United States Patent [19]

Caldemeyer

[11] **3,738,706**

[45] **June 12, 1973**

[54] **MOTOR DRIVEN HEADREST AND BACK FOR RECLINER CHAIR**

[76] Inventor: **Daniel F. Caldemeyer,** 4300 Jennings Lane, Evansville, Ind. 47712

[22] Filed: **Aug. 30, 1971**

[21] Appl. No.: **175,997**

[52] **U.S. Cl.** **297/410,** 297/354

[51] **Int. Cl.** **A47c 7/36**

[58] **Field of Search** 297/216, 330, 353, 297/363, 410; 312/306

[56] **References Cited**

UNITED STATES PATENTS

3,343,875	9/1967	Ferrara	297/410
3,286,971	11/1966	Walter et al.	297/363

FOREIGN PATENTS OR APPLICATIONS

1,218,541	1/1971	Great Britain	297/410

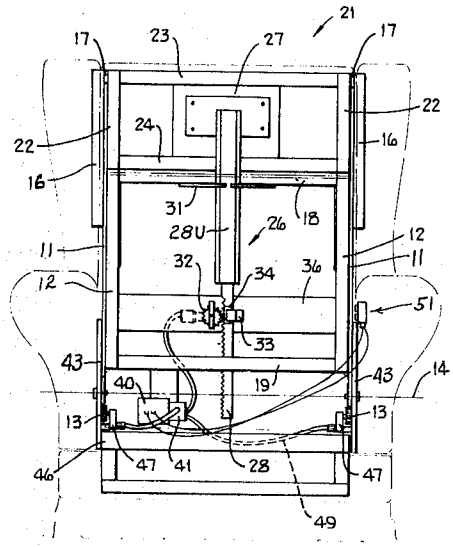
Primary Examiner—Casmir A. Nunberg

Attorney—Woodard, Weikart, Emhardt & Naughton

[57] **ABSTRACT**

A chairback has adapter plates pivotally attached to each side thereof and readily securable to a chair base or seat mount structure. Sector gears on the chairback engage pinions in gearheads mounted to the adapter plates for motor driven tilting of the chairback. A headrest linearly movable vertically in the chairback has a gear rack post extending into the chairback centrally thereof and engaged by a pinion in a gearhead secured to the lower back frame to drive the headrest up or down. Widely spaced slides on the headrest serve as guides and supports therefor. One embodiment includes a chairback cushion vertically movable in response to headrest extension.

26 Claims, 17 Drawing Figures



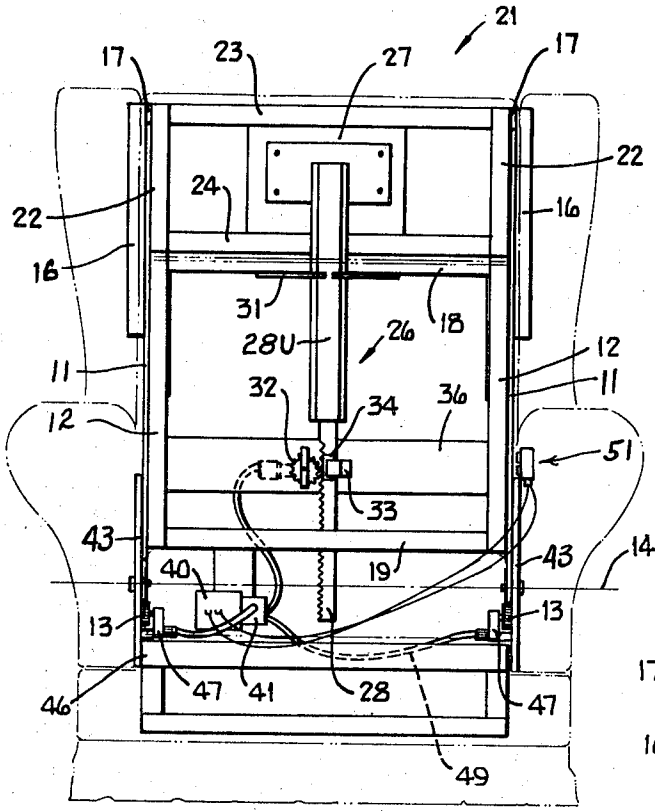


Fig. 1.

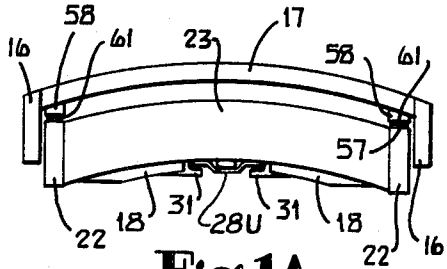


Fig. 1A.

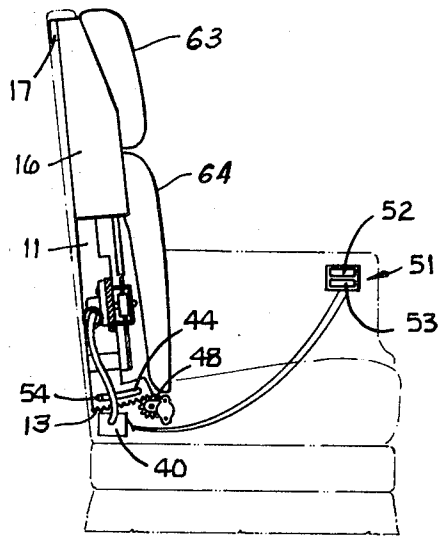


Fig. 2.

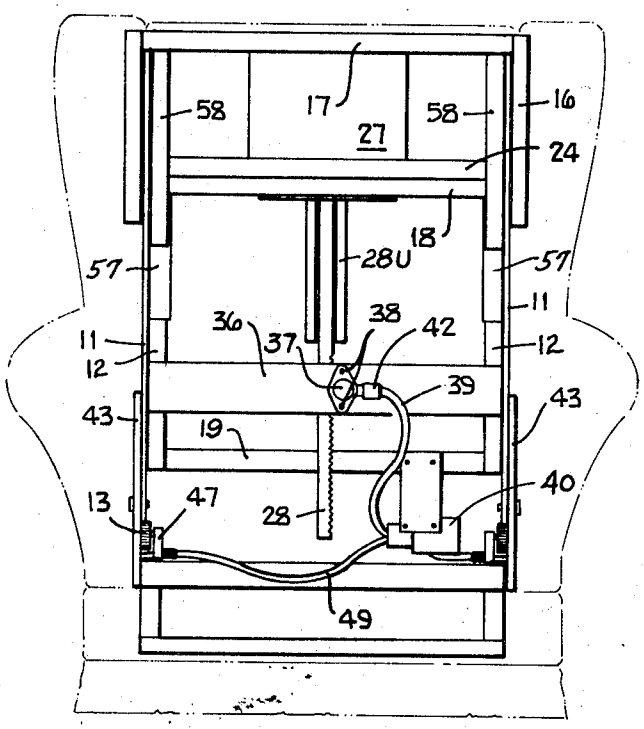


Fig. 3.

