June 22, 1965 N. W. MIZELLE 3,190,690

RECLINING CHAIR FIXTURE

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FIG. 2

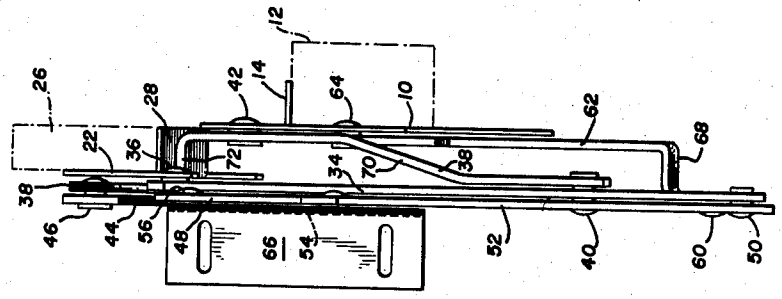


FIG. 1

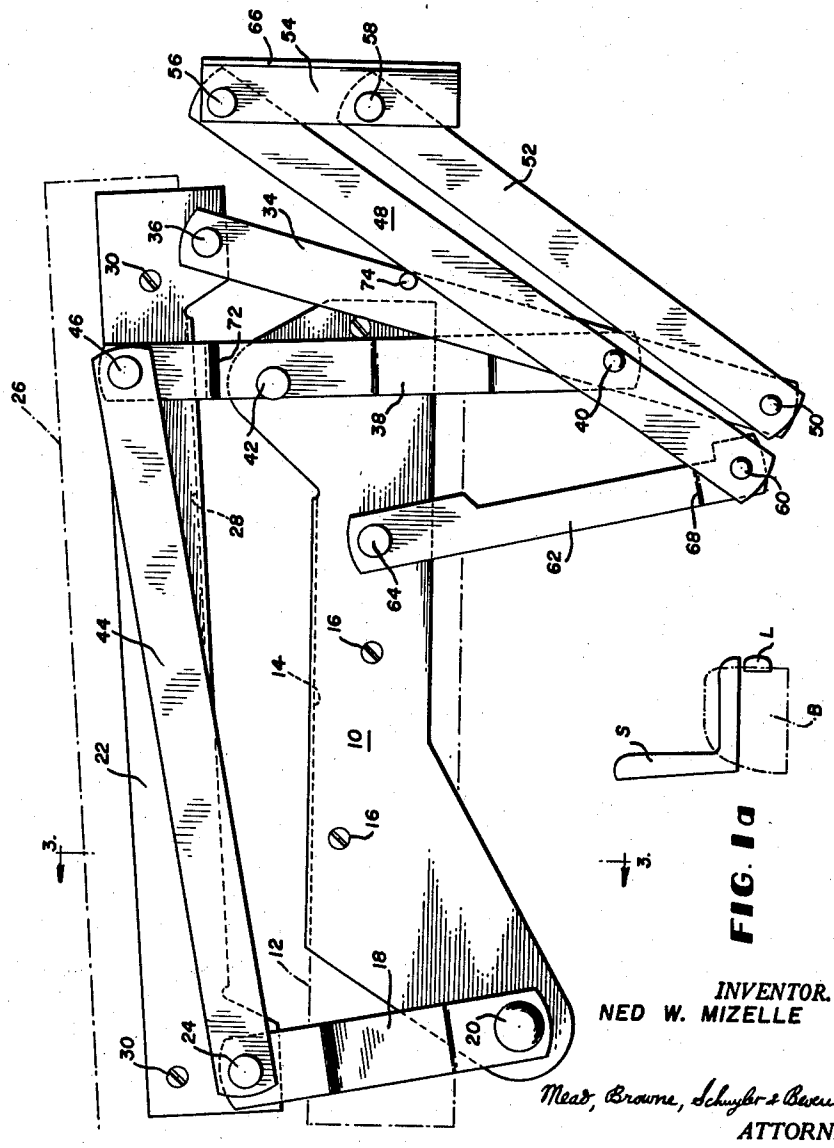


FIG. 1a

INVENTOR.
NED W. MIZELLE

Mead, Browne, Schuyler & Beveridge
ATTORNEYS

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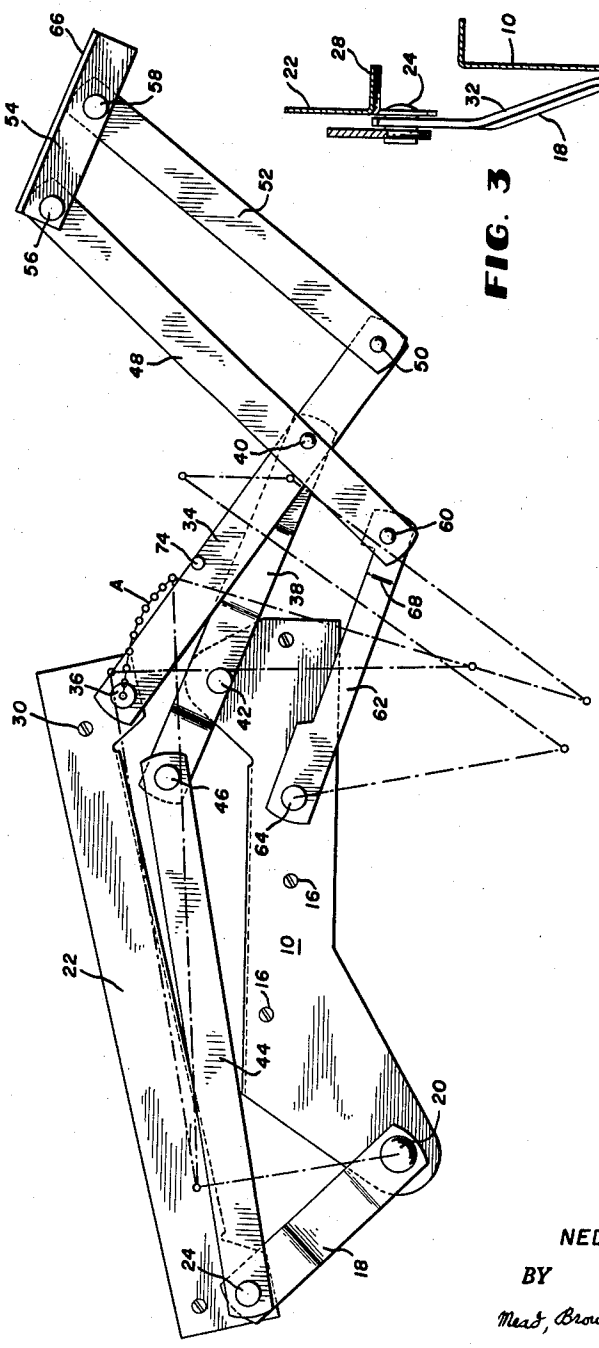


FIG. 4

FIG. 3

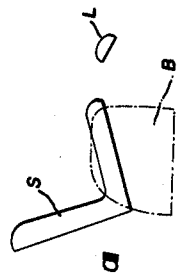


FIG. 4a

INVENTOR.
NED W. MIZELLE
BY
Mead, Browne, Schuyler & Beveridge
ATTORNEYS

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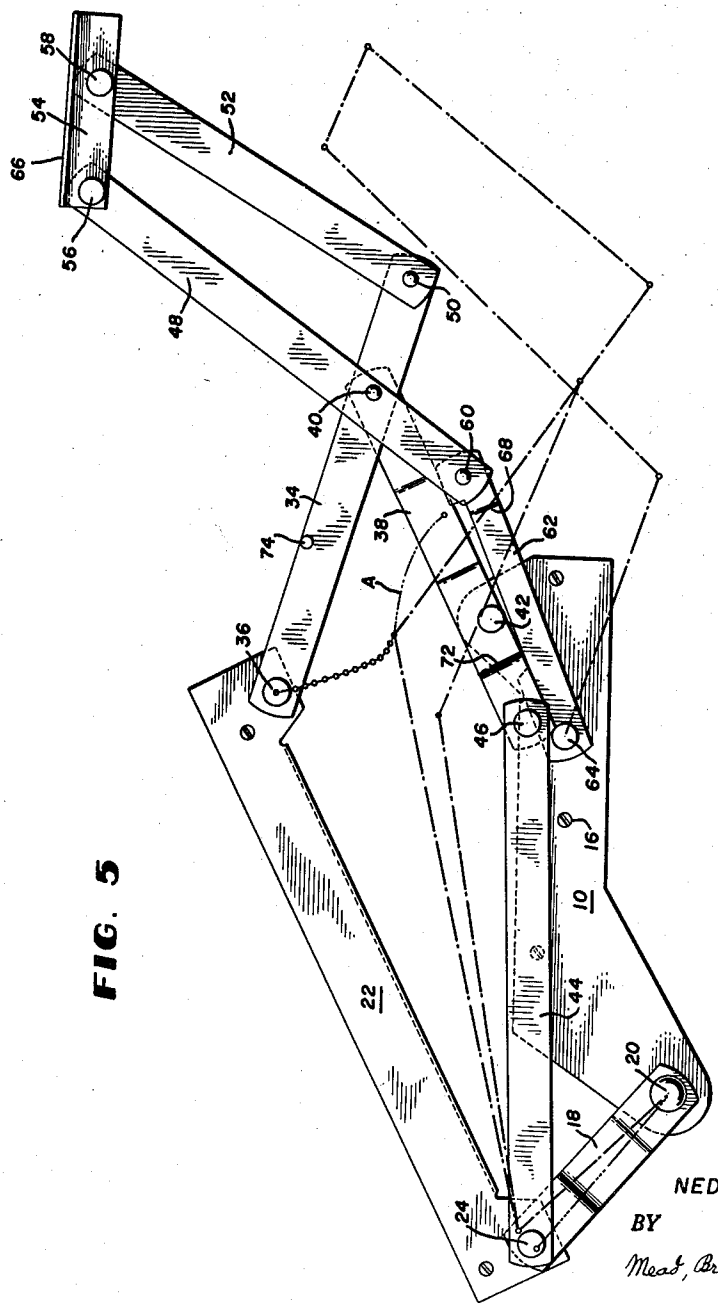


FIG. 5

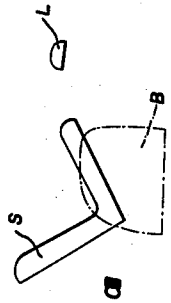


FIG. 5a

INVENTOR.
NED W. MIZELLE
BY
Mead, Browne, Schuyler & Beveridge
ATTORNEYS

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RECLINING CHAIR FIXTURE

Ned W. Mizelle, High Point, N.C., assignor, by mesne assignments, to General Steel Products, Inc., High Point, N.C., a corporation of North Carolina

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13 Claims. (Cl. 297—89)

This invention relates to reclining chair fixtures, and more particularly to a two-way, three position type fixture, the term "two-way" meaning that the seat and back of the reclining chair are rigid with each other but move relative to a stationary base to operate a leg rest, and the term "three position" meaning that the fixture will support a chair seat upon the stationary base in any of three positions of relative inclination to the base.

