July 2, 1963 P. S. FLETCHER 3,096,119

RECLINING CHAIR OF THE MULTIPLE POSITION LOUNGER TYPE

Original Filed Aug. 3, 1956 3 Sheets-Sheet 1

FIG. 1.

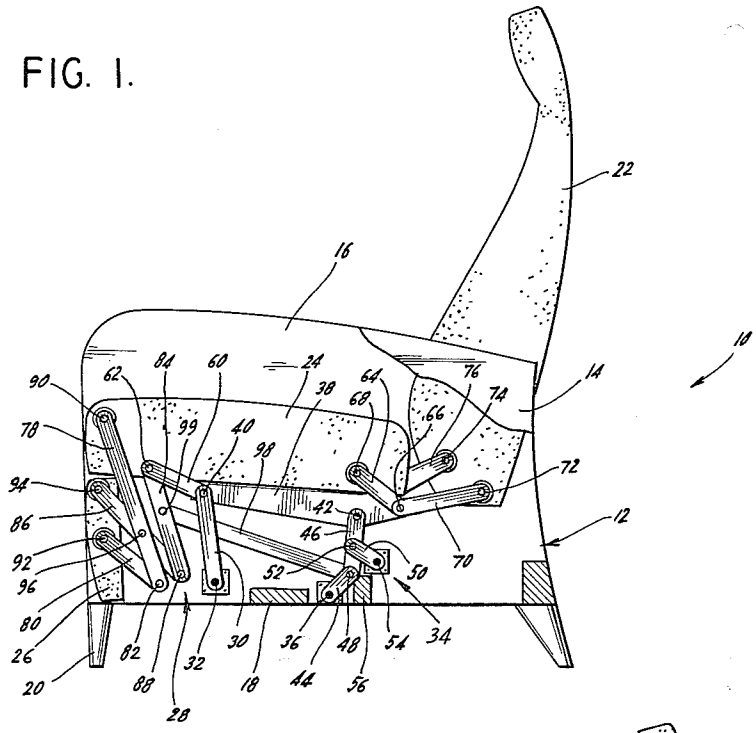
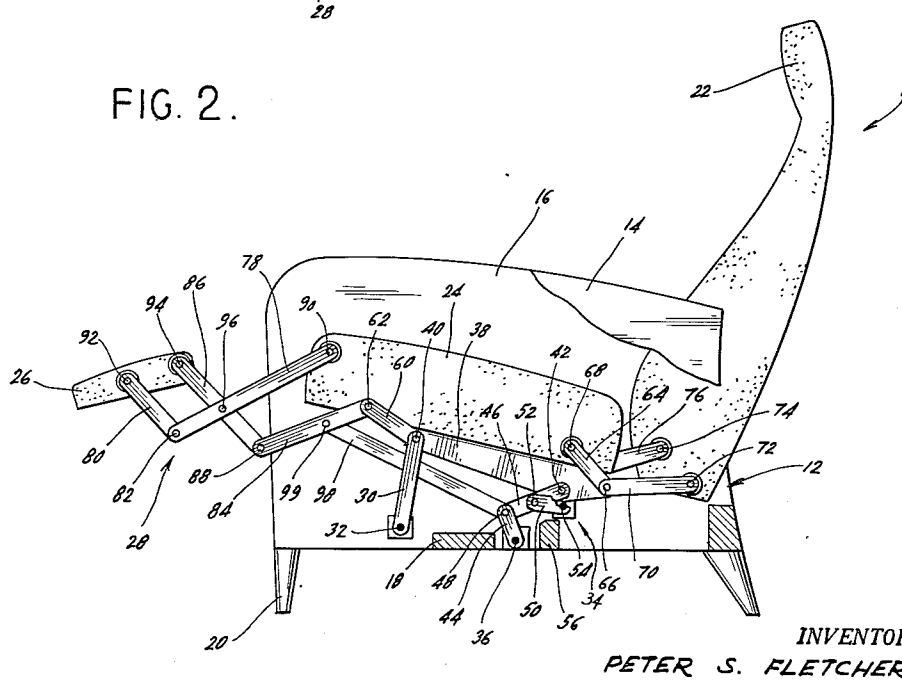


FIG. 2.



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Original Filed Aug. 3, 1956 3 Sheets-Sheet 2

FIG. 3.