INVENTOR
DANIEL F. CALDEMEYER
BY
Woodard, Weikart, Emhardt & Naughton
ATTORNEYS

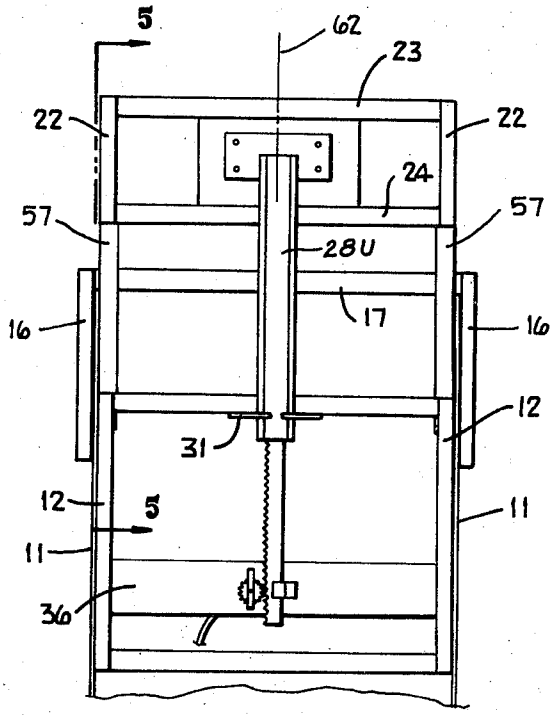


Fig.4.

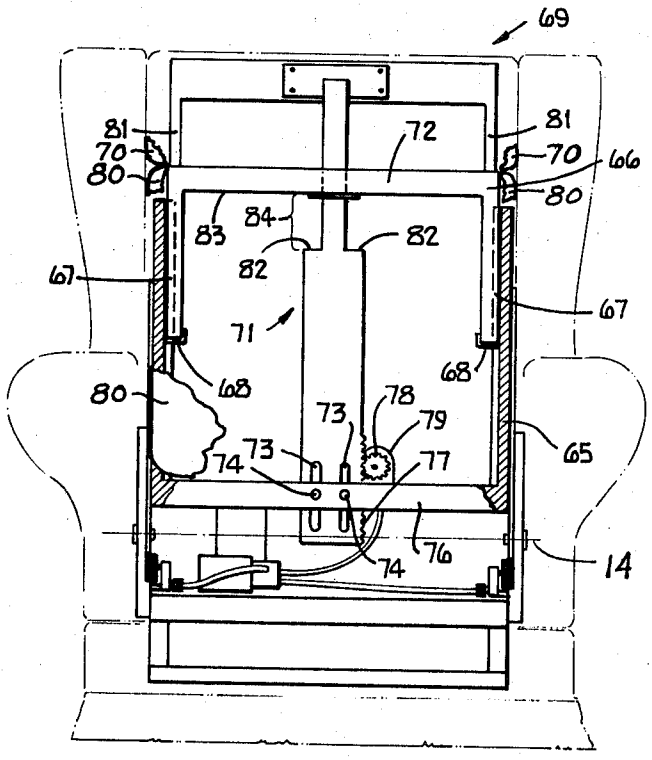


Fig.6.

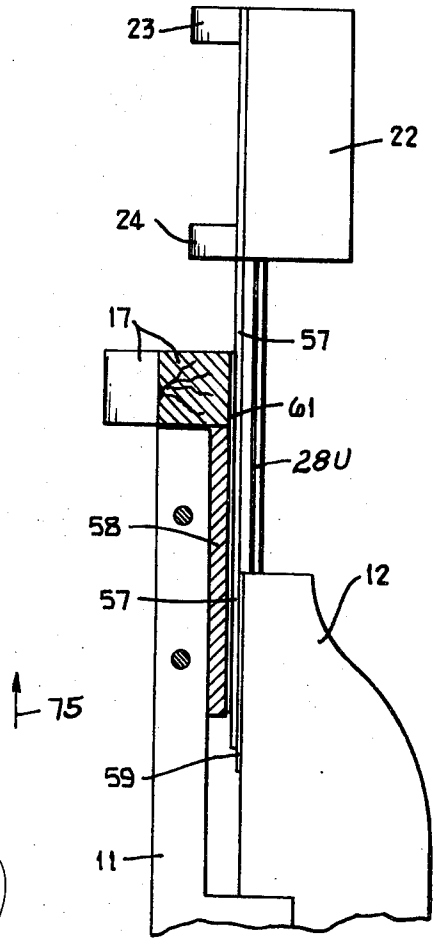


Fig.5.

INVENTOR
DANIEL F. CALDEMEYER
BY
Woodard, Weikart, Emhardt & Naughton
ATTORNEYS

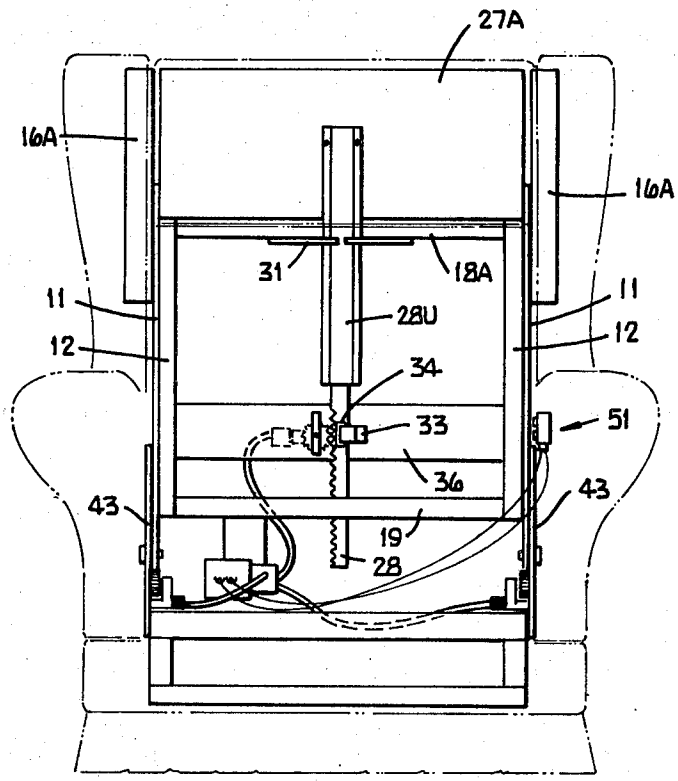


Fig. 7.

