June 16, 1964 F. M. RÉ 3,137,521

RECLINING CHAIR

Filed May 31, 1963 3 Sheets-Sheet 1

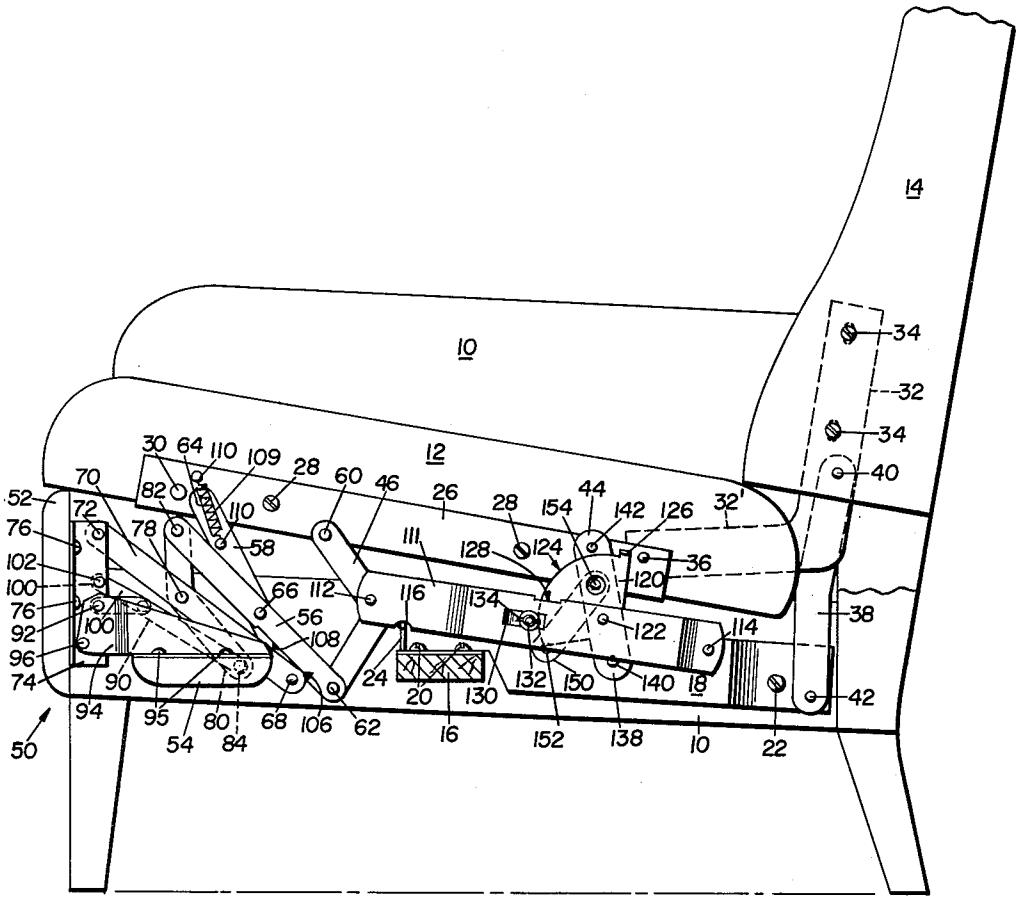


Fig. 1.

