July 12, 1960 J. J. BARABAS ET AL 2,944,595

POWER OPERATED RECLINING CHAIR

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Fig. 1.

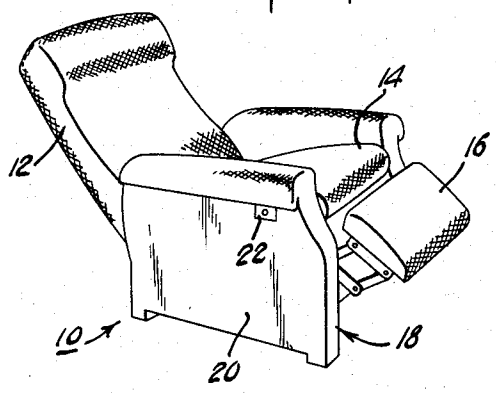


Fig. 4.

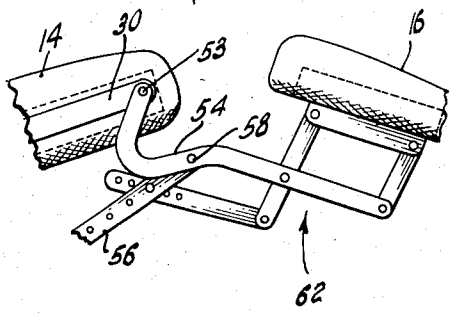


Fig. 2.

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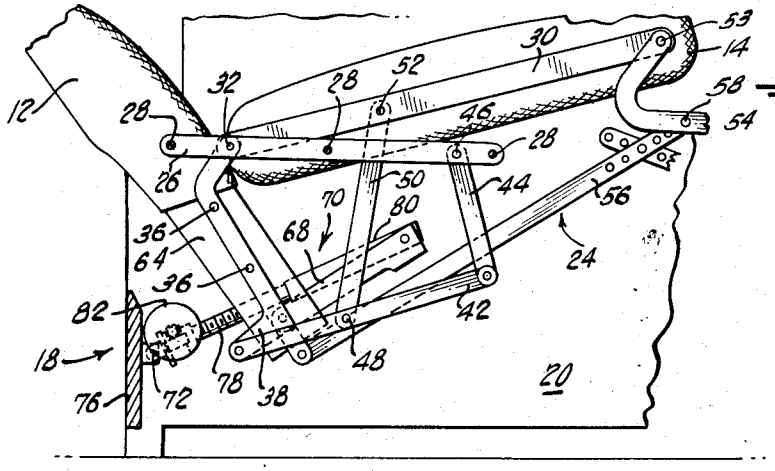


Fig. 3.

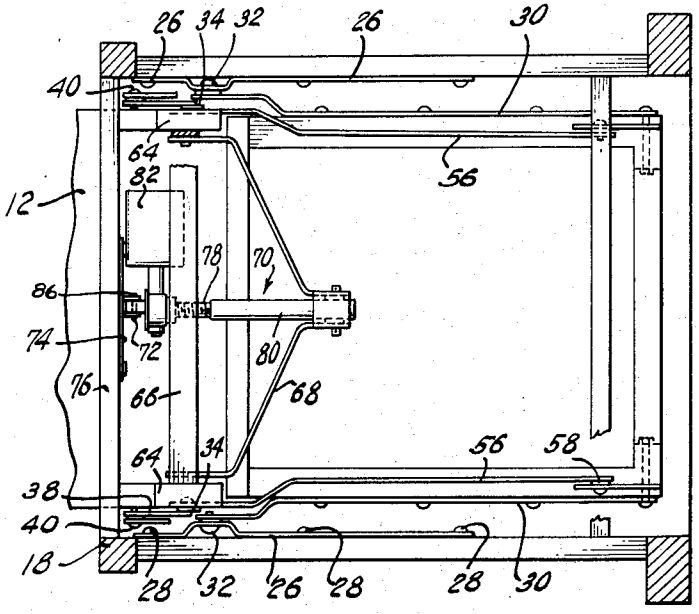


Fig. 5.

