

Dec. 2, 1969

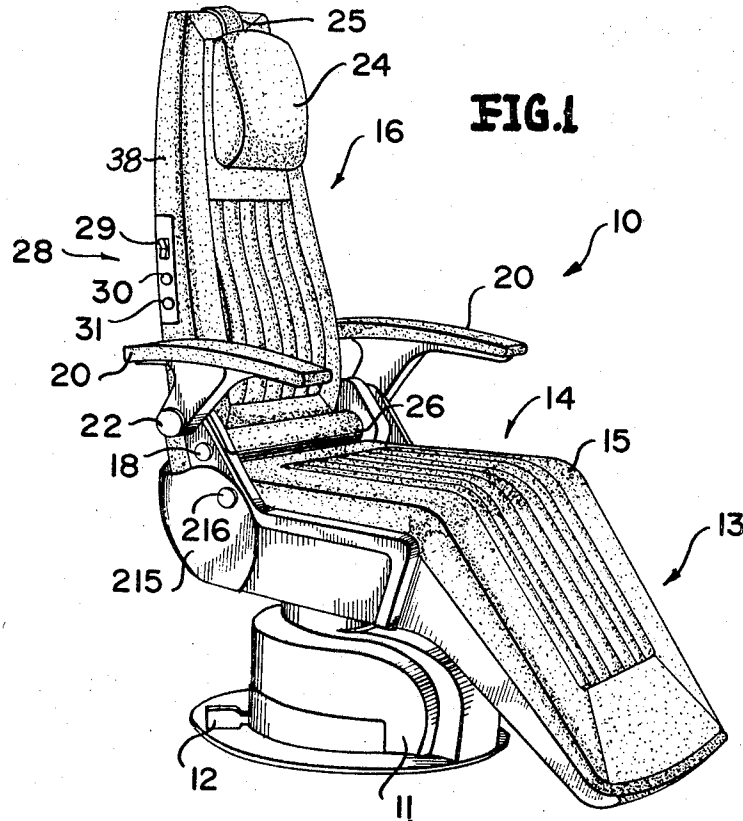
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3,482,072

