

Aug. 16, 1949.

W. McARTHUR
RECLINING CHAIR

2,479,175

Filed Aug. 10, 1946

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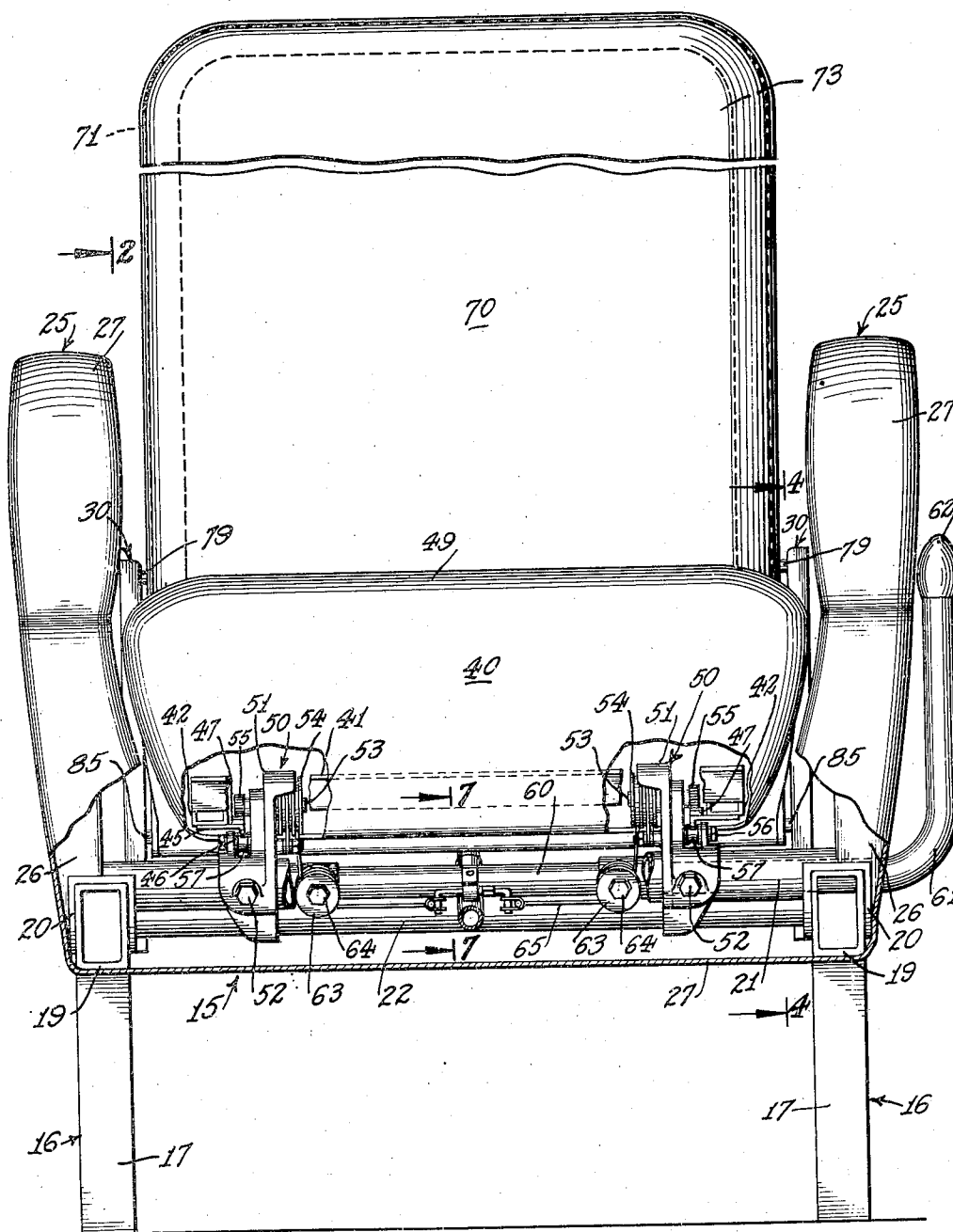


FIG. 1.

