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RECLINING CHAIR

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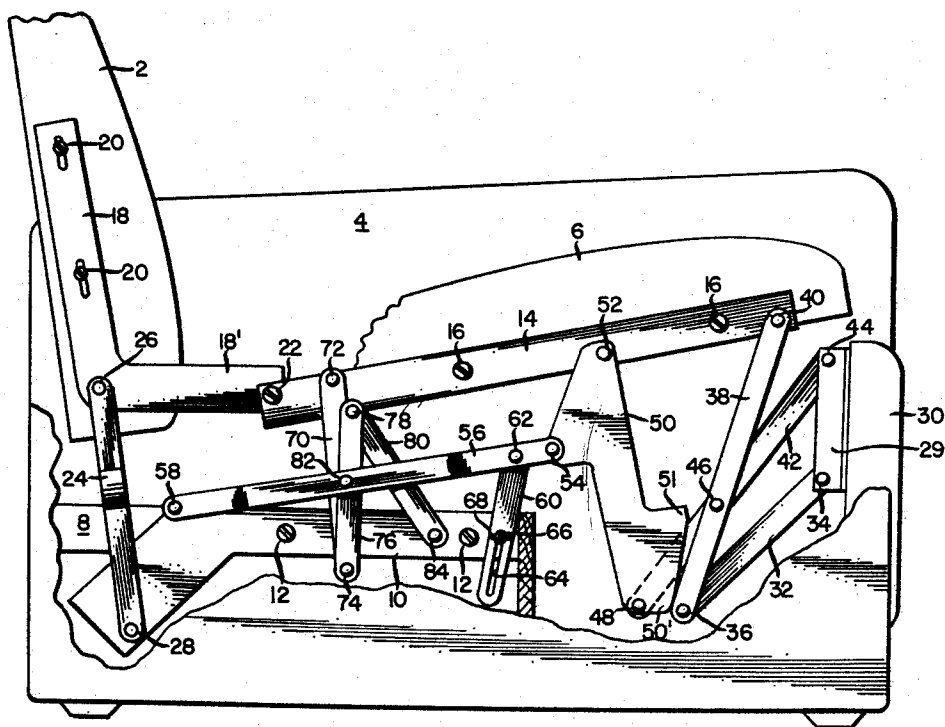


