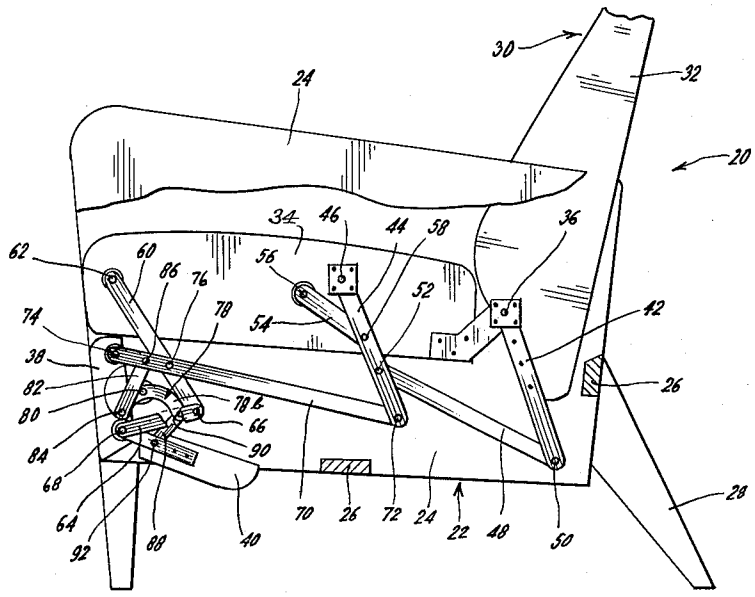
Sept. 26, 1961 P. S. FLETCHER 3,001,817

LEG-REST AND ACTUATING MECHANISM

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FIG. 1.



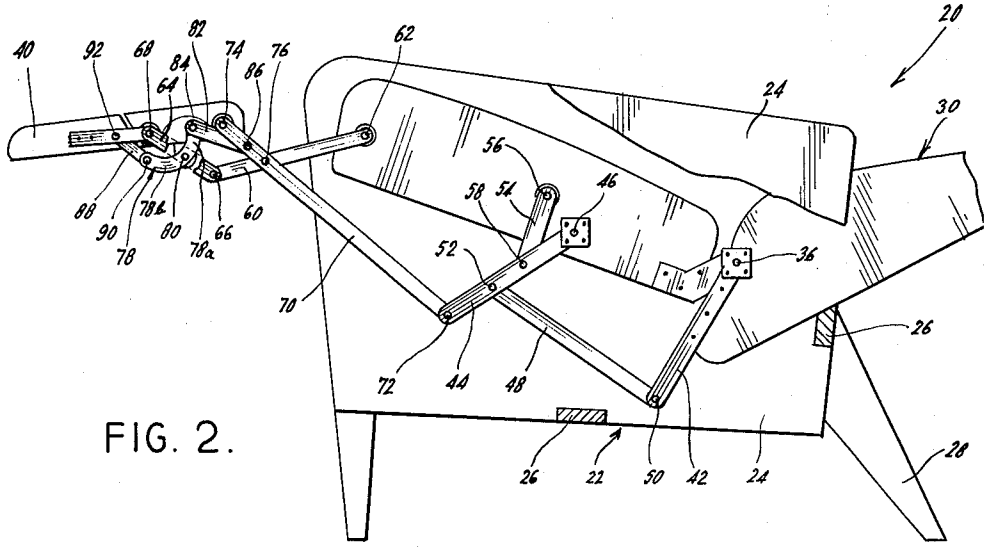


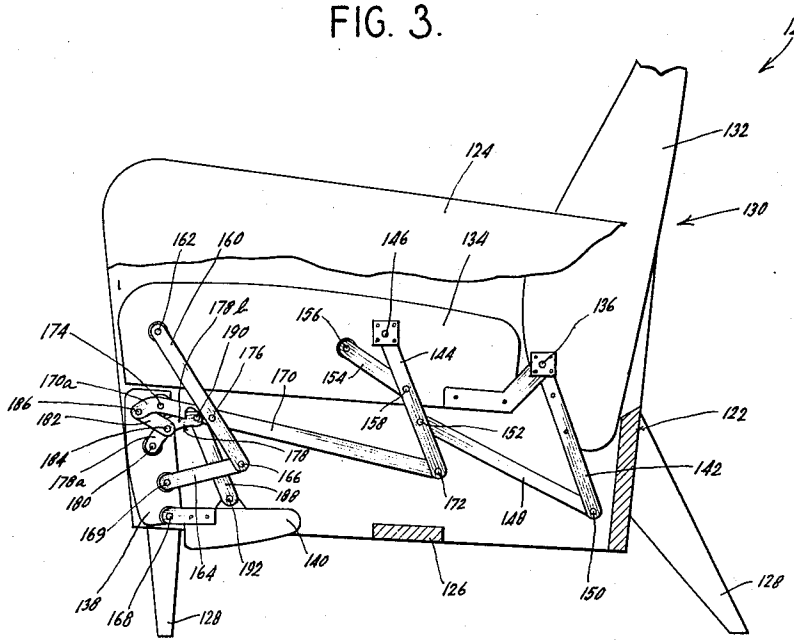
FIG. 2.

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LEG-REST AND ACTUATING MECHANISM

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FIG. 3.



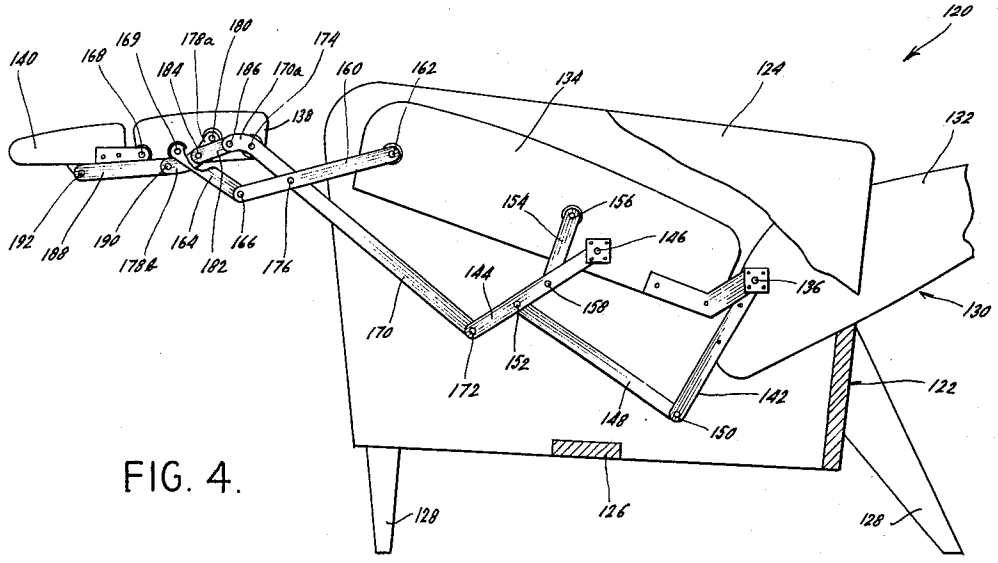


FIG. 4.

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LEG-REST AND ACTUATING MECHANISM

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FIG. 3A.

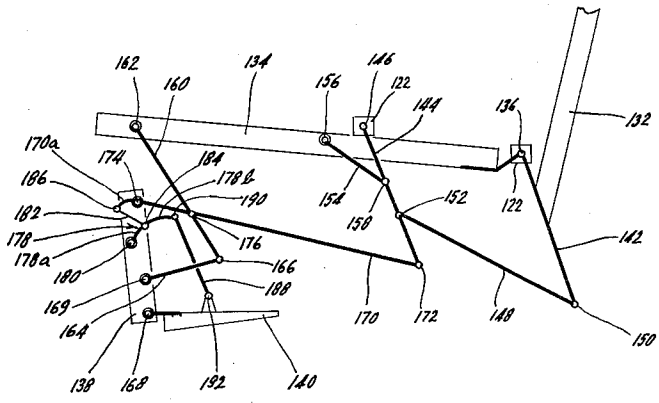


FIG. 4A.