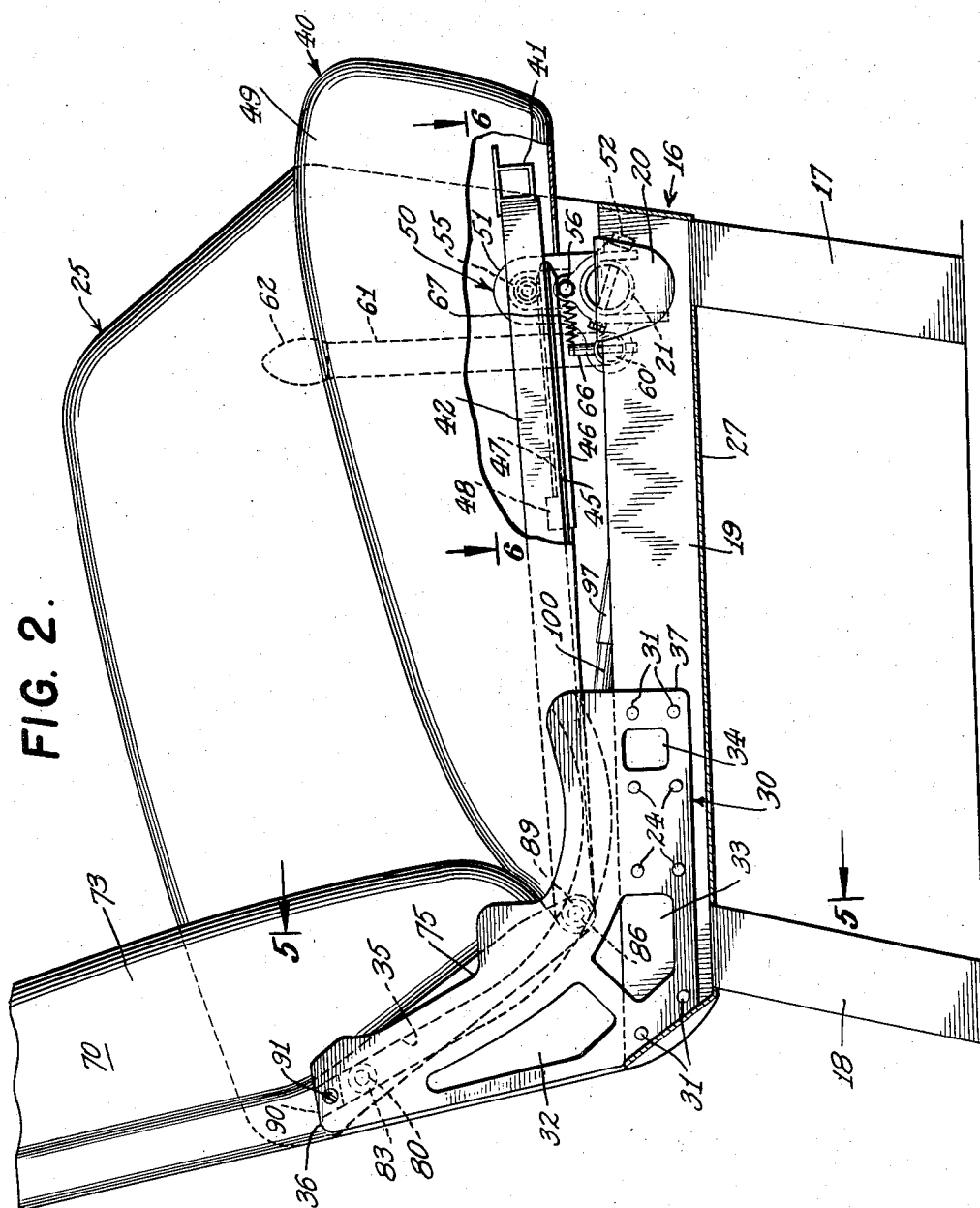
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FIG. 2.