Fig. 1

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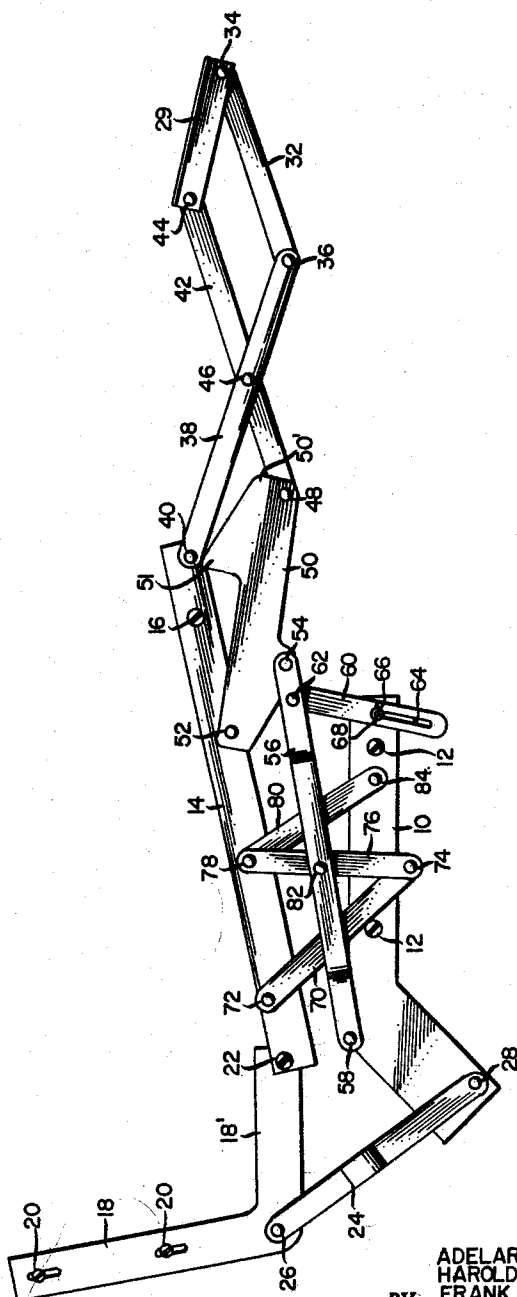
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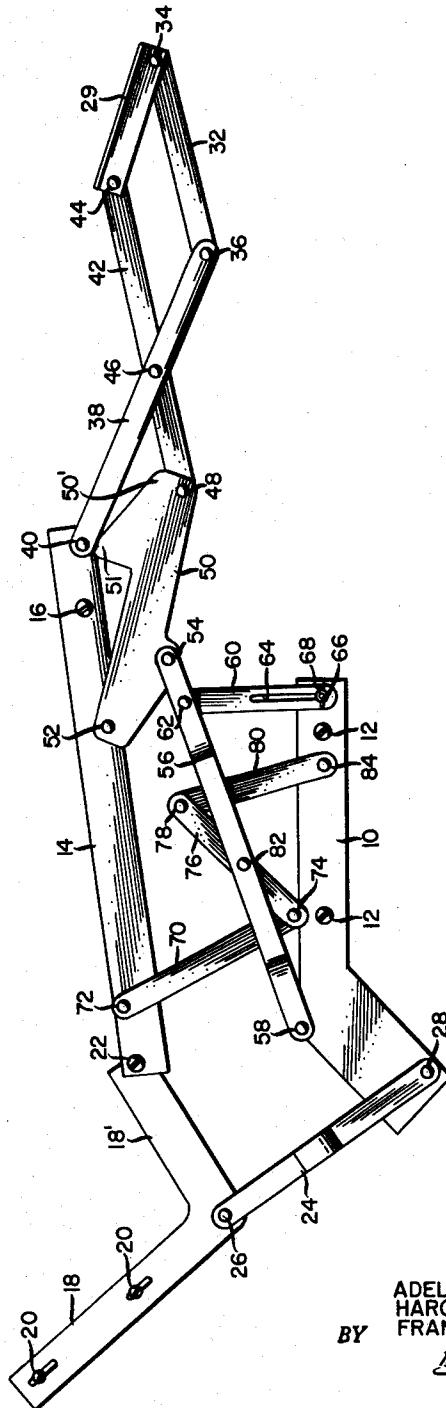
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Fig. 3