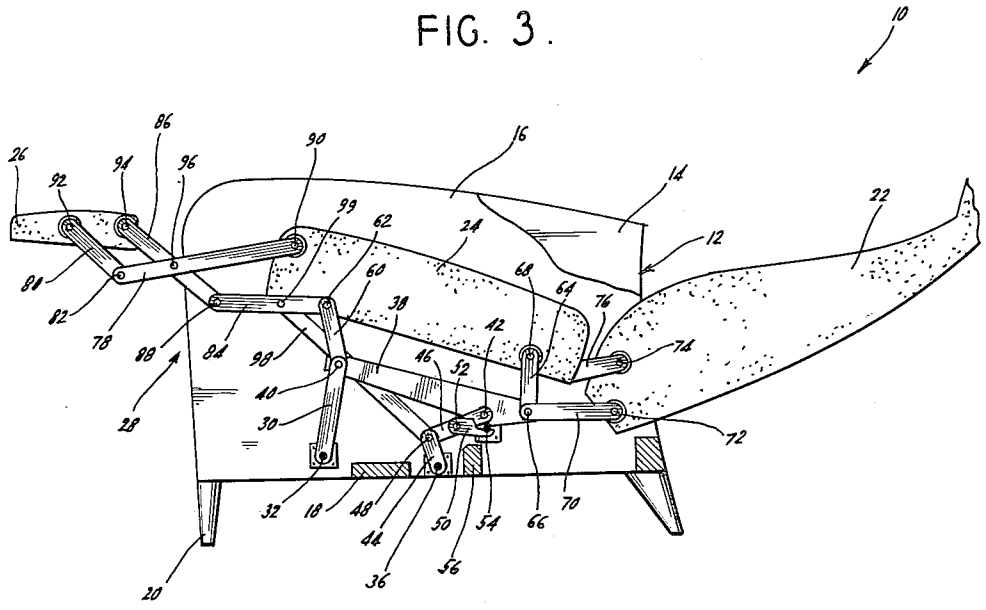
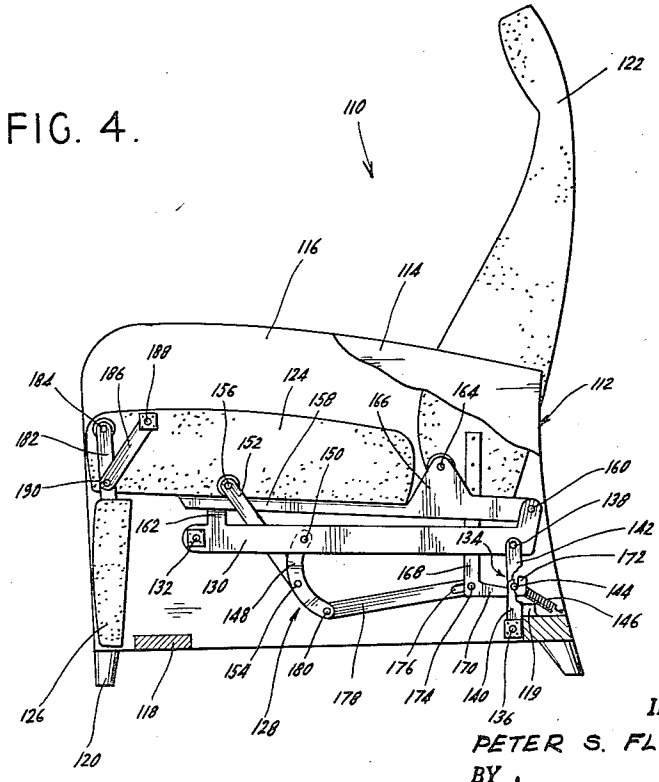


FIG. 4.



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Original Filed Aug. 3, 1956 3 Sheets-Sheet 3

FIG. 5.

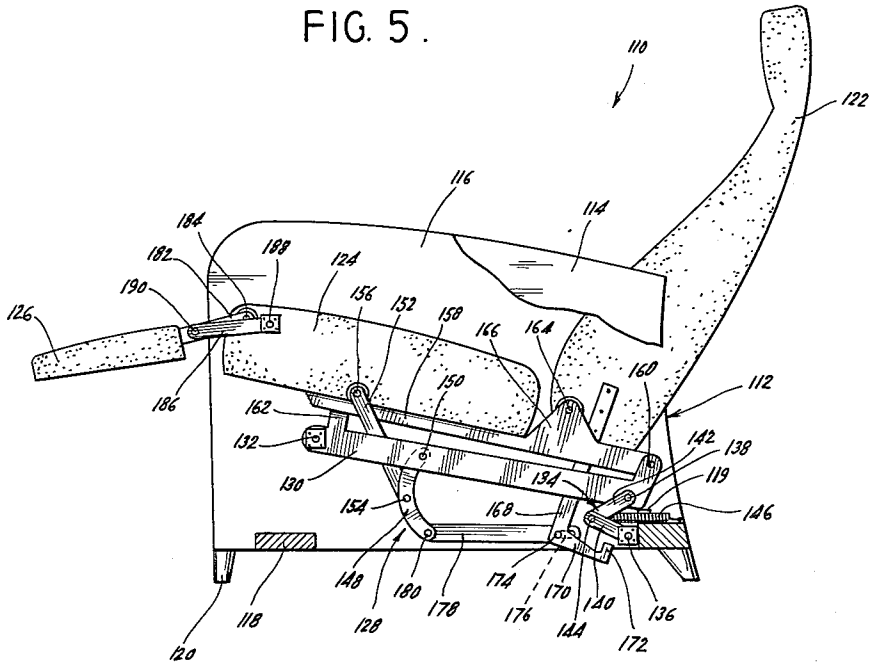
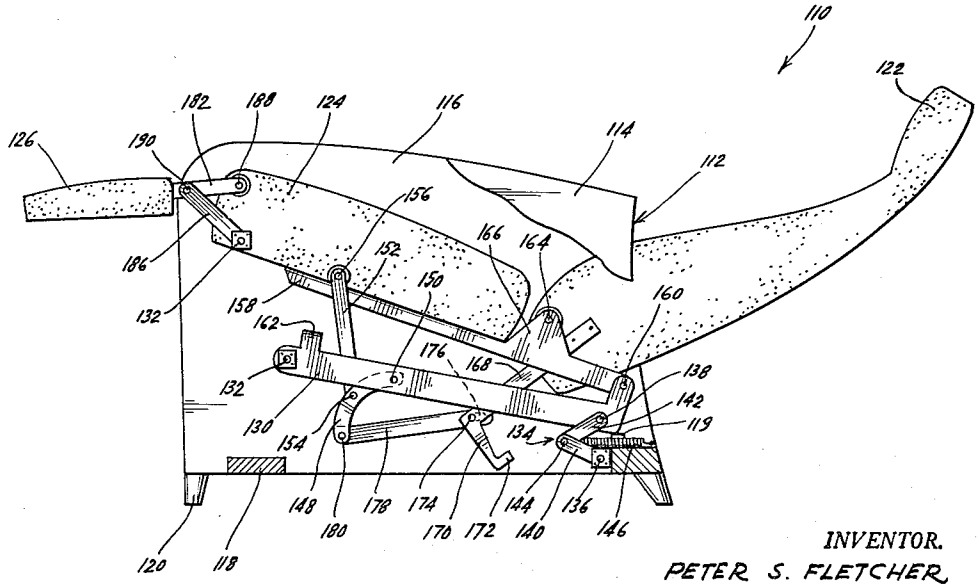


FIG. 6.



