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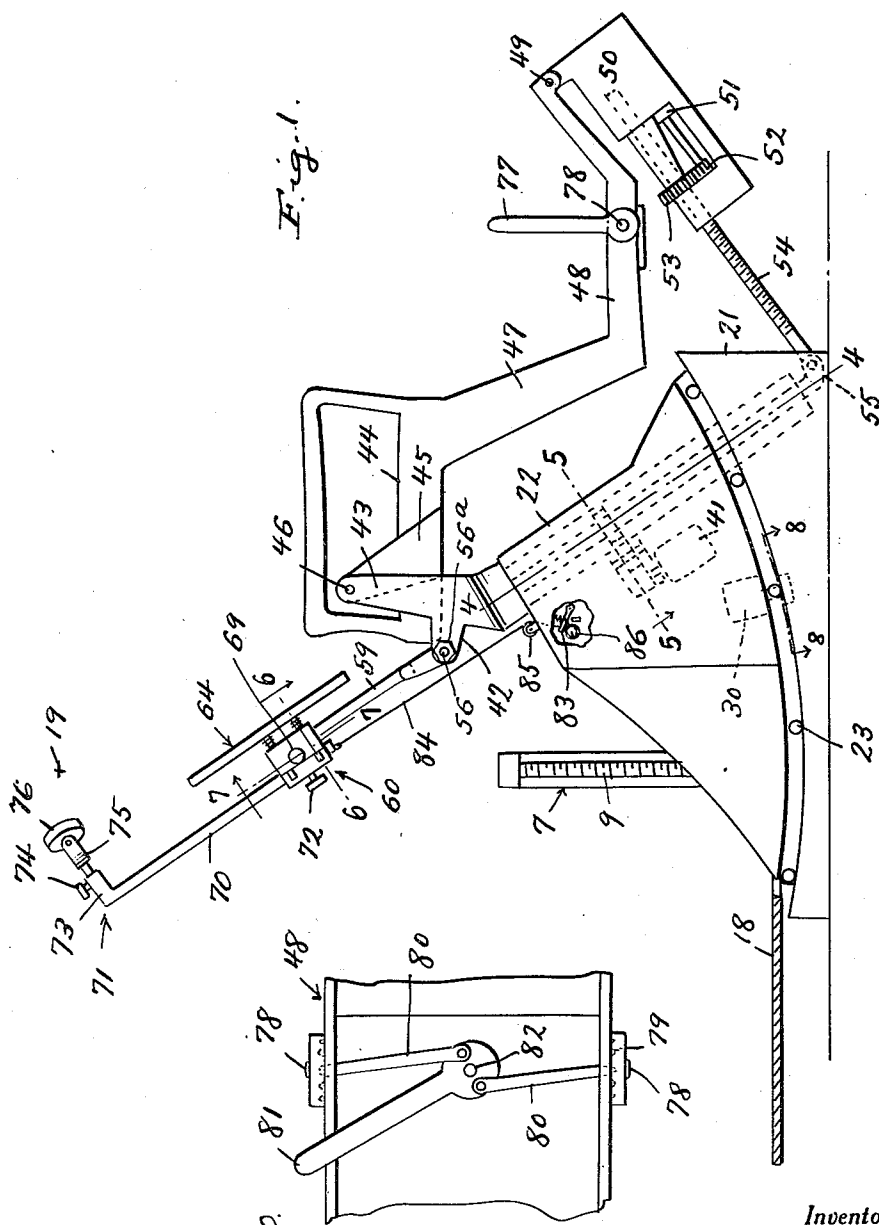
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2,286,372