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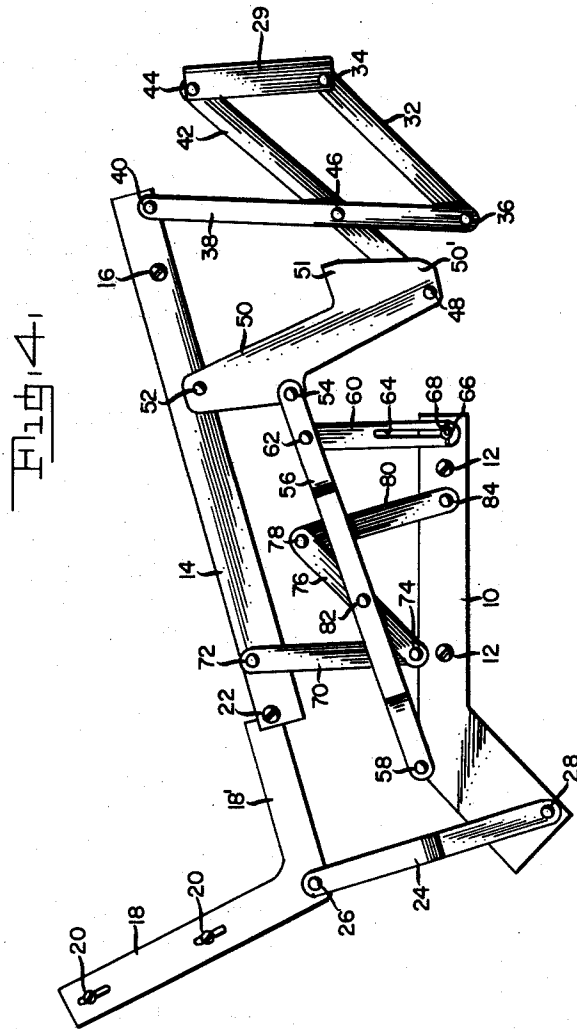
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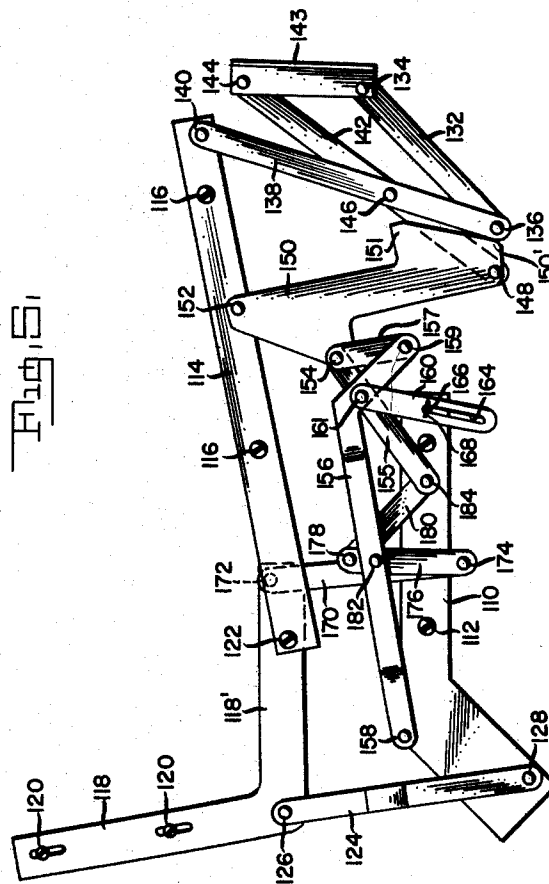
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5 Sheets-Sheet 5



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RECLINING CHAIR

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Our present invention relates to structural refinements in reclining chairs and more particularly to a reclining chair including a foot-rest interconnected via a linkage mechanism with the stationary and reclining elements thereof for movement between retracted and extended positions, and positions therebetween, with such movement being coordinated with the movement of the reclining elements relative to the stationary elements.

It will be helpful to an understanding of our invention, first, to consider briefly some of the essential points and more important features and aspects thereof, so that same may be kept in mind during the subsequent reading of the detailed description of the practical embodiments of our improvements and illustrations thereof in the hereunto annexed drawings.

It is first to be noted that it is a principal object hereof to provide a reclining chair in which the seat and back-rest and footrest are pivotal relative to a fixed base or chassis for coordinated movement via a linkage system relative to said base.

Another chief object of the invention is to provide a linkage system in which certain components thereof control both the rate and the range of movement of the linkage and in which the displacement of the links from each other permits smooth, non-interfering, movement of the linkage components and in which certain thereof define limits of relative movement of the linkage.

Without intending to place undue limitations upon the scope of the invention beyond what may be required by the state of the prior art, the particular embodiment may be briefly described as embracing the concept of a mechanism for a reclining chair (which includes a seat and a back-rest pivotally mounted in a swingable manner upon a base) wherein, as the back-rest is tilted, the seat is tilted upwardly and rearwardly and a leg-rest is pivotally interconnected to the forward portion of the seat, and a linkage mechanism is provided which includes a slotted link and rise bar whereby the leg-rest may be raised to an extended position while the seat and back-rest assume one of several tilted or reclined positions. A frictional adjustment means is also provided whereby reclining movements of the chair elements may be adjusted to suit the desires of individual chair occupants.

Still another feature worthy of note is the fact that certain of the links function as so-called stop means in controlling the reclination of the seat and back-rest and the extension of the leg-rest thus obviating the necessity for the provision of unsightly and otherwise objectionable stop pins or pegs protruding from the base.

