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2,668,581

LOUNGE CHAIR

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4 Sheets-Sheet 1

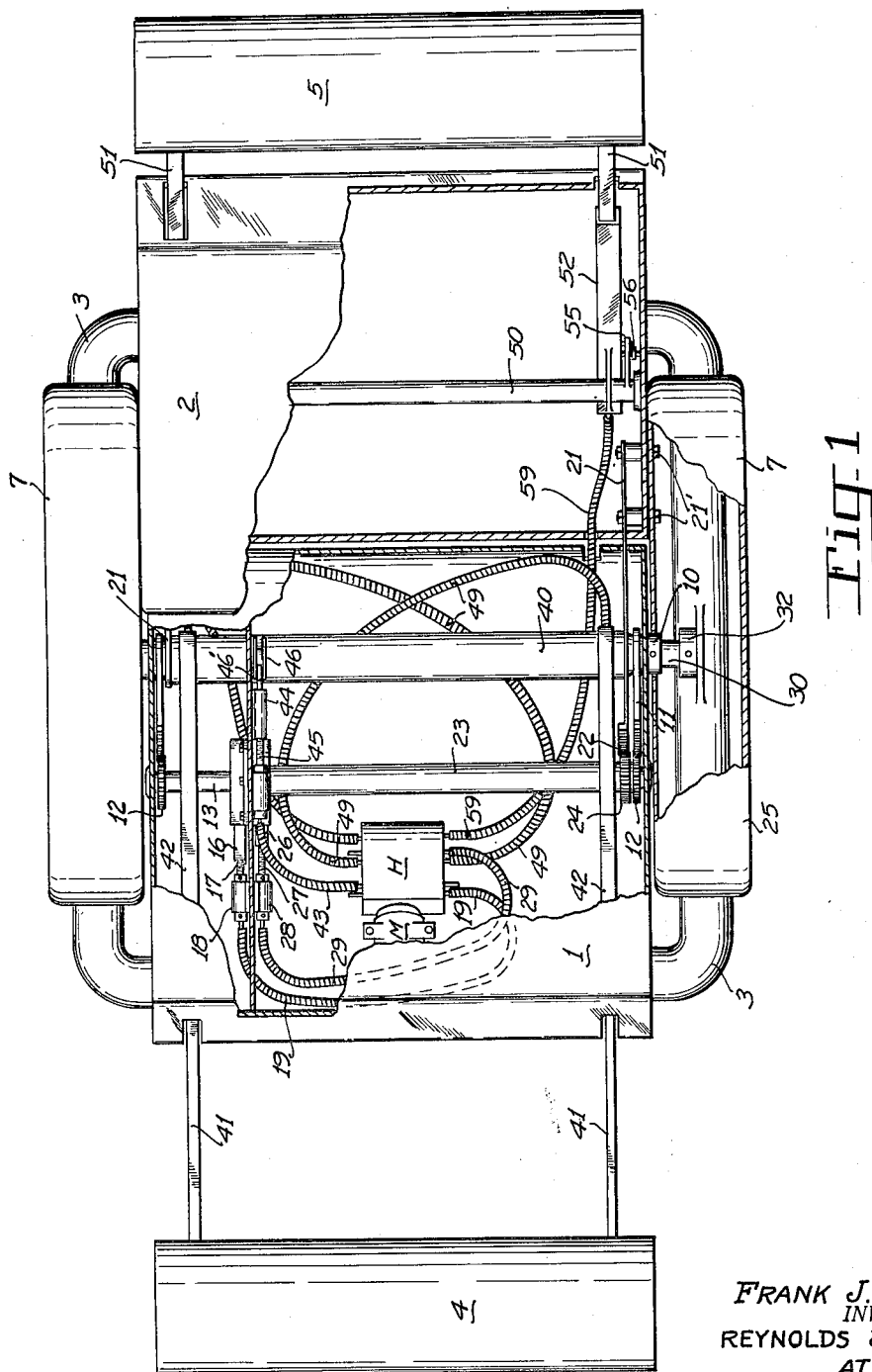


