

June 19, 1962

P. S. FLETCHER

3,039,815

RECLINING CHAIR OF THE MULTIPLE TYPE

Filed Aug. 31, 1959

4 Sheets-Sheet 1

FIG. 1

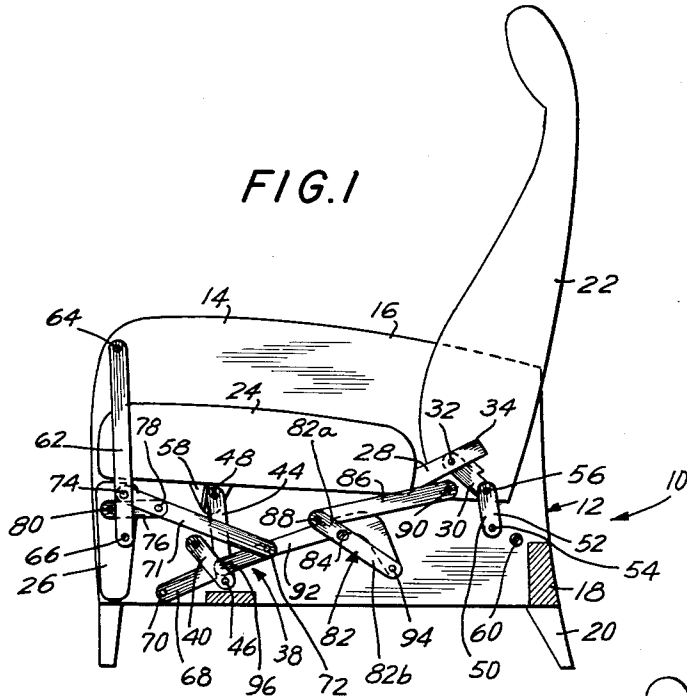
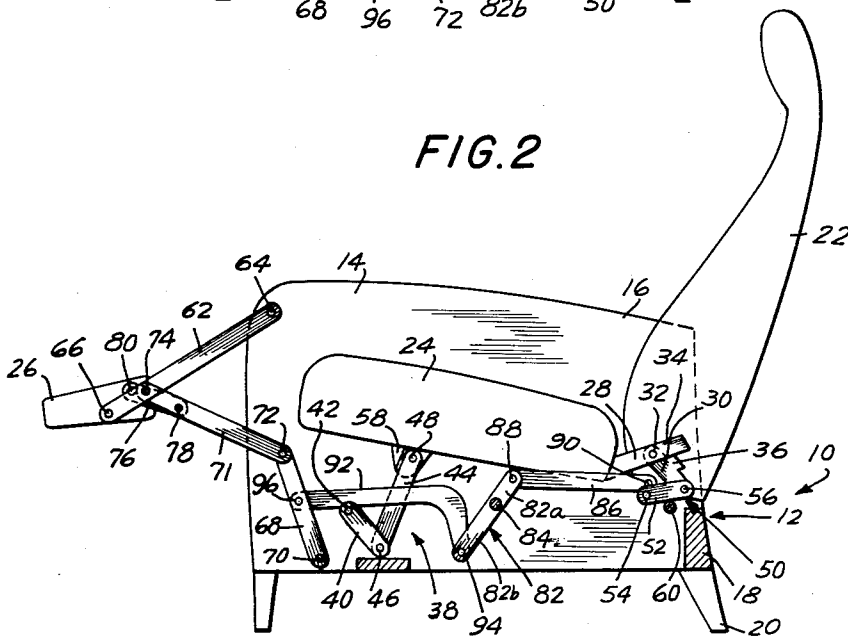


FIG. 2



INVENTOR.
PETER S. FLETCHER

BY
Ametur & Levy
ATTORNEYS

June 19, 1962

P. S. FLETCHER

3,039,815

RECLINING CHAIR OF THE MULTIPLE TYPE

Filed Aug. 31, 1959

4 Sheets-Sheet 2

FIG. 3

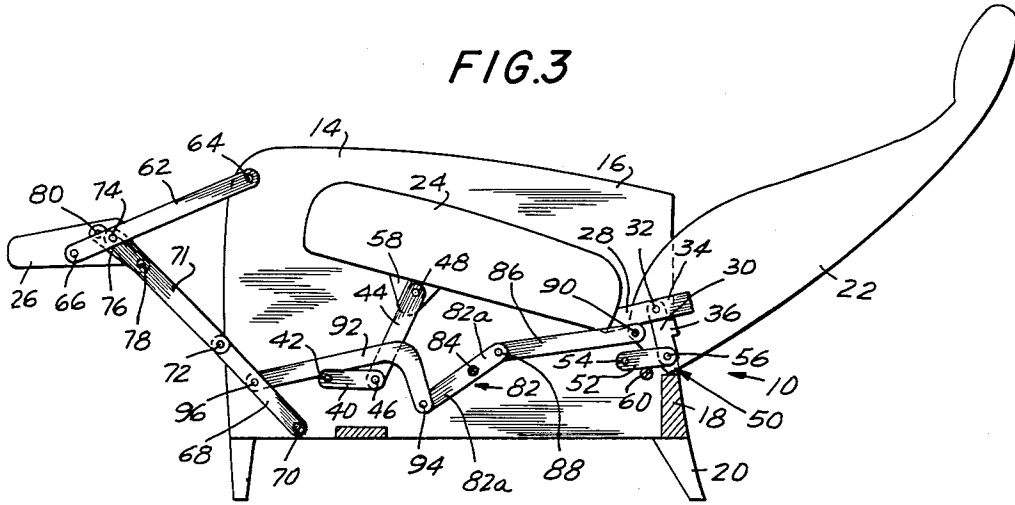
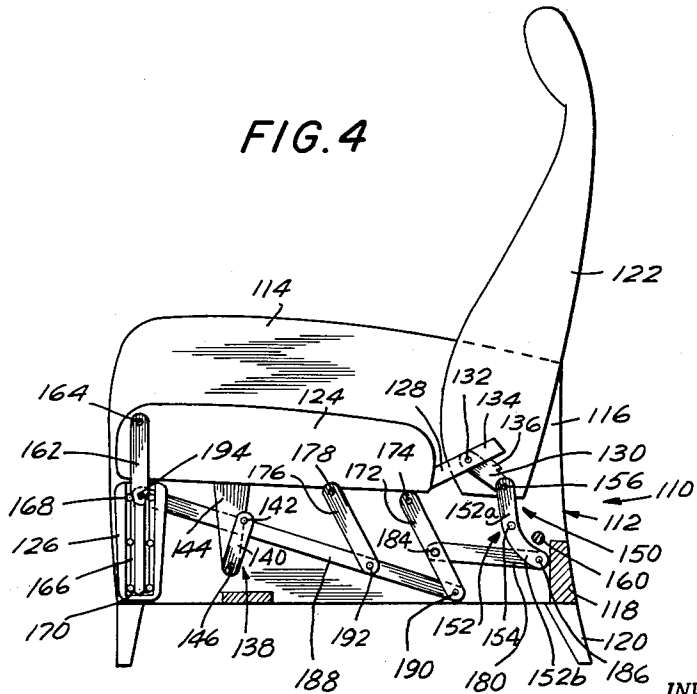