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United States Patent Office

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3,096,119

RECLINING CHAIR OF THE MULTIPLE POSITION LOUNGER TYPE

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Continuation of application Ser. No. 601,885, Aug. 3, 1956. This application July 14, 1959, Ser. No. 827,065

20 Claims. (Cl. 297—85)

The present invention relates to reclining chairs, and in particular to an improved reclining chair of the type including a 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. This is a continuation of my earlier filed application Serial No. 601,885 filed on August 3, 1956, and entitled Movable Reclining Chair With Back-Rest, Seat and Leg Rest, 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-supporting positions, with appropriate means coordinating the back-rest, seat and leg-rest for the requisite chair movement. Heretofore, there has 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 chairs 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 the 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 sitting 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 during 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.

In such double movement reclining chairs, there usually is an appreciable rearward movement of the body-supporting means relative to the chair frame or support during the first and second movement phases of the chair. Such rearward movement may present a source of difficulty in that the center of gravity of the chair may move toward a position close to the rear legs of the chair frame, with the attendant risk that the chair may tip over when

occupied. This difficulty may be remedied by the provision of a chair frame which is somewhat longer, when measured from front to rear, as compared to the usual chair frame. However, from the standpoint of furniture design and esthetics, it is undesirable to increase such overall length of the chair frame.

Accordingly, it is a further object of the present invention to provide an improved reclining chair of the double movement type which obviates the aforesaid difficulty. Specifically, it is within the contemplation of the present invention to provide a reclining chair of the double movement type wherein the body-supporting means has a comparatively small rearward movement and a correspondingly small rearward displacement of the center of gravity thereof to thereby assure stability in an environment compatible with esthetic requirements for such chair.

In accordance with an illustrative embodiment demonstrating features and advantages of the present invention, there is provided a reclining chair which 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 the body-supporting means on the 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 first and second guiding linkages for guiding the body-supporting means during movement between the sitting position and the intermediate, tilted sitting position and between the tilted position and the reclined position. The first guiding linkage includes the support as a stationary link thereof, an intermediate coordinating link and movable links including a pair of links serving as a rear guide means during the first movement phase. The pair of links are arranged relative to each other such that there is a rapid lowering of the rearward portion of the body-supporting means during the first movement phase, thereby reducing the overall rearward movement of the body-supporting means during the chair operation. Advantageously, the link pair may take the form of a straight line linkage mechanism or a toggle linkage mechanism both of which moves the body-supporting means downwardly with relatively little rearward displacement during such downward movement.

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 but 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 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;

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;

FIG. 4 is a side elevational view of a modified reclining chair of the double movement type, demonstrating further features of the present invention, with the chair shown in the upright sitting position;

FIG. 5 is a side elevational view similar to FIG. 4, but showing the chair in the intermediate, tilted sitting position; and,

FIG. 6 is a side elevational view similar to FIG. 5 but showing the chair in the fully reclined or complete relaxation 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 **12** 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 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 **28** includes a first movement front guiding link **30** having a pivotal mount **32** on the support **12**, a second or rear guiding linkage **34** having a pivotal mount **36** adjacent its lower end on the support **12** and an intermediate coordinating link **38** having respective pivotal connections **40**, **42** intermediate its ends to the upper ends of the front guiding link **30** and to the rear guiding linkage **34** respectively. Link **30**, linkage **34** and link **38** comprise a first linkage providing a guiding means for the seat **24** and the back-rest **22** between the sitting position of FIG. 1 and the tilted position of FIG. 2, with the portion of the support intermediate the pivotal mounts **32**, **36** serving as a stationary link of the first guiding linkage and with the front guiding link **30**, the portion of the intermediate coordinating link **38** intermediate the pivotal connections **40**, **42** and the links of rear guiding linkage **34** serving as the movable links of the first guiding linkage. For all intents and purposes during the first movement phase the back-rest **22** and the seat **24** may be considered to be unitary with the intermediate coordinating link **38** and thus movable as a unit with the link **38** as the first linkage guides the body-supporting means.

Specifically, the rear guiding linkage **34** includes a first guiding link **44** and a second guiding link **46** having their adjacent ends connected at a pivotal connection **48**, with the first guiding link **44** having the pivotal mount **36** on the support **12** and the second guiding link **46** having the pivotal connection **42** to the intermediate coordinating link **38**. In the upright or sitting position of the chair shown in FIG. 1, the links **44**, **46** define an obtuse angle therebetween and are disposed at the rearward side of a dead center position. In the dead center position the links **44**, **46** and their respective pivots **36**, **48**, **42** are in alignment with each other. A constraining link **50** extends rearwardly from the link **46** and has a pivotal connection **52** at its forward end to the link **46** intermediate the pivotal connections **42**, **48** and has a pivotal mount **54** on the support **12** at a point rearwardly of the links **44**, **46**. In response to the first movement phase, the rearward movement of the pivotal connection **42** relative to the pivotal mount **54** of the constraining link **50** causes the link pair **44**, **46** to move through and past the dead center position, such that the links of the link pair **44**, **46** define progressively decreasing angles therebetween. During the initial movement of the rear guiding linkage **34** from the position illustrated in FIG. 1 to the dead center position, there is a substantially horizontal and rearward guiding action imparted to the back-rest **22** and seat **24**; and after the rear guiding linkage **34** moves through the dead center position, there is a sharp lowering of the rearward portion of the body-supporting means incident to the continued movement through the first motion phase. By progressively inspecting FIGS. 1 and 2, it is observed that the body-supporting means is lowered at its rearward end, but is not appreciably displaced rearwardly relative to the chair frame or support **12**.