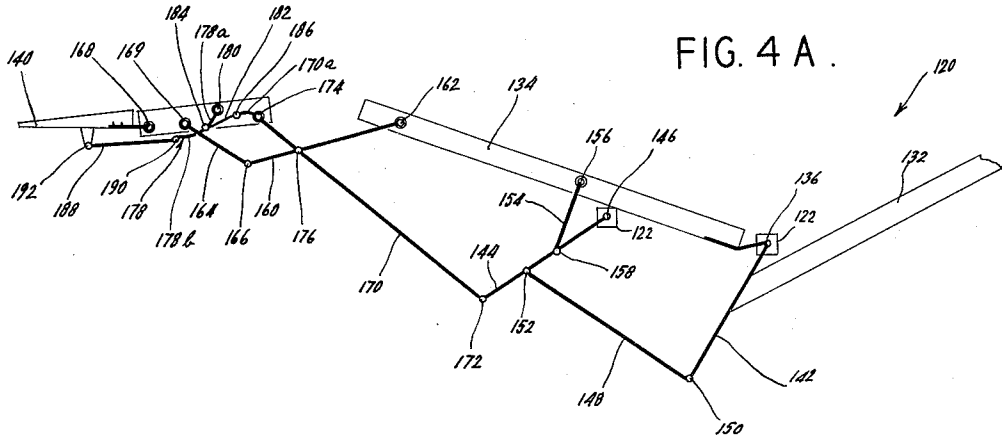
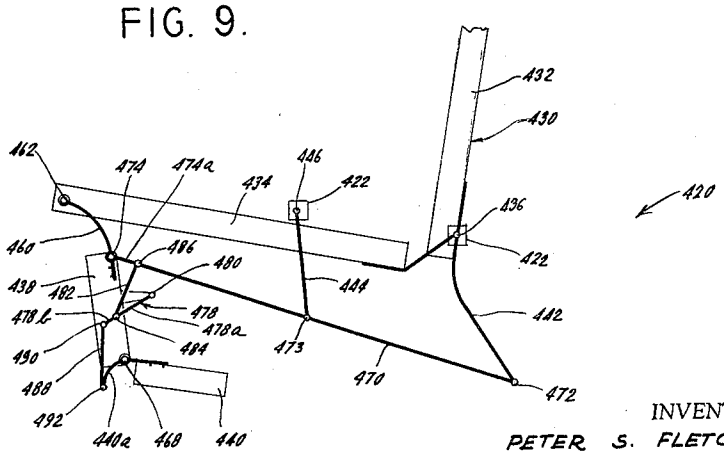


FIG. 9.



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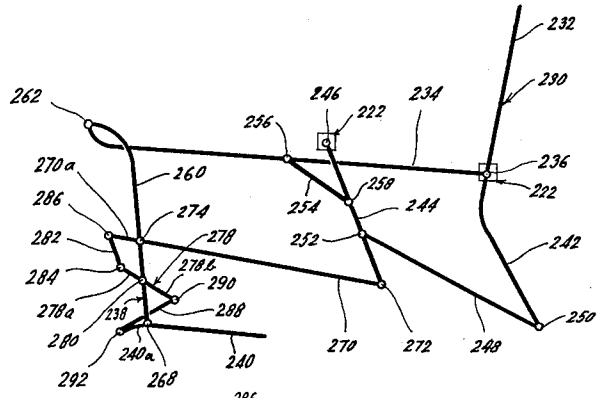


FIG. 5.

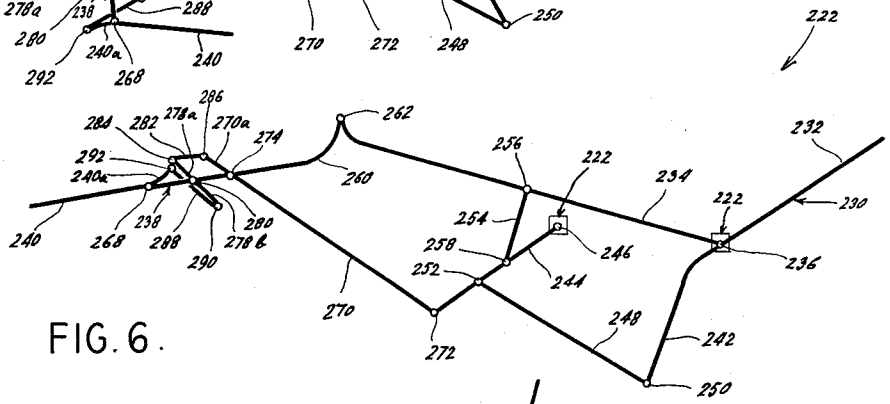


FIG. 6.

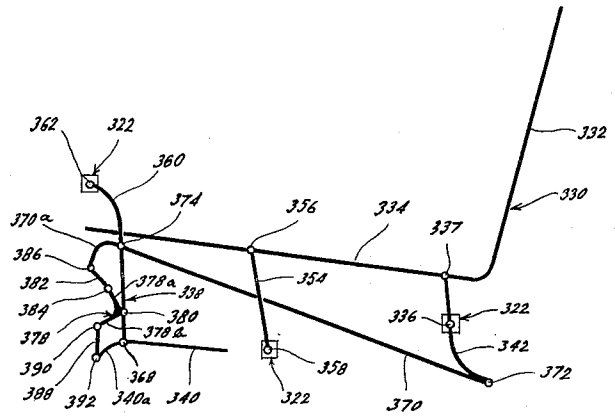


FIG. 7.

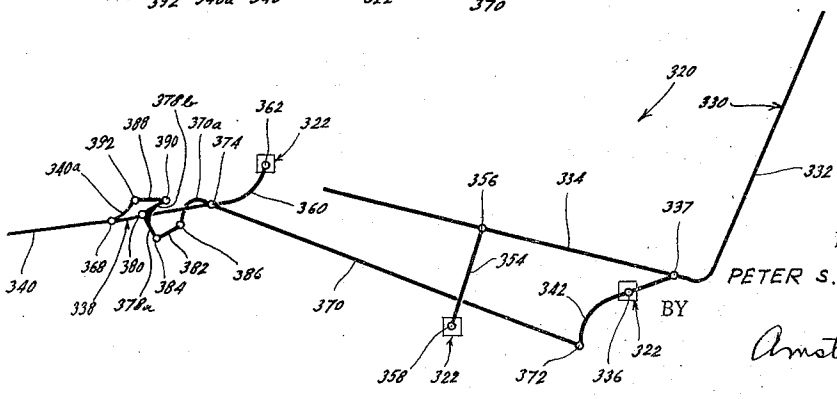


FIG. 8.

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FIG. 10.

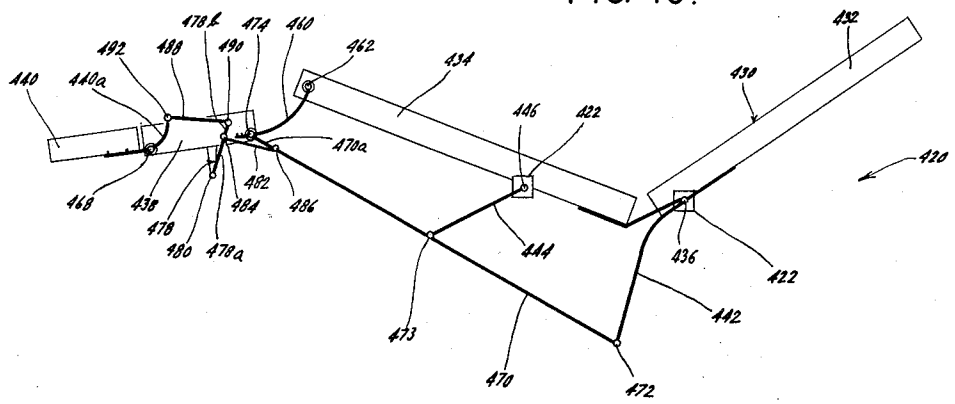


FIG. 11.

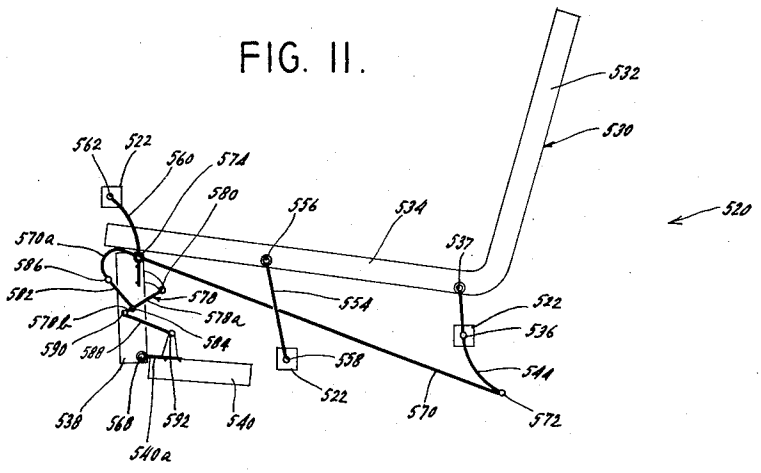
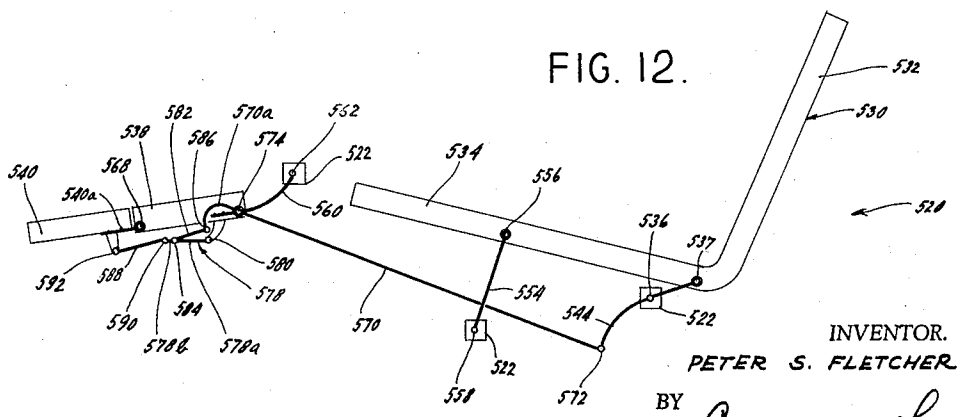


FIG. 12.