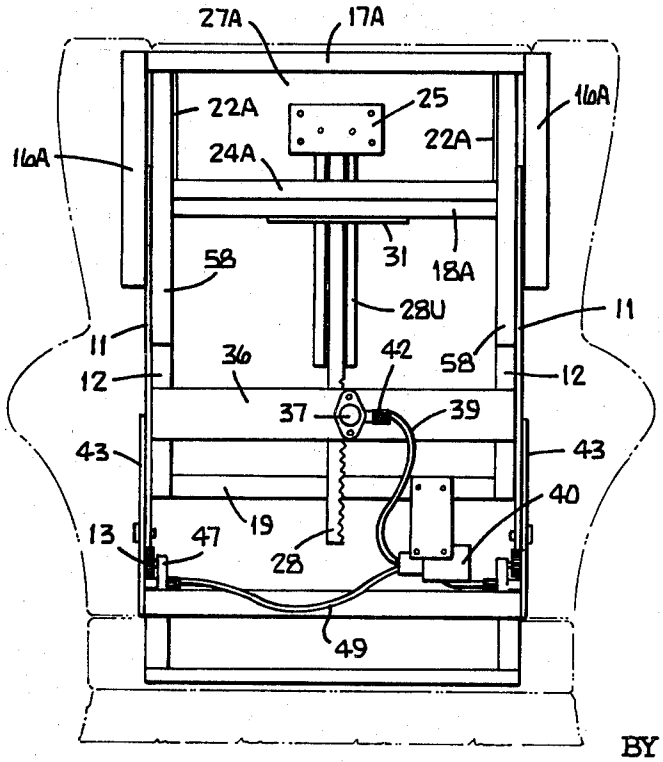


Fig. 8.

INVENTOR
DANIEL F CALDEMEYER
BY
Woodard, Weikart, Emhardt & Naughton
ATTORNEYS

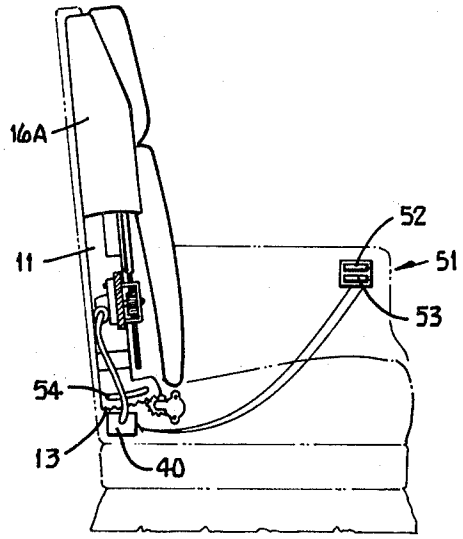


Fig. 9.

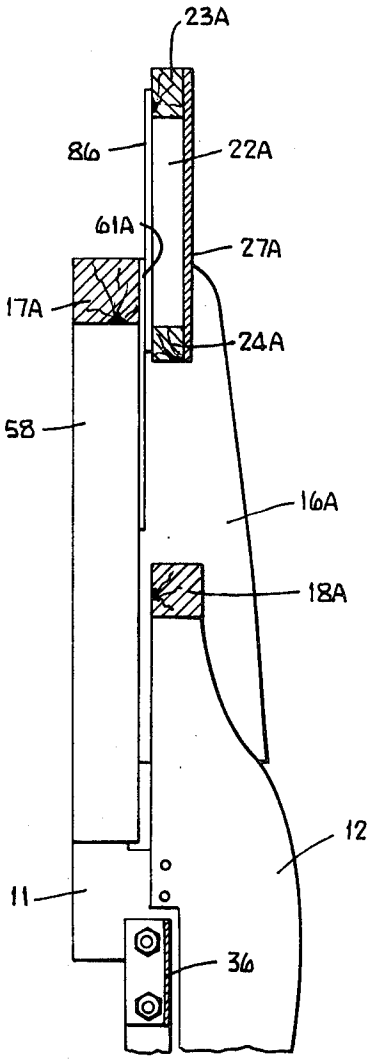


Fig. 11.

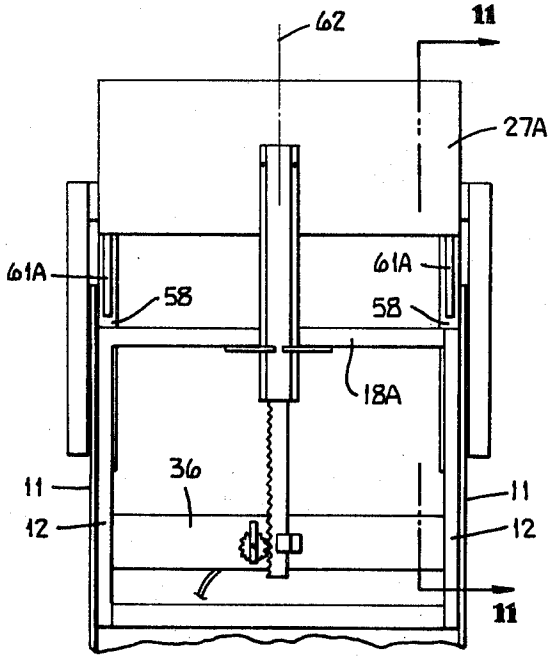


Fig. 10.

INVENTOR
DANIEL F. CALDEMEYER
BY
Woodard Weikart Emhardt & Naughton
ATTORNEYS

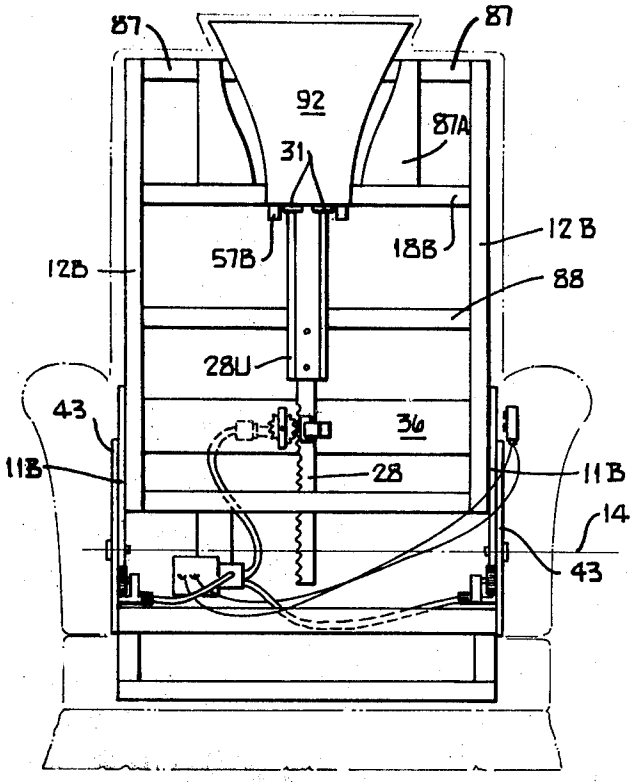


Fig. 12.

