Feb. 26, 1957 E. G. KRAKAUER 2,782,836

RECLINING CHAIR

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Fig. 2

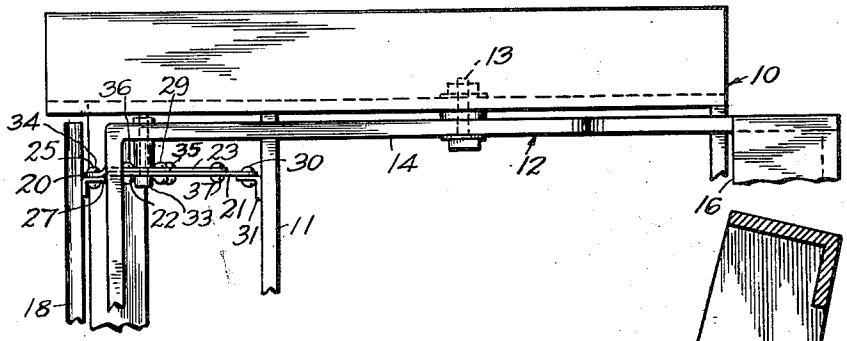
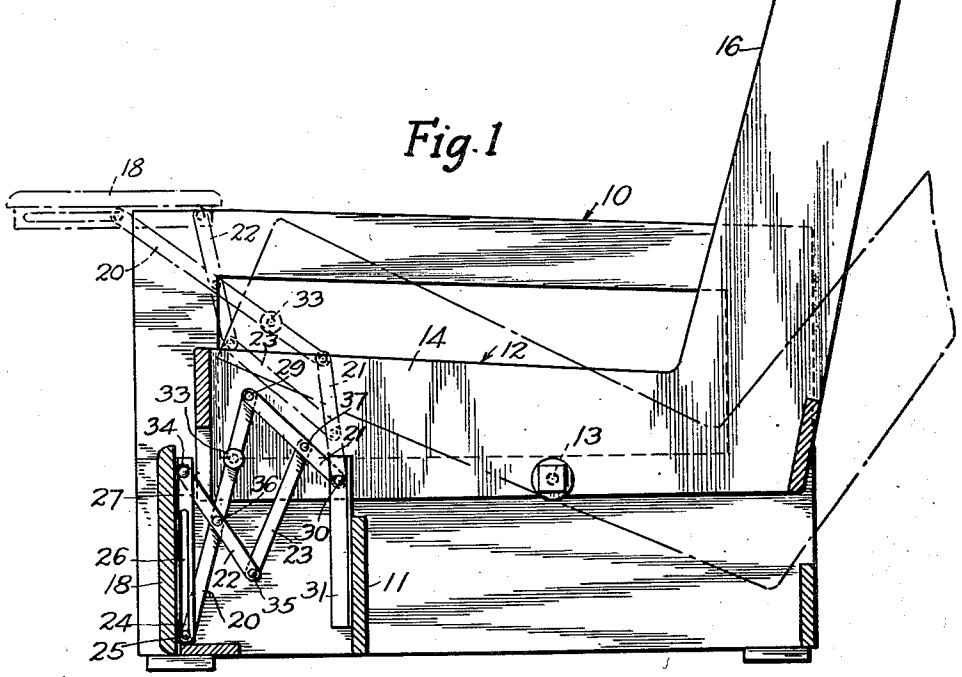


Fig. 1



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RECLINING CHAIR

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9 Claims. (Cl. 155—105)

This invention relates to reclining chairs and particularly to the means for automatically moving a leg-rest into and out of the operative leg-supporting position thereof as the inclinations of the movable parts of the chair are changed.

The invention contemplates the provision in connection with the balanced movable frame of a reclining chair, of a simple, dependable and inexpensive linkage functioning also as a hinge for the leg-rest of the chair, for moving the leg-rest into its leg-supporting position when the movable frame is overbalanced rearwardly and moved into the reclining position thereof, and for returning the leg-rest to the inoperative position thereof when the chair is overbalanced forwardly into the normal sitting position thereof.