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United States Patent Office 3,001,817 Patented Sept. 26, 1961

3,001,817

LEG-REST AND ACTUATING MECHANISM

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Continuation of applications Ser. No. 612,406, Sept. 27, 1956, and Ser. No. 615,538, Oct. 12, 1956. This application Feb. 14, 1958, Ser. No. 715,386

10 Claims. (Cl. 297—75)

The present invention relates generally to reclining chairs incorporating a leg-rest and in particular to an improved linkage mechanism for actuating an extension of the leg-rest of the reclining chair, which extension is normally disposed below the chair seat in a stored position and is brought into an extended position in substantial alignment with the leg-rest in response to reclining movement of the chair. This is a continuation of my earlier filed application Serial No. 612,406, filed September 27, 1956, now abandoned, and Serial No. 615,538 filed October 12, 1956, now abandoned, both entitled "Movable Reclining Chair With Back-Rest, Seat and Leg-Rest."

The well-known reclining chair comprises a support, a body-supporting means including a seat and a back-seat rockably mounted on the support, a leg-rest and a linkage mechanism controlled from the back-rest and coordinated to the seat and the leg-rest for inclining the seat and for elevating the leg-rest in response to movement of the back-rest from a sitting position to various reclining positions. Of recent time, the industry has been presented with the problem of designing a reclining chair of a modern and streamlined appearance and preferably incorporating a chair frame supported by depending feet or legs. In order to incorporate an adequate leg-rest in this type of chair, resort has been made to a two-part leg-rest which includes a leg-rest proper and a leg-rest extension. In the normal upright sitting position of the chair, the leg-rest proper extends vertically and downwardly beneath the forward end of the chair, with the leg-rest extension folded back beneath the chair. The leg-rest and its extension are usually stored within the outline of the chair frame so that no substantial portion of the two-part leg-rest projects below the chair frame and into the open region provided beneath the chair by the supporting feet or legs. The leg-rest extension is coordinated to the remaining components of the reclining chair such that the leg-rest extension is brought into an in-line position with the leg-rest proper in response to reclining movements of the chair under control of the chair occupant. A typical prior art construction may be found in U.S. Patent No. 2,774,412 of December 18, 1956, in the name of J. Luckhardt.

It is broadly an object of the present invention to provide an improved reclining chair having a two-part leg-rest with provision for bringing the leg-rest extension into alignment with the leg-rest proper in response to reclining movement of the chair.

In chairs of this general construction, the degree of movement of the leg-rest extension relative to the leg-rest proper has been substantially uniform throughout the extent of the reclining movement of the chair. Accordingly, when the reclining chair is only partially reclined, the leg-rest extension is still folded back relative to the leg-rest proper and for all intents and purposes serves no useful function. The conventional linkages heretofore employed bring the leg-rest extension into alignment with the leg-rest proper only when the chair is substantially brought to its fully reclined position. Obviously, the leg-rest extension serves no useful supporting function for the many intermediate reclined positions into which the chair may be brought during actual use. In the absence of an adequate leg-rest support in the various intermediate reclined positions, optimum

comfort is not afforded to the occupant of the chair although the arrangement meets the aesthetic requirements.

It is a further object of the present invention to provide an improved two-part leg-rest which is coordinated to the reclining movement of the chair such that the leg-rest extension is brought into alignment with the leg-rest proper at an intermediate reclining position well in advance of the fully reclined position whereby the leg-rest proper and its extension are in substantial alignment with each other to provide effective support between the intermediate reclined position and the fully reclined position. Specifically, it is within the contemplation of the invention to provide an improved linkage which is effective in response to the initial reclining movement of the back-rest to rapidly rotate the leg-rest extension from the stored position beneath the chair to an in-line position relative to the leg-rest proper to thereby provide adequate support for the legs of the chair occupant during a substantial portion of the reclining movement of the chair.

In accordance with an illustrative embodiment demonstrating features of the present invention, an illustrative reclining chair comprises a support, body-supporting means including a seat and back-rest rockably mounted on said support, a leg-rest, a first linkage mechanism connected to said leg-rest for coordinating said leg-rest for movement to an elevated position in response to reclining movement of said back-rest from a sitting position into a reclining position, a leg-rest extension normally disposed below said seat in a stored position and mounted on said leg-rest for turning movement from said stored position into an extended position in substantial alignment with said leg-rest, and a second linkage mechanism controlled by said first linkage mechanism and operatively connected to said leg-rest extension for effecting the turning movement of the latter in response to reclining movement of said back-rest. The second linkage mechanism includes at least first and second groups of links, each of said groups including a driver, a follower, and a connecting link coupling said driver to said follower. The follower and connecting link of at least one group is arranged to produce a toggle effect on the leg-rest extension in response to said reclining movement to achieve a rapid rotation of the leg-rest extension into a relatively stationary in-line position with respect to said leg-rest.

The above brief description, as well as further objects, features and advantages of the present invention will be more fully understood by reference to the following detailed description of a number of illustrative embodiments of the present invention, when taken in conjunction with the accompanying drawing wherein:

FIGURE 1 is an elevational view, with parts broken away, of a reclining chair embodying features of the present invention, the chair being shown in the upright sitting position;

FIGURE 2 is an elevational view similar to FIGURE 1 but showing the chair in a reclining position;

FIGURE 3 is an elevational view of a modified form of reclining chair in accordance with the present invention, the chair being shown in the upright sitting position;

FIGURE 3A is a diagrammatic showing corresponding to FIGURE 3;

FIGURE 4 is a side elevational view of the modified reclining chair shown in FIGURE 3, with the chair illustrated in a reclined position;

FIGURE 4A is a diagrammatic showing of the reclining chair illustrated in FIGURE 4;

FIGURE 5 is a diagrammatic showing of a further modified reclining chair in accordance with the present invention, the chair being shown in the upright sitting position;

FIGURE 6 is a diagrammatic showing of the chair illustrated in FIGURE 5, the chair being shown in a reclined position;

FIGURE 7 is a diagrammatic showing of a further modified reclining chair in accordance with the present invention, the chair being shown in the upright sitting position;

FIGURE 8 is a diagrammatic showing of the chair illustrated in FIGURE 7, the chair being shown in a reclined position;

FIGURE 9 is a diagrammatic showing of a further modified reclining chair in accordance with the present invention, the chair being shown in the upright sitting position;

FIGURE 10 is a diagrammatic showing of the chair illustrated in FIGURE 9, the chair being shown in a reclined position;

FIGURE 11 is a diagrammatic showing of a further modified reclining chair in accordance with the present invention, the chair being shown in the upright sitting position; and

FIGURE 12 is a diagrammatic showing of the chair illustrated in FIGURE 11, the chair being shown in a reclined position.

Preliminary to a detailed description of a number of illustrative embodiments demonstrating features of the present invention, a brief description of the design theory employed in the various illustrative embodiments will be set forth to facilitate a more thorough understanding of the invention and its many variants. I have found that the leg-rest extension can be brought into a position in substantial alignment with the leg-rest proper very rapidly in response to reclining movement of the chair by the employment of a linkage chain or mechanism including a number of toggle linkages preferably coupled together by reverse toggle linkages. I define a toggle linkage as a pair of links joined together at a pivot, one of the links constituting a driver and being constrained to move in a rotary path to produce an axial force in the other of the links which constitutes a connecting link, the rotary motion of the driver being such that the effective lever arm (which is the perpendicular distance from the line of action of the connecting link to the center of rotation of the driver) is less when the driver is in its final position than in its initial position. The axial force produced in the connecting link is transmitted to the component which is to be subjected to the toggle effect (e.g. the leg-rest extension), and the toggle effect is to occur between the sitting position and the reclining position of the chair, that is, the effective lever arm of the driver in the reclining position must be less than the effective lever arm of the driver in the sitting position.

I define a reverse toggle linkage as a pair of links joined together at a pivot, one of the links constituting a connecting link and being subjected to axial movement and the other of the links constituting a follower and being rotated under control of the connecting link, the axial movement of the connecting link being such that the effective lever arm of the follower (which is the perpendicular distance from the line of action of the connecting link to the center of rotation of the follower) is greater when the follower is in its final position than in its initial position. The toggle effect is to occur between the sitting position and the various reclining positions of the chair and accordingly the effective lever arm must be increased in the reclining position of the chair. The reverse toggle effect can also be recognized by the connecting link and the follower approaching or assuming a position substantially at right angles to each other in response to reclining movement of the chair.