FIG. 4



INVENTOR.
PETER S. FLETCHER

BY

Amster & Levy
ATTORNEYS

June 19, 1962

P. S. FLETCHER

3,039,815

RECLINING CHAIR OF THE MULTIPLE TYPE

Filed Aug. 31, 1959

4 Sheets-Sheet 3

FIG. 5

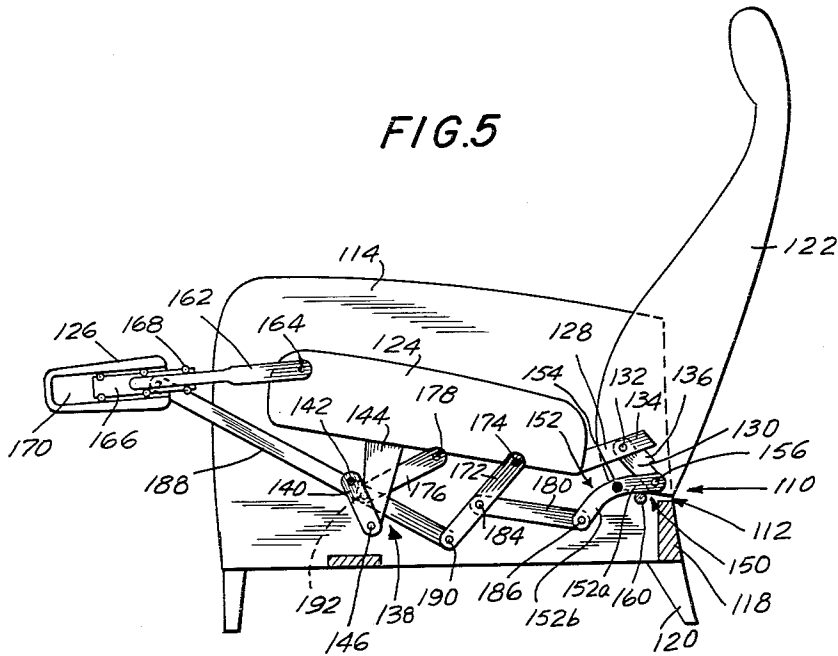
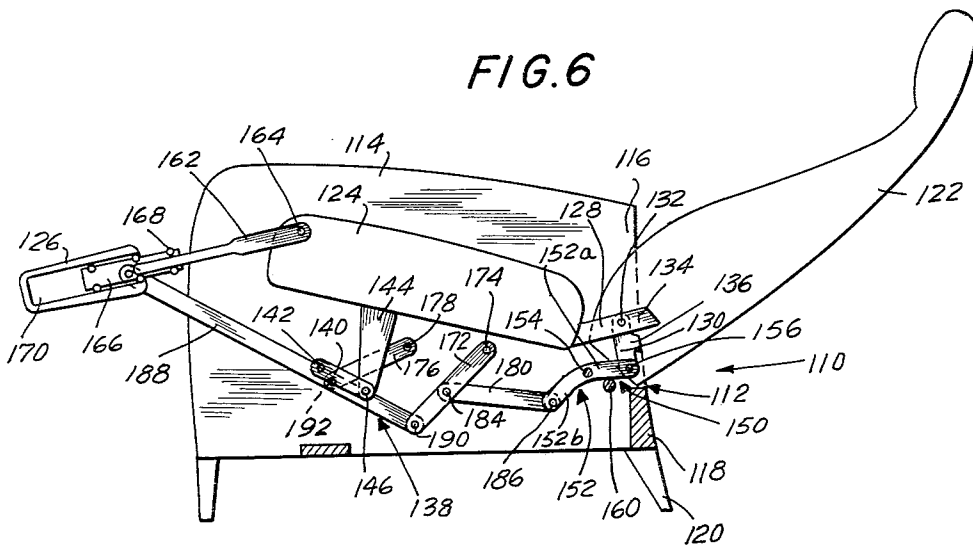


FIG. 6



INVENTOR.
PETER S. FLETCHER

BY *Ametis & Lury*
ATTORNEYS

June 19, 1962

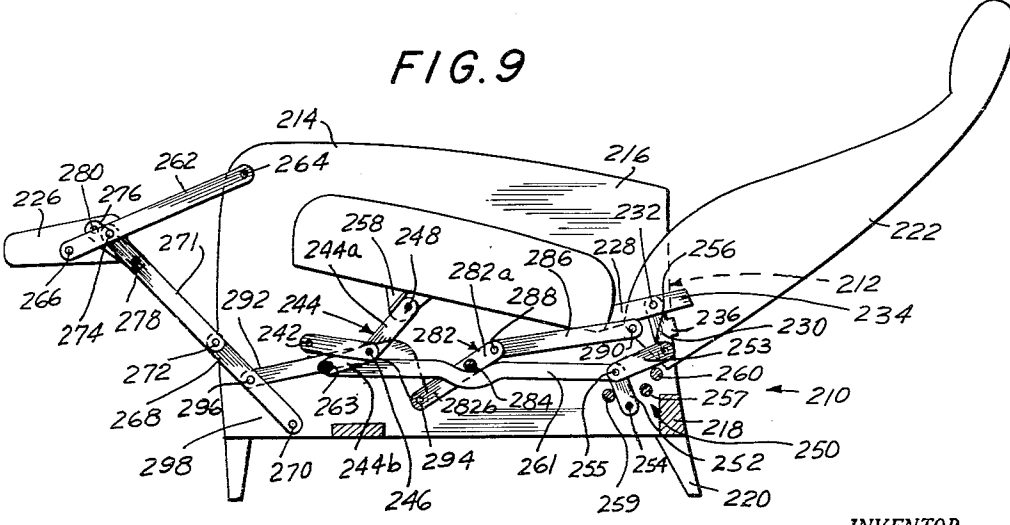
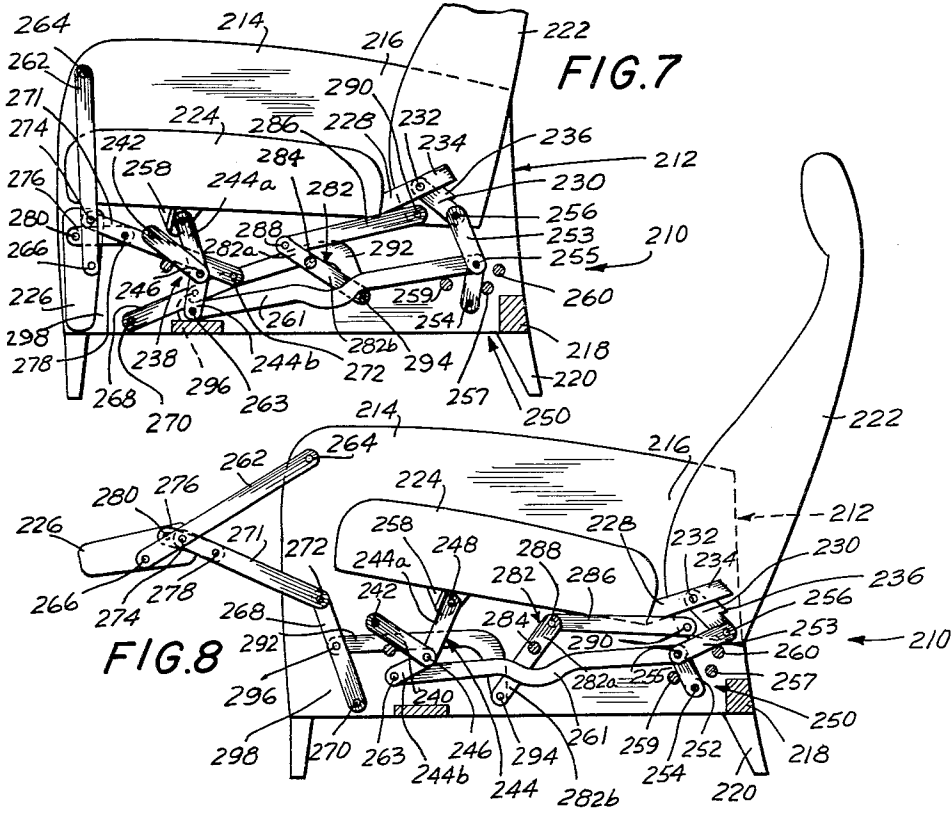
P. S. FLETCHER

3,039,815

RECLINING CHAIR OF THE MULTIPLE TYPE

Filed Aug. 31, 1959

4 Sheets-Sheet 4



INVENTOR.