CONTROL FOR ADJUSTABLE CHAIR

Original Filed July 27, 1965

4 Sheets-Sheet 1



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4 Sheets-Sheet 2

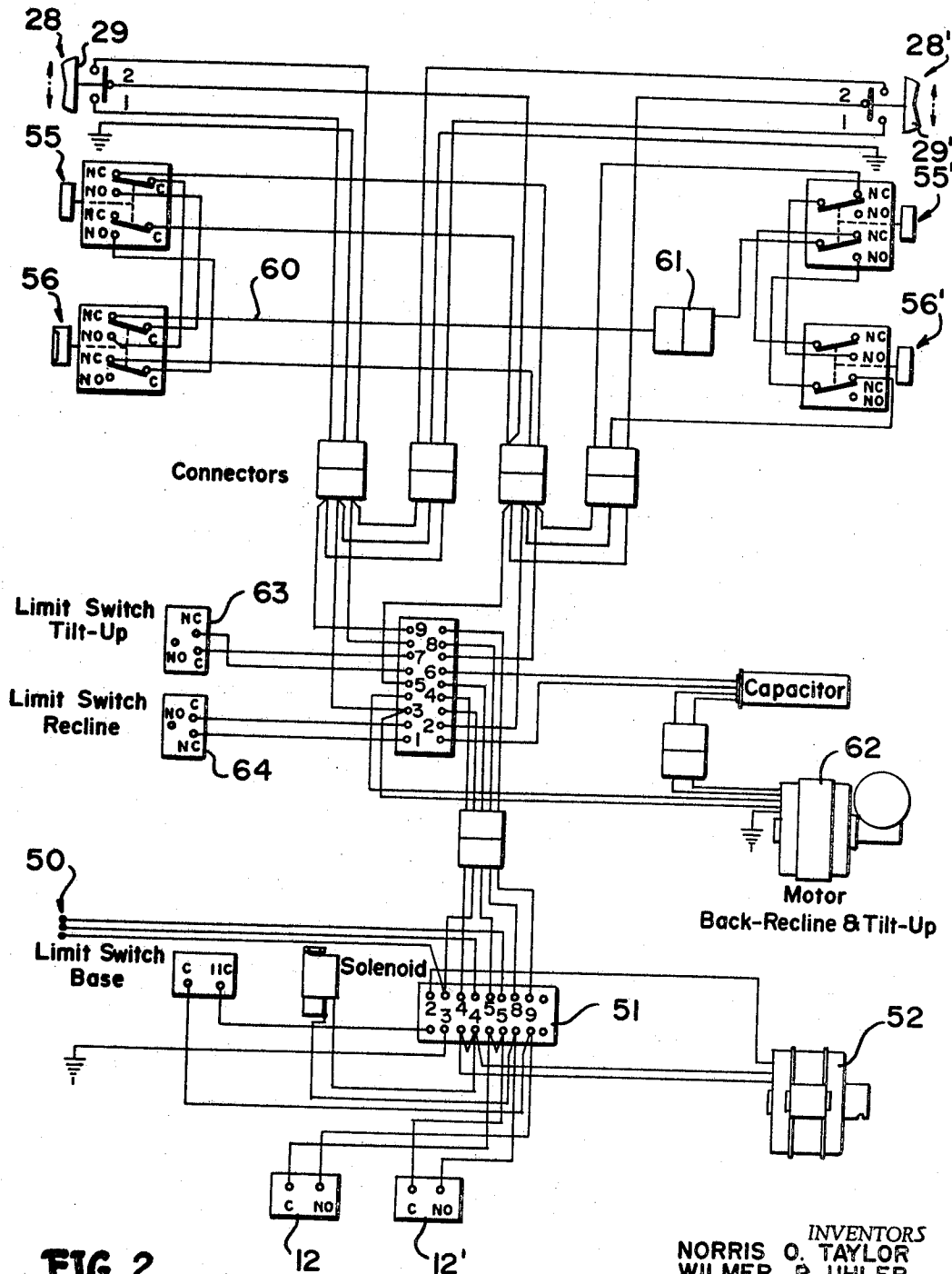


FIG. 2

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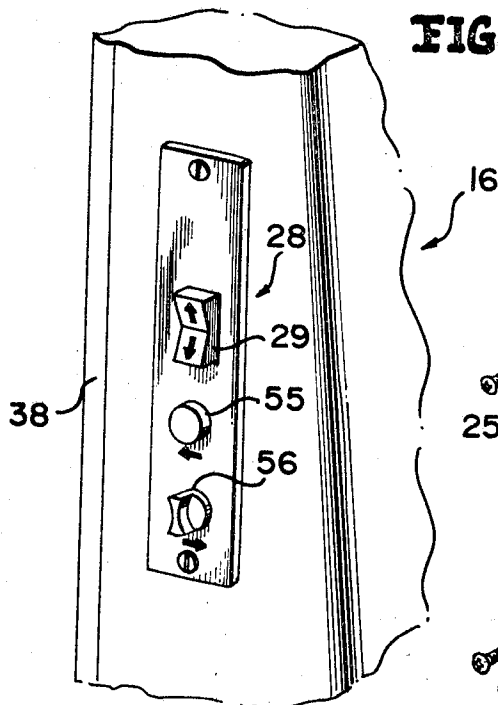


