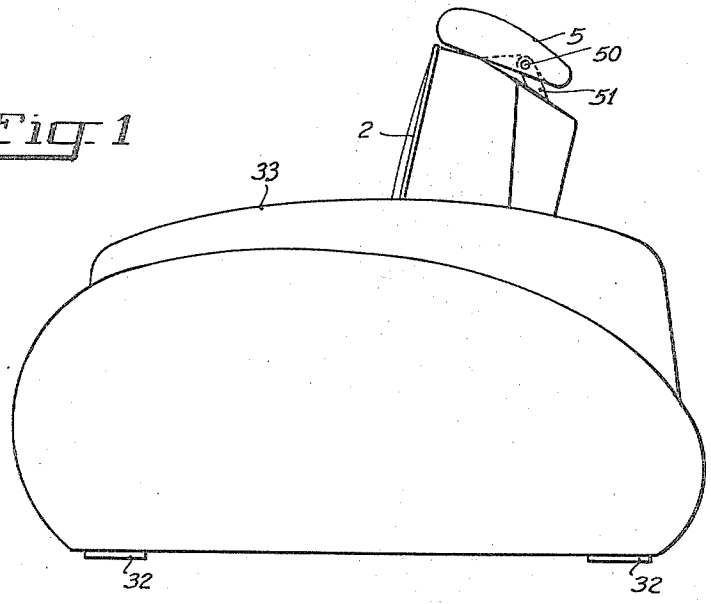
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CHAIR