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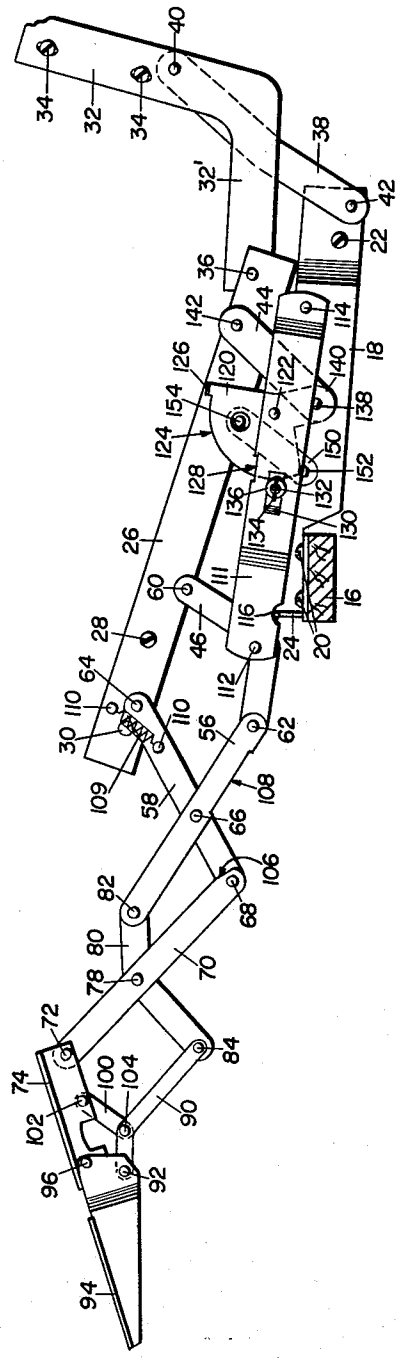


FIG. 2

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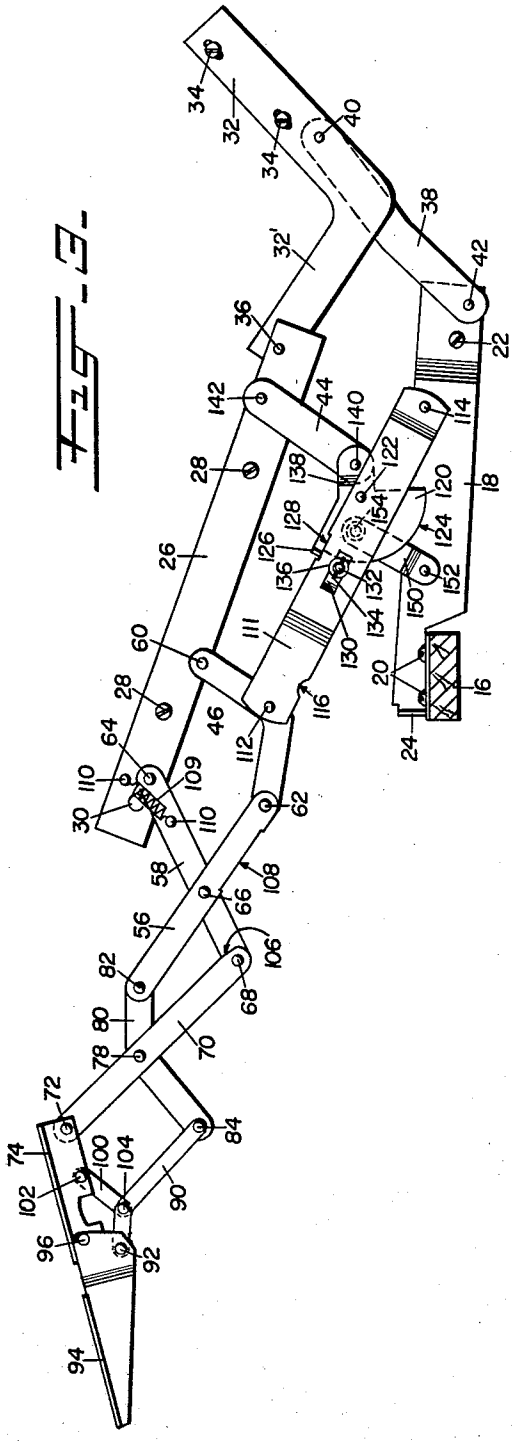