FIG. 3

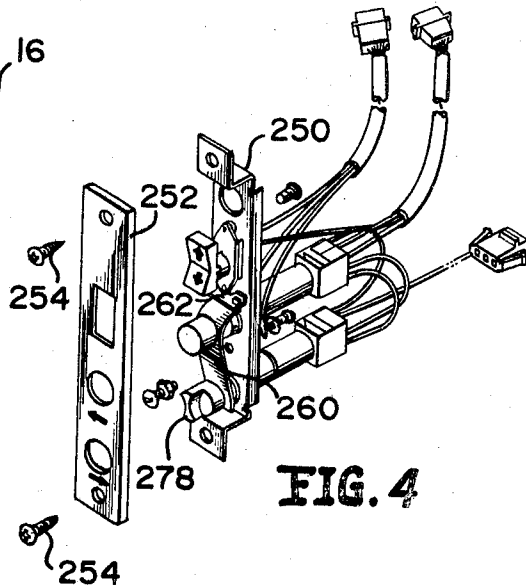


FIG. 4

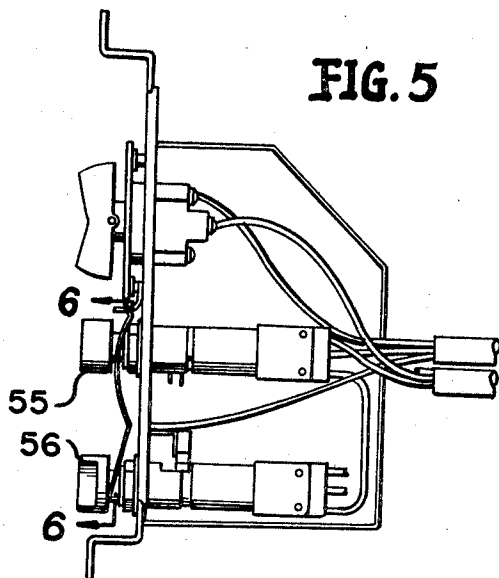


FIG. 5

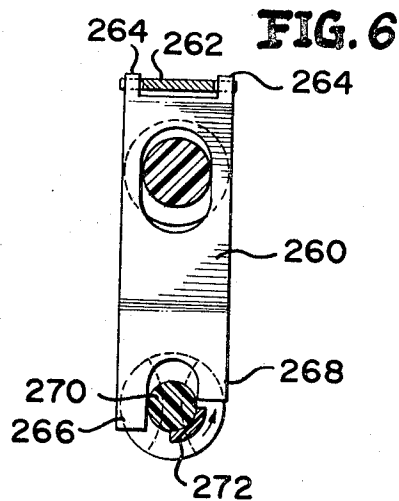


FIG. 6

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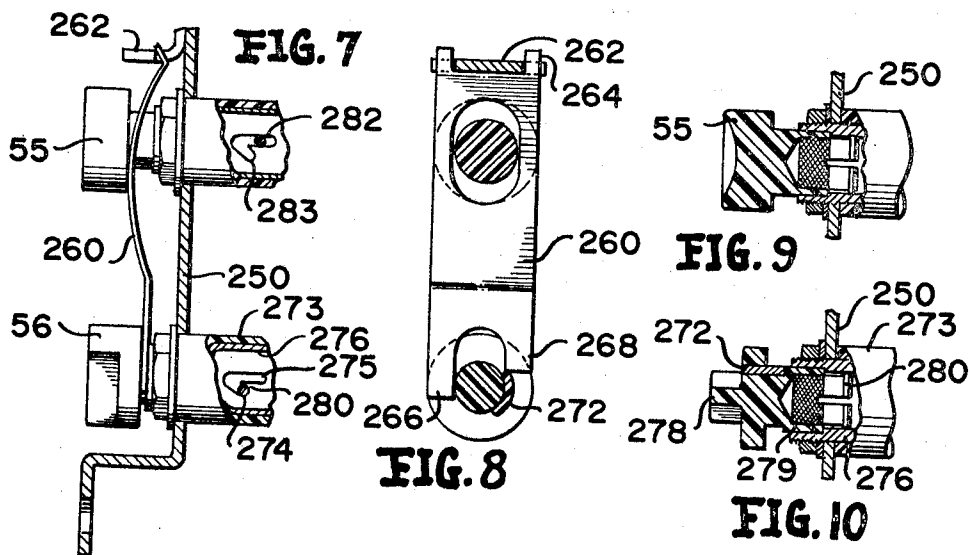
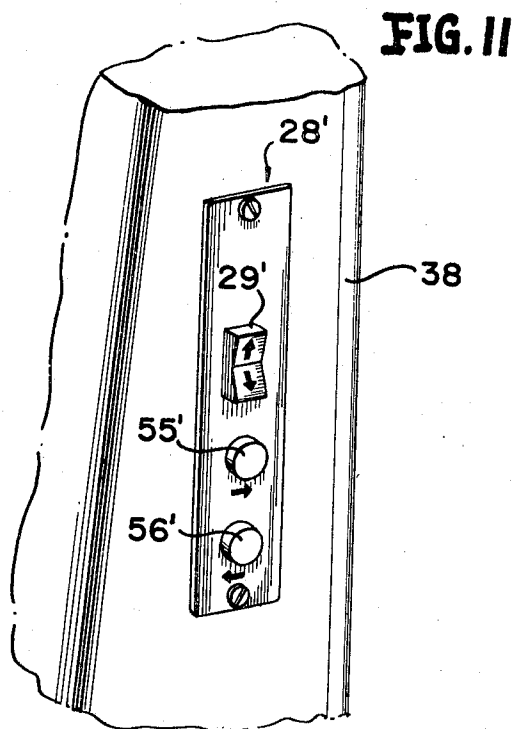
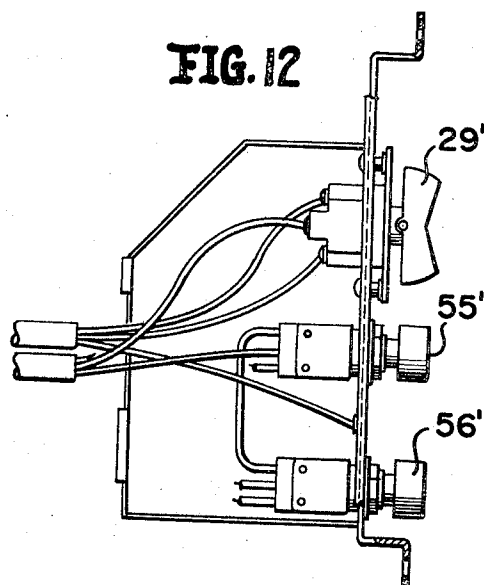
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CONTROL FOR ADJUSTABLE CHAIR

