April 23, 1963 P. S. FLETCHER 3,086,815

RECLINING CHAIR OF THE MULTIPLE MOVEMENT TYPE

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FIG. 1.

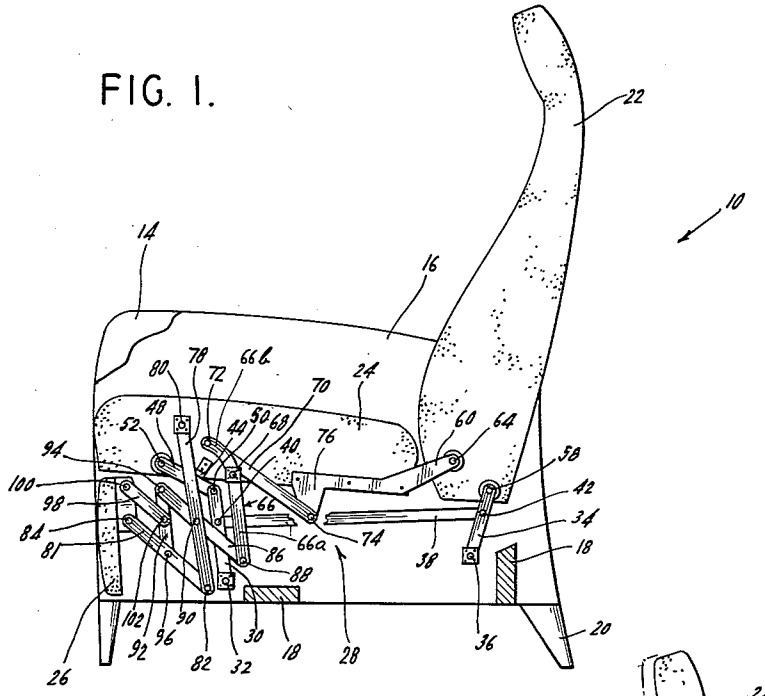
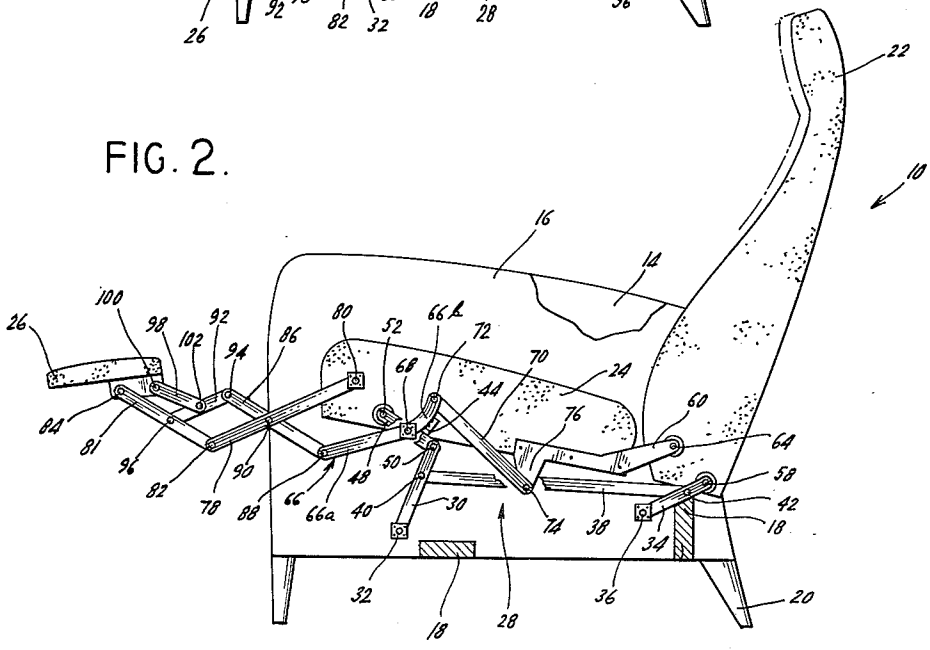


FIG. 2.



