Feb. 24, 1953

F. J. LUKETA

LOUNGE CHAIR

2,629,428

Filed July 11, 1949

4 Sheets-Sheet 1

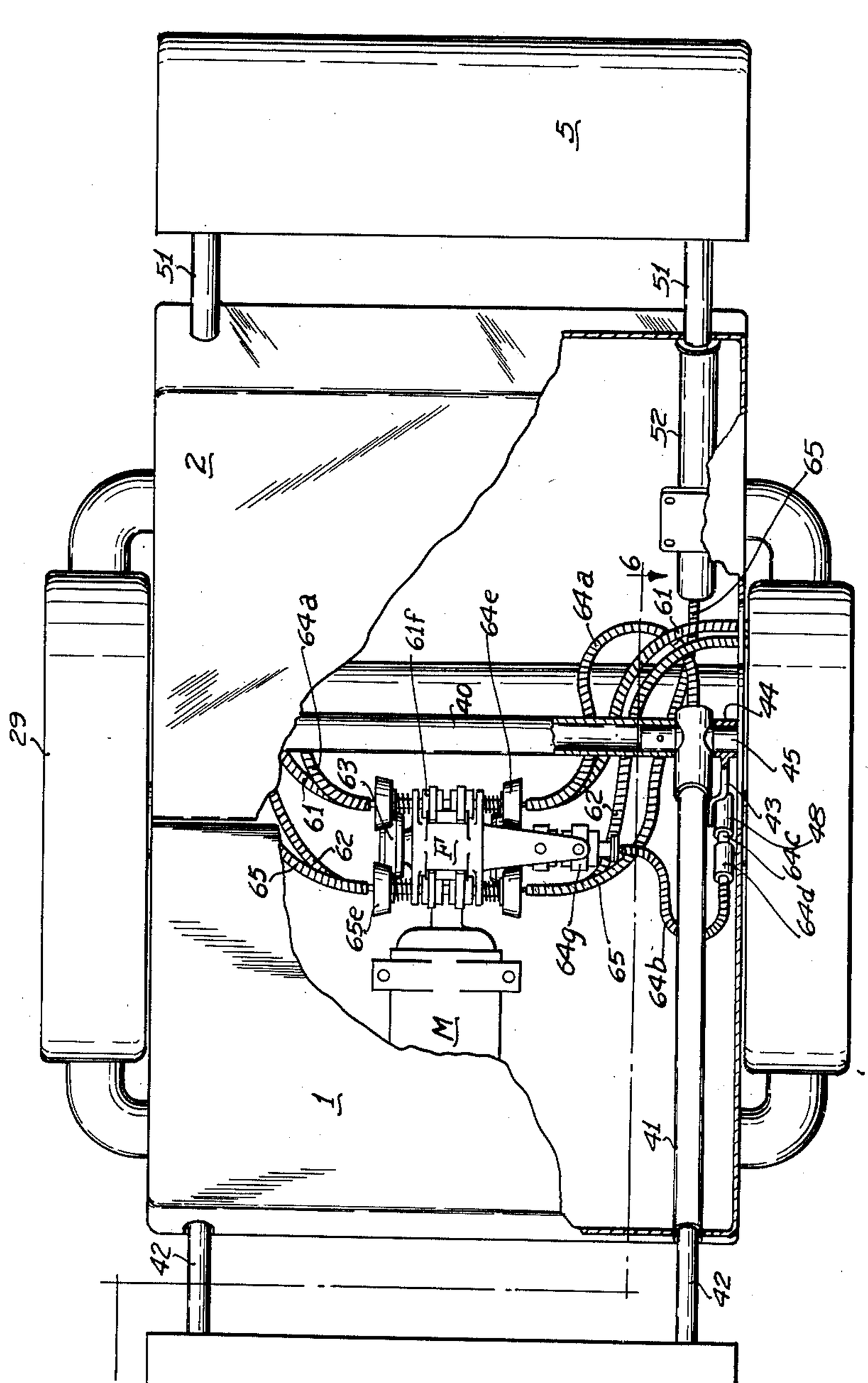

Fig. 1

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