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Original application July 27, 1965, Ser. No. 475,181, now Patent No. 3,414,324, Divided and this application Dec. 28, 1967, Ser. No. 722,503

Int. Cl. H01h 3/12

U.S. Cl. 200—159

1 Claim

ABSTRACT OF THE DISCLOSURE

In an adjustable chair with pivotally mounted seat and back rests, first and second push-buttons are employed to effect opposite movement in opposite directions of the back rest relative to the seat rest by means of an interposed spring on the first button, a cam on the second button, and a detent which holds the cam in engagement with the spring and thus distorts the spring until the detent is released by movement of the first button into engagement with the distorted spring.

CROSS-RELATED APPLICATIONS

This is a division of application #475,181 filed July 27, 1965, now Patent No. 3,414,324.

This invention relates to a control for an adjustable chair which is ideally suited for use in the modern practice of dentistry.

According to the invention, a first push-button switch is employed to move the back rest to a reclining position and a second push-button switch is employed to move the back rest to an upright position. With a novel arrangement the second switch can be rotated so that a cam is engaged by a detent to hold the switch until the back rest moves to a fully upright position. During such movement of the back rest a spring interposed between the first and second switches is distorted, but movement of the first switch for reclining the back rest engages the distorted spring and the detent is released. As a result, the second switch is moved back to its inactive position.

With the above and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by reference to the following detailed description, the appended claimed subject matter and the several views illustrated in the accompanying drawings:

In the drawings:

FIGURE 1 is a perspective view of an adjustable chair to which the present invention is applied.

FIGURE 2 is a schematic diagram illustrating the various electrical components incorporated in the adjustable chair.

FIGURE 3 is a fragmentary perspective view of the switches and mounting plate which are located on the dentist's side of the back rest.

FIGURE 4 is a partially exploded view of the switches which are located on the dentist's side of the chair.

FIGURE 5 is an elevational view of the assembled switches which are illustrated in FIGURE 4.

FIGURE 6 is an enlarged sectional view, taken on line 6—6 of FIGURE 5, and shows a novel spring member which is mounted between the "recline" switch and the "tilt-up" switch on the dentist's side of the back rest.

FIGURE 7 is a fragmentary view illustrating the "tilt-up" switch in a fully depressed and locked position, and illustrates the "recline" switch in a released position, and

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also shows the novel spring member in a bowed position which results from engagement of the spring member by a cam located upon the "tilt-up" switch.

FIGURE 8 is a view similar to FIGURE 6 and illustrates the cam on the "tilt-up" switch engaged with the spring member for causing distortion thereof.

FIGURE 9 is a cross-sectional view of the pushbutton portion of the "recline" switch.

FIGURE 10 is a cross-sectional view of the pushbutton portion of the "tilt-up" switch.

FIGURE 11 is a fragmentary perspective view of the switches and mounting plate located on the assistant's side of the back rest.

FIGURE 12 is a sectional view of the assistant's control switch and shows a portion of the wiring therefor.

Referring to the drawings in detail, there is illustrated in FIGURE 1 an adjustable chair, generally indicated by the numeral 10, which chair is particularly adapted for use in the practice of dentistry. The chair 10 includes a conventional lift-mechanism 11, which may be actuated by a conventional foot-operated switch 12 for vertically raising and lowering the chair 10.

A forwardmost portion of the chair 10 comprises a leg rest portion 13 which depends forwardly and downwardly from a seat rest portion 14. The leg rest portion 13 and seat rest portion 14 includes a cushion member 15 which extends, without interruption, from a rearward portion of the seat rest portion 14 to a lower portion of the leg rest portion 13 so as to provide a continuous uninterrupted supporting surface.