Fig. 1

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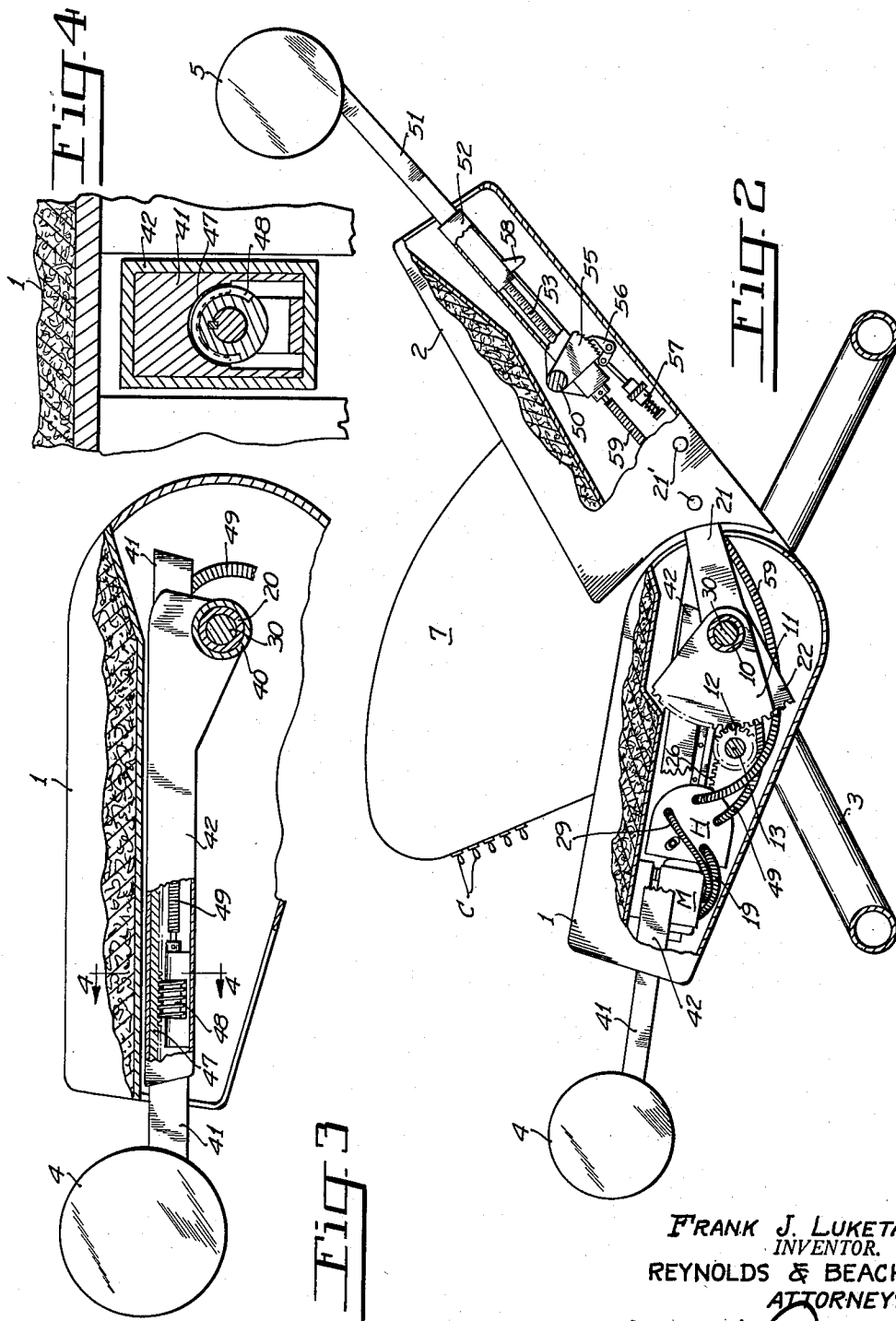
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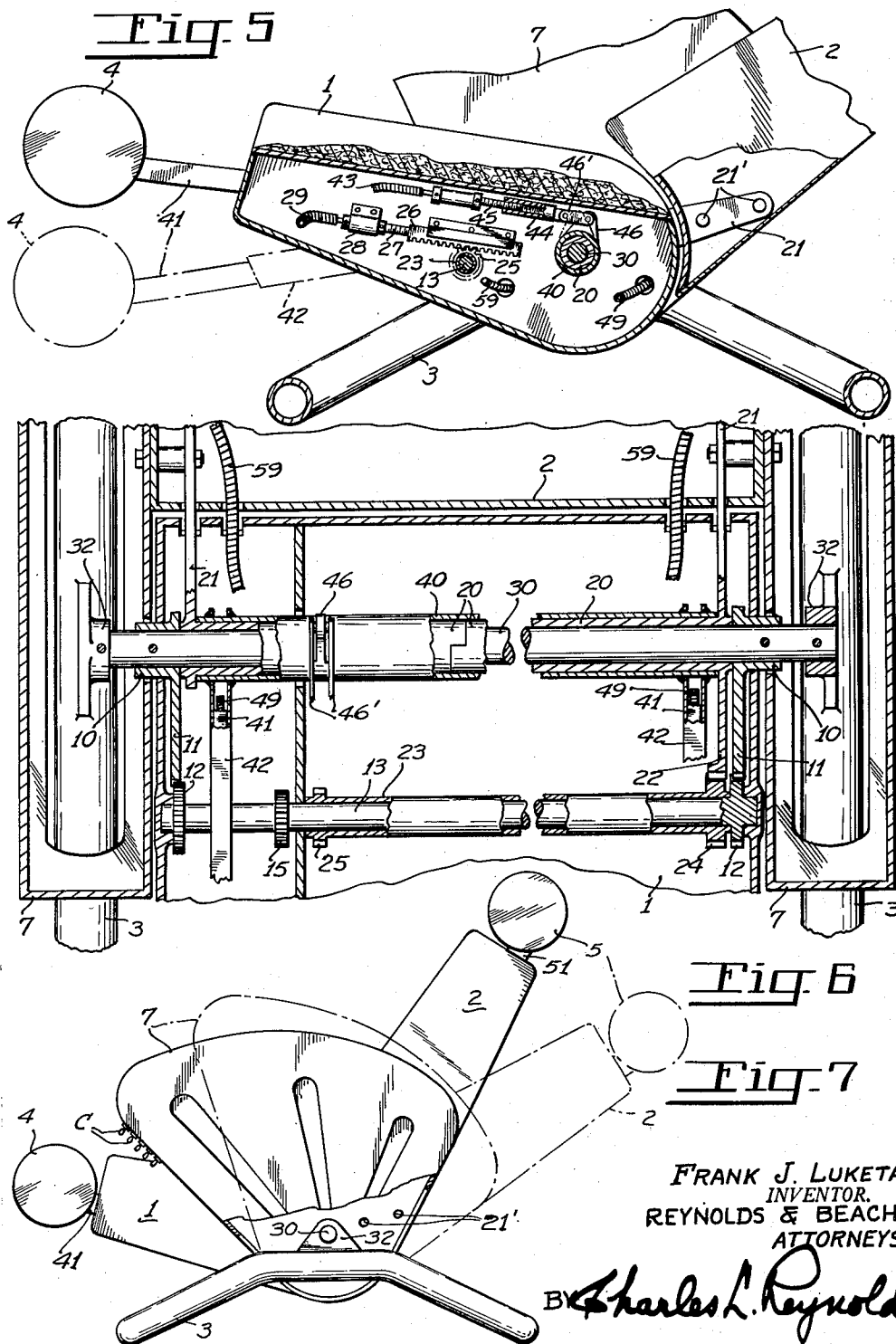
