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W. J. NAVELLE ET AL

2,880,784

RECLINING CHAIR

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2 Sheets-Sheet 1

Fig. 1.

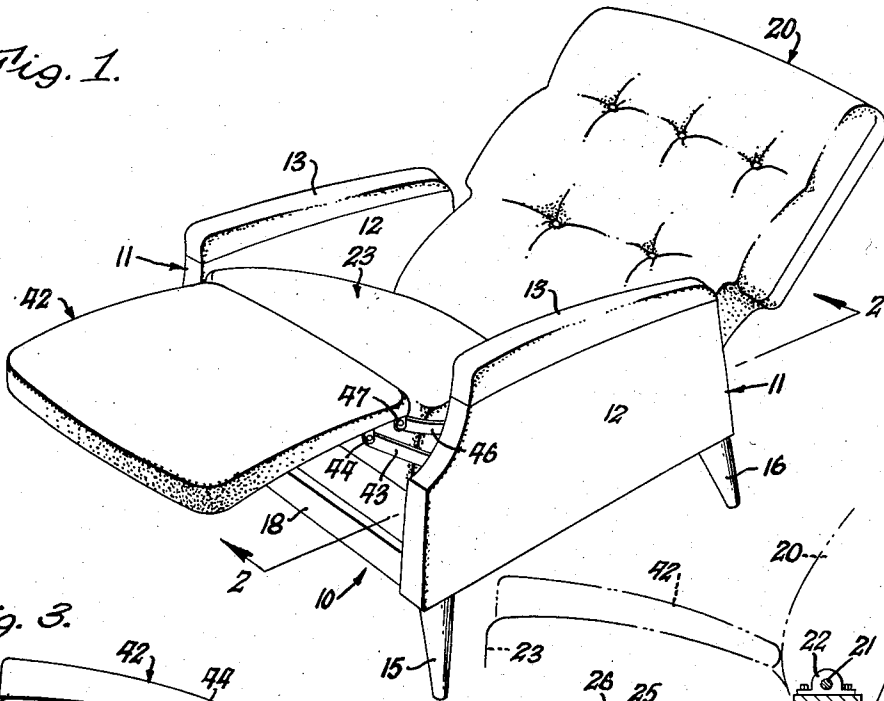


Fig. 3.

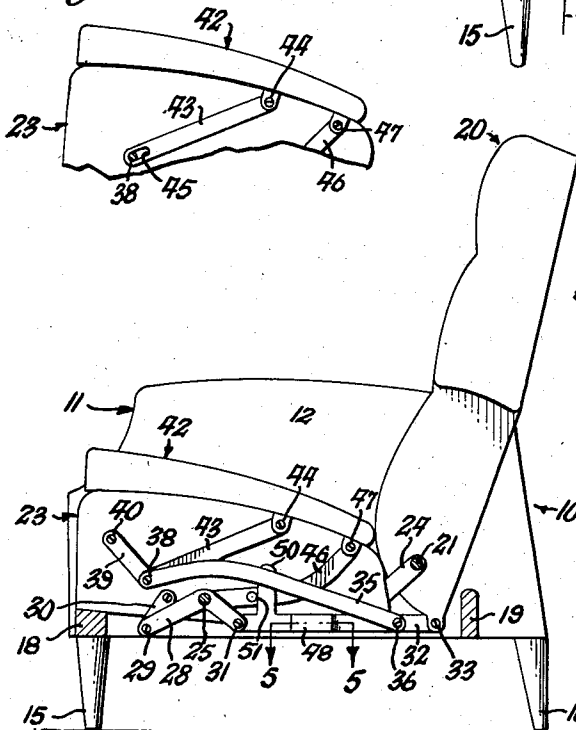
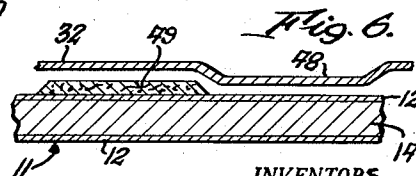
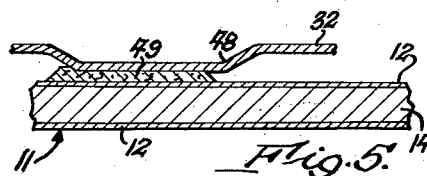
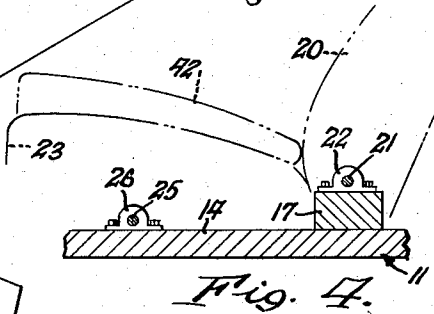


Fig. 2.