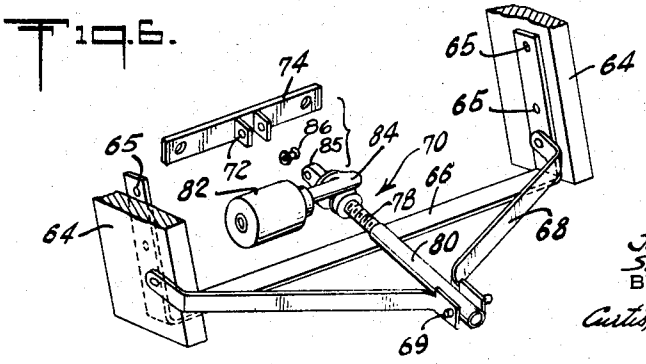


Fig. 6.

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Fig. 7.

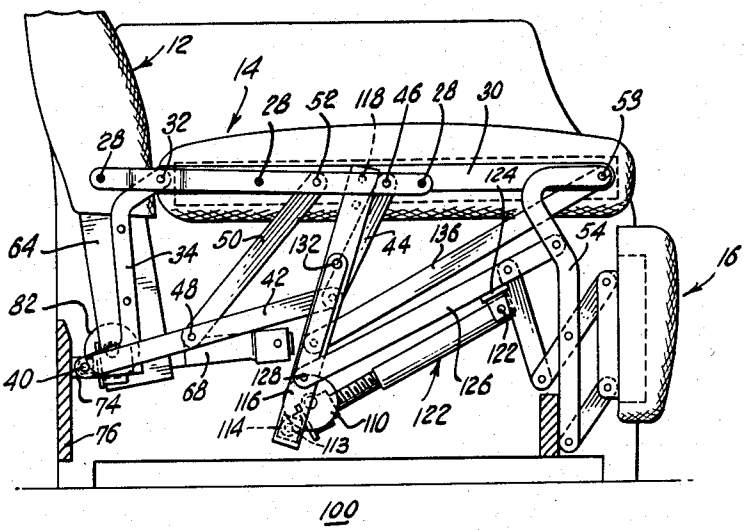
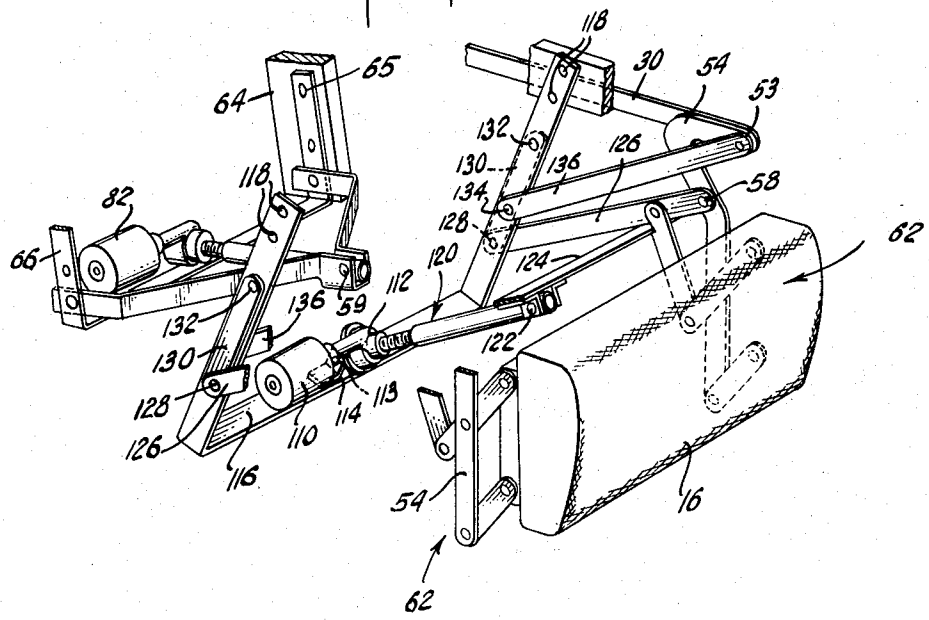


Fig. 8.