The invention contemplates a novel article of furniture having multiple coacting parts which are relatively spaced on and swingable relative to a stationary base whereby the chair components may be actuated by the occupant with facility so as to move same between a normal upright or sitting position and one of a multiplicity of reclining positions. In assuming any reclined position, the seat and the back-rest pivoted thereto are swingable relative to a base to effect angularization of the seat and back-rest relative to the base and simultaneously to bring about the swinging or shifting of the leg-rest relative to the angularization of the seat and back-rest and further to permit the adjustment of the leg-rest component independent of the relative positioning of the other com-

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ponents, all in manner whereby the components are maintained in a balanced relationship at all times wherein a fluidity of maneuverability of the movable body and leg supporting members is allowed with a minimum of effort and a maximum of ease.

The linkage mechanism hereof permits the body supporting unit to be moved into suitable reclined positions without the chair occupant experiencing the objectionable falling sensations so often present in many prior art reclining chairs.

These foregoing objects and other incidental ends and advantages will be more fully pointed out as the nature of the invention is better understood in the progress of the disclosure below.

It will be apparent that the physical embodiments delineated, albeit the preferred exemplifications, are only indicative of but several of the multiplicity of ways in which the principles of the invention may be employed and these are submitted as best known embodiments with a view to illustrating and explaining the principles of the invention and their embodiment for practical use, in order that others skilled in the art to which the invention pertains may be enabled to adapt and modify them in numerous variations and modifications, each as may be best adapted to the conditions of any particular use.

The characteristic features which we consider to be novel with our invention, as to its construction and organization and as to its method of operation, will be better understood from a consideration of the following detailed description forming a part of this specification, when read in conjunction with the illustrations in the accompanying drawings in which:

FIG. 1 is a fragmentary, side elevational view of a reclining chair incorporating one embodiment of the invention, said chair being shown in the upright position;

FIG. 2 is a side elevational view of the linkage mechanism shown in FIG. 1, said mechanism being shown in an intermediate reclining position;

FIG. 3 is a side elevational view of the linkage mechanism shown in FIG. 1, said mechanism being shown in the fully reclined position;

FIG. 4 is a side elevational view of the linkage mechanism shown in FIG. 1, said mechanism being shown in position for maintaining the leg-rest in a partially retracted position; and

FIG. 5 is a side elevational view of a modified form of the linkage mechanism shown in FIG. 1.

In the following description and in the appended claims, various components and details thereof will be identified by specific names for purposes of convenience, such specific terms and expressions being employed in a generic and descriptive sense only for purposes of identification. The phraseology or terminology is not intended to exclude any reasonable equivalents.

With continued reference now to the drawings, we have shown a reclining chair comprising a stationary base 4, a back-rest 2 and a seat 6, said seat being pivotal relative to said back-rest and both said seat and back-rest being pivotal relative to said stationary framework.

The linkage mechanism illustrated is one of a pair of such mechanisms, each being located at a side of the chair between the base and the seat and back-rest structures and fixed to the adjacent horizontally-extending base rail 8 of said base, as is conventional. Only one such mechanism is shown and described, it being understood that, alternatively, a single centrally located unitary mechanism may be employed in lieu of a pair of such mechanisms.

The linkage mechanism will now be described.

A generally horizontally-extending base bracket 10 is fixed to base rail 8, as by screws 12, and extends in a front-rear dimension of the chair, and a seat bracket 14

is fixed to a side of seat 6, as by screws 16, said brackets 10 and 14 being substantially vertically aligned.

An L-link 18, fixed to a side of back-rest 2, as by screws 20, includes a lower forwardly-extending foot portion 18', the forward face end of which is pivotally connected to seat bracket 14 as by a connection 22.

The seat-back structure is pivotally supported for movement relative to the base by means of a support link 24 pivotally connected at its upper end, at 26, to L-link 18 and pivotally connected at its lower end, at 28, to base bracket 10.

