July 11, 1950 F. J. LUKETA 2,514,655

RECLINING CHAIR

Filed Feb. 12, 1946 4 Sheets-Sheet 1

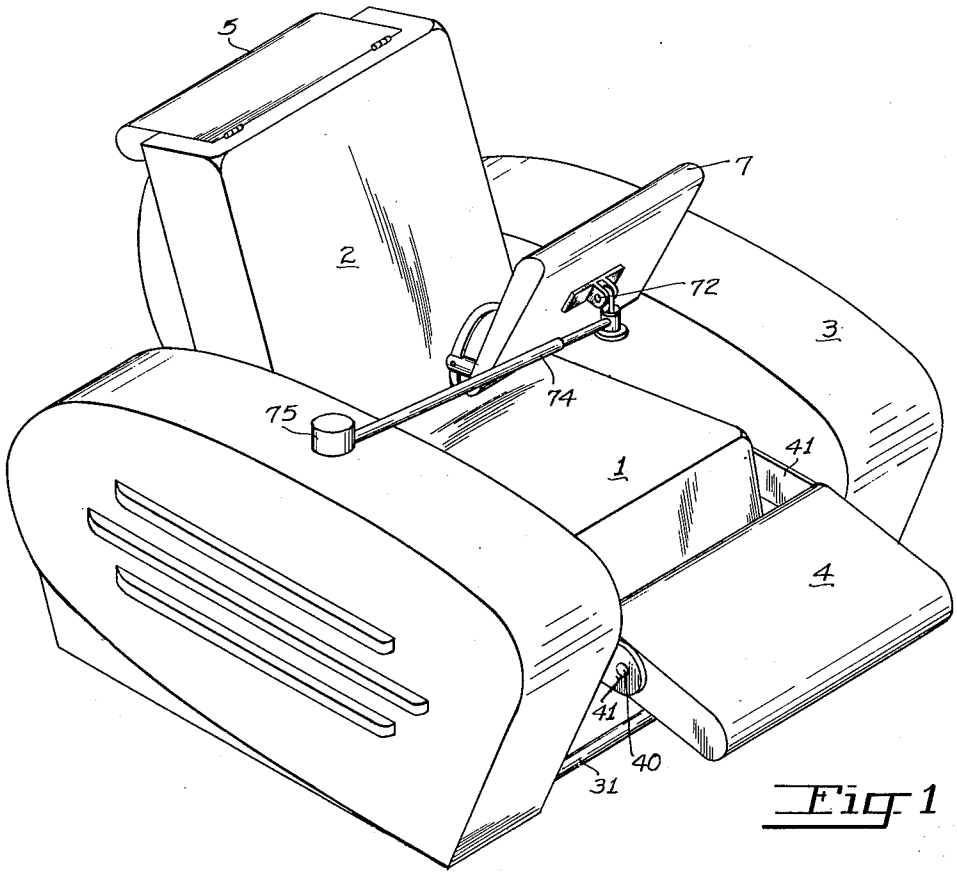


Fig. 1

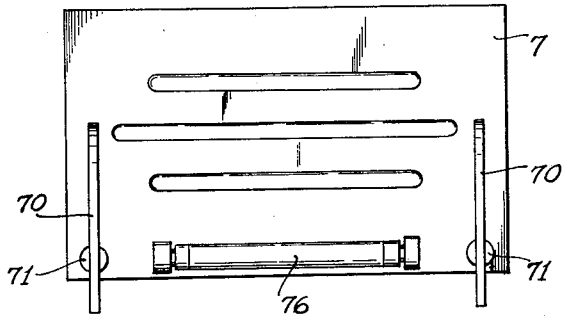
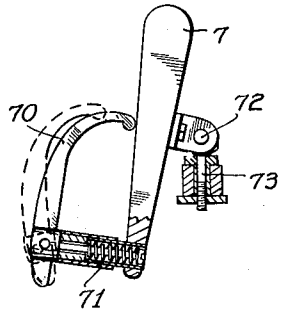