At the present time, three position reclining chairs are enjoying increasing popularity. In chairs of this type, a seat unit and a leg rest are supported upon a stationary base for co-ordinated movement relative to the base between three rest positions. The first rest position is what might be termed the normal position of the chair in which the seat unit is supported upon the base with the back in an upright position and in which the leg rest is retracted so that the outward appearance of the reclining chair is that of a conventional chair. In the second rest position of the chair, the seat unit is slightly reclined as compared to its previously described normal position and the leg rest is extended forwardly from the base in leg supporting relationship to the seat of the chair. In the third rest position, the chair seat unit is located at an extreme reclined position upon the base and the leg rest is elevated in leg supporting relationship with the seat. In the usual case, there is very little relative movement between the seat unit of the chair and the leg rest between the intermediate reclined position and the fully reclined position.

A basic problem in designing a satisfactory fixture to achieve the three rest positions discussed above arises by virtue of the fact that substantially all movement of the leg rest relative to the seat must occur during movement from the normal position of the chair to the intermediate reclined position coupled with the fact that it is desirable to minimize movement of the leg rest relative to the seat during movement of the chair between the intermediate and fully reclined positions. Thus, it is the usual practice in this field to design the fixture as a linkage having two separate and distinct "phases" of movement by providing stops so that certain links are locked against relative movement during one "phase" and other links are locked against relative movement during the other "phase" of movement of the linkage. In many cases, the desired action is achieved through the use of a pivotal connection which is connected between two or more links of the linkage in a fashion such that the pivot can move in translation or slide relative to one of its connected links during one phase of movement, as by moving from one end of a slot to another, and provides a pivotal connection between the links during the other phase of movement. In other cases, a system of stops is employed to block relative movement between two pivotally connected links during one or the other phase of movement of the fixture.

Fixtures employing sliding pivots are undesirable because the unpleasant noise which arises during the sliding movement of the piovt is objectionable to prospective purchasers of the chair. The employment of various stops within the linkage to define the transition between the first and second "phases" of movement of the linkage have also been found objectionable because the location of these stops determines the intermediate reclined position of the chair and thus the relative position of the leg rest to the chair seat. A position of the leg rest relative to the seat in the intermediate position which is comfortable for one occupant of the chair frequently is uncomfortable to another occupant. Further, when fixed stops are employed in the foregoing manner, the fixture, in the final analysis, consists of two linkages since some links are active only during the first phase while other links are active only during the second phase.

Accordingly, it is a primary object of the invention to provide a three position reclining chair fixture employing only simple pivotal connections between the links and wherein all links of the linkage pivot relative to each other throughout the entire range of movement of the fixture.

Another object of the invention is to provide a three position reclining chair fixture wherein the intermediate rest position of the chair is established by balancing that portion of the weight of the occupant exerted against the seat unit against that portion of the weight of the occupant exerted upon the leg rest.

Another object of the invention is to provide a reclining chair fixture wherein the weight of a relaxed occupant of the chair is applied to positively maintain the chair in either of its extreme positions—i.e. normal position or fully reclined position—and is applied in a self-balancing action to the fixture to determine the intermediate reclined position of the chair.

It is another object of the invention to provide a three position reclining chair fixture in which each link of the fixture is connected and constrained to pivotal movement relative to two or more other links of the fixture throughout the full range of movement of the fixture.

The foregoing, and objects, are achieved in a reclining chair fixture having a closed quadric linkage including one link movable with the seat unit of the reclining chair and a second link movable with the leg rest and pivotally connected to the first link. The quadric linkage is supported for movement upon a stationary base link by a first fixed pivot which is pivotally connected to a third link of the quadric linkage a location intermediate the ends of the third link and by a support link mounted at one end on a fixed pivot and connected at its other end to a pivot which also pivotally interconnects the fourth link of the quadric linkage to the first link. The third link of the quadric linkage is pivotally connected at one end to the second link and downward forces exerted against the front end of the seat and against the leg rest are thus applied to this one end of the third link. The opposite end of the third link is coupled to the rear portion of the seat of the unit and hence forces exerted against the rearward end of the seat are applied against the opposite end of the third link. During the initial portion of the movement of the chair, the forces applied to the opposite ends of the third link act against each other about the fixed pivot on which the third link is supported and the intermediate position of the fixture is established when the forces applied to the forward end of the seat and to the leg rest counterbalance the weight forces applied to the rearward end of the seat link.

When the chair is in its normal position, the pivot interconnecting the third and fourth links of the quadric linkage moves into an overcenter relationship about the first link. As the chair approaches its fully reclined position, this same pivot moves below an overcenter relationship wherein the third and fourth links are in alignment with each other. The self-balancing action of the fixture occurs between these two overcenter relationships while the normal relaxed weight of the occupant is applied to the fixture in a fashion such that it positively maintains the fixture in either the normal or fully re-

clined positions by urging the aforementioned pivot to its extreme overcentered relationship established by respective end limit stops within the linkage. Other objects and features of the invention will become apparent by reference to the following specification and to the drawings.