A back rest portion 16 is pivotally mounted, at 18, to an upstanding portion of the seat rest portion 14, and has a pair of arm rests 20 pivotally connected thereto, at 22. The back rest portion 16 has a head rest 24 adjustably mounted thereon by a strap member 25. The transition roll 26 is located at the juncture between the seat rest portion 14 and the back rest portion 16 so as to provide a continuous supporting surface between the seat rest portion 14 and the back rest portion 16 regardless of any changes in the relative position of the back rest portion 16 and seat rest portion 14.

Control means 28 are located on a side of the back rest portion 16 and include a rocker switch 29 for vertically raising and lowering the chair 10, a push-button 30 for moving the back rest portion 16 to a reclined position, and a second push-button 31 for moving the back rest portion 16 to an upright position. The rocker switch 29 actuates the lift-mechanism 11 in the same manner as the foot-operated switch 12 so that the chair 10 may be adjusted by the switch which is most conveniently located for the dentist during any given operation. As will be more fully described, a dual set of control means is located on the other side of the back rest portion 16 so that the dentist's assistant is also provided with convenient control for varying the positions of the chair 10.

A general understanding of the operation of the chair 10 will become apparent by consideration of the wiring diagram illustrated in FIGURE 2. A power supply, generally indicated by the numeral 50, is connected to a terminal board 51 to provide power for operating the various mechanisms. The conventional lifting mechanism 11 is actuated by a motor 52 which is controlled by the foot-operated switch mechanisms 12 and 12', located at the base of the chair 10, or by the control means 28 and 28' which are located along opposite sides of the back rest portion 16. Movement of the switch 12 from its normally opened position to the closed position will actuate the motor 52 and thus causing the chair 10 to raise. In order to lower the chair 10, it is necessary to actuate the switch 12' so as to open an oil-release solenoid valve thus permitting the chair 10 to lower.

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The second point at which the chair 10 can be raised or lowered is at either of the control panels 28 or 28'. The rocker switches 29 and 29' are conventional three-position switches which are normally open. When the upper portion of either rocker switch 29 or 29' is pressed, the motor 52 starts and causes the chair 10 to raise. Pressing the lower portion of either of the rocker switches 29 or 29' causes a conventional solenoid valve to open which releases the oil pressure in the lift mechanism 11, thus permitting the chair 10 to lower. If by accident, the foot lever 12 and either of rocker switches 29 and 29' are actuated for opposing motions, no harm will come to the chair 10 although this is not recommended.

The reclining and tilting-up operation of the chair 10 is controlled by push-button switches 55 and 55', and 56 and 56', respectively. Switches 55 and 56 are located at the control panel 28 on the dentist's side of the chair 10, while the switches 55' and 56' are located at the control panel 28' on the assistant's side of the chair. The chair 10 can be brought to any angle of recline by simply pressing the correct switch for the desired motion. Pressing the switch 55 or 55' would recline the chair 10 and, by releasing the finger pressure from the switch, the chair motion will stop at any angle desired. Switches 55 and 56' will tilt the chair 10, i.e. the back rest 38, up from the horizontal position. This operation can be accomplished by either pressing the switch 56 or 56', and holding it, or the switch 56 can be pushed in and then pushed clockwise to a lock and hold position. The switch will hold in this position throughout the travel of the chair and return to its normal position when the "recline" switch 55 is actuated. This feature of the invention will be more clearly defined with the explanation of FIGURES 5-8.

An important feature of this invention is that means are provided whereby the dentist's controls will override any command given by the assistant's controls. Power is fed to the assistant's switches 55' and 56' through the wire 60 and connector 61. Tracing the wire 60 through the dentist's switches 56 and 55 will show a complete circuit so that actuation of either of the assistant's switches 55' or 56' will cause the respective desired motion of the chair. However, if the dentist presses either switch 55 to cause the chair to recline, or pushes the switch 56 to cause the chair to tilt up, the circuit to the assistant's switches 55' and 56', through wire 60 and connector 61 is broken so that no conflicting signals can be given to the assistant's switches.

The reclining mechanism for the chair 10 is operated by motor 62 which is preferably a single phase A.C. reversible motor. A limit switch 63 is provided for shutting off motor 62 when the chair has reached its "upright" position, and a similar limit switch 64 is provided for shutting off motor 62 when the chair has reached its extreme recline position.