ADJUSTABLE CHAIR

Filed July 7, 1939

4 Sheets-Sheet 1



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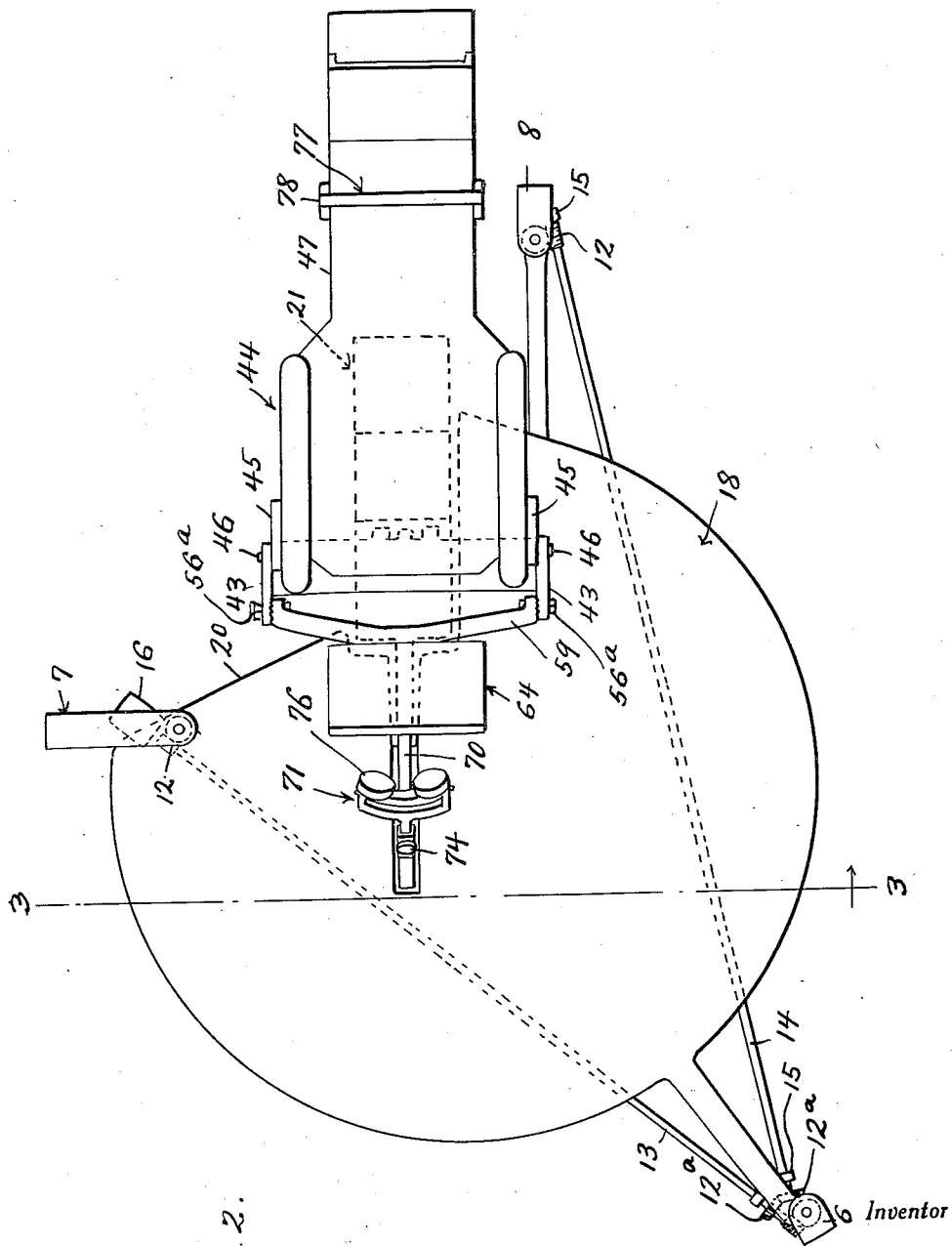
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