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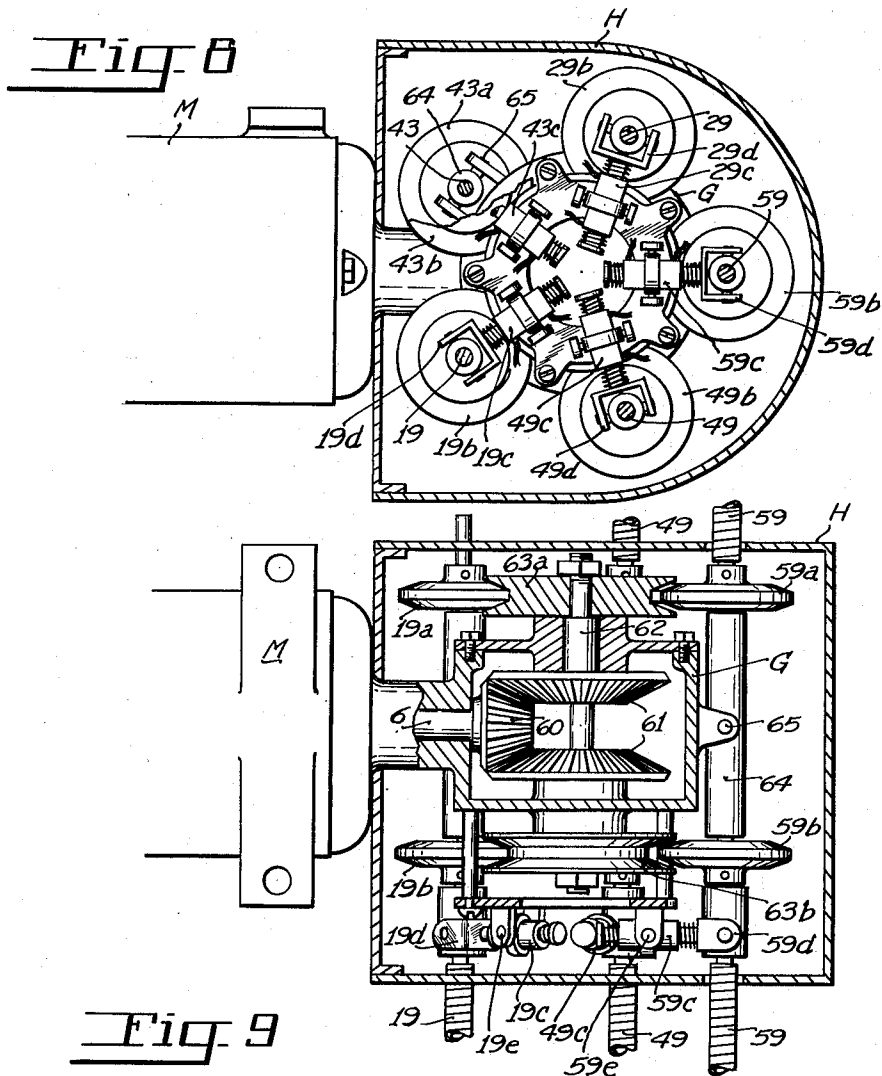
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UNITED STATES PATENT OFFICE