The invention further contemplates the provision of relatively inexpensive linkage interposed between the movable frame for the chair seat and the leg-rest for limiting the forward movement of the movable frame and seat into the normal sitting position and for limiting the rearward movement of the movable frame into the reclining position while eliminating the hinges or pivots heretofore used to connect the forward edge of the seat or movable frame to the leg-rest.

The invention further contemplates the provision of a combined linkage and hinge for moving the leg-rest into an operative substantially horizontal position in forward spaced relation to the seat portion of the movable frame when the parts are moved into the reclining position and for holding the leg-rest substantially vertical when the parts are in the sitting position.

The various objects of the invention will be clear as the description progresses and from the drawings, in which

Fig. 1 is a vertical longitudinal sectional view of typical frames for the chair sides and for the pivoted combined seat and back, showing the linkage connecting the seat to the leg-rest and further showing in dash-dot lines, the positions assumed by the parts in the reclining position of the chair, the customary upholstery and upholstery springs being omitted for clarity.

Fig. 2 is a top plan view of the frames, linkage and leg-rest in the sitting position of the chair.

In the practical embodiment of the invention shown by way of example, the relatively fixed chair frame **10** comprises the usual side frames connected by the suitable cross braces **11**, and constitutes the support for the swingable combined seat frame and back frame **12**. Suitable axially aligned bolts serving as pivots **13**, only one of which is shown, pass respectively through the side rails **14** of the seat portion of the frame and pivotally mount the movable frame **12** on the fixed frame **10**. The position of the bolts is selected so that the frame **12** is normally slightly overbalanced forwardly and is normally maintained in the sitting position, said frame remaining in said position when the chair is occuped by a sitter who does not press excessively on the back **16**. In other words, when the chair is unoccupied, the center of gravity of the combined frame **12** is in front of the pivot **13**. However,

the user can easily swing the frame **12** rearwardly, or in a clockwise direction as viewed in Fig. 1, about the pivots **13**, merely by deliberately leaning back enough to put the requisite pressure on the back **16**. This is because the center of gravity of the frame **12** is approximately at the pivot **13** when the chair is occupied by a person of average size in a sitting position.

The means for limiting the amount of forward and backward movement of the frame **12** will be described in connection with the leg-rest-operating linkage. It should be understood at this point that the occupant of the chair may readily balance the combined seat and back and the movable frame therefor at any rotated position between the sitting and fully reclined positions merely by leaning with more or less pressure against, or toward, the back with the upper part of the body, the lower part of the occupant's body exerting a counter-balancing effect against such pressure, so that little effort is required to move the frame **12** from or into any selected position thereof or to hold the frame in such balanced position.

As has been indicated, suitable linkage is provided to operate the leg-rest **18** when the frame **12** is swung about its pivots **13**. The linkage forms the sole support for the leg-rest, replacing the hinges formerly employed for that purpose. Said linkage comprises the actuating or lifting links **20** and **21**, and the hinging links **22** and **23**. The outer end **24** of the lifting link **20** has a slidable connection with the outer part of the leg-rest. Included in the connection is the pin or roller **25** sliding in the slot **26** made in one leg **27** of an elongated angle member, the other leg of which is suitably secured to the inner or rear face of the leg-rest. The rear end of the first lifting link **20** is pivoted as at **29** to the forward end of the second lifting link **21** the rear end of which is in turn pivoted to the fixed frame **10** as at the fixed pivot **30** on the upright angle member **31** secured to the cross brace **11** of said frame **10**. To cause the lifting link **20** to be alternately lifted and dropped and rotate about its pivot **29** when the seat frame is swung, a point of said link intermediate the ends thereof is pivoted to the seat portion **14** of the frame **12** as at **33**.

