;

FIG. 3 is a view similar to FIG. 2, but illustrating the chair after the second motion phase in the fully-tilted position thereof;

FIG. 4 is a side elevational view of a modified form of the invention employing an alternate seat control structure and a sectional type of leg-rest, with parts being broken away to show other parts in section and in detail;

FIG. 5 is a view similar to FIG. 4, but illustrating the chair thereof in its intermediate position with the leg-rest extended;

FIG. 6 is a view similar to FIG. 5, but illustrating the reclining chair in the fully tilted position after the second motion phase has occurred; and,

FIG. 7 is a partial perspective view of a portion of the invention including part of the carrier member and the sequencing means.

With continuing reference to the accompanying drawings wherein like reference numerals designate similar parts throughout the various views, the reclining chair shown (FIGS. 1-3) comprises a base or support frame generally designated by the reference numeral 10 and having spaced side walls 12 and 14 interconnected by cross bars or braces 16 and 18 and supported on legs 20. The chair also includes a body-supporting unit, generally designated by reference numeral 22, comprising a seat 24 and a back-rest 26 formed rigidly with each other. The body-supporting unit 22 is movably mounted on the support frame 10 for movement relative thereto from an upright sitting position of FIG. 1 to the "active" intermediate tilted position of FIG. 2 and then to an "inactive" fully tilted position shown in FIG. 3. The mounting of the body-supporting unit 22 on the support frame 10 is accomplished by a front and rear guide means which specifically includes a rear guide link 28 mounted by pivot 30 on the support frame 10 and connected by pivot 32 to a bracket or extension 34 depending from the rear portion of seat 24. The front guide means includes a slot 38 formed in a plate 36 affixed to the support frame 10 and forming a pair of separate intercommunicating slot sections 40 and 42 which have separate centers of curvature, the center of curvature of the slot section 40 being below that of the slot section 42.

Fixed to the seat 24 is a bracket 44 carrying a roller 46 which is slidably contained within slot 38 and cooperates with the latter to form the front guide means.

The chair structure also includes a leg-rest 48 which is

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pivotally mounted on the front end of seat 24 by means of a hinge 50. The leg-rest 48 is made in the triangular shape shown in FIGS. 1-3 and has a leg-supporting surface 52. In the retracted position of the leg-rest 48 shown in FIG. 1, the leg-supporting surface 52 thereof is directed downwardly and is substantially parallel to the floor surface.

The leg-rest 48 is moved between its retracted and extended positions by an actuating link 54 which is mounted at one end on the support frame 10 by pivot 56. The forward end of actuating link 54 is connected to leg-rest 48 by pivot 58 at a point closely spaced to the hinge 50 which constitutes the pivotal mount of the leg-rest on the seat.

In the upright sitting position of the chair shown in FIG. 1, the actuating link 54 is in a substantially horizontal position as is the seat member 24, and the leg-rest 48 is in its retracted position. The guide roller 46 abuts against the lowermost end of the slot section 40 to support the forward end portion of the seat, and the rear guide link 28 extends upwardly and forwardly from its pivotal mount 30 on support frame 10. It will be observed that in this position the pivotal mount 56 of the actuating link 54 is located to the rear of the pivotal connection 32 between the rear guide link 28 and the seat 24.

When an occupant, seated in the chair in the upright sitting position of FIG. 1, wishes to assume a more comfortable sitting position with his legs extended, he shifts his weight rearwardly to apply rearward pressure against the body-supporting unit 22. The front and rear guide means then operate to bring the body-supporting unit 22 through a first motion phase to the intermediate position of FIG. 2. During this first motion phase, the rear guide link 28 turns about its fixed pivotal mount 30, carrying the rear portion of the seat 24 rearwardly, while simultaneously the roller 46 rides upwardly and rearwardly in the slot section 40 to move the forward portion of the seat rearwardly and also raise the same slightly. The end of the first motion phase is achieved when the roller 46 reaches the end of slot section 40 and engages the rear wall of the slot 38 at the junction of slot sections 40 and 42. Rearward movement of roller 46 is thus halted and the body-supporting unit 22 is temporarily maintained in the intermediate position of FIG. 2. In this position, the unit is slightly tilted, and the occupant's body is supported in a comfortable "active" sitting position suitable for viewing television, reading, or the like.