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LOUNGE CHAIR

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Application June 11, 1949, Serial No. 98,511

7 Claims. (Cl. 155-105)

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This application, like various other copending applications, concerns a chair wherein a seat and a back, each of which constitutes a main body-supporting member, is tiltable about a common axis, located near the rear edge of the seat, with respect to a fixed floor-engaging support. The tilting is accomplished by motor means which will tilt either the seat or the back independently about their common pivot axis. Additionally, and still in common with many of the other cases of the series, this invention involves a head rest and a leg rest, each of which constitutes an auxiliary body-supporting member, and each of which is projectable and retractable with respect to the swinging edge of the main body-supporting element with which it is most closely associated, by power means, and which, preferably and additionally, is also tiltable with respect to the swinging edge of its main body-supporting element. The leg rest is so tiltable by power means, and the head rest could be, but is not so arranged herein. As to the leg rest, in this chair its tilting axis is the axis which is common to the tiltable seat and back.

Unlike other cases of the series, the present invention involves a single motor means consisting, in the form illustrated, of a single electric motor with multiple power take-offs and transmissions, this motor being mounted on one of the main body supporting members, the seat preferably, and transmitting power under selective controls and through the individual power take-offs and transmissions to the several movable elements, to accomplish their movement. By way of example, the motor carried by the seat will effect the tilting of the seat itself, will effect the tilting of the back, will effect projection and retraction of the leg rest and projection and retraction of the head rest, and will effect raising and lowering of the leg rest. It might effect, but is not arranged in the disclosure to effect, tilting of the head rest, and in the present disclosure tilting of the head rest is manually accomplished.