It will now be seen that as the seat is swung clockwise about its pivots **13**, the link pivot **33** is moved with the seat frame to the dash-dot position of Fig. 1, thereby increasing the angle between the lifting links **20** and **21** and raising the leg-rest. At the same time, the roller or pin **25** moves to the inner end of the slot **26**. Such relative straightening movement of the lifting links is not enough by itself to swing the leg-rest from its normal vertical position to the desired horizontal position thereof. It is to effect such swinging or hinging movement that the hinging links **22** and **23** are provided. The more forwardly arranged first hinging link **22** is pivoted at its front end to the upper end portion of the slotted leg **27** as at **34** at a point in spaced relation to the pin **25** and to the slot **26**, and at its rear end is pivoted to the front end of the second hinging link **23** as at **35**, while an intermediate point of the link **22** is pivoted to the first lifting link **20** at the point **36** where said links **20** and **22** cross each other. The rear end of the second hinging link **23** is pivoted to an intermediate point as **37** of the second lifting link **21**, which point has relatively little movement.

It will now be apparent that as the lifting link **20** swings about its pivot **33**, it will rotate the leg-rest **18** about the pivot **34** and will as well raise said leg-rest. It will also be noted that said pivot **34** moves relatively to the seat portion **14** by reason of the movement of the links **22** and **23** relatively to each other and relatively to the seat portion, whereby the leg-rest may be projected by the hinging links forwardly away from the seat portion as much or as little as desired within reasonable limits thereby to attain the most convenient bal-

ancing effect and spacing between the leg-rest and the front edge of the seat.

In the fully reclined position of the frame **12**, the pin or roller **25** is at the innermost end of the slot **26** thereby determining the reclining position and preventing the combined seat and back from moving rearwardly past said position. In the normal or sitting position, the pin **25** is at the other or outermost end of the slot **26** and the weights of the forward parts of the movable frame and of the occupant are transmitted through the link **20** to said pin and therethrough to the remaining linkage and finally through the members **31** and **11** to the fixed frame **10**, without undue stress on any of the parts. In the reclining position, said weights are similarly transmitted to the fixed frame.

In use, the frame **12** is normally in the sitting position shown in full lines in Figs. 1 and 2, and remains in that position with the pin **25** in the outermost part of the slot **26** while the occupant normally sits in the chair. When it is desired to recline, the occupant leans backwardly with more than the force used in normal sitting, whereby the frame **12** is rotated through the desired angle in a clockwise direction as seen in Fig. 1, and the leg-rest and the occupant's legs which are in contact with the leg-rest are raised simultaneously into the dash-dot line position shown. The occupant can stop or adjust the balanced positions of the movable parts by leaning forwardly or backwardly as he finds necessary until the desired position is attained short of the reclining position, or leaning fully back to swing the parts into the fully reclined position. From said position, by releasing the pressure on the back **16**, the weights of the forward parts of the chair and occupant swing the movable parts back to the sitting position.

It will be seen that a simple, inexpensive and effective linkage free of hinges between the leg-rest and the seat portion has been provided, permitting balancing of the seat and back in a selected position; that the linkage is adapted to move the leg-rest into position for maximum comfortable support of the legs of the occupant and incorporates limiting stops for the sitting and reclining positions, and that the structure is well designed for practical and commercial use.

While a certain specific embodiment of the invention has herein been shown and described, obvious changes may be made therein without departing from the spirit of the invention defined in the appended claims.

I claim:

1. In a reclining chair having a movable frame provided with a seat portion and with a back portion and having a fixed frame, a pivot arranged intermediate the front and the back portion of the movable frame and swingably mounting the movable frame on the fixed frame, a movable leg-rest at the front of the movable frame, and linkage means interposed between the leg-rest and the movable frame and constituting the sole means for swinging the leg-rest into an operative substantially horizontal position in forward spaced relation to and at the top part of the seat portion when said movable frame is tilted in one direction about said pivot, said linkage moving the leg-rest into an inoperative substantially vertical position largely below the movable frame after the movement of the movable frame in the opposite direction about said pivot to the relatively untilted position of the movable frame, a second pivot hinging the linkage to the fixed frame and a third pivot hinging the linkage to the movable frame, the linkage comprising a leg-rest-lifting link having a slidable connection with the leg-rest and carrying the third pivot at a point intermediate the ends of said link.