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Fig. 1



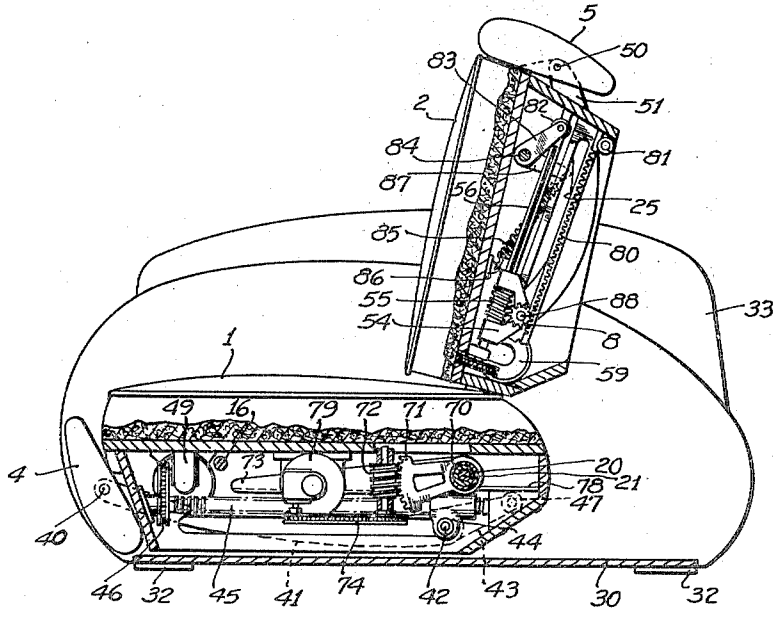


Fig. 2

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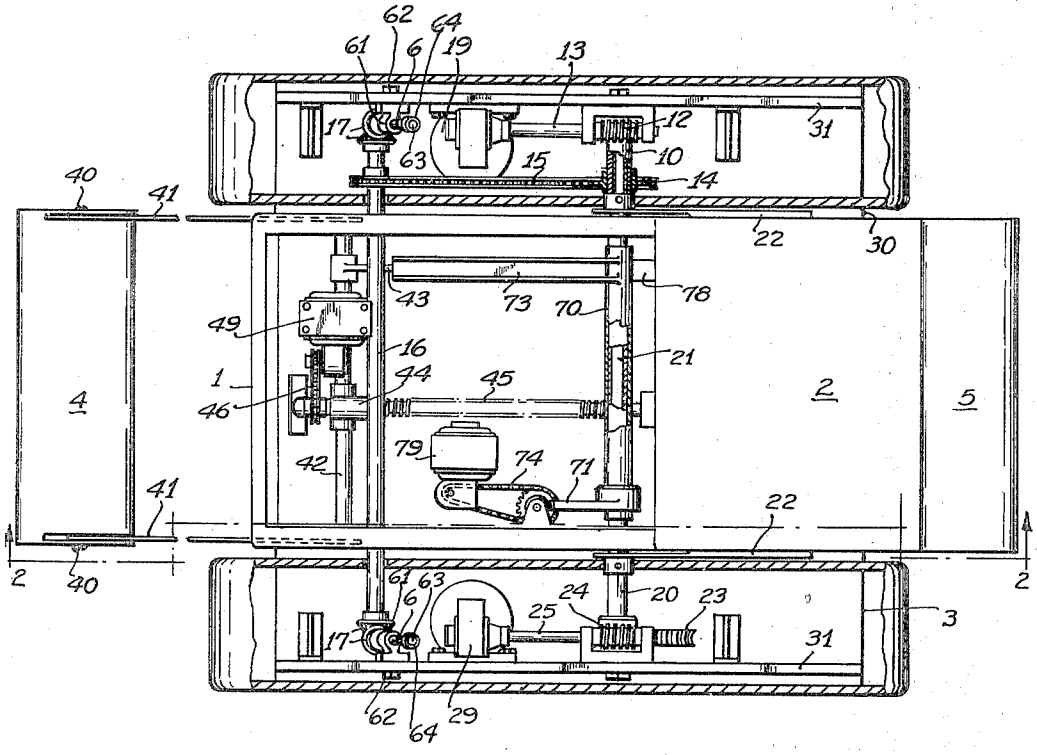