PETER S. FLETCHER

BY

Amster & Levy
ATTORNEYS

1

3,039,815

RECLINING CHAIR OF THE MULTIPLE TYPE

Peter S. Fletcher, Delray Beach, Fla., assignor to
Anton Lorenz

Filed Aug. 31, 1959, Ser. No. 837,154

10 Claims. (Cl. 297-84)

The present invention relates generally to reclining chairs, and in particular to an improved reclining chair of the type including body-supporting means having a movable back-rest and a movable seat which are coordinated with each other to include several distinct phases of chair movement. This is a continuation-in-part of my earlier filed application Serial No. 666,604 filed June 19, 1957 and entitled Reclining Chairs, now abandoned.

The well known reclining chair comprises a support, body-supporting means including a back-rest and seat movably mounted on the support, and a leg-rest mounted beneath the seat and movable into various elevated leg-supported positions incident to the chair movement. Heretofore there has been two distinct types of reclining chair, those constructed with a unitary back-rest and seat mounted on a support for movement into various tilted positions and those constructed with a movable back-rest and movable seat and mounted on the support for reclining and inclining movement respectively. Chairs of the type incorporating a unitary back-rest and seat were found to be most suitable for accommodating the chair occupant in a tilted back position, but in a sitting attitude, with the occupant's leg supported on the elevated leg-rest. Chairs of the type incorporating a movable back-rest and movable seat were found to be most suitable for accommodating the chair occupant in a complete and full relaxation position, with the occupant's leg supported on the elevated leg-rest, in that the angle between the back-rest and seat increases in response to the reclining movement of the chair.

Of recent times there has been introduced an improved double or multiple movement reclining chair which exhibits attributes of both types of chairs which have been heretofore sold, to wit, those suitable for accommodating the chair occupant in a semi-reclined or tilted back attitude and those suitable for accommodating the chair occupant in a fully reclined or complete relaxation attitude. Provision is made in such chairs of the double movement type for a first movement phase from a sitting position to an intermediate tilted position during which there is substantially no angular displacement between the back-rest and seat, with the leg-rest moving to an elevated leg-supporting position and for a second movement phase from the intermediate tilted position to a fully reclined position during which the angle between the seat and back-rest opens up, with the leg-rest remaining in an elevated leg-supporting position.

Broadly, it is an object of the present invention to provide an improved reclining chair of the multiple movement type. Specifically, it is within the contemplation of the present invention to provide an improved and simplified reclining chair having two distinct phases of movement.

In accordance with an illustrative embodiment demonstrating features of the present invention, a reclining chair is provided which comprises a support and body-supporting means including a seat and back-rest adapted to be mounted for movement from a sitting position through a first movement phase to an intermediate tilted position and through a second movement phase from the intermediate tilted position to a reclining position. A link is pivotally connected at a seat pivot and extends rearwardly therefrom, with the back-rest being operatively connected to the link. Blocking means are operatively connected

2

between the seat and back-rest and arranged to establish a prescribed angular relationship therebetween during the first movement phase and to preclude movement of the seat and back-rest towards each other. The blocking means is further arranged to permit movement of the seat and back-rest away from each other during the second movement phase to increase the angular relationship therebetween to establish a reclining position for the chair. Front guiding means are pivotally mounted on the support at a first pivotal mount and pivotally connected to the seat at a first pivotal connection. Rear guiding means are pivotally mounted on the support at a second pivotal mount and pivotally connected to the link at a point spaced rearwardly of the seat pivot. The front guide means, the portion of the seat and the link intermediate the first and second pivotal connections, and the rear guiding means serve as movable links during the first movement phase, with the portion of the support intermediate the first and second pivotal mounts serving as a stationary link. The front guiding means, the seat, and the link serve as movable links during the second movement phase, with a stationary link being provided intermediate the first pivotal mount and the second pivotal connection.

The above brief description as well as further objects, features and advantages of the present invention will be more fully appreciated by reference to the following detailed description of several presently preferred illustrative embodiments in accordance with the present invention, when taken in conjunction with the accompanying drawings, wherein:

FIG. 1 is a side elevational view, with parts broken away and sectioned, showing a reclining chair of the double movement type embodying features of the present invention, with the chair shown in the upright or sitting position;

FIG. 2 is a side elevational view similar to FIG. 1, but showing the reclining chair in an intermediate tilted or semi-reclined position, with the leg-rest moved to an elevated leg-supporting position;

FIG. 3 is a side elevational view, similar to FIG. 2, but showing the reclining chair in a fully reclined position wherein the back-rest and seat have been angularly displaced relative to each other to establish a complete relaxation position for the chair occupant, with the leg-rest being disposed in an elevated leg-supporting position;

FIG. 4 is a side elevational view, with parts broken away and sectioned, showing a reclining chair of the double movement type embodying features of the present invention, with the chair shown in the upright or sitting position;

FIG. 5 is a side elevational view similar to FIG. 4, but showing the reclining chair in an intermediate tilted or semi-reclined position, with the leg-rest moved to an elevated leg-supporting position;

FIG. 6 is a side elevational view, similar to FIG. 5, but showing the reclining chair in a fully reclined position wherein the back-rest and seat have been angularly displaced relative to each other to establish a complete relaxation position for the chair occupant, with the leg-rest being disposed in an elevated leg-supporting position;

FIG. 7 is a side elevational view, with parts broken away and sectioned, showing a reclining chair of the double movement type embodying features of the present invention, with the chair shown in the upright or sitting position;

FIG. 8 is a side elevational view similar to FIG. 7, but showing the reclining chair in an intermediate tilted or semi-reclined position, with the leg-rest moved to an elevated leg-supporting position; and,

FIG. 9 is a side elevational view, similar to FIG. 8, but showing the reclining chair in a fully reclined posi-

3

tion wherein the back-rest and seat have been angularly displaced relative to each other to establish a complete relaxation position for the chair occupant, with the leg-rest being disposed in an elevated leg-supporting position.

Referring now specifically to FIGS. 1 to 3 of the drawings, there is shown a first embodiment of a reclining chair demonstrating features of the present invention, generally designated by the reference numeral 10, which includes a support or frame 12 having opposite side walls 14, 16 interconnected by suitable cross braces 18 and supported on depending legs 20.

Body-supporting means including a back-rest 22 and a seat 24 are movably mounted on the support 12 for reclining and inclining movement respectively for a first movement phase from the sitting position illustrated in FIG. 1 to the intermediate tilted position illustrated in FIG. 2 and for a second movement phase from the intermediate tilted position illustrated in FIG. 2 through a series of reclining positions to a fully reclined or complete relaxation position illustrated in FIG. 3.

Disposed beneath the forward end of the seat 24 is the leg-rest 26 which is mounted from a stored or retracted position as shown in FIG. 1 to elevated leg-supporting positions, as shown in FIGS. 2 and 3. As will be described, the leg-rest 26 is coordinated to the back-rest 22 and the seat 24 for movement into an elevated leg-supporting position in response to the first movement phase of the chair, with the leg-rest 26 remaining substantially in the elevated leg-supporting position as the chair moves from the intermediate tilted or semi-reclined position of FIG. 2 to the fully reclined position of FIG. 3.

In this illustrative embodiment, the seat 24 carries a rearwardly directed rigid hanger arm 28 and extending rearwardly and downwardly from the hanger arm 28 is a link 30 which is rigid with the back-rest and has its upper and forward end pivotally connected to the hanger 28 at a seat pivot 32.

Blocking means are operatively connected between the seat 24 and the back-rest 22 and are arranged to establish a prescribed angular relationship therebetween during the first movement phase and to preclude movement of the seat 24 and the back-rest 22 toward each other. In this illustrative embodiment, the hanger 28 includes an integral blocking arm 34 which projects rearwardly of the seat pivot 32 and engages a stationary blocking plate 36 integral with the link 30 and projecting rearwardly therefrom. As seen in FIGS. 1 and 2, the blocking arm 34 and blocking plate 36 are in abutment with each other when the seat 24 and the back-rest 22 are disposed in the requisite angular relationship for the sitting and intermediate tilted positions. As may be appreciated by progressively inspecting FIGS. 2 and 3, the blocking arm 34 and blocking plate 36 permit relative movement of the seat 24 and back-rest 22 away from each other during the second movement phase to increase the angular relationship therebetween to establish the proper relationship between the seat and back-rest for the reclining position illustrated in FIG. 3.