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POWER OPERATED RECLINING CHAIR

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9 Claims. (Cl. 155—106)

This invention relates to adjustable reclining chairs and more particularly to an improved operating mechanism therefor.

An object of this invention is to provide a power operated reclining chair which is comfortable and convenient to use and which has a relatively simple and inexpensive operating mechanism.

A further object is to provide such a power operated mechanism which is rugged and reliable in operation but yet is not bulky or large and can be used in reclining chairs having attractive styling.

These and other objects will in part be understood from and in part pointed out in the description given hereinafter.

An important practical consideration in designing an adjustable reclining chair is that the chair should be comfortable to sit in and easy to adjust to any desired reclining position. In the past many reclining chairs, though comfortable, were awkward or difficult to change from upright to reclining position and when once adjusted to a position were hard to change to another position. Furthermore, such chairs were usually very complicated in structure and hence expensive to manufacture.

For the convenience of the person using a reclining chair, it is desirable to free him so far as possible from the mechanics of adjusting the chair from one position to another. Also, it is desirable to provide a chair operating mechanism which automatically locks in any selected position once reached, but which also does not interfere with a rapid and effortless change to another position when desired. For example, when a chair is extended in full reclining position and locked to prevent its shifting by movement of the person resting thereon, some means of effortlessly unlocking the chair and returning it to upright position should be provided. Otherwise the person in the chair will be unnecessarily burdened and might come to view the chair as more of a master than a servant.

One general type of reclining chair used in the past has depended upon the position and weight of the person in it to hold the chair in the position desired with no positive locking mechanism being provided for this purpose. By simply shifting his position, the person using the chair was able to move it from upright to full reclining position and vice versa. This was a convenient mode of operation and in general provided comfort and simplicity. There remained, however, the desirability of having a practical reclining chair which could readily be shifted from one position to another without any effort whatsoever on the part of the person using the chair and which when brought to a position remained there until intentionally shifted to another. The present invention provides such a reclining chair which, moreover, is simple and inexpensive to manufacture.

In accordance with the present invention, an operating mechanism for adjusting a reclining chair is equipped with a small electric motor uniquely mounted and connected to the operating mechanism to drive it efficiently and easily. Within a few seconds the motor, which is very small, can move the chair from an upright position to a full reclining position. Then by electrically reversing the motor, the chair can be returned just as quickly to upright position. Even though the motor drive responds with great speed, the chair can be accurately adjusted to any position of greatest comfort to the user. When once set in any particular position, the chair remains locked there, even though the user shifts his weight, until the motor is again started. Vibration and noise from the motor are held to an absolute minimum by the unique way in which the motor is mounted, this way of mounting also makes possible a simple and rugged driving connection between the motor and the chair operating mechanism.

A better understanding of the invention together with a fuller appreciation of its many advantages will best be gained from a study of the following detailed description given in connection with the accompanying drawings in which:

Figure 1 is a perspective view of one reclining chair embodying features of the invention;

Figure 2 is an enlarged side view of the chair of Figure 1 shown partly in section to reveal the operating mechanism, the chair being shown in its upright position;

Figure 3 is a view like Figure 2 but showing the chair in a reclining position;

Figure 4 is a detailed side view of the foot rest broken away from Figure 3 to show the foot rest in extended position;

Figure 5 is a bottom view of the chair seen in Figure 2;

Figure 5 is an exploded perspective view of the motor and certain driven elements associated with it, other parts being broken away or not shown;

Figure 7 is a side view partly in section showing, in upright position, another chair embodying features of the invention; and

Figure 8 is a perspective view of the motors and the elements driven by them in the chair shown in Figure 7, other parts being broken away or not shown.