As the seat 24 moves rearwardly in the first motion phase, it carries the leg-rest 48 with it in a rearward direction through its hinged connection 50. The actuating link 54, however, is held against rearward movement by its fixed pivotal mount 56 on the support frame 10. The actuating link 54 therefore acts as a pusher link upon the rearwardly moving leg-rest, exerting a forward pushing force at its pivotal connection 58 and thereby causing the leg-rest to turn about its hinged connection 50 with the seat 24. Since the pivot 58, constituting the point of actuation, is located close to the hinge 50, the leg-rest 48 is turned through a wide angle of almost 180°, so that in the intermediate position of FIG. 2, the leg-rest has been brought to its extended position. In this position, the leg-rest is disposed forwardly of the seat 24 with its leg-supporting surface 52 upwardly directed and substantially aligned with the surface of said seat 24. Thus, while the body-supporting unit 22 is only slightly tilted, the leg-rest 48 is fully extended in position to comfortably support the out-stretched legs of the occupant.

It will be observed that the distance between the fixed pivots 30 and 56 is equal to the length of the rear guide link 28 between pivots 30 and 32. Further, the pivotal mount 56 of the actuating link 54 is so positioned with relation to the rear guide link 28 that when said rear guide link pivots rearwardly to its position of FIG. 2, its pivotal connection 32 with the seat is in substantial registry with the pivot 56. This is of great importance

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during the second motion phase, as will be presently explained.

When the occupant of the chair in the intermediate "active" position of FIG. 2 wishes to assume a more reclined position for greater relaxation, he again shifts his weight rearwardly to apply pressure against the body supporting unit 22. The rear guide link 28 can turn no further rearwardly because of the presence of the roller 46 at the rear end of slot section 40. However, the slot section 42 forms the arc of a circle whose center is at the pivotal connection 32 between the rear guide link 28 and seat 24 when said pivot 32 is located in its position shown in FIG. 2. The seat 24 is thus enabled to turn about its pivotal connection 32 with the stationary rear guide link 28 in a second motion phase, the roller 46 sliding up slot section 42 to permit this movement. The second motion phase terminates in the fully-tilted position of FIG. 3 by engagement of the roller 46 with the top end of slot section 42.

Since the seat pivot 32 has been brought into registry or approximate registry with the actuating link pivotal mount 56, both the seat 24 and actuating link 54 turn about substantially concentric points during the second motion phase. As the seat turns, its forward end carries the leg-rest 48 upwardly through hinge 50. The actuating link 54 turns through the same path so that there is no appreciable pushing or pulling effect performed by it upon the leg-rest at point 58. Thus, when the body-supporting unit 22 is moved through the second motion phase to the fully-tilted position of FIG. 3, the leg-rest is maintained in the extended leg-supporting position with little or no movement relative to the seat.

It will be appreciated that the slot 38, in addition to serving as the front guide means, also operates as sequencing means to insure that the body-supporting unit travels through the first motion phase before it commences its travel in the second motion phase. Ordinarily, in the upright sitting position of FIG. 1, the body-supporting unit would have a tendency to begin its movement by turning about its pivotal connection 32 with the rear guide link, rather than to be guided by both front and rear guide means. The presence of the roller 46 in the slot section 40, however, prevents such premature movement, and the turning of the unit about the pivot 32 cannot begin until the roller 46 has travelled the length of slot section 40 and has moved into registry with slot section 42.

To return from the fully tilted position to the intermediate position, it is only necessary for the occupant to shift his weight forwardly, thereby moving forward the center of gravity of the body-supporting unit 22 and causing the latter to turn forwardly about the concentrically disposed pivots 32, 56 until the position as shown in FIG. 2 is again reached.

To return from the intermediate tilted position to the upright sitting position, the occupant merely shifts his weight further forwardly and applies downward pressure on the leg-rest 48, this pressure causing the body-supporting unit 22 to move forwardly with the roller 46 riding down slot section 40, thus retracting the leg-rest 48 and returning to the position shown in FIG. 1.