A cross brace **56** serving as a stop is positioned rearwardly of the link **44** of the rear guiding linkage to establish the sitting position for the chair while the pivot **54** serves as a stop positioned below the intermediate coordinating link **38** and behind the rear guiding linkage **34** in position to be abutted by the link **38** 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 second movement front guiding link **60** having a pivotal mount at its lower end on the intermediate coordinating link **38** coaxially with the pivotal connection **40** and a pivotal connection **62** to the seat contiguous to the forward end thereof, a rear guiding link **64** having a pivotal mount **66** on the intermediate coordinating link **38** and a pivotal connection **68** to the seat **24** contiguous to the rear end thereof. The second guiding linkage is completed by the connection of the back-rest at **22** to the intermediate coordinating link by a connecting link **70** having the coaxial pivotal connection **66** at its forward end to the intermediate coordinating link **38** and a pivotal connection **72** at its rearward end to the backrest **22** at a point spaced below and rearwardly of the seat pivot **74** on the back-rest **22** provided by the hanger **76** rigid with the seat **24**. In this embodiment, the second guiding linkage includes the intermediate coordinating link **38** as the stationary link thereof and the back-rest **22** and seat **24** as movable links thereof. Specifically, the second guiding linkage comprises a seat control linkage including the portion of the link **38** intermediate the pivotal mounts **40**, **66** as the stationary link thereof and the front guiding link **60** the portion of the seat **24** intermediate the pivotal connections **62**, **68**, and the rear guiding link **64** as the movable links thereof. The back-rest is coupled to the seat control linkage by the pivotal connection **74** on the seat and by the connecting link **70**, with the portion of the back-rest intermediate the pivotal connections **74**, **72** and the connecting link **70** serving as additional movable links of the second guiding linkage. Essentially the guided action of the seat during the second movement phase may be established to be independent of the guided action of the back-rest. The use of such separate but interconnected linkages for the seat and back-rest controls respectively allows for greater flexibility in establishing the relative movement of the seat and back-rest to each other and to the support during the second phase of the chair movement.

In this illustrative embodiment, the leg-rest **26** is mounted for movement into the various elevated leg-supporting positions by a leg-rest mounting linkage includ-

ing a first pair of links 78, 80 having a pivotal connection 82 therebetween and a second pair of links 84, 86 having a pivotal connection 88 therebetween. The links 78, 84 have pivotal mounts on the seat at 90, 62 while the links 80, 86 have spaced apart pivotal connections 92, 94 to the leg-rest 26. The link 78 crosses over the link 86 and at the cross-over point the link pairs 78, 80 and 84, 86 are interconnected at a coordinating pivot 96. The leg-rest mounting linkage is actuated by a pusher link 98 having the coaxial pivotal connection 48 at its rearward end to the rear guiding linkage 34 and a pivotal connection 99 at its forward end to the leg-rest mounting linkage.

Accordingly, during the first movement phase and in response to the forward movement of the rear guiding linkage 34, the leg-rest 26 is moved into the first elevated leg-supporting position; and in response to the second phase of the reclining movement during which the rear guiding linkage 34 remains stationary and the pusher link 98 turns about its pivotal connection 48, the leg-rest 26 is moved somewhat further upwardly into a further elevated leg-supporting position for the requisite leg-supporting functions in the various reclined positions, including the fully reclined position of FIG. 3.

For a better understanding of the operation of my improved double movement type of chair, a typical sequence of operations will now be described in detail.

When the chair occupant is seated in the chair 10 and leans against the back-rest 22, the front and rear guiding means 30, 34 of the first linkage turn about their respective pivotal mounts 32, 36 on the support with the back-rest 22 and the seat 24 being maintained in a relatively fixed relationship with respect to each other. The front and rear guiding means 30, 34 of the first linkage is arranged in relation to the front and rear guiding means 60, 64 of the second linkage such that less work is required to bring about the actuation of the first linkage as compared to the second linkage initially and until the first linkage is blocked against further movement. In this connection it is seen that the front guiding link 30 of the first guiding linkage is inclined slightly forwardly from a vertical position such that when a relatively small force is exerted against the back-rest 22, such force is sufficient to cause the pivot 40 to move past a vertical position relative to the pivotal mount 32 and into the limit position established by the stop 54 which contacts the link 38. Simultaneously, the rear guiding linkage 34 moves through and past the dead center position and rapidly drops the rearward portion of the body-supporting means. The front and rear guiding links 60, 64 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. Incident to the movement of the first linkage, the body-supporting means moves to the intermediate, tilted sitting 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 its pivotal mounts 90, 62 on the seat 24 due to the forwardly directed thrust imparted via the connecting link 98 to the leg-rest mounting linkage. When the intermediate coordinating link 38 arrives at the position illustrated in FIG. 2 in abutment with the stop 54, the link 38 thereafter becomes a stationary support to all intents and purposes. 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 positions wherein the angle between the seat and back-rest opens up into the fully reclined positions of FIG. 3. During the second movement phase, the respective guiding linkages for the back-rest and seat, which are coordinated to each other but which may be independently designed, may be arranged to impart a requisite inclining movement to the seat and reclining movement to the back-rest.

When the chair occupant desires to restore the chair to the upright sitting position, the occupant merely leans forwardly whereupon the chair moves in the reverse direction through the second movement phase into the intermediate, tilted sitting position with the chair coming to a pronounced stop at such intermediate, tilted sitting position. Thereupon by applying pressure on the leg-rest, the chair may be resorted to the upright sitting position.

Referring now specifically to FIGS. 4 to 6 of the drawings, there is shown a further embodiment of reclining chair demonstrating further 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 one or more cross braces 118, 119 and supported on depending legs.

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 sitting position illustrated in FIG. 5 and for a second movement phase from the intermediate, tilted sitting position through a series of reclining positions to the fully reclined position illustrated in FIG. 6.