FIG. 3

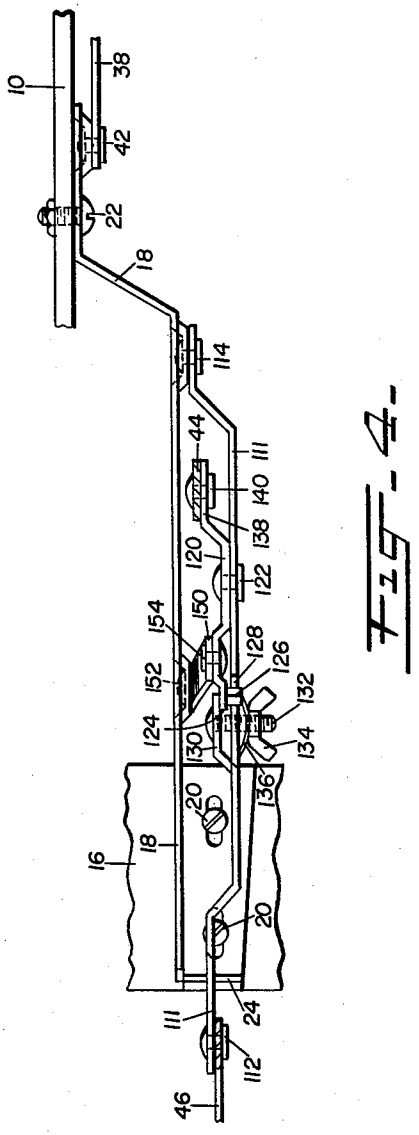


FIG. 4

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RECLINING CHAIR

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The present invention relates generally to reclining chairs and particularly to an operating mechanism for a reclining chair incorporating a fully-articulated, two-part, fold-away type of leg-rest, and inclusive of a seat and back-rest and leg-rest each so mounted relative to a chassis or base and interrelated by cooperant interconnecting means as to achieve smooth reclining movements of the seat and back-rest and leg-rest relative to the chassis and in coordination with each other.

A primary object hereof is to provide a reclining chair including a two-part leg-rest interconnected through a linkage mechanism with the cooperant stationary and reclining elements of the chair for movements between retracted and extended positions and intermediate positions therebetween, simultaneous with coordinated movements of the reclining elements relative to the stationary elements, all coacting and so controlled as to allow smooth action, particularly in the reclining motion wherein the objectionable falling sensation, experienced in so many prior art reclining chairs, is obviated.

Another salient object is to provide an improved reclining chair inclusive of a two-part, fold-away leg-rest or leg-supporting unit constituted by a major leg-rest portion and a minor leg-rest portion, which portions may be moved unitarily between a stored non-operative position and a forwardly-extended operative position when the body-supporting sub-assembly of the chair assumes a tilted relationship with respect to the stationary element normally constituting a base or chassis or support, and wherein the body-supporting sub-assembly incorporates a novel control and braking means wherein smooth coordinated reclining movements are insured.

These and other objects will be more apparent from a consideration of the subjoined drawings, wherein:

FIG. 1 is a fragmentary side elevational view of a reclining chair incorporating the structure of the invention, with the chair shown in the upright or sitting position;

FIG. 2 is a side elevational view of the linkage mechanism incorporated into the chair shown in FIG. 1, with the mechanism being shown in the intermediate reclining or TV position;

FIG. 3 is a side elevational view of the linkage mechanism shown in FIG. 2, with the mechanism being shown in fully reclining position; and

FIG. 4 is an enlarged, fragmentary, top plan view of the linkage mechanism of FIG. 3, with certain portions being broken away and with other portions being omitted for the purpose of clarity.

In the drawings, I have shown, in FIG. 1, a reclining chair comprising a supporting framework **10**, a seat **12**, and a back-rest **14**. The back-rest will be observed to be secured pivotally relative to the seat.

The seat and back-rest will be understood to form a body-supporting sub-assembly which has a pivotal relationship to supporting framework **10**.