Referring now to FIGS. 4-7, there is shown therein a modified form of chair made in accordance with the invention. The chair includes a base or support frame 110 having spaced side walls 112 and 114 interconnected by cross bars 116, 118 and 160. The reclining chair is supported on plurality of legs 120 and also includes a body-supporting unit designated generally by the reference numeral 122 and comprising a seat 124, and a back-rest 126 formed rigidly with each other. The body-supporting unit 122 is movably mounted on the support frame 110 for rearward movement relative thereto from the upright sitting position of FIG. 4 to the "active" intermediate tilted position of FIG. 5, and then to an inactive fully-tilted position shown in FIG. 6. The mounting of

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the body-supporting unit 122 on the support frame 110 is again accomplished by front and rear guide means, in this instance constituting a rear guide link 128 and a front guide link 162.

The rear guide link 128 is mounted by pivot 130 on the support frame 110 and is connected by pivot 132 to a bracket 134 carried by the rear portion of seat 124. The pivot 132 carries a roller 133.

The chair also includes a leg-rest actuating link 154 mounted at its rear end on the support frame 110 by pivot 156. In this instance, the actuating link 154 rests upon the cross bar 160 and is supported thereby in the sitting position of FIG. 1. The front guide link 162 is mounted on the actuating link 154 at an intermediate point thereon by a pivot 166. The other end of the front guide link 162 is connected by pivot 168 to the seat 124.

A bracket 161 is secured to the rear end portion of actuating link 154 and is carried thereby. The bracket 161, best shown in FIG. 7, includes a plate 163 having a pair of L-shaped legs 165 and 167 affixed to the actuating link 154 by welding, riveting, or similar means. The roller 133 extends into an arcuate slot 169 in plate 163 and is freely movable therealong.

The chair structure also includes a leg-rest generally designated by reference numeral 148. The leg-rest is formed in two sections 170 and 172 which are hingedly connected at 174. Brackets 176 and 178 are respectively provided for the sections 170 and 172 to allow for pivotal connections 171 and 173 for a pair of links 175 and 177. A second pair of links 179 and 180 are mounted on the seat 124 by respective pivots 181 and 182. The lower end of link 180 is connected by pivot 183 to the rear end of link 177, while at an intermediate point the link 180 is connected by pivot 184 to the rear end of link 175. The lower end of link 179 is connected by pivot 185 to an intermediate point on link 177. A pin 186, carried at an intermediate point on link 179, extends through a longitudinally-extending slot 187 in an intermediate portion of link 175.

The link 180 is provided with a lateral extension 188 having a slot 189 therein. A pin 190, carried by the forward end of the actuating link 154, extends slidably through the slot 189. The pin-and-slot connection 189, 190 prevents binding between the link 180 and the actuating link 154 as the latter moves the leg-rest to its extended position.

When the chair is moved by the occupant from the sitting position of FIG. 4 to the intermediate position of FIG. 5, the body supporting unit 122 is guided through a first motion phase by the guide links 128 and 162 moving in unison. The rear guide link 128 turns rearwardly about its fixed pivotal mount 130 on the support frame 110 while the front guide link 162 turns rearwardly about its pivotal mount 166 on the stationary actuating link 154. During this movement, the roller 133, carried by the rear guide link 128 travels from the forward end of slot 169 to the rear end thereof. The end of the first motion phase is determined by engagement of the roller 133 with the rear end of slot 169 at the intermediate "active" position of FIG. 5. In this position, the pivot 132, connecting the rear guide link 128 to the seat 124, has moved into substantial registry with the pivotal mount 156 of actuating link 154.

In moving through the first motion phase, the seat 124 carries the leg-rest linkage and the leg-rest 148 rearwardly with it. The stationary actuating link 154 acts as a pusher link upon the link 180 at its point of connection 190. The links 179 and 180 turn about their respective pivotal mounts 181 and 182 on the seat, carrying the other pair of links 175 and 177 forwardly and upwardly. The ends of links 175 and 177 spread apart during this extension movement, and the leg-rest sections 170 and 172 are turned into substantial alignment as the leg-rest 148 is extended to its leg-supporting position of FIG. 5.