Fig. 3

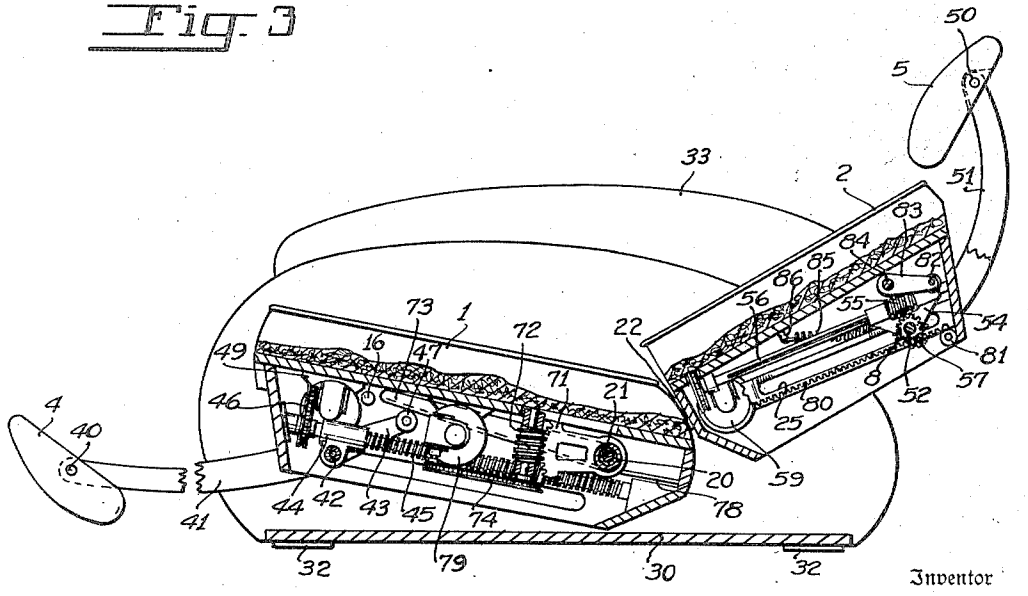


Fig. 4

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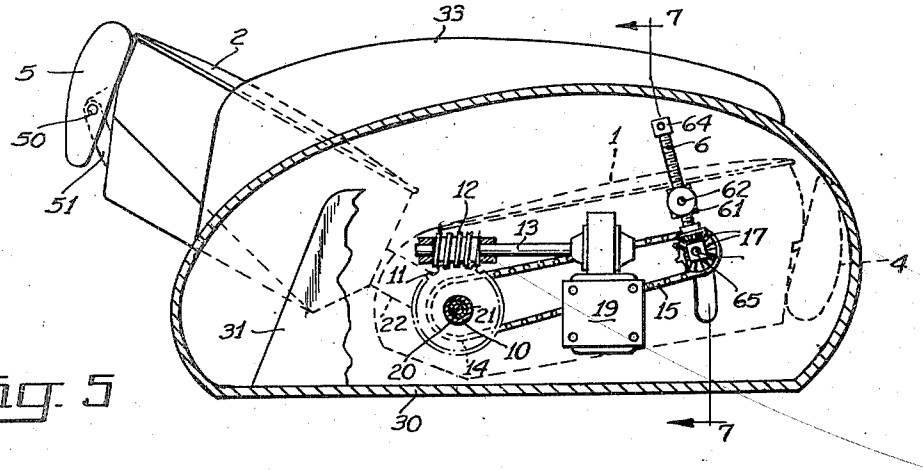


Fig. 5

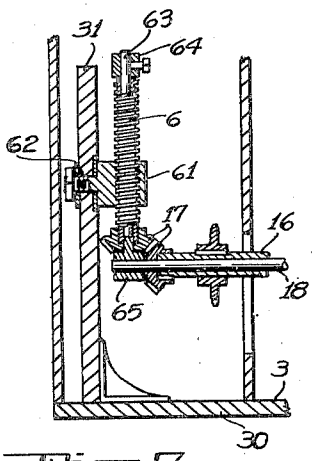


Fig. 7

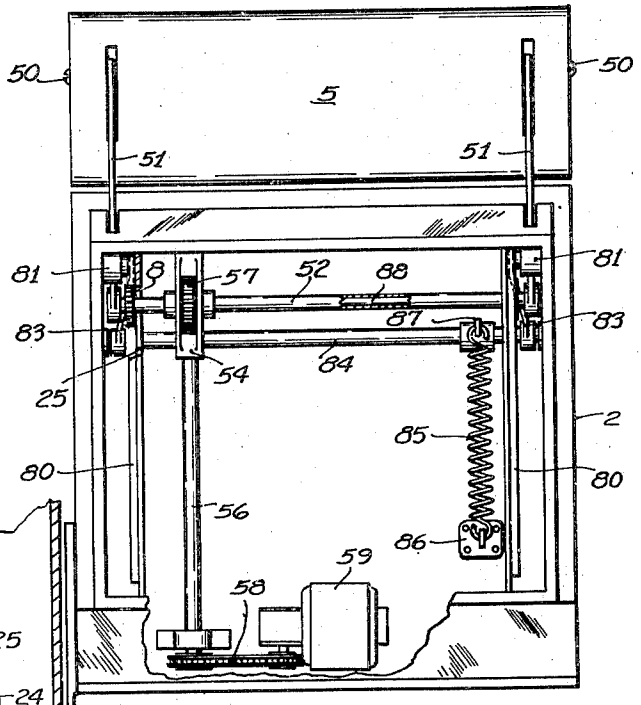
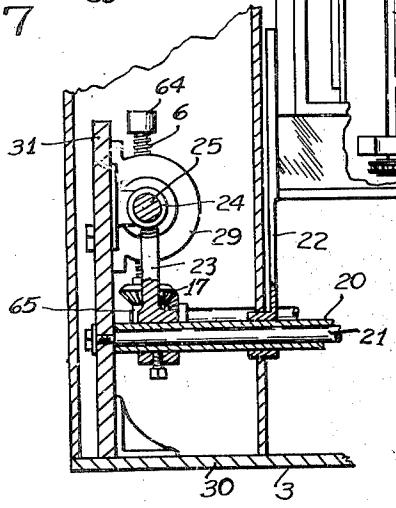


Fig. 6



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UNITED STATES PATENT OFFICE

2,491,898

CHAIR

Frank J. Luketa, Seattle, Wash.