In my copending application Serial No. 579,926, filed April 23, 1956 and entitled "Article of Repose for Supporting the Body of a Person," and now U.S. Patent No. 2,945,533 of July 19, 1960, and entitled "Improved Leg-Rest and Actuating Mechanism," I disclose the use of a single toggle linkage which is effective to bring the leg-rest extension into alignment with the leg-rest rapidly and in response to a first phase of the reclining movement of the chair whereby the leg-rest extension forms a continuation of the leg-rest proper over a substantial remaining portion of the reclining movement, thereby providing an adequate support for the legs of the chair occupant. It is exceptionally advantageous if the toggle effect can be made very pronounced in that this will result in a more effective leg-rest supporting arrangement, that is, the leg-rest extension will be in alignment with the leg-rest proper over an even greater portion of the reclining movement of the chair. Further, a pronounced toggle effect will minimize the tendency of the leg-rest extension to displace about the dead center position of the toggle linkage when brought into the in-line position relative to the leg-rest proper.

As is understood, uniform motion imparted to the driver of a toggle linkage causes rapid turning of the follower until the pivots of the toggle linkage approach the in-line or dead center position. As the dead center position is approached, the uniform motion imparted to the driver manifests itself as a rapidly decreasing turning movement of the follower. When in the dead center position and for a substantial degree of movement past the dead center, there is little turning movement of the follower despite the continued uniform motion imparted to the driver. I have found that a number of toggle linkages appropriately coupled together can be employed to enhance the initial toggle action, that is, to bring the follower into its dead center position more rapidly for the same uniform motion imparted to the driver, as compared to a similarly proportioned and driven system employing but a single toggle mechanism. Further, the use of multiple toggle linkages minimizes the tendency of the follower to depart from the ideal stationary position. This principle of operation is employed to advantage in the various illustrated embodiments to bring the leg-rest extension into the in-line position relative to the leg-rest proper quickly and in response to a first phase of the reclining movement of the chair; and when once brought into the in-line position to minimize the tendency of the leg-rest extension from appreciably moving out of a substantially stationary position relative to the leg-rest proper.

Referring now specifically to FIGURES 1 and 2 of the drawings, there is shown a reclining chair **20** of generally known construction, which comprises a support or chair frame **22** including opposed side walls **24** joined together by a series of cross braces **26** and supported above the floor level by four depending legs **28**. A body-supporting means generally designated by the reference numeral **30**, is rockably supported on the chair frame and includes a back-rest **32** and a seat **34**. The back-rest **32** and the seat **34** are pivotally supported between the opposite side walls **24** by pivot pins **36**. Positioned below the forward end of the seat **34** is a leg-rest **38** which carries a leg-rest extension **40**. The leg-rest **38** terminates within the outline of the underside of the chair frame **22** and the leg-rest extension **40** is folded behind the leg-rest **38** into a stored position substantially within the outline of the chair frame **22**.

An appropriate coordinating linkage mechanism is connected between the support or chair frame **22**, the body-supporting unit **30** and the leg-rest **38** to coordinate the several moving components of the reclining chair in relation to each other; to wit, the seat **34** is inclined and the leg-rest **38** is elevated in coordination with the rearward reclining movement of the back-rest **32**. In this embodiment the coordinating linkage includes an arm **42** rigid with and depending from the back-rest **32**, a guiding link **44** pivotally supported on the chair frame **22** at the pivot **46**, and a first connecting link **48** connected at the pivot **50** to the lower end of the arm **42** and at the pivot **52** to an intermediate point on the guiding link **44**. The seat is coordinated for inclining movement by a seat

control link 54 which is connected at pivot 56 to the seat and at pivot 58 to the guiding link 44, the pivot 58 being disposed between the pivots 46, 52.

Th leg-rest 38 is suspended beneath the forward end of the seat by a supporting link 60 which is connected to the seat at pivot 62. The lower end of the supporting link 60 is connected to the lower end of the leg-rest 38 by a guiding link 64 which has a pivotal connection 66 at its rear end to the supporting link 60 and a further pivotal connection 68 at the lower end of the leg-rest 38. The four-bar leg-rest supporting linkage is completed by an actuating link 70 which has a pivotal connection 72 at its rear end to the lower end of the guiding link 44, a pivotal connection 74 at its forward end to the upper end of the leg-rest 38, and a further pivotal connection 76 to the supporting link 60.

The coordination of the chair components by the described linkage is substantially as follows:

When the chair occupant leans back against the back-rest 32, the back-rest turns about the pivot 36 and a forward motion is imparted to the connecting link 48 which causes a clockwise rotation of the guiding link 44 about its pivot 46. The clockwise rotation of the guiding link 44 is imparted to the seat via the seat control link 54, causing the seat to incline relative to the normal sitting position illustrated in FIGURE 1 (see FIGURE 2) and imparts forward motion to the actuating link 70 which in turn causes the supporting link 60 to rotate a clockwise direction about its pivot 62. This motion causes the leg-rest to be elevated from the normal stored position beneath the forward end of the seat, as shown in FIG. 1, to the elevated position as shown in FIG. 2.

In accordance with the present invention, a further linkage mechanism or link chain is operatively connected to the leg-rest extension 40 for effecting a turning movement of the latter in response to the reclining movement of the chair to bring the leg-rest extension 40 from the folded back or stored position illustrated in FIGURE 1 to the extended or in-line position illustrated in FIGURE 2. This further linkage mechanism or link chain includes an intermediate coupling member 78 which includes a rocker arm 78*a* and a driver arm 78*b*. The intermediate coupling member 78 is pivotally mounted on the leg-rest 38 at the pivotal connection 80 for oscillating movement, as will subsequently be described. It is within the contemplation of the present invention to mount the intermediate coupling member 78 on other movable components associated with the leg-rest (e.g. link 64), so long as the coupling member 78 will move with the leg-rest relative to the linkage actuating means, which will subsequently be described.

The rocker arm 78*a* of the coupling member 78 is connected to the actuating link 70 by a first connecting link 82, the connecting link 82 having a pivotal connection 84 at one of its ends to the rocker arm 78*a* and having a pivotal connection 86 at the other of its ends to the actuating link 70 intermediate the pivotal connections 74, 76. The driver arm 78*b* of the coupling member 78 is connected to the leg-rest extension 40 by a second connecting link 88, the second connecting link 88 having a pivotal connection 90 at one of its ends to the driver arm 78*b* and having a pivotal connection 92 at the other of its ends to the leg-rest extension 40 at a point spaced from the pivotal connection 68 of the leg-rest extension 40 to the leg-rest 38.

The further linkage mechanism which includes the coupling member 78, the first and second connecting links 82, 88, the leg-rest extension 40 and the portion of the actuating link 70 between pivots 74, 86, may be grouped into four link pairs, one or more of which link pairs produce a toggle effect on the leg-rest extension 40. In this embodiment of the invention, the portion of the actuating link 70 intermediate the pivots 74, 86, will be recognized as a driver arm of a toggle linkage, with the first connecting link 82 serving as the connecting link of said toggle linkage. This may be appreciated by progressively inspecting FIGURES 1 and 2 wherein the effective lever arm of the driver (the link portion between the pivots 74, 86) relative to the link 82 is decreased in response to the reclining movement of the chair. Stated somewhat differently, it is seen that the pivots 74, 86, 84 of this toggle linkage approach the in-line position with respect to each other as the chair is reclined.

The connecting link 82 and the rocker arm 78*a* of the coupling member 78 will be recognized as a reverse toggle linkage in that the effective lever arm of the rocker arm 78*a* relative to the connecting link 82 increases in response to the reclining movement of the chair. Stated somewhat differently, it will be seen that the connecting link 82 and the rocker arm 78*a* approach a position substantially at right angles relative to each other in response to the reclining movement of the chair.

The driver arm 78*b* of the coupling member 78 and the second connecting link 88 will be recognized as a toggle linkage. This will be appreciated by progressively inspecting FIGURES 1 and 2 wherein the effective lever arm of the driver 78*b* relative to the follower 88 is decreased in response to the reclining movement of the chair. Stated somewhat differently, it is seen that the pivots 80, 90, 92 of this toggle linkage approach an in-line position relative to each other as the chair is reclined.

In this embodiment of the invention, there is no reverse toggle effect provided by the connecting link 88 and the leg-rest extension 40.

Referring now specifically to FIGURES 3, 3A, 4 and 4A, there is shown a further reclining chair 120 of generally known construction which comprises a support or chair frame 122 including opposite side walls 124 joined by a series of cross braces 126 and supported above the floor level by four depending legs 128. A body supporting means generally designated by the reference numeral 130, is rockably supported on the chair frame and includes a back-rest 132 and a seat 134. The back-rest and seat are pivotally supported on a common coaxial pivot 136 through provision of rearwardly extending arms on the seat 134. Positioned below the forward end of the seat 134 is a leg-rest 138 which carries a leg-rest extension 140. As previously described, the leg-rest terminates within the outline of the under surface of the chair frame 122 and the leg-rest extension 140 is folded beneath the leg-rest into a stored position substantially within the outline of the chair frame.

An appropriate coordinating linkage is connected to the support 122, the body-supporting means 130 and the leg-rest 138 to coordinate the several moving components of the reclining chair. In this embodiment the coordinating linkage is substantially identical to that illustrated in conjunction with FIGURES 1 and 2 and includes an arm 142 rigid with the back-rest 132, a guiding link 144 pivotally supported on the chair frame at the pivot 146, a first connecting link 148 having a pivotal connection 150 to the lower end of the arm 142 and a pivotal connection 152 to the guiding link, and a seat control link 154 having a pivotal connection 156 to the seat and a pivotal connection 158 to the guiding link 144.