In the drawings:

FIG. 1 is a side elevational view of a reclining chair fixture embodying the present invention;

FIG. 1*a* is a side elevational view of a reclining chair equipped with the fixture of FIG. 1 showing the relationship of the seat, base and leg rest when the fixture is in the position shown in FIG. 1;

FIG. 2 is a front elevational view of the fixture of FIG. 1;

FIG. 3 is a cross sectional view of the fixture taken on line 3—3 of FIG. 1;

FIG. 4 is a side elevational view of the fixture of FIG. 1 in another position;

FIG. 4*a* is a view similar to FIG. 1*a* showing the relationship between the parts of the chair when the fixture is in the position shown in FIG. 4;

FIG. 5 is a side elevational view of the fixture of FIG. 1 in still another position; and

FIG. 5*a* is a view similar to FIG. 1 showing the relationship between the parts of the chair when the fixture is in the position shown in FIG. 5.

The fixture disclosed in the drawings is a pivotally constrained linkage which includes a base frame link **10** upon which all other links are directly or indirectly supported. Base frame link **10** is adapted to be fixedly attached to a fixed frame member **12** of the chair base B to extend in a generally horizontal front to rear direction at one side of the chair. It will be understood that in the usual case two fixtures are employed in each chair, one being mounted to extend along each of the left and right hand sides of the chair. The fixture shown in the drawings is for mounting on the left hand side of the chair—i.e. that side of the chair at the left hand side of an occupant of the chair.

In the form shown in the drawings, an outwardly projecting horizontal flange **14** is formed on base link **10** to overlie the top of base frame member **12**. Base link **10** is bored at suitable locations through which mounting screws such as **16** may be driven to rigidly attach base link **10** to base frame member **12**. At the rearward end of base link **10**, a rear support link **18** is mounted at its lower end for movement relative to base link **10** about a rear fixed pivot **20** on base link **10**.

At its upper end, rear support link **18** is connected to the rearward end of a seat frame link **22** by a rear seat link pivot **24**. Seat link **22** is constructed to be fixedly attached to a seat frame member **26** of a rigid chair seat and back unit S as by an outwardly projecting lower flange **28** and mounting screws such as **30**. As best seen in FIG. 3, the central portion of rear support link **18** is offset as at **32** so that the plane of movement of seat link **22** is offset inwardly of the chair from the general plane of base link **10**.

The forward end of seat link **22** is supported upon and guided in movement relative to base link **10** by a front support link **34** which is pivotally mounted at one end on a front seat link pivot **36** on the forward end of seat link **22** and which is pivotally coupled at a location intermediate its ends to one end of a control link **38** by a pivot **40**. Control link **38** is mounted upon base link **10** by a front fixed pivot **42** at the forward end of base link **10** which is connected to control link **38** at a location intermediate the ends of link **38**. A constraining link **44** is connected at one end to rear seat link pivot **24** and is connected at its opposite end to control link **38** by a pivot **46**.

As most clearly seen in FIGS. 4 and 5, a cross link **48** is also connected to front support link **34** by pivot **40** for rotation relative to both links **38** and **34**. Front support link **34** projects beyond pivot **40** and at its outer

end is connected by a pivot **50** to one end of a guide link **52**. Guide link **52** extends in general parallelism with cross link **48** and at the upper or outer ends of links **48** and **52** a leg rest link **54** is connected by a pivot **56** to cross link **48** and by a pivot **58** to link **52**. The lower end of cross link **48** is connected by a pivot **60** to one end of a guide link **62** mounted upon base link **10** by an intermediate fixed pivot **64** located below and to the rear of front fixed pivot **42**.

A flange **66** on leg rest link **54** is employed to provide a means for fixedly attaching a leg rest to the fixture.

To afford the necessary working clearances for the various links of the fixture, certain of the links are constructed with offset portions, link **62** having a step offset **68** (FIG. 2) near its lower end, while control link **38** is formed with an inclined offset portion **70** between pivots **42** and **40** and a step offset **72** (FIG. 2) between pivots **42** and **46**.

The foregoing linkage defines a pivotally constrained linkage in which each of a plurality of individual rigid links are connected to two or more other links for constrained pivotal movement relative to each other. The linkage is provided with two positive stops to define opposite end limits of movement of the links relative to the normally fixed parts of the linkage defined by base link **10** and its three fixed pivots **20**, **42** and **64**. The first of these fixed stops is a pin **74** fixedly mounted upon front support link **34** between pivots **40** and **36** to project into the path of movement of cross link **48** and engage cross link **48** as shown in FIG. 1 to define what might be termed the collapsed or normal rest position of the fixture. As indicated in FIG. 1*a*, the position of the linkage determined by stop pin **74** corresponds to the normal position of a reclining chair employing the fixture in which the rigid seat back unit S of the chair is supported in a normal upright position upon stationary base B and a leg rest L mounted upon leg rest link **54** is disposed in a generally vertical retracted position at the front edge of the base B.

A second positive stop in the linkage is defined by the abutment between step offset **72** on control link **38** and a side edge of guide link **62**, step offset **72** projecting transversely across the path of movement of guide link **62**. This position of the linkage is shown in FIG. 5 and, as indicated in FIG. 5*a*, corresponds to a fully reclined position of seat back unit S upon base B with the leg rest extended forwardly from the base in leg supporting relationship with the seat of unit S. By virtue of the fact that the fixture consists of rigid links pivotally interconnected, the relative position of any one link with respect to base link **10** positively determines the relative positions of all other links relative to fixed link **10**.