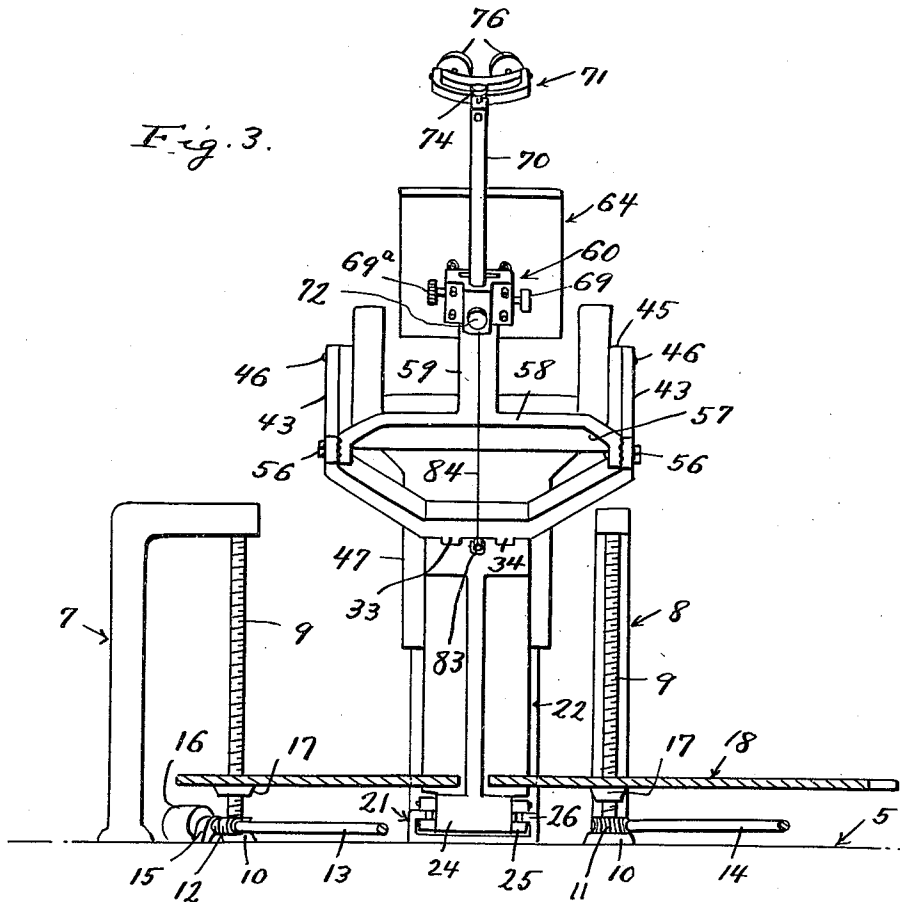
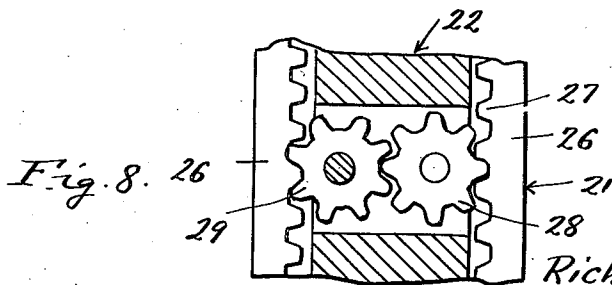
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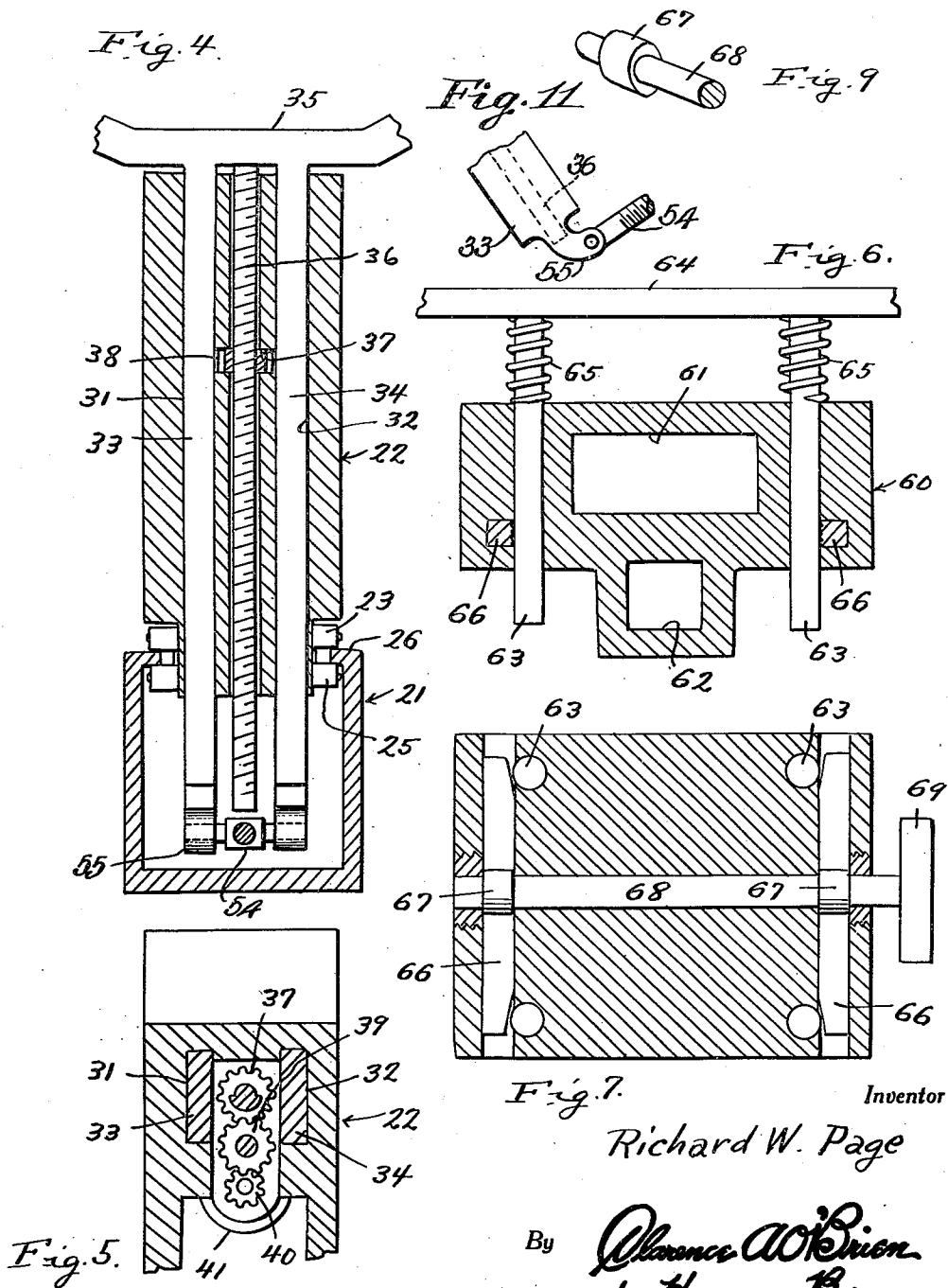