The leg-rest 138 is mounted on a supporting link 160 which has a pivotal connection 162 to the seat and is connected to the leg-rest by a guiding link 164 which has a pivotal connection 166 at its rear end to the supporting link 160 and a pivotal connection 169 at its forward end to the leg-rest. The leg-rest supporting linkage is completed by an actuating link 170 which has a pivotal connection 172 at its rear end to the lower end of the guiding link 144, a pivotal connection 174 adjacent to and spaced from its forward end to the leg-rest 138 and a further pivotal connection 176 to the supporting link 160.

In accordance with this embodiment of the invention, a further linkage mechanism or chain is operatively connected to the leg-rest extension 140 for effecting a rapid

turning movement of the latter into an in-line position relative to the leg-rest 138 in response to reclining movement of the chair. This further linkage mechanism includes an intermediate coupling member 178 which is pivotally mounted adjacent one of its ends on the leg-rest 138 at the pivotal connection 180 for oscillating movement. The intermediate coupling member is connected to the forward extension 170*a* of the actuating link 170 by a first connecting link 182. The connecting link 182 has a pivotal connection 184 to an intermediate point on the coupling member 178, dividing the coupling member into a follower arm 178*a* between the pivots 180, 184 and a driver arm 178*b* between the pivot 180 and the pivotal connection 190 to the second connecting link 188. The first connecting link 182 has a pivotal connection 186 to the forward end of the extension 170*a*, while the second connecting link 188 has the pivotal connection 190 at its upper end to the driver arm 178*b* and a pivotal connection 192 at its lower end to the leg-rest extension 140 at a point spaced from the pivotal mounting 168 of the leg-rest extension 140 on the leg-rest 138.

The further linkage mechanism which includes the coupling member 178, the first and second connecting links 182, 188, the leg-rest extension 140 and the extension 170*a* of the actuating link 170 may be grouped into four link pairs, one or more of which link pairs may produce a toggle effect on the leg-rest extension 140. In this embodiment of the invention the extension 170*a* will be recognized as the driver arm of a toggle linkage, with the first connecting link 182 serving as the connecting link of the toggle linkage. The driver arm 178*b* of the coupling member 178 and the second connecting link 188 will be recognized as a further toggle linkage. In this illustrative arrangement the link pairs coupling the designated toggle linkages do not provide a reverse toggle effect, as preferred.

Referring now specifically to FIGURES 5 and 6, there is shown a further reclining chair 220 which comprises a support or chair frame 222. A body-supporting means generally designated by the reference numeral 230, is rockably supported on the chair frame and includes a back-rest 232 and a seat 234. The back-rest and seat are pivotally mounted on the support 222 by a common coaxial pivot 236 at the rearward end of the seat and at the lower end of the back-rest 232 above the depending extension or arm 242. Positioned below the forward end of the seat 234 is a leg-rest 238 which carries a leg-rest extension 240. As previously described, the leg-rest 238 and the leg-rest extension are adapted to be stored within the outline of the chair frame.

An appropriate coordinating linkage is connected to the support 222 and the body-supporting means 230 and the leg-rest 238 to coordinate the several moving components of the reclining chair. In this embodiment the coordinating linkage includes the arm 242 rigid with the back-rest 232, a guiding link 244 pivotally supported on the chair frame at the pivot 246, a first connecting link 248 having a pivotal connection 250 to the lower end of the arm 242 and the pivotal connection 252 adjacent to and spaced from the lower end of the guiding link 244 and a seat control link 254 having a pivotal connection 256 to the seat and a pivotal connection 258 to the guiding link 244 intermediate the pivots 246, 252. The leg-rest 238 is mounted on the forward end of the seat by a rigid hanger arm or link 260 which has a pivotal connection 262 to the seat. The leg-rest coordinating linkage is completed by an actuating link 270 which has a pivotal connection 272 at its rear end to the lower end of the guiding link 244 and a further pivotal connection 274 to the leg-rest 238 at a location spaced inwardly from the end thereof whereby an integral link extension 270*a* of the actuating link projects beyond the leg-rest connection 274.

A further linkage mechanism or chain is operatively connected to the leg-rest extension 240 for effecting a rapid turning movement of the latter into an in-line position relative to the leg-rest 238 in response to reclining movement of the chair. This further linkage mechanism includes an intermediate coupling member 278 which includes a rocker arm 278*a* and a driver arm 278*b*. The intermediate coupling member 278 is pivotally mounted on the leg-rest 238 at the pivotal connection 280 intermediate its ends for oscillating movement. The rocker arm 278*a* of the intermediate coupling member 278 is connected to the forward link extension 270*a* of the actuating link 270 by a first connecting link 282 having a pivotal connection 284 at its lower end to the rocker arm 278*a* and a pivotal connection 286 at its upper end to the actuating link extension 270*a*. The driver arm 278*b* of the intermediate coupling member 278 is connected to the leg-rest extension 240 by a second connecting link 288 having a pivotal connection 290 at its upper end to the driver arm 278*b* and a pivotal connection 292 at its lower end to the leg-rest extension 240. In this embodiment the leg-rest extension 240 is pivoted on the leg-rest 238 at a pivot 268, which pivot 268 is spaced from the pivotal connection 292 to the second connecting link 288 such that the leg-rest extension 240 includes an integral link 240*a* intermediate the pivots 268, 292.

The further linkage mechanism which includes the coupling member 278, the first and second connecting links 282, 288, and integral link 240*a* on the leg-rest extension 240 and the integral link 270*a* on the actuating link 270 may be grouped into four link pairs, one or more of which link pairs produce a toggle effect on the leg-rest extension 240. In this embodiment of the invention the link 270*a* will be recognized as a driver arm of the toggle linkage, with the first connecting link 282 serving as the connecting link of the toggle linkage. This may be appreciated by progressively inspecting FIGURES 5 and 6 wherein it is seen that the effective lever arm of the driver link 270*a* relative to the connecting link 282 is decreased in response to the reclining movement of the chair, with the pivots 274, 286, 284 of this toggle linkage approaching an in-line position with respect to each other as the chair is reclined. The connecting link 282 and the rocker arm 278*a* will be recognized as a reverse toggle linkage in that the effective lever arm of the rocker 278*a* relative to the connecting link 282 increases in response to the reclining movement of the chair. Stated somewhat differently, it is seen that the connecting link 282 and the rocker arm 278*a* approach a position substantially at right angles relative to each other in response to the reclining movement of the chair. The driver arm 278*b* of the coupling member and the second connecting link 282 will be recognized as a further toggle linkage. This may be seen by progressively inspecting FIGURES 5 and 6 wherein it is seen that the effective lever arm of the driver 278*b* relative to the link 288 decreases in response to reclining movement, with the pivots 280, 290, 292 approaching an in-line position with respect to each other as the chair is reclined. The connecting link 288 and the link 240*a* will be recognized as a reverse toggle linkage wherein the effective lever arm of the link 240*a* relative to the connecting link 288 increases in response to reclining movement of the chair. Stated somewhat differently, it is seen that the link 240*a* and the connecting link 288 approach a position substantially at right angles to each other in response to reclining movement of the chair.

Referring now specifically to FIGURES 7 and 8, there is shown a further reclining chair 320 which comprises a support or chair frame 322. A body-supporting unit, generally designated by the reference numeral 330 is rockably supported on the chair frame and includes a back-rest 332 and a seat 334 rigid with said back-rest. The body-supporting unit 330 is pivotally mounted on the support 322 by a guiding link 342 which is pivoted on the support at the pivot 336 and has a pivotal connection 337 to the body-supporting unit. Positioned below the forward end of the seat 334 is a leg-rest 338 which carries a leg-rest extension 340. As previously de-

scribed, the leg-rest 338 and the leg-rest extension 340 are adapted to be stored within the outline of the chair frame.

An appropriate coordinating linkage is connected to the support 322 and the body-supporting unit 330 and the leg-rest 338 to coordinate the several moving components of the chair. In this embodiment the coordinating linkage includes the guiding link 342 and a seat control link 354 having a pivotal connection 356 to the seat and a pivotal connection 358 to the support 322. The leg-rest 338 is mounted on the forward end of the support by a rigid hanger arm or link 360 which has a pivotal connection 362 to the support. The leg-rest supporting linkage is completed by an actuating link 370 which has a pivotal connection 372 at its rear end to the lower end of the guiding link 342 and a further pivotal connection 374 to the leg-rest 338 at a location spaced inwardly from the end thereof whereby an integral extension 370*a* of the actuating link projects beyond the leg-rest 338.