Fig. 7

Fig. 8



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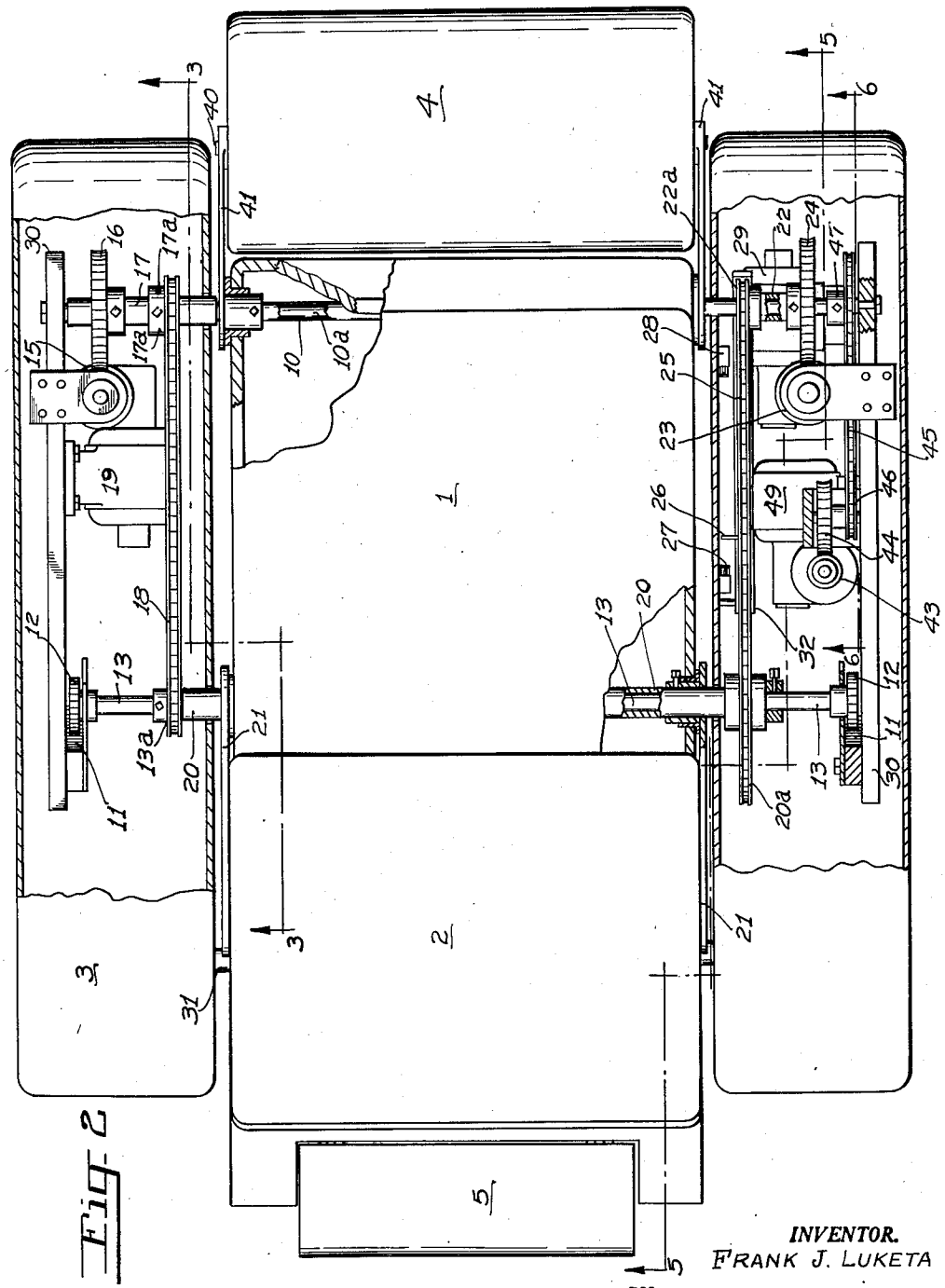

Fig. 2

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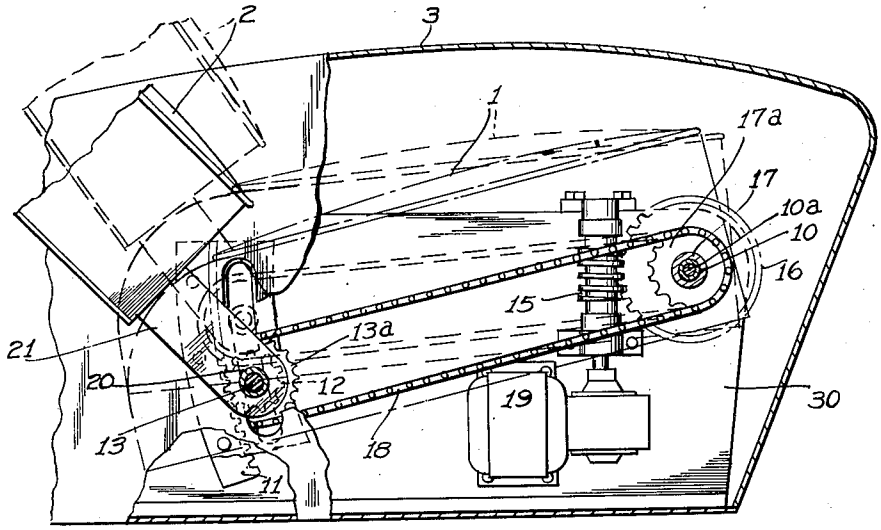