INVENTORS  
Ward J. Navelle  
Nicholas de Ories  
Ernest F. Becker  
by Popp and Sommer  
ATTORNEYS.

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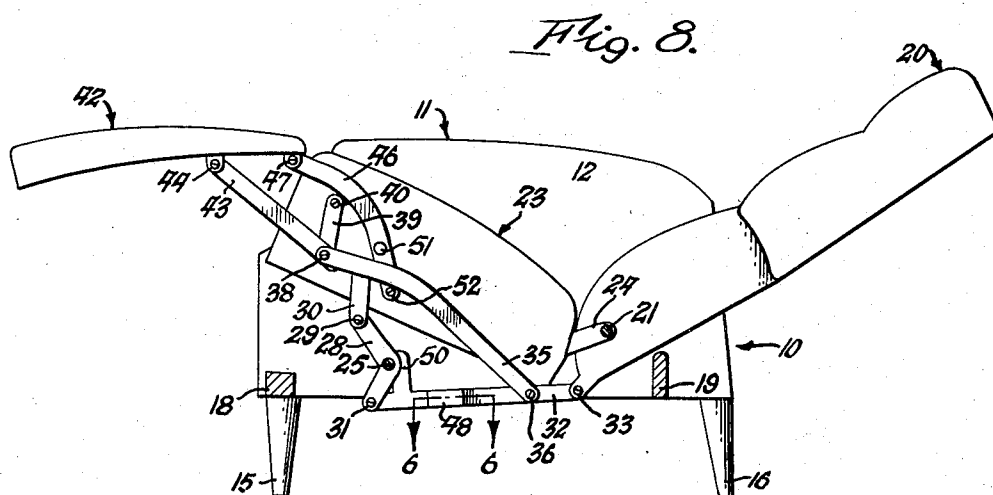
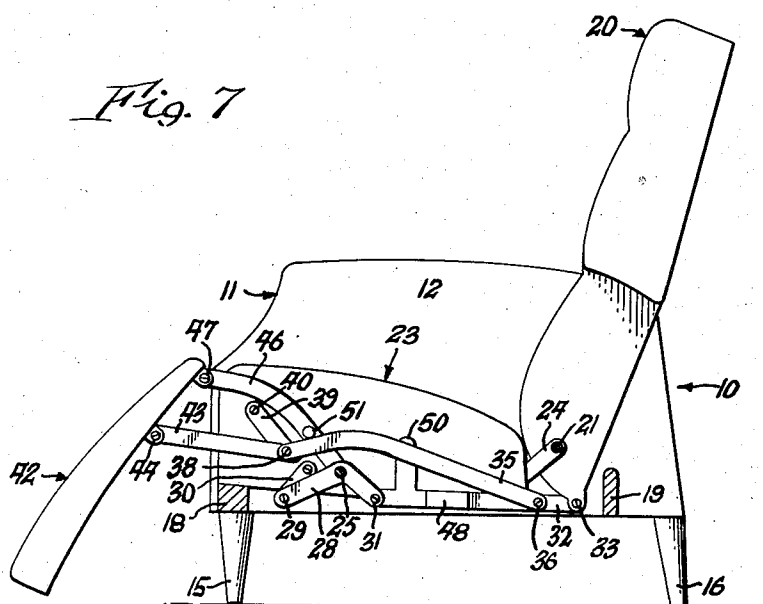
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INVENTORS  
Ward J. Navelle  
Nicholas de Vries  
Ernest F. Becker  
by Popp and Sommer  
ATTORNEYS

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## RECLINING CHAIR

Ward J. Navelle, Medina, N.Y., Nicholas de Vries, Brookfield, Conn., and Ernest F. Becher, East Aurora, N.Y.