A further linkage mechanism or chain is operatively connected to the leg-rest extension 340 for effecting a rapid turning movement of the latter into an in-line position relative to the leg-rest 338 in response to reclining movement of the chair. This further linkage mechanism includes an intermediate coupling member 378 in the form of a bell crank which includes a rocker arm 378*a* and a driver arm 378*b*. The intermediate coupling member 378 is pivotally mounted on the leg-rest 338 at the pivotal connection 380 for oscillating movement. The rocker arm 378*a* of the intermediate coupling member 378 is connected to the forward extension 370*a* of the actuating link 370 by a first connecting link 382 having a pivotal connection 384 at its lower end to the rocker arm 378*a* and a pivotal connection 386 at its upper end to the actuating link extension 370*a*. The driver arm 378*b* of the intermediate coupling member 378 is connected to the leg-rest extension 340 by a second connecting link 388 having a pivotal connection 390 at its upper end to the driver arm 378*b* and a pivotal connection 392 to the leg-rest extension 340. In this embodiment the leg-rest extension 340 is pivoted on the leg-rest 338 at a pivot 368, which pivot is spaced from the pivot 392 such that the leg-rest extension 340 includes an integral link 340*a* intermediate the pivots 368, 392.

The further linkage mechanism which includes the coupling member 378, the first and second connecting links 382, 388, the integral link 370*a* on the actuating link 370 may be grouped into four link pairs, one or more of which link pairs produce a toggle effect on the leg-rest extension 340. In this embodiment of the invention the link 370*a* will be recognized as a driver arm of the toggle linkage, with the first connecting link 382 serving as the connecting link of the toggle linkage. This may be appreciated by progressively inspecting FIGURES 7 and 8 wherein it is seen that the effective lever arm of the driver link 370*a* relative to the link 382 is decreased in response to the reclining movement of the chair, with the pivots 374, 386, 384 of this toggle linkage approaching an in-line position with respect to each other as the chair is reclined.

The connecting link 382 and the rocker arm 378*a* will be recognized as a reverse toggle linkage in that the effective lever arm of the rocker 378*a* relative to the connecting link 382 increases in repsonse to the reclining movement of the chair. Stated somewhat differently, it is seen that the connecting link 382 and the rocker arm 378*a* approach a position substantially at right angles relative to each other in response to the reclining movement of the chair. In this embodiment, the remaining link pairs do not provide appreciable toggle or reverse toggle effects.

Referring now specifically to FIGURES 9 and 10, there is shown a further reclining chair 420 which comprises a support or chair frame 422. A body-supporting unit generally designated by the reference numeral 430 is rockably supported on the chair frame and includes a back-rest 432 and a seat 434. The back-rest and seat are pivotally mounted on the support 422 by a common coaxial pivot 436 located adjacent the rearward end of the seat and the lower end of the back-rest 432 at the upper end of the depending extension or arm 442. Positioned below the forward end of the seat 434 is a leg-rest 438 which carries a leg-rest extension 440. As previously described, the leg-rest 438 and the leg-rest extension 440 are adapted to be stored within the outline of the chair frame.

An appropriate coordinating linkage is connected to the support 422 and the body-supporting unit 430 and the leg-rest 438 to coordinate the several moving components of the reclining chair. In this embodiment the coordinating linkage includes the arm 442 rigid with the back-rest 432 and a guiding link 444 having a pivotal connection 446 to the chair frame 422. The leg-rest 438 is mounted on the forward end of the seat by a rigid hanger arm or link 460 which has a pivotal connection 462 to the seat. The leg-rest supporting linkage is completed by an actuating link 270 which has a pivotal connection 472 at its rear end to the lower end of the arm 442, a further pivotal connection 473 to the lower end of the guiding link 444, and a further pivotal connection 474 to the leg-rest 438 and its hanger 460.

A further linkage mechanism or chain is operatively connected to the leg-rest extension 440 for effecting a rapid turning movement of the latter into an in-line position relative to the leg-rest 438 in response to reclining movement of the chair. This further linkage mechanism includes an intermediate coupling member 478 which includes a rocker arm 478*a* and a driver arm 478*b*. The intermediate coupling member 478 is pivotally mounted on the leg-rest 438 at the pivotal connection 480 at one end thereof for oscillating movement. The rocker arm 478*a* of the intermediate coupling member 478 is connected to the link portion 470*a* of the actuating link 470 by a first connecting link 482 having a pivotal connection 484 at its lower end to one end of the rocker arm 478*a* and a pivotal connection 486 at its upper end to the actuating link extension 474*a*. The driver arm 478*b* of the intermediate coupling member 478 is connected to the leg-rest extension 440 by a second connecting link 488 having a pivotal connection 490 at its upper end to the driver arm 478*b* and a pivotal connection 492 to the leg-rest extension 440. In this embodiment the leg-rest extension 440 is pivoted on the leg-rest 438 at a pivot 468, which pivot is spaced from the pivot 492 to the second connecting link 488 such that the leg-rest extension 440 includes an integral link 440*a* intermediate the pivots 468, 492.

The further linkage mechanism which includes the coupling member 478, the first and second connecting links 482, 488, the integral link 440*a* on the leg-rest extension 440 and the integral link 470*a* on the actuating link 470 may be grouped into four link pairs, one or more of which link pairs produce a toggle effect on the leg-rest extension 440. In this embodiment of the invention the link 470*a* will be recognized as a driver arm of the toggle linkage, with the first connecting link 482 serving as the connecting link of the toggle linkage. This may be appreciated by progressively inspecting FIGURES 9 and 10 wherein it is seen that the effective lever arm of the driver link 470*a* relative to the follower link 482 is decreased in response to the reclining movement of the chair, with the pivots 474, 486, 484 of this toggle linkage approaching an in-line position with respect to each other as the chair is reclined.

The connecting link 482 and the rocker arm 478*a* will be recognized as a reverse toggle linkage in that the effective lever arm of the rocker 478*a* relative to the connecting link 482 increases in response to the reclining movement of the chair. Stated somewhat differently, it is seen that the connecting link 482 and the rocker arm

478*a* approach a position substantially at right angles relative to each other in response to the reclining movement of the chair. In this embodiment the driver arm 478*b* of the coupling member and the second connecting link 482 do not act as a further toggle linkage and in fact produce somewhat of a reverse toggle effect. The connecting link 488 and the link 440*a* will be recognized as a reverse toggle linkage wherein the effective lever arm of the link 440*a* relative to the connecting link 488 increases in response to reclining movement of the chair. Stated somewhat differently, it is seen that the link 440*a* and the connecting link 488 approach a position substantially at right angles to each other in response to reclining movement of the chair.

Referring now specifically to FIGURES 11 and 12, there is shown a further reclining chair 520 which comprises a support or chair frame 522. A body-supporting unit generally designated by the reference numeral 530 is rockably supported on the chair frame and includes a rigid back-rest 532 and a seat 534. The rigid back-rest and seat are pivotally mounted on the support 522 at a pivot 536 by a guiding link 544. Positioned below the forward end of the seat 534 is a leg-rest 538 which carries a leg-rest extension 540. As previously described, the leg-rest 538 and the leg-rest extension 540 are adapted to be stored within the outline of the chair frame.

An appropriate coordinating linkage is connected to the support 522 and the body-supporting unit 530 and the leg-rest 538 to coordinate the several moving components of the reclining chair. In this embodiment the coordinating linkage includes the guiding link 544 pivotally supported on the chair frame intermediate its ends at the pivot 536, and a seat control and guiding link 554 having a pivotal connection 556 to the seat and a pivotal connection 558 to the chair frame 522. The leg-rest 538 is mounted on the forward end of the support by a rigid hanger arm or link 560 which has a pivotal connection 562 to the support 522. The leg-rest supporting linkage is completed by an actuating link 570 which has a pivotal connection 572 at its rear end to the lower end of the guiding link 544 and a further pivotal connection 574 to the leg-rest 538 and its hanger 560. The actuating link 570 includes an integral extension 570*a* projecting beyond the pivot 574.

A further linkage mechanism or chain is operatively connected to the leg-rest extension 540 for effecting a rapid turning movement of the latter into an in-line position relative to the leg-rest 538 in response to reclining movement of the chair. This further linkage mechanism includes an intermediate coupling member 578 which includes a rocker arm 578*a* and a driver arm 578*b*. The intermediate coupling member 578 is pivotally mounted at its end on the leg-rest 538 at the pivotal connection 580 for oscillating movement. The rocker arm 578*a* of the intermediate coupling member 578 is connected to the forward extension 570*a* of the actuating link 570 by a first connecting link 582 having a pivotal connection 584 at its lower end to one end of the rocker arm 278*a* and a pivotal connection 586 at its upper end to the actuating link extension 570*a*. The driver arm 578*b* of the intermediate coupling member 578 is connected to the leg-rest extension 540 by a second connecting link 588 having a pivotal connection 590 at its upper end to the driver arm 578*b* and a pivotal connection 592 to the leg-rest extension 540. In this embodiment the leg-rest extension 540 is pivoted on the leg-rest 538 at a pivot 568, which pivot is spaced from the pivot 592 to the second connecting link 588 such that the leg-rest extension 540 includes an integral link 540*a* intermediate the pivots 568, 592.