Fig. 3

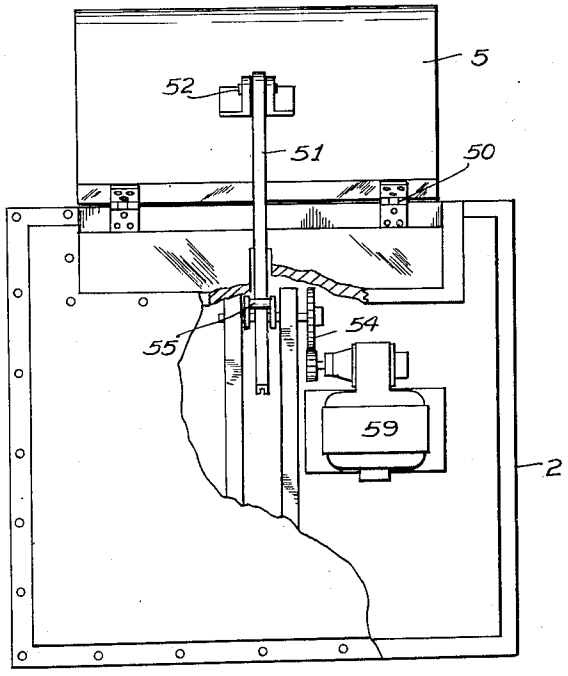

Fig. 4

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Fig. 6

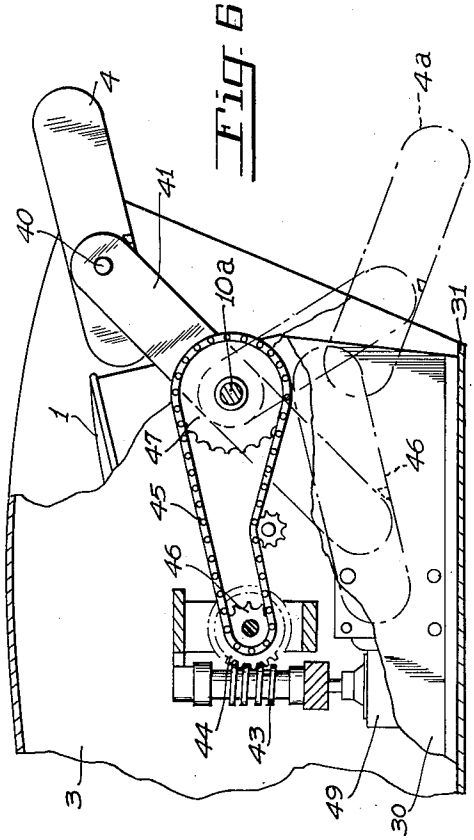

Fig. 5

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2,514,655

RECLINING CHAIR

Frank J. Luketa, Seattle, Wash.

Application February 12, 1946, Serial No. 647,153

8 Claims. (Cl. 155—105)

1

The present invention concerns a chair in which a seat and a back, and preferably also a leg rest, are each independently tiltably mounted for adjustment at will by power means, with respect to each other and to the supporting floor-supported frame. A head rest is preferably also mounted upon and adjustable relative to the back.

The chair of the present invention is similar to the chair disclosed and claimed in my copending application Serial No. 583,246, filed March 17, 1945, now abandoned, and in other copending applications disclosing varying constructional forms. Primarily the present invention differs from the forms of these several applications in that, herein, the seat is supported for tilting about an axis adjacent the seat's forward edge, and the back is supported upon the seat for tilting about an axis adjacent the seat's rear edge.