A front guiding means, generally designated by the reference number 38, is operatively connected between the support 12 and the seat 24 which guiding means is operative during the first and second movement phases of the chair. In this illustrative embodiment, the front guiding means includes a first link 40 extending rearwardly and downwardly from its upper end to its lower end and having a pivotal mount 42 at its upper end on the support 12. Extending upwardly from the lower end of the first link 40 is a second link 44 which has a pivotal connection 46 at its lower end to the first link 40 and a pivotal connection 48 at its upper end to the seat 24. The links 40, 44 are arranged such that the intermediate pivotal connection 46 rests on the cross brace 18 serving as a stop, with the link 44 turning in the clockwise direction about the pivotal connection 46 serving as a stationary pivotal mount during the first movement phase, and with the link 40 turning in the counterclockwise

4

direction about the stationary pivotal mount 42 during the second movement phase.

A rear guiding means, generally designated by the reference numeral 50, is operatively connected between the link 30 and the support 12 for guiding the rearward portion of the body-supporting means during the first movement phase, with the rear guiding means remaining stationary relative to the support and providing a back-rest pivot during the second movement phase. In this illustrative embodiment, the rear guiding means 50 includes a rear guiding link 52 which has a pivotal mount 54 at its lower end on the support and a pivotal connection 56 at its upper end to the lower and rearward end of the link 30 which is rigid or integral with the back-rest 22.

Provision is made for blocking relative movement between the link 44 of the front guide means 38 and the seat 24 at the end of the first movement phase and for blocking turning movement of the rear guiding link 52 about its pivotal mount 54. Specifically, the seat 24 carries a depending stop 58 in the region of the pivotal connection 48 which stop becomes coextensive with the adjacent end portion of the link 44 in the intermediate tilted position and for all intents and purposes renders the link 44 rigid with the seat 24 during the second movement phase. Further, a stop 60 is located rearwardly of the rear guiding link 52 to abut the link 52 in the intermediate tilted position to preclude further clockwise movement of the rear guiding link about its pivotal mount 54.

The first movement phase guiding linkage includes the link 44 of the front guiding means, the portion of the seat 24 and the link 30 intermediate the pivotal connection 48 and the pivotal connection 56, and the rear guiding link 52 as the movable link thereof and the portion of the support 12 intermediate the pivotal connection 46 and the pivotal mount 54 as the stationary link thereof. In this connection, it should be recalled that the blocking means 34, 36 renders the seat 24 and the back-rest 22 rigid with each other during the first movement phase. The second movement phase guiding linkage includes the link 40 of the front guiding means 38, the portion of the seat 24 intermediate the pivotal connection 46 and the seat pivot 32, and the link 30 as the movable link thereof, with a stationary link being provided intermediate the pivotal mount 42 and the pivotal connection 56, the latter serving as a relatively stationary pivotal mount during the second movement phase.

In this illustrative embodiment, the leg-rest 26 is mounted for movement from the retracted position of FIG. 1 to the elevated leg-supporting position illustrated in FIGS. 2 and 3 by a leg-rest mounting linkage including a first mounting link 62 which has a pivotal mount 64 at its upper end on the support 12 and a pivotal connection 66 at its lower end on the leg-rest 26 and a second mounting link 68 which has a pivotal mount 70 at its lower end on the support at a point spaced below the pivotal mount 64. The mounting link 68 is coupled to the mounting link 62 and to the leg-rest 26 by a first connecting link 71 which has a pivotal connection 72 at its rearward end to the upper end of the mounting link 68 and a pivotal connection 74 at its forward end to the mounting link 62 at a point spaced from the pivotal connection 66 to the leg-rest and a further connecting link 76 which has a pivotal connection 78 at its rearward end to the connecting link 71 at a point spaced rearwardly of the pivotal connection 74 and a pivotal connection 80 at its forward end to the leg-rest 26 at a point spaced from the pivotal connection 66. The leg-rest mounting linkage thus described is actuated from the back-rest 22 via a double-arm actuating lever 82 which has a pivotal mount 84 intermediate its ends on the support. The arm 82a of the double-arm lever 82 is coupled to the back-rest 22 by a connecting link 86 which has a pivotal connection 88 at its forward end to the arm 82a and a pivotal connection 90 at its rearward end to the back-rest at a point spaced

forwardly of the pivotal connection 56. The arm 82b of the double-arm lever 82 is coupled to the mounting link 68 via a further connecting link 92 which has a pivotal connection 94 at its rearward end to the arm 82b and a pivotal connection 96 at its forward end to the mounting link 68 intermediate the ends thereof. Accordingly, in response to the rearward movement of the back-rest 22 during both the first and second movement phases, a rearwardly directed thrust is imparted via the connecting link 86 to the arm 82a of the double-arm actuating lever 82 which swings the arm 82b thereof in the clockwise direction about the pivotal mount 84. Such clockwise movement imparts a forward thrust via the connecting link 92 to the mounting link 68 which turns the mounting link 68 in the counterclockwise direction about the pivotal mount 70 thereby moving the leg-rest from the stored position to the several elevated leg-supporting positions.

For a better understanding of this illustrative embodiment of the present invention, reference will be made to a typical sequence of operations:

When the chair occupant is seated in the chair 10 and leans against the back-rest 22 the body-supporting unit 22, 24 is displaced rearwardly and downwardly relative to the support with no angular displacement between the back-rest 22 and the seat 24. During such initial or first movement phase, the forward portion of the seat 24 is guided by the link 44 of the front guiding means or linkage 38 which turns in the clockwise direction about the pivotal connection 46 serving as a pivotal mount. The rearward portion of the seat and the back-rest which is rigid therewith are guided by the rear guiding link 52 which likewise turns in the clockwise direction about its pivotal connection 54. Incident to such rearward movement of the body-supporting unit, the requisite turning movement is imparted to the double-arm actuating lever 82 and the leg-rest 26 moves to the elevated leg-supporting position. The end of the first movement phase is established when the link 44 abuts the stop 58 and when substantially simultaneously the rear guiding link 52 abuts the stop 60. At such time, and as illustrated in FIG. 2, the link 44 becomes unitary with the seat 24 and together define a single movable link for the second movement phase intermediate the pivotal connection 46 and the seat pivot 32. When the rear guiding link 52 abuts the stop 60, the link 52 becomes unitary with the support for all intents and purposes and thereafter the pivotal connection 56 to the link 30 serves as a relatively stationary pivot for the second movement phase. When the chair occupant exerts continued pressure with the chair in the intermediate tilted or semi-reclined position of FIG. 2, the back-rest 22 begins to turn about the relatively fixed or stationary pivotal mount 56, with the seat 24 being guided by the link 40 which turns in the counter-clockwise direction about the pivotal mount 42. As may be appreciated by progressively inspecting FIGS. 2 and 3, the action of the front guiding means 38 is to guide the seat 24 generally upwardly with approximately the same inclination, while the back-rest is turning about the pivotal mount 56 such that the included angle between the back-rest and seat opens up to establish the fully reclined position of FIG. 3. The second movement phase continues until such time as the second movement phase linkage is blocked, for example, by the contact of the lower portion of the back-rest 22 with the rear cross brace 18 serving as a stop. It will be appreciated that during the second movement phase a relatively small rearward thrust is imparted to the connecting link 86 which results in a small turning movement of the actuating lever 82 such that the leg-rest 26 is somewhat further elevated as may be appreciated, by comparing the relative position of the links 68, 71 in the FIG. 2 and FIG. 3 respectively. When the chair occupant desires to restore the chair to the upright sitting position illustrated in FIG. 1, the occupant leans forwardly such that the back-rest, seat and leg-

rest move through the reverse sequence of movement with the chair first moving into the intermediate tilted position of FIG. 2 and then being returned to the upright or sitting position illustrated in FIG. 1.

