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(54) ACTUATOR FOR ADJUSTING THE SEAT HEIGHT OF DENTISTS' CHAIRS

(71) We, EURODENT DI CONTI GIACOMO & C. Societa in accomandita semplice, a Limited Parnership, organized and existing under the laws of Italy, of Via Emilia Levante, 482/1 - S. Lazzaro di Savena, Provice of Bologna, Italy, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:-

This invention relates to an actuator for adjusting the height of a dentist's chair supported by a pedestal.

According to the invention there is provided an actuator for adjusting the height of a seat of a dentist's chair supported by a pedestal, comprising a pair of arms swingable in a vertical plane by having each one end pivoted to the pedestal and the other end articulated to the seat so that the arms, the pedestal and the seat define the sides of an articulated parallelogram; a screw-threaded rod having one end hinged to the seat; a motor-driven nut assembly in engagement with the rod and pivoted to one said arm, thereby moving, in use, the threaded rod relative to the nut to raise or lower the seat; an electric switch for controlling the motor; and a control lever for the switch pivoted to one said arm and linked to the nut assembly so as to act on the switch in response to a resisting effect on downward movement of the seat.

An embodiment of the actuator according to the invention is described below and illustrated in the accompanying drawings, in which:

Figure 1 is an elevation cross-sectional view of the actuator; and

Figure 2 is a plan view with cut-away portions of the actuator of Figure 1.

With reference to the above described figures, in which the like members or elements are indicated by the same reference numerals, a known box pedestal 1 for dentist's chairs, constitutes a fixed member in an articulated parallelogram swinging in a vertical plane.

A connecting rod of the parallelogram is constituted by a box base 2 of a chair seat, not shown. The articulated parallelogram comprises an upper rocker arm 3 and a lower rocker arm 4, which are substantially constituted, in a manner known per se, by two box-like sections of U cross-section one of which may be received in the other. The rocker arm 3 is hinged to the pedestal 1 and the base 2 by means of axles 5 and 6 while the rocker arm 4 is articulated to respective axles 7 and 8.

The actuator designed to cause angular excursions of the articulated parallelogram to adjust the height of the seat relative to the pedestal 1, is fitted diagonally to the parallelogram and is articulated to the hinging axle 7 common to the rocker arm 4, and the pedestal 1, and to the hinging axle 6 common to the rocker arm 3 and connecting rod 2.

The axle 6 carries a sleeve 9 rigid with a bell-shaped member 10 having a mouth portion 10*a* which locates a bush 11 fixed to the portion 10*a* by screw dowels, not shown. A bush 12 is concentrically arranged inside the bush 11. The bushes 11 and 12 have a respective outer rim 11*a* and 12*a* extending radially outwards. A spacer sleeve 13 of rubber of good elasticity and damping characteristics is disposed between the bushes 11 and 12. The rubber of the sleeve 13 is caused to rigidly adhere to the bushes 11 and 12 by vulcanization to provide an intentional non-rigid connection between them.

One end portion of a screw-threaded rod 14 is coaxially located in the inner bush 12 and is fixed to the bush 12 by means of a screw 15, a washer 16, and a retaining ring 17. The rod 14 engages with a nut, not shown, and is arranged free to rotate in a

tubular member 18. The nut is rotated in either direction by a geared electric motor 19 fixed to the tubular member 18.

A bush 20 through which the screw thereaded rod 14 extends is coaxially secured to the member 18 on its side facing away from the bell-shaped member 10. The bush 20 is resiliently housed in an outer bush 21 with the interposition of a sleeve 22 of vulcanized rubber. Mutually aligned pins 23 project externally from the bush 21 at diametrically opposite positions.