The linkage mechanism, now to be described, is one of a pair, one being located at each side of the chair between the supporting framework and the respective adjacent sides of the seat and back-rest.

The linkage mechanism is fixed to a brace **16** extendable transversely relative to and between the opposite sides of the supporting framework and being secured to the said sides.

A substantially horizontally-extending base bracket **18** is stationarily fixed to brace **16** by screws **20** or other suitable securing means and is fixed to the adjacent portion of supporting framework **10** by a screw **22** or other suitable securing means.

Base bracket **18** extends lengthwise or in a front-rear dimension of the chair and a stop **24** extends laterally outwardly from base bracket **18** adjacent its forward end and serves to limit movement of the linkage mechanism, as will subsequently appear.

A seat bracket **26** is stationarily secured to the lower edge of seat **12** as by screws **28** or equivalent, and a stop **30** extends outwardly from seat bracket **26** adjacent its forward end and serves to limit the movement of the leg-rest unit to be described.

A boomerang link **32** fixed to a side of back-rest **14** as by screws **34**, includes a lowermost forwardly-extending foot portion **32'**, the forwardly-facing end of which is pivotally connected to seat bracket **26** as by a connection **36**.

The seat and back-rest are pivotally supported for movement relative to the supporting framework by means of a primary pivot link **38** which is pivotally connected at **40** at its upper end to boomerang link **32** and thereby to back-rest **14**, and is pivotally connected at **42** at its lower end to base bracket **18** and thereby to supporting framework **10**.

Additionally, the seat and back-rest are pivotally supported for movement relative to the supporting framework by means of secondary and tertiary pivot links **44** and **46** respectively, subsequently to be described.

A fully-articulated, two-part, fold-away leg-rest or leg-supporting unit, generally indicated by **50**, is positioned at the forward end of the chair and is inclusive of a major leg-rest portion **52** and a minor leg-rest portion **54** pivoted thereto adjacent its lower end.

The leg-rest unit is mounted by means of a control linkage, subsequently to be delineated, on the forward end of seat **12** for movements between a retracted position, as is shown in FIG. 1, and an extended position, as is shown in FIGS. 2 and 3, and a plurality of intermediate positions therebetween.

In the fully upright or sitting position of the chair, as illustrated in FIG. 1, major leg-rest portion **52** is disposed flush with the forwardly-facing vertical wall of seat **12**, while cooperant minor leg-rest portion **54** extends rearwardly from the lower end of said major leg-rest portion in manner as to be hidden from view beneath seat **12**.

When major leg-rest portion **52** is elevated and advanced, cooperant minor leg-rest portion **54** is moved to a position forwardly thereof and in axial alignment therewith.

The leg-rest unit is suspended from seat **12** by a means inclusive of tertiary pivot link **46**, a primary actuator link **56**, and a secondary actuator link **58**.

Tertiary pivot link **46** is pivoted at **60** at its upper end to seat **12** and is pivoted at **62** at its opposite lower end to the lower end of primary actuator link **56**.

Secondary actuator link **58** is pivoted at **64** at its upper end to seat **12**, at **66** at its approximate midsection to the midsection of primary actuator link **56**, and at **68** at its lower end to the lowermost extremity of a primary lifter link **70**.

Said primary lifter link **70** is pivoted at **72** at its opposite or forward end to a major leg-rest plate **74** which functions as a support for major leg-rest portion **52** and is fixed thereto as by screws **76**.

Primary lifter link **70** is pivoted at **78**, at its approximate midsection, to the midsection of a secondary lifter link **80**.

Said secondary lifter link **80** is pivoted at **82** at its upper end to the upper end of primary actuator link **56** and is

pivoted at 84 at its opposite or lower end to the lower end of a primary control link 90.

Said primary control link 90 is pivoted at 92 at its forward end to a minor leg-rest plate 94 which functions as a support for minor leg-rest portion 54 and is fixed thereto as by screws 95.