2. The reclining chair of claim 1, the linkage comprising a leg-rest-hinging link crossing and pivoted to the lifting link and a pivotal connection between the hinging link and the leg-rest.

3. In a reclining chair having a movable frame provided with a seat portion and with a back portion and having a fixed frame, a pivot arranged intermediate the front and the back portion of the movable frame and swingably mounting the movable frame on the fixed frame, a movable leg-rest at the front of the movable frame, and linkage means interposed between the leg-rest and the movable frame and constituting the sole means for swinging the leg-rest into an operative substantially horizontal position in forward spaced relation to and at the top part of the seat portion when said movable frame is tilted in one direction about said pivot, said linkage moving the leg-rest into an inoperative substantially vertical position largely below the movable frame after the movement of the movable frame in the opposite direction about said pivot to the relatively untilted position of the movable frame, a second pivot hinging the linkage to the fixed frame and a third pivot hinging the linkage to the movable frame, the linkage comprising a pair of lifting links, a pivotal connection between the lifting links, the second pivot being on one of the links, and a sliding connection between the other link and the leg-rest, the third pivot being on said other link.

4. The reclining chair of claim 3, the linkage further comprising a pair of hinging links pivoted together, one of the hinging links being pivoted to the leg-rest at a point in spaced relation to said sliding connection and the other hinging link being pivoted to said one of the lifting links.

5. In a reclining chair, a movable frame having a seat and a back, a fixed frame, a pivot mounting the movable frame swingably on the fixed frame at a point between the front and back parts of the movable frame, a normally vertical leg-rest, a first lifting link, a pivotal connection between the first link and said leg-rest, the pivot of said connection being movable relatively to the leg-rest, a second pivotal connection between the link and the movable frame, a second lifting link pivoted to the first link and to the fixed frame, and leg-rest hinging link means connecting the leg-rest to the links, the hinging means comprising a first hinging link pivoted to an edge part of the leg-rest and to the first lifting link, and a second hinging link pivoted to the second lifting link and to the first hinging link.

6. The reclining chair of claim 5, the pivotal connection of the first lifting link to the leg-rest comprising a member having a slot therein and secured to the leg-rest and the pivot of said connection being a pin on said first lifting link sliding in the slot.

7. In a reclining chair, a movable frame having a seat and a back, a fixed frame, a pivot mounting the movable frame swingably on the fixed frame at a point between the front and back parts of the movable frame, a normally vertical leg-rest, a first lifting link, a pivotal connection between the first link and said leg-rest, the pivot of said connection being movable relatively to the leg-rest, a second pivotal connection between the link and the movable frame, a second lifting link pivoted to the first link and to the fixed frame, and leg-rest hinging link means connecting the leg-rest to the links, the pivotal connection of the first lifting link to the leg-rest comprising an angle member having one leg thereof secured to the leg-rest and having a slot in the other leg thereof, and the pivot of said connection being a pin carried by the first lifting link and sliding in the slot, one end of the slot limiting the swinging movement of the movable frame in one direction and the other end of the slot limiting the swinging movement of the movable frame in the opposite direction.

8. In a reclining chair having a movable frame provided with a chair seat and a chair back and having a fixed frame and a movable leg-rest, the movable frame being pivoted to the fixed frame, and means for swinging the leg-rest on swinging movement of the movable frame and for limiting said swinging movement in both direc-

tions, said means comprising a pair of lifting links pivoted together, one of the links having a sliding connection with the leg-rest and being pivoted to the movable frame and the other link being pivoted to the fixed frame, and means for limiting the movement of the sliding connection in both directions, and hinging linkage interposed between the leg-rest and the lifting links and connected thereto.

9. The reclining chair of claim 8, the limiting means comprising a member secured to the leg-rest and having a slot therein, and a member on the first lifting link sliding in the slot from one end thereof to the other

end, the hinging linkage comprising a first hinging link pivoted to the leg-rest at a point in spaced relation to the slot and also pivoted to the first lifting link, and a second hinging link pivoted to the first hinging link and to the second lifting link.

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