The further linkage mechanism which includes the coupling member 578, the first and second connecting links 582, 588, the integral link 540*a* on the leg-rest extension 540 and the integral link 570*a* on the actuating link 570 may be grouped into four link pairs, one or more of which link pairs produce a toggle effect on the leg-rest extension 540. In this embodiment of the invention the link 570*a* will be recognized as a driver arm of the toggle linkage, with the first connecting link 582 serving as the connecting link of the toggle linkage. This may be appreciated by progressively inspecting FIGURES 11 and 12 wherein it is seen that the effective lever arm of the driver link 570*a* relative to the connecting link 582 is decreased in response to the reclining movement of the chair, with the pivots 574, 586, 584 of this toggle linkage approaching an in-line position with respect to each other as the chair is reclined. The driver arm 578*b* of the coupling member and the second connecting link 582 will be recognized as a further toggle linkage. This may be seen by progressively inspecting FIGURES 11 and 12 wherein it is seen that the effective lever arm of the driver 578*b* relative to the follower 588 decreases in response to reclining movement, with the pivots 580, 590, 592 approaching an in-line position with respect to each other as the chair is reclined. In this embodiment, there is no reverse toggle action between the toggle linkage.

While preferred embodiments of the invention have been described herein, it is obvious that numerous additions, changes and omissions may be made without departing from the spirit and scope of the invention.

What I claim is:

1. A reclining chair comprising a support, body-supporting means including a seat, back-rest and leg-rest rockably mounted on said support, a first linkage mechanism connected to said leg-rest for coordinating said leg-rest for movement to an elevated position in response to reclining movement of said back-rest from a sitting position into a reclining position, a leg-rest extension normally disposed below said seat in a stored position and mounted on said leg-rest for turning movement from said stored position into an extended position in substantial alignment with said leg-rest, and a further linkage mechanism controlled by said first linkage mechanism and operatively connected to said leg-rest extension for effecting the turning movement of the latter in response to reclining movement of said back-rest, said further linkage mechanism including an intermediate coupling member having a rocker arm and a driver arm, means mounting said coupling member for oscillating movement with respect to said leg-rest, means including a first connecting link coupling said rocker arm to said first linkage mechanism whereby an actuating force is applied to said rocker arm in response to reclining movement of said back-rest, said first connecting link and said rocker arm being positioned substantially in alignment with each other in said stored position of said leg-rest extension and arranged to produce a reverse toggle effect in response to reclining movement of said back-rest, and means coupling said driver arm to said leg-rest extension whereby a turning force is applied to said leg-rest extension in response to the oscillating movement of said coupling member, said first connecting link and said rocker arm being effective in response to uniform motion imparted to said first connecting link to bring about a rapid movement of said leg-rest extension from said stored position to said extended position with said first connecting link and said rocker arm moving into a position approaching right angles with respect to each other.

2. A reclining chair comprising a support, body-supporting means including a seat, back-rest and leg-rest rockably mounted on said support, a first linkage mechanism connected to said leg-rest for coordinating said leg-rest for movement to an elevated position in response to reclining movement of said back-rest from a sitting position into a reclining position, a leg-rest extension normally disposed below said seat in a stored position and mounted on said leg-rest for turning movement from said stored position into an extended position in substantial alignment with said leg-rest, and a further linkage

mechanism controlled by said first linkage mechanism and operatively connected to said leg-rest extension for effecting the turning movement of the latter in response to reclining movement of said back-rest, said further linkage mechanism including an intermediate coupling member having a rocker arm and a driver arm, means mounting said coupling member for oscillating movement with respect to said leg-rest, means including a first connecting link coupling said rocker arm to said first linkage mechanism at a point selected such that said point moves away from the center of oscillation of said coupling member in response to said reclining movement whereby a pulling force is applied to said rocker arm in response to reclining movement of said back-rest, said first connecting link and said rocker arm being positioned substantially in alignment with each other in said stored position of said leg-rest extension and arranged to produce a reverse toggle effect in response to reclining movement of said back-rest, and means coupling said driver arm to said leg-rest extension whereby a turning force is applied to said leg-rest extension in response to the oscillating movement of said coupling member, said first connecting link and said rocker arm being effective in response to uniform motion imparted to said first connecting link to bring about a rapid movement of said leg-rest extension from said stored position to said extended position with said first connecting link and said rocker arm moving into a position approaching right angles with respect to each other.

3. In a reclining chair, a support, body-supporting means including a seat and back-rest rockably mounted on said support, a leg-rest, a leg-rest control linkage controlled by said body-supporting means and connected to said leg-rest for coordinating said leg-rest for movement to an elevated position in response to reclining movement of said back-rest from a sitting position into a reclining position, a leg-rest extension normally disposed below said seat in a stored position and mounted on said leg-rest for turning movement from said stored position into an extended position in substantial alignment with said leg-rest, and a leg-rest extension control linkage operatively connected to said leg-rest extension and including a first driver arm connected to said leg-rest control linkage for effecting turning movement of said leg-rest extension in response to reclining movement of said back-rest. said extension control linkage including a coupling member having a rocker arm and a further driver arm, means mounting said coupling member for oscillating movement relative to said leg-rest, means including a first connecting link operatively connecting said rocker arm to said first driver arm whereby an actuating force is applied to said rocker arm in response to reclining movement of said back-rest, said first connecting link and said rocker arm being positioned substantially in alignment with each other in said stored position of said leg-rest extension and arranged to produce a reverse toggle effect in response to reclining movement out of said back-rest, and means including a further connecting link coupling said further driver arm to said leg-rest extension whereby a turning force is applied to said leg-rest extension in response to the oscillating rotary movement of said coupling member, said first connecting link and said rocker arm being effective in response to uniform motion imparted to said first connecting link to bring about a rapid movement of said leg-rest extension from said stored position to said extended position with said first connecting link and said rocker arm moving into a position approaching right angles with respect to each other, said first driver arm and said first connecting link constituting a first link pair and said further driver arm and said further connecting link constituting a second link pair, the driver arm and connecting link of one of said link pairs being disposed at an angle with respect to each other in said sitting position and having adjacent ends connected together to provide a toggle linkage, the reclining movement of said back-rest being effective to impart a straightening action to said toggle linkage whereby said driver arm and connecting link of said one link pair approach an in-line position in response to reclining movement of said back-rest.

4. In a reclining chair, a support, body-supporting means including a seat and back-rest rockably mounted on said support, a leg-rest, a leg-rest control linkage controlled by said body-supporting means and connected to said leg-rest for coordinating said leg-rest for movement to an elevated position in response to reclining movement of said back-rest from a sitting position into a reclining position, a leg-rest extension normally disposed below said seat in a stored position and pivotally mounted on said leg-rest for turning movement from said stored position into an extended position in substantial alignment with said leg-rest, and a leg-rest extension control linkage operatively connected to leg-rest extension and including a first driver arm connected to said leg-rest control linkage for effecting turning movement of said leg-rest extension in response to reclining movement of said back-rest, said extension control linkage including a coupling member having a rocker arm and a further driver arm, means pivotally mounting said coupling member on said leg-rest for oscillating movement, means including a first connecting link pivotally connecting said rocker arm to said first driver arm whereby a pulling force is applied to said rocker arm in response to reclining movement of said back-rest, and means including a further connecting link pivotally connecting said further driver arm to said leg-rest extension whereby a turning force is applied to said leg-rest extension in response to the oscillating rotary movement of said coupling member, said first driver arm and said first connect-ink link constituting a first link pair and said further driver arm and said further connecting link constituting a second link pair, the driver arm and connecting link of each of said link pairs being disposed at an angle with respect to each other in said sitting position and having adjacent ends connected together to provide two toggle linkages, the driver arm and connecting link of each of said toggle linkages being disposed at an angle with respect to each other in said stored position of said leg-rest extension, said two toggle linkages being effective in response to uniform motion imparted to said driving arms to initially bring about a rapid movement of said leg-rest extension from said stored position to said extended position as said body-supporting means moves into a partially reclined position and with said driver arms and said connecting links of each of said link pairs moving into a substantially aligned position, said two toggle linkages permitting said leg-rest and said leg-rest extension to be elevated as a unit in substantial alignment with each other in response to continued uniform motion imparted to said driver arms between said partially reclined position and said fully reclined position with said driver arm and said connecting link of each of said link pairs remaining substantially in said aligned position.

5. A reclining chair comprising a support, body-supporting means including a seat, back-rest and leg-rest rockably mounted on said support, a first linkage mechanism connected between said body-supporting means and said leg-rest for coordinating said leg-rest for movement from a retracted position to an elevated position in response to reclining movement of said body-supporting means, a leg-rest extension normally disposed below said seat in a stored position and mounted on said leg-rest for turning movement from said stored position into an extended position in substantial alignment with said leg-rest, and a further linkage mechanism controlled by said first linkage mechanism and operatively connected to said leg-rest extension for effecting the turning movement of the latter into said extended position in response to movement of said body-supporting means into a partially reclined position, said further linkage mechanism including a coupling member having a rocker arm and a driver arm, means

mounting said coupling member for oscillating movement, means including a first connecting link coupling said rocker arm to said first linkage mechanism whereby an actuating force is applied to said rocker arm in response to said reclining movement, and means including a second connecting link coupling said driver arm to said leg-rest extension whereby a turning force is applied to said leg-rest extension in response to the oscillating movement of said coupling member, said first connecting link and said rocker arm being disposed nearly in alignment with each other in said stored position of said leg-rest extension and being arranged to provide a reverse toggle linkage, said reverse toggle linkage being effective in response to uniform motion imparted to said first connecting link to initially bring about a rapid movement of said leg-rest extension from said stored position to said extended position as said body-supporting means moves into said partially reclined position with said first connecting link and said rocker arm moving into a position approaching right angles with respect to each other.