Fig. 7.

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UNITED STATES PATENT OFFICE

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ADJUSTABLE CHAIR

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8 Claims. (Cl. 155—25)

My invention relates to an adjustable chair for use by dentists and other persons whose work requires that the head or other portions of the body of the patient or customer be in readily adjustable relation to the operator while being in a predetermined fixed relation to operative equipment and accessories, and an important object of the invention is to provide an arrangement of this character which is efficient, relatively simple in construction, and easily and quickly operated and adjusted with a minimum of trouble and inconvenience.

Other important objects and advantages of the invention will be apparent from a reading of the following description in connection with the appended drawings showing a preferred embodiment of the invention.

In the drawings:

Figure 1 is a side elevational view, showing the invention as embodied in a preferred form in a dental chair, and with the parts in the positions occupied when the chair generally is in the most nearly reclining position and the seat is at its lowest position.

Figure 2 is a top plan view of Figure 1.

Figure 3 is a transverse vertical sectional view taken through Figure 2 approximately on the line 3—3 and looking toward the right in the direction of the arrow.

Figure 4 is an enlarged transverse vertical sectional view taken through Figure 1 approximately on the line 4—4 and showing the guide rods and the operating screw with its operating pinion threaded thereon.

Figure 5 is an enlarged horizontal sectional view taken through Figure 1 approximately on the line 5—5 and looking downwardly in the direction of the arrow.

