Nov. 8, 1966 HIROSHI HIRAMATSU 3,284,135

DENTAL CHAIR

Filed June 15, 1964

FIG. 1.

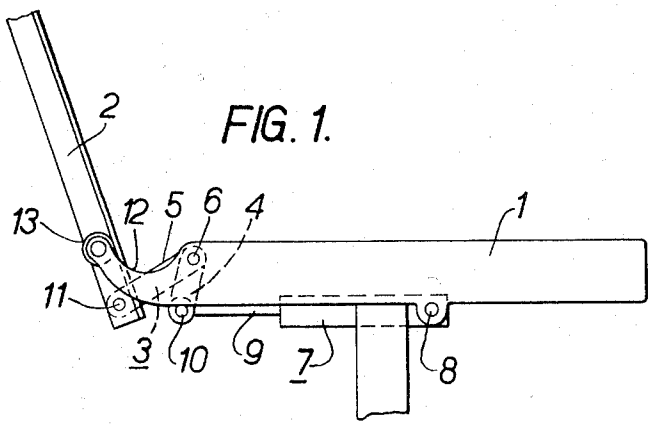


FIG. 2.

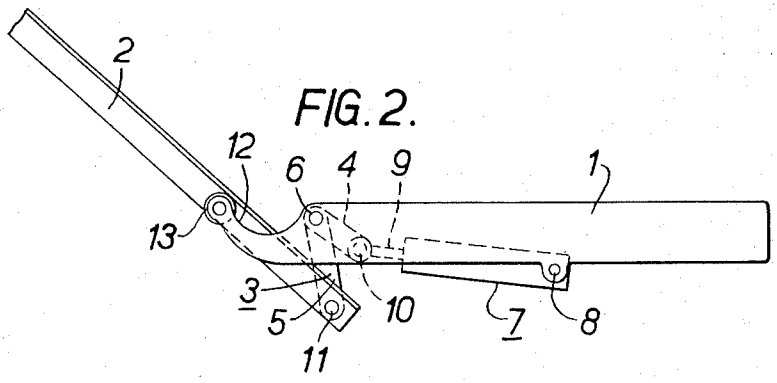
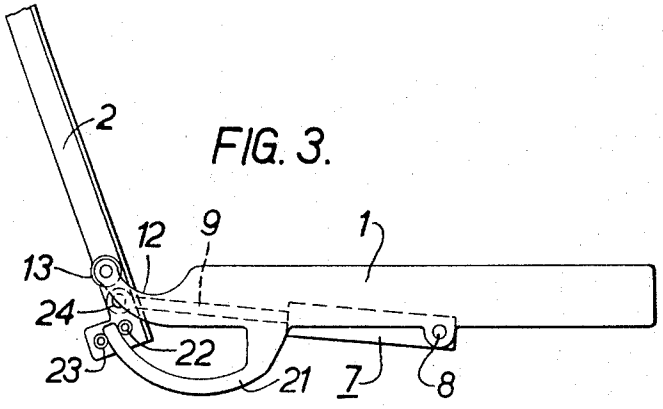


FIG. 3.



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DENTAL CHAIR

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This invention relates to dental apparatus and more particularly to a dental chair having an inclinable back.

In such chairs, as the inclination of the chair back is changed, that of the body of a person leaning against it is also changed. The centers of such movement of the chair back and the body of the person seldom coincide. Consequently, when the inclination of the chair back with a headrest attached thereto is changed, a point on the back of the person's head or on the person's back comes to contact a different point on the headrest or on the chair back from the point thereon it contacted before the inclination of the chair back was changed. In other words, as the inclination of the chair back is changed, a point on the back of the person's head or on the person's back and the corresponding point on the headrest or chair back trace out different loci so that the person's head and back slide on the contacting surface of the headrest and the back of the chair. This gives discomfort to the person seated in the chair, on one hand, and causes inconvenience to the dentist performing the dental work on the other hand. Elimination of such defects may be effected by making the above two loci as strictly coincident as possible.