The reclining chair **10** in Figure 1, which is shown in reclining position, has the same outward appearance and a similar back **12**, seat **14** and foot-rest **16** as the chair disclosed and claimed in co-pending U.S. patent application No. 612,743, filed September 28, 1956. The back, seat, and foot rest of chair **10** are supported for coordinated swinging and shifting movement within a stationary frame **18** by an operating mechanism shortly to be described. Just behind and below the front end of the right armrest **20** of the chair is mounted an electric switch **22** which can be pushed forward to make the chair move to its upright position or alternatively pressed backward to move the chair to its reclining position. Switch **22** has a center open-circuit position for deenergizing the motor which drives the chair operating mechanism.

Referring to Figure 2, seat **14** and back **12** of the chair are supported on frame **18** for movement by the operating mechanism generally indicated at **24** and consisting of a right side linkage, shown here, and a left side linkage which is the mirror image of the linkage at the right. Each side linkage includes a stationary mounting bracket **26** which is fixed to the inside of a respective arm of the chair frame at the points **28**. Fixed to each side of seat **14** is a strap **30** pivoted at its rearward end to a one of the brackets **26** at point **32**. A similar strap **34** is fixed to each side of the back **12** at the points **36**. The upper ends of straps **34** are pivoted in common with straps **30** to brackets **26** at the points **32**.

Protruding from the rear of each strap 34 near the lower end thereof is a spur 38, to the outer end of which is pivoted at point 40 the rear end of a swinging link 42. This link 42 is pivotally connected at its forward end to a link 44 which, in turn, is pivotally connected at its upper end to fixed bracket 26 at point 46. Near the center of swinging link 42 at point 48 is pivoted the link 50 whose upper end is pivotally connected to seat strap 30 at point 52.

To the front end of seat strap 30 at point 53 is pivoted the curved link 54 which is adapted to swing forward, as shown for example in Figure 4, and to move foot rest 16 supported therefrom outward and upward. The swinging movement of curved link 54 is controlled by the push link 56 having its forward end pivoted to link 54 near its upper end at point 58. The rear end of link 56 is pivoted to the lower end of strap 34 at the point 60. The forward swinging movement of curved link 54 in conjunction with the movement of push link 56 actuates a "lazy-tongs" arrangement, generally indicated at 62, on which the foot-rest is mounted.

As seen in Figures 2 and 5 straps 34 are attached to the outer sides of the spaced apart and parallel arms 64 of the back frame which extend down below the upholstered portion of the back 12. The lower ends of these arms 64, with straps 34 omitted, are also shown in Figure 6. Fastened on the inside of these arms 64 at points 65 is a U shaped bracket 66 to which, near its lower end, is rigidly fixed the forwardly projecting yoke 68. In the center of this yoke is pivoted at 69 the front end of a telescoping worm shaft or jack screw unit, generally indicated at 70.

The rear end of telescoping shaft unit 70 is pivoted at 72 to the clevis of a bracket 74 mounted on the fixed cross board 76 which extends across the lower rearward portion of the chair frame 18. Thus, when the telescoping shaft 70 is extended from the position shown in Figure 2 to that shown in Figure 3 the chair is adjusted from an upright to a reclining position.