Application August 15, 1955, Serial No. 528,242

4 Claims. (Cl. 155—106)

This invention relates to a reclining chair and more particularly to such a chair adapted for use conventionally as a normal upholstered chair but which, when released, has movable back, seat and leg rest parts connected to one another and to the base part of the chair by a linkage at each side of the chair and which linkages serve to maintain these movable parts in proper relation to one another to provide the maximum comfort at any selected degree of reclining of these movable parts.

This application is an improvement on the reclining chair described and claimed in the copending De Vries and Becher application, Serial No. 430,532, filed May 18, 1954, and in common with said application, important general objects of the present invention are (1) to provide such a reclining chair which is of attractive appearance and when in its formal, upright position can be designed to follow the desirable form of non-reclining chairs particularly in having a low back and small base supported by high legs so as to provide a high open space beneath the chair and thereby avoid having a base of massive appearance; (2) which does not have any loose lengths of cloth between the back and the base which some reclining chairs require for concealment purposes; (3) which is deeply cushioned both in its formal and reclining positions; (4) which when in its upright, formal position has its parts positively latched against movement so that the sitter cannot be startled by an unexpected movement of the chair parts; (5) in which the linkages cause the chair parts to track each other to provide the maximum comfort in all positions; (6) which is smooth and trouble free in action without peaks of resistance, noise or uncertainties in action; (7) which, when extended is sturdy and free from wobbliness; (8) in which control of the movement is essentially a function of opposing leverages; (9) the base of which is strong and adequately braced by cross bars at its front and rear; (10) which is without tendency to pull upon or crumple the clothing of the user; (11) and in which the chair parts, in reclining position, have an unusual overall length to accommodate very tall persons.

A specific object of the present invention is to provide a friction brake which is effective to require a deliberate shifting of the occupant's weight to reposition the chair parts and thereby hold these parts against slipping out of a selected position because of slight movements on the part of the user.

Another specific object of the invention is to provide a more positive latch than in the aforesaid application for latching the parts against movement after they have been brought to their formal erect position.

Another object is to reduce the number of main bearings between the base and the movable parts of the chair.

Another object is to arrange each side linkage in the space between the corresponding side frame and the moving parts of the chair and principally in the space between the corresponding seat frame and the seat part of the chair.

Another object is to simplify the linkages and their ac-

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tion and to so arrange their pivot joints that they work in unison.

Other objects and advantages of the invention will be apparent from the following description and drawings in which:

Fig. 1 is a perspective view of a reclining chair embodying the present invention and showing the same in fully extended or reclining position.

Fig. 2 is a vertical fore-and-aft section taken generally on line 2—2, Fig. 1 and showing the chair in its fully erect formal position.

Fig. 3 is a fragmentary view generally similar to Fig. 2 but showing certain of the links removed.

Fig. 4 is a vertical fore-and-aft section through the bottom fore-and-aft rail of one of the side frames of the chair and showing the manner in which the two main bearings of the movable parts are mounted thereon.

Figs. 5 and 6 are enlarged horizontal sections taken generally on the correspondingly numbered lines, Figs. 2 and 8, respectively, and illustrating the action of the friction brake.

Fig. 7 is a view similar to Fig. 2 but showing the leg rest part brought down preparatory to sitting in the chair and bringing its movable parts to reclining position.

Fig. 8 is a view similar to Figs. 2 and 7 and showing the chair in its fully reclining position.

In the accompanying drawings, the numeral 10 represents the base and arms of the chair and which consists of a pair of side frames 11 which are enclosed by a cloth cover 12 and are shown as having upper upholstered arm rests 13. Each side frame includes a fore-and-aft bottom bar or rail 14 supported at its front end by a front leg 15 and at its rear end by a rear leg 16. The chair base is completed by front and rear cross bars 18 and 19 which connect the fore-and-aft bottom bars or rails 14 near their front and rear legs 15, 16, respectively.

The numeral 20 represents the upholstered back part or backrest of the reclining chair and which can be of any form to have its lower part fit between the side frames 11. A pivot 21, illustrated as being in the form of a horizontal pivot rod extending through the lower part of the backrest 20, connects the lower part of the backrest 20 with each of the side frames 11. The opposite ends of this pivot rod 21 can be journaled in the two side frames 11 of the base in any suitable manner, as by journalling each end of this pivot rod in a bearing 22 mounted on a block 17 fast to the fore-and-aft bottom bar or rail 14 of each side frame as shown in Fig. 4.