The principal object of this invention is to provide a dental chair which eliminates such prior art defects as mentioned above by the provision of means for raising or lowering the chair back simultaneously with changing of the inclination thereof. In accordance with the invention, the chair back is slidably supported by bearing means mounted on the seat in such a manner that the bearing means regulates the inclination of the chair back, and as the inclination of the chair back is changed, the chair back is simultaneously raised or lowered relative to the bearing means, sliding thereon.

Other objects features and advantages of the invention will be apparent from the following description with reference to the drawings wherein like reference numerals denote like parts and wherein:

FIG. 1 is a schematic side elevation of one embodiment of the invention;

FIG. 2 is a view similar to FIG. 1 but with the chair back shown in a differently inclined position; and

FIG. 3 is a view similar to FIG. 1 but showing another embodiment of the invention.

Referring now in detail first to FIGS. 1 and 2, there are shown a seat frame **1** and a back frame **2**. A seat of a suitable soft material (not shown) may be placed on each of these frames. A lever **3** having two arms **4** and **5** separated by a suitable angular distance is mounted on the rear end of the seat frame **1** for pivotal movement about a pivot pin **6**. A driving mechanism **7** such as an oil-pressure mechanism is also mounted on the seat frame **1** by a pin **8** for pivotal movement about it. The mechanism **7** has a piston rod **9** whose outer end is connected by a pin **10** to the free end of the lever arm **4**. The other lever arm **5** is pivotally connected to the lower end of back frame **2** by a pin **11**. A pair of support arms **12** project rearwardly from the rear end of the seat frame **1**. The support arms **12** are provided at their outer ends with bearing means such as rollers **13** against which the back frame **2** leans. The inclination of the back frame **2** relative to the seat frame **1** is regulated by both the position of the pin **11** and that of the bearing roller **13**.

In operation, when the oil-pressure mechanism **7** is so operated that its piston rod **9** is drawn into its cylinder, the lever arms **4** and **5** are turned counter-clockwise about the pivot pin **6**, causing the pin **11** to move on an arc of a circle with center at the pin **6** and a radius equal to the distance between the pins **6** and **11**. The counter-clockwise circular movement of the pin **11** brings this pin to a position lower than its previous position and simultaneously increases the inclination of the line connecting the pin **11** and the roller **13** relative to seat frame **1**. Since the position of the roller **13** is fixed and the back frame **2** is slidably supported thereupon, the latter is pulled substantially downwardly simultaneously with its increasing inclination. In other words, as the inclination of the back frame relative to the seat frame, that is, the angle between the two frames increases, the bearing point of the roller **13** regulating the inclination of the back frame is raised relatively or displaced upwardly along the length of the back frame.

When the chair back is to be inclined oppositely, that is, it is to be moved toward its upright position, the oil-pressure mechanism **7** is so operated that the piston rod **9** is pushed outwardly from the cylinder, whereupon the lever **3** is turned clockwise so that the back frame is raised relative to the bearing roller **13** it slides on and, at the same time, moved toward its upright or vertical position, with the angle between the seat frame and the back frame being decreased.

FIG. 3 shows another embodiment of the invention, wherein the lever **3** of the previous embodiment is replaced by a pair of curved guide arms **21** whose curvature may be an arc of a circle with a center and a radius corresponding to the center and radius of the arc of the circle the pin **11** traces out in the case of the above-mentioned embodiment. The guide arms **21** may be otherwise suitably curved. In the lower end of each side of the back frame **2**, there are provided a pair of rolls **22** and **23** at the position corresponding to the position of the pin **11** in the previous embodiment. These rolls **22** and **23** are so spaced as to roll along both sides of the guide arm **21**. The outer end of the piston rod **9** is pivotally connected to the lower end of the back frame by a pin **24**.