Application June 11, 1945, Serial No. 598,744

12 Claims. (Cl. 155—105)

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The present invention concerns a chair which generically is similar to that disclosed in my copending application Serial No. 583,246, filed March 17, 1945. As in that application, the present invention discloses a chair having seat and back sections which are pivoted for independent swinging about a common axis adjacent the rear edge of the seat; the seat has carried upon it a leg rest which is extensible and also adjustable in elevation with respect to the seat; the back has a head rest which is adjustable inwardly and outwardly with respect to the back, and which is always urged forwardly or upwardly whenever it is projected. The present invention, however, discloses various detail differences, particularly in the mechanism for operating the several parts or components of the chair.

The objectives and the features of novelty in the present arrangement are in general the same as those in my application referred to above, and wherein they differ therefrom will become apparent as this description progresses. Specifically, the present invention concerns primarily the auxiliary rest element, such as the leg rest, and its relationship to the chair component, such as the tilting seat, which supports it.

Figure 1 is a side elevation of the chair, with the back generally upright and the head rest and leg rest retracted.

Figure 2 is a longitudinal section through the seat and back, generally along the line 2—2 of Figure 3, but with the leg rest in retracted position and the back in erect position.

Figure 3 is a plan view of the chair with certain parts broken away for greater clarity.

Figure 4 is a view corresponding to Figure 2, with the chair components, however, in the positions they occupy in Figure 3.

Figure 5 is a vertical section through one arm, illustrating details of the seat-tilting mechanism, the plane of section being generally just inside the panel whereon the mechanism is mounted.

Figure 6 is a rear view of Figure 2 partly in section, certain parts being broken away.

Figure 7 is a detail section of the seat-tilting mechanism substantially along the line 7—7 of Figure 5.

The chair includes the seat 1 and the back 2, each tiltably supported upon a frame 3, and each carries a rest element, such as the leg rest 4 carried by the seat 1, and the head rest 5 carried by the back 2. Each of these rest elements is mounted to swing with its supporting component, and in retracted position to lie along the swinging edge thereof, but each such rest element

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is projectible and retractable with respect to the swinging edge of the supporting component, and is also supported for transverse adjustment or swinging movement with respect to its supporting component. Tilting of the leg rest relative to the seat is controllable, whereas tilting of the head rest is automatic, tending to urge the head rest forwardly as it is projected, and vice versa. The several components or elements of the chair are decorated and upholstered as desired or necessary, but since these details constitute no part of my invention it will not be necessary to describe them.

The supporting frame consists essentially of right and left arms, within each of which is an upright longitudinally extending panel 31 mounted upon a base board 30 extending beneath and connected to the side arms close to the floor, and supported upon spacers or feet 32. Each panel 31 is suitably braced from the base board 30, and is encased, with operating mechanism which is mounted upon it, within a removable hood 33 which constitutes the arm of the chair, and which is suitably shaped in accordance with the intended design of the chair as a whole.

The back 2 is pivoted for tilting upon a tubular shaft 20, suitably journaled and supported between the frame members 31 at opposite sides, as, for example, by the tie rod 21 which extends through the frame panels 31. Arms 22 fixed upon the tubular rock shaft 20 engage the opposite sides of the framework of the back 2, as may be seen, for example, in Figure 6. The shaft 20 may be oscillated by means of a worm quadrant 23 (see Figure 3) fast upon the shaft 20, engaged by a worm pinion 24 upon a shaft 25, which is driven in one sense or the other by the reversible motor 29, which is mounted upon one of the frame panels 31. The controls for the motor 29 are not illustrated, but would be located upon one or the other of the arms, conveniently to the occupant of the chair, and similarly other motor controls, later to be described, would be similarly located, but have been omitted for simplicity of illustration.

The seat 1 is pivoted for tilting about an axis common to the tilting axis of the back 2. To this end a short tubular shaft 10 carried by the seat is supported upon and revoluble relative to the shaft 20 within one of the arms, and this shaft 10 has fast upon it a worm gear 11, with which is meshed a worm pinion 12 upon a shaft 13 which is driven by a motor 19. The shaft 10 also carries a sprocket wheel 14, which through a chain 15 drives a similar sprocket upon a shaft

16, which is journaled in the framework of the seat 1.