Disposed beneath the forward end of the seat 124 is a leg-rest 126 which is mounted for movement from a stored or retracted position shown in FIG. 4 to successive elevated leg-supporting positions, as shown in FIGS. 5 and 6. As will be described, the leg-rest 126 is coordinated to the movement of the back-rest 122 and the seat 124 for movement into the successive elevated leg-supporting positions in response to the respective first and second movement phases of the chair.

A mounting arrangement, generally designated by the reference numeral 128, provides respective first and second guiding linkages for guiding the movement of the back-rest 122 and the seat 124 in the requisite relationship during the first and second movement phases of the reclining chair. Specifically, the mounting arrangement includes a substantially horizontally disposed intermediate coordinating link 130 having a pivotal mount 132 adjacent its forward end on the support. Disposed intermediate the rearward end of the intermediate coordinating link 130 and the support is a rear guiding linkage, generally designated by the reference numeral 134, which has a pivotal mount 136 on the support, and a pivotal connection 138 to the intermediate coordinating link 130 adjacent the rearward end thereof. The rear guiding linkage 134 includes first and second guiding links 140, 142 having their adjacent ends pivotally connected together at a knee pivot 144, with the links 140, 142 being held in substantial end to end alignment with each other by a releasable locking arrangement to be described. The locking arrangement coacts with a spring 146 having one end connected to the first guiding link 140 and having its other end anchored on the support 112. The links 130, 142 and 140 comprise a first guiding linkage for the back-rest 122 and the seat 124 between the sitting position of FIG. 4 and the intermediate tilted position of FIG. 5, with the portion of the support 112 intermediate the pivotal mounts 132, 136 serving as the stationary link of the first guiding linkage, and with the intermediate coordinating link 130 and the links 140, 142 of the rear guiding linkage 134 serving as the movable links of the first guiding linkage. During such first movement phase there is a slight rearward movement of the back-rest 122 in relation to the seat 124, for a purpose to be subsequently described, but otherwise the back-rest 122 and the seat may be considered to be unitary with the intermediate coordinating link 130 and moving as a unit therewith.

The first and second guiding links 140, 142 of the rear guiding linkage 134 will be recognized as providing a toggle linkage mechanism which, upon movement of the knee pivot 144 in a counter-clockwise direction about the pivotal mount 136 and out of its position of alignment

with the pivotal mount 136 and the pivotal connection 138, will cause a rapid rearward lowering of the rear portion of the body-supporting means, with the intermediate coordinating link 130 turning in the clockwise direction about its pivotal mount 132.

The mounting arrangement 128 further includes a second guiding linkage for the back-rest 122 and seat 124 operable during the movement between the intermediate tilted position of FIG. 5 and the various reclined positions including the final reclined position of FIG. 6. The second guiding linkage includes a depending front guiding link 148 having a pivotal mount 150 at its upper end on the intermediate link 130 at a point spaced rearwardly of the pivotal mount 132 of the intermediate coordinating link 130 and an upwardly inclined connecting link 152 having a pivotal connection 154 adjacent its lower end at an intermediate point on the depending front guiding link 148 and having a pivotal connection 156 at its upper end to the seat 124. The seat 124 is rigidly connected to a horizontally-extending seat carrier link 158 which has a pivotal mount 160 at its rearward end to the rearward end of the intermediate coordinating link 130 providing a seat pivot. The seat carrier link or member 158 normally rests on a rigid stop or abutment 162 projecting upwardly from the forward end of the intermediate coordinating link 130. As may be appreciated by progressively inspecting FIGS. 4 to 6 inclusive, during the first movement phase there is no relative movement between the intermediate coordinating link 130 and the carrier link 158 and during the second movement phase the carrier link 158 turns in the clockwise direction about its pivotal mount 160 on the intermediate coordinating link 130, with the latter remaining substantially stationary and in the position established by the contact of the rearward end of the intermediate coordinating link with the rear brace 119 serving as a stop to establish the end of the first movement phase for the reclining chair.

The back-rest 122 is mounted at a back-rest pivot 164 on an integral upward extension 166 on the seat carrier link 158 at a point spaced forwardly and above the pivotal mount 160 of the link 158 on the intermediate coordinating link 130. The back-rest 122 is provided with a depending rigid extension 168 which carries a rearwardly projecting locking member or arm 170 having a latch piece 172 which is adapted to be engaged behind the knee pivot 144 of the first and second rear guiding links 140, 142 in the upright or sitting position of the chair. The arm 170 and the latch piece 172 comprise a releasable locking arrangement which in response to the initial reclining movement of the back-rest 122 about the back-rest pivot 164 is effective to urge the knee pivot 144 forwardly out of the in-line position to initiate the operation of the first guiding linkage. The depending extension 168 of the back-rest 122 is coupled via a lost motion connection including a pin 174 on the depending extension 168 engaged within a slot 176 provided in a connecting link 178, to the second guiding linkage. The connecting link 178 has a pivotal connection 180 at its forward end to the depending front guiding link 148 of the second guiding linkage. In response to the initial reclining movement of the back-rest 122, the pin 174 of the lost motion connection moves through its lost motion travel, which is determined by the length of the slot 176 and is effective to delay the operative connection of the back-rest 122 to the second guiding linkage. The releasable locking means 170, 172, which unlocks the first guiding linkage during the initial reclining movement of the back-rest 122 in the first movement phase of the reclining chair, serves with the lost motion connection 174, 176 as a sequencing arrangement for establishing the operation of the first and second guiding linkage in the order named.