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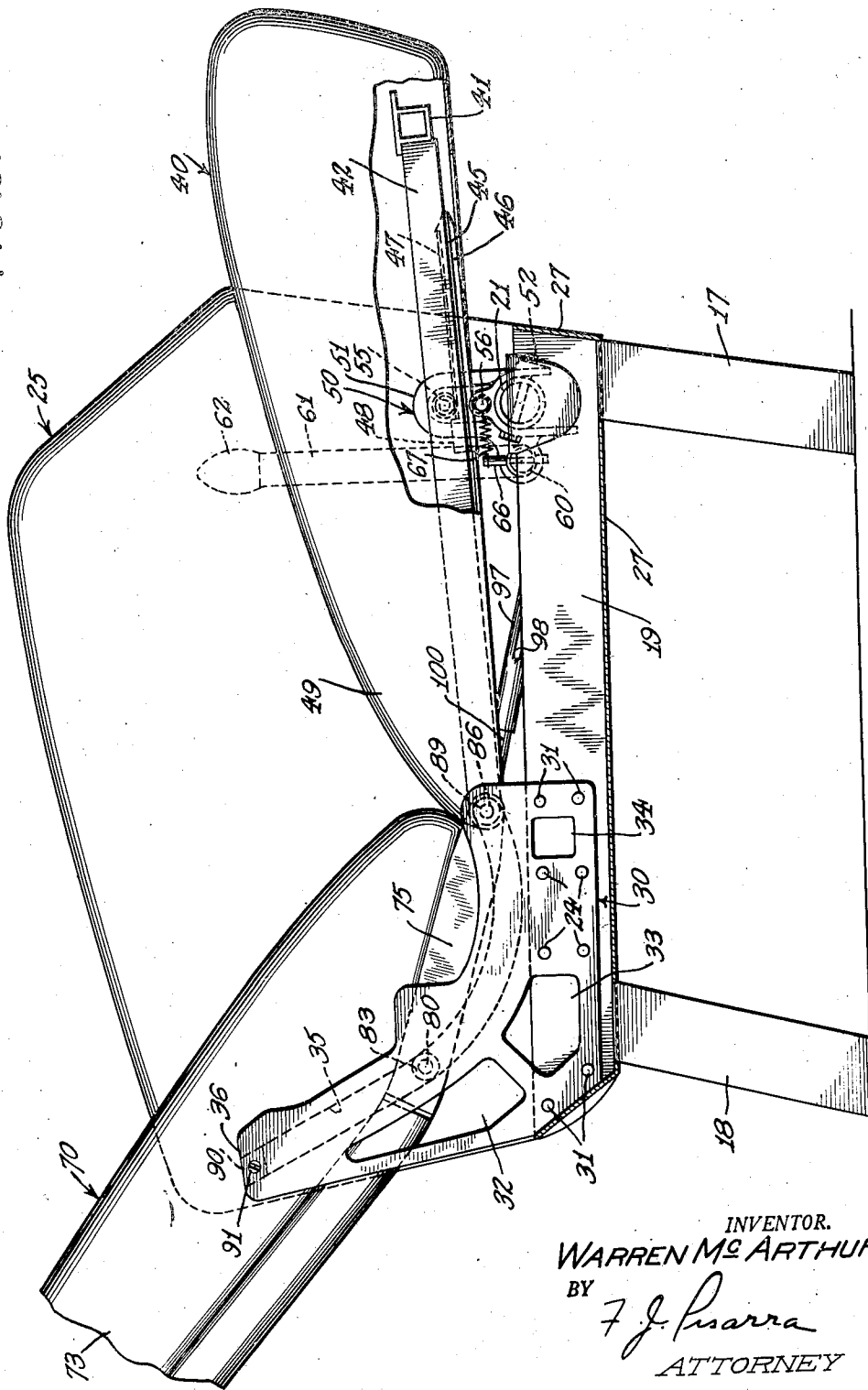
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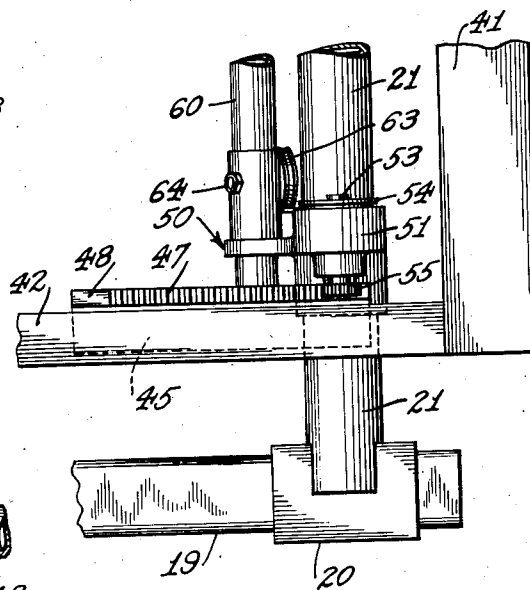
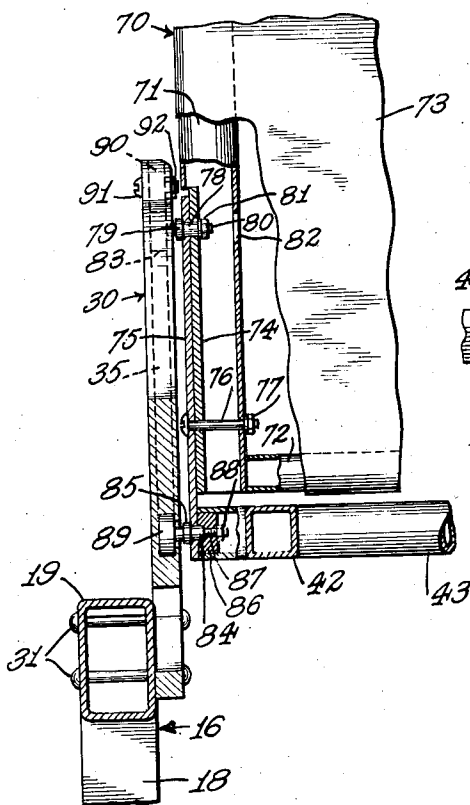
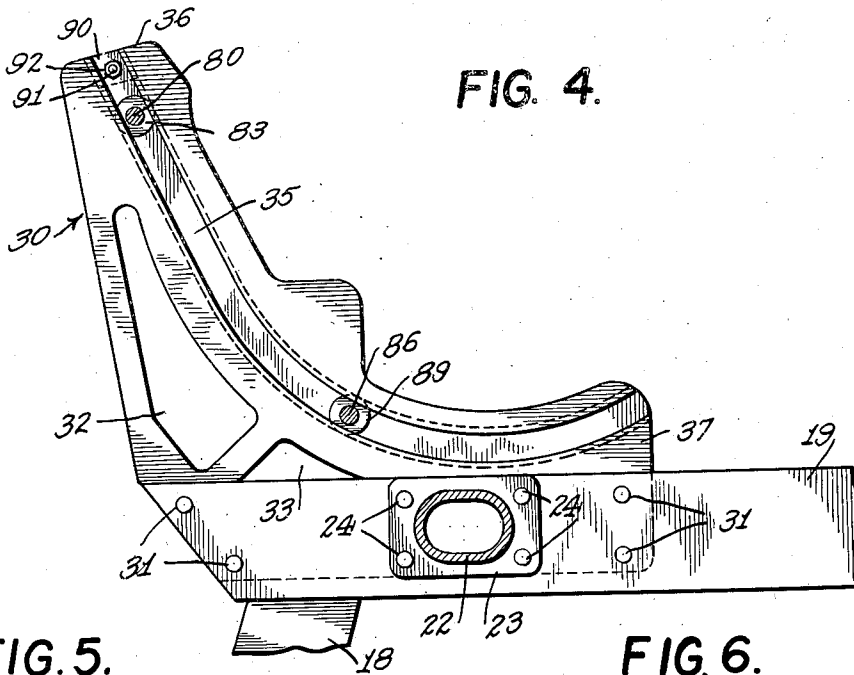