Referring now specifically to FIGS. 4 to 6 of the drawings there is shown a further embodiment of a reclining chair demonstrating features of the present invention, generally designated by the reference numeral 110, which includes a support or frame 112 having opposite side walls 114, 116 interconnected by suitable cross braces 118 and supported on depending legs 120.

Body-supporting means including a back-rest 122 and a seat 124 are movably mounted on the support 112 for reclining and inclining movement respectively for a first movement phase from the sitting position illustrated in FIG. 4 to the intermediate tilted position illustrated in FIG. 5 and for a second movement phase from the intermediate tilted position illustrated in FIG. 5 through a series of reclining positions to a fully reclined or complete relaxation position illustrated in FIG. 6.

Disposed beneath the forward end of the seat 124 is the leg-rest 126 which is mounted for movement from a stored or retracted position as shown in FIG. 4 to elevated leg-supporting positions, as shown in FIGS. 5 and 6. As will be described, the leg-rest 126 is coordinated to the back-rest 122 and the seat 124 for movement into an elevated leg-supporting position in response to the first movement phase of the chair, with the leg-rest 126 remaining substantially in the elevated leg-supporting position as the chair moves from the intermediate tilted or semi-reclined position of FIG. 5 to the fully reclined position of FIG. 6.

In this illustrative embodiment, the seat 124 carries a rearwardly directed rigid hanger arm 128. Extending rearwardly and downwardly from the hanger arm 128 is a link 130 which is rigid with the back-rest and has its upper and forward end pivotally connected to the hanger 128 at a seat pivot 132.

Blocking means are operatively connected between the seat 124 and the back-rest 122 and are arranged to establish a prescribed angular relationship therebetween during the first movement phase and to preclude movement of the seat 124 and the back-rest 122 toward each other. In this illustrative embodiment, the hanger 128 includes an integral blocking arm 134 which projects rearwardly of the seat pivot 132 and engages a stationary blocking plate 138 integral with the link 130 and projecting rearwardly therefrom. As seen in FIGS. 4 and 5 the blocking arm 134 and blocking plate 136 are in abutment with each other when the seat 124 and the back-rest 122 are disposed in the requisite angular relationship for the sitting and intermediate tilted positions. As may be appreciated by progressively inspecting FIGS. 5 and 6, the blocking arm 134 and blocking plate 136 permit relative movement of the seat 124 and back-rest 122 away from each other during the second movement phase to increase the angular relationship therebetween to establish the proper relationship between the seat and back-rest for the reclining position illustrated in FIG. 6.

A front guiding means, generally designated by the reference number 138 is operatively connected between the support 112 and the seat 124 which guiding means is operative during the first and second movement of the chair. In this illustrative embodiment, the front guiding means includes a link 140 extending forwardly and downwardly from its upper end to its lower end and having a pivotal mount 142 at its upper end on the support 112. Extending downwardly from the seat 124 is a depending extension which has a pivotal connection 146 at its lower end to the lower end of the link 140. The link 140 turns in the counterclockwise direction about the pivotal mount 142 during the first and second movement phases.

A rear guiding means, generally designated by the reference numeral 150, is operatively connected between the link 130 and the support 112 for guiding the rear-

ward portion of the body-supporting means during the first movement phase, with the rear guiding means remaining stationary relative to the support and providing a back-rest pivot during the second movement phase. In this illustrative embodiment, the rear guiding means 150 includes a double-arm lever 152 which has a pivotal mount 154 intermediate its ends on the support. The upwardly extending arm 152a of the double-arm lever 152 has a pivotal connection 156 at its upper end to the lower and rearward end of the link 130 which is rigid or integral with the back-rest 122.

Provision is made for blocking turning movement of the rear guiding link 152a about its pivotal mount 154. Specifically, a stop 160 is located rearwardly of the rear guiding link 152a to abut the link in the intermediate tilted position of FIG. 5 to preclude further clockwise movement of the link about its pivotal mount 154.

The first movement phase guiding linkage includes the link 140, the portion of the seat 124 and the link 130 intermediate the pivotal connection 146 and the pivotal connection 156, and the rear guiding link 152a as the movable link thereof and the portion of the support 112 intermediate the pivotal mount 142 and the pivotal mount 154 as the stationary link thereof, it being recalled that the blocking means 134, 136 renders the seat 124 and the back-rest 122 rigid with each other during the first movement phase. The second movement phase guiding linkage includes the link 140, the portion of the seat 124 intermediate the pivotal connection 146 and the pivot 132, and the link 130 as the movable link thereof, with a stationary link being provided intermediate the pivotal mount 142 and the pivotal connection 156, the latter serving as a relatively stationary pivotal mount during the second movement phase.

In this illustrative embodiment the leg-rest 126 is mounted for movement from the retracted position of FIG. 4 to the elevated leg-supporting positions illustrated in FIGS. 5 and 6 by a mounting link or arm 162 which has a pivotal mount 164 at its upper end on the seat 124. The lower end of the mounting arm 162 is confined within a trolley member 166 by appropriate bearings 168, the bearings being engaged within a track or guideway 170 formed within the leg-rest 126. Appropriate stops, not shown are associated with the trolley member 166, which with the mounting arm 162 provides an adjustable length coupling between the seat 124 and the leg-rest 126. The leg-rest 126 is coupled to the back-rest 122 by a coordinating linkage including a first guiding link 172 which has a pivotal mount 174 at its upper end on the support, a second guiding link 176 which has a pivotal mount 176 at its upper end on the support, a first coupling or connecting link 180 which extends between the guiding link 172 and the arm 152b of the double-arm lever 152 which has a pivotal connection 184 at its forward end to the guiding link 172 and a pivotal connection 186 at its rearward end to the arm 152b, and a further coupling or connecting link 188 which has a pivotal connection 190 at its rearward end to the guiding link 172, a pivotal connection 192 intermediate its ends to the lower end of the guiding link 176, and a pivotal connection 194 at its forward end to the mounting arm 162. Accordingly, in response to the rearward turning movement of the rear guiding link 152a, a forward thrust is imparted via the respective connecting links 180, 188 and the guiding links 172, 176 to the leg-rest for moving the same to the elevated leg-supporting position. In this embodiment the arm 152b remains stationary during the second movement phase and accordingly the leg-rest actuating linkage is effectively blocked.

For a better understanding of this illustrative embodiment of the present invention, reference will be made to a typical sequence of operations.

When the chair occupant is seated in the chair 110 and leans against the back-rest, the body-supporting unit 122, 124 is displaced rearwardly and downwardly rela-

tive to the support with no angular displacement between the back-rest 122 and the seat 124. During such initial or first movement phase, the forward portion of the seat 124 is guided by the link 140 which turns in the counterclockwise direction about the pivotal mount 142, with the rearward portion of the seat and the back-rest which is rigid therewith being guided by the rear guiding link 152a which turns in the clockwise direction about its pivotal mount 154. Incident to such rearward movement of the body-supporting unit, the requisite turning movement is imparted via the double-arm actuating lever 152 to the leg-rest mounting linkage and the leg-rest moves to the elevated leg-supporting position. The end of the first movement phase is established when the rear guiding link 152 abuts the stop 160. At such time and as illustrated in FIG. 5, the link 152a becomes unitary with the support for all intents and purposes and thereafter the pivotal connection 156 to the link 130 serves as a relatively stationary pivot for the second movement phase. When the chair occupant exerts continued pressure with the chair in the intermediate tilted or semi-reclined position of FIG. 5, the back-rest 122 begins to turn about the relatively fixed or stationary pivotal mount 156, with the seat 124 being guided by the link 40 which continues turning in the counterclockwise direction about the pivotal mount 42. As may be appreciated by progressively inspecting FIGS. 5 and 6, the action of the front guiding means 138 is to guide the seat generally upwardly at approximately the same inclination, while the back-rest is turning about the pivotal mount 156 such that the included angle between the back-rest and seat opens up to establish the fully reclined position of FIG. 6. The second movement phase continues until such time as the second movement phase linkage is blocked, for example by the contact of the lower portion of the back-rest 122 with a rear cross brace serving as a stop. When the chair occupant desires to restore the chair to the upright sitting position illustrated in FIG. 4, the occupant leans forwardly such that the back-rest, seat and leg-rest move through the reverse sequence of movement with the chair first moving into the intermediate tilted position of FIG. 5 and then being returned to the upright or sitting position illustrated in FIG. 4.