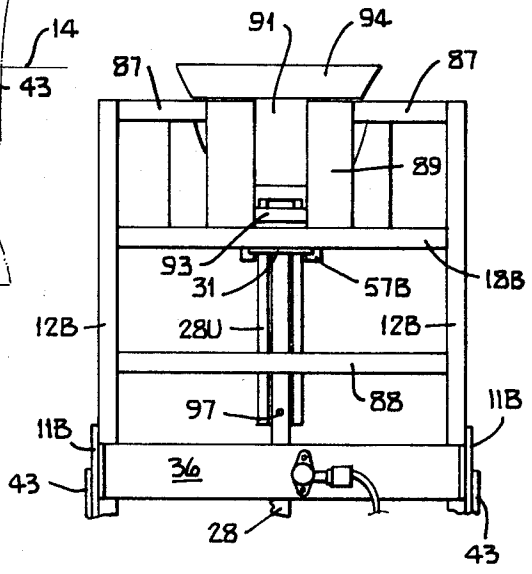


Fig. 13.

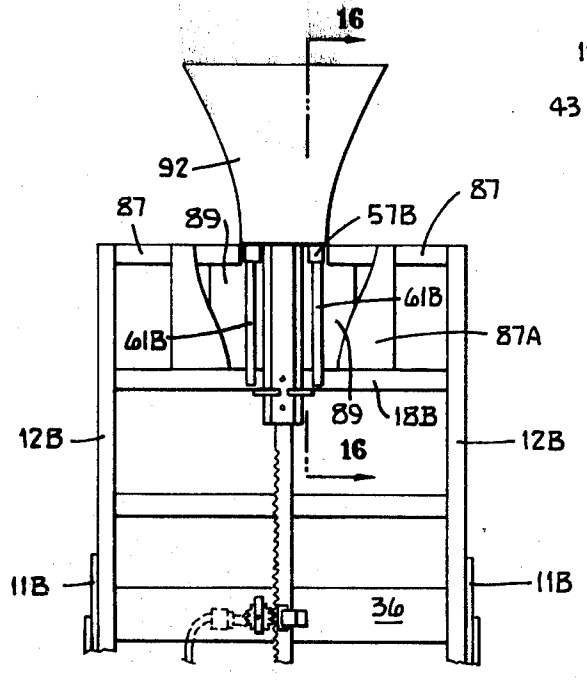


Fig. 14.

INVENTOR
DANIEL F. CALDEMEYER

BY
Woodard Weikart Emhardt & Naughton
ATTORNEYS

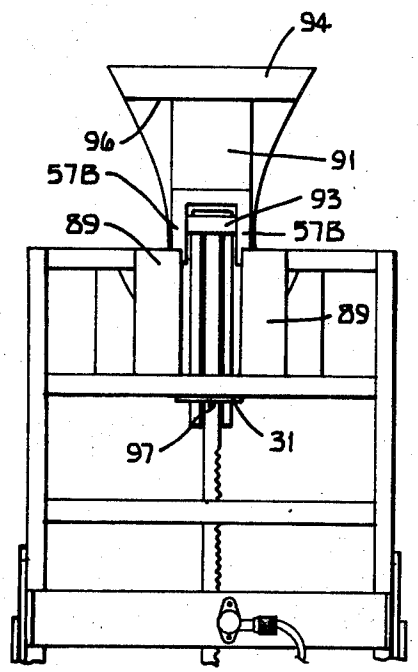


Fig. 15.

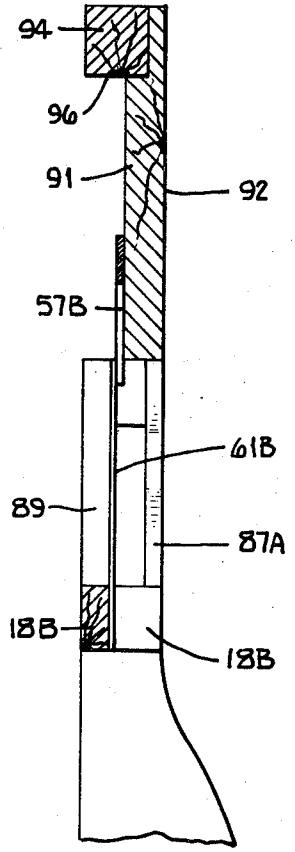


Fig. 16.

INVENTOR
DANIEL F. CALDEMEYER

BY

Woodard Weikart Emhardt & Naughton
ATTORNEYS

MOTOR DRIVEN HEADREST AND BACK FOR RECLINER CHAIR

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to seating equipment, and more particularly to reclining chairs with movable headrests.

2. Description of the Prior Art

There is a considerable amount of prior art having some relationship to the present invention. A list of United States patents showing such prior art will be included at the end of this specification. Inspection of such prior art reveals that much of it pertains to special-purpose, comparatively expensive seating devices. That is particularly true where motorized features are employed. Yet certain desirable comfort features can be secured with considerably less expense using conventional manufacturing materials but employed according to the concepts of my invention. These will become apparent as the description proceeds.

SUMMARY OF THE INVENTION

Described briefly, in a typical embodiment of the present invention, a chairback structure is provided with a headrest vertically slidable therein, the headrest being primarily supported and guided by widely spaced slides, but having a central post assembly with a gear rack thereon engaged by a motor driven pinion in the chairback, to drive the headrest vertically. The guides eliminate all but the linear driving loads from the central post. The drive motor is located to avoid any bulge in the chairback cushion; yet the front-to-rear thickness of the chairback can be minimal.

The chairback is also provided with sector gears at the lower side margins thereof. Brackets are pivotally mounted to the chairback and have gearheads thereon with pinions engaging the sector gears to facilitate motorized drive thereof for tilting the chairback forward or to the rear. The arrangement is such as to facilitate drive by a motor mounted on the chairback itself, or on the seat mounting structure or base, and selector switches are conveniently located for controlling the headrest and back movement.