Telescoping shaft unit 70 is advantageously a unit manufactured by the Eaton Manufacturing Corporation and sold by the F. L. Jacobs Co. Briefly described, with reference to Figures 5 and 6, it includes a rotatable inner worm shaft 78 which telescopes within an outer non-rotatable sleeve 80. A slip nut in sleeve 80 meshes with the worm shaft 78 and is frictionally held from rotating in the sleeve to telescope the shaft and sleeve. The nut, however, is adapted to slip in sleeve 80 when it meets a fixed stop. Thus when shaft 80 is fully telescoped, the worm nut will engage a pin on the shaft and rotate within sleeve 80 to permit shaft 78 to continue its rotation without advancing farther. Reversal of the direction of rotation of shaft 78, however, will immediately begin the withdrawal of the shaft from the sleeve. Upon maximum withdrawal, the friction fitted slip nut will once again slip and permit rotation of shaft 78 without longitudinal movement of it relative to sleeve 80. The inner and outer limits of movement of shaft 78 relative to sleeve 80 can be set as desired by placing small pins at spaced points on shaft 78 to engage the slip nut within sleeve 80.

The shaft 78 is adapted to be rotated in either direction by a small reversible motor 82 acting through a gear unit 84 adjacent the rear end of the shaft. The housing of this unit is non-rotatably pivoted through its eyelet 85 in the clevis bracket 74 at point 72, a rubber grommet 86 being inserted through eyelet 85 to reduce vibration passing from housing 84 to clevis 74. Motor 82 is supported on the drive housing 84 to one side thereof. The sole support for motor 82 is its attachment to the drive housing. The end of the rotatable shaft of motor 82 carries a worm shaft (not shown) which engages the rim of a worm wheel (not shown) mounted within housing 84 and fixed to the end of shaft 78 for rotation with it. By virtue of this construction wherein the motor is not mounted directly on the frame of the chair, vibration and noise are effectively reduced. Moreover, the force exerted by shaft 78 and sleeve 80 is always in line with their axis since both ends of the shafts are pivoted. Additionally, the thrust produced by shaft 78 does not tend to bend the motor shaft and the operation of motor 82 is not affected by the angular swinging of the chair mechanism.

The electrical connections to motor 82 have not been shown but it is to be understood that they can be entirely conventional ones for a single phase 110 volt 60 cycle reversible motor system.

Figure 7 shows a second embodiment of the invention comprising a chair 100 having the same back, seat and foot rest portions as chair 10 in Figure 1. The supporting mechanism for chair 100 is similar to that in chair 10 and corresponding parts have been given the same reference numerals. The mechanism for operating chair 100 includes a motor 82 which functions in the same way as described above to control the position of the seat and back of the chair. This motor 82, however, does not control the position of the footrest 16, the latter being raised or lowered by a second motor 110 operating independently of the first motor and controlling only the position of the footrest relative to the seat. Motor 110 is best seen in Figure 8 wherein the chair mechanism is shown in perspective with some portions thereof broken away. It is mounted in substantially the same way as motor 82, being supported at one side of a gear housing 112 having an eyelet at its rear end. This eyelet is pivoted at 113 in a clevis 114 formed on a U-shaped bracket 116 which is rigidly fastened to the wooden frame of the seat of the chair at points 118. Motor 110 actuates a jack screw 120 whose forward end is pivoted at 122 to a cross-bar 124. Cross-bar 124 has its outer ends fixed to the parallel links 126 of the "lazy-tongs" arrangement 62 and when the bar is moved forward from the position shown, the links 126, whose front ends are pivoted to links 54 at points 58, move to raise or extend footrest 16.

The rear end of each link 126 is pivoted at 128 to a swinging link 130 whose upper end is pivoted at 132 to the fixed bracket 116. Extending forward from bracket 116 at points 134 are two stationary braces 136 fastened to the seat at points 53 to reenforce the bracket and hold it rigidly in position. Thus, foot rest 16 can be raised or lowered independently of the position of the back of the chair and depending only upon whether jack 120 is lengthened or shortened by motor 110. This motor can be controlled by a switch in the same way as motor 82.

The above description of the invention is intended in illustration and not in limitation thereof. Various changes may occur to those skilled in the art and these may be made without departing from the spirit or scope of the invention as set forth.