Referring now specifically to FIGS. 7 to 9 of the drawings there is shown a still further embodiment of a reclining chair demonstrating features of the present invention, generally designated by the reference numeral 210, which includes a support or frame 212, having opposite side walls 214, 216 interconnected by suitable cross braces 218 and supported on depending legs 220.

Body-supporting means including a back-rest 222 and a seat 224 are movably mounted on the support 212 for reclining and inclining movement respectively for a first movement phase from the sitting position illustrated in FIG. 7 to the intermediate tilted position illustrated in FIG. 8 and for a second movement phase from the intermediate tilted position illustrated in FIG. 8 through a series of reclining positions to a fully reclined or complete relaxation position illustrated in FIG. 9.

Disposed beneath the forward end of the seat 224 is the leg-rest 226 which is mounted for movement from a stored or retracted position as shown in FIG. 7 to elevated leg-supporting positions, as shown in FIGS. 8 and 9. As will be described, the leg-rest 226 is coordinated to the back-rest 222 and the seat 224 for movement into an elevated leg-supporting position in response to the first movement phase of the chair, with the leg-rest 226 remaining substantially in the elevated leg-supporting position as the chair moves from the intermediate tilted or semi-reclined position of FIG. 8a to the fully reclined position of FIG. 9.

In this illustrative embodiment, the seat 224 carries a rearwardly directed rigid hanger arm 228 and extending rearwardly and downwardly from the hanger arm 228 is

a link 230 which is rigid with the back-rest 222 and has its upper and forward end pivotally connected to the hanger 228 at a seat pivot 232.

Blocking means are operatively connected between the seat 224 and the back-rest 222 and are arranged to establish a prescribed angular relationship therebetween during the first movement phase and to preclude movement of the seat 224 and the back-rest toward each other. In this illustrative embodiment, the hanger 228 includes an integral blocking arm 234 which projects rearwardly of the seat pivot 232 and engages a stationary blocking plate 23b integral with the link 230 and projecting rearwardly therefrom. As seen in FIGS. 7 and 8 the blocking arm 234 and blocking plate 236 are in abutment with each other when the seat 224 and the back-rest 222 are disposed in the requisite angular relationship for the sitting and tilted positions. As may be appreciated by progressively inspecting FIGS. 8 and 9, the blocking arm 234 and blocking plate 236 permit relative movement of the seat and back-rest away from each other during the second movement phase to increase the angular relationship therebetween to establish the proper relationship between the seat and back-rest for the reclining position illustrated in FIG. 9.

A front seat guiding means, generally designated by the reference number 238, is operatively connected between the support 212 and the seat 224 which seat guiding means is operative during the first and second movement phases of the chair. In this illustrative embodiment, the front seat guiding means includes a first link 240 extending rearwardly and downwardly from its upper end to its lower end and having a pivotal mount 242 at its upper end on the support. Extending across the lower end of the first link 240 is a double-arm lever 224 which has a pivotal connection or mount 246 intermediate its ends on the first link 240, with the arm 244 having a pivotal connection 248 at its upper end to the seat 224. The link 240 rests on a stop 249 during the first movement phase, with the arm 244a of the lever 244 turning in the clockwise direction about the pivotal connection 246 serving as a stationary pivotal mount to guide the seat 224. During the second movement phase, the link 240 turns in the counterclockwise direction about the stationary pivotal mount 242 and along with the arm 244b guides the seat 224. During the first movement phase the depending arm 244b of the double-arm lever 244 turns in the clockwise direction about the pivotal connection 246 to serve as an actuating means for the rear guiding means 250, which will now be described.

In this illustrative embodiment, the rear guiding means 250 includes first and second rear guiding links 252, 253 which have their adjacent ends interconnected at a pivotal connection 255 serving as the knee pivot of a toggle link pair. The rear guiding link 252 has a pivotal mount 254 at its lower end on the support and the rear guiding link 253 has a pivotal connection 256 at its upper end to the link 230. Normally the knee pivot 255 of the toggle link pair 252, 253 is disposed to the rear of a dead center position, with the link 252 resting against a stop 257 as shown in FIG. 7. In response to actuation of the toggle link pair 252, 253, as by the application of a forwardly directed pulling force to the knee pivot 255, the toggle link pair moves forwardly through the dead center position, bringing about a rapid lowering of the rearward portion of the body-supporting means 222, 224, with the link 252 coming to rest against the stop 259 and the link 253 coming to rest against the stop 260, as shown in FIG. 8. The toggle link pair of the rear guide means 250 is actuated from the depending arm 244b of the double-arm lever 244 by provision of an actuating link 261 which has its rearward end pivotally connected to the toggle link pair 252, 253 at the knee pivot 255 and has its forward end pivotally connected to the arm 244b at the pivotal connection 263. Accordingly, in response to clockwise turning movement of the arm 244b about the pivotal mount

246, the requisite pulling force is imparted to the toggle link pair 252, 253.

Provision is made for blocking relative movements between the link 244 of the front guide means 238 and the seat 224 at the end of the first movement phase. Specifically, the seat 224 carries a depending stop 258 in the region of the pivotal connection 248 which stop becomes coextensive with the adjacent end portion of the link 244 in the intermediate tilted position and for all intents and purposes renders the link 244 rigid with the seat 224 during the second movement phase.

The first movement phase guiding linkage includes the link 244, the portion of the seat 224 and the link 230 intermediate the pivotal connection 248 and the pivotal connection 256, the rear guiding links 252, 253 of the toggle linkage mechanism and the actuating link 261 as the movable link thereof, with a stationary link being provided intermediate the pivotal connection 246 and the pivotal mount 254, it being recalled that the blocking means 234, 236 renders the seat 224 and the back-rest 222 rigid with each other during the first movement phase.

The second movement phase guiding linkage includes the links 246, 244a of the front seat guiding means 238, the portion of the seat 224 intermediate the pivotal connection 243 and the seat pivot 232, and the link 230 as the movable link thereof, with a stationary link being provided intermediate the pivotal mount 242 and the pivotal connection 25b, the latter serving as a relatively stationary pivotal mount during the second movement phase.

In this illustrative embodiment, the leg-rest 226 is mounted for movement from the retracted position of FIG. 7 to the elevated leg-supporting position illustrated in FIGS. 8 and 9 by a leg-rest mounting linkage including a first mounting link 262 which has a pivotal mount 264 at its upper end on the support 212 and a pivotal connection 266 at its lower end on the leg-rest 226 and a second mounting link 268 which has a pivotal mount 270 at its lower end on the support at a point spaced below the pivotal mount 264. The mounting link 268 is coupled to the mounting link 262 and to the leg-rest 226 by a first connecting link 271 which has a pivotal connection 272 at its rearward end to the upper end of the mounting link 268 and a pivotal connection 274 at its forward end to the mounting link 262 at a point spaced from the pivotal connection 266 to the leg-rest and a further connecting link 276 which has a pivotal connection 278 at its rearward end to the connecting link 270 at a point spaced rearwardly of the pivotal connection 274 and a pivotal connection 280 at its forward end to the leg-rest 226 at a point spaced from the pivotal connection 266. The leg-rest mounting linkage thus described is actuated from the back-rest 222 via a double-arm actuating lever 282 which has a pivotal mount 284 intermediate its ends on the support. The arm 282a of the double-arm lever 282 is coupled to the back-rest 222 by a connecting link 286 which has a pivotal connection 288 at its forward end to the arm 282a and a pivotal connection 290 at its rearward end to the back-rest 222 at a point spaced downwardly of the pivotal connection 256. The arm 282b of the double-arm lever 282 is coupled to the mounting link 268 via a further connecting link 292 which has a pivotal connection 294 at its rearward end to the arm 282b and a pivotal connection 296 at its forward end to the mounting link 268 intermediate the ends thereof. Accordingly, in response to the rearward movement of the back-rest 222 during both the first and second movement phases, a rearwardly directed thrust is imparted via the connecting link 286 to the arm 282a of the double-arm actuating lever 282 which swings the arm 282b thereof in the clockwise direction about the pivotal mount 284. Such clockwise movement imparts a forward thrust via the connecting link 292 to the mounting link 268 which turns the mounting link 268 in the counterclockwise direction about the pivotal mount 270 thereby moving the leg-rest from

the stored position to the several elevated leg-supporting positions.

