Oct. 30, 1962 F. F. SCHLIEPHACKE 3,061,367

MULTIPLE POSITION RECLINING CHAIR

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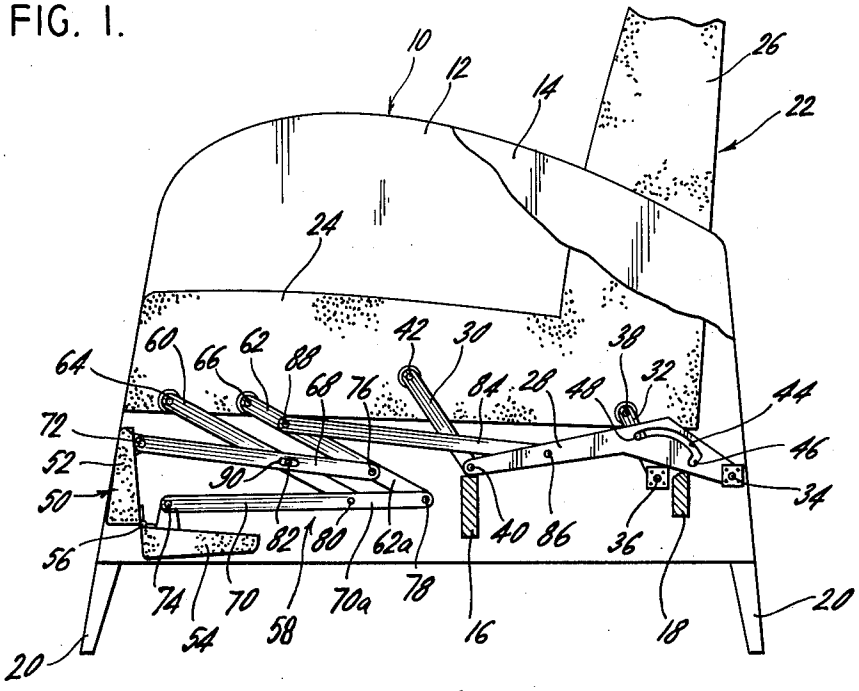
FIG. 1.



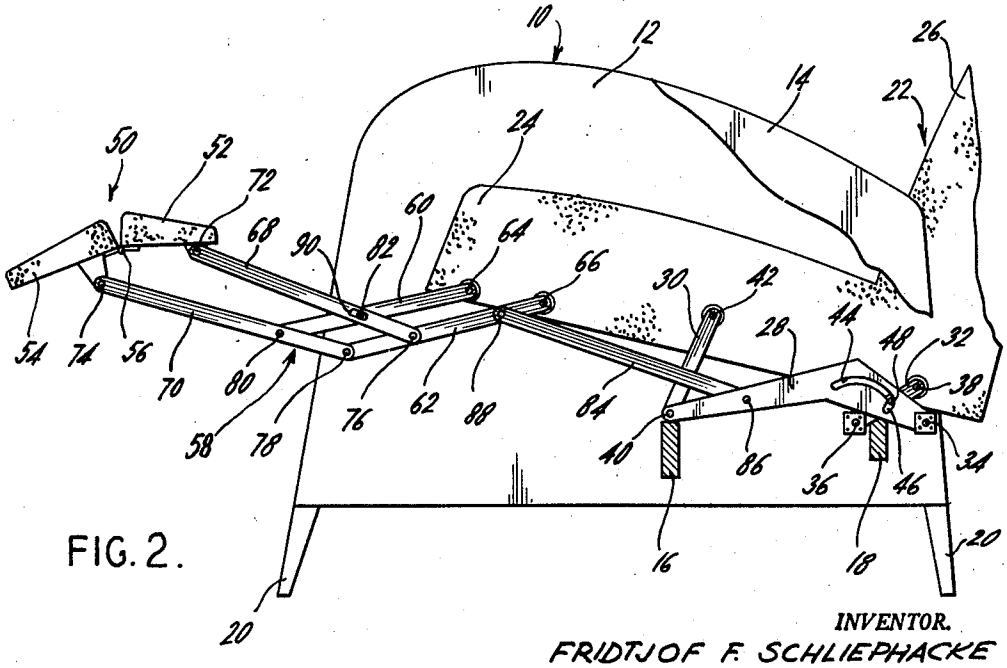


FIG. 2.