The numeral 23 represents the upholstered seat part of the reclining chair and which can be of any suitable form to fit between the side frames of the chair base. Desirably, this seat part 23 is spring filled so that a person either sitting upright or reclining on this seat part is resiliently and comfortably supported. This seat part 23 has a pair of upwardly and rearwardly extending arms 24 at its opposite sides, these arms embracing the lower end of the back part 20 and being journaled on the pivot rod 21 so that the back part 20 and seat part 23 swing about a common axis or pivot represented by the pivot rod 21.

Another base pivot pin 25 is journaled on each fore-and-aft bottom bar or rail 14 of each side frame 11. These pins are journaled in bearings 26 on these bottom bars or rails and are comparatively short, terminating close to the sides of the seat part 23.

The back part 20 and seat part 23 are operatively linked to each other and to the chair base 10 by a pair of linkages which are preferably constructed as follows. These linkages are identical, each nesting between a corresponding side frame 11 of the base 10 and the back and seat parts 20, 23. Each of these linkages is in the form of flat metal links and levers and connected by pivots, the

axes of which are parallel with the axes of the base pivot rods 21 and 25.

Each of these short pivot rods 25 carries the central part of a double armed or bell crank lever 28. The opposite ends of this bell crank lever incline downwardly in the erect position of the chair parts as illustrated in Fig. 2. Each double ended or bell crank lever 28 is interposed between the corresponding side frame 11 and the seat part 23 to swing about the horizontal axis of its short pivot pin 25 and is pivotally connected at its front end, as indicated at 29, to the lower end of a relatively short, generally vertical link 30. Each bell crank lever is pivotally connected, as indicated at 31, to the forward end of a relatively long generally horizontal main drive link 32, the rear end of which is pivotally connected, as indicated at 33, to the lower extremity of the back part 20.

A relatively long link 35 is pivotally connected, as indicated at 36, to the rear part of each main drive link 32. The front end of each long link 35 is pivotally connected, as indicated at 38, to the lower end of a corresponding short link 39. The upper end of this last link is pivoted, as indicated at 40, to the front part of the seat part 23.

An important feature of the invention resides in the provision of a combined leg rest part and seat cushion part 42. This combined leg rest and seat cushion part can be constructed as set forth in the said copending De Vries and Becher application so as to have sufficient rigidity to maintain its shape and to carry pivots for connecting linkages but is upholstered to form a seat cushion and add to the resilient support provided by the seat part 23 and also, in the extended position of the chair, to form a comfortable leg rest. These linkages for supporting the combined seat cushion and leg rest part 42 each comprises a link 43 secured at its lower end to the corresponding pivot 38 and pivotally connected at its upper end, as indicated at 44, to the combined seat cushion and leg rest part 42 in advance of the rear edge of the latter and adjacent but rearwardly of its transverse horizontal centerline. In order to permit the combined seat cushion and leg rest part 42 to rest on the seat part 23 as shown in Fig. 2 and also to assume the positions shown in Figs. 7 and 8, it is essential that this link, in effect, be longer when in the position shown in Fig. 2 than when shown in Figs. 7 and 8. This is accomplished by a longitudinal slot 45 in the lower end of the link 43 and surrounding the pivot pin 38 so that when the combined seat cushion and leg rest part 42 is in the position shown in Fig. 2, the pivot pin 38 will be at the lower extremity of the slot 45 whereas when the combined seat cushion and leg rest part 42 is in the position shown in Figs. 7 and 8 the pivot pin 38 will be at the upper extremity of the slot 45.

Each linkage is completed by a link 46, the upper end of which is pivoted to the corresponding rear corner of the combined seat cushion and leg rest part 42 as indicated at 47 and the front end of which is pivotally connected to the side of the seat part 23 by a pivot 52.

A feature of the invention resides in the provision of a moderate amount of friction as the chair parts leave the fully reclining position shown in Fig. 8 so as to impart a degree of stability and require a definite effort or substantial movement of the body to alter the position of the chair parts and thereby avoid a rocking chair effect. For this purpose, a central part of one or both of the main drive links 32 is offset laterally toward the lower fore-and-aft rail 14 of the corresponding side frame 11, as indicated at 48. As best shown in Figs. 5 and 6, this rail carries a strip 49 of leather or similar soft, resilient material which the offset 48 engages in all positions of the chair other than when substantially in the fully reclining position shown in Figs. 6 and 8. It will be seen that as the chair approaches its fully erect position shown in Figs. 2, 5 and 7, the offset 48 comes into progressively

greater contact with the leather strip 49 so as to provide light but increasing frictional resistance to the movement of the chair parts.