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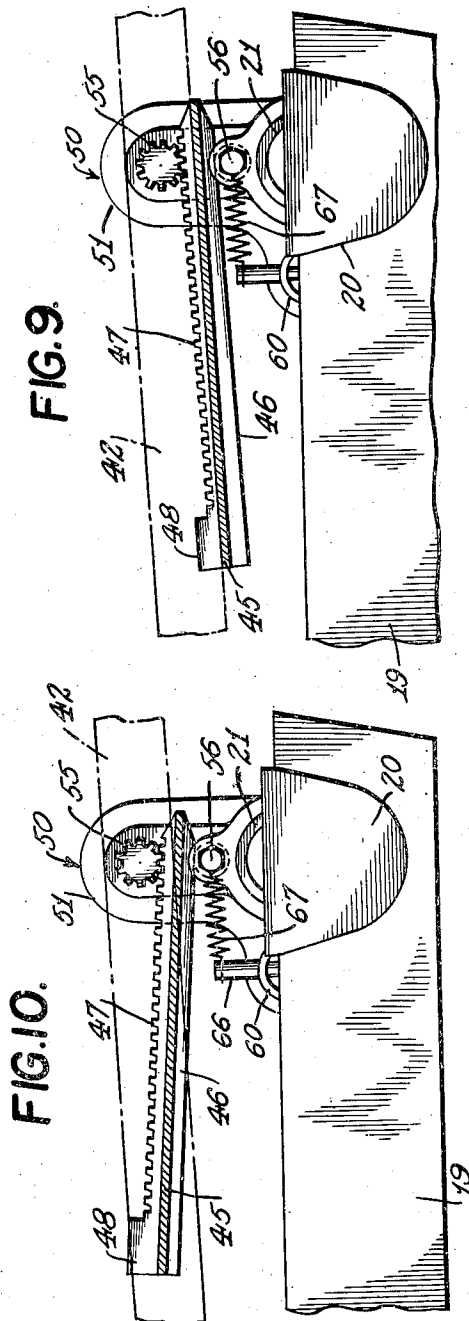
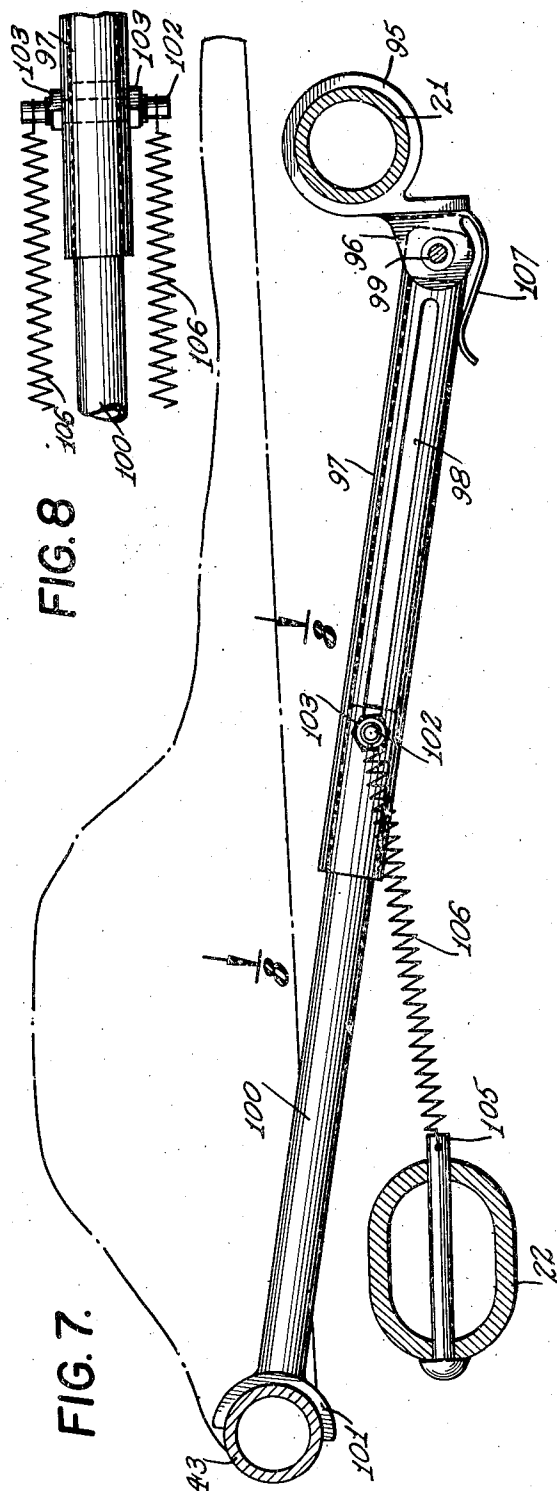
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5 Sheets-Sheet 5