Since the actuating link 154 is supported by cross-bar 160 in a stationary position during the first motion phase,

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the pin-and-slot coupling 189, 190 permits the link 180 to turn forwardly relative to the stationary actuating link 154, the slot 189 moving so that the pin 190 is located at the bottom end thereof at the intermediate position of FIG. 5. Further, the pin-and-slot connection 186, 187 permits extension of the leg-rest linkage without binding of the inter-connected links therein.

When the occupant of the chair moves the body-supporting unit 22 from the intermediate position of FIG. 5 to the fully-tilted position of FIG. 6, the body-supporting unit turns about its pivotal connection 132 with the rear guide link 128. In this second motion phase, the actuating link 154 turns about its pivotal mount 156 so that it raises from cross-bar 160. Because the pivots 132 and 156 are in substantial registry, the seat 124 and actuating link 156 turn through the same path and the leg-rest linkage merely rises with the seat with no appreciable movement relative thereto. The leg-rest 148 is therefore maintained in the same extended position forwardly of the seat during the second motion phase and in the fully-tilted position of FIG. 6. The latter position is determined by engagement of the actuating link 154 with a stop member 194 affixed to the support frame 110, the body-supporting unit 122 being then halted from further rearward pivoting movement.

It will be observed that the slot 169 and roller 133 act as sequencing means in this instance to prevent the body-supporting unit 122 from moving through the second motion phase before it has completed its movement through the first motion phase. When the roller 133 is at the forward end of slot 169 in the upright sitting position of FIG. 4, the seat 124 cannot turn about the pivot 132 because to do so it would have to raise the actuating link 154 through the link 162 as well as link 160. The actuating link 154 in this position, however, cannot turn upwardly about its pivotal mount 156, because the roller 133 in the forward end of slot 169 provides a rigid connection between actuating link 154 and the fixed pivot 130 through rear guide link 128. To move from the upright sitting position, therefore, the body-supporting unit 122 must be guided through the first motion phase by simultaneous pivoting movement of both guide links 128 and 162. The actuating link 154 cannot pivot upwardly until the roller 132 reaches the rear end of slot 169 and is in substantial registry with the pivot 156.

While preferred embodiments of the invention have been shown and described herein, it is obvious that numerous additions, changes and omissions may be made in such embodiments without departing from the spirit and scope of the invention.

What I claim is:

1. A multiple position reclining chair comprising a support frame, a body-supporting unit including a seat and back-rest, front and rear guide means mounting said body-supporting unit on the support frame for movement through a first motion phase from an upright sitting position to an intermediate tilted position and then through a second motion phase from said intermediate tilted position to a fully-tilted position, a leg-rest, means mounting said leg-rest on the forward portion of said seat for movement between a retracted position beneath said seat and an extended position forwardly of said seat, a leg-rest actuating link pivotally mounted on the support frame and operatively connected to said leg-rest, said rear guide means comprising a rear guide link pivotally connected to the seat and pivotally mounted on said support frame at a point forwardly of and beneath the pivotal mount of the actuating link, said body-supporting unit being moved rearwardly by both the front and rear guide means during the first motion phase with the rear guide link turning rearwardly about its pivotal mount on the support frame, the actuating link raising the leg-rest to its extended position during the first motion phase as the leg-rest is carried rearwardly with the seat relative to the pivotal mount of the actuating member, means halting movement of the rear guide link at the intermediate position whereby the

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body-supporting unit turns about the pivotal connection between the seat and the stationary rear guide link during a second motion phase, the pivotal mount of the actuating link on the support frame being so located that the pivotal connection between the rear guide link and the seat is moved rearwardly by the rear guide link into substantial registry with the pivotal mount of the actuating link at the intermediate position whereby the seat and the actuating link turn about concentric centers of rotation during the second motion phase and the leg-rest is maintained in its extended position without further movement relative to the seat.

2. A multiple position reclining chair according to claim 1 in which the front guide means includes a front guide link pivotally connected to the seat and pivotally mounted on said actuating link.

3. A multiple position reclining chair according to claim

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1 in which one of said guide means includes sequencing means to prevent movement of the body-supporting unit in the second motion phase until the first motion phase is completed at the intermediate position, said sequencing means including a slot rigid with the frame during the first motion phase, and carried by the rear end of the actuating link and a member carried by the seat and slidable in said slot, said member being located at the pivotal connection between the rear guide link and the seat.

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