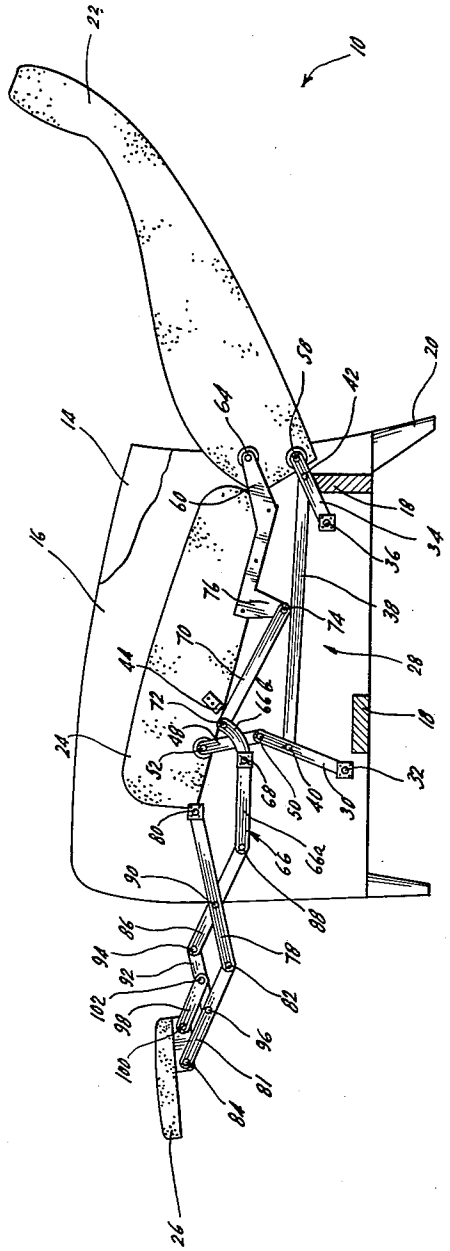
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FIG. 3.



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RECLINING CHAIR OF THE MULTIPLE MOVEMENT TYPE

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6 Claims. (Cl. 297—85)

The present invention relates to reclining chairs, and in particular to an improved reclining chair of the type including body-supporting means having a movable back-rest and movable seat which are coordinated with each other to include at least two distinct phases of chair movement.

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-supporting positions, with appropriate means coordinating the back-rest, seat and leg-rest for the requisite chair movement. Heretofore, there have been two distinct types of reclining chairs, those constructed with a rigid body-supporting unit including a unitary back-rest and seat mounted on the support for movement into various tilted positions and those constructed with a movable back-rest and movable seat mounted on the support for reclining and inclining movement respectively. Chairs of the type incorporating a rigid or unitary seat and back-rest unit 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 legs supported on the elevated leg-rest. Such chairs are particularly suitable for accommodating the chair occupant in an attitude appropriate for television viewing, reading, sewing and like activities. Chairs of the type incorporating a movable back-rest and movable seat are suitable for complete and full relaxation in that the angle between the back-rest and seat increases in response to reclining movement of the chair to comfortably accommodate the chair occupant in a stretched out or fully reclined attitude.

Broadly, it is an object of the present invention to provide an improved 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 tilted-back attitude and those suitable for accommodating the chair occupant in a fully reclined or complete relaxation attitude.

Specifically, it is within the contemplation of the present invention to provide an improved reclining chair wherein in a first movement phase from a sitting position to an intermediate, tilted sitting position, during which there is substantially no angular displacement between the back-rest and seat, the leg-rest is moved to an elevated leg-supporting position to establish the intermediate, tilted sitting position; and in a second movement phase from the intermediate, tilted sitting position to a fully reclined position the angle between the seat and back-rest opens up, with the leg-rest remaining elevated, to establish a complete relaxation or fully reclined attitude. Advantageously, with this type of chair the functional attributes of chairs having a rigid seat and back-rest and chairs having a movable seat and movable back-rest may be realized in a single construction, with the occupant being able to move first to an intermediate, tilted sitting position and then through successive complete relaxation positions to a fully reclined position.