Another feature of the present invention is a positive latch for holding the chair parts against movement when in the formal position shown in Fig. 2 so that one sitting on this chair has the feel of sitting in an ordinary upholstered lounge chair and is not subjected to any surprise or start because of an unexpected movement of any of the parts. To this end, the main drive link 32 is provided near its front end with a riser or upwardly extending integral arm 50. The link 46 connecting with the rear end of the combined seat cushion and leg rest part 42 is provided with a laterally projecting pin 51. This pin 51 is positioned to engage the forward edge of the corresponding riser 50 when the combined seat cushion and leg rest part is positioned on top of the seat part 23 as shown in Fig. 2. This engagement of the pin 51 with the riser 50 latches the entire linkage so that the back part 20, seat part 23, combined seat cushion and leg rest part 42 are held immobilized with respect to the base part 10 of the chair and with reference to one another.

The pins 51 also serve the function of preventing the combined seat cushion and leg rest part from engaging the floor when the parts are moved to the position shown in Fig. 7. As shown in this figure, each of these pins is engageable with the top of the corresponding link 35 at the forward end thereof and hence prevents the pivot 47 from dropping below the level shown in Fig. 7. This serves to hold the combined seat cushion and leg rest part 42 in the off-the-floor position shown in this figure.

#### Operation

In the full erect and formal position of the chair illustrated in Fig. 2, the combined seat cushion and leg rest part 42 is directly supported by the seat part 23. In this position, the back part 20 inclines rearwardly and upwardly. It will particularly be noted that in this position, the chair presents the appearance of a normal upholstered lounge chair. Thus it has high legs with an open space of corresponding height underneath the chair in contrast to reclining chairs where the linkage is arranged under the chair and where, accordingly, the sides of the chair base 10 must be carried down far enough to conceal this linkage but which necessarily results in a base of excessively massive appearance. Furthermore, in those reclining chairs where the leg rest part 42 folds against the front of the base 10 to form the front hinged panel thereof, this panel almost touches the floor in order to provide a leg rest of adequate size, and hence the sides of the base have to be lowered to conform.

It will also be noted that there is no loose piece of cloth between the back part 20 and base 10 which is required in many reclining chairs but which impart an undesirable droopy appearance to the upholstery at this place. On the matter of appearance, it will be seen that the leg rest part 42 appears merely as, and in fact merely is, a removable seat cushion. Properly designed, the cushioning effect of this leg rest 42 is additive to the cushioning effect provided by the seat part 23 so that in the position shown in Fig. 2 the seat springing is of luxurious depth. It will also be observed that in the positioning of the parts shown in Fig. 2 they are positively locked against displacement with reference to one another so that one sitting in the chair has nothing to apprise him that he is not sitting in an ordinary upholstered chair. This is in contrast to the unpleasant feeling of one not initiated sitting in a chair of normal appearance and having the back move or the seat slide out or some other unexpected movement of the chair parts take place. On this feature, it will be noted that the entire linkage at each side of the chair is held immobilized because in the formal position of the chair as shown in Fig. 2, the pin 51 is in wedging or compressive relation

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with the riser or upstanding arm 50 of the main drive link 32 so that two links at each side of the chair are latched together.

In the formal position of the chair parts as illustrated in Fig. 2, the combined seat cushion and leg rest part 42 rests on the seat part 23 and moves vertically with the occupant by virtue of the slot 45 provided in each of the links 43 which connect with this combined seat cushion and leg rest part 42. As best shown in Fig. 3, the slots 45 permit this position of the combined seat cushion and leg rest part.

To use the chair as a reclining chair, the first step is to manually lift the combined seat cushion and leg rest part 42 from its formal position as a removable cushion on the seat part 23 and lift it upwardly and forwardly and then permit it to lower to the position shown in Fig. 7. This swinging movement of this combined seat cushion and leg rest part 42 is determined and controlled by the two links 43 and 46 which swing somewhat in the manner of parallelogram links, although this analogy to a parallelogram is by no means strictly accurate since the links 43 and 46 are not of the same effective length nor are their pivots in parallel relation to one another. Each link 46 swings about its pivot 52 and each link 43 swings about its pivot 38.