Another embodiment of the invention employs a vertically movable chairback cushion which can be extended in response to extension of the headrest beyond a certain minimum. A lost-motion feature is employed to permit extending the headrest alone, if desired.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a front elevational view of chair construction employing a typical embodiment of the present invention, showing by "phantom" lines some appearance features and parts of the chair which are not an integral part of the present invention.

FIG. 1A is a stop view of the upper portion of the chairback and headrest of FIG. 1.

FIG. 2 is a side elevational view of the chair of FIG. 1, but on a smaller scale and omitting the lower portion of the chairback frame and adapter plate on the side of the chair near the observer, in order to better show the headrest drive components.

FIG. 3 is a rear elevational view thereof.

FIG. 4 is a front elevational view like FIG. 1 but showing the headrest fully raised (extended).

FIG. 5 is an enlarged section at line 5—5 in FIG. 4 and showing some of the guide features.

FIG. 6 is a view similar to FIG. 1 but showing a second embodiment having a vertically extendable chairback cushion arrangement, the headrest cushion and chairback cushion being shown only fragmentarily.

FIG. 7 is a view similar to FIG. 1 and showing a third embodiment wherein the headrest construction is somewhat different from FIG. 1, and has less vertical travel, permitting the elimination of several parts.

FIG. 8 is a rear elevational view of the third embodiment.

FIG. 9 is a view similar to FIG. 2 but showing the third embodiment.

FIG. 10 is a front view of the third embodiment, with the headrest fully extended.

FIG. 11 is a section taken at lines 11—11 in FIG. 10, viewed in the direction of the arrows, at about twice the size of FIG. 10.

FIG. 12 is a front elevational view similar to FIG. and showing a fourth embodiment wherein the headrest is recessed in the top central portion of the chairback.

FIG. 13 is a fragmentary rear elevational view of the chair of FIG. 12.

FIG. 14 is a fragmentary view of the chair of FIG. 12 but with the headrest fully extended.

FIG. 15 is a view like FIG. 13 but with the headrest fully extended.

FIG. 16 is a section taken at line 16—16 in FIG. 14 and viewed in the direction of the arrow.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In this description it should be understood that the present invention can be employed in a variety of seating devices. Thus the term "chair" as employed herein should be considered as broadly including couches, davenports, or virtually any device for seating one or more people. Also, while it is intended to show only a chair with a stationary base herein, it will be readily recognized that the present invention can be incorporated in rocking or rocker recliner chairs. Further because of its construction, the chairback assembly of the present invention can be employed in a variety of comparatively conventional chairs of fixed-back or reclining chair construction, to provide a truly motorized recliner at minimal cost.

Referring now to FIGS. 1, 2 and 3, the illustrated chairback includes a pair of steel side plates 11 to which the front side members 12 are secured and to which sector gears 13 are mounted at the bottom, with the center of curvature of the sector gears lying on a horizontal axis 14. Upper rear side members 16 are secured to upper portions of the side plates 11 and a cross member 17 is secured to the upper ends thereof. An upper front cross member 18 is secured between the upper ends of the members 12, and the lower front cross member 19 is secured between the lower ends of the members 12. The members 12, 16, 17, 18 and 19 are preferably made of wood, as this is a readily available, widely used material in conventional chair construction and lends itself readily to attachment of other components, upholstery and the like.

A headrest 21 is mounted to the back and includes a pair of side members 22, and upper and lower cross members 23 and 24 respectively. When the headrest is in the lowered condition, as shown by the solid lines in

FIGS. 1, 2 and 3, the lower cross member 24 thereof rests on the upper front cross member 18 of the chairback, and the headrest is immediately ahead of and concealed (when the chair is viewed from the rear) by the upper rear cross member 17 of the chairback.

To drive the headrest vertically with respect to the chairback, a center post assembly 26 is employed and, in the illustrated embodiment it includes a length of steel of channel-shaped cross section affixed to the center block 27 of the headrest and affixed to a steel bar 28 having a gear rack 29 on the left-hand edge thereof as viewed from the front in FIG. 1. The upper portion 28U is received in an appropriately shaped guide plate 31 secured to the under side of the upper front cross member 18. The lower portion of the center post assembly is received between a pinion 32 engaging the gear rack 29, and guide means 33 engaging the edge of the bar opposite the gear rack and having a low friction insert 34 of "Nylon" or other material engaging the front face of the bar 28. The rear face of the bar may slidingly engage an intermediate cross member 36 typically made of steel and affixed to side plates 11. The guide means 33 and a gearhead 37 (FIG. 3) holding the pinion 32 are mounted to member 36.

As shown in FIG. 3, the gearhead is secured to the cross member 36 by a pair of screws 38 and has a yoke portion which projects from the back face of crossmember 36, through a slot therein, to the front thereof, where the pinion is disposed and engaged with the gear rack. This gearhead is conventional and includes another pinion in the housing at the rear of crossmember 36 and which is driven by a worm gear which is, in turn, driven by a flexible cable inside the flexible cable assembly 39 connected to the transmission 41 powered by a drive motor 40. A quick-disconnect fitting at 42 of conventional construction may be employed to facilitate connection and disconnection between the gearhead and flexible cable assembly.

Although the motor and transmission are shown mounted to the lower frame of the back, they could be mounted in the chair base or anywhere else considered suitable. In any event, they are located so they impose no limitation on springing or padding for comfort.

It was mentioned above that sector gears 13 are secured to the lower ends of the side plates 11. Adapter plates 43 are pinned, riveted or otherwise pivotally attached to the side plates 11 at the horizontal axis 14. As best shown in FIG. 2, each of these plates has an arcuate slot 44 therein centered on the axis 14. Each of the plates is affixed to the chair seat or base frame structure 46, typically by means of a pair of screws or bolts. Each plate 43 has a gearhead 47 affixed thereto and having a pinion 48 thereon engaging the sector gear 13. As was the case with gearhead 37, each of the gearheads 47 has an input thereto by means of a flexible drive cable assembly 49.

As suggested above and as will be described more fully hereinafter, the present invention is intended to facilitate the control and operation of the headrest and back of a reclining chair. Accordingly a pair of switch assemblies is employed and located on the inwardly facing surface of the left-hand arm of the chair as shown at 51. The assembly includes an upper button 52 having a neutral position, and rockable between the neutral position and either of two switching positions. An identical switch button 53 is provided below it. These are quite conventional and the leads therefrom are connected to the motor and transmission assembly 40–41. A suitable motor and transmission assembly is that employed by the General Motors Corporation for control of its six-way" adjustable front seats on its passenger vehicles. Two output cable therefrom are connected to the gearheads for the sector gear drive, and one is connected to the gearhead for the headrest rack drive. By rocking the upper button 52 in one direction, for example, the switch will drive motor 40 in one direction and engage the transmission to drive the output cable for the gearhead 37 in one direction to raise the headrest. Rocking the button 52 in its opposite direction will reverse the drive of motor 40 and engage the output cable therefrom to the gearhead 37 to provide downward motion of the headrest. When the button is released, it returns to neutral position, deenergizing the motor 40 and disengaging the drive for the gearhead 37.