Fig 2

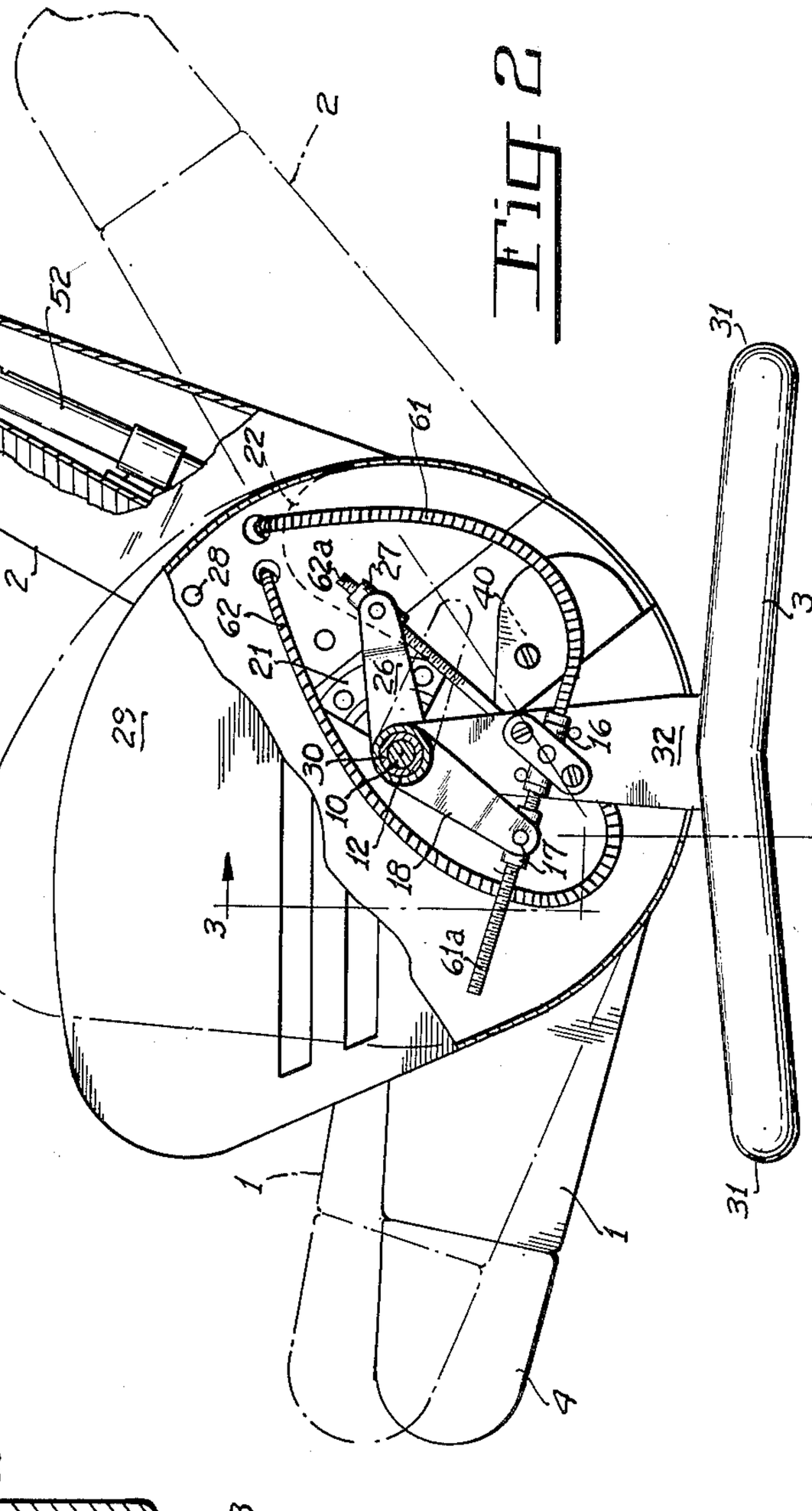

Fig 4

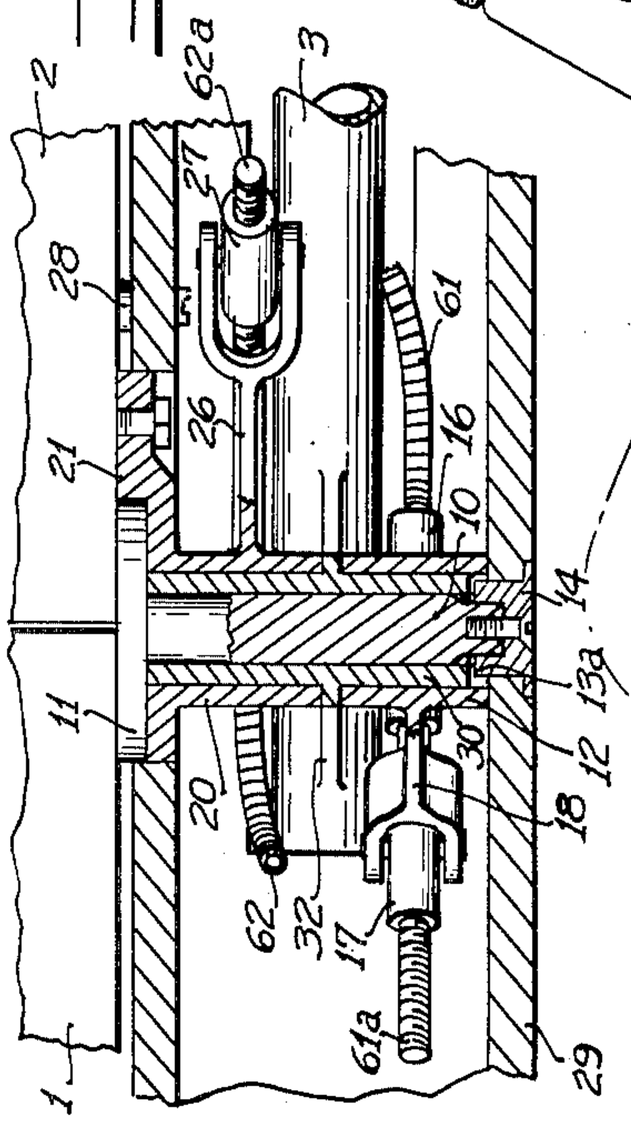

Fig 3

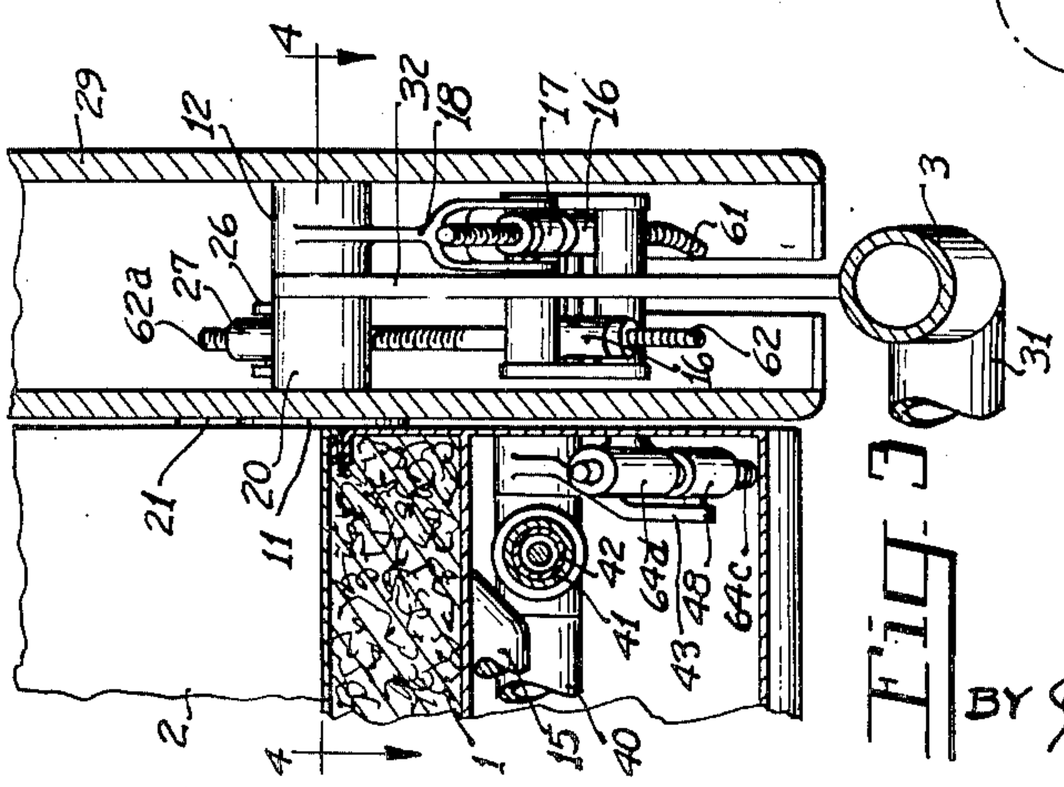