In this movement, the pin 51 arcs upwardly and forwardly first to leave contact with the riser or upstanding arm 50 of the main drive link 32. When this occurs, this pin has no latching effect upon the linkage and all of the links and levers are free to move. As the pins 51 swing downwardly in their arcing movement, they engage and come to rest upon the forward ends of the links 35. This limits the downward movement of the outer ends or pivots 47 of the links 46 and hence limits the downward movement of the rear extremity of the combined seat cushion and leg rest part to the position shown in Fig. 7. Since the fore-and-aft position of this combined seat cushion and leg rest part 42 is determined by the relation of the pivots 44 and 47 which drop to the position shown in Fig. 7, and since in this position of these pivots, the combined seat cushion and leg rest part 42 is held off the floor and in the angular position shown in Fig. 7, in this position, the chair can easily be occupied and the combined seat cushion and leg rest part is at a comfortable angle to adequately support the legs of a person.

The person seated on the seat part 23 and with his legs resting on the combined seat cushion and leg rest part 42 then pushes back against the back part 20 so as to adjust all of these parts to any degree of reclining which he may choose. Thus as the occupant, from the position of the parts shown in Fig. 7, pushes back the back part 20, he moves the main drive link 32 forwardly. This rotates each of the double ended or bell crank levers 28 clockwise about its base pivot pin 25 thereby to elevate the pivot 29. Through the short link 30, this lifts the forward end of the seat part 23 from the position shown in Fig. 7 toward the position shown in Fig. 8.

At the same time, the forward movement of the main drive link 32 moves forwardly the link 35 pivoted thereto. This swings the link 39 clockwise about its pivot 40 and also moves the corresponding link 43 forwardly. This forward movement of this link 43 is translated into an upwardly swinging movement of the combined seat cushion and leg rest part 42, this part swinging about the axis of its pivots 47 toward the position shown in Fig. 8.

The parts are stopped in the full reclining position shown in Fig. 8 by the riser or upstanding arm 50 of each main drive link 32 engaging the corresponding base pivot 25.

To return the seat to the erect position shown in Fig. 8, all that is necessary is for the occupant to pull or shift his weight forwardly so as to impress his weight on the forward part of the seat part 23. This brings the parts to the position shown in Fig. 7 and which is determined, as previously indicated, by the engagement of the pins 51

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with the forward ends of the links 35. To return the parts to their formal position shown in Fig. 2, the occupant gets out of the chair, lifts the combined seat cushion and leg rest part and swings it backwardly until it is replaced on top of the seat part 23.

It will particularly be noted that when the combined seat cushion and leg rest part 42 is positioned on the seat part 23, the height of the back part 20 is reduced in appearance by the depth of the combined seat cushion and leg rest part 42. It will also be noted that the height of the arms, in appearance, is reduced by a like amount. Both of these considerations are important in providing a reclining chair which, in the formal erect position shown in Fig. 2, looks and feels like an ordinary upholstered lounge chair and does not have an excessively high back and arms and an excessively low base in order to achieve the reclining function in a three-part reclining chair. It will also be seen that by having the dual function of a combined seat cushion and leg rest part 42, it can be made to extend a great distance from the seat part 23 and at the same time be of pleasing appearance when nested in the formal position of the chair.

We claim:

1. A reclining chair, comprising a base part, a backrest, a seat part, means pivotally connecting the lower end of said backrest and the rear end of said seat part to said base part to permit the upper end of said backrest to swing fore-and-aft and the front part of said seat part to swing up and down, said backrest having an extension projecting downwardly from said connecting means, a linkage pivotally connecting said downward extension, base part and the forward end of said seat part and arranged to elevate the front end of said seat part in response to rearward movement of said backrest and vice versa, a leg rest arranged in front of said seat part, a link pivotally connected at one end to a central part of said seat part to have its opposite end swing fore-and-aft from adjacent the front upper corner to adjacent the rear upper corner of said seat part, a pivot connecting said opposite end to one extremity of said leg rest, and linkage means operatively connecting said leg rest with said downward extension of said backrest and operative to swing said leg rest about said pivot in synchronism with the movement of said seat part with reference to said backrest.