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UNITED STATES PATENT OFFICE

2,479,175

RECLINING CHAIR

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Application August 10, 1946, Serial No. 689,660

4 Claims. (Cl. 155—116)

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This invention relates to an article of furniture, and more particularly to a chair of the reclining type having improved structural characteristics and having parts so arranged to permit of greater comfort to the user and ready adjustability of the seat and back within a relatively wide range of increments of recline from "upright" to "full recline" positions.

In the usual type of reclining chair, the back is pivoted about a fixed axis intermediate its top and bottom, and the rear end of the seat is in turn pivoted to the back below this fixed axis. As a result of this arrangement, when the back is tilted from "upright position" to "full recline position," the seat is not only moved forward but the rear portion thereof is raised upwardly and tends to urge the occupant of the seat forwardly and out of the seat. This is highly objectionable as the occupant, instead of securing comfort and being able to relax, is oftentimes subject to discomfort and nervous strain, especially if the occupant attempts to use the chair in a recline position for an extended period of time. This is particularly the case in many reclining chairs that have heretofore been used in airplanes, railroad cars, buses and other means of transportation.

The reclining chair of this invention obviates many of the difficulties experienced in the past and affords a number of improved features and distinct advantages. For one thing, my reclining chair has the back and seat so arranged, with respect to each other and to a support frame, that as the chair is adjusted from upright to various degrees of recline, the rear of the seat is lowered, thereby eliminating any tendency of the occupant to slide forward and out of the seat. This is accomplished by permitting the lower portion of the back and the rear end of the seat to move in unison along a preferably arcuate path defined by a track and roller arrangement, as distinguished from the construction employed in the past wherein the back is pivoted to the support frame about a fixed axis.

The chair of this invention preferably comprises a support frame including a pair of side frames that are maintained in spaced-apart relation by a front and a rear stretcher. Secured to each side frame and extending upwardly therefrom is a plate having a downward and forward, preferably arcuate, slot that serves as a track. The seat is slidable forwardly and rearwardly along the front stretcher and is provided at its rear with a pair of laterally projecting rollers that register with the plate slots and move

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along the path defined thereby. The back is pivotally connected to the rear of the seat about the axis of the seat rollers. The back carries a pair of rollers disposed above the seat rollers and registering with the plate slots and movable along the path defined by the slot. Thus, as the back is tilted from upright to full recline position, it moves forward of the position it would attain if it were pivoted to the support frame about a fixed axis. This is an important feature and is particularly advantageous if the chair is used in airplanes or the like, where one seat is mounted close to the rear of a seat in front of it to economize on space, since the top of the back will not project so far rearwardly when in recline position, as would be the case with conventional reclining chairs.

The slots in the plates carried by the side frames extend from the forward edge of the plate to the top edge thereof so as to permit the removal of both the back and seat by a single upward movement. A removable plug within the upper portion of one or both of the slots serves as a stop to limit rearward movement of the back and seat, while an element associated with a suitable chair locking mechanism limits forward movement of the seat and, therefore, the back.