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Fig. 5

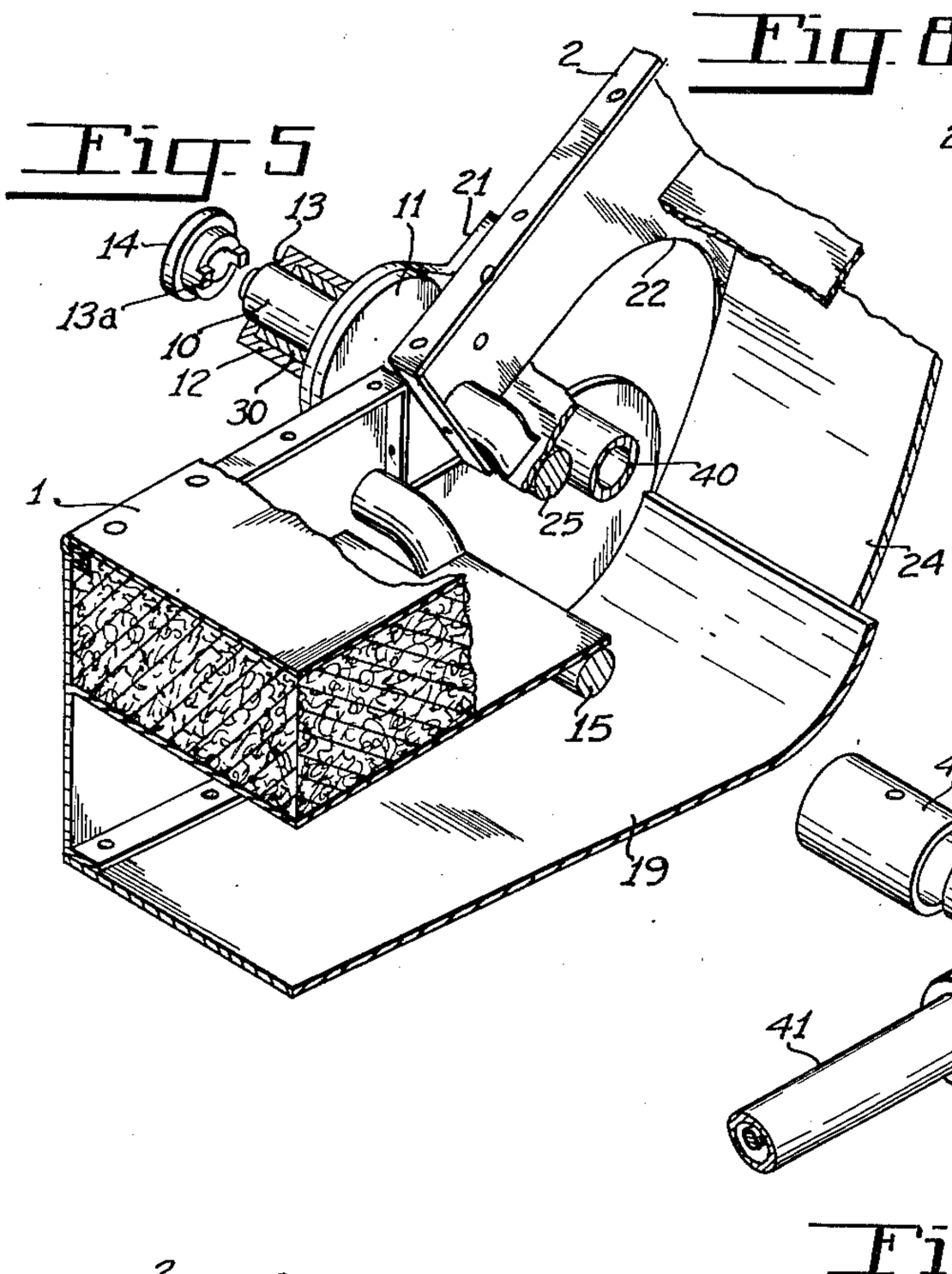


Fig. 8

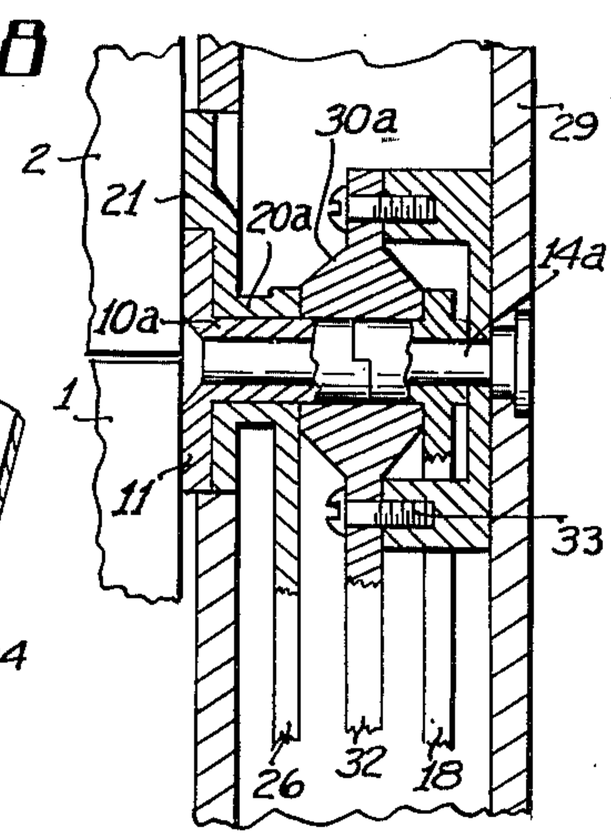


Fig. 7