A leg-rest plate 29 having a leg-rest 30 of conventional design fixed thereto is positioned at the forward facing edge of the chair and is inter-connected with the seat-back-rest structure by means of a primary lifter link 32 pivotally connected at 34 at its forward end to the leg-rest plate and at its rearward end at 36 to the lower end of a propeller link 38, the upper end of said propeller link being pivoted at 40 to seat bracket 14. A secondary lifter link 42 is pivotally connected at 44 at its forward end to the leg-rest and at 46 at its approximate mid-section to said propeller link 38 and at 48 at its rearward end to the lower end portion of a limit link 50.

The upper end portion of limit link 50 is pivoted at 52 to seat bracket 14 and at 54 to the forward end of a generally horizontally-extending rise bar 56.

Rise bar 56 is pivoted at its rearward end at 58 to base bracket 10.

A slotted link 60 is pivoted at its upper end at 62 to rise bar 56 adjacent pivot pin 54 and is provided with a vertically-extending slot 64 through which a pin 66, fixed to base rail 8 and extending laterally outwardly of and transversely to base bracket 10, is extendable.

Pin 66 is in the form of a bolt and has a wing nut 68 threaded thereonto, the nut being tightenable against the adjacent face of slotted link 60 to increase the frictional engagement between said link and base bracket 10. Conversely, by loosening nut 68, the frictional engagement between link 60 and base bracket 10 may be decreased, desirable in the case of persons of light weight in that the device may be adjusted for easier operation thereby.

Nut 68, in combination with slotted link 60, functions as an adjustable braking device whereby the force or weight required to move the seat and back-rest to one of the reclining positions may be varied in accordance with the requirements of individual chair occupants.

A connecting link 70 is pivoted at its upper end at 72 to seat bracket 14, adjacent pivotal connection 22, and at its lower end at 74 to a primary pull link 76, in turn connected at its upper end at 78 to a secondary pull link 80 and at its approximate mid-section at 82 to rise bar 56. Secondary pull link 80 is pivoted at its lower end at 84 to base bracket 10, adjacent slotted link 60.

In FIG. 1, we have illustrated the relative positions of the components of the linkage system when the chair is in the fully upright position wherein leg-rest 30 will be observed to be retracted, bolt 66 to be disposed at the upper end of slot 64, and the lower end of propeller link 38 to be in contact with a toe portion 50' at the lower extremity of limit link 50.

To attain the intermediate position of FIG. 2, the chair occupant may bring pressure to bear upon the back-rest, causing the seat-back structure to become angularized relative to base bracket 10 by pivotal rotative movement of support link 24 upon pivots 26 and 28.

In the movement from upright position, limit link 50 and propeller link 38 are swung upwardly and forwardly as seat 6 is moved upwardly and rearwardly while support link 24 pivots in a counterclockwise direction. As limit link 50 rotates, it urges secondary lifter link 42 forwardly and upwardly which, in turn, simultaneously impels propeller link 38 forwardly and upwardly to cause a similar movement of primary lifter link 32, thereby bringing leg-rest plate 29 to the raised or extended positions of FIGS. 2 or 3, at which point a stop portion 51

of limit link 50 contacts link 38 adjacent its upper end to preclude any further leg-rest movement.

During this sequence of movements, rise bar 56 will be observed not to have changed its generally horizontal position relative to base bracket 10, and bolt 66 will be observed as continuing to rest in the upper extremity of slot 64 of slotted link 60. It will also be noted that seat rail 14 has moved longitudinally rearwardly relative to base bracket 10 during the upward movement of the leg-rest plate, thereby causing the upper end of connecting link 70 to be moved longitudinally rearwardly while the lower end of said link pivots in a counterclockwise direction upon pivot 74.

As previously stated, support link 24 is pivotally connected to L-link 18, which is in turn pivotally connected through toe portion 18' to seat bracket 14, wherefore, as the back-rest is moved, the seat rail is caused to move therewith by pivoting upon pivot point 22.