Figure 6 is an enlarged horizontal sectional view taken through Figure 1 approximately on the line 6—6 and looking downwardly in the direction of the arrows.

Figure 7 is an enlarged transverse vertical sectional view taken through Figure 1 approximately on the line 7—7 and looking toward the right in the direction of the arrow.

Figure 8 is an enlarged horizontal sectional view taken through Figure 1 approximately on the line 8—8 and looking downwardly in the direction of the arrows.

Figure 9 is an enlarged fragmentary perspective view of one of the locking cams.

Figure 10 is an enlarged fragmentary bottom plan view of the adjustable foot rest locking pin operating mechanism.

Figure 11 is a side view of a detail showing the connection between the lower end of the seat support and the screw for adjusting the tilt of the seat and arm rest portion.

Referring in detail to the drawings, the numeral 5 generally designates a level supporting platform on which are fastened at each of the three corners of a triangle the inverted L-shaped standards 6, 7 and 8 each of which has rotatably depending therefrom an elevating screw 9 which turns in a bearing 10 on the platform 5. The horizontal shaft 13, the ends of which are journaled in suitable brackets 15 has a worm 12 fixed on each end thereof, these worms being in mesh with worm wheels 11 fixed to the lower ends of vertical screws 9. The end of the shaft 13 adjacent the bracket 7 is fastened to the shaft of a reversible electric motor 16. The opposite end of the shaft 13 has fixed thereon a bevel gear 12a in mesh with a similar bevel gear 12a fixed to one end of the horizontal shaft 14. The opposite end of the shaft 14 has fixed thereon a worm 12 meshed with worm wheel 11 on the screw 9. The ends of the shaft 14 are journaled in suitable brackets 15. Collars 17 are threaded on the elevating screws, arranged against turning relative to the screws, are connected to points on the three-quarter circular platform 18, upon which the operator stands while working. Operating the motor 16 in opposite directions elevates or depresses the platform 18 the required amount. A plumb line dropped to the center of the platform 18 will have its upper end about six inches from the arbitrary reference point 19 relative to which all positionings of the chair are referred.

The chair proper is set on the platform 5 in the opening 20 of the platform 18 and this comprises a base comprising the stationary section 21 which has an arcuate upper face with its center of curvature at the reference point 19, and the movable section 22 which has an arcuate lower face riding on a series of rollers 23 on the top of the stationary section, a depending part 24 of the movable section having rollers 25 disposed under retaining flanges 26 on the stationary section. The said flanges 26 have gear teeth 27 on their laterally inward edges as shown in Figure 8 with which are meshed an idler pinion 28 and a driven pinion 29, also meshed with the pinion 28 and connected to the shaft of a reversible electric motor 30 which is mounted on the movable section. Operation of the motor 30 effects the desired positioning of the movable section 22 relative to the stationary section 21 of

the base so as to impart the desired body inclination of the patient in the chair.

The movable section 22 is formed with two spaced vertical channels 31, 32, visible in Figures 4 and 5 in which slides 33, 34 work which depend from the yoke 35 which has a fixed screw 36 depending between the slides and threaded through an operating pinion 37 which is confined against vertical movement as indicated at 38, this pinion being in mesh with another pinion 39 which is driven by the smaller pinion 40 on the shaft of a reversible electric motor 41. Both the motor 41 and the motor 30 are supported within and connected by walls of the movable section 22. Each of the arms of the yoke 35 involves a rearwardly projecting arm 42 and an upwardly projecting arm 43.

The seat and arm rest portion 44 of the chair has rearwardly inclined brackets 45 pivoted at their upper ends at 46 to the upper ends of the arms 43, and the portion 44 has a forwardly declining part 47 terminating in the two-angle foot support 48 which is pivoted at its extremity at 49 to the elevated end of a combined motor and gear support 50 which involves a reversible electric motor 51 having a shaft including a pinion 52 meshed with a gear 53 which is fixed on the support 50 against movement along its axis, this gear 53 being threaded on a screw 54 which is pivotally connected at 55 to lower ends of the slides 33, 34.