The same sort of operation is provided for tilting of the chairback. Rocking button 53 in one direction will drive the motor 40 in one direction and engage the output cables in cable assemblies 49 to drive the pinions in gearheads 47 and drive the sector gears forward, thus tilting the chairback rearwardly. Rocking the switch button 53 in the other direction will reverse the motor and again engage the drive to output cable assemblies 49 and return the chairback to its forward upright position. When the button 53 is released, it returns to its neutral position whereupon the drive terminates. So it is that the headrest or chairback can be positioned anywhere desired between the available limits by simply pushing the appropriate button and releasing it at the appropriate time. Because each of the gearheads employs a worm and pinion arrangement, creep of the headrest or chairback under load, when the motor is not actuated, can be avoided. Of course it should be pointed out that if it was desired to use a motor which could operate in only one direction, a more exotic transmission could be employed and controlled by appropriate solenoids switched by the buttons 52 and 53, to obtain the desired direction of drives depending upon button inclination.

If desired for any reason, a bolt can be used, having its head 54 at the outside face of plate 43 and its shank extending through the slot 44 and through an aperture in the lower portion of side plate 11, a coil spring surrounding it and engaging directly, or through a washer, the inside face of side plate 11, and retained in place by a wingnut. The tension on the spring, and thereby the resistance to pivoting of the chairback, can thereby be adjusted. In addition, by having the motor and transmission located on the lower chairback frame, below the pivot axis 14, a certain amount of counterbalancing can be accomplished.

As stated above, by appropriate manipulation of the control buttons, the chairback can be reclined, and the headrest extended. Another important feature of the present invention pertains to guidance and support of the headrest in its various degrees of extension. Perhaps this can be best appreciated by referring to FIGS. 4 and 5. As shown best in FIG. 4, the headrest is provided with a pair of slides which, in the illustrated embodiment, are two steel strips 57 affixed to the back of the headrest side members 22. Even with the headrest fully extended as shown in FIG. 4, these members extend down into the chairback to positions behind the rear faces of members 12. They also are disposed im-

mediately in front of the front faces of the members 58 which are secured to the upper portions of side plates 11 and to the underside of the upper rear cross member 17 of the chairback. "Nylon" or "Teflon" bearing strips are provided on the rear faces of members 12 at 59 and on the front faces of members 58 at 61. Accordingly, with the members 57 closely fitting and slidingly received between the bearing strips, as well as being laterally confined between the members 16, they are appropriately guided during elevation and descent of the headrest. Furthermore, when the headrest is extended and the chairback is reclined, the assembly is protected against twisting about a longitudinal axis 62 of the center post, and thus secured from damage or faulty operation despite application of torsional forces about the axis 62 as might occur if someone were standing behind the reclined chair and leaning on one corner of the headrest. These provisions help protect the center post and vertical drive assembly from the results of such loading, and help to confine the duties of the center post assembly to simply raising and lowering the headrest. Thus it can be of the type construction and mounting best suited to this limited function. In addition, by having the slides widely spaced as shown in FIG. 4, particularly at the side margins of the headrest, the greatest structural strength can be secured with the least bulk, and the rear of the headrest can be neatly finished with upholstery if and as desired to provide a completely finished appearance from the rear as well as the front, although the headrest be fully extended.

It will be appreciated from the foregoing, that the structure is such as to facilitate the provision of ample cushioning on the headrest as at 63, and on the chairback as at 64, without bulk and without lumps and ridges.

Referring now to FIG. 6, the chairback includes a lower back frame 65 having mounting plates thereon and secured to the chair base structure in the same way as for the embodiment shown in the preceding figures. However, in this instance, the chairback includes also an upper back frame 66 vertically movable with respect to the lower back frame by means of ball bearing slides at 67 between the respective side members of the lower and upper back frames. The chair back cushioning is mounted to the upper back frame 66 and appropriate stops may be provided at 68 or elsewhere to limit the downward travel of the upper frame 66.

A headrest assembly 69 is provided and has a center post assembly 71 similar to that of the previously described embodiment and which may be guided in the upper cross member 72 of the upper back frame 66 in the same manner as in the previously described embodiment. Similarly, the lower portion of the post assembly can be mounted in the same way as in the first described embodiment. One of the possible alternatives is illustrated and may employ a pair of slots 73 receiving pins 74 mounted in the lower cross member 76 of the lower back frame. A rack 77 is drivable by pinion 78 in a gearhead 79 connected to a transmission and motor in the same way as in the previously described embodiment. Also appropriate slides 81 are provided at the lateral margins of the headrest assembly and received in appropriate guides in the upper back frame 66 to accommodate movement of the headrest up and down with respect to the upper back frame 66.

An important feature of the embodiment of FIG. 6 is the provision of means whereby, after a certain predetermined amount of extension of the headrest and thereby its cushion 70 affixed thereto, the upper back frame assembly and thereby the back cushion, is elevated in the direction of arrow 75. This is accomplished by provision of shoulders 82 on the post assembly and which are engageable with the lower surface 83 of the cross member 72. Upon elevating the headrest sufficiently to close up the space 84 between the shoulders 82 and the underside abutment face 83 of the cross member 72, the upper back frame and the chairback cushion 80 affixed thereto will be raised along with the headrest. Conversely, as the headrest is lowered, the upper chairback frame and the cushion therewith will be lowered until descent is terminated by the stop 68 whereupon the headrest will continue to descend until fully retracted or closed, so long as the control button continues to be pressed in the "down direction". As with the previous embodiment, termination of motor operation at any point can be effected by simply releasing the control button.

By way of example and not limitation, the lower cross member 76 may be approximately 16 inches above the floor, and the slides at 67, approximately 30 inches from the floor. The full vertical travel of the center post assembly may be 12 inches. The space 84 may be 6 inches. Thus a total headrest height adjustment of 12 inches, and a chairback height adjustment of 6 inches can be achieved.

If desired, integral motor-gearhead assemblies can be used where I have shown gearheads with flexible shaft inputs. Control buttons can be on either arm or elsewhere on the chair. Various materials may be used in the slides.

Referring now to FIGS. 7 through 11, parts therein which may be the same as in FIGS. 1 through 5, are given the same reference numerals. Other components which typically are somewhat different in shape or size are given the same reference numeral with a postscript A.