In this illustrative embodiment, the leg-rest 126 is mounted for movement into the various elevated leg-supporting positions on a depending hanger 182 having a pivotal mount 184 at its upper end adjacent the forward end of the seat and having a rigid connection at its lower end to the leg-rest 126. The leg-rest mounting and actuating arrangement is completed by an actuating link 186 which extends downwardly and forwardly from its upper end to its lower end, with the constraining link 186 having a pivotal mount 188 adjacent its upper end on the support 112 and a pivotal connection 190 adjacent its lower end to the hanger 182. During the first and second movement phases of the chair, and in response to the rearward movement of the seat 124 and the leg-rest mounting pivot 184 relative to the stationary pivotal mount 188, the actuating link 186 is effective to cause the leg-rest 126 to turn in the clockwise direction about its movable pivotal mount 184 such that the leg-rest moves to the elevated leg-supporting positions shown respectively in FIGS. 5 and 6. The disclosed leg-rest mounting arrangement is described and claimed in application Serial No. 35,674 filed June 13, 1960, in the name of the inventor herein.

For a better understanding of the operation of this embodiment of an improved double movement type of reclining chair, a typical sequence of operation will be described in detail.

When the chair occupant is seated in the chair 110 and leans against the back-rest 122, the initial reclining movement of the back-rest 122 turns the extension 168 in the clockwise direction about the back-rest pivot 164 such that the latch piece 172 pushes forwardly against the knee pivot 144 thereby actuating the rear guiding linkage 134 and moving the same out of the alignment position shown in FIG. 4. As the rearward portion of the body-supporting means 122, 124 drops as a result of the actuation of the first guiding linkage during the first movement phase, the pin 174 completes its lost motion travel along the slot 176 to effectively complete the operative connection between the back-rest and the links of the second guiding linkage, with the intermediate coordinating link 130 having its rearward end coming to rest against the rear cross brace 119 serving as a stop. When the intermediate coordinating link 130 arrives at the position illustrated in FIG. 5, the intermediate coordinating link becomes a stationary support for the second guiding linkage. As the chair occupant exerts further pressure against the back-rest 122, the body-supporting means may be moved from the intermediate, tilted sitting position through a series of reclining positions during which the angle between the back-rest 122 and the seat 124 opens up until the fully reclined position of FIG. 6 is reached. During the second movement phase, the seat 124 rigid with the carrier link 158 turns about the pivotal mount 160 serving as the seat pivot while the back-rest 122 turns about the back-rest pivot 164 on the extension 166 on the carrier link 158. The seat control portion of the second guiding linkage is effective to increase the angle between the back-rest 122 and the seat 124 in the desired ratio to establish the fully reclined position illustrated in FIG. 6.

When the chair occupant desires to restore the chair to the upright or sitting position, the occupant leans forwardly whereupon the chair moves in the reverse direction through the second movement phase into the intermediate, tilted sitting position of FIG. 5, with the chair coming to a pronounced stop at the intermediate, tilted sitting position. When pressure is exerted on the leg-rest 126 of the chair, the chair moves in the reverse direction through the first movement phase and is restored to the upright or sitting position of FIG. 4.

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 with 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 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 and for a second movement phase from said intermediate, tilted sitting position to a reclining position, the mounting means including a first constrained linkage for guiding said body-supporting means during movement between said sitting position and said intermediate, tilted sitting position and a second constrained 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, an intermediate coordinating link and movable links including a pair of links serving as a rear guide means, said pair of links being pivotally connected together at a knee pivot, means pivotally mounting one of said links of said pair on said support and means pivotally connecting the other of said links of said pair to said intermediate coordinating link, said second linkage including said intermediate coordinating link as the stationary link thereof and said seat and back-rest as movable links thereof and means operatively connecting said intermediate coordinating link to said body-supporting means.

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, titlted sitting position and for a second movement phase from said intermediate, tilted sitting position to a reclining position, the mounting means including a first constrained linkage for guiding said body-supporting means during movement between said sitting position and said intermediate, tilted sitting position and a second constrained 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, an intermediate coordinating link and movable links including a pair of links serving as a rear guide means and having a dead center position in substantial alignment with each other, said pair of links being pivotally connected together at a knee pivot and arranged at one side of said dead center position in said sitting position of said body-supporting means, means pivotally mounting one of said links of said pair on said support and means pivotally connecting the other of said links of said pair to said intermediate coordinating link, said pair of links moving through and past said dead center position during said first movement phase, said second linkage including said intermediate coordinating link as the stationary link thereof and said seat and back-rest as movable links thereof and means operatively connecting said intermediate coordinating link to said body-supporting means.

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 and for a second movement phase from said intermediate, tilted sitting position to a reclining position, the mounting means including a first constrained linkage for guiding said body-supporting means during movement between said sitting position and said intermediate, tilted sitting position and a second constrained 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, an intermediate coordinating link and movable links including a pair of links serving as a rear guide means, and arranged in substantial alignment with each other in said sitting position of said body-supporting means, said pair of links being pivotally connected together at a knee pivot, means pivotally mounting one of said links of said pair on said support and means pivotally connecting the other of said links of said pair to said intermediate coordinating link, said pair of links moving out of alignment during said first movement phase, said second linkage including said intermediate coordinating link as the stationary link thereof and said seat and back-rest as movable links thereof.

4. A reclining chair comprising a support, a 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 constrained linkage for guiding said body-supporting means for movement between said sitting position and said intermediate, tilted sitting position and second constrained linkage for guiding said body-supporting means for movement between said intermediate, tilted sitting position and said reclining position, said first linkage including said support as a stationary link thereof, an intermediate coordinating link and a pivotally interconnected link pair serving as a rear guide means and having one link of said pair pivotally connected to said intermediate coordinating link and the other link of said pair pivotally connected to said support, said second linkage means including said intermediate coordinating link as the stationary link thereof and said seat and back-rest as movable links thereof.