Such location and arrangement of the motor, and the necessity of controlling the same from a remote point for accomplishment of the particular movement or movements desired, as also the necessity of transmitting power reliably from the single motor to the various movable elements, some closely adjacent and others remotely located, often past or through independently pivotable or otherwise movable intermediate elements, with no conspicuous evidence of such transmission means, and with no loss of compactness, comfort, convenience, or serviceability, introduces

many involved problems of coordination, and the solution of such problems and the production of a unitary, coordinated design having the multiple capabilities indicated, is the primary object of this invention.

One of the objects of the present invention is to provide such a chair having the several capabilities of adjustment already indicated, wherein the several adjustments may be independently (but not necessarily sequentially) accomplished, usually in either sense, as projection and retraction, from a single electric motor, so that all the motor mechanism may be concentrated in one location and the power can be transmitted by simple means to the various independently movable members of the chair.

It is a further object to provide a chair which by reason of the mounting of the motor in the manner already indicated, can be made of lighter, less bulky construction than chairs of the same general type heretofore devised by me, particularly with respect to the floor engaging frame or support, and the over-all cost can be lessened.

With respect to the motor and power take-off mechanism, it is an object to provide a compact, light, and comparatively simple arrangement, capable of incorporation in such a chair, without unduly interfering with its function as such, nor with its comfort, which is capable of control, usually in opposite senses, by control devices such as electric switches remotely located on the chair.

With such objects in mind, and others as will appear hereinafter, my invention comprises the novel chair, and the novel combination and arrangement of the several parts thereof, as shown in the accompanying drawings, described in this specification, and as will be more particularly defined by the claims which terminate the same.

In the accompanying drawings the invention is shown embodied in a typical and presently preferred form, and it will be understood that various changes may be made in the form, character, and arrangement of the several parts within the scope of the claims.

Figure 1 is a general plan view of the chair, with the seat and back both in more or less horizontal or reclining position, and with the head rest and leg rest extended, the view showing various parts broken away to illustrate the interior construction and arrangement.

Figure 2 is in general a side elevation of the chair, with parts in much the same position as shown in Figure 1, parts in this view being also broken away to show the interior construction and arrangement.

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Figure 3 is a view similar to Figure 2, but limited to the seat and leg rest, with particular emphasis on the showing of the leg rest projecting and retracting mechanism.

Figure 4 is an enlarged detail sectional view, taken substantially on the line 4—4 of Figure 3.

Figure 5 is a view similar to Figure 2, broken back, however, to illustrate the leg rest tilting and the back tilting mechanisms.

Figure 6 is an enlarged part-sectional view in plan, showing parts in the vicinity of the common pivot axis of the seat, back and leg rest.

Figure 7 is a side elevation, partly broken away, of the chair as a whole, with particular emphasis on the supporting frame and the side arms, and their juncture with the back.

Figure 8 is a side elevation, and Figure 9 is in general an axial or plan section, of the power and power transmission mechanism.

The seat 1 and back 2 are each pivotally mounted for tilting about a common axis, defined by the transverse elevated pivot rod 30, which is in effect a part of the floor-engaging frame 3. This may be accomplished by pivotally mounting the frame of the seat 1 directly upon the pivot rod 30, or through the intermediary of a boss 10, which is part of a quadrant 11 that is keyed immovably to the shaft near the opposite sides of the frame, (see Figure 6), and by supporting the back directly upon arms 21, which project radially at each end of a tubular shaft 20 oscillatably mounted upon the fixed pivot rod 30. The pivot rod 30 is fixedly supported at 32 in each side of the floor engaging frame 3. The tubular shaft 20 is formed in two parts rotatively interconnected but capable of being pulled apart endwise for convenience of assembly and disassembly; see Figure 6.

To complete the description of the mechanism in the vicinity of the pivot rod 30, it will be noted that a second tubular element 40 surrounds the oscillatable tubular shaft 20, and this element 40, in a manner which will be explained shortly, is caused to oscillate in order to accomplish elevation and depression or tilting of the leg rest 4.