For a better understanding of this illustrative embodiment of the present invention, reference will be made to a typical sequence of operations:

When the chair occupant is seated in the chair 210 and leans against the back-rest, the body-supporting means 222, 224 is displaced rearwardly and downwardly relative to the support, with no angular displacement between the back-rest 222 and the seat 224, during an initial or first movement phase. The forward portion of the seat 224 is guided by the arm or link 244a, of the front seat guiding means or linkage 238 which turns in the clockwise direction about the pivotal connection 246 serving as a pivotal mount. The rearward portion of the body-supporting means 222, 224 is guided by the rear guiding linkage 252, 253 which is initially actuated by its coupling to the depending arm 244b of the front guiding link 244a. Incident to such rearward movement of the body-supporting means, the requisite turning movement is imparted to the double-arm actuating lever 282 and the leg-rest 226 moves to the elevated leg-supporting position. The end of the first movement phase is established when the link 244 abuts the stop 258 and when substantially simultaneously the rear guiding links 252, 253 abut the stops 259, 260. At such time and as illustrated in FIG. 8 the lever 244 becomes unitary with the seat 224 and together define a single movable link for the second movement phase intermediate the pivotal connection 246 and the seat pivot 232. Also the links 252, 253 of the toggle link pair become unitary with the support for all intents and purposes and thereafter the pivotal connection 256 to the link 230 serves as a relatively stationary pivotal mount for the second movement phase. When the chair occupant exerts continued pressure with the chair in the intermediate tilted or semi-reclined position of FIG. 8, the back-rest 222 begins to turn about the relatively fixed or stationary pivotal mount 256, with the seat 224 being guided by the link 240 which turns in the counterclockwise direction about the pivotal mount 242. As may be appreciated by progressively inspecting FIGS. 8 and 9, the action of the front guiding means 238 on the seat is to guide the same generally upwardly, with approximately the same inclination, while the back-rest 222 is turning about the pivotal mount 256 such that the included angle between the back-rest and seat opens up to establish the fully reclined position of FIG. 9. The second movement phase continues until such time as the second movement phase linkage is blocked, for example by the contact of the leg-rest mounting link 268 against the stop 298. It will be appreciated that during the second movement phase a small rearward thrust is imparted to the connecting link 286 which results in the same turning movement of the actuating lever 282, such that the leg-rest 226 is somewhat further elevated as may be appreciated by comparing the relative position of the links 268, 271 in FIG. 8 and FIG. 9 respectively. When the chair occupant desires to restore the chair to the upright sitting position illustrated in FIG. 7, the occupant leans forwardly such that the back-rest, seat and leg-rest move through the reverse sequence of movement with the chair first moving into the intermediate tilted position of FIG. 8 and then being returned to the upright or sitting position illustrated in FIG. 7.

A latitude of modification, change and substitution is intended in the foregoing disclosure and in some instances some features of the invention will be employed without a corresponding use of other features. Accordingly, it is appropriate that the appended claims be construed broadly and in a manner consistent with the spirit and scope of the invention herein.

What I claim is:

1. A reclining chair comprising a support, body-supporting means including a seat and back-rest adapted to move from a sitting position through a first movement

phase to an intermediate tilted position and through a second movement phase to a reclining position, a link pivotally connected to said seat at a seat pivot and extending rearwardly therefrom, means operatively connecting said back-rest to said link, blocking means operatively connected between said seat and back-rest and arranged to establish a prescribed angular relationship therebetween during said first movement phase and to preclude movement of said seat and back-rest toward each other, said blocking means being further arranged to permit movement of said seat and back-rest away from each other during said second movement phase to increase the angular relationship therebetween to establish a reclining position, front guiding means pivotally mounted on said support at a first pivotal mount and pivotally connected to said seat at a first pivotal connection, and rear guiding means pivotally mounted on said support at a second pivotal mount and pivotally connected to said link at a point spaced rearwardly of said seat pivot.

2. A reclining chair comprising a support, body-supporting means including a seat and back-rest adapted to move from a sitting position through a first movement phase to an intermediate tilted position and through a second movement phase to a reclining position, a link pivotally connected to said seat at a seat pivot and extending rearwardly therefrom, means operatively connecting said back-rest to said link, blocking means operatively connected between said seat and back-rest and arranged to establish a prescribed angular relationship therebetween during said first movement phase and to preclude movement of said seat and back-rest toward each other, said blocking means being further arranged to permit movement of said seat and back-rest away from each other during said second movement phase to increase the angular relationship therebetween to establish a reclining position, front guiding means pivotally mounted on said support at a first pivotal mount and pivotally connected to said seat at a first pivotal connection, and rear guiding means pivotally mounted on said support at a second pivotal mount and pivotally connected to said link at a point spaced rearwardly of said seat pivot, said front guiding means, the portion of said seat and said link intermediate said first and second pivotal connections, and said rear guiding means serving as movable links during said first movement phase with a stationary link being provided intermediate said first and second pivotal mounts, said front guiding means, said seat and said link serving as movable links during said second movement phase with a stationary link being provided intermediate said first pivotal mount and said second pivotal connection.

3. A reclining chair comprising a support, body-supporting means including a seat and back-rest adapted to move from a sitting position through a first movement phase to an intermediate tilted position and through a second movement phase to a reclining position, a link pivotally connected to said seat at a seat pivot and extending rearwardly therefrom, means operatively connecting said back-rest to said link, blocking means operatively connected between said seat and back-rest and arranged to establish a prescribed angular relationship therebetween during said first movement phase and to preclude movement of said seat and back-rest toward each other, said blocking means being further arranged to permit movement of said seat and back-rest away from each other during said second movement phase to increase the angular relationship therebetween to establish a reclining position, front guiding means pivotally mounted on said support at a first pivotal mount and pivotally connected to said seat at a first pivotal connection, rear guiding means pivotally mounted on said support at a second pivotal mount and pivotally connected to said link at a point spaced rearwardly of said seat pivot, said front guiding means, the portion of said seat and said link intermediate said first and second pivotal connections, and said rear

guiding means serving as movable links during said first movement phase with a stationary link being provided intermediate said first and second pivotal mounts, and a stop engaging said rear guiding means at the end of said first movement phase to establish said intermediate tilted position, said front guiding means, said seat and said link serving as movable links during said second movement phase with a stationary link being provided intermediate said first pivotal mount and said second pivotal connection.

4. A reclining chair comprising a support, body-supporting means including a seat and back-rest adapted to move from a sitting position through a first movement phase to an intermediate tilted position and through a second movement phase to a reclining position, a link pivotally connected to said seat at a seat pivot and extending rearwardly therefrom, means operatively connecting said back-rest to said link, blocking means operative between said seat and back-rest to establish a prescribed angular relationship therebetween during said first movement phase, said blocking means being arranged to preclude movement of said seat and back-rest toward each other during said first and second movement phases and to permit movement of said seat and back-rest away from each other during said second movement phase to establish a reclining position, front guiding means pivotally mounted on said support at a first pivotal mount and pivotally connected to said seat at a first pivotal connection, rear guiding means pivotally mounted on said support at a second pivotal mount and pivotally connected to said link at a second pivotal connection spaced rearwardly of said seat pivot, at least a portion of said front guiding means, the portion of said seat and said link intermediate said first and second pivotal connections, and said rear guiding means serving as movable links during said first movement phase with a stationary link being provided intermediate said first and second pivotal mounts, and a stop engaging one of said guiding means at the end of said first movement phase to establish said intermediate tilted position, at least a portion of said front guiding means, said seat and said link serving as movable links during said second movement phase with a stationary link being provided intermediate said first pivotal mount and a pivotal connection of said rear guiding means.