An intermediate rest or conversational position of the chair is shown in FIG. 4*a* and finds the seat back unit of the chair at a location intermediate the normal or upright position of FIG. 1*a* and the fully reclined position of FIG. 5*a* with leg rest L projected in leg supporting relationship to the seat back unit. The chair position shown in FIG. 4*a* is a balanced position in which the forces exerted by an occupant of the chair upon the seat back unit S and upon the elevated leg rest L are balanced against each other within the linkage described above. While the relationship between the leg rest and seat is constrained by the links of the fixture, the relationship between the seat and leg rest and base B when the chair is in the intermediate position varies for different occupants of the chair because of the self-balancing action of the fixture. The self-balancing action of the fixture may be best appreciated by following the movement of the various links of the fixture from the normal rest position of FIG. 1.

When the fixture is in a position corresponding to the normal position of the chair shown in FIG. 1*a*, control link **38** is disposed in a substantially vertical position with pivot **46** located above fixed pivot **42** and pivot **40** located

substantially below fixed pivot 42. Constraining link 44 connects pivot 46 with pivot 24 on the rearward end of seat link 22. Movement of the chair from the normal position is initiated by the occupant exerting a rearward force against the back of unit S as by pushing forwardly against the arms of base B to start a rearward movement of seat link 22 relative to base link 10, causing control link 38 to be rotated about fixed pivot 42 in a counter-clockwise direction as viewed in FIG. 1. Movement of control link 38 in a counter clockwise direction about pivot 42 elevates pivot 40 and thus, through link 34 elevates the forward end of seat link 22. However, rearward movement of seat link 22 pivots main support link 18 about pivot 20 and thus the rearward movement of the seat link minimizes the elevating of the front of seat link 22 by permitting link 34 to swing from the position of FIG. 1 toward the position of FIG. 4. The elevating movement of pivot 40 is, however, transmitted directly to the leg rest to rapidly swing the leg rest from the retracted position of FIG. 1 forwardly and upwardly into leg supporting relationship with the seat of the chair. The minimizing of the elevating movement of the front portion of the seat link in turn magnifies the elevating and forwardly projecting effect upon the leg rest and hence a relatively small initial movement of the seat link from the position of FIG. 1 acts to rapidly swing the leg rest upwardly into leg supporting relationship with the seat.

As the leg rest moves upwardly toward the position of FIG. 4, the weight of the legs of the occupant upon the leg rest begins to resist upward movement of the leg rest and this resistance is applied at pivot 40 to the lower end of control link 38. By virtue of the lowering movement of the rearward end of seat link 22 along the path of movement constrained by link 18, rearward movement of the seat link continues to act through constraining link 44 and pivot 46 to move the lower end of link 38 at pivot 40 upwardly against the force exerted by the occupant against the leg rest. However, the effect of rearward movement of the seat continuously diminishes because of a continuously reducing lever arm about pivot 42 and at some point when the linkage is in approximately the position of FIG. 4, the reaction of the weight of the occupant against the leg rest counterbalances the weight of the occupant exerted upon the seat link and the chair assumes a balanced position.

To move the chair from the normal position of FIG. 1*a* toward the intermediate position of FIG. 4*a*, the occupant of the chair basically shifts his center of gravity rearwardly to move the chair seat in a path in which the forward end of the seat, as represented by pivot 36 follows the path A indicated in FIG. 4. Referring now to FIG. 5, it will be seen that the path of pivot 36 indicated by the curve A breaks sharply upwardly immediately beyond the position of the fixture indicated in FIG. 4. Because of this sharp upward break of the curve, it is apparent that further reclining movement beyond the position of the fixture indicated in FIG. 4 necessarily requires that some force be applied to elevate the front portion of the chair seat against the weight of the occupant. Because of this relationship, the fixture is self-balancing in its intermediate position to automatically assure the most comfortable position for an occupant of the chair essentially by positioning the linkage in accordance with the location of the center of gravity of a relaxed occupant of the chair.

Starting with the chair in the normal position of FIG. 1*a* the center of gravity of the occupant may be basically imagained as being applied vertically downwardly to seat link 22 somewhere approximately midway between pivots 24 and 36. Because of the slightly rearwardly inclined position of link 18 (FIG. 1), the effect of the occupant's weight at the rearward end of the seat link is swing link 18 downwardly and rearwardly in a counter-clockwise direction about pivot 20. At the forward end of the seat link however, the occupant's weight is applied downwardly on pivot 36 and transmitted by link 34 to attempt to drive pivot 40 rearwardly. Since pivot 40 is substantially at its maximum vertical displacement below fixed pivot 42, pivot 40 is in a position of substantial equilibrium. This position is positively maintained by the engagement of stop pin 74 against link 48 which is also pivoted on pivot 40 and constrained by guide link 62 to move in a path such that rearward movement of pivot 40 urges link 48 more firmly against stop 74. Constraining link 44 coupled to the upper end of control link 38 is also acted upon by opposed forces when the chair is in this position.