Likewise, in the vicinity of, but offset from, the axis of the pivot rod 30 is a jack shaft 13, journaled in the frame of the seat, and carrying pinions 12 which mesh with the fixed quadrants 11, and a tubular jack shaft 23 surrounds and is rotatable about the jack shaft 13, this jack shaft 23 carrying a pinion 24 which meshes with a quadrant 22 which is rigid with the back supporting arms 21, and with the tubular shaft 20. It is clear that rotation of the jack shaft 13 will cause the gear 12 to ride upwardly or downwardly about the axis of the fixed quadrant 11, thereby to raise or lower the forward edge of the seat wherein the jack shaft 13 is journaled. In like manner, rotation of the tubular jack shaft 23 will effect tilting of the quadrant 22 and arms 21, hence of the back 2 relative to the seat. The pinions 12 and the fixed quadrants 11 are duplicated at opposite sides, so that the seat will not sag at one side, but the back-tilting mechanism is not thus duplicated, the pinion 24 and quadrant 22 being provided at one side only, but the connection across is by means of the rigid tubular shaft 20, which joins both back-tilting arms 21 into a rigid whole.

The single electric motor M is mounted upon one of the main body-supporting members; in the form illustrated it is carried within the seat 1. It is provided with a plurality of power take-

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offs, individually controllable, yet capable of being energized coincidentally with energization of other such power take-offs. All are shown herein within the housing H. The details of this multiple power take-off are shown in Figures 8 and 9, but without going into the details of such mechanism at this point, it may be noted that a plurality of flexible shafts extend from the power take-off within the housing H to individual driven mechanisms having to do with the individual adjustments of the various parts of the chair.

For the purpose of tilting the back, a flexible shaft 29 extends from the appropriate power take-off, is journaled at 23 in the frame of the seat, and rotates a screw 27 in one sense or the other in the direction of its length. By so doing, a rack 26, wherein an end of screw 27 is threaded, and which is guided in the frame of the seat 1, and meshes with a rack pinion 25 upon the tubular jack shaft 23, effects rotation of the latter; this, through the pinion 24 meshing with the quadrant 22, effects oscillation of the tubular main shaft 20, and of the back about the axis of the pivot rod 30. In similar fashion a flexible shaft 19 rotates a screw 17 fixedly journaled at 18 in the frame of the seat 1, and threaded within a nut carried by rack 16, thereby shifting lengthwise the rack 16 which meshes with a rack pinion 15, carried by the jack shaft 13. In turn this effects rotation of the pinion 12, causing it to move upwardly or downwardly about the fixedly positioned quadrant 11, thus to tilt the seat 1.

The foot rest 4 is carried by arms 41, which in effect are extensible and retractable. These arms 41 to that end are slidably guided, for movement in the direction of their own length, within guides 42, which are fixed to the tubular shaft 40, previously referred to. Extension and retraction of the arms 41 within the tiltable guides 42 is accomplished by means such as the flexible shaft 49, taking off from the appropriate power take-off within the housing H, of which there are two, one for each side of the chair; these flexible shafts (see Figures 3 and 4) terminate in a screw or worm 48, journaled within the guide 42, and meshing with a rack 47 which is formed upon the arms 41.

Tilting of the leg rest and its extensible supports 41, 42 is accomplished by oscillating the tubular shaft 40. A radial arm 46 thereon is rocked one way or the other by a jack screw 45 fixedly journaled in the frame of the seat, and threaded within a nut 44 which is connected to the links 46', that engage the arm 46. The screw 45 is rotated for raising or lowering of the leg rest by the flexible shaft 43, which takes off from its individual power take-off within the housing H.

The head rest 5 is similarly projectable and retractable, and tiltable, although preferably its tilting is effected by hand. It is supported on arms 51 guided within a guide 52, which is pivotally supported at 50, fixedly journaled within the frame of the back 2. Extension and retraction of the supporting arms 51 are accomplished by mechanism similar to that described in conjunction with the leg rest, for instance by a screw 53 journaled within the guide 52 and threaded within the arm 51, the screw being rotated by means of a flexible shaft 59 which takes off from its appropriate power take-off within the housing H.