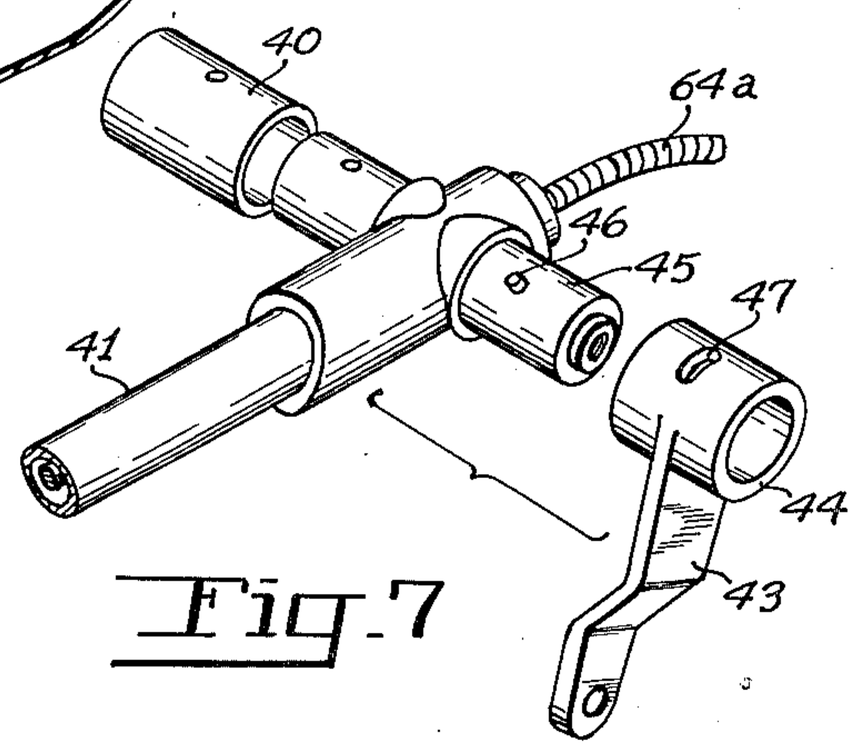
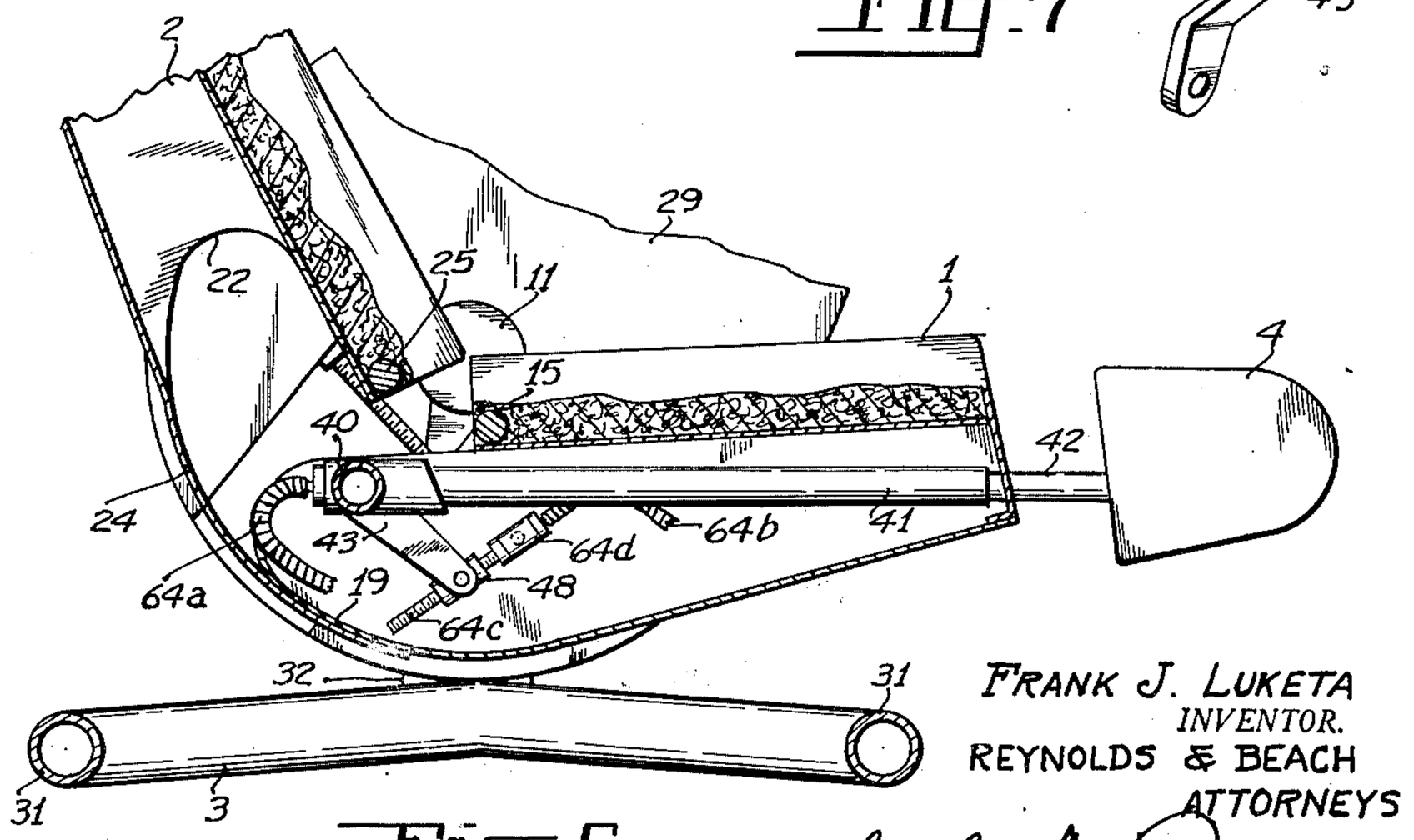


Fig. 6



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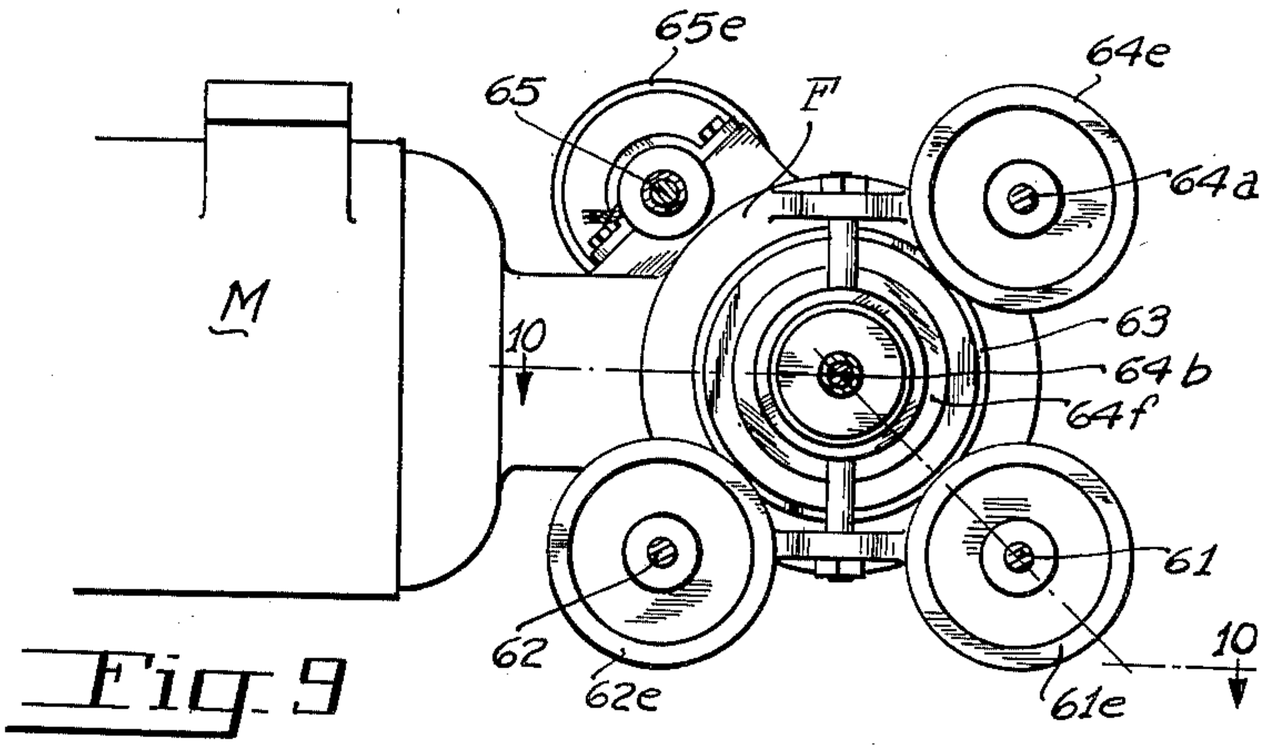