Another feature of my reclining chair construction resides in affording adequate space for the legs and feet of a person seated to the rear of the chair. The track and roller arrangement eliminates the possibility of the person's shins being injured in the course of varying the recline of a chair under which his feet may be extended. Also, the clearance between the under side of the chair seat and the floor is at a maximum to provide storage space, as may be required.

An additional feature lies in the provision of a resilient mechanism for normally urging the seat and back from recline positions to the relative position assumed by the seat and back when the back is in "upright position." This mechanism enables an occupant to return the seat and back to the upright or non-recline position with very little effort on his part. Furthermore, this mechanism does not appreciably hinder the occupant in adjusting the seat from upright to any one of the desired recline positions.

It is accordingly the principal object of this invention to provide a reclining seat wherein the back, seat and support frame are so arranged as to afford requisite comfort to the occupant regardless of the degree of recline of the back with respect to a vertical plane.

Another object of the invention is to provide a

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reclining chair wherein the parts are so arranged as to allow adequate room for the feet of an occupant seated in a chair to the rear. This is especially desirable in transportation seating and in close seating arrangements.

Another object of the invention is the provision of a reclining chair having an adjustable seat and back that may be readily removed as a unit from the frame of the chair.

This invention has for a further object the provision of a chair of the character indicated wherein the seat and back are adjustable in unison along a generally downward and forward path.

A still further object of the invention is to provide a reclining chair that is characterized by its simple design, staunch construction, and light weight.

The foregoing, as well as other objects and advantages, will be readily understood by persons skilled in the art upon reference to the following detailed description, taken in conjunction with the annexed drawings, which respectively describe and illustrate preferred embodiments of the invention.

In the drawings, wherein like reference numerals denote corresponding parts throughout the several views:

Figure 1 is a front elevational view of a reclining chair constructed in accordance with this invention, parts being broken away for better illustration;

Figure 2 is a view taken along line 2—2 of Figure 1, with parts broken away and other parts omitted, and illustrating the relationship of the parts when the back and seat are adjusted to "upright position";

Figure 3 corresponds to Figure 2 and illustrates the relationship of the parts when the back and seat are adjusted to "full recline position";

Figure 4 is an enlarged view taken along line 4—4 of Figure 1;

Figure 5 is an enlarged fragmentary view taken along line 5—5 of Figure 2, with parts broken away for better illustration;

Figure 6 is an enlarged view taken along line 6—6 of Figure 2;

Figure 7 is an enlarged view taken along line 7—7 of Figure 1, with parts omitted. The purpose of Figure 7 is to illustrate the devices in the mechanism for normally urging the seat and back from "recline" to "upright position";

Figure 8 is a fragmentary view taken along line 8—8 of Figure 7;

Figure 9 is an enlarged view of devices employed with the locking mechanism for controlling movement of the seat with respect to the support frame; and

Figure 10 corresponds to Figure 9 and is illustrative of a modification of the arrangement shown in Figure 9.

The reclining chair of this invention comprises a support frame, generally indicated by numeral 15 in Figure 1, and including a pair of spaced parallel and upright side frames 16. Each side frame includes a front leg 17 and a rear leg 18 that are joined together at the top by a brace 19. Legs 17 and 18 and braces 19 are preferably made of magnesium tubing elements that are rectangular in cross section to obtain requisite strength and rigidity and to provide light-weight construction. Proximate the forward end of each brace 19 and secured thereto in any desired manner is an inverted U-shaped member 20, to which the opposite ends of a front circular tubu-

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lar stretcher 21 are affixed. A rear tubular stretcher 22, preferably elliptical in cross section (Figures 4 and 7), is connected to the rear portion of each brace 19 through the medium of an attaching plate 23 and rivets or the like 24, as is best shown in Figure 4.

Secured to each side frame 16 and projecting thereabove, is an arm rest 25 that includes an upstanding tubular frame 26 and that is provided with the usual padding material (not shown) and is covered with a suitable upholstery fabric 27 which extends under each brace 19 and spans the space between these braces, as is indicated in Figures 1 and 2.

As is best shown in Figures 4 and 5, each side frame also includes an upstanding metal plate 30, mounted against the inner vertical face and at the rear portion of a corresponding brace 19 through the medium of a series of rivets 31 and rivets 24, earlier mentioned. Each plate 30 is provided with cutouts or apertures 32, 33 and 34 for effectively reducing the weight of the plate without impairing its strength or rigidity. Formed in each plate 30 is an elongated downwardly and forwardly extending arcuate milled slot or groove 35 that is preferably of C cross-sectional configuration and that serves as a track for rollers, as will be hereinafter described in greater detail. It will be noted from an examination of Figure 4 that each slot 35 is open to the inner face of its plate 30, and further that each slot extends from upper edge 36 to forward edge 37 of a corresponding plate 30.