The shaft 16 is a means of connecting across from one side to the other of the chair, and of equalizing the lifting stresses between fixed supports at the opposite sides of the chair, so that the seat will not sag at one side or the other, by reason of unbalanced forces. The shaft 16, therefore, is connected by a pair of miter gears 17 at each end to rotate a jack screw 6, threaded within a nut 61 which is swiveled at 62 upon the frame member 31. The paired miter gears 17 are held in mesh by a rod 63 passing through the axial bore of the screw 6, having a fixed collar 64 upon its upper end, and connected similarly, or integrally, to a collar 65, which in effect is mounted upon the shaft 16, or directly upon the rod 18 which extends therethrough (see Figure 7).

Whenever the motor 19 is actuated its power is delivered by way of the shaft 13, pinion 12, worm gear 11, shaft 10, sprocket 14, chain 15, and shaft 16 to the opposite screws 6, each of which, rotating in its nut 61, draws the forward edge of the seat 1 upwardly or downwardly, in accordance with the sense of rotation of the motor 19.

The leg rest 4 is pivoted at 40 upon the outer or forward ends of opposite arms 41, which are fast upon a rock shaft 42, which in turn has upon it an arm 43, so that in effect the arms 41 and the arm 43 constitute a lever pivoted between its ends. The rock shaft 42 is carried by a nut 44, within which is threaded a jack screw 45, which extends lengthwise of and is journaled in the framework of the seat 1, and which is rotated by means of a chain 46 from a motor 49 carried by the seat. By energization of the motor 49, the leg rest 4 may be moved inwardly or outwardly to retract it or to project it with respect to the forward edge of the seat. In effect, the jack screw is a guide for the projective and retractive movement of the leg rest. The leg rest's normal position is flat against the forward edge of the seat, as is best seen in Figure 2, and by pivoting it upon the arms at the pivot 40 it will, by engagement with the forward edge of the seat during its movement into final retracted position, always swing to and automatically assume this normal retracted position; compare Figures 4 and 2.

By controlling swinging of the arm 43, and thereby of the associated arms 41, the leg rest may be raised or lowered with respect to the seat. The arm 43 is engaged to this end by an arm 73 fast upon a tubular shaft 70 which surrounds the shaft 20. The tubular shaft 70 carries also a quadrant arm 71, with which meshes a worm pinion 72 driven through a chain 74 from the motor 79, which is mounted on the frame work of the seat.

By controlling the sense of rotation of the motor 79 the arm 73 may be oscillated upwardly or downwardly, thereby moving the arm 43 upwardly or downwardly to correspond, and regardless of the projected or retracted position of the leg rest 4. The end of the arm 43 has a follower 47 engaging the lower edge of the arm 73 as a cam follower, as the rock shaft 42 is moved inwardly or outwardly. In the final retracted position of the leg rest the follower 47 will run past the rock shaft 70 which carries the arm 73 (see Figure 2). Here the follower 47 engages a fixed cam element 78, which serves in all cases to return the leg rest 4 to its proper level with respect to the forward edge of the seat.

The head rest 5, in its relation to the back 2, is quite analogous to the leg rest 4 in its relation to the seat 1, and is quite similarly operable. The arms 51, by which the head rest is pivotally supported at 50, are mounted upon the rock shaft 88 and are moved lengthwise of the back by the transverse tubular shaft 52. This shaft 52 surrounds and rotates about the rock shaft 88, and is journaled in a slide 54, so that as the slide 54 moves outwardly, or inwardly, the tubular shaft 52, and the rock shaft 88, must also move correspondingly. Such movement of the slide 54 is accomplished under the influence of a worm pinion 55 journaled in the slide, meshing with a worm gear 57 fast upon the shaft 52, the pinion 55 being feathered to slide lengthwise of the shaft 56. The shaft 52, thus rotated in one sense or the other, carries rack pinions 8 at its ends which roll along longitudinal racks 80 secured to the back frame; by reaction from the racks 80 rotation of the shaft 56 effects vertical displacement of the shaft 52 and its supported rock shaft 88, though the latter is not thereby rocked. Guides 25 guide the outer ends of the shaft 52, these guides constituting part of the seat frame. Rotation of the shaft 56, to effect such projection or retraction of the head rest, is initiated at the motor 59, acting through the drive chain 58.