Fig. 9

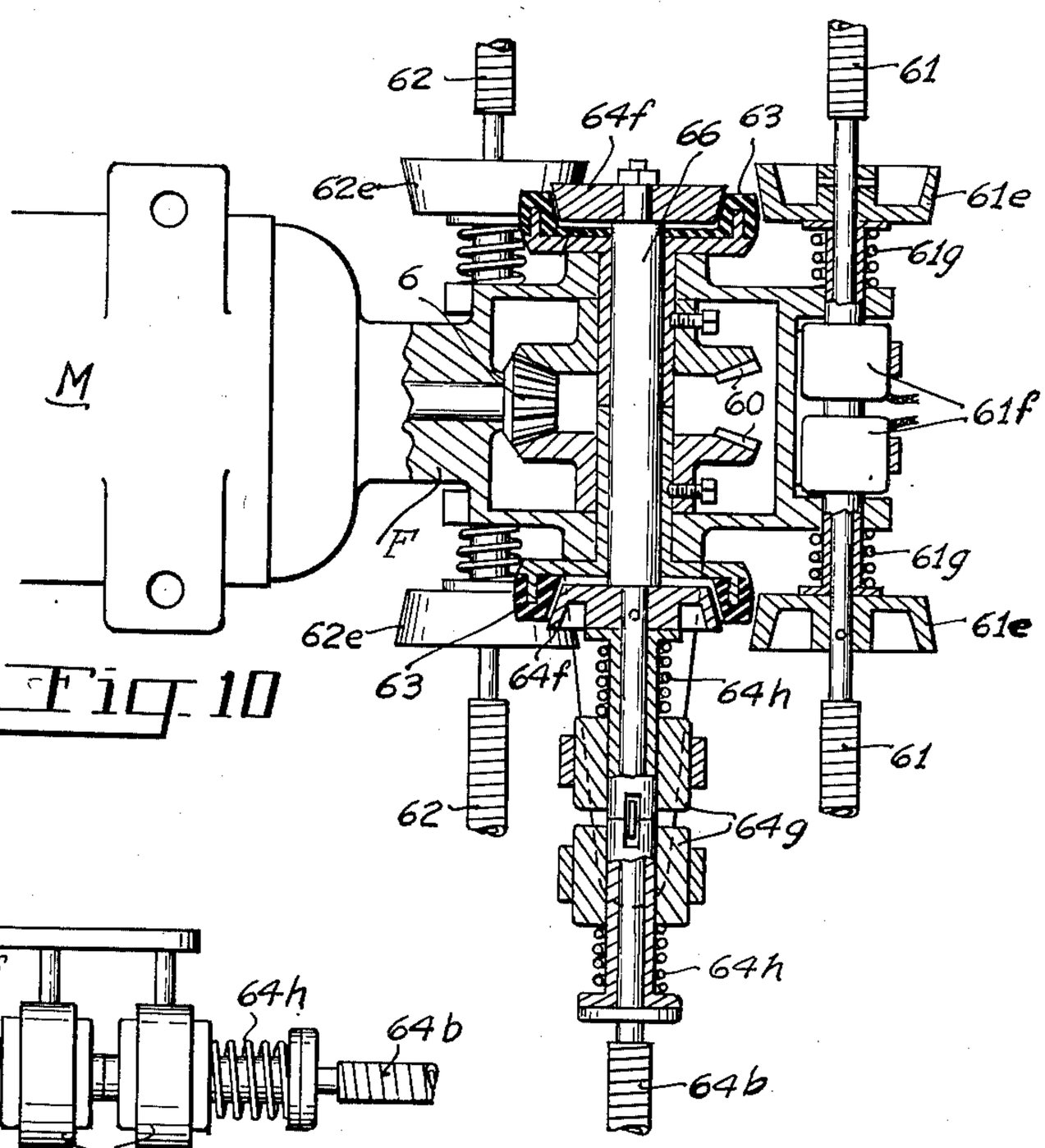

Fig. 10

Fig. 11

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UNITED STATES PATENT OFFICE

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LOUNGE CHAIR

Frank J. Luketa, Seattle, Wash.

Application July 11, 1949, Serial No. 103,987

11 Claims. (Cl. 155—105)

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This invention concerns a lounge chair, similar in its general aspects to several inventions which are respectively the subject matter of various copending applications, in that two main body-supporting members, a seat and a back, are supported upon a fixed floor-engaging frame for independent tilting movement between substantially horizontal and substantially upright positions, and two auxiliary or secondary body-supporting members, a leg rest and a head rest, are also supported for movement with respect to the seat and the back, respectively. Such movement of the leg rest relative to the seat, and of the head rest relative to the back, is at least movement of extension and retraction, and preferably in addition a movement which might be called a tilting movement transversely of the plane of the seat or the back, as the case may be. The two movements of the leg rest and the head rest, namely, projection and retraction on the one hand, and tilting on the other hand, are capable of accomplishment each independently of the other, and, to some degree, independently of the position of the main body-supporting element, the seat or the back, with respect to which such auxiliary body-supporting member is mounted and movable. Conversely, the seat and the back are each tiltable independently of the adjusted position of the leg rest or the head rest, within certain limitations. Power means are provided to effect such movement in opposite senses, each independently of the other, and under control of the occupant of the chair. In this particular application, similarly to the structure shown in my application, Serial No. 98,511, filed June 11, 1949, a single power source, such as an electric motor, is mounted within one of the body-supporting elements of the chair, and carries selective clutch or power take-off mechanisms engageable with the power source, and connected to transmit the power from the single source to any one of the various power-driven means to accomplish some one type of movement.

In distinction to application, Serial No. 98,511, the present invention provides a specifically different form of take-off or selective power transmission mechanism.