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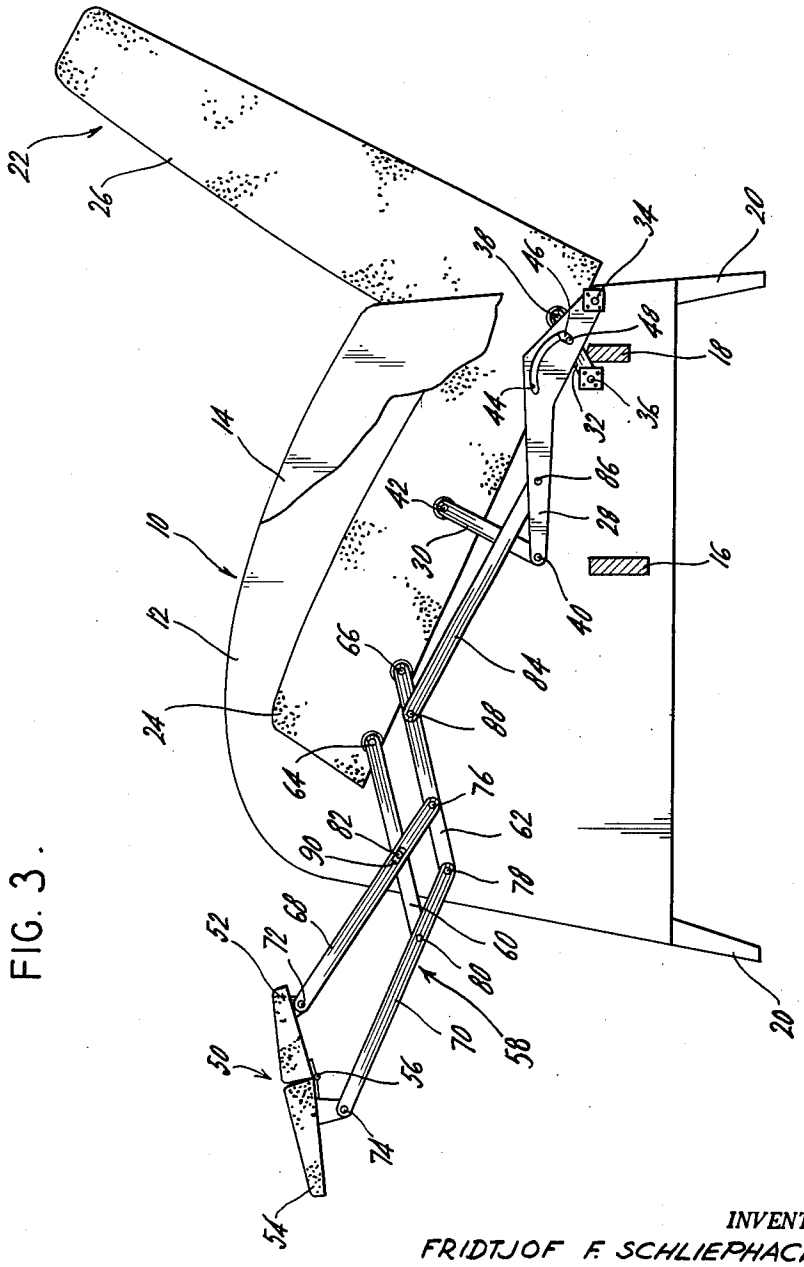

FIG. 3.

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MULTIPLE POSITION RECLINING CHAIR

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6 Claims. (Cl. 297—89)

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

Multiple position reclining chairs of the type shown herein are characterized by their ability to be moved through separate motion phases to an intermediate position and to a fully-tilted or reclining position. In the intermediate position, the seat and back-rest are slightly tilted but still in an "active" sitting position suitable for viewing television, reading, sewing, or the like, yet the leg-rest is fully extending to a position to support the occupant's legs comfortably in outstretched condition. 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 extended, leg-supporting position.

In multiple position chairs previously devised, it is known to provide a carrier member in the form of a bar pivotally mounted on the chair support frame, for providing the multiple position movement for the seat and back-rest. Invariably, a pair of guide links are mounted on the carrier member and connected to the seat. The carrier member rests immovably on a portion of the chair frame during the first phase of seat and back-rest movement and the two guide links turn about their pivotal mounts on the immovable carrier member to move the seat and back-rest rearwardly to the intermediate position. During the second motion phase, the carrier member turns about its pivotal mount on the support frame, carrying the guide links, seat and back-rest with it, so that the seat and back-rest turn about the pivotal mount of the carrier member on the support frame to the fully-tilted or reclining position.