Referring to FIG. 1, it will be observed that links 70 and 24 are disposed in parallelism as to each other and remain in parallelism during the movement of the chair components to the position shown in FIG. 2, whereby the relative angle between the seat and back is maintained during this movement from the upright position of FIG. 1 to the intermediate position of FIG. 2.

To move to the position of FIG. 3 from that of FIG. 2, additional weight is brought to bear upon the back-rest whereupon L-link 18 pivots upon pivot 26 as seat rail 14 pivots upon pivot 22, thus raising the forward end of rise bar 56 through its pivotal connection with limit link 50.

As the forward end of rise bar 56 moves upwardly, it exerts an upward force upon slotted link 60 through connection 62, thereby causing said slotted link to move upwardly relative to bolt 66.

Rise bar 56 is also pulled upwardly by the pulling action of primary pull link 76, such pulling action being exerted through connection 82 between said members.

As seat rail 14 is moved upwardly, link 70 is moved upwardly, causing link 76 to pivot relative thereto as it exerts an upward pulling force upon rise bar 56.

The interaction of connecting link 70 and pull links 76 and 80 precludes too rapid an angularization of the chair components to make for a smoother operation of the chair mechanism than in the case of those employing slots for such purpose.

It will be noted that, due to support link 24 being held to the base bracket at 28, when rise bar 56 moves upwardly in going from the position of FIG. 2 to that of FIG. 3, links 70 and 76 are also moved upwardly, as previously described. This, in turn, causes the rear end of bracket 14 to move upwardly and L-link 18 to pivot counterclockwise about 26. The chair back then tilts rearwardly and the rear end of the seat moves upwardly, giving the back a greater degree of reclination without a rearwardly falling sensation.

It will be appreciated that the chair occupant may, if he so desires, cause the various components of the linkage to stop at any point between the upright position of FIG. 1 to the intermediate position of FIG. 2, and the position of FIG. 3. Stated otherwise, the occupant need not continue angularization of the seat-back until the stop portion 51 of link 50 engages link 38. He may find a more comfortable position intermediate the upright position and the position of FIG. 3, as for example, the position of FIG. 4.

Again, the chair occupant may position the chair components at an angle between that shown in FIG. 2 and that shown in FIG. 3, it is not being necessary that slotted link 60 be raised its entire length relative to fixed bolt 66.

The occupant may return the chair from the position of FIG. 3 to the position of FIG. 2 by exerting a slight downward pressure upon seat 6, causing slotted link 60 to ride downwardly relative to bolt 66 while the leg-rest plate is maintained in a substantially extended position.

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It will also be appreciated that the chair operator may, if he so desires, retract the leg rest plate from the position shown in FIG. 3, in which case, bolt 66 remains in the lowermost position of slot 64.

The occupant may also recline from the position of FIG. 1 with the leg-rest plate retracted to the position shown in FIG. 4, should he so desire.

In the embodiment shown in FIG. 5, the linkage has been modified by the addition of a drop link, while the leg of the L-link is now connected directly to the connecting link, whereby greater ease of angularization may be attained. L-link 118, is fixed to a side edge of a back-rest, not shown, as by screws 120, and is provided with a lowermost, generally horizontally-extending, toe portion 118', the forward end of which is pivotally connected at 172 to the upper extremity of a connecting link 170.

Said toe portion 118' is also pivotally connected at 122, adjacent the connection 172 to a seat rail 114, fixed to a seat, not shown, as by screws 116.

The seat-back structure is pivotally mounted for movement about a base rail, not shown, by means of a support link 124, which is pivotally attached at 126 at its upper end to L-link 118 and thus to the seat-back structure.

The lower end of support link 124 is pivotally connected at 128 to a base bracket 110 fixed to the base rail, not shown, as by screws 112.

A leg-rest, not shown, is positioned at the forward end of the chair and is connected to the seat-back structure by a linkage system including a primary lifter link 132 which is pivotally connected at its forward end at 134 to a leg-rest plate 143 and at its rearward end at 136 to the lower end of a propeller link 138, the upper end of the propeller link being pivoted at 140 to seat bracket 114, and a secondary lifter link 142 which is pivotally connected at its forward end at 144 to said leg-rest plate 143 and at its approximate mid-section at 146 to the propeller link 138 and at its rearward end at 148 to the lower end of a limit link 150.