Additionally, and in distinction to all prior cases, the present invention pivotally supports the seat and the back, which are deeply upholstered, for movement about an intangible axis which is located at the juncture of the upholstered top surface of the seat and the upper or forward surface of the back, it being an object

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in so doing to avoid disturbance of the clothes of the chair's occupant as the chair's components are adjusted, to augment his comfort and avoid any possibility of his contacting hard pivot elements, and to simplify the construction at this point of the seat and back.

Likewise, in distinction to other cases, the leg rest tilting axis, though fixed relative to the seat, and tangible, does not coincide with the tilting axis of the seat and back, but rather is offset therefrom. It being tangible, there is effective transmission of forces from one side to the other of the leg rest supports, by reason of its rigidity, yet being submerged beneath the upholstery, it avoids any likelihood of contact with this rigid cross connection, and secures the full benefit of the cushion effect in the vicinity of the tilting axis of the seat and back, and at the juncture between the upholstered surfaces of the two latter.

In the present invention, the tilting axis of the leg rest is carried by the seat, and consequently oscillates about the seat-tilting axis from which it is offset, with the possible result that a depressed leg rest may contact the floor during down-tilting of the seat, and it is an object to provide lost-motion means in the support of the leg rest from the seat, which will permit sufficient yielding of the leg rest to avoid damage in such an event.

The pivot supports for the seat and the back are coaxial, and as in my copending application, Serial No. 723,171, filed January 20, 1947, now abandoned, are located wholly outside the margins thereof, yet each much be positively oscillated for tilting, independently of the other. Each must be capable of being readily taken apart for servicing. Notwithstanding the load concentrated upon these outwardly directed pivot supports, they must be relatively short and simply constructed, to avoid undue bulk in the side arms. The attainment of these ends is an object of this invention.

Such lounge chairs are articles of furniture which must be in harmony with other furnishings, and such harmony is hardly attainable if there are unsightly open gaps admitting to internal structure and mechanism, yet it is difficult to avoid this in all degrees. Nevertheless, it is an object of this invention to provide a complemental structure, as between the seat and back in the region of their juncture, which is radially displaced from their common pivot axis, which will house in all the open or mechanical

parts in all relative positions of the seat and back, in a pleasing and unobtrustive manner.

Additional objects, particularly such as pertain to mechanical structures, will become evident as this specification progresses.

In the accompanying drawings the invention has been shown in a presently preferred form, and various supplemental mechanisms have been suggested, but now shown in detail, in view of the fact that their particular form is not considered a part of the present invention, and is in any event similar to corresponding structure in other cases of this series.

Figure 1 is in general a plan view of the chair with parts rather in reclining position, and with other parts broken away and shown in section for illustration of hidden details.

Figure 2 is in general a side elevational view with parts of the nearer side arm and back broken away to illustrate internal details.

Figure 3 is a sectional view substantially on the line **3—3** of Figure 2, illustrating a detail of the seat-tilting and back-tilting mechanism.

Figure 4 is a detail sectional view along the tilting axis of the seat and back, substantially as indicated at **4—4** in Figure 3.

Figure 5 is a broken-away isometric view of the interior of the seat and back, illustrating structural details of the same and of their pivot supports.

Figure 6 is an elevational view, largely in section, taken substantially along the line indicated at **6—6** in Figure **1**.

Figure 7 is a partially exploded isometric view of the pivot support for the tilting of the leg rest.

Figure 8 is a view similar to Figure 4, illustrating a modified form of pivot support for the seat and back.

Figure 9 is a side elevation, Figure 10 is an axial sectional view, and Figure 11 is a further elevational view, illustrating the power take-off mechanism.

The chair includes two main body-supporting members, being respectively the seat **1** and the back **2**, each of which is tiltable about a common axis, but, unlike my copending applications, the pivot axis is not buried within or beneath the upholstery, but coincides with the juncture between the upper surface of the upholstery of the seat and the forward or upper surface of the upholstery of the back. The mechanism for accomplishing this will be described in detail hereinafter.

In addition, and in common with other cases in the series, the chair includes a leg rest **4** which is mounted for projection and retraction with respect to the swinging forward edge of the seat and for tilting, to give it up and down movement with respect to the same edge of the seat. Also, a head rest **5** is movable with respect to the back, at least for extension and retraction, and it could also be tiltable with respect to the back. The two auxiliary body-supporting elements, the leg rest **4** and the head rest **5**, in such respects are similar to auxiliary body-supporting members and their relationship to their respective main body-supporting members in other cases of the series, but the mechanisms for supporting the several members and for accomplishing these movements are different in this chair.

One important reason for locating the pivot axis of the seat and back at least as high as the level of the line of juncture of their upper upholstered surfaces concerns the comfort of the occupant. In any chair wherein the seat and back are relatively tiltable about an axis submerged beneath that surface, downtilting of the seat or back, or both, tends to lengthen the distance from the point of support of the occupant's hips to the point of support of his shoulders, yet that distance is actually unchanged in each individual. His upper garments, being in frictional contact with the back, would pull out at the waist, due to such lengthening tendency. Conversely, uptilting tended to shorten the distance, and to crowd his upper garments downwardly towards his waist, and thus to restrict his shoulders. The result was annoyance and discomfort, at least, and since comfort is the primary aim in a chair of this nature, whatever detracts therefrom is most objectionable. By locating the pivot axis of the seat and back close to coincidence with the hinges of the user's hip joints, this lengthening and shortening tendency is practically eliminated, and the comfort afforded by the chair is materially increased.

The support for the chair as a whole, and in particular for the tiltable seat and back, consists of a main or floor-engaging frame **3** having front and rear feet **31**, and upright posts **32** at each side. Each post terminates at its upper end in a transversely directed sleeve **30** which journals within it a pin **10** which constitutes the pivot support of the seat **1**, and externally journals a sleeve **20** which is the pivot support for the back **2**. The pin **10** is formed with a flange **11** (see Figure 4) which is secured to the frame of the seat **1**, and the sleeve **20** is formed with a flange **21** which is similarly secured to the frame of the back **2**. The whole is secured together and encased by a hollow side arm **29** which is secured at **28** to the frame of the back and therefore tilts with the back. In addition to the sleeve **20**, which is the journal support of the back, a sleeve **12** surrounds one end of the pivot sleeve **30**, this being provided with a flange **13** (see Figure 5) overlying the end of the pivot sleeve **30** and notched complementally to notches in the pivot pin **10**, for reception of keys **13***a* in a disk **14** which is secured in the end of the pin **10**. In this manner the keys **13***a* transmit oscillatory movement from the sleeve **12** to the pin **10** and thence to the seat **1**.

