Feb. 11, 1969 D. H. HALE 3,427,072

RECLINING DENTAL CHAIR

Filed Aug. 15, 1966 Sheet 1 of 2

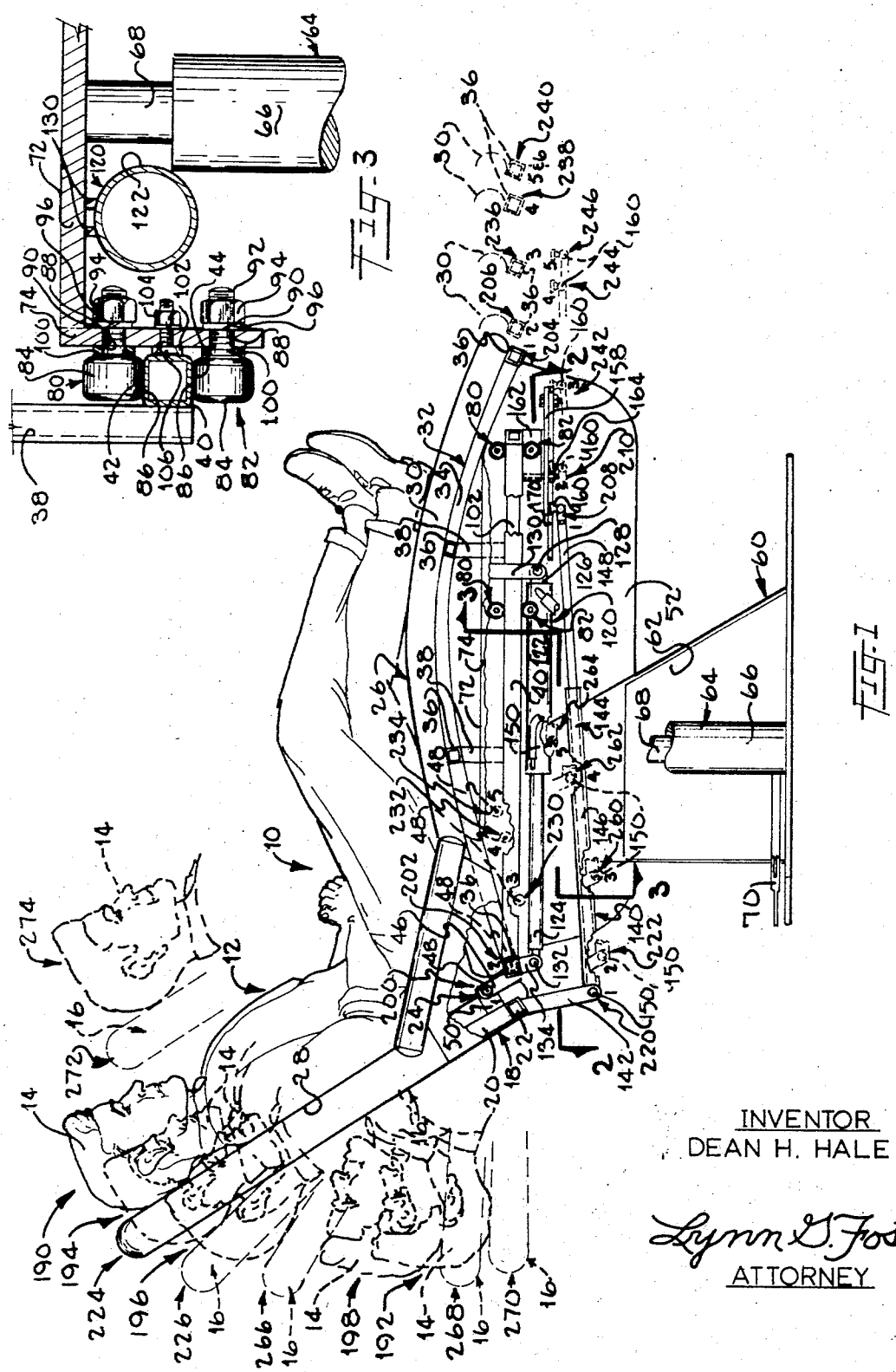


FIG-1

FIG-3

INVENTOR
DEAN H. HALE

Lynn S. Foster
ATTORNEY

Feb. 11, 1969 D. H. HALE 3,427,072

RECLINING DENTAL CHAIR

Filed Aug. 15, 1966 Sheet 2 of 2

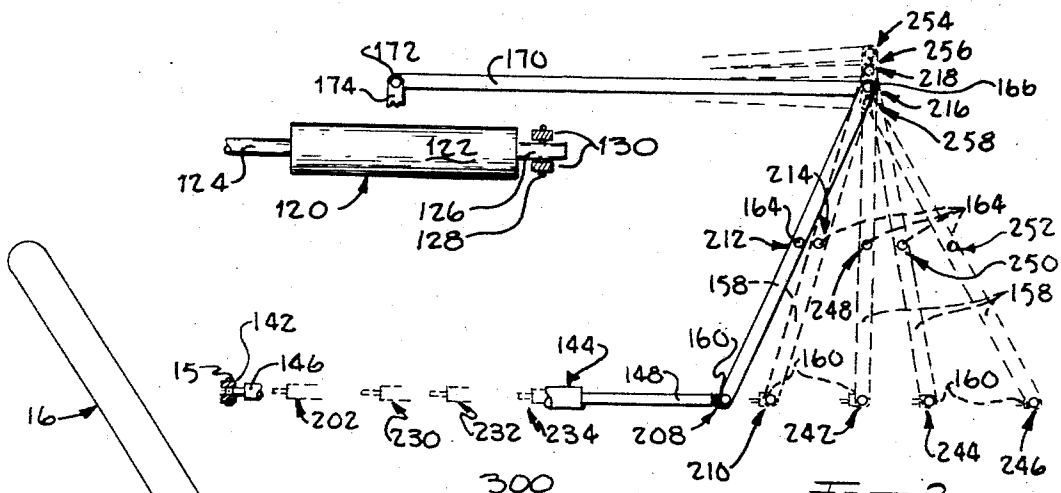


Fig. 2

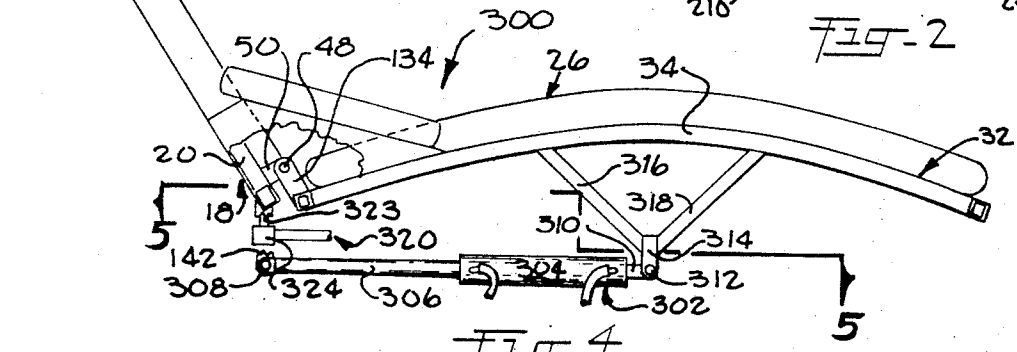


Fig. 4