Forward and rearward thrusting of the head rest is automatic as it is projected or retracted, and is permitted because the rock shaft 88 which supports the arms 51 is merely supported within but is not fast to the traversable and rotatable shaft 52. These arms 51 are guided, as they project or retract, by rollers 81 and 82 which engage the opposite edges of the arms. The rollers 81 are fixed, and both limit rearward tilting of the arms 51, and by cooperation with the curved or cam-like shape of the rear edge of the arms effect forward thrusting of the head rest as the latter is projected, and vice versa. The rollers 82 yieldingly urge rearwardly the forward edges of the arms 51, to which end they are carried by the swinging ends of arms 83 upon a fixedly positioned rock shaft 84, and an extension spring 85 anchored to the back at 86 acts upon a second arm 87 upon the rock shaft 84.

The effect is to project the head rest 5 forwardly or upwardly as it is projected, and as it reaches its final retracted position its rear edge is drawn rearwardly about its pivot 50 by reason of the contact of its forward or lower edge with the swinging edge of the back 2, and it automatically assumes the final retracted position which is shown in Figures 1, 2 and 5.

It will be seen that there are striking similarities in principle between the construction of the present application and that of my copending application Serial No. 583,246, referred to above. In both, the several components and elements of the chair are independently adjustable by power means from an upright sitting position to a generally horizontal or recumbent position. The stresses in the seat and back are equalized at the opposite sides of the various elements and components, and all connections from one side to the other (except for the shaft 16) take place through elements surrounding the common pivot axis of the seat and back. There are no transverse connecting elements in the path of movement of the seat or of the back, for instance, and none at all except the concentric elements 21, 20, and 70. The construction is such that it can readily be taken apart for inspection or servicing, or for replacement of parts.

Limit switch mechanism would probably be employed in conjunction with the several motors, but since such devices are common, and their use in this particular environment is not inventive, it has been deemed unnecessary to illustrate them. Similarly the control buttons for accomplishing movement in one direction or the other of each of the several motors have been omitted for simplicity of illustration, it being understood that they would be located conveniently to the occupant of the chair.

I claim as my invention:

1. In a chair, a seat, a leg rest supported thereon for projection or retraction, and for raising and lowering, relatively to the seat's forward edge, power means mounted on the seat and operatively connected to the leg rest to effect such projection or retraction, regardless of the vertical adjustment thereof, and further power means also mounted on the seat and operatively connected to the leg rest to effect such raising or lowering of the leg rest in substantially any projected position.

2. In a chair, including a seat, a leg rest, means guiding said leg rest for projection forwardly from the seat's forward edge, and for retraction rearwardly, means upon the seat mounting said leg rest for limited tilting about a transverse axis, and means carried by the seat to effect such tilting of the leg rest in substantially any projected position, and also to effect such projection and retraction of the leg rest in substantially any position within its tilting range.

3. In a chair, including a sea, a leg rest, means guiding said leg rest for projection forwardly from the seat's forward edge, and for retraction rearwardly, means upon the seat mounting said leg rest for limited tilting about a transverse axis, means carried by the seat to effect such tilting of the leg rest in substantially any projected position, and also to effect such projection and retraction of the leg rest in substantially any position within its tilting range, and means carried by the seat, and positioned for operative engagement by the leg rest to tilt the leg rest, during its final retractive movement, into a neutral position, for proper registry with the seat's front edge.

4. In a chair, a seat, a leg rest supported thereon for projection or retraction, and for raising and lowering, relatively to the seat's forward edge, means operatively connected to the leg rest to effect such projection or retraction, regardless of the vertical adjustment thereof, means operatively connected to the leg rest to effect such raising or lowering of the leg rest in substantially any projected position, and means to restore the leg rest, upon final retraction, from any vertically adjusted position to its normal position along the seat's front edge.