We claim:

1. A power operated reclining chair comprising: a stationary frame having two spaced sides, two side brackets each fixed to a respective side of said chair, a seat positioned between said sides and pivoted at points adjacent its rear to said side brackets, a back extending generally upward and pivoted to said points with a portion of said back extending above said seat and a portion below said seat, a first pair of links pivoted to the lower end of said back and extending forward, a second pair of links pivoted to the forward end of said first links and extending upward, said second pair of links being pivoted to said fixed brackets, a third pair of links pivoted to the middle of the first links, extending upwardly and being pivoted to said seat forward of said rear pivot points, a somewhat Y-shaped bracket rigidly attached to the lower end of said back and having a thrust point forward thereof, a jack screw pivoted at one end to said thrust point and pivoted at its other end to a fixed point on said chair frame generally behind and on a level with said thrust point, and an electric motor connected to said jack screw and adapted to retract or extend it, said motor being suspended solely from said jack screw.

2. The structure as in claim 1 in further combination with a foot rest, said foot rest depending from the forward end of said seat by a linkage, and power operated means connecting said linkage to said seat to raise or lower said foot rest independently of said back.

3. The structure in claim 2 wherein said power operated means includes a second jack screw pivoted at its forward end to said linkage and pivoted at its rear end to a U-shaped bracket extending down from said seat below the forward end of said first jack screw.

4. A double action reclining chair of the character described comprising: a stationary frame having two sides spaced apart, a back pivotally mounted on said sides and adapted to stand upright and alternatively to swing back to reclining position, said back having a lower portion adapted to swing forward, a seat supported from said sides in front of said back, a foot rest mounted on the front of said seat and adapted to hang vertically downward in front of said seat and alternatively to swing upward in front of said seat generally on a level therewith, first power operated means acting between the lower portion of said back and a fixed point on said frame to adjustably position said back, and second power operated means adapted to swing said foot rest upward independently of the position of said back.

5. The structure as in claim 4 wherein said first and second power operated means include a mechanical jack screw and linkage, said jack screw being pivoted at each end and being extendable along a straight line between its pivoted ends.

6. The structure as in claim 4 wherein said first power means includes a first jack screw extendable forward of said chair to move said back to reclining position, and said second power means includes a second jack screw positioned below and in front of said first screw and extendable forward to swing said foot rest.

7. The structure as in claim 4 wherein the rearward end of said first screw is pivoted to a lower rearward portion of said frame, and at its forward end is pivoted to a bracket carried by said back lower portion, and wherein the rearward end of said second screw is pivoted to a bracket suspended in said chair within said arms and extending below the front end of said first screw, and the forward end of said second screw is attached to said foot rest.

8. A power-operated reclining chair comprising a chair frame having two sides and a back portion, a chair back having an upper upholstered portion and two downwardly extending side arms, a chair seat, pivot means at each side of the chair frame for mounting said chair back at a point intermediate its ends and said seat adjacent its rearward edge, a foot rest pivoted beneath the front of said seat and adapted to swing back and forth between a retracted vertical position and an outwardly extended position, a linkage at each side of said seat connected between said frame sides, said seat and the lower end of said chair back for coordinating their swinging movement between an upright and a reclining position, a somewhat Y-shaped supporting bracket connected between the arms of said chair back adjacent their lower ends and having a thrust point substantially forward of and generally equidistant from said lower ends, extensible jack screw means having one end pivoted to said thrust point on said supporting bracket and its other end pivoted to a fixed point on said frame behind and generally on a level therewith, and an electric motor for rotating said extensible jack screw means to move the lower ends of said arms farther away from or closer to said fixed point, said extensible jack screw means including a rotatable screw shaft, a nut engaged thereon, and a gear drive housing mounted on one end of said shaft and connected to said motor and serving as the sole support of said motor, said housing and said nut each being pivoted for straight line thrust along said shaft between said thrust point on said supporting bracket and said fixed pivot point.

9. The combination of elements as in claim 8 wherein a noise insulating bushing is inserted at the pivot between said fixed point and the rear end of said jack screw means.

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