The seat 40 of the chair of this invention includes a seat frame that is preferably fabricated from tubular magnesium members consisting of a front tubular member 41, a pair of spaced side tubular members 42 and a rear tubular member 43. As is shown in Figures 1, 2, 3, 5 and 7, front and side tubular members 41 and 42 are square in cross section, while rear tubular member 43 is circular in cross section. These tubular members are welded together to obtain a rigid light-weight seat frame.

Attached to each side tubular member 42 is a member 45 including a depending flange or rail 46 and carrying a rack 47 having an integral rear upward extension or stop 48 (Figures 1 and 9). Seat 40 may be equipped with any desired known type of spring construction and padding material (not shown) and is covered with an upholstery fabric 49.

A locking mechanism 50 is mounted on support frame 15 and coacts with racks 47 to control forward and/or rearward movement of seat 40 with respect to the support frame. This locking device may include a pair of brackets 51 attached to front stretcher 21 by bolts 52. Rotatably supported in each bracket 51 is a shaft 53 that carries a cable drum 54 and a pinion 55 at its inner and outer ends, respectively. Each pinion 55 meshes with a corresponding rack 47. A bolt 56 is mounted in each bracket 51, below and in parallel relation to a corresponding shaft 53, and carries a peripherally grooved roller 57 along which rail 46 is arranged to ride. A control lever includes a horizontal portion 60, that extends through and is rotatable in brackets 51, and an upwardly extending portion 61 positioned adjacent the outside of one of the side frames 16 and that has an actuating hand grip 62 at its free end. A pair of spaced pulleys 63 are attached to lever portion 60 by bolts 64, as is best shown in Figures 1 and 6. A flexible cable means 65 is wrapped one or more turns about each cable

drum 54 and passes under each pulley 63. A pin 66 (Figures 2 and 9), projecting upwardly from portion 60 of the control lever, is connected to bolt 56 by a helical spring 67. This spring is in tension and tends to normally urge the control lever in a clockwise direction (Figure 1) to thereby place flexible cable means 65 in tension and effect snubbing engagement of the cable means with the cable drums. Locking device 50 may be the same as or similar to the corresponding mechanism disclosed in my pending application Serial No. 664,184, filed April 23, 1946, to which reference may be had for details of construction and operation but which has become abandoned.

As is best shown in Figure 9, the front end of flange or rail 46 is inclined forwardly and upwardly, while the front end of rack 47 is inclined forwardly and downwardly to permit their ready mounting on roller 57 and meshing with pinion 55, respectively. In Figure 2, the seat 40 is shown at its rearwardmost position, pinion 55 being in meshing engagement with the forward portion of rack 47. When the seat is in the position illustrated in Figure 3, stop 48 bears against pinion 55, thereby restraining the seat against further forward movement.

A back 70 (Figures 1, 4 and 5) includes a frame consisting of an inverted U-shaped tubular member 71, having the lower portion of each arm bent forwardly, and a cross tubular member 72 welded together. The back is preferably provided with suitable springs (not shown) for added comfort and is covered with an upholstery fabric 73. The lower portion 74 of each arm of tubular member 71 is slitted and depressed, as indicated in Figure 5, to receive a bar 75 that is rigidly attached thereto by a bolt 76, a nut 77, and a sleeve 78 having a flange 79, a bolt 80, and a nut 81. Portion 74 of each arm is provided with an aperture 82 to permit a wrench or other tool to be inserted within the tube for the manipulation of nut 81. Each bolt 80 carries at its outer end a roller 83 that is adapted to register with slot 35 in a corresponding plate 30 and ride along the track defined by this slot in the plate.

The lower portion of each bar 75 extends below the back frame and is pivotally connected to the rear of the seat through the medium of a sleeve 84 having a flange 85, a plug 86 suitably anchored within rear tubular member 43 of the seat frame, a bolt 87, and a nut 88. A roller 89, that may be the same as roller 83, is rotatable about the common axis of bolt 87 and sleeve 84 and is adapted to register with and ride along the track defined by the slot 35 in a corresponding plate 30.

A cap plug 90 is positioned in the upper end of each slot 35 and is removably attached to plate 30 by a bolt 91 and a nut 92. Plugs 90 serve as stops to limit upward travel of back 70 and to prevent accidental removal of the back and seat from the support frame. It will be apparent from a consideration of Figures 2 and 5 that upon removal of cap plugs 90, back 70 and seat 40 may be removed from the support frame in unison by merely pulling upwardly on the back itself.