In accordance with an illustrative embodiment demonstrating features and advantages of the present invention, my reclining chair of the double movement type comprises a support, body-supporting means including a back-rest and seat adapted to be mounted on the support for reclining and inclining movement respectively, and means movably mounting said body-supporting means on said support for a first movement phase from a sitting position to an intermediate, tilted sitting position and for a second movement phase from the intermediate, tilted sitting position to a reclining position. The mounting means includes a first linkage providing guide means for the body-supporting means during the first movement phase and a second linkage providing guiding means for the body-supporting means during the second movement phase. The first linkage includes front and rear guiding means having front and rear pivotal mounts on the support respectively. The second linkage includes the back-rest and seat as movable links thereof and means mounting the movable links of the second linkage on the front and rear guide means of the first linkage serving as a stationary link for the second linkage. With this type of mounting arrangement, it is possible to obtain a small amount of movement of the movable links of the second linkage during the first movement phase from the sitting position to the intermediate, tilted sitting position. Such slight movement may be useful to compensate for the balancing characteristics of the chair or to produce a small amount of relative movement between the back-rest and the seat as may be required for more complete comfort.

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 a presently preferred but nonetheless illustrative embodiment 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 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 sitting position, with the leg-rest moved to an elevated leg-supporting position; and,

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

Referring now specifically to FIGS. 1 to 3 of the drawings there is shown 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 for reclining and inclining movement respectively for a first movement phase from the sitting position illustrated in FIG. 1 to the intermediate, tilted sitting position illustrated in FIG. 2 and for a second movement phase from the intermediate, tilted sitting position illustrated in FIG. 2 through a series of reclining positions to the fully reclined position illustrated in FIG. 3. Disposed beneath the forward end of the seat **24** is a leg-rest **26** which is mounted for movement from a stored or retracted position, as shown in FIG. 1, to a first elevated leg-supporting position, as shown in FIG. 2 and to a further elevated leg-supporting position, as shown in FIG. 3. As will be described, the leg-rest **26** is coordinated to the movement of the back-rest **22** and the seat **24** for movement into the 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 sitting position shown in FIG. 2 to the fully reclined position shown in FIG. 3.

A mounting arrangement, generally designated by the reference numeral **28**, provides respective first and second linkages for guiding the back-rest **22** and the seat **24** during the first and second movement phases of the reclining chair. Specifically, the mounting arrangement includes a front guiding link **30** having a pivotal mount **32** adjacent its lower end on the support **12**, a second or rear guiding link **34** having a pivotal mount **36** adjacent its lower end on the support **12** and a connecting or coordinating link **38** extending at a level below the upper ends of the guiding links **30**, **34** and having respective pivotal connections **40**, **42** at its ends to the front and rear guiding links **30**, **34** respectively at points spaced below the upper ends of the links **30**, **34**. Links **30**, **34** and **38** comprise a first linkage providing a guiding means for the back-rest and seat between the sitting position of FIG. 1 and the intermediate, tilted sitting position of FIG. 3, with the portion of the support intermediate the pivotal mounts **32**, **36** serving as a stationary link of the first linkage and with the front guiding link **30**, the portion of the coordinating link **38** intermediate the pivotal connections **40**, **42**, and the rear guiding link **34** serving as movable links of the first linkage.

A stop **44** is positioned forwardly of the front guiding link **48** of the linkage for the second movement phase to establish the initial position for this linkage, leaving the back-rest **22** free to move relative to the seat **24** during the first movement phase as will be described hereinafter. The rear cross brace **18** serves as a stop behind the rear guiding link **34** and is in position to be abutted by the link **34** to establish the end of the first movement phase and the intermediate, tilted sitting position as shown in FIG. 2.

The mounting arrangement **28** further includes a second linkage providing guiding means for the back-rest **22** and the seat **24** during movement between the intermediate, tilted sitting position and the various reclining positions, with the second or further linkage including a front guiding link **48** having a pivotal mount **50** on the upper end of the front guiding link **30** of the first linkage at a point spaced above the pivotal connection **40** and a pivotal connection **52** to the seat **24** contiguous to the forward end thereof. The second linkage is completed by the mounting of the back-rest **22** on the upper end of the rear guiding link **34** at a back-rest pivot **58** at a point spaced above the pivotal connection **42** and the mounting of the seat **24** on the back-rest via the hangar **60** at a seat pivot **64** spaced above and forwardly of the back-rest pivot **58**. The second linkage includes a stationary link intermediate the pivotal mount **50** and the back-rest pivot **58** and movable links including the front guiding link **48**, the portion of the seat **24** intermediate the pivotal connections **52**, **64** and the portion of the back-rest **22** intermediate the pivotal connections **64**, **58**.