The ends of the pins 23 are located in respective seats 24 formed in side ribs 25*a* of a fork support, whose base 25*b* is rigid with the rocker arm 4 in proximity to its hinging axle 7. The two seats 24 are cut open towards the geared motor 19. A pin 23 carries a plate 26 having a first hole engaged by the pin and a second hole engaged by a pin 27 projecting from one of the ribs 25*a* below its seat 24. The plate 26 is retained on the pin 27 by a perforated block 28, fixed to the pin 27 by an elongate screw dowel 29 so as to be accessible manually. A microswitch 30, is fitted on the rib 25*a* from which the pin 27 projects and is controlled by the plate 26 to form a safety device. The pin 23 is normally in the bottom of the seats 24, and thus the plate 26 acts on the microswitch. However, if, upon operating the geared motor 19 in one direction the rod 14 progressively enters the bush 20 and the tubular member 18, and thus the rocker arm 4 descends (its lowest position being that shown in Figure 1), the descent of the rocker arm 4 is resisted by an underlying obstacle, the pins 23 withdraw slightly from the bottom of the seats 24, and the plate 26 can slightly pivot about the pin 27 owing to resilient deformation of the sleeves 13,22, thereby releasing the microswitch. This results in the geared motor 19 being stopped. When the geared motor is operated in the other direction, the distance between the axle 6 and the pins 23 increases, and the chair seat rises.

As one can see the actuator is suitable to enable the seat height to be gradually and silently adjusted, especially during the starting and stopping stages. Moreover, the actuator is automatically stopped should the movement of the seat encounter any obstacle.

WHAT WE CLAIM IS:-

1. An actuator for adjusting the height of a seat of a dentist's chair supported by a pedestal, comprising a pair of arms swingable in a vertical plane by having each one end pivoted to the pedestal and the other end articulated to the seat so that the arms, the pedestal and the seat define the sides of an articulated parallelogram; a screw-threaded rod having one end hinged to the seat; a motor-driven nut assembly in engagement with the rod and pivoted to one said arm; thereby moving in use, the threaded rod relative to the nut to raise or lower the seat; an electric switch for controlling the motor; and a control lever for the switch pivoted to one said arm and linked to the nut assembly so as to act on the switch in response to a resisting effect on downward movement of the seat.

2. An actuator as claimed in Claim 1, wherein the nut assembly is pivoted on a support member rigid with said one arm.

3. An actuator as claimed in Claim 2, wherein the support member is a fork support with two side ribs each formed with a respective cut-open seat.

4. An actuator as claimed in Claim 3, wherein the nut assembly has two projecting pins extending perpendicular to the said plane of swing and designed to be mounted in the seats in the support member so as to be capable of pivoting and sliding therein.

5. An actuator as claimed in Claim 4, wherein the control lever is a plate pivoted to the support member and to one said projecting pin.

6. An actuator as claimed in any one preceding Claim, wherein the pins in the nut assembly are rigid with an outer bush surrounding an inner bush with interposition of a resilient material, the inner bush being coaxial with the rod.

7. An actuator as claimed in any one preceding Claim, wherein the threaded rod has said one end housed in a bell-shaped element with the interposition of a resilient material.

8. An actuator for adjusting the height of a seat of a dentist's chair substantially as described herein and as illustrated in the accompanying drawings.