A rearward shifting movement of the center of gravity of the occupant reduces the downward force applied to pivot 36 and increases the force applied on pivot 24, thus permitting the rearward end of seat link 22 to swing rearwardly and downwardly about fixed pivot 20. Once started, the tendency of link 18 to swing downwardly and rearwardly about pivot 20 continuously increases, this action through constraining link 44 and pivot 46 rapidly swinging the leg rest upwardly and outwardly into engagement with the legs of the occupant. As explained above, the forces on the seat link and on leg rest link 54 eventually balance each other by exerting opposed actions on control link 38.

To move beyond the intermediate position to the fully reclined position of FIGS. 5 and 5*a*, it is necessary for the occupant to again exert a rearward force upon the seat link. In this case, the force exerted is primarily a tilting force applied about the axis of pivot 24 which is accomplished by the occupant leaning backwardly against the upper part of the back of unit S. As indicated in FIG. 4, in the intermediate position, pivot 46 is approaching a position where it moves into alignment with a line connecting pivots 24 and 42. When pivot 46 is aligned with both pivots 42 and 24, rear support link 18 has reached its maximum rearward limit of movement relative to base link 10. However, the seat back unit may partake of further reclining movement by pivoting in a counter-clockwise direction about pivot 24. This action swings the forward end of the seat upwardly rapidly as indicated by the curve A in FIG. 5. Because of the positive constraint applied by the pivotally interconnected links, movement of control link 38 about pivot 42 in a direction carrying pivot 46 past the direct line connecting pivots 24 and 42 constraining link 44 to shift pivot 24 forwardly during the final portion of the reclining movement of the chair. This action, together with the reclined position of the seat back unit shifts the center of gravity of the occupant rearwardly of pivot 24 to maintain the assembly in the final fully reclined position indicated in FIG. 5*a* and determined by the engagement of offset 72 with guide link 62.

Seat link 22, front support link 34, control link 38 and constraining link 44 define a closed quadric linkage whose corners are defined by pivots 24, 36, 40 and 46. This closed quadric linkage is supported for movement by fixed pivot 42 located at an intermediate position on control link 38 and by rear support link 18 which is mounted for movement about a second fixed pivot 20. It will be noted that the constrained quadric linkage is movable in a fashion such that pivot 46 is successively moved over center of lines respectively connecting pivot 24 to pivot 36 and connecting pivot 24 to pivot 40. The self-balancing action of the fixture occurs when pivot 46 is between the two over center positions. The fixture is related such that the normal or related center of gravity of the occupant in either of the normal or fully reclined positions is located to hold the quadric linkage in its respective extreme over center relationships. Between the two over center relationships, the fixture seeks a self-balanced intermediate rest position. Viewing the overall motion of seat link 22 relative to base link 10, it may be said that seat link 22 is supported for concurrent swinging movement about front and rear fixed pivots 42 and 20 by front support link means and rear support link means.

The rear support link means is constituted by link **18** while the front support link means includes that portion of link **38** between pivots **42** and **40**, pivot **40**, and that portion of link **34** between pivots **40** and **36**. The effective link length of the front support link means is the direct distance between fixed pivot **42** and seat link pivot **36**, and as is apparent from the path of pivot **36** indicated by curve A, the effective link length of the front support link means is varied during movement of the seat link. This variation is accomplished by pivoting links **34** and **38** relative to each other about their interconnecting pivot **40** by the constraining action of link **44**.

While I have described one exemplary embodiment of my invention, it will be apparent to those skilled in the art that the disclosed embodiment may be modified. Therefore, the foregoing description is to be considered exemplary rather than limiting and the true scope of the invention is that defined in the following claims.

I claim:

1. In a reclining chair having a stationary base, a seat unit, and a leg rest; a fixture for supporting said unit and said leg rest upon said base for co-ordinated movement between a first rest position of said chair wherein said seat unit is upright upon said base and said leg rest is retracted, a second rest position of said chair wherein said unit is reclined upon said base and said leg rest is extended in leg supporting relationship to said unit, and a third rest position of said chair wherein said seat unit is disposed intermediate said upright and said reclined postions and said leg rest is extended in leg supporting relationship with said unit, said fixture comprising a pivotally constrained closed linkage including a base link adapted to be fixedly attached to said base, a seat link adapted to be fixedly attached to said seat unit, a leg rest link adapted to be fixedly attached to said leg rest, a first link mounted on said seat link for movement about a first pivot on the forward end of said seat link and coupled to said leg rest link to move about said first pivot in accordance with movement of said leg rest relative to said seat unit, a second link mounted at one end for movement about a second pivot on the rearward end of said seat link in accordance with movement of said seat unit relative to said base and mounted at its other end upon a fixed pivot on the rearward end of said base link, a control link mounted intermediate its ends for movement about a fixed pivot on the forward end of said base link, a third pivot pivotally interconnecting one end of said control link to said first link at a location spaced from said first pivot, and a constraining link pivotally connected at one end of said second link and at its other end to the other end of said control link.

2. In a fixture as defined in claim **1**, first stop means in said linkage establishing a first position of said fixture corresponding to the first rest position of said chair wherein the pivotal connection between said contraining link and said other end of said control link is disposed vertically above said fixed pivot on the forward end of said base link and said second link is inclined upwardly and rearwardly from said rear fixed pivot on said base link to said second pivot, and second stop means in said linkage for establishing a second position of said linkage corresponding to said second rest position of said chair wherein the pivotal connection between said constraining link and said other end of said control link is located at a position rearwardly and below said fixed pivot on said forward end of said base link.