In this illustrative embodiment, the leg-rest **26** is mounted for movement into the several elevated leg-supporting positions by a leg-rest mounting and control linkage patricularly suited to achieve a relatively long extension of the leg-rest relative to the body-supporting means. Specifically, a double-arm mounting lever **66** is provided having a pivotal mount **68** intermediate its ends on the support, with the arm **66***a* thereof being coupled to the leg-rest **26** as will be described. The arm **66***b* of the double-arm lever **66** is coupled to the seat by a connecting link **70** which has a pivotal connection **72** at its forward end to the upper end of the arm **66***b* and a pivotal connection **74** at its rearward end to a bracket **76** depending from and rigid with the seat **24**. Forwardly of the double-arm lever **66** there is arranged a mounting arm **78** having a pivotal mount **80** adjacent its upper end on the support **12**. The mounting arm **78** is coupled to the leg-rest **26** by a connecting link **81** which has a pivotal connection **82** at its rearward end to the lower end of the mounting arm **78** and a pivotal connection **84** at its forward end to the leg-rest **26**. The extensible leg-rest mounting linkage further includes a connecting link **86** which has a pivotal connection **88** at its rearward end to the arm **66***a* of the double-arm lever **66** and a pivotal connection **90** intermediate its ends and at a cross-over point to the mounting arm **78**. A further mounting link **92** is provided which has a pivotal connection **94** at one end thereof to the forward end of the connecting link **86** and a pivotal connection **96** at the other end thereof to an intermediate point of the connecting link **81**, the mounting link **92** being coupled to the leg-rest **26** by a still further connecting link **98** having a pivotal connection **100** at its forward end to the leg-rest **26** at a point spaced from the pivotal connection **84** and a pivotal connection **102** at its rearward end to an intermediate point of the mounting link **92**. The previously described linkage will be recognized as being generally of the lazy-tong type wherein upon movement of the pivot **88** toward the pivotal mount **80** in response to turning movement of the double-arm lever **66**, the inter-pivoted links **78**, **86** move with a scissor-like action to bring the pivots **82**, **94** closer together, with a corresponding extension and elevation of the leg-rest **26**.

For a better understanding of the operation of the present double movement chair, a typical sequence of operations will now be described in detail:

When the chair occupant is heated in the chair **10** and leans against the back-rest **22** the front and rear guiding links **30**, **34** of the first linkage turn about their respective pivotal mounts **32**, **36** on the support. The inclination of the guiding links **30**, **34** of the first linkage is selected in relation to the inclination of the guiding link **48** and the guiding link provided by the portion of the back-rest between pivots **64**, **58** of the second linkage such that considerably less work is required to bring about the actuation of the first linkage until such time as the first linkage is blocked against further movement. The front guiding link **30** is inclined slightly forwardly from a vertical position such that a relatively small pressure against the back-rest **22** will cause the pivots **40** to move past a vertical position relative to the pivotal mount **32**, with the balance being such that the first linkage thereafter moves into the limit position established by the stop **46**. The front and rear guiding links of the second linkage have a substantial forward inclination such that there is a very pronounced tendency for the first and second linkages to operate in the desired sequence and in this sense the linkages are constrained. In some instances it may be desirable and/or necessary to incorporate a positive sequencing arrangement, for example as disclosed in U.S. Patent No. 3,012,816 of December 12, 1961, which is assigned to the assignee herein. Incident to the movement of the first linkage, the body-supporting means moves to the intermediate position shown in FIG. 2 with substantially no change in the angular relationship between the back-rest **22** and the seat **24** and simultaneously the leg-rest **26** swings forwardly about an instantaneous center which is above the top front edge of the seat as defined by the links **66**, **78** due to the rearwardly directed pull imparted to the connecting link **70** incident to the rearward displacement of the seat **24**. When the rear guiding link **34** arrives at the position illustrated in FIG. 2 in abutment with the stop **18**, the front and rear guiding links **30**, **34** become a stationary supporting link for the second movement phase linkage.