When the piston rod **9** is drawn into the cylinder of the mechanism **7**, the back frame supported by the bearing rollers **13** slidably thereon is pulled downwardly, and at the same time, with its lower end being displaced inwardly along the arc of the arm **21** the rolls **22** and **23** roll on, the back frame increases its backward inclination, or to put it otherwise, the angle between the two frames increases. In other words, the downward movement of the back frame takes place simultaneously with its backward inclination. During the course of events, the mechanism **7** slightly turns about its pivot pin **8**.

When the piston rod **9** is pushed outwardly of its cylinder, the back frame is pushed upwardly and, with simulataneous outward displacement of its lower end along the arc of the arms the rolls **22**, **23** roll on, the back frame is moved toward its upright or vertical position. In other words, the angle between the two frames is decreased.

As described above in detail, in accordance with the invention, the chair back is received slidably longitudinally thereof by the bearing means which are in turn supported by the chair seat and the lower end of the chair back is movable along a predetermined curve, so that as the chair back is thus moved, it slides on the bearing means upwardly or downwardly and, at the same time, its inclination relative to the chair seat, regulated by the dis-

placed contact point of the bearing means, is decreased or increased. The arrangement of the component parts of the mechanism is such that as the inclination of the chair back a person is leaning against is changed, the locus that a point on the back of the person's head or body traces out may substantially coincide with the locus that the corresponding contact point on the headrest or chair back traces out.

Thus, the dental chair of the invention has successfully eliminated that uncomfortable feeling the person seated therein would otherwise experience due to his head or back sliding on the upper surface of the headrest or back of the chair upon changing of inclination of the chair back. The mechanism of the invention is simple in construction, smooth in operation, and insures stability of the chair back in any inclined position.

It should be recognized that the embodiments herein disclosed are merely illustrative and that changes and modifications may be made without departing from the scope of the invention as defined in the appended claims.

What I claim is:

1. A dental chair comprising: a seat frame; bearing means mounted on said seat frame; a back frame so arranged relative to said seat frame as to be received by said bearing means slidably thereon; and driving and guide means coupled with the lower end of said back frame and with said seat frame for moving the lower end of said back frame along a predetermined curve such that as the angle between said back frame and said seat frame is increased said back frame is lowered.

2. A dental chair as defined in claim **1**, wherein said bearing means comprises a pair of rollers mounted on the outer ends of a pair of arms projecting from the rear end of said seat frame.

3. A dental chair as defined in claim **2**, wherein said driving and guide means includes a cylinder, a piston, and means connecting said cylinder to one of said frames and said piston to the other of said frames.

4. A dental chair as defined in claim **3**, wherein said last named means includes a lever pivoted on said seat frame and comprising two arms separated by an angular distance, one of said arms being pivoted on the lower end of said back frame, while the other arm is pivotally connected to said piston rod for the lever to be driven thereby, so that the pivotal point on said lower end of the back frame is moved along an arc of a circle.

5. A dental chair as defined in claim **3**, wherein said driving and guide means further includes a pivot pin connecting said piston rod to the lower end of the back frame; a pair of curved guide arms projecting from the rear end of said seat frame; and a pair of rolls provided at the lower end of each side of said back frame so that the rolls roll along both sides of each of said guide arms upon movement of said piston rod.

6. A dental chair of claim **5**, wherein the curvature of said guide arms is an arc of a circle.

7. A dental chair as defined in claim **2** wherein said last named means includes a lever pivoted on said seat frame and connected to said back frame at points such that when said lever is rotated clockwise said back frame rotates clockwise about said rollers, and when said lever is rotated counterclockwise said back frame rotates counterclockwise about said rollers.

8. A dental chair comprising in combination: a seat frame; roller support means extending rearwardly from the rear end of said frame; roller means mounted on the outer end of said support means; a back frame having means slidably engaged with said roller means; lever means pivoted on said seat frame and coupled with the lower end of said back frame; and drive means connected to said lever means to selectively rotate the same, said lever means being pivoted on said seat frame and coupled with said back frame at points such that when said lever means is rotated in one direction the lower end of said chair moves in an arc of a circle causing the angle between said frames to be increased and the lower end of said back frame to be pulled under said chair frame.

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