5. A reclining chair comprising a support, a 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 constrained linkage for guiding said body-supporting means for movement between said sitting position and said intermediate, tilted sitting position and second constrained linkage for guiding said body-supporting means for movement between said intermediate, tilted sitting position and said reclining position, said first linkage including said support as a stationary link thereof, an intermediate coordinating link and a pivotally interconnected link pair serving as a rear guide means and having one link of said pair pivotally connected to said intermediate coordinating link and the other link of said pair pivotally connected to said support, said link pair having a dead center position wherein the links thereof are in substantial end to end alignment and being arranged at an obtuse angle at one side of said dead center position when said body-supporting means is in said sitting position, said link pair moving through and past said dead center position during said first movement phase with the angle between the links of said link pair decreasing after passing said dead center position to cause a

rapid lowering of the rearward portion of said body-supporting means.

6. A reclining chair comprising a support, a 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 constrained linkage for guiding said body-supporting means for movement between said sitting position and said intermediate, tilted sitting position and second constrained linkage for guiding said body-supporting means for movement between said intermediate, tilted sitting position and said reclining position, said first linkage including said support as a stationary link thereof, an intermediate coordinating link and a link pair serving as a rear guide means and including links pivotally connected at a knee pivot and having one link pivotally connected to said intermediate coordinating link and the other link pivotally connected to said support, the links of said pair of links being arranged in substantial end to end alignment when said body-supporting means is in said sitting position, said link pair breaking at said knee pivot during the initial portion of said first movement phase and moving into successive angular positions during the remaining portion of said first movement phase to rapidly lower the rearward portion of said body-supporting means.

7. 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 and for a second movement phase from said intermediate tilted sitting position to a reclining position, the mounting means including a first constrained linkage for guiding said body-supporting means during movement between said sitting position and said intermediate, tilted sitting position and a second constrained 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, an intermediate coordinating link and movable links, said second linkage including said intermediate coordinating link as the stationary link thereof and said seat and back-rest as movable links thereof, the movable links of one of said linkages including a pair of links serving as a rear guide means, said pair of links being pivotally connected together at a knee pivot and being movable to cause a rapid lowering of the rearward portion of said body-supporting means during its movement phase.

8. 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 and for a second movement phase from said intermediate, tilted sitting position to a reclining position, the mounting means including a first constrained linkage for guiding said body-supporting means during movement between said sitting position and said intermediate, tilted sitting position and a second constrained linkage for guiding said body-supporting means during movement between said intermediate, tilted sitting position and said reclining position, and rear guiding means as part of one of said constrained linkages and operative during one of said movement phases to cause a rapid lowering of the rearward portion of said body-supporting means with a relatively small rearward displacement of said body-supporting means.

9. 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 and for a second movement phase from said intermediate, tilted sitting position to a reclining position, the mounting means including a first constrained linkage for guiding said body-supporting means during movement between said sitting position and said intermediate, tilted sitting position and a second constrained linkage for guiding said body-supporting means during movement between said intermediate, tilted sitting position and said reclining position, and rear guiding means as part of one of said constrained linkages and operative during one of said movement phases to cause a rapid lowering of the rearward portion of said body-supporting means with a relatively small rearward displacement of said body-supporting means, said rear guide means including a pair of links pivotally interconnected and having a position in alignment with each other when said body-supporting means is in said sitting position, said pair of links moving out of said position of alignment through successive positions at progressively smaller acute angles during said one of said movement phases.

10. 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 and for a second movement phase from said intermediate, tilted sitting position to a reclining position, the mounting means including a first constrained linkage for guiding said body-supporting means during movement between said sitting position and said intermediate, tilted sitting position and a second constrained linkage for guiding said body-supporting means during movement between said intermediate, tilted sitting position and said reclining position, and rear guiding means as part of one of said constrained linkages and operative during one of said movement phases to cause a rapid lowering of the rearward portion of said body-supporting means with a relatively small rearward displacement of said body-supporting means, said rear guide means including a straight line linkage mechanism having a pair of links arranged to define an obtuse angle therebetween at one side of a dead center position wherein the links of said pair are in alignment with each other when said body-supporting means is in said sitting position, and a constraining link pivotally connected to a link of said link pair of moving said link pair through and past said dead center position in response to movement of said body-supporting means during said one of said movement phases.

11. 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 and for a second movement phase from said intermediate, tilted sitting position to a reclining position, the mounting means including a first constrained linkage for guiding said body-supporting means during movement between said sitting position and said intermediate tilted sitting position and a second constrained linkage for guiding said body-supporting means during movement between said intermediate, tilted sitting position and said reclining position, and rear guiding means as part of one of said constrained linkages and oper-

ative during one of said movement phases to cause a rapid lowering of the rearward portion of said body-supporting means with a relatively small rearward displacement of said body-supporting means, said rear guide means including a toggle mechanism having a pair of links arranged in substantial alignment with each other, means for blocking movement of said pair of links in one direction out of alignment with each other, and means for moving said pair of links in the opposite direction in response to movement of said body-supporting means during said one of said movement phases.

12. 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 and for a second movement phase from said intermediate, tilted sitting position to a reclining positon, the mounting means including a first constrained linkage providing a first guiding means for said body-supporting means during movement between said sitting position and said intermediate, tilted sitting position, a second constrained linkage providing a second guiding means for said body-supporting means during movement between said intermediate, tilted sitting position and said reclined position, said first guiding means including an intermediate coordinating link pivotally mounted adjacent its forward end on said support, a link pair pivotally connected to said intermediate coordinating link adjacent the rearward end thereof and to said support, said link pair including first and second links pivotally connected at a knee pivot and having a position of alignment with each other, and means for moving said first and second links out of said position of alignment during said first movement phase.