Rotatably, but normally locked in a fixed predetermined position by the nut 56a at 56 on the arms 42 are the lower ends of depending arms 57 of the inverted yoke 58 which has a standard 59 rising from the middle thereof on which is vertically adjustable the slide 60 shown in Figures 6 and 7 and being provided with a first vertical opening 61 receiving the standard 59 and a second vertical opening 62 receiving the shank 70 of the head rest assembly. The slide 60 has horizontal openings slidably accommodating the upper and lower pairs of slide rods 63 of the back rest 64 on which are circumposed cushioning springs 65 disposed between the slide and the back rest. The slide 60 has additional vertical openings slidably accommodating aligned pairs of back rest slide rod locking cam rods 66 which are operated by rotary cams 67 located between the paired cam rods and fixed on a rotary shaft 68 having a hand hold 69 exposed at one side of the slide 60, whereby the slide rods 63 may be locked in various front or back positions. By this means, as best shown in Figures 6 and 7, the four slide rods 63 of back rest 64 may be locked so as to set the back rest at any desired distance from the slide 60 within its limits of adjustment by turning handle 69 and the cams 67 fixed upon its shaft 68 so as to force the bevel surfaces upon the four cam rods 66 against the slide rods 63. Springs 65 serve merely to urge the back rest 64 outwardly when not locked so as to permit adjustment of this part by pushing it toward slide 60 prior to locking in the desired position. The numeral 69a designates a hand knob equipped set screw threaded in the slide 60 so as to engage the standard 59 and lock the slide and hence the back rest 64 in vertically adjusted positions on the standard 59.

The pivots 46 being positioned above the seat 44, as shown, and the back rest 64 being adjustable as described, a patient may be sat in the chair with pivots 46 approximately opposite his hip joints, so that angular adjustment of seat

44 about pivots 46 will not substantially alter the position of the patient's head or mouth.

The shank 70 of the head rest assembly 71 slides through the opening 62 in the slide 60 and is arranged to be locked in the selected vertical adjustment by a set screw 72 threaded in the back of the slide 60.

The upper end of the head rest assembly shank 70 has a forward extension 73 having on its top a set screw 74 entering an opening slidably receiving shank on a yoke 75 on which are pivoted the headrest pads 76.

An inverted U-shaped rearwardly spring pressed foot rest 77 has the lower end of its legs pivoted at 78 to the outer sides of the horizontal part of the two-angle foot support 48 and these lower ends having circumferentially spaced holes 79 designed to receive the ends of arms 80 slidably mounted through the depending flange on the foot support and eccentrically pivoted at their inner ends to the radially inward end of a horizontal laterally outwardly extending operating lever 81 which is pivoted at 82 to the web of the foot support as shown in Figure 10. The patient having pushed the foot rest to a comfortable position the lever 81 is operated to place the outer ends of the arms 80 into the holes 79 so as to positively lock the foot rest in its adjusted position.

To always stop the head rest 76 at the predetermined elevation regardless of the amount of adjustment made to it by the operator, the lower end of the head rest support 70 has attached to it a cable 84 running over the pulley 85 and weighted at its lower end by the weight 86. The chair is elevated by closing the manual switch (not shown) which is in series with the switch 83 which controls the elevating motor 41. As the chair reaches the predetermined limit of elevation the weight 86 engages under the arm of the switch and this opens the switch 83 and stops the elevating motor 41. A suitable reversing switch (not shown) is connected to the motor 41 for lowering the chair. Other manual switches (not shown) are provided for starting and stopping the motors 30 and 51.

In operation, a patient may be placed in the chair, as described, and the latter adjusted to conform properly to the patient's body by employing the adjustments of seat assembly 44, etc., the adjustments of back rest 64, and the adjustments of head rest 76. By means of elevating motor 41 the chair assembly attached to the frame 22 may now be raised into operating position, being automatically stopped at the correct level by cable 84 opening switch 83. Still further adjustment for the purpose of positioning the patient's mouth more closely at the predetermined reference point 19 on the axis of angular adjustment of the chair may be had by means of the transverse adjustment of the head rest yoke 75.