Major and minor leg-rest plates, 74 and 94 respectively, are articulately interlinked by a pivotal connection 96.

A secondary control link 100, extending between major leg-rest plate 74 and primary control link 90, is pivoted at 102 at one of its ends to said major leg-rest plate and is pivoted at 104 at its opposite end to said primary control link.

Any unwanted rearward movement of the leg-rest unit is precluded when the lower end of primary lifter link 70 abuts the adjacent side edge of primary actuator link 56, positive stop action being assured by a unique configuration of said primary lifter link in that its side edge is specially flattened as at 106 adjacent the link lower end, wtih the adjacent side edge of the primary actuator link being provided with a longitudinally-extending notch 108. In the chair's upright position, flat 106 is receivable in notch 108 wherewith a positive stop action is achieved.

A spring 109 extends between seat bracket 26 and secondary actuator link 58 and is connected at its opposite ends to studs 110 which extend transversely outwardly from said members. Said spring permits a controlled extension of the leg-rest unit and aids in the smooth withdrawal of said unit from an extended position to a retracted position and acts to support the minor leg-rest support in the upright position.

A rise bar 111 interconnects the aforedescribed leg-rest linkage means to the chair base by means of tertiary pivot link 46 which is pivoted at 112 to a forward portion of said rise bar.

Rise bar 111 rotates about a pivot 114 at its rearward portion relative to base bracket 18.

The lower edge of said rise bar is provided adjacent its forward end with a recess 116, which recess is adapted to abut stop 24 on base bracket 18 so as to preclude downward movement of rise bar 111 beyond the desired limits prescribed by the upright position of the chair.

A friction plate 120 is pivoted at 122 to rise bar 111 and is provided with an arcuate forward edge 124 which terminates adjacent its upper extremity in an offset lip or flange 126. Said lip functions as a stop in the fully-reclined position of the chair upon engagement in a notch 128 provided in the upper edge of rise bar 111, as will be evident subsequently.

A portion of rise bar 111 adjacent arcuate edge 124 of friction plate 120 is deformed so as to provide an offset friction finger 130, the friction finger and rise bar being so cooperant as to allow the insertion of a portion of friction plate 120 therebetween, with one planar face of friction plate 120 being flush with the inner planar face of rise bar 111, and with the other planar face of said friction plate being flush with the inner planar face of friction finger 130.

A bolt 132 is extendable laterally through friction finger 130 with a wing nut 134 being threadedly engageable therewith and tightened against a washer 136, said washer being of appropriate size to bridge the opening in rise bar 111 created therein by the formation of friction finger 130, and to rest flush against the rise bar's outer planar face.

Said wing nut may be tightened against washer 136 wherefore friction finger 130 is drawn inwardly in manner to increase the frictional engagement between friction plate 120 and rise bar 111, and conversely, by loosening wing nut 134, the frictional engagement between friction plate 120 and rise bar 111 may be decreased, an especially desirable feature wherewith persons of relatively lighter weight may adjust the device for easier chair operation, as will appear.

In effect, wing nut 134 and washer 136, in combination with friction finger 130, may be delineated as an adjustable braking device whereby the force or weight required to move both the seat and back-rest to one of a plurality of reclining positions may be varied, all in accordance with the desires or requirements of the chair occupant.

A cut-away lowermost portion of friction plate 120 forms a link portion 138 which is pivoted at 140 to the lower end of secondary pivot link 44, with the secondary pivot link in turn being pivoted at 142 at its upper end to seat bracket 26.

A limit link 150 is pivoted at 152 at its lower end to base bracket 18 and at 154 at its opposite or upper end to friction plate 120. Limit link 150 functions to limit the degree of angularization of the body-supporting unit in the fully-reclined chair position.