In accordance with the present invention, a multiple position reclining chair is provided in which the seat and back-rest unit is again mounted by a pair of guide links. The rear guide link is pivotally mounted on the support frame, while the front guide link is pivotally mounted on a carrier member which is itself pivotally mounted on the support frame. The pivotal mount of the carrier member is located rearwardly of the pivotal mount of the rear guide link and the carrier member crosses over the rear guide link. At their crossing-over point, the rear guide link and carrier member are connected by a pin-and-slot coupling which acts as sequencing means to insure that the unit travels through the first motion phase before beginning the second motion phase. A leg-rest is also provided, as well as means mounting the leg-rest on the seat. Actuating means operatively connect the leg-rest with the carrier member in such a manner that the leg-rest is moved to an extended, leg-supporting position during the first motion phase.

It is an object of the present invention to provide in a multiple position chair of the character described, simple seat control means wherein a carrier member is provided to mount only the front guide link.

Another object of the invention is the provision of a multiple position chair of the character described in which an effective sequencing means is provided by a pin-and-slot coupling between the carrier member and the rear guide link.

A further object of the invention is the provision of

a multiple position reclining chair of the character described which is adapted to incorporate a split leg-rest having two hinged sections in which one section is retracted to an underslung position beneath the seat.

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 illustrating a preferred embodiment of the invention, and in which:

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

FIG. 2 is a side elevational view similar to FIG. 1, but showing the chair in its intermediate tilted position with the leg-rest extended to a leg-supporting position; and

FIG. 3 is a similar side elevational view showing the chair in its fully-tilted position.

Referring now specifically to the drawings, the reclining chair shown therein comprises a base or support frame designated generally 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 designated generally by the reference numeral **22** and 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 the 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 carrier member **28**, and a pair of guide links **30** and **32**.

The carrier member **28** is mounted at its rear end by a pivot **34** on the support frame **10**. The rear guide link **32** is pivotally mounted at **36** on the support frame and is connected by pivot **38** to the rear end portion of the seat. The front guide link is mounted by pivot **40** on the free or forward end of the carrier member **28**, and at its upper end is connected by pivot **42** to the forward portion of the seat **24**.

In the upright sitting position of the chair shown in FIG. 1, the carrier member **28** is in a substantially horizontal position, resting upon the cross bars **16** and **18**.

The carrier member **28** is formed with an arcuate slot **44** having a short terminal extension **46**. A pin **48** fixed to an intermediate portion of rear guide link **32** is slidably received in the slot **44** for movement through said slot and its extension **46**. This pin-and-slot coupling serves as sequencing means, as will be presently explained in detail, for insuring that the body-supporting unit **22** travels through the first motion phase before beginning the second motion phase.

The chair also includes a leg-rest designated generally by the reference numeral **50**, which is made of two parts **52** and **54** connected by a hinge **56**. The portion **52** constitutes the main leg-rest section, while the portion **54** constitutes an auxiliary leg-rest section or front extension. The leg-rest **50** is mounted by a control linkage designated generally by the reference numeral **58** on the forward end portion of the seat **24** for movement between a retracted position, shown in FIG. 1, and an extended position shown in FIGS. 2 and 3.

The leg-rest control linkage **58** includes a first pair of links constituting a first link **62** and a second link **68** interconnected by a pivot **76**. The first link **62** is mounted by pivot **66** on the forward end of the seat **24**. The second

link 68 is connected by pivot 72 to the main section 52 of the leg-rest 50.

The leg-rest control linkage also includes a second pair of links constituting a third link 60 and a fourth link 70, interconnected by a pivot 80. The free end of the third link 60 is mounted by pivot 64 on the seat 24 at a point spaced forwardly of the pivot 66. The free end of the fourth link 70 is connected by pivot 74 to the auxiliary leg-rest section 54.

The third link 60 crosses over the second link 68 and these links are pivotally interconnected at their crossing over points by a pivot pin 82. This pivot pin 82 extends slidably through a slot 90 in link 68. The first link 62 has an extension portion 62*a* projecting downwardly beyond the pivotal connection 76 with the second link 68, and the fourth link 70 has an extension portion 70*a* extending rearwardly beyond the pivotal connection 80 with the third link 60. The extensions 62*a* and 70*a* are connected by pivot 78.

Means are provided to actuate the leg-rest control linkage 58 and thereby move the leg-rest 50 between its retracted and extended positions. Such actuating means comprises an actuating link 84 mounted at its rear end on the carrier member 28 by pivot 86 and connected at its front end to the link 62 by pivot 88. The actuating link operates as a pusher link to actuate the leg-rest control linkage 58 and raise the leg-rest 50 to its extended position during the first motion phase. The actuating link 84 then operates in conjunction with the carrier member 28 to maintain the leg-rest in its extended position during the second motion phase.