Since in the second linkage the front guiding link **48** and the portion of the back-rest intermediate the pivots **64**, **58** serving as a rear guiding link are mounted respectively on the upper ends of the front and rear guiding links **30**, **34** of the first movement phase linkage, there can be a small amount of movement of the back-rest **22** relative to the seat **24** during the first movement phase.

During such relative movement, the front guiding link 48 of the second movement phase linkage is supported on the stop 44. This small relative movement attainable during the first movement phase (which is shown by the partial broken line showing of the back-rest in the intermediate, tilted sitting position of FIG. 2 illustrating the position the back-rest would otherwise occupy) may be employed to adjust the back-rest 22 relative to the seat 24 for a number of purposes. For example, the back-rest 22 may be too upright in the sitting position relative to the seat for use in the intermediate, tilted sitting position and it therefore may be desirable to somewhat open up the included angle between back-rest 22 and the seat 24 in the intermediate, tilted sitting position. Further, the back-rest 22 may be displaced relative to the seat 24 during the first movement phase to modify or improve the balance characteristics of the chair, it being recalled that the leg-rest 26 moves to an extended and elevated leg-supporting position during the first movement phase which alters the balance characteristics.

As the chair occupant exerts further pressure against the back-rest 22, the chair may be moved from the intermediate, tilted sitting position through a series of reclining positions wherein the angle between the seat and back-rest opens up until the fully reclined positions of FIG. 3 is reached. During the movement into the fully reclined position, the rearward displacement of the seat 24 causes a further rearward pull to be exerted via the connecting link 70 to the arm 66*b* of the mounting lever 66 whereupon further elevating movement is imparted to the leg-rest, as may be appreciated by progressively inspecting FIGS. 2 and 3.

The first and second linkages which are operative during the first and second phases of chair movement act like constrained linkages due to the sequencing characteristic attained by the disposition of the links and the weight of the chair occupant. This sequencing characteristic may be supplemented by the provision of a sequencing arrangement as disclosed in copending application Serial No. 601,885, now abandoned.

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 is claimed is:

1. A reclining chair comprising a support, body-supporting means including a back-rest and seat adapted to be mounted on said support for reclining and inclining movement respectively, and means movably mounting said body-supporting means on said support for a first movement phase from a sitting position to an intermediate, tilted sitting position during which there is no appreciable relative angular displacement between said back-rest and seat and for a second movement phase from said intermediate tilted sitting position to a reclining position during which there is angular displacement between said back-rest and said seat, the mounting means including a first guiding linkage for guiding said body-supporting means during movement between said sitting position and said intermediate tilted sitting position and a second guiding linkage for guiding said body-supporting means during movement between said intermediate tilted sitting position and said reclining position, said first guiding linkage including said support as a stationary link, front guiding means pivotally mounted on said support, rear guiding means pivotally mounted on said support and a coordinating link pivotally connected to said front and rear guide means, said second guiding linkage including said front and rear guiding means serving as a stationary mount, movable links including said back-rest and seat, and means pivotally mounting said movable links on said stationary mount.

2. A reclining chair comprising a support, body-supporting means including a back-rest and seat adapted to be mounted on said support for reclining and inclining movement respectively, and means movably mounting said body-supporting means on said support for a first movement phase from a sitting position to an intermediate, tilted sitting position during which there is no appreciable relative angular displacement between said back-rest and seat and for a second movement phase from said intermediate, tilted sitting position to a reclining position during which there is angular displacement between said back-rest and said seat, the mounting means including a first guiding linkage for guiding said body-supporting means during movement between said sitting position and said intermediate tilted sitting position and a second guiding linkage for guiding said body-supporting means during movement between said intermediate tilted sitting position and said reclining position, said first guiding linkage including said support as a stationary link, a front guiding link pivotally mounted adjacent its lower end on said support, a rear guiding link pivotally mounted adjacent its lower end on said support and a coordinating link pivotally connected to said front and rear guide links respectively at points spaced from the upper ends thereof, said second guiding linkage including said front and rear guiding link serving as a stationary support, movable links including said back-rest and seat, and means pivotally mounting said movable links on said upper ends of said front and rear guiding links.