The alternative pivotal support for the seat and back which is illustrated in Figure 8 includes the flanged sleeves **10***a* and **20***a*, corresponding to sleeves **10** and **20** respectively, but the two-part sleeve **10***a* is directly journaled in the pivot sleeve **30***a*, and itself constitutes the journal for the sleeve **20***a*. The sleeve **10***a* is formed in two torque-transmitting parts for simplicity of assembly, and the whole is held together by a bolt **14***a*. The bridge-like element **33** is merely an outboard extension of the post **32**, for better support of the bolt **14***a* and the pivot sleeves rockable thereabout.

The pivot structure of my abandoned application, Serial No. 723,171 is not located relative to the usable plane of the seat and back as is herein disclosed, but in that case the pivot supports are disposed wholly outside the margins of the seat and back, as is necessary in order to achieve the advantages of this invention to the full. The pivot structure of that application suitably relocated relative to the usable planes and their juncture, might serve in this chair.

Whichever type of support is employed, it is duplicated at opposite sides of the chair, and the pivot axis thus defined is located in all forms

quite closely to the junction between the upholstered upper surfaces of the seat and back respectively, so that there is no appreciable crack between them, no lengthening or shortening relative to the person of the occupant, and no structure extending between the two sides of the seat and back, to interfere with his comfort.

It is preferred that the upholstery stop short at this point of juncture, to support which cross bars **15** and **25** are provided as parts of the frame of the seat and back respectively.

In this chair the preferred power source for effecting movement of the various members of the chair is a single motor M of adequate capacity connected in much the manner indicated in my companion case, Serial No. 98,511, filed June 11, 1949. It is shown as mounted in the seat itself. The details of the construction of the power source and selective power take-off mechanism will be described hereinafter, but presently it is sufficient to indicate that the power for tilting the seat **1** is derived from a flexible shaft **61**, the end of which is swiveled at **16** upon the post **32**, which rotates a jackscrew **61***a* journaled within a nut **17** pivotally mounted in the swinging end of an arm **18** which is fast to the sleeve **12**, in the form shown in most of the figures, or fast to one end of two-part sleeve **10***a* in the form of Figure 8. Movement of the nut **17** in and out along the jackscrew **16***a*, depending on the sense of rotation of the latter, tilts the seat **1** down or up through the connections already described from the sleeve **12** to the seat. In similar fashion, a flexible drive shaft **62** rotates a jackscrew **62***a*, reacting from the post, within a nut **27** pivotally carried by an arm **26** which is fast to the sleeve **20** or **20***a*.

It is preferred that this actuating mechanism also be duplicated at opposite sides of the seat, whereby the seat and back will be tilted evenly and without racking or other stress, and without sagging at one side or the other. This is particularly desirable in view of the fact that there is no direct connection between the two trunnions, those at the opposite sides, whereby the seat and back are pivotally mounted.

The leg rest **4** is carried upon telescoping arms **41**, **42** for in and out or retractive and extensive movement, the extending and retracting being accomplished by drive mechanism indicated at **61***a*, but not shown in detail. In the main, it is housed within the tubular arm **41**. This arm **41** is pivotally mounted by means of the sleeve **40**, to which the sleeve **41** is pinned or otherwise fixedly secured, and which is pivotally mounted in the frame of the seat **1** offset to the rear of and somewhat below the pivot axis of the seat itself. A lever arm **43** formed with a sleeve **44** at its upper end which fits upon a transverse stub **45** projecting from the sleeve **41**, and a radial pin **46** in this stub enters a circumferentially elongated slot **47** in the sleeve **44**. A jackscrew **64***c* rotated by a flexible shaft **64***b*, the end whereof is swiveled in the frame of the seat **1** at **64***d*, is threaded within a nut **48** which is pivotally mounted in the swinging end of the arm **43**, and by these means the leg rest **4** may be tilted about its tube **40** as a pivot. Its tilting movement is independent of its retractive or projective movement, and vice versa. The tube **40** being located well below the surface of the upholstery offers no likelihood of being contacted by the user, and does not detract from the comfort of the chair.

Since it was necessary to extend the frame of the chair rearwardly of the rear end of its upholstery, in order to support the tube **40**, it is desirable to recess the frame of the back to accommodate the same when the two lie more nearly in coplanar relationship. Such a recess is shown at **22**. Likewise a curved apron **24** extends downwardly to overlap a similar apron **19** of the seat to house in the mechanism and to prevent it from detracting from the appearance of the chair, and to minimize the entrance of dust and the like. These cooperating aprons **19** and **24** are curved about the pivot axis of the seat and back.

It will be noted that the crossbars **15** and **25** are bent near their ends so that their center portions drop downwardly. This offset adjacent their ends affords room for the leg rest supporting arms **41** to swing upwardly without interference, while still dropping the greater part of the length of these crossbars to a level where they will properly support the upholstery, as is best seen in Figure 5.

The head rest **5** is supported by arms **51** slidably received within a guide **52** and may be considered as fixed within the frame of the back **2**. The head rest **5** is projectable and retractable by means (not shown) which are driven from the power take-off **65**. The mechanism to this end is no essential part of the present invention, therefore has been omitted. Likewise, the head rest may be tiltable with respect to its supporting arms **51**, but this, too, has been omitted for simplicity of illustration.

The power source is indicated as an electric motor M mounted within the frame of the seat **1**. Its arbor bears bevel gear **6** which meshes with opposite double gears **60** carried in the frame F, by means of which two driving clutch elements **63** are driven. These rotate in opposite senses, and the sense of drive of the individual chair members is dependent upon which of the driving clutch elements **63** is engaged with the power take-off for the particular chair member. By engaging a driven clutch elements **61***e* with the exterior of the driving clutch **63**, the shaft **61** which elevates or lowers the seat **1** is energized in one sense or the other, depending upon which solenoid **61***f* is energized. Springs **61***g* return the two driven clutch elements **61***e* to neutral position upon the deenergization of the two solenoids.

Similar arrangements control the energization of the other power take-offs. Engagement of the driven clutch elements **62***e*, **64***e* and **65***e* with the exterior of the driving clutch elements **63**, effects rotation in the corresponding sense of the shafts **61**, **64***a* and **65**. In much the same fashion axial shifting of the shaft **66**, to which are pinned the driven clutch elements **64***f*, effects engagement of the latter with the interior of the driving clutch elements **63**, through which the shaft **66** extends. Such movement is controlled by energization of one or the other of the solenoids **64***g* against the centering springs **64***h*, and such engagement of one or the other of the clutch elements **64***f* rotates the shaft **64***b* in one sense or the other.

It will be noted particularly from Figure 1 that the drive for effecting projection and retraction of the head rest, for effecting tilting of the seat and of the back, and for effecting projection and retraction of the leg rest, is duplicated at the two sides of the chair. The mechanism for effecting tilting of the leg rest is not so duplicated, though it could be, but it need not be owing to the fact that the torque tube **40** trans-

mits the torque evenly and directly from one side to the other of the leg rest.