Limit link 150 is pivoted at its upper end at 152 to seat bracket 114 and at 154 adjacent said upper end to the forward end of an intermediate link 155, and also at 154 to the upper end of a drop link 157, which drop link 157 is pivoted at its lower end at 159 to the forward end of a generally horizontally-extending rise bar 156.

Intermediate link 155 is pivotally connected at 154 to said drop link 157 and at 184 to said base rail 110.

Said rise bar 156 is pivoted at its rearward end at 158 to base bracket 110.

Slotted link 160 is provided with a vertically-extending slot 164, through which slot a bolt 166 extending laterally outwardly from the base bracket 110, is extendable.

Bolt 166 has a wing nut 168 threadedly receivable thereon which may be tightened against the planar face of slotted link 160 to increase the frictional engagement between said link and base bracket 110.

The upper extremity of slotted link 160 is pivotally connected at 161 to rise bar 156 adjacent its forward end. It will be noted that said slotted link is pivoted only to said rise bar.

A connecting link 170 is pivoted at 174 at its lower end to a primary pull link 176 connected at 178 at its upper end to the upper end of secondary pull link 180, and at its approximate mid-section at 182 to rise bar 156.

The lower end of secondary pull link 180 is pivoted at 184 to intermediate link 155 and base rail 110.

To effect angularization of the seat-back structure from the position of FIG. 5, pressure is brought to bear upon the back-rest, causing the structure to pivot relative to the base rail upon support link 124.

The leg-rest plate is brought to an extended position through the coaction of links 150, 138, 142 and 132 in manner similar to that earlier described in connection with the embodiment shown in FIGS. 1-4, having a toe portion 150' integral with limit link 150, urging propeller link 138 forwardly and upwardly and a stop portion 151

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integral with link 150 limiting further movement thereof upon reaching the upper extremity of said link.

As the leg-rest plate is extended, seat rail 114 is moved longitudinally rearwardly and upwardly relative to base rail 110 while connecting link 170 pivots upon pivot 174.

During this sequence of movements, rise bar 156 will not have changed its generally horizontal position relative to base bracket 110, and bolt 166 continuous to rest in the upper extremity of slot 164 of link 160.

To achieve a further reclined position, additional pressure is brought to bear upon the back-rest, whereupon the seat is moved upwardly and slotted link 160 is caused to move upwardly relative to fixed bolt 166 through the pulling force exerted thereupon by rise bar 156.

It will be noted that the object of links 155 and 157 is to cause the front end of the seat to move in a more rearward and less upward manner in going from a position similar to that shown in FIG. 2 to one similar to that shown in FIG. 3. They have no effect in going from a position that is similar to FIG. 1 to one similar to that of FIG. 2. In this manner, the falling sensation experienced in going from the position similar to FIG. 2 to the position similar to FIG. 3 is still further minimized.

It will also be appreciated that an infinite number and variety of chair positions may be achieved by the application or shifting of body weight and/or leg movement or restraint, relative to the back-rest, seat and leg-rest, and that the pressure required to move those components will at times be directly related to the pressure of slotted link 160 upon base bracket 110, same being increased or decreased by the rotation of wing nut 168 relative to bolt 166.

In both the preferred embodiment of FIGS. 1-4, and the modification of FIG. 5, the chair occupant may cause the seat-back structure to be angularized to any desired position between the fully upright, intermediate, or fully reclined positions, all without experiencing any disagreeable falling sensation.

The claims are desired to include within the scope thereof all of said suitable variations, modifications and equivalents by which substantially the results of the invention may be obtained through the use of substantially the same or equivalent devices or means. Accordingly, limitation hereof should only be made as determined by a proper interpretation of the prior art and the scope of the subjoined claims, in which it is our intention to claim all novelty inherent herein as broadly as possible.