One of the objects of the present invention is to provide transmission mechanism of simple, rugged, reliable nature, for tilting the back and seat, each with respect to its immediate support, and each independently of or conjointly with the other, from power means mounted upon the frame, notwithstanding that the back is tiltably mounted upon the tiltable seat. More particularly, it is an object to connect the power means, so mounted, with the back through a rotative element mounted coaxially of the axis about which the seat tilts, and, further, to effect the connection in such a way that the tilting force is applied substantially equally at both sides of the back.

It is another object of the present invention to effect tilting of the seat by tilting means applied directly between the rear edge of the seat and the frame, for best mechanical advantage, yet connected to the power means upon the frame by way of the axis about which the seat tilts, at the seat's forward edge.

Another object is to mount the leg rest, in a chair wherein the seat and back are operatively arranged as described above, also for tilting about the axis about which the seat tilts, for movement between a retracted and projected positions, and to effect such movement by power means mounted upon the frame.

Thus, cumulatively, it is an object to connect power means upon the frame with each of tilting means for the seat, back, and leg rest, by way of a rotative element mounted coaxially of that axis about which the seat tilts.

Various other objects will appear more clearly, or in greater detail, as this specification progresses.

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The present invention comprises those parts and combinations, and the relationship of various elements to one another, such as is defined in the claims.

The drawings illustrate the invention in a representative form, although it will be clear that the drawings are illustrative, and are not intended to be complete as to details.

Figure 1 is an isometric view of the chair as a whole.

Figure 2 is a general plan view, the component parts being shown in reclining adjustment, and with various parts broken away for better illustration of otherwise hidden parts.

Figure 3 is a section generally along the line 3—3 of Figure 2, showing the seat-tilting means.

Figure 4 is a broken-away rear elevation of the back, illustrating the head-rest tilting mechanism.

Figure 5 is a section along the line 5—5 of Figure 2, primarily illustrating the back-tilting means, and secondarily the head rest tilting mechanism.

Figure 6 is a detail section along the line 6—6 of Figure 2, illustrating the leg rest adjusting means.

Figure 7 is a front elevation, and

Figure 8 a broken-away side elevation, of the reading stand which is incorporated in this chair.

The principal components of the chair are the seat 1, the back 2, the frame which includes primarily the arms 3, the leg rest 4, and the head rest 5. The chair, as illustrated, incorporates also a reading stand 7. The particular construction and shape of each such component is largely immaterial, and is only conventionally represented in the drawings. The general mounting of each element has already been described, and will be later described in detail.

The floor-supported frame is made up, for example, of two panels 30 upstanding from a base 31, whereby the panels 30 are located and supported upright within the removable casings which define the side arms 3.

A hollow cross shaft 10 is disposed adjacent the forward edge of the seat, being removably supported by a cross rod 10a passing through it and extending between the opposite frame panels 30. This shaft 10 defines the axis about which the seat tilts, but of itself is not the means whereby the seat is tilted. The seat-tilting means engages the rear edge of the seat, in order to secure the best mechanical advantage; preferably the seat's rear edge is lifted equally at its opposite sides, so that it does not sag at one corner,

The reversible motor 19 mounted upon a frame panel 30 provides power for tilting the seat 1. An arcuate rack 11, centered on the axis at 10 about which the seat tilts, with which meshes a rack pinion 12 fixed upon a cross shaft 13 journaled in the seat adjacent its rear edge, constitutes the final link in the power transmission whereby to tilt the seat. The pinion 12 and rack 11 are duplicated at the opposite sides of the seat, to prevent sagging or undue stress. Intermediate the shaft 13 on the seat and the motor 19 on the frame are suitable drive means, such as the worm pinion 15 driving the worm gear 16 upon the sleeve 17, which sleeve is journaled upon and hence coaxial with the shaft 10; a gear 17*a* is fixed upon the sleeve 17, and a chain 18 connects the gear 17*a* and a gear 13*a* fast upon the shaft 13. Rotating the motor 19 in one direction or the other rotates the coaxial sleeve 17 by an irreversible connection 15, 16, and hence rolls the rack pinions 12 up or down their arcuate racks 11, raising or lowering the rear edge of the seat, and tilting the seat about the shaft 10 which supports its forward edge.

The back 2 is carried upon arms 21 at each side which are secured to the tubular or sleeve shaft 20 journaled upon the cross shaft 13. Thus the back rises and falls with the tilting of the seat 1, and furthermore tilts about an axis adjacent the rear edge of the seat. This is accomplished by a motor 29 mounted upon a frame panel 30, by way of a sleeve 22 journaled upon and hence coaxial with the shaft 10 which is the support about which the seat tilts.