In the upright sitting position of the chair shown in FIG. 1, the carrier member 28 rests upon the cross bars 16 and 18, the latter preventing said carrier member 28 from turning downwardly about its fixed pivot 34. The guide links 30 and 32 are both forwardly inclined, and the pin 48 on rear guide link 32 is located at the front end of slot 44, so that the rear guide link is restrained from pivoting forwardly. The leg-rest 50 is in a retracted position with the section 52 extending vertically downward beneath the forward end of the seat 24, and the section 54 extending rearwardly from the lower end of section 52 in an underslung position substantially parallel to the lower surface of seat 24.

When the occupant of the chair exerts rearward pressure against the body-supporting unit 22, the guide links 30 and 32 turn rearwardly about their respective pivotal mounts 40 and 36, to bring the body-supporting unit 22 to its intermediate tilted position of FIG. 2. In this connection, it will be noted that the front guide link 30 is longer than the rear guide link 32 and is more forwardly inclined, the upper end of the front guide link moving upwardly and rearwardly to raise the forward portion of the seat 24, while the upper end of rear guide link 32 turns downwardly to lower the rear portion of said seat. The seat 24 is therefore slightly tilted as it is moved rearwardly in the first motion phase.

It will be appreciated that during the first phase of motion of the body-supporting unit 22 from the sitting position of FIG. 1 to the intermediate tilted position of FIG. 2, the carrier member 28 remains stationary, resting upon the cross bars 16 and 18, and thus in effect serves as a fixed portion of the support frame 10. The pivotal mount 40 of the front guide link 30 is therefore a fixed pivot during this first motion phase, for the rearward turning movement of said front guide link.

The slot 44 in carrier member 28 is formed as an arc whose center is at the pivotal mount 36 of the rear guide link 32. As the rear guide link 32 turns rearwardly during the first motion phase, the pin 48 carried by its slides through slot 44, until at the intermediate position of FIG. 2 it is located at the rear of said slot 44.

The intermediate tilted position of FIG. 2 is determined by the engagement of the rear guide link 32 with the cross bar 18, the latter preventing further rearward turning movement of the guide links 30 and 32 relative to the support frame 10.

As the forward end portion of the seat 24 moves rearwardly, it carries with it the leg-rest control linkage 58 and the leg-rest 50. The actuating link 84, however, mounted on the stationary carrier member 28, restrains rearward movement of link 62 at point 88 and causes links 62 and 60 to turn forwardly about their respective pivots 66 and 64 relative to the seat 24. The leg-rest control linkage 58 is therefore extended to the position shown in FIG. 2 in the intermediate position of the body-supporting unit 22, the link 70 being moved further than the link 68 during this movement to turn the leg-rest section 54 into substantial alignment with the section 52. The pin 82 slides in slot 90, permitting a degree of movement between links 60 and 68, and preventing the linkage from binding.

It will be observed that in the "active" or intermediate tilted position of FIG. 2, the body-supporting unit 22 is only slightly tilted and the occupant's body is supported in a substantially upright attitude suitable for reading, viewing television, or the like. At the same time the leg-rest 50 is sufficiently extended to properly support the outstretched legs of the occupant.

Since the guide links 30 and 32 are blocked from further rearward movement in the intermediate tilted position of FIG. 2, the only further rearward movement of the body-supporting unit 22 is now limited to turning movement about its pivotal connection 38 with the rear guide link 32. To bring the body-supporting unit 22 from the intermediate tilted position to the fully tilted position, therefore, the occupant applies further rearward pressure against the back-rest 26. The rearward shift of the occupant's weight changes the center of gravity of the body-supporting unit, and causes the latter to turn about the pivot 38 which is now held in a fixed position by engagement of the rear guide link 32 with the cross-bar 18.

As the body-supporting unit 22 turns about the pivot 38, its front end portion is raised relative to the support frame carrying upwardly and rearwardly with it the leg-rest control linkage 58 and the front guide link 30. As the front guide link 30 is lifted with the seat, it raises the forward portion of carrier member 28 upwardly from the cross-bar 16, as shown in FIG. 3, the carrier member 28 turning about its fixed pivotal mount 34 on the support frame 10. In this position, the pivotal mount 34 of the carrier member 28 is located close to the pivotal mount 38 of the body-supporting unit, but since these pivotal mounts are not concentric, the leg-rest control linkage 58 will move rearwardly at a slightly faster rate than the carrier member at point 86. Consequently, the actuating link 84 will push the control linkage 58 slightly outwardly during the second motion phase, extending the leg-rest 50 further to a slight degree and bringing the sections 52 and 54 more into alignment as shown in FIG. 3. Nevertheless, the leg-rest is still maintained extended in proper leg-supporting position during the second motion phase.