The rock shaft 50 carries a ratchet quadrant 55, with which is engageable a spring-held

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ratchet dog 56, which in turn is disengageable upon energization of a solenoid 57. A projecting striker 58 carried by the inner end of the sliding arm 51 may engage the dog 56 or elements connected therewith, as the head rest 5 in retraction approaches its innermost position, to disengage the dog 56 automatically and thereby avoid interference of the head rest 5 or its arms 51 with the end of the back 2. The head rest is tilted forwardly or upwardly by hand, and the ratchet means 55, 56 hold it in any such position of adjustment. In all normal operations energization of the solenoid 57 will disengage the dog 56 and permit the head rest 5 to tilt by gravity to its rearmost or lowermost position, but if the occupant fails or forgets so to energize the solenoid no harm results, as the dog 56 is automatically disengaged by the striker 58, as already made clear.

Unlike the majority of the chairs of the co-pending applications in my same series, the side arms 7 are not a part of the floor engaging frame 3, but are secured to the back 2 to tilt with the latter. The connection to this end is shown at 21. By this means the occupant may recline comfortably and continue to rest his forearms upon the side arms 7 of the chair, while the back rises or falls. Control buttons C are positioned upon a side arm for selective control of energization and of the sense of operation of the several power take-offs or flexible shafts, and these, by tilting with the side arm and back, are always within convenient reach of the occupant. As will be understood, the seat, the back, and the side arms are appropriately recessed or slotted for the projection and movement of the back supporting arms 21, of the leg rest supporting arms 41, of the head rest supporting arms 51, and for similar purposes.

To review briefly the operation of the parts so far described, it will be realized that by operation of the correct button or control C the seat may be tilted upwardly or downwardly, by applying power to the flexible shaft 19; the back may be tilted upwardly or downwardly relative to the seat by applying power to the flexible shaft 29. In passing, it may be remarked that whenever the seat 1 is tilted, the back 2 will tilt with it, unless simultaneously the back control is compensatingly energized, but the converse is not true. By applying power to the flexible shaft 49 the leg rest may be projected or retracted, and by applying power to the flexible shaft 43 it may be tilted upwardly or downwardly, that is, it may be raised or lowered. Each such movement is independent of the other, and independent of movement of the seat or back, although they may be simultaneously accomplished. Likewise, by applying power to the flexible shaft 59 the head rest may be projected or retracted, and when so projected it can be tilted forwardly or rearwardly, and automatically in the event of retraction, if it has not previously been depressed, it will be depressed.

The power take-offs and the first part of the power transmission mechanism are shown in Figures 8 and 9, and in these views the flexible shafts or their initial elements are designated by the same numerals as previously used. Each of the drives is shown to be reversible, and therefore the motor shaft 6 terminates in a bevel gear 60, which meshes in common with two oppositely rotative bevel gears 61 on stub shafts 62, to which are secured main friction driving wheels 63a and 63b, one of which corresponds to forward drive

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and the other to reverse drive. These wheels are shown as grooved for engagement therewith of complementally shaped driven wheels mounted upon the several shafts 19, 29, 43, 49, and 59. Each such shaft is journaled in a sleeve 64, pivotally mounted at 65 upon a gear casing G, which is rigid with the motor frame and housing, so that by tilting of the sleeve 64 the driven wheel 59a or 59b, for example, may be selectively engaged with the respective driving wheels 63a or 63b, as the required sense of operation calls for. In this particular case engagement of the driven wheel 59a with driving wheel 63a might extend the head rest 5, and engagement of the driven wheel 59b with driving wheel 63b would then retract the same. Some of the drives are not necessarily double-ended, but all are normally reversible, so that by way of a second example tilting of that sleeve 64 which journals the shaft 19 will engage the driven wheel 19a or 19b with the driving wheel 63a or 63b, respectively, in the one instance to raise the swinging edge of the seat, and in the other instance to lower the seat.

Double acting solenoids are provided for accomplishing this tilting of the journal sleeve 64. Thus, for instance, the solenoid 19c, the armature whereof controls the positioning of the yoke 19d, which solenoid is supported at 19e from a fixed frame element, is normally spring-held in a neutral position wherein neither driven wheel 19a nor 19b is engaged with the corresponding driving wheels, but upon energization of one end of the solenoid 19c, one of the driven wheels referred to is engaged with its driving wheel, and upon energization of the opposite end of the solenoid the other such driven wheel is operatively engaged.