In the form herein shown, the reversible motor 29 drives a worm pinion 23, in mesh with a worm gear 24 which is fast upon the sleeve 22. Such a drive is irreversible. A sprocket gear 22*a* is also fast upon the sleeve 22, and a sprocket chain 25 passes about the gear 22*a* and a sprocket quadrant 20*a* fixed upon the sleeve 20. One end of the chain 25 is secured to the quadrant 20*a*; after wrapping about the gear 22*a* its other end is guided in a fixed guide 32, and carries a finger 26 engageable alternatively with limit switches 27 and 28 in the circuit controlling the back-tilting motor 29. Some such provision is necessary because the tilting of the back relative to the horizintal is not absolute, but is partially determined by the tilting of the seat, and varies as the seat tilts.

By choice of the direction of drive of the motor 29 the chain 25, or similar tension member, is pulled in or let out, thus raising or lowering the back about the axis about which the latter tilts, as defined by the shaft 13. The arms 21 being joined by the sleeve 20, the tilting forces are equalized as between opposite sides, and the back will not sag. The drive includes the irreversible worm drive at 23, 24, and the transmission includes the sleeve 22 which is coaxial with the tilting axis of the seat, whereby from a fixedly mounted motor 29 to tilt the back, which in turn is carried by the tiltable seat.

The leg rest 4 is mounted tiltably (at 40) upon supporting arms 41 which are fixed upon the shaft 10, to tilt and thus to move the leg rest from or to a projected position such as the full-line position of Figure 6 through the intermediate dot-dash line position 4*a* to or from a retracted position 46 beneath the forward edge of the seat and close to the floor. A reversible motor 49 affords the power for so doing, acting through an endless chain 45 connecting sprocket gear 46, fast to the worm gear 44, and sprocket gear 47, fast to the shaft 10.

The leg-rest power transmission incorporates, like the others, an irreversible drive at 43, 44, and a rotative element 47—actually, also, the shaft 10 itself—which is coaxial with the axis about which the seat tilts. By such means a motor mounted fixedly upon the frame may operate a tiltably mounted leg rest through a rotative element coaxial with the seat's axis about which the seat tilts.

The head rest 5 is hinged at 50 to the upper edge of the back, and is tiltable relative to the back by means of a reversible motor 59 mounted upon the back. A rack bar 51, pivotally connected at 52 to the head rest, is thrust outwardly or drawn inwardly, by a meshed rack pinion 53, driven from the motor 59 by suitable gearing 54. It is not so necessary here that the drive be irreversible, but normally it would be substantially irreversible. A guide 55 retains the pinion 53 in mesh with the rack 51, and guides the latter in its lengthwise movement.

The controls for the several motors 19, 29, 49, and 59 are not shown, but would be located conveniently to the occupant of the chair, in whatever position it might be adjusted. Each component is adjustable, in either sense, regardless of the adjusted position of any other component. In particular it should be noted that the leg rest can be adjusted without regard to the adjusted position of the seat, for the reason that the seat's front edge does not change its level, and the leg rest can always swing under, or outwardly of, the seat. Limit switches and the like, in addition to those described, would normally be employed, but are not shown since they are conventional and add nothing to the understanding of the invention.

To complete the chair, a reading stand 7 would normally be provided. This is mounted for substantially universal adjustment relative to the chair, so that it may always be positioned comfortably relative to the chair's occupant, whatever the adjusted position of the chair's component parts. It also has means to secure reading material, so that it will not fall from the stand as the latter is adjusted.

The stand's table 7 has fingers 70, spring-urged towards the table at 71, to secure reading matter. It is pivoted to tilt about a horizontal axis at 72, and about an upright axis at 73. It may be slid transversely by the telescoping arm 74, and may be swung aside by the rotative support upon an arm 3, at 75. A lamp 76 illuminates the reading matter so held, and is shaded from the reader's eyes.

I claim as my invention:

1. A chair comprising a floor-supported frame, a seat mounted thereon for tilting about an axis adjacent the seat's forward edge, a back mounted upon the seat for tilting about an axis adjacent the seat's rear edge, power means carried by the frame, seat-elevating means, including a rotatable member carried by the seat engageable between the frame and the seat's rear edge, transmission means operatively connecting said power means and said rotatable member of said seat-elevating means, through the axis about which the seat tilts, and means on the frame operatively connected to tilt the back, independently of tilting of the seat.