As aforementioned, in FIG. 1 is illustrated the relative positions of the components of the linkage, when the chair is in fully upright position, and therein it will be observed that leg-rest unit 50 is retracted, with major leg-rest portion 52 positioned flush with the forward end of seat 12, and with minor leg-rest portion 54 disposed rearwardly thereof beneath seat 12. In such chair position, rise bar 111, in a generally-horizontal position, rests on stop 24 with friction finger 130 and bolt 132 being disposed adjacent the lower end of the arcuate edge of friction plate 120.

Now to reach the intermediate reclining position, as shown in FIG. 2, from this upright position, the chair occupant may bring rearward pressure to bear upon back-rest 14, causing the seat and back-rest structures to move in substantially rearward directions relative to chair brace 16 by the coordinated swinging movements of primary pivot link 38 and secondary pivot link 44 and tertiary pivot link 46, each upon its respective pivot points.

By so mounting the seat and back-rest, the body-supporting unit will be observed to be movable from the upright or sitting position of FIG. 1 to the positions of FIGS. 2 and 3 and/or to any intermediate position therebetween.

In the course of movement from upright position to a reclining position and with the leg-rest unit extended, the pivot links 38, 44 and 46, and secondary actuator link 58 pivot unisonly in a clockwise direction (as viewed in FIG. 1) concomitantly with the movement of seat bracket 26 and seat 12.

As tertiary pivot link 46 rotates, same urges primary actuator link 56 forwardly and upwardly, which, in turn, simultaneously urges secondary actuator link 58 forwardly and upwardly to cause a corresponding movement of primary lifter link 70, all whereby major leg-rest plate 74 and major leg-rest portion 52 are motivated toward a generally-horizontal position.

Similarly, as primary actuator link 56 rotates, rotation is imparted to secondary lifter link 80 whereby control links 90 and 100 are moved forwardly and outwardly to urge minor leg-rest plate 94 to pivot at 96 relative to major leg-rest plate 74.

A smoothly swinging motion of minor leg-rest plate 94 is assured by secondary control link 100 which acts to constrain the forward movement of primary control link 90 and to bring minor leg-rest plate 94 into axial alignment with major leg-rest plate 74, all wherewith major leg-rest portion 52 and minor leg-rest portion 54 are placed in axial alignment as to each other to form a unit when the chair is in a semi-reclining position such as is illustrated in FIG. 2, or in a fully-reclining position such as is illustrated in FIG. 3.

In FIG. 2, it will be appreciated that by the sequence of movements just described, rise bar 111 will not have changed its generally horizontal position relative to base bracket 18 and will continue to rest on stop 24, even though the leg-rest unit is now fully extended so that major leg-rest plate 74 and minor leg-rest plate 94 are axially-aligned, and further that the forward edge of

secondary actuator link 58 abuts stop 30 on seat bracket 22 to preclude further extension of the leg-rest unit.

It is to be here noted that, had he so desired, the chair occupant might have positioned the body-supporting unit at any position of reclination between the positions of FIGS. 1 and 2, with a concomitant partial extension of leg-rest unit 50 with ample leg support being provided by major leg-rest portion 52.

To reach the fully-reclining position of FIG. 3 from the semi-reclining position of FIG. 2, the chair occupant may once again bring additional rearward pressure to bear upon back-rest 14 by pushing with the hands upon the arms of the chair, or for example if in the upright or TV position by hooking the heel in the leg-rest unit and pushing rearwardly, whereupon the forward end of the rise bar will be urged upwardly by tertiary pivot link 46 through pivotal connection 112 to cause the rise bar to swing at its rearward end on its pivot 114. During such movement, secondary actuator link 58 will continue to abut stop 30 on seat bracket 26 and to preclude any further extension of leg-rest unit 50.

As back-rest 14 is further angularized, seat 12 and seat bracket 26 are urged forwardly and upwardly by toe portion 32' of boomerang link 32 through its pivotal connection 36.