6. A reclining chair comprising a support, body-supporting means including a seat, back-rest and leg-rest rockably mounted on said support, a first linkage mechanism connected between said body-supporting means and said leg-rest for coordinating said leg-rest for movement from a retracted position to an elevated position in response to reclining movement of said body-supporting means, a leg-rest extension normally disposed below said seat in a stored position and mounted on said leg-rest for turning movement from said stored position into an extended position in substantial alignment with said leg-rest, and a further linkage mechanism controlled by said first linkage mechanism and operatively connected to said leg-rest extension for effecting the turning movement of the latter into said extended position in response to movement of said body-supporting means into a partially reclined position, said further linkage mechanism including a coupling member having a rocker arm and a driver arm, means mounting said coupling member for oscillating movement, means including a first connecting link coupling said rocker arm to said first linkage mechanism whereby an actuating force is applied to said rocker arm in response to said reclining movement, and means including a second connecting link coupling said driver arm to said leg-rest extension whereby a turning force is applied to said leg-rest extension in response to the oscillating movement of said coupling member, said first connecting link and said rocker arm being disposed nearly in alignment with each other in said stored position of said leg-rest extension and being arranged to provide a reverse toggle linkage, said reverse toggle linkage being effective in response to uniform motion imparted to said first connecting link to initially bring about a rapid movement of said leg-rest extension from said stored position to said extended position as said body-supporting means moves into said partially reclined position with said first connecting link and said rocker arm moving into a position approaching right angles with respect to each other, said driver arm and said second connecting link being disposed at an angle with respect to each other in said stored position of said leg-rest extension and being arranged to provide a toggle linkage, said toggle linkage coacting with said reverse toggle linkage in response to uniform motion imparted to said driver arm to bring about said rapid movement of said leg-rest extension with said driver arm and said second connecting link moving into a substantially aligned position with respect to each other.

7. A reclining chair comprising a support, body-supporting means including a seal, back-rest and leg-rest rockably mounted on said support, a first linkage mechanism, including a first driver arm, connected between said body-supporting means and said leg-rest for coordinating said leg-rest for movement from a retracted position to an elevated position in response to reclining movement of said body-supporting means, a leg-rest extension normally disposed below said seat in a stored position and mounted on said leg-rest for turning movement from said stored position into an extended position in substantial alignment with said leg-rest, and a further linkage mechanism controlled by said first linkage mechanism and operatively connected to said leg-rest extension for effecting the turning movement of the latter into said extended position in response to movement of said body-supporting means into a partially reclined position, said further linkage mechanism including a coupling member having a rocker arm and a further driver arm, means mounting said coupling member for oscillating movement, means including a first connecting link coupling said rocker arm to said first linkage mechanism whereby an actuating force is applied to said rocker arm in response to said reclining movement, and means including a second connecting link coupling said further driver arm to said leg-rest extension whereby a turning force is applied to said leg-rest extension in response to the oscillating movement of said coupling member, said first connecting link and said rocker arm being disposed nearly in alignment with each other in said stored position of said leg-rest extension and being arranged to provide a reverse toggle linkage, said reverse toggle linkage being effective in response to uniform motion imparted to said first connecting link to initially bring about a rapid movement of said leg-rest extension from said stored position to said extended position as said body-supporting means moves into said partially reclined position with said first connecting link and said rocker arm moving into a position approaching right angles with respect to each other, said first driver arm and said first connecting link providing a first link pair and said further driver arm and said second connecting link providing a second link pair, the links of said first and second link pairs being disposed respectively at an angle with respect to each other in said stored position of said leg-rest extension and being arranged to provide first and second toggle linkages, said toggle linkages being coupled together by said reverse toggle linkage and coacting with said reverse toggle linkage to bring about said rapid movement of said leg-rest extension with said links of said first and second link pairs moving into respective substantially aligned positions.

8. A reclining chair comprising a support, body-supporting means including a seat, back-rest and leg-rest rockably mounted on said support, a first linkage mechanism, including a first driver arm, connected between said body-supporting means and said leg-rest for coordinating said leg-rest for movement from a retracted position to an elevated position in response to reclining movement of said body-supporting means, a leg-rest extension normally disposed below said seat in a stored position and mounted on said leg-rest for turning movement from said stored position into an extended position in substantial alignment with said leg-rest, and a further linkage mechanism controlled by said first linkage mechanism and operatively connected to said leg-rest extension for effecting the turning movement of the latter into said extended position in response to movement of said body-supporting means into a partially reclined position, said further linkage mechanism including a coupling member having a rocker arm and a further driver arm, means mounting said coupling member for oscillating movement, means including a first connecting link coupling said rocker arm to said first linkage mechanism whereby an actuating force is applied to said rocker arm in response to said reclining movement, and means including a second connecting link coupling said further driver arm to said leg-rest extension whereby a turning force is applied to said leg-rest extension in response to the oscillating movement of said coupling member, said first driver arm and said first connecting link providing a first link pair and said further driver arm and said second connecting link providing a second link pair, the links of said first and second link pairs being disposed

respectively at an angle with respect to each other in said stored position of said leg-rest extension and being arranged to provide first and second toggle linkages, said first and second toggle linkages coacting with each other in response to motion imparted thereto as said body-supporting means moves into said partially reclined position to bring about said rapid movement of said leg-rest extension with said links of said first and second link pairs moving into respective substantially aligned positions.

9. A reclining chair comprising a support, body-supporting means including a seat, back-rest and leg-rest rockably mounted on said support, a first linkage mechanism connected between said body-supporting means and said leg-rest for coordinating said leg-rest for movement from a retracted position to an elevated position in response to reclining movement of said body-supporting means, a leg-rest extension normally disposed below said seat in a stored position, means including a rocker arm mounting said leg-rest extension on said leg-rest for turning movement from said stored position into an extended position in substantial alignment with said leg-rest, and a further linkage mechanism controlled by said first linkage mechanism and operatively connected to said leg-rest extension for effecting the turning movement of the latter into said extended position in response to movement of said body-supporting means into a partially reclined position, said further linkage mechanism including a coupling member having a further rocker arm and a driver arm, means mounting said coupling member for oscillating movement, means including a first connecting link coupling said further rocker arm to said first linkage mechanism whereby an actuating force is applied to said further rocker arm in response to said reclining movement, and means including a second connecting link coupling said driver arm to said rocker arm whereby a turning force is applied to said leg-rest extension in response to the oscillating movement of said coupling member, said second connecting link and said rocker arm being disposed nearly in alignment with each other in said stored position of said leg-rest extension and being arranged to provide a reverse toggle linkage, said reverse toggle linkage being effective in response to uniform motion imparted to said second connecting link to initially bring about a rapid movement of said leg-rest extension from said stored position to said extended position as said body-supporting means moves into said partially reclined position with said second connecting link and said rocker arm moving into a position approaching right angles with respect to each other, said driver arm and said second connecting link being disposed at an angle with respect to each other in said stored position of said leg-rest extension and being arranged to provide a toggle linkage, said toggle linkage coacting with said reverse toggle linkage in response to uniform motion imparted to said driver arm to bring about said rapid movement of said leg-rest extension with said driver arm and said second connecting link moving into a substantially aligned position with respect to each other.

10. A reclining chair comprising a support, body-supporting means pivotally mounted on said support for reclining movement through successive partially reclined positions and into a fully reclined position, a leg-rest, a linkage mechanism connected between said leg-rest and said body-supporting means for elevating said leg-rest in response to reclining movement of said body-supporting means, a leg-rest extension pivotally mounted on the lower end of said leg-rest and normally disposed in a stored position folded behind said leg-rest, and at least two toggle linkages connected between said leg-rest and said leg-rest extension and controlled by said linkage mechanism for bringing said leg-rest extension into an extended position substantially in alignment with said leg-rest in response to movement of said body-supporting means into a partially reclined position, each of said toggle linkages including a driving link operatively connected to said linkage mechanism and a connecting link pivotally connected to said driving link and coupled to said leg-rest extension serving as a driven member, said driving link and said connecting link being disposed at an angle with respect to each other in said stored position of said leg-rest extension, said two toggle linkages being effective cumulatively and in response to uniform motion imparted to said driving links from said linkage mechanism to initially bring about a rapid movement of said leg-rest extension from said stored position to said extended position as said body-supporting means moves into said partially reclined position and with said driving links and said connecting links moving into substantially aligned positions, said two toggle linkages permitting said leg-rest and said leg-rest extension to be elevated as a unit in substantial alignment with each other in response to continued uniform motion imparted to said driving links between said partially reclined position and said fully reclined position, with said driving links and said connecting links remaining substantially in said aligned position.

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