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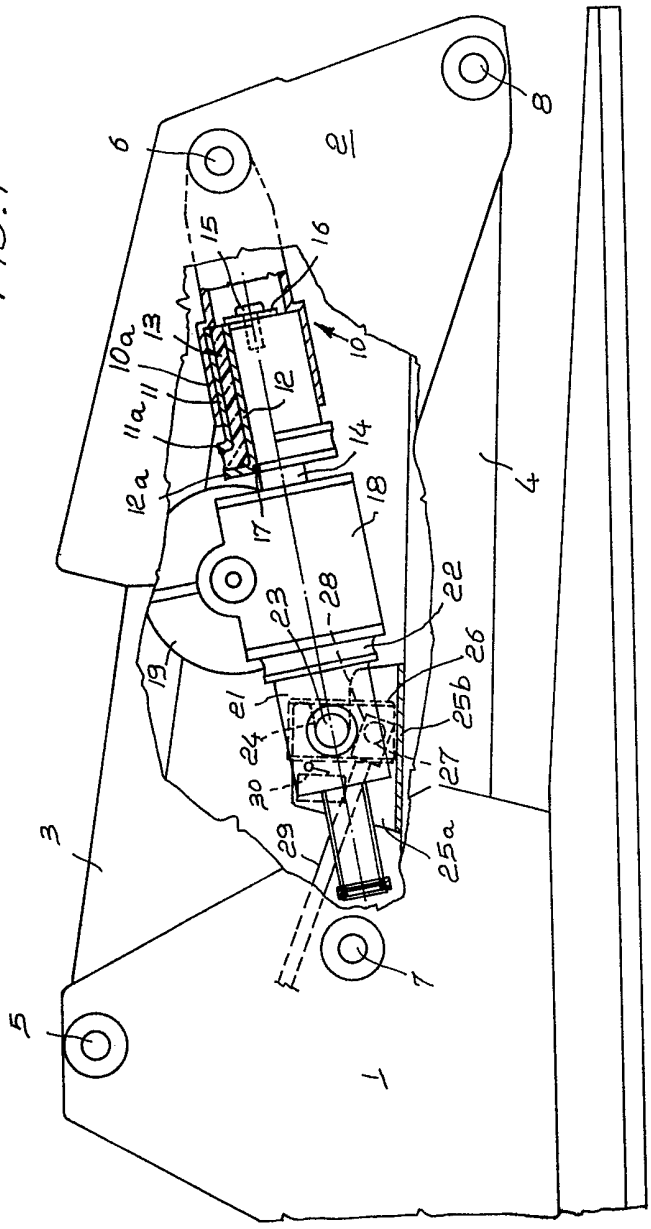
Sheet 1

FIG. 1



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Sheet 2

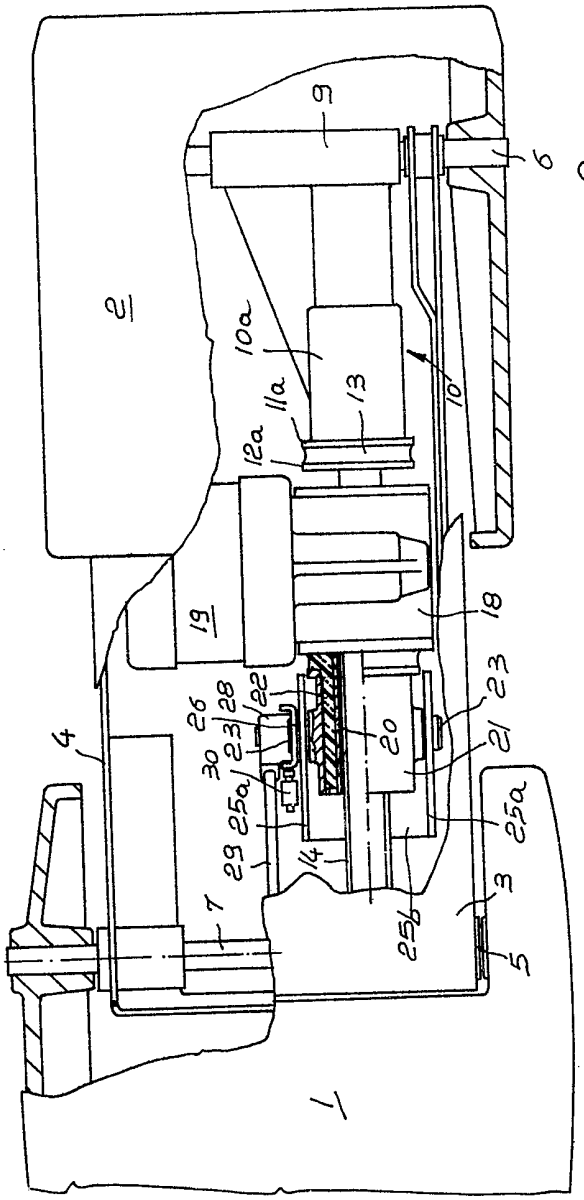

FIG-2