As seat bracket 26 moves forwardly and upwardly, the lower end of link portion 138 will be pulled upwardly by secondary pivot link 44 through its pivotal connection 140 whereupon friction plate 120 will pivot relative to rise bar 111 on its pivot point 122 until flange 126 of the friction plate will become engaged in notch 128 in the upper edge of the rise bar whereupon further rotation of friction plate 120 is precluded.

Limit link 150, extending between friction link 120 and base bracket 18, precludes angularization of the body-supporting unit beyond the limits prescribed by the chair fully-reclined position.

Friction finger 130 controls the ease of rotation of friction plate 120 upon pivot 122 depending upon the tension set up in the friction finger by the adjustment of wing nut 134 relative to bolt 132 and washer 136. By this simple adjustment coupled with the rise of the seat, the objectionable falling sensation, so often experienced in reclining chairs, is precluded.

The occupant may return the chair from this fully reclined position of FIG. 3 to the semi-reclined position of FIG. 2, with the leg-rest unit remaining extended by exerting a slight downward pressure upon seat 12 or by simply bringing the shoulders away from the back of the chair, causing rise bar 111 to move downwardly into contact with stop 24 of bracket 18 and causing secondary pivot link 44 to exert a downward pressure upon link portion 138 of friction plate 120 whereupon the friction plate rotates upon its pivot 122 and the arcuate edge 124 moves upwardly relative to friction finger 130 and bolt 132.

Alternatively, the occupant may return directly to the fully-upright position of FIG. 1 by exerting a slight downward pressure of the heels upon the leg-rest unit.

By the novel interconnection between rise bar 111, secondary and tertiary pivot links 44 and 46 respectively, and friction plate 120, the reclining movements of the body-supporting unit are smooth and effortless and are perfectly controlled and balanced and coordinated.

While I have shown and described a preferred embodiment of the invention herein, it will be obvious to those skilled in the art to which the invention pertains that certain omissions or changes may be made therein, all without departing from the spirit and scope of the invention.

I claim:

1. A reclining article of furniture having a stationary frame, a body-supporting unit including a back-rest and a seat pivotal relative to said frame and pivotal each relative to the other, means mounting said body-supporting unit for movement relative to said frame successively between a sitting position and an intermediate resting position and a fully reclined position and positions therebetween, a two-part leg rest formed of a major portion and minor portion hingedly interconnected for turning movement relative to each other, and a control linkage mounting said leg rest on the seat and guiding said leg rest between retracted position with the main portion of said leg rest disposed in a substantially vertical position beneath the seat and with the auxiliary portion of said leg rest disposed in an inverted substantially horizontal position beneath the seat and a plurality of extended positions forwardly of the seat, said control linkage constituted by a pair of spaced links with one of the spaced links of said pair thereof being pivotally connected to the main portion of said leg rest and the other of the spaced links of said pair thereof being pivotally connected to the auxiliary portion of said leg rest and a control link pivotally interconnecting between the main portion of said leg rest and the one of the spaced links of said pair thereof pivotally connected to the auxiliary portion of said leg rest for effecting a rotative movement of the auxiliary portion of said leg rest relative to the main portion of said leg rest, actuating means connecting between the seat and frame and connected to said control linkage for actuating said control linkage to move said leg rest responsively to movement of the body supporting member with the main portion of said leg rest being projected between the retracted position and one of a plurality of extended positions with the auxiliary portion of said leg rest being turned in coordinated movement relative to the main portion of said leg rest, said actuating means including a rise bar pivotally connected to said control linkage and frame, a friction plate pivoted to said rise bar and pivotally connected to said seat, a limit link extending between said friction plate and said frame, and adjustable brake means integral with said rise bar in frictional contact with said friction plate, said adjustable brake means in combination with said friction plate and said limit link adapted to control the ease and range and rate of reclining movement of said body-supporting unit.

2. In a reclining article of furniture as set forth in claim 1 including stop means on said seat, stop means on said frame, and stop means on said friction plate limiting the range of movement of said control linkage and said body-supporting unit.

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