The patient being thus properly positioned in the chair so as to locate his mouth at point 19, the whole chair assembly may now be adjusted angularly by means of motor 30. Since this motion is centered about an axis passing through point 19, the effect of such adjustment will be to rotate the operative zone or area about point 19 without causing any substantial displacement thereof.

Further adjustment may be had to vary the angle between the patient's legs and trunk by means of motor 51, adjusting seat 44 around pivots 46, and the adjustment, in turn, will not

substantially displace the patient's mouth from point 19, due to the placing of pivots 46 above seat 44 and forwardly of back rest 64.

As will now be apparent, an operating chair has been provided which is capable of a wide range of adjustment to fit various patients and to place the patient's body in a desired position, while at the same time permitting the operative zone to remain at a predetermined point, without any appreciable displacement being caused by the adjustments provided.

The operative zone being thus fixed at a definite point, the operator is enabled to remain at all times within the comparatively small area of platform 18 and to operate at any desired height with relation to the patient's mouth by raising or lowering the platform by means of motor 16. This vertical adjustment of operating platform 18 is made practicable within reasonable space limitations by eliminating horizontal movement of the operating zone so that a relatively small platform may be employed.

Although I have shown and described a preferred embodiment of the invention it is to be definitely understood that I do not limit the application of the invention thereto, as modifications will be obvious to those skilled in this art.

Having described the invention, what is claimed as new is:

1. A chair for dental work and the like, comprising in combination, a movable section, means for supporting the said section and adjusting it angularly about a predetermined point located above said movable section, and means attached to the said section for supporting a patient and adjustable to position the said patient relative to said movable section to place the mouth of said patient at the said point.

2. A chair for dental work and the like, comprising in combination, a movable section, means for supporting the said section and adjusting it angularly about a predetermined point located above said movable section, and means attached to the said section for supporting a patient and including a head rest, the last said means being adjustable to position the said patient relative to said movable section to place the mouth of the said patient at the said point.

3. A chair according to claim 2 in which the said means attached to the said section include also a seat adjustably carried by the said section upon pivots positioned for approximate alignment with the hip joints of a patient, whereby the said seat may be adjusted angularly with relation to the said section without altering substantially the position of a patient's head with reference to said head rest.

4. A chair according to claim 2 in which the

said means attached to the said section include a back rest, adjustable along said section and transversely thereof and also a seat carried upon pivots positioned with reference to said seat for approximate alinement with the hip joints of a patient and adjustable along said section, whereby the said seat may be adjusted angularly with relation to the said section without altering substantially the position of a patient's head with reference to said head rest.

5. A chair according to claim 2, in which the said means for supporting the said section and adjusting it angularly about a predetermined point include mechanism for elevating the said section and automatic means for stopping said mechanism upon the said head rest reaching a predetermined level.

6. A chair for dental work and the like, comprising in combination, a movable section, means for supporting the said section and adjusting it angularly about a predetermined point, means attached to the said section for supporting a patient and adjustable to position the mouth of the said patient at the said point, and a vertically adjustable platform adapted to support an operator.

7. A chair for dental work and the like, said chair comprising a lower stationary section and an upper movable section, said stationary section being formed with tracks curved out of a horizontal plane with reference to an arbitrary point above the chair, said upper movable section having conformably curved means supportably resting on said tracks, and means for swinging said movable section relative to said stationary section on the horizontal axis of said arbitrary point, and a vertically adjustable platform having an opening accommodating said stationary section.

8. A chair for dental work and the like, said chair comprising a stationary section and a movable section, a seat on said movable section to support a patient with his mouth area at a predetermined point above said base, means supporting said movable section on said stationary section on a horizontal axis substantially coinciding with said predetermined point, whereby the movable section may be adjusted to change the position of the patient between reclining and sitting positions while retaining the mouth area of the patient at said predetermined point, and platform means surrounding a portion of said stationary section to support the operator for working at said predetermined point, and means for adjusting the elevation of said platform means.

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