3. A reclining chair comprising a support, body-supporting means including a back-rest and seat adapted to be mounted on said support for reclining and inclining movement respectively, and means movably mounting said body-supporting means on said support for a first movement phase from a sitting position to an intermediate, tilted sitting position during which there is no appreciable relative angular displacement between said back-rest and seat and for a second movement phase from said intermediate, tilted sitting position to a reclining position during which there is angular displacement between said back-rest and said seat, the mounting means including a first guiding linkage for guiding said body-supporting means during movement between said sitting position and said intermediate, tilted sitting position and a second guiding linkage for guiding said body-supporting means during movement between said intermediate, tilted sitting position and said reclining position, said first guiding linkage including said support as a stationary link, a front guiding link pivotally mounted at its lower end on said support, a rear guiding link pivotally mounted at its lower end on said support and a coordinating link pivotally connected to said front and rear guiding links intermediate the ends thereof, said second guiding linkage including said front and rear guiding links serving as a stationary support, means pivotally mounting said back-rest on said rear guiding link at a back-rest pivot, means pivotally mounting said seat on said back-rest at a seat pivot spaced above said back-rest pivot, the portion of said back-rest intermediate said seat and back-rest pivots serving as a rear guiding link of said second guiding linkage, and a further front guiding link pivotally mounted on said front guiding link of said first linkage and pivotally connected to said seat.

4. A reclining chair comprising a support, body-supporting means including a back-rest and seat adapted to be mounted on said support for reclining and inclining movement respectively, means movably mounting body-supporting means on said support for a first movement phase from a sitting position to an intermediate, tilted sitting position and for a second movement phase from said intermediate, tilted sitting position to a reclining position, the mounting means including a first linkage for guiding said body-supporting means during movement between said sitting position and said intermediate, tilted sitting position and a second lnkage for guiding said

body-supporting means during movement between said intermediate, tilted sitting position and said reclining position, said first linkage including front and rear guiding means having front and rear pivotal mounts on said support respectively, said second linkage including said back-rest and seat as movable links thereof and means mounting said movable links on said front and rear guiding means of said first linkage serving as a stationary mount for said second linkage, and blocking means engaging said first linkage at the end of said first movement phase and as said body-supporting means moves into said intermediate, tilted sitting position.

5. A reclining chair comprising a support, body-supporting means including a back-rest and seat adapted to be mounted on said support for reclining and inclining movement respectively, means movably mounting body-supporting means on said support for a first movement phase from a sitting position to an intermediate, tilted sitting position and for a second movement phase from said intermediate, tilted sitting position to a reclining position, the mountng means including a first linkage for guiding said body-supporting means during movement between said sitting position and said intermediate, tilted sitting position and a second linkage for guiding said body-supporting means during movement between said intermediate, tilted sitting position and said reclining position, said first linkage including said support as a stationary link thereof and front and rear guiding means having front and rear pivotal mounts on said support respectively, said second linkage including said back-rest and seat as movable links thereof and means mounting said movable links on said front and rear guiding means of said first linkage serving as a stationary mount for said second linkage, 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, said leg-rest being disposed in an elevated leg-supporting position through said second movement phase.

6. A reclining chair comprising a support, body-supporting means including a back-rest and seat adapted to be mounted on said support for reclining and inclining

movement respectively, and means movably mounting said body-supporting means on said support for a first movement phase from a sitting position to an intermediate, tilted sitting position during which there is no appreciable relative angular displacement between said back-rest and seat and for a second movement phase from said intermediate, tilted sitting position to a reclining position during which there is angular displacement between said back-rest and said seat, the mounting means including a first guiding linkage for guiding said body-supporting means during movement between said sitting position and said intermediate, tilted sitting position and a second guiding linkage for guiding said body-supporting means during movement between said intermediate, tilted sitting position and said reclining position, means on said support engaging said first guiding linkage in said intermediate, tilted sitting position for blocking movement of said first guiding linkage during said second movement phase, said first guiding linkage including said support as a stationary link, front guiding means pivotally mounted on said support, rear guiding means pivotally mounted on said support and a coordinating link pivotally connected to said front and rear guide means, said second guiding linkage including said front and rear guiding means serving as a stationary mount, movable links including said back-rest and seat, and means pivotally mounting said movable links on said stationary mount, 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, said leg-rest being disposed in an elevated leg-supporting position throughout said second movement phase.

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