We therefore particularly point out and distinctly claim as our invention:

1. A reclining chair comprising, a support, a body-supporting unit including a back-rest portion and a seat portion pivotal relative thereto and pivotal each relative to the other, means mounting said body-supporting unit for movement about a pivot successively between a sitting position and an intermediate resting position and a fully reclined position, and positions therebetween, a leg-rest, a leg-rest control linkage including coaxing links movable relative to each other in response to movement of said body-supporting unit, and permitting the adjustment of the leg-rest independent of the relative positioning of the body-supporting unit, said leg-rest control linkage including: a base bracket fixed to said support, a seat bracket fixed to said seat, primary and secondary lifter links pivotally mounted to said leg-rest, a propeller link pivotally connected to said primary and secondary lifter links and to said seat bracket, a limit link pivotally connected to said secondary lifter link and to said seat bracket, a rise bar pivotally mounted on said base bracket and pivotally connected to said limit link, a slotted link slidably mounted on said base bracket and pivotally connected to said rise bar, means engageable with said slotted link whereby the frictional engagement between said slotted link and said base bracket may be adjusted, means integral with said limit link adaptable for engagement with said propeller link to control the reclination of the body-

supporting unit and the extension of the leg-rest, a connecting link pivotally mounted on said seat bracket and pivotally connected to a primary pull link, said primary pull link pivotally connected to said rise bar, a secondary pull link pivotally mounted on said base bracket and pivotally connected to said primary pull link, whereby said body-supporting unit may be brought to an intermediate reclining position with said leg-rest fully extended; whereby said body-supporting unit may be brought to a fully reclined position from said intermediate position with said leg-rest fully extended; whereby said body-supporting unit may be angularized from a fully upright position with said leg-rest retracted to one of a plurality of positions between said fully upright position and an intermediate reclining position with said leg-rest partially extended, and whereby said leg-rest may be moved from an extended to a retracted position independent of the relative positioning of said body-supporting unit.

2. A reclining article of furniture comprising, a support, a body-supporting unit including a back-rest portion and a seat pivotal relative thereto, means mounting said body-supporting unit for movement about a pivot successively between a sitting position and an intermediate resting position and a fully reclined position and a plurality of positions between said sitting position and said intermediate position and said fully reclined position, a leg-rest, a leg-rest control linkage including coaxing links movable relative to each other in response to movement of said body-supporting unit, said leg-rest control linkage including: a base bracket fixed to said support, a seat-bracket fixed to said seat, primary and secondary lifter links pivotally mounted to said leg-rest, a propeller link pivotally connected to said primary and secondary lifter links and to said seat bracket, a limit link having stop means integral therewith pivotally connected to said secondary elevator link and to said seat bracket, a rise bar pivotally mounted on said base bracket and pivotally connected to said limit link, whereby said leg-rest may be elevated into a leg-supporting position in response to movement of the links of said leg-rest control linkage relative to each other as said body-supporting unit moves into the resting position and into reclining position, a slotted link mounted on said base

bracket and pivotally connected to said rise bar, means engageable with said slotted link whereby frictional engagement between said slotted link and said base bracket may be adjusted, a connecting link pivotally mounted on said seat bracket and pivotally connected to a primary pull link, said primary pull link pivotally connected to said rise bar, a secondary pull link pivotally mounted on said base bracket and pivotally connected to said primary pull link, whereby too rapid angularization of said body-supporting unit is precluded, and whereby said body-supporting unit may be moved successively between a sitting position and one of a plurality of positions between said sitting position and an intermediate position, with said leg-rest partially or fully extended, and whereby said body-supporting unit may be moved successively between said intermediate position and one of a plurality of positions between said intermediate position and a fully-reclined position with said leg-rest fully-extended or partially retracted.

3. In a reclining article of furniture as set forth in claim 2 wherein said means mounting said body-supporting unit and said connecting link are disposed in parallelism as to each other and remain in substantial parallelism during movement of said body-supporting unit between an upright sitting position and an intermediate resting position, and a fully-reclined position, whereby the relative angle between said seat and said back-rest portion remains constant during movement of the body-supporting unit.

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