As shown in FIG. 7, a panel 27A is disposed between wing members 16A, the latter being affixed to side plates 11 of the chairback. As shown in FIG. 8, a steel plate 25 is affixed to the back of panel 27A by fasteners near the corner of the plate, and the portion 28U of the center post is affixed to the plate 25. As in the first described embodiment, portion 28U is a channel section affixed to the bar 28 having the gear rack thereon drivable by the gearhead 37. In addition to the panel 27A and plate 25, a headrest panel support frame is provided in somewhat the same general configuration as in the first described embodiment of the invention. The side members 22A of this frame are partially hidden by the chairback side members 58 which are affixed to the side plates 11 as in the previously described embodiment. A lower cross member 24A is provided, as well as an upper cross member 23A, shown in FIG. 11, on the headrest.

Referring further to FIG. 11, it should be observed, in order to avoid confusion by comparison with FIG. 5, for example, that the cutting plane for FIG. 11 is at a different location. FIG. 11 shows that the front side members 12 of the chairback are affixed to the side plates 11, just as are the rear side members 58. In this embodiment, nylon or fiber strips 61A (also partially shown in FIG. 10) are affixed to the front faces of members 58. They are engaged by nylon or fiber strips 86 affixed to the back faces of the vertical side mem-

bers 22A of the headrest frame. Accordingly, engagement of the strips 86 with strips 61A provides the support and guidance for the headrest from its closed portion to its maximum open position of FIGS. 10 and 11 and avoids pivoting thereof about the axis 62 when the chairback is reclined and a load is placed on the headrest as by a child leaning on a corner thereof, for example.

Referring now to FIGS. 12 through 16, some parts therein which may be the same as in FIGS. 1 through 5, are given the same reference numerals. Other parts typically somewhat different in shape or size are given the same reference numeral with a post script B.

In the embodiment of FIGS. 12 through 16, the chairback side members 12B extend upward from the lower cross ember 19 to the area of attachment to the side plates 11B and then on up to upper cross members 87. Cross members 18B and 88 are provided between the upper cross members 87 and the gearhead mounting plate 36, the latter being affixed to the side plates 11B in the same manner as in the previously described embodiment. In fact, the portions below the cross member 36 are constructed in the same way as in the first described embodiment. Also the construction of the center post assembly may be the same.

Headrest support members 89 are affixed to the members 87 and 18B and, as shown in FIG. 14, a bearing strip 61B of nylon, fiber, or other suitable material, is affixed to the front face of each of the members 89 and extends parallel to the center post assembly. Two steel strips 57B are provided on the headrest itself, one at each side of the center post assembly and engaging one of the two bearing strips 61B. Perhaps this is best shown in FIG. 16. Each of the steel strips 57B is affixed to the rear of a center block 91 affixed to the back of the front panel 92 of the headrest. The center post assembly is affixed to the headrest by any suitable means which may include a strap 93 affixed thereto and to the steel strips 57B, (FIG. 15). An upper cross member 94 is affixed to the headrest by attachment to the face panel 92 or block 91 or both. The lower face 96 of this cross member, abuttingly engaging the upper face of the upper cross members 87 of the chairback, can serve as a stop for the descent of the headrest. As in the previously described embodiments, a guide plate 31 can be provided, affixed to the lower face of cross member 18B, and guiding the channel section of the center post assembly. A stop 10 can be provided at 97 in the center post assembly for engagement of the underside of member 31 to limit upward travel of the headrest assembly. This same arrangement can be provided in the other embodiments of the invention. However, it should be understood that it may be considered preferable to employ limit switches to terminate motor drive as the headrest approaches the mechanical limits of motion, rather than relying on abutting engagement of mechanical stops.

While the invention has been disclosed and described in some detail in the drawings and foregoing description, they are to be considered as illustrative and not restrictive in character, as other modifications may readily suggest themselves to persons skilled in this art and within the broad scope of the invention.

List of Prior Art

2,158,183	Hascham	May 16, 1939
2,481,133	Luketa	Sept. 6, 1949
2,491,898	Luketa	Dec. 20, 1949
2,533,595	Luketa	Dec. 12, 1950
2,668,581	Luketa	Feb. 9, 1954
2,684,708	Luketa	July 27, 1954
2,701,606	Hascham et al.	Feb. 8, 1955
2,869,619	Petersen et al.	Jan. 20, 1959
2,947,347	Spound	Aug. 2, 1960
2,919,746	Fidel	Jan. 5, 1960
2,985,229	Shamblin	May 23, 1961
2,989,341	Schliephacke	June 20, 1961
Re.25,345	Spound	Mar. 12, 1963
3,147,038	Barabas	Sept. 1, 1964
3,311,413	Martens	Mar. 28, 1967
3,345,107	Homier et al.	Oct. 3, 1967
3,427,073	Downs et al.	Feb. 11, 1969
3,462,193	Tamura	Aug. 19, 1969
3,471,198	Homier et al.	Oct. 7, 1969
3,473,845	Taylor et al.	Oct. 21, 1969

The invention claimed is:

1. The combination comprising:
a chair back;
a headrest;
first post means projecting downward from said headrest into said back, and having a first gear member thereon;
a second gear member on said back, and engaging said first gear member;
motor means connected to one of said gear members for driving said gear members;
and additional post means projecting downward from said headrest into said back, said additional post means being laterally spaced from said first post means and from each other to prevent turning of said headrest about an axis extending lengthwise of said first post means;
said headrest being linearly movable up and down with respect to said chair back;
said chair back including first and second back members, said second member having cushion means thereon and being linearly movable up and down with respect to said first back member;
said first post means having first laterally extending shoulder means;
said second back member having an abutment thereon engageable by said shoulder means as said headrest is moved upwardly with respect to said chair back, to thereupon move said second back member upwardly with respect to said first back member.

2. The combination of claim 1 wherein:
said shoulder means and said abutment are vertically spaced when said headrest is at its lowermost position with respect to said chair back, to provide some lost motion of said headrest with respect to said second back member during initial movement of said headrest upwardly with respect to said chair back.

3. The combination comprising:
a chair back;
a headrest;
first post means projecting downward from said headrest into said back, and and having a first gear member thereon;
a second gear member on said back, and engaging said first gear member;
motor means connected to one of said gear members for driving said gear members;
and additional post means projecting downward from said headrest into said back, said additional post means being laterally spaced from said first post means and from each other to prevent turning of

said headrest about an axis extending lengthwise of said first post means;

sector gear means on the lower portion of said chair back;

mounting means pivotally connected to said chair for pivoting on a horizontal axis through the center of curvature of said sector gear;

a gearhead secured to said mounting means and including a pinion engaged with said sector gear means, said gearhead including input means for drive by a motor to pivot said chair back about said axis on said mount means.