In similar fashion solenoids 43c, 29c, 59c, and 49c control energization of their respective shafts 43, 29, 59, and 49. The energization of these solenoids, it will be understood, is accomplished by manipulation of the correct control button C. Deenergization of the solenoid permits the armature to return automatically to neutral position, wherein neither driven wheel engages a driving wheel.

Clearly, movement of any element of the chair occurs so long as, and no longer than, its particular solenoid is energized by its button at C, and the sense of its movement is governed by the choice at such button of the one end or the other of its solenoid for energization. Given adequate power at the driving wheels 63a and 63b, any combination of movements, or even movement of all such elements, can be accomplished simultaneously.

I claim as my invention:

1. A chair comprising a floor-engaging support including a transverse pivot rod means supporting said pivot rod in a position elevated above the floor, a seat and a back each independently pivotally mounted thereon to tilt about such axis, means reacting between one of the seat or back and said support to tiltably adjust said seat or back, as the case may be, relative to said support, and to retain the same in any such position of adjustment, and means reacting directly between the one so adjustable and the other for tilting adjustment of that other, and its retention in adjusted position.

2. A chair comprising a floor-engaging support including a transverse, elevated pivot rod, a seat and a back each independently tiltably supported upon said rod, a motor carried by the seat, a first jack shaft journaled in the seat, offset from the

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axis of said rod, a tubular second jack shaft rotatably mounted upon said first jack shaft, each of said jack shafts being operatively connected for independent rotation to said motor, a first gear quadrant fixed to said pivot rod, a pinion on the seat meshing therewith and connected for rotation to one of said jack shafts, thereby to tilt the seat, a second gear quadrant fixed to the back, a pinion on the seat meshing therewith and operatively connected for rotation to the other of said jack shafts, thereby to tilt the back, and control means selectively energizable to tilt the back or the seat from said motor.

3. A chair as in claim 2, wherein the operative connection between each jack shaft and the motor comprises a rack guided in the seat, screw means operable from the motor to move said rack in the direction of its length, and a rack pinion upon the jack shaft meshing with said rack and rotatable by the latter's lengthwise movement.

4. A chair comprising a floor-engaging support, a first main body-supporting member pivotally supported from said support for tilting about a transverse horizontal axis located above the floor, a second main body-supporting member likewise pivotally supported from said support coaxially of said first member, means reacting directly from said first member for tilting said second member relative to the first, and for retaining the second in any such tilted position relative to the first, and means reacting from the support for tilting the first member, and the second therewith, relative to the support, and for retaining the first in any such tilted position relative to the support.

5. A chair comprising a floor-engaging support, a first main body-supporting member pivotally supported from said support for tilting about a transverse horizontal axis located above the floor, a second main body-supporting member likewise pivotally supported from said support coaxially of said first member, means reacting directly from said first member for tilting said second member relative to the first, and for retaining the second in any such tilted position relative to the first, and means reacting from the support for tilting the first member, and the second therewith, relative to the support, and for retaining the first in any such tilted posi-

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tion relative to the support, a single power means mounted upon and tiltable with one of said members, reversible transmission means extending thence to the means for tilting the first member, further reversible transmission means extending thence to the means for tilting the second member, and control means to energize at will either of said transmission means, in either sense, or both simultaneously.

6. A chair as in claim 5, characterized in that the power means is mounted upon the first member.

7. A chair comprising a support, a seat, a back; means supporting each of the seat and back from the support for tilting; a head rest, a leg rest, means supporting each thereof for movement relative to the seat and back, respectively; adjusting mechanism reacting between one of the several movable members and the support; further adjusting mechanism reacting between that member and the other such members for adjustment of the latter; a single power source carried by one such member; transmission mechanism extending from said power source to the several adjusting mechanisms; and selective control means operable to energize each transmission mechanism independently of any other thereof, and so to effect adjustment of each movable member relative to the frame, or of all conjointly with that one the adjusting mechanism whereof reacts from the support.

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