2. A reclining chair, comprising a base part, a backrest, a seat part, means pivotally connecting the lower end of said backrest and the rear end of said seat part to said base part to permit the upper end of said backrest to swing fore-and-aft and the front part of said seat part to swing up and down, said backrest having an extension projecting downwardly from said connecting means, a main drive link extending fore-and-aft in a generally horizontal direction and pivoted to said downward extension to swing vertically, a double armed lever pivoted at its center to said base part adjacent the forward end of said main drive link to swing in a fore-and-aft generally vertical plane, means pivotally connecting said forward end of said main drive link with one arm of said double armed lever, a relatively short link pivotally connecting the other arm of said double armed lever with said seat part, a leg rest arranged in front of said seat part, a link pivotally connected at one end to a central part of said seat part to have its opposite end swing fore-and-aft from adjacent the front upper corner to adjacent the rear upper corner of said seat part, a pivot connecting said opposite end to one extremity of said leg rest, a link pivotally connected at one end to said main drive link to swing vertically, pivot means connecting the other end of said last link to another link, means pivotally connecting the other end of said another link with said leg rest at a point remote from said pivot, a link connecting said pivot means with the front part of said seat part thereby constraining said pivot means and the links connected thereby to move with said seat part, a pin mounted on said link pivotally

connected at one end to a central part of said seat part, and an upwardly extending arm on said main drive link in position to have its forward edge engaged by said pin when said leg rest is swung to a position on top of said seat part.

3. A reclining chair, comprising a base part, a backrest, a seat part, means pivotally connecting the lower end of said backrest and the rear end of said seat part to said base part to permit the upper end of said backrest to swing fore-and-aft and the front part of said seat part to swing up and down, said backrest having an extension projecting downwardly from said connecting means, a main drive link extending fore-and-aft in a generally horizontal direction and pivoted to said downward extension to swing vertically, a double armed lever pivoted at its center to said base part adjacent the forward end of said main drive link to swing in a fore-and-aft generally vertical plane, means pivotally connecting said forward end of said main drive link with one arm of said double armed lever, a relatively short link pivotally connecting the other arm of said double armed lever with said seat part, a leg rest arranged in front of said seat part, a link pivotally connected at one end to a central part of said seat part to have its opposite end swing fore-and-aft from adjacent the front upper corner to adjacent the rear upper corner of said seat part, a pivot connecting said opposite end to one extremity of said leg rest, a link pivotally connected at one end to said main drive link to swing vertically, pivot means connecting the other end of said last link to another link, means pivotally connecting the other end of said another link with said leg rest at a point remote from said pivot, a link connecting said pivot means with the front part of said seat part thereby constraining said pivot means and the link connected thereby to move with said seat part, a stop pin mounted on said link pivotally connected at one end to a central part of said seat part in position to engage and rest upon said link connected at one end to said main drive link and thereby limit the movement of said backrest, seat part and leg rest in a corresponding direction.

4. A reclining chair, comprising a base part, a backrest, a seat part, means pivotally connecting the lower end of said backrest and the rear of said seat part to said base to permit the upper part of said backrest to swing fore-and-aft and the front part of said seat part to swing up and down, said backrest having an extension projecting downwardly from said connecting means, a main drive link extending fore-and-aft in a generally horizontal direction and pivoted to said extension to swing vertically, a double armed lever pivoted centrally to one of said parts adjacent the forward end of said main drive link to swing in a fore-and-aft generally vertical plane, means pivotally connecting said forward end of said main drive link with one arm of said double armed lever, a relatively short link pivotally connecting the other arm of said double armed lever with the other of said parts, a leg rest arranged in front of said seat part, a link pivotally connected at one end centrally to said seat part to have its opposite end swing in a plane generally parallel with the planes of movement of the other links and from adjacent the front upper corner to adjacent the rear upper corner of said seat part, pivot means connecting said opposite end to one extremity of said leg rest, a link operatively connected at one end to said downward extension of said backrest to swing vertically, pivot means connecting said last link to another link, means pivotally connecting the other end of said another link with said leg rest at a point remote from said one extremity thereof, and a link connecting said last pivot means with the front part of said seat part thereby to constrain said last pivot means and the links connected thereby to remove with said seat part.

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