4. The combination of claim **3** wherein:

said motor means includes a plurality of output devices, one of said output devices being connected to said one of said gear members for the drive thereof, another of said output devices being connected to said gearhead for driving said pinion.

5. The combination of claim **4** and further comprising:

switch means coupled to said motor means for activation of said motor means and selective activation of said output devices, for operation of said headrest on said chair back, and for operation of said chair back on said mounting means.

6. The combination of claim **5** wherein:

said mounting means include members securable to a chair seat supporting structure, and said output devices include flexible drive cables.

7. The combination of claim **5** and further comprising:

a floor mountable seat supporting structure,

said mounting means being affixed to said structure whereby said chair back is pivotable backward and forward with respect to said structure by operation of said switch means.

8. The combination comprising:

a chair back;

a headrest;

first post means projecting downward from said headrest into said back, and having a first gear member thereon;

a second gear member on said back, and engaging said first gear member;

motor means connected to one of said gear members for driving said gear members;

and additional post means projecting downward from said headrest into said back, said additional post means being laterally spaced from said first post means and from each other to prevent turning of said headrest about an axis extending lengthwise of said first post means;

said additional post means including a pair of slides, said back having a pair of guides receiving said slides therein.

9. The combination of claim **8** wherein:

said chair back has a frame including first and second side members at opposite sides of said back, an upper front crossmember connected between upper portions of said side members, and a second crossmember connected between said side members and spaced below said upper crossmember; and

each guide of said pair is secured to one of said side members and includes front and rear rails, with one of said slides slidingly received between facing surfaces of said front and rear rails.

10. The combination of claim **9** wherein each guide includes a surface facing toward the center of said back and engageable with one of said slides for lateral confinement and guidance of said headrest, the combination further comprising:

an upper center post guide on said upper front crossmember and guidingly receiving an upper portion of said first post means therethrough;

lower center post guide means on said second crossmember, said lower center post guide means including a low friction bearing device and a pinion spaced therefrom.

11. The combination of claim **10** wherein:

said first gear member is a gear rack;

said second gear member is said pinion;

said gear rack being provided on a bar portion of said first post means and engaging said bearing device opposite the teeth on said rack and holding said rack in engagement with said pinion.

12. The combination of claim **11** wherein:

said motor means are located on said chair back below said second crossmember and coupled to said pinion through a flexible drive cable.

13. The combination comprising:

a chair back;

a headrest;

first post means projecting downwardly from said headrest into said back and having a first gear member thereon;

a second gear member in said back and engaging said first gear member;

motor means connected to one of said gear members for driving said gear members;

first and second back members, said second member having cushion means thereon and being linearly movable up and down with respect to said first back member;

said first post means has first laterally extending shoulder means;

said second back member has an abutment thereon engageable by said shoulder means as said headrest is moved upwardly with respect to said chair back, to thereupon move said second back member upwardly with respect to said first back member.

14. The combination of claim **13** wherein:

said shoulder means and said abutment are vertically spaced when said headrest is at its lowermost position with respect to said chair back, to provide some lost motion of said headrest with respect to said second back member during initial movement of said headrest upwardly with respect to said chair back.

15. The combination comprising:

a chair back;

a headrest;

first post means projecting downwardly from said headrest into said back and having a first gear member thereon;

a second gear member in said back and engaging said first gear member;

motor means connected to one of said gear members for driving said gear members;

sector gear means on the lower portion of said chair back;

mounting means pivotally connected to said chair back for pivoting on a horizontal axis through the center of curvature of said sector gear means;

and a gearhead secured secured to said mounting means and including a pinion engaged with said sector, said gearhead including input means for drive by a motor to pivot said chair back about said axis on said mount means.

16. The combination of claim **15** wherein:

said motor means includes a plurality of output devices, one of said output devices being connected to said one of said gear members for the drive thereof, another of said output devices being connected to said gearhead for driving said pinion.

17. The combination of claim **16** and further comprising:

switch means coupled to said motor means for activation of said motor means and selective activation of said output devices, for operation of said headrest on said chair back, and for operation of said chair back on said mounting means.

18. The combination of claim **17** wherein:

said mounting means include members securable to a chair seat supporting structure, and said output devices include flexible drive cables.

19. The combination of claim **8** wherein:

said chairback has a frame including first and second headrest support members thereon;

each guide of said pair is secured to one of said headrest support members and includes an elongated strip of bearing material extending lengthwise vertically on the front of each of said support members;

each of said slides includes an elongated strip of bearing material extending lengthwise vertically on the rear of said headrest and slidingly engaging the said bearing material strip on the front of said support member.

20. The combination of claim **19** wherein:

said strip of bearing material on said headrest is a steel strip.

21. The combination of claim **20** wherein:

said chairback frame includes an upper front crossmember and a second crossmember spaced below said upper crossmember,

an upper center post guide is located on said upper front crossmember and guidingly receives an upper portion of said first post means therethrough, and

a lower center post guide is mounted on said second crossmember.

22. The combination comprising:

a chairback frame having wood sidemembers;

metal side plates affixed to said side members for mounting said frame to a support therefor;

a headrest;

first post means projecting downward from said headrest into said chairback;

drive means on said chairback and on said post means for moving said headrest relative to said chairback; and

bearing means on said chairback frame and said headrest to prevent pivoting of said headrest on said chairback about an axis parallel to the direction of movement of said headrest relative to said chairback by said drive means;

said chairback frame including first and second forwardly facing bearing means thereon;

said headrest including second and third post means having rearwardly facing bearing means thereon sliding engaging said forwardly facing bearing means on said chairback frame during said movement of said headrest relative to said chairback.

23. The combination of claim **22** wherein:

said chairback frame sidemembers include front and rear sidemembers affixed to said side plates,

said first and second bearing means being located on said rear sidemembers;

additional rearwardly facing bearing means located on said front sidemembers;

said first mentioned rearwardly facing bearing means also having forwardly facing bearing surfaces thereon slidingly engaging said additional rearwardly facing bearing means;

said second and third post means projecting below the lower margin of said headrest and thereby permitting guided and supported extension of said headrest above the upper margin of said chairback frame.

24. The combination of claim **22** wherein:

said second and third post means are vertical sidemembers of said headrest.

25. The combination of claim **24** wherein:

said chairback has an upper front crossmember and

upper guide means for said first post and mounted to said upper front crossmember and having rearwardly facing guide surface means engaging said first post.

26. The combination of claim **25** wherein:

said upper guide means include laterally facing guide surface means guidingly engaging side margins of said center post.

* * * * *