5. In a chair, a seat, a leg rest supported upon the seat, and in its full retracted position lying along the seat's forward edge, means carried by the seat to project and retract the leg rest relative to the seat, and means carried by the seat to raise and lower the leg rest relative to the seat, in substantially all projected positions of the leg rest.

6. In a chair, a seat, a leg rest, arms, upon the outer end of which said leg rest is pivotally mounted, guided upon the seat for projection and retraction of the leg rest relative to the forward edge of the seat, power means so to move said arms, the leg rest being so disposed and weighted, relative to the arms, its pivot thereon, and the seat, that by engagement with the seat in its movement into its final retracted position it will rotate about its pivotal mounting upon the arms, to lie finally flat against the forward edge of the seat.

7. In a chair, a seat, arms guided thereupon for projection and retraction relative to the seat's forward edge, a leg rest pivotally mounted upon the forward ends of said arms, means also supporting said arms for tilting relative to the seat, to raise or lower the leg rest while it is in any projected position, power means to effect such projection and retraction, and such raising or lowering, of the leg rest, and means positioned for guiding engagement by the arms to alter the vertical and the pivotal positions of the leg rest, as it contacts the seat in its final movement towards retracted position, to such extent, if any, as may be necessary to dispose the leg rest, in such latter position, flat along and at the same level as the forward edge of the seat, regardless of its previous raised or lowered position.

8. In a chair, a seat, a leg rest, pivotally supported arms supporting the leg rest, means on the seat guiding the pivot support of said arms for movement lengthwise of the seat, to project or retract the leg rest relative to the seat's forward edge, power means to effect such projection or retraction, means on the seat engageable with said arms, in any projected position, to tilt them about their pivot support, to raise or lower the leg rest relative to the seat, and power means on the seat to effect such raising or lowering.

9. In a chair, a seat, a leg rest, a jack screw extending lengthwise of the seat, a nut threaded thereon, leg-rest-supporting arms, pivot means supporting said arms between their ends upon the nut, said arms being arranged to support the leg rest by their forward ends, for projection and retraction of the leg rest by movement of the nut along the screw, and for raising and lowering thereof by tilting of the arms about said pivot means upon the nut, an actuating arm swingably supported upon the seat, and engageable with the rear end of a leg-rest-supporting arm, to effect movement of the latter about its pivot, and power means to rotate said screw and to swing said actuating arm.

10. In a chair, a seat, a leg rest, a jack screw extending lengthwise of the seat, and nut threaded thereon, leg-rest-supporting arms, pivot means tiltably supporting said arms between their ends upon the nut, said arms supporting the leg rest by their forward ends, for projection and retraction of the leg rest by movement of the nut along the screw, and for raising and lowering of the same by tilting of the arms about said pivot means upon the nut, an actuating arm swingably supported upon the seat, and engageable with the rear end of a leg-rest-supporting arm, to effect movement of the latter about its pivot, power means to rotate said screw and to swing said actuating arm, and a fixed cam on the seat aligned with the rear end of said actuating arm, for engagement by the leg-rest-supporting arm during final retractive movement, to dispose the leg rest always at a given level, when retracted, relative to the front edge of the seat.

11. In a chair, a frame, a seat mounted thereon for tilting about a pivot axis adjacent the seat's rear edge, a back likewise mounted upon the frame for tilting about the same axis, power means for so tilting each of the back and seat, including concentric tubular shafts disposed in such axis, a leg rest mounted upon the seat for adjustment relative thereto, and power means upon the seat, including a tubular shaft concen-

tric with said first-mentioned tubular shafts, for effecting such adjustment of the leg rest.

12. In combination with a chair component, a rest element, a guide extending lengthwise of the chair component, a pivot member disposed along a transverse axis, and guided by said guide, arm means tiltably supported from said pivot member, and supporting the rest element upon its outer end, for movement between a retracted position wherein it is adjacent the chair component, and a projected position, and means to swing said arm means about said pivot member's axis, in any projected position of the rest element.

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