When the body-supporting unit 22 reaches its fully-tilted position of FIG. 3, the extension 46 of slot 44 has moved upwardly relative to pin 48 until the pin 48 is at the bottom of said slot extension 46, at which point the carrier member 28 can no longer turn upwardly relative to the immovable rear guide link 32 and the body-supporting unit is stopped in its fully-tilted position.

To permit this movement, the slot extension 46 is formed as the arc of a circle whose center is located at the pivotal mount 34 of carrier member 28.

As was previously indicated, the pin 48 and slot 44 serve as sequencing means to insure that the body-supporting unit 22 moves rearwardly as guided by the guide links 30 and 32 during the first motion phase and before it begins to turn about the pivot 38 in the second motion

phase. The body-supporting unit, in the upright sitting position of FIG. 1, may have a tendency to begin turning about its pivotal connection 38 with the rear guide link 32. In this event, the front guide link 30 would be raised, causing the carrier member 28 to turn upwardly about its fixed pivotal mount 34 to permit such pivoting movement of the body-supporting unit. The presence of the pin 48 in the slot 44, however, prevents the carrier member 28 from turning prematurely. Since the pin 48 is fixed upon the rear guide link 32, the carrier member 28 cannot turn relative to said rear guide link. During the first motion phase, therefore, the body-supporting unit 22 is carried by both guide links 30 and 32.

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 pivot 38, and the carrier link 28 to turn downwardly about the pivot 36 until the body-supporting unit again reaches the intermediate tilted position of FIG. 2. During this return movement, the pin 48 slides upwardly in slot extension 46. To return from the intermediate tilted position to the upright sitting position, the occupant need merely apply downward pressure on the leg-rest 50, this pressure causing the body-supporting unit 22 to move forwardly on the guide links 30 and 32.

While a preferred embodiment of the invention has been shown and described herein, it is obvious that numerous additions, changes and omissions may be made therein, 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, and means mounting the 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, said mounting means including a carrier member pivotally mounted on the support frame, said carrier member extending forwardly from its pivotal mount in the upright sitting position of said chair and resting upon a fixed portion of the support frame, a front guide link pivotally mounted on the carrier member and pivotally connected to said seat, a rear guide link pivotally mounted on the support frame at a point spaced forwardly of the pivotal mount of the carrier member and pivotally connected to the rear end portion of the body-supporting unit and crossing over said carrier member, the two guide links pivoting rearwardly during said first motion phase to guide said body-supporting unit to its intermediate tilted positions, stop means positioned to engage the rear guide link in the intermediate tilted position to halt further rearward movement of the guide links in the first motion phase, the body-supporting unit tilting rearwardly in the second motion phase about the rear guide link, and the front guide link raising said carrier member from its horizontal position as the front portion of the seat is raised above the pivotal mount of said carrier member during said second motion phase, an arcuate slot in said carrier member at said cross over with said rear guide link and having a center of curvature concentric with the pivotal mount of said rear guide link, and a pin carried by said rear guide link and slidably received in said slot.

2. A multiple position reclining chair comprising a support frame, a body-supporting unit including a seat and back-rest formed rigidly with each other, and means mounting the 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, said mounting means including a carrier member pivotally mounted at its rear end on the support frame, said carrier member extending forwardly from its pivotal mount in the upright sitting position of said chair, means supporting said carrier member relative to the support frame during the first motion phase, a front guide link pivotally mounted on the forward portion of the carrier member and pivotally connected to the forward portion of said seat, a rear guide link pivotally mounted on the support frame at a point spaced forwardly of the pivotal mount of the carrier member and pivotally connected to the rear end portion of the body-supporting unit, the front guide link turning rearwardly about its pivotal mount on the stationary carrier member and the rear guide link turning rearwardly about its pivotal mount on the support frame during said first motion phase to guide said body-supporting unit to its intermediate tilted position, said rear guide link and carrier member crossing over each other, a pin-and-slot connection between said rear guide link and carrier member at their crossing-over point, and stop means on the support frame engaging the rear guide link in the intermediate tilted position to halt further rearward movement of the guide links in the first motion phase, the body-supporting unit tilting rearwardly in the second motion phase about its pivotal connection with the rear guide link, and the front guide link raising said carrier member about its pivotal mount on the support frame from its horizontal position as the front portion of the seat is raised above the pivotal mount of said carrier member during said second motion phase.