I claim as my invention:

1. A chair comprising a cushioned seat, a cushioned back, a frame, means pivotally supporting each of the seat and back from the frame for tilting about a transverse axis substantially coinciding with the rear edge of the seat cushion's upper surface and the lower edge of the back cushion's forward surface, said means including a hollow trunnion projecting from both sides of one of the seat or back, and a trunnion coaxial with each hollow trunnion and projecting from both sides of the other, all for journaling upon the frame, individual power-driven means reacting between the frame and the respective trunnions, and selectively energizable for oscillating the latter for tilting of the seat or back, each independently of the other, and a hollow side arm at each side, carried by and tiltable with one of the seat and back, and housing the trunnions and the power-driven means, and slotted for passage of frame members.

2. A chair as in claim 1, including a single power source mounted upon one of the tiltable members, and individual drive connections between said power source and each of the individual power-driven means housed within the side arms.

3. A chair as in claim 1, wherein each frame includes a support at each side upstanding within the hollow side arm, a pivot sleeve disposed in the tilting axis of the seat and back and carried by each of said supports, a sleeve journaled about said pivot sleeve and a pin journaled therein, the latter sleeve and the pin being secured, one to the seat and the other to the back, an arm projecting radially from the externally journaled sleeve for engagement by the power-driven means, a sleeved arm also for engagement by the power-driven means and also journaled about the pivot sleeve, and a torque-transmitting element interconnecting said sleeved arm and said pin.

4. A chair as in claim 1, wherein each frame includes a support at each side upstanding within the hollow side arm, a pivot sleeve disposed in the tilting axis of the seat and back and carried by each of said supports, a two-part pin, the two parts whereof are interconnected for transmission of torque, journaled within said pivot sleeve, a sleeve journaled about said pivot sleeve, the so-journaled sleeve and one part of the pin being secured, one to the seat and one to the back, an arm secured to and projecting radially from the other part of said pin, for engagement by the power-driven means, and a second arm projecting radially from the externally journaled sleeve, also for engagement by the power-driven means.

5. A chair comprising a deep-cushioned seat, a deep-cushioned back, a frame, means located outside the body-supporting area of the seat and back for pivotally supporting each of the latter from the frame, for tilting about a common transverse axis which substantially coincides with the rear edge of the seat cushion's upper surface and with the lower edge of the back cushion's forward surface, individual power-driven means reacting between the frame and the seat and the back, respectively, for tilting of each of the latter, a leg rest, arms supporting the same, and pivoted for tilting upon the seat, about an axis adjacent, but offset from the seat's and back's tilting axis, and power-driven means reacting between the seat and said leg rest supporting arms, so to tilt the latter, said power-driven means for each of the seat, back, and leg rest including a single power source mounted upon one of the seat or back, and selective transmission means extending thence to each of the individual power-driven means.

6. A chair comprising a deep-cushioned seat, a deep-cushioned back, a frame, means located outside the body-supporting area of the seat and back for pivotally supporting each of the latter from the frame for tilting about a common transverse axis which substantially coincides with the rear edge of the seat cushion's upper surface and with the lower edge of the back cushion's forward surface, individual power-driven means reacting between the frame and the seat and the back, respectively, for tilting of each of the latter, a leg rest, arms supporting the same, and pivoted for tilting upon the seat, about an axis offset from the seat's and back's tilting axis, the side marginal frame of the seat being extended rearwardly to support the same, and the side marginal frame of the back being recessed to accommodate the same when both seat and back lie in generally horizontal position, side arms mounted upon and tiltable with one or the other of the seat and back, housing in the back's recesses in all relative positions of seat and back, and power-driven means reacting between the seat and said leg rest supporting arm, so to tilt the latter.

7. A chair comprising a frame including spaced front and rear feet and upright posts at each side, a deep-cushioned seat and a deep-cushioned back each tiltable about a common transverse axis disposed at the juncture of their upper cushion surfaces, coaxial pivot means projecting laterally from each of the seat and back, and carried by the upright posts, for tilting support of the seat and back from the frame, a pair of hollow side arms mounted upon and for tilting with the back, and slotted for reception of the respective upright posts, power-driven means within each arm, reacting between the post and the seat and the back, respectively, for tilting each of the latter, a rear cover on each of the seat and the back, curved concentrically about the tilting axis, and of relative lengths to overlap in all relative tilted positions of the seat and back, and a power source and selective clutch mechanism carried by one of the seat or back, operatively connected to said power-driven means.

8. A chair as in claim 7, including a leg rest, arms at each side supporting the same, and mounted upon the seat for tilting about an axis to the rear of the seat's tilting axis, the seat being extended rearwardly for such tilting support, and the back being complementally recessed at its sides, and power-driven means, operatively connected to the power source, within and reacting from the seat, and to said arms, for tilting said leg rest.

9. A chair comprising a cushioned seat, a cushioned back, each of the seat and back including a rigid marginal frame of material depth, and including a cover for the reverse surface of each such marginal frame, a frame for the support of the chair, means pivotally supporting each of the seat and back from said supporting frame for tilting about a transverse axis substantially coinciding with the rear edge of the seat cushion's upper surface and the lower edge of the back cushion's forward surface, said pivotally supporting means including a hollow trunnion projecting from both sides of one of the

seat or back, and a trunnion coaxial with each hollow trunnion and projecting from both sides of the other, all for journaling upon the frame, the two covers and the marginal frames of the seat and back being curved about the tilting axis as a center, with the covers in overlapping relation, and individual power-driven means reacting between the frame and the respective trunnions, and selectively energizable for oscillating the latter for tilting of the seat or the back, each independently of the other.

10. A chair comprising a frame, a seat supported thereon for tilting about a transverse axis in the vicinity of the seat's rear edge, a leg rest, arms supporting said leg rest and pivotally supported upon the seat for tilting about a transverse axis offset from the seat's tilting axis, means to project and retract the leg rest relative to the seat, power-driven means reacting between the seat and the frame to tilt the seat, power-driven means reacting between the seat and the leg rest supporting arms to tilt the leg rest, and lost-motion means between the arms and the seat, to permit downward tilting of the seat beyond the point where the leg rest engages the floor.

11. A lounge chair comprising a floor-engaging frame, two main body-supporting members, a seat and a back, respectively, a trunnion fixed

to and projecting at each side of one such member, a sleeve journaled about each trunnion and fixed to the other such member, the trunnions and sleeves being tiltably supported from said frame to define the tilting axis of the seat and back, located adjacent the seat's rear edge, a power source energizable to effect tilting of either the seat or the back at will, and transmission means independent of said members positively connecting said power source to each of the trunnions and to each of the sleeves, to equalize the tilting forces applied to each of the seat and back.

FRANK J. LUKETA.

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