The dentist's controls 28 are illustrated in FIGURES 3-10. The rocker switch 29, and the push-button switches 55 and 56 are mounted upon a support bracket 250 which is fixedly secured to the dentist's side of the back rest portion 16 by an exterior cover plate 252 and a pair of suitable screws 254. The switches 55 and 56 of FIGURES 3, 5 and 7 correspond to the push-buttons 30 and 31 of FIGURE 1.

A feature of this invention is the provision of a leaf spring 260 which extends between the switches 45 and 56. A stop lug 262 is centrally mounted upon the bracket 250 intermediate the switches 29 and 55. The spring 260 includes a pair of ears 264 mounted in a pair of slots in the stop lug 262. The opposite end of spring 260 is provided with a pair of extension arms 266 and 268 which extend on opposite side portions of a reduced portion 270 of the switch 56. A cam 272 is fixedly secured to the reduced portion 270 and is disposed for engagement with the free edge of extension arm 268.

After the dentist has completed his work upon a patient, the push-button switch 56 is depressed in order

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to raise the back rest 38 from a reclined toward an upright position. In order to avoid holding the switch 56 depressed during the time that the mechanism raises the chair to its full extent of travel, a lock pin 274, as is best shown in FIGURE 7, is fixed in casing 273 and co-operates with a slot 275 which is provided in barrel member 276. Barrel member 276 is slightly biased outwardly to the left, as is shown in FIGURE 7, by a spring, not shown. The finger-engaging portion of the switch 56 is provided with a reduced section to provide a grip 278. A knurled fitment 279 is provided with a bead 280 and frictionally connects the grip portion 278 to the barrel 276 for movement therewith. As the switch 56 is depressed, lock pin 274 rides in slot 275 and, upon slight rotation of the grip portion 278 and barrel member 276 in a counterclockwise direction, as viewed in FIGURES 6 and 8, a shoulder 280 is positioned for engagement with the lock pin 274 when the pressure on the switch 56 is released and the switch 56 is biased outwardly by the spring, not shown. During rotation of the grip portion 278 and barrel 276, the cam 272 engages the free edge portion of the extension arm 268 and distorts the leaf spring 260 from the position shown in FIGURES 5 and 6 to the position shown in FIGURES 7 and 8. The portion of the spring 260 near the ears 264 is precluded from movement by the stop lug 262 such that the spring 260 becomes pronouncedly bowed and moved toward contact with the finger-engaging portion of the switch 55. The switch 56 remains in active position and the chair 10 moves from a reclined position to a fully upright position whereupon ball nut 100 on the screw 87 actuates the limit switch 64 so as to turn off the motor 62. At the start of the next operation, after the patient is seated, the switch 55 is depressed, so as to move the chair 10 toward a reclined position, and the bowed portion of spring 260 is flattened and causes the extension arm 268 to rotate the switch 56 through engagement with the cam 272, and cause shoulder 280 to become disengaged with the lock pin 274. As a result, the switch 56 is forced outwardly, by its biasing spring, to its inactive position. Switch 55 may also be provided with a lock pin 282 and a slot 283, if so desired.

FIGURES 11 and 12 illustrate the controls 28' for the assistant's side of the chair 10. Rocker switch 29' is actuated to raise and lower the chair 10, push-button switch 55' is actuated to move the chair 10 to a reclined position, and push-button switch 56' is pushed to raise the chair 10 to its upright position. As previously pointed out, switches 55' and 56' can operate the chair 10 only in the absence of an overriding signal from the dentist's switches 55 and 56.

While preferred forms and arrangements of parts have been shown in illustrating the invention, it is to be clearly understood that various changes in details and arrangements of parts may be made without departing from the spirit and scope of the invention, as defined in the appended claimed subject matter.

We claim:

1. In an adjustable chair of the type including a seat rest and a back rest pivotally mounted on said seat rest and movable between a reclined position and an upright position relative to said seat rest, a first push-button switch means for causing said back rest to move to a reclined position, a second push-button switch means for causing said back rest to move toward said upright position, spring means disposed between said first and second push-button switch means, cam means on said second push-button switch means, said cam means being engageable with said spring means by rotating said second push-button switch means about its longitudinal axis, detent means cooperable with said second push-button switch means for holding said cam means in engagement with said spring means, said spring means being distorted by said engagement, said first push-button switch means

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being mounted for axial movement into engagement with said distorted spring means for causing rotation of said second push-button switch means to release said detent means.

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U.S. Cl. X.R.