3. A reclining chair fixture comprising a base frame link, a seat frame link, a support link connected at one end to a first pivot on the forward end of said seat link, a control link connected at one end to a second pivot on said support link at a location spaced from said first pivot, a constraining link connected at one end to a third pivot on the other end of said control link, a fourth pivot connecting the other end of said constraining link to the rearward end of said seat link, said first, second, third and fourth pivots defining the corners of a closed quadric linkage, means for supporting said quadric linkage upon said base link for constrained movement relative to said base link comprising a first fixed pivot at the forward end of said base link connected to said control link at a location between said second and third pivots, a first link connected at one end to said fourth pivot for pivotal movement relative to both of said seat link and said constraining link and connected at its opposite end to a second fixed pivot on the rearward end of said base link, and means supporting a leg rest link upon said support link for movement therewith relative to said seat link.

4. A reclining chair fixture as defined in claim **3** including first stop means for defining a first rest position of said closed quadric linkage wherein said third pivot is located above said first fixed pivot and said first pivot is spaced forwardly of said third pivot at a location vertically intermediate said third pivot and said first fixed pivot, said fourth pivot being located below the horizontal level of said first pivot, movement of said fixture from said first rest position shifting said third pivot to a location below a line connecting said first and fourth pivots.

5. A reclining chair fixture as defined in claim **4** comprising second stop means for establishing a second end position of said fixture wherein said third pivot is disposed rearwardly and below said first fixed pivot in substantial horizontal alignment with said fourth pivot, said first pivot being located rearwardly of and above said first fixed pivot and said second pivot.

6. A reclining chair fixture comprising a base link, a seat link, a support link connected at one end to a first pivot on the forward end of said seat link, a control link connected at one end to a second pivot on said support link at a location spaced from said first pivot, a constraining link connected at one end to a third pivot on the other end of said control link, a fourth pivot connecting the other end of said constraining link to the rearward end of said seat link, said first, second, third and fourth pivots defining the corners of a closed quadric linkage, supporting means including a first fixed pivot on the forward end of said base link connected to said control link at a location between said second and third pivots for supporting said quadric linkage upon said base link for constrained movement between a first rest position and a second rest position respectively established by first and second stop means engageable with said support link and said control link, respectively, said supporting means and said first stop means disposing said quadric linkage in a first overcenter position when in said first rest position wherein said third pivot is located substantially vertically above said fixed pivot and above a line passing through said fourth pivot and said first pivot, said supporting means and said second stop means establishing said second rest position of said linkage wherein said third pivot is located in a second overcenter position below a line extending through said fourth pivot and said second pivot, and leg rest link supporting means connected to said support link to establish a balanced intermediate rest position of said fixture when said quadric linkage is between said first and said second overcenter positions by balancing a downward force exerted on said leg rest link means against a downward force exerted on said seat frame link.

7. In a reclining chair having a stationary base, a rigid seat back unit, and a leg rest; a fixture for supporting said unit and said leg rest upon said base for co-ordinated movement between a normal position wherein said unit is upright and said leg rest is retracted and a fully reclined position wherein said unit is reclined and said legrest is located in leg supporting relationship with said seat, said fixture comprising a base link adapted to be fixedly attached to said base, a seat link adapted to be fixedly attached to said unit, front seat supporting link means pivotally interconnected between the respective forward ends of said seat link and said base link, rear seat sup-

porting link means pivotally interconnected between the respective rearward ends of said seat link and said base link, leg rest supporting link means for supporting said leg rest on said front seat supporting link means for movement therewith, and constraining link means pivotally interconnecting said seat supporting link means to each other for constraining movement of said front seat supporting link means relative to said rear seat supporting link means to establish an equilibrium position of said unit and said leg rest upon said base intermediate said normal position and said reclined position by balancing the respective forces exerted by an occupant of said chair upon said leg rest supporting link means and said unit supporting link means.

8. In a reclining chair having a stationary base, a rigid seat back unit, and a leg rest; a fixture for supporting said unit and said leg rest upon said base for co-ordinated movement between a normal position wherein said unit is upright and said leg rest is retracted and a fully reclined position wherein said unit is reclined and said leg rest is located in leg supporting relationship with said seat, said fixture comprising a base link adapted to be fixedly attached to said base, a seat link adapted to be fixedly attached to said unit, a front support link connected at one end to a front pivot at the forward end of said seat link, a rear support link connected at its upper end to a rear pivot on the rearward end of said seat link and connected at its lower end to a first fixed pivot on the rearward end of said base link, leg rest supporting link means for supporting said leg rest on said front support link for movement therewith, and control link means pivotally interconnected between said front support link and said rear support link for constraining movement of said front support link relative to said rear support link, said control link means including a first control link pivotally supported at a location intermediate its ends upon a second fixed pivot adjacent the forward end of said base link and connected in said control link means to establish a balanced equilibrium position of said unit and said leg rest upon said base intermediate said normal position and said reclined position by applying forces exerted by an occupant of said chair upon said front support link and said rear support link to opposite ends of said first control link in opposition to each other.