3. A multiple position reclining chair comprising a support frame, a body-supporting unit including a seat and back-rest formed rigidly with each other, and means mounting the 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, said mounting means including a carrier member pivotally mounted at its rear end on the support frame, said carrier member extending forwardly from its pivotal mount in the upright sitting position of said chair, means supporting said carrier member relative to the support frame during the first motion phase, a front guide link pivotally mounted on the forward portion of the carrier member and pivotally connected to the forward portion of said seat, a rear guide link pivotally mounted on the support frame at a point spaced forwardly of the pivotal mount of the carrier member and pivotally connected to the rear end portion of the body-supporting unit, the front guide link turning rearwardly about its pivotal mount on the stationary carrier member and the rear guide link turning rearwardly about its pivotal mount on the support frame during said first motion phase to guide said body-supporting unit to its intermediate tilted position, and stop means on the support frame engaging the rear guide link in the intermediate tilted position to halt further rearward movement of the guide links in the first motion phase, the body-supporting unit tilting rearwardly in the second motion phase about its pivotal connection with the rear guide link, the front guide link raising said carrier member about its pivotal mount on the support frame from its horizontal position as the front portion of the seat is raised above the pivotal mount of said carrier member during said second motion phase, and sequencing means between said rear guide link and said carrier member for restraining movement of the body-supporting unit through the first motion phase until the body-supporting unit has completed the first motion phase and is in the intermediate tilted position, said sequencing means including a slot in said carrier member and a pin carried by said rear guide link and slidably received in said slot, said slot having a section defining an arc of a circle with a center at the pivotal mount of the rear guide link on the support frame and an extension section defining the arc of a circle with a

center at the pivotal mount of the carrier member on the support frame.

4. A multiple position reclining chair comprising a support frame, a body-supporting unit including a seat and back-rest formed rigidly with each other, and means mounting the 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, said mounting means including a carrier member pivotally mounted at its rear end on the support frame, said carrier member extending forwardly and substantially horizontally from its pivotal mount in the upright sitting position of said chair, means supporting said carrier member immovably relative to the support frame during the first motion phase, a front guide link pivotally mounted on the forward portion of the carrier member and pivotally connected to the forward portion of said seat, a rear guide link pivotally mounted on the support frame at a point spaced forwardly of the pivotal mount of the carrier member and pivotally connected to the rear end portion of the body-supporting unit, an arcuate sequencing slot in the carrier member having a center of curvature concentric with the pivotal mount of the rear guide link on the support frame, a pin carried by the rear guide link and slidably received in said slot, the front guide link turning rearwardly about its pivotal mount on the stationary carrier member and the rear guide link turning rearwardly about its pivotal mount on the support frame during said first motion phase to guide said body-supporting unit to its intermediate tilted position, stop means on the support frame engaging the rear guide link in the intermediate tilted position to halt further rearward movement of the guide links in the first motion phase, the body-supporting unit tilting rearwardly in the second motion phase about its pivotal connection with the rear guide link, and the front guide link raising said carrier member from its horizontal position as the front portion of the seat is raised above the pivotal mount of said carrier member during said second motion phase, a leg-rest, means mounting the leg-rest on the forward portion of the seat for movement between a retracted position beneath the seat and an extended position forwardly of the seat, and an actuating link pivotally mounted on the carrier member and operatively connected to the leg-rest for raising the leg-rest to its extended position during the first motion phase when the leg-rest is moved rearwardly with the seat relative to the stationary carrier member.

5. A multiple position reclining chair according to claim 4 in which the pivotal connection between the rear guide link and the body-supporting unit is located close to the pivotal mount of the carrier member during the second motion phase, whereby the carrier member travels through substantially the same path of movement as the seat during the second motion phase and the leg-rest is maintained in extended position relative to the seat.

6. A multiple position reclining chair according to claim 5 in which said leg-rest is formed of two hinged sections, and the mounting means for the leg-rest comprises a first pair of links pivotally mounted at spaced points on the seat and a second pair of links pivotally connected to the respective sections of leg-rest, each link of the first pair being pivotally connected to both links of the second pair, one of the latter pivotal connections being a pin and slot coupling.

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