2. A chair comprising a floor-supported frame, a seat mounted thereon for tilting about an axis adjacent the seat's forward edge, a back mounted

upon the seat for tilting about an axis adjacent the seat's rear edge, power means carried by the frame, and power transmission means, including an element mounted coaxially of the axis about which the seat tilts, operatively connecting said power means and said back, for tilting the latter in any adjusted position of the seat.

3. A chair comprising a floor-supported frame, a seat mounted thereon for tilting about an axis adjacent the seat's forward edge, a back mounted upon the seat for tilting about an axis adjacent the seat's rear edge, power means carried by the frame, transmission means, including an element coaxial with the axis about which the seat tilts, operatively connecting the power means and the back, for tilting the latter in any adjusted position of the seat, and power means on the frame operatively connected to tilt the seat, and arranged for energization substantially independently of the power means for tilting the back.

4. A chair comprising a floor-supported frame, a seat mounted thereon for tilting about an axis adjacent the seat's forward edge, a back mounted upon the seat for tilting about an axis adjacent the seat's rear edge, a first power means carried by the frame, transmission means, including an element coaxial with the axis about which the seat tilts, operatively connecting the power means and the back, for tilting the latter in any adjusted position of the seat, a second power means on the frame arranged for energization independently of the back-tilting power means, and transmission means, including an element mounted coaxially of the axis about which the seat tilts, operatively connecting said second power means and the seat for tilting the latter.

5. A chair comprising a floor-supported frame, a seat mounted thereon for tilting about an axis adjacent its forward edge, a back mounted upon the seat for tilting about a transverse axis adadjacent the seat's rear edge, an arcuate rack mounted upon the frame, coaxially of the axis about which the seat tilts, and disposed adjacent the seat's rear edge, a rack gear journaled upon the seat, and meshed with said arcuate rack, power means upon the frame, transmission means interconnecting the power means and said gear, including an element mounted coaxially of the seat's tilting axis, for tilting said seat at will, and further transmission mechanism connecting power means on the frame with the back, including an element coaxial with the axis about which the seat tilts, but tiltable independently of energization of the seat tilting means.

6. A chair comprising a floor-supported frame, a seat mounted thereon for tilting about an axis adjacent its forward edge, an arcuate rack, coaxial with the axis about which the seat tilts, mounted upon the frame at each side of the seat's rear edge, a transverse shaft journaled in the rear edge of the seat, a back mounted coaxially of but independently of said shaft, a pair of rack gears upon said shaft, meshing with the respective racks, power means upon the frame, transmission means interconnecting said power means and said shaft, at one side of the seat, said transmission means including an element mounted coaxially of the axis about which the seat tilts, and further transmission mechanism connecting power means on the seat with said back to tilt the latter, including a quadrant fast to the back and coaxially mounted, a rotative winding element coaxial with but independent of the seat, and a tension member interconnecting said quadrant and said winding element.

7. A chair comprising a floor-supported frame, a seat supported thereon for tilting about an axis adjacent the seat's forward edge, a back mounted upon the seat for tilting, relative to the seat, about an axis adjacent the seat's rear axis, a quadrant fixed with relation to the back, a tension element secured to and extending about said quadrant, a rotative element mounted coaxially of the axis about which the seat tilts, about which rotative element said tension element is wound, and power means carried by the frame and operatively connected to said rotative element, to wind in or out the tension element, and thus to tilt the back at will.

8. A chair comprising a floor-supported frame, a seat supported thereon for tilting about an axis adjacent the seat's forward edge, an arcuate rack, coaxial with the axis about which the seat tilts, mounted upon the frame adjacent the seat's rear edge, a transverse shaft journaled in the rear edge of the seat, a sleeve journaled upon said shaft, a rack gear fixed upon said shaft and meshing with said rack, a quadrant fixed upon said sleeve, a back also fixed upon said sleeve, a tension element fixed to and extending about said quadrant, a first rotative element mounted coaxially of the axis about which the seat tilts, about which first rotative element said tension element is wound, a second rotative element mounted coaxially of the axis about which the seat tilts, and operatively connected to said shaft, and power means mounted upon said frame, operatively connected to the respective rotative elements, for selective tilting of the seat or the back.

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