9. In a reclining chair having a stationary base, a rigid seat back unit, and a leg rest; a fixture for supporting said unit and said leg rest upon said base for co-ordinated movement between a first rest position of said chair wherein said seat back unit is upright upon said base and said leg rest is retracted, a second rest position of said chair wherein said unit is reclined upon said base and said leg rest is extended in leg supporting relationship to the seat of said unit, and a third rest position of said chair wherein said seat back unit is intermediate said upright and said reclined positions and said leg rest is extended in leg supporting relationship with said seat, said fixture comprising a pivotally constrained closed linkage including a base link adapted to be fixedly attached to said base, a seat link adapted to be fixedly attached to said seat back unit, a leg rest link adapted to be fixedly attached to said leg rest, a plurality of control links pivotally interconnected between said base link, seat link and leg rest link, a first abutment on a control link engageable with another control link to establish a first constrained position of said linkage corresponding to said first rest position of said chair, a second positive stop on a control link engageable with another control link to establish a second constrained position of said linkage corresponding to said second rest position of said chair, one of said control links being pivoted intermediate its ends upon a fixed pivot on said base link and pivoted at its opposite ends to respective others of said control links respectively movable with said seat and said leg rest, said one of said control links being operable to transmit movement of said seat back unit relative to said base to said leg rest and to balance the forces exerted by occupant of said chair against said unit and against said leg rest to establish said third rest position of said chair.

10. In a reclining chair having a chair seat, a leg rest, a stationary base, and a fixture supporting said seat and said leg rest on said base for coordinated movement between a normal position wherein said seat is disposed in upright relationship to said base and said leg rest is in a retracted position and a fully reclined position wherein said seat is tilted rearwardly relative to said base and said leg rest is in an extended leg supporting relationship to said seat; the improvement wherein said fixture comprises a completely pivotally constrained compound linkage means supporting said seat for combined pivotal and translatory movement relative to said base wherein said seat is maintained in a substantially upright relationship to said base during the initial portion of the movement of said chair from said normal to said fully reclined position and wherein the major portion of the rearward tilting movement of said seat relative to said base occurs during the final portion of movement of said chair toward said fully reclined position, leg rest linkage means pivotally connected in said constrained linkage means for swinging said leg rest from said retracted position into leg supporting relationship with said seat during said initial portion of movement of said chair from said normal position and for maintaining said leg rest in substantially the same leg supporting relationship to said seat throughout said final portion of movement of said chair toward said fully reclined position, and balancing link means in said constrained linkage means for applying the normal gravitational forces exerted by an occupant of the chair upon said seat against the normal gravitational forces exerted by the occupant upon said leg rest to establish a balanced equilibrium position of said chair at a position intermediate said normal and said reclined positions wherein said leg rest is in leg supporting relationship with said seat.

11. In a reclining fixture as defined in claim 10, the further improvement wherein said balancing link means comprises two links, one of said two links being mounted upon said base by a first pivot of said balancing link means and the other of said two links being pivotally connected to said seat by a second pivot of said balancing link means, a third pivot of said balancing link means pivotally connecting said two links to each other, and a fourth pivot in said balancing link means pivotally connecting said balancing link means to said leg rest linkage means.

12. In a reclining chair as defined in claim 11, the further improvement wherein one of the pivots of said balancing link means is located intermediate the ends of a link of said balancing link means, said fourth pivot being located at one end of the last mentioned link, another of said pivots of said balancing link means being located at the opposite end of the last mentioned link and connected in said fixture for movement in accordance with the position of said seat relative to said base, the forces exerted by the occupant upon said seat being applied to the last mentioned link through said another of said balancing link pivots.

13. In a reclining chair having a chair seat, a leg rest, a stationary base, and a fixture supporting said seat and said leg rest on said base for coordinated movement between a normal position wherein said seat is disposed in upright relationship to said base and said leg rest is in a retracted position and a fully reclined position wherein said seat is tilted rearwardly relative to said base and said leg rest is in an extended leg supporting relationship to said seat; the improvement wherein said fixture comprises a completely pivotally constrained linkage having a rear support link pivotally mounted at its lower end upon the rearward end of said base and pivotally connected at its upper end to the rearward end

of said seat, compound front support link means pivotally mounted on the forward end of said base and pivotally connected to the forward end of said seat, said front support link means and said rear support link cooperatively supporting said seat for combined pivotal and translatory movement relative to said base wherein said seat is maintained in a substantially upright relationship to said base during the initial portion of movement of said chair from said normal position to said fully reclined position and wherein the major portion of the rearward tilting movement of said seat relative to said base occurs during the final portion of movement of said chair toward its fully reclined position, leg rest linkage means defined in part by said front support link means supporting said leg rest for movement relative to said seat and said base, and balancing link means pivotally connected between said rear support link and said leg rest linkage means for swinging said leg rest from said retracted position into leg supporting relationship with said seat during said initial portion of movement of said chair from said normal position and for maintaining said leg rest in substantially the same leg supporting relationship to said seat throughout the final portion of movement of said chair toward said fully reclined position, said balancing link means including a control link having a pivot at each end and a third pivot

intermediate its ends and connected in said fixture to apply the normal gravitational forces exerted by an occupant of said chair upon said seat to one end of said control link to apply a moment urging said control link in pivotal movement in one direction about said third pivot and to apply the normal gravitational forces exerted by the occupant upon said leg rest to the opposite end of said control link to apply a moment about said intermediate pivot in the opposite direction to achieve a statically balanced rest position of said fixture intermediate said normal and said reclined positions wherein said leg rest is in leg supporting relationship with said seat.

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FRANK B. SHERRY, *Primary Examiner.*

GEORGE L. BREHM, *Examiner.*