5. A reclining chair comprising a support, body-supporting means including a seat and back-rest adapted to move from a sitting position through a first movement phase to an intermediate tilted position and through a second movement phase to a reclining position, a link pivotally connected to said seat at a seat pivot and extending rearwardly therefrom, means operatively connecting said back-rest to said link, blocking means operative between said seat and back-rest to establish a prescribed angular relationship therebetween during said first movement phase, said blocking means being arranged to preclude movement of said seat and back-rest toward each other during said first and second movement phases and to permit movement of said seat and back-rest away from each other during said second movement phase to establish a reclining position, front guiding means pivotally mounted on said support at a first pivotal mount and pivotally connected to said seat at a first pivotal connection, rear guiding means pivotally mounted on said support at a second pivotal mount and pivotally connected to said link at a point spaced rearwardly of said seat pivot, and a stop engaging one of said guiding means at the end of said first movement phase to establish said intermediate tilted position.

6. A reclining chair comprising a support, body-supporting means including a seat and back-rest adapted to move from a sitting position through a first movement phase to an intermediate tilted position and through a second movement phase to a reclining position, a link pivotally connected to said seat at a seat pivot and ex-

tending rearwardly therefrom, means operatively connecting said back-rest to said link, blocking means operative between said seat and back-rest to establish a prescribed angular relationship therebetween during said first movement phase, said blocking means being arranged to preclude movement of said seat and back-rest toward each other during said first and second movement phases and to permit movement of said seat and back-rest away from each other during said second movement phase to establish a reclining position, a front guiding linkage including first and second front guiding links having a pivotal interconnection, said front guiding linkage being mounted on said support at a first pivotal mount and pivotally connected to said seat at a first pivotal connection, rear guiding means pivotally mounted on said support at a second pivotal mount and pivotally connected to said link at a point spaced rearwardly of said seat pivot, said second front guiding link, the portion of said seat and said link intermediate said first and second pivotal connections, and said rear guiding means serving as movable links during said first movement phase with a stationary link being provided intermediate said pivotal interconnection and said second pivotal mount, a stop engaging one of said guiding means at the end of said first movement phase to establish said intermediate tilted position, said first front guiding link, said second front guiding link, said seat and said link serving as movable links during said second movement phase with a stationary link being provided intermediate said first pivotal mount and a pivotal connection of said rear guiding means.

7. A reclining chair comprising a support, body support means including a seat and back-rest adapted to move from a sitting position through a first movement phase to an intermediate tilted position and through a second movement phase to a reclining position, a link pivotally connected to said seat at a seat pivot and extending rearwardly therefrom, means operatively connecting said back-rest to said link, blocking means operative between said seat and back-rest to establish a prescribed angular relationship therebetween during said first movement phase, said blocking means being arranged to preclude movement of said seat and back-rest toward each other during said first and second movement phases and to permit movement of said seat and back-rest away from each other during said second movement phase to establish a reclining position, a front guiding link pivotally mounted on said support at a first pivotal mount and pivotally connected to said seat at a first pivotal connection, rear guiding means pivotally mounted on said support at a second pivotal mount and pivotally connected to said link at a point spaced rearwardly of said seat pivot, said front guiding link, the portion of said seat and said link intermediate said first and second pivotal connections, and said rear guiding means serving as movable links during said first movement phase with a stationary link being provided intermediate said first and second pivotal mounts, a stop engaging one of said guiding means at the end of said first movement phase to establish said intermediate tilted position, said front guiding link, said seat and said link serving as movable links during said second movement phase with a stationary link being provided intermediate said first pivotal mount and a pivotal connection of said rear guiding means.

8. A reclining chair according to claim 7 wherein said rear guiding means includes a toggle linkage pair having a pivotal interconnection between the links thereof, said pivotal interconnection serving as a stationary pivotal mount during said second movement phase.

9. A reclining chair comprising a support, body-supporting means including a seat and back-rest adapted to move from a sitting position through a first movement phase to an intermediate tilted position and through a second movement phase to a reclining position, a link pivotally connected to said seat at a seat pivot and extending rear-

15

wardly therefrom, means operatively connecting said back-rest to said link, blocking means operative between said seat and back-rest to establish a prescribed angular relationship therebetween during said first movement phase, said blocking means being arranged to preclude movement of said seat and back-rest toward each other during said first and second movement phases and to permit movement of said seat and back-rest away from each other during said second movement phase to establish a reclining position, front guiding means pivotally mounted on said support at a first pivotal mount and pivotally connected to said seat at a first pivotal connection, rear guiding means pivotally mounted on said support at a second pivotal mount and pivotally connected to said link at a point spaced rearwardly of said seat pivot, a leg-rest, means mounting said leg-rest for movement from a stored position to an elevated leg-supporting position, and means operable during said first movement phase for moving said leg-rest to said elevated leg-supporting position.

10. A reclining chair comprising a support, body-supporting means including a seat and back-rest adapted to move from a sitting position through a first movement phase to an intermediate tilted position and through a second movement phase to a reclining position, a link pivotally connected to said seat at a seat pivot and extending rearwardly therefrom, means operatively connecting said back-rest to said link, blocking means operative between said seat and back-rest to establish a prescribed angular relationship therebetween during said first movement phase, said blocking means being arranged to preclude

16

movement of said seat and back-rest toward each other during said first and second movement phases and to permit movement of said seat and back-rest away from each other during said second movement phase to establish a reclining position, a front guiding linkage including first and second guiding links having a pivotal interconnection, said front guiding linkage being pivotally mounted on said support at a first pivotal mount and pivotally connected to said seat at a first pivotal connection, rear guiding means pivotally mounted on said support at a second pivotal mount and pivotally connected to said link at a point spaced rearwardly or said seat pivot, a leg-rest, means mounting said leg-rest for movement from a stored position to an elevated leg-supporting position, means operable during said first movement phase for moving said leg-rest to said elevated leg-supporting position, and a stop engaging one of said guide means at the end of said first movement phase to establish said intermediate tilted position.

References Cited in the file of this patent

UNITED STATES PATENTS

2,615,497	Luckhardt -----	Oct. 28, 1952
2,918,109	Schliephacke -----	Dec. 22, 1959
2,918,113	Lorenz -----	Dec. 22, 1959

FOREIGN PATENTS

797,178	Great Britain -----	June 25, 1958
---------	---------------------	---------------

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,039,815

June 19, 1962

Peter S. Fletcher

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 1, line 21, for "has" read -- have --; lines 30 and 34, for "leg", each occurrence, read -- legs --; column 4, line 35, for "link", second occurrence, read -- links --; line 43, for "link", second occurrence, read -- links --; column 6, line 47, for "138" read -- 136 --; column 7, line 22, for "link" read -- links --; line 30, for "link", second occurrence, read -- links --; line 50, for "176" read -- 178 --; column 8, line 24, for "40" read -- 140 --; line 26, for "42" read -- 142 --; line 71, for "FIG. 8a" read -- FIG. 8 --; column 9, line 12, for "23b" read -- 236 --; line 34, for "224" read -- 244 --; column 10, line 17, for "link", first occurrence, read -- links --; line 23, after "238" strike out the comma and insert -- and --; line 25, for "243" read -- 246 --; line 26, for "link", first occurrence, read -- links --; line 28, for "25b" read -- 256 --; line 48, for "270" read -- 271 --; line 64, for "conenction" read -- connection --; column 14, line 13, for "mouted" read -- mounted --; line 33, for "support" read -- supporting --; line 72, for "move", second occurrence, read -- movement --.

Signed and sealed this 18th day of December 1962.

(SEAL)

Attest:

ERNEST W. SWIDER

Attesting Officer

DAVID L. LADD

Commissioner of Patents