Reference is next had to Figures 7 and 8 for details of construction of a mechanism for normally and yieldingly urging seat 40 and back 70 in the direction of upright position. This mechanism includes a sleeve 95 concentric with front stretcher 21 and having an integral depending bifurcated bracket 96. A first tube 97 is provided with a pair of diametrically opposed longitudinal slots 98, only one of which is shown in the draw-

ings; and is pivotally connected at its forward end to bracket 96 by a bolt 99. A second tube 100 is telescopically arranged with respect to first tube 97 and is provided at its rear end with a semi-cylindrical yoke 101 that receives and bears against rear tubular member 43 of the seat frame. A threaded pin 102 extends through the forward end of tube 100 and projects through and beyond slots 98 in tube 97. A nut 103 is provided on opposite sides of tube 97 to restrain pin 102 against axial movement. A pair of pins 105, only one of which is shown in Figure 7, projects through rear stretcher 22 and is connected to opposite ends of pin 103 by corresponding helical springs 106. Springs 106 are stressed in tension and tend to maintain yoke 101 in readily detachable coupling engagement with seat frame member 43 and urge the seat 40 rearwardly. A curved leaf spring 107, attached to bracket 96 and positioned beneath and along tube 97, serves to maintain telescoping tubes 97 and 100 in the position shown in Figure 7 against the action of springs 106 when the seat 40 and back 70 are removed from the support frame, so that yoke 101 will be in position to again receive seat frame member 43 when the seat and back are again mounted in slots 35 of plates 30. Additionally, spring 107 eliminates the possibility of binding action between tubes 97 and 100 when they are in the relative position shown in Figure 7. It will be noted that tube 100 is shown extended with respect to tube 97 in Figure 7, which is illustrative of the relative position of the parts, due to the action of springs 106, when the back and seat are in upright position (Figure 2).

In the embodiment of the invention shown in Figures 1, 2, 3 and 9, member 45 and rack 47 are parallel to side tubular members 42 of the seat frame. As the seat and back are adjusted from upright position (Figure 2) to full recline position (Figure 3), the front of the seat moves both forwardly and upwardly.

In Figure 10, member 45 and rack 47 are shown inclined downwardly and forwardly with respect to side tubular member 42 of the seat frame. When the seat and back are adjusted from upright to one of the recline positions, this arrangement permits the front of seat 40 to move forwardly and horizontally or downwardly, depending upon the angle of incline between the seat frame and member 45. It will be apparent that member 45 may be disposed at any desired angle with respect to side tubular members 42 of the seat frame so as to raise or lower the forward portion of seat 40 with respect to the support frame when the chair is in a recline position.

From the foregoing, it is thought that the objects, construction, operation, and many advantages of the herein described invention will be apparent to those skilled in the art, without further description; and, it will be understood that various changes in the size, shape, proportion and minor details of construction may be resorted to without departing from the spirit, or sacrificing any of the advantages of the invention.

I claim:

1. In a chair construction, a support including a pair of spaced side frames, a track carried by each side frame and defining a generally downward and forward arcuate path, a seat, a back having its lower portion pivotally connected to the rear portion of the seat, means supporting the upper portion of the back and a roller secured and disposed to each side of the seat and rotatable about

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an axis that is substantially coincident with the axis of the pivotal connection between the seat and the back, each roller engaging a corresponding track to permit simultaneous movement of the rear portion of the seat and the lower portion of the back along the path defined by the tracks.

2. In a chair construction, a support including a pair of spaced side frames, a track carried by each side frame and defining a generally downward and forward arcuate path, a seat, a back 10 having its lower portion pivotally connected to the rear portion of the seat, a roller attached to each side of the seat and rotatable about an axis that is substantially coincident with the axis of the pivotal connection between the seat and the back, and a roller secured to each side of the back intermediate the top thereof and the pivotal connection between the seat and back, the rollers on each side of the seat and back engaging a corresponding track to permit simultaneous 15 movement of the seat and back along the path defined by the tracks.

3. In a chair construction, a support including a pair of spaced side frames, a track carried by each side frame and defining a generally downward and forward path, a seat having its forward portion slidably mounted in the forward portion of the support, a back having its lower portion pivotally connected to the rear portion of the seat, a roller attached to each side of the seat and rotatable about an axis that is substantially coincident with the axis of the pivotal connection between the seat and the back, and a roller secured to each side of the back intermediate the top thereof and the pivotal connection 35 between the seat and back, the rollers on each side of the seat and back engaging a corresponding track to permit simultaneous movement of the seat and back along the path defined by the tracks.

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4. In a chair construction, a support including a pair of spaced members, each member having grooves formed therein, said grooves being disposed in opposing substantially parallel relationship and defining a generally downward and forward arcuate path, a seat, a back having its lower portion pivotally connected to the rear portion of the seat, a roller attached to each side of the seat and rotatable about an axis that is substantially coincident with the axis of the pivotal connection between the seat and the back, and a roller secured to each side of the back intermediate the top thereof and the pivotal connection between the seat and back, the rollers on each side of the seat and back registering with a corresponding groove to permit simultaneous movement of the rear portion of the seat and lower portion of the back along the path defined by the grooves.

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