13. 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 and for a second movement phase from said intermediate, tilted sitting position to a reclining position, the mounting means including a a first constrained linkage providing a first guiding means for said body-supporting means during movement between said sitting position and said intermediate, tilted sitting position and a second constrained linkage providing a second guiding means for said body-supporting means during movement between said intermediate, tilted sitting position and said reclined position, said second guiding means including a stationary link, movable links including said seat and back-rest and a lost motion interconnection between said back-rest and one of said movable links of said second guide means effective to delay the operative connection of said back-rest with said one movable link of said second guide means during the initial tilting movement of said back-rest in said first movement phase.

14. 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 and for a second movement phase from said intermediate, tilted sitting position to a reclining position, the mounting means including a first constrained linkage providing a first guiding means for said body-supporting means during movement between said sitting position and said intermediate, tilted sitting position and a second constrained linkage providing a second guiding means for said body-supporting means during movement between said intermediate, tilted sitting position and said reclined position, and releasable locking means engaging said first guide means and controlled from said back-rest, said locking means being releasable during the initial reclining movement of said back-rest relative to said seat in said first movement phase and serving as a sequencing arrangement for establishing the operation of said first and second guide means in the order named.

15. A reclining chair comprising a support, a 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 and for a second movement phase from said intermediate, tilted sitting position to a reclining position, the mounting means including a first constrained linkage providing a first guiding means for said body-supporting means during movement between said sitting position and said intermediate, tilted sitting position and a second constrained linkage providing a second guiding means for said body-supporting means during movement between said intermediate, tilted sitting position and said reclined position, said second guiding means including a stationary link, movable links including said seat and back-rest and a lost motion interconnection between said back-rest and one of said movable links of said second guide means effective to delay the operative connection of said back-rest with said one movable link of said second guide means during the initial reclining movement of said back-rest in said first movement phase, and releasable locking means engaging said first guide means and controlled from said back-rest, said locking means being releasable during said initial reclining movement of said back-rest in said first movement phase and serving with said lost motion interconnection as a sequencing arrangement for establishing the operation of said first and second guide means in the order named.

16. 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 and for a second movement phase from said intermediate, tilted sitting position to a reclining position, the mounting means including a first constrained linkage providing a first guiding means for said body-supporting means during movement between said sitting position and said intermediate titlted sitting position and a second constrained linkage providing a second guiding means for said body-supporting means during movement between said intermediate tilted sitting position and said reclined position, said first guide means including said support as a stationary link thereof and movable links including an intermediate coordinating link, said second guiding means including said intermediate coordinating link as the stationary link thereof, movable links including said seat and back-rest and a lost motion interconnection between said back-rest and one of said movable links of said second guide means effective to delay the operative connection of said back-rest with said one movable link of said second guide means during the initial reclining movement of said back-rest in said first movement phase.

17. 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 and for a second movement phase from said intermediate tilted sitting position to a reclining position, the mounting means including a first constrained linkage providing a first guiding means for said body-supporting means during movement between said sitting position and said intermediate, tilted sitting position and

a second constrained linkage providing a second guiding means for said body-supporting means during movement between said intermediate, tilted sitting position and said reclined position, said first guide means including said support as a stationary link thereof and movable links including an intermediate coordinating link, said second guiding means including said intermediate coordinating link as the stationary link thereof and movable links including said seat and back-rest, and releasable locking means engaging said first guide means and controlled from said back-rest, said locking means being releasable during an initial reclining movement of said back-rest relative to said seat in said first movement phase and serving as a sequencing arrangement for establishing the operation of said first and second guide means in the order named.

18. 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 and for a second movement phase from said intermediate, tilted sitting position to a reclining position, the mounting means including a first constrained linkage providing a first guiding means for said body-supporting means during movement between said sitting position and said intermediate, tilted sitting position and a second constrained linkage providing a second guiding means for said body-supporting means during movement between said intermediate, tilted sitting position and said reclined position, said first guide means including said support as a stationary link thereof and movable links including an intermediate coordinating link, said second guiding means including said intermediate coordinating link as the stationary link thereof, movable links including said seat and back-rest and a lost motion interconnectin between said back-rest and one of said movable links of said second guide means effective to delay the operative connection of said back-rest with said one movable link of said second guide means during the initial reclining movement of said back-rest in said first movement phase, and releasable locking means engaging said first guide means and controlled from said back-rest, said locking means being releasable during said initial reclining movement of said back-rest in said first movement phase and serving with said lost motion interconnection as a sequencing arrangement for establishing the operation of said first and second guide means in the order named.

19. 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 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 said intermediate, tilted sitting position to a reclining position, the mounting means including a first constrained linkage for guiding said body-supporting means during movement between said sitting position and said intermediate, tilted sitting position and a second constrained 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, an intermediate coordinating link and movable links including a pair of links serving as a rear guide means, said pair of links being pivotally connected together at a knee pivot, means pivotally mounting one of said links of said pair on said support and means pivotally connecting the other of said links of said pair to said intermediate coordinating link, said second linkage including said intermediate coordinating link as the stationary link thereof and said seat and back-rest as movable links thereof and means operatively connecting said intermediate coordinating link to said body-supporting means, a leg-rest, and means operatively connected to said body-supporting means and to said leg-rest for moving said leg-rest into an elevated leg-supporting position in response to the movement of said body-supporting means into said intermediate, tilted sitting position.

20. 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 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 said intermediate, tilted sitting position to a reclining position, the mounting means including a first constrained linkage for guiding said body-supporting means during movement between said sitting position and said intermediate, tilted sitting position and a second constrained linkage for guiding said body-supporting means during movement between said intermediate, tilted sitting position and said reclining position, and rear guiding means as part of one of said constrained linkages and operative during one of said movement phases to cause a rapid lowering of the rearward portion of said body-supporting means with a relatively small rearward displacement of said body-supporting means, a leg-rest, and means operatively connected to said body-supporting means and to said leg-rest for moving said leg-rest into an elevated leg-supporting position in response to the movement of said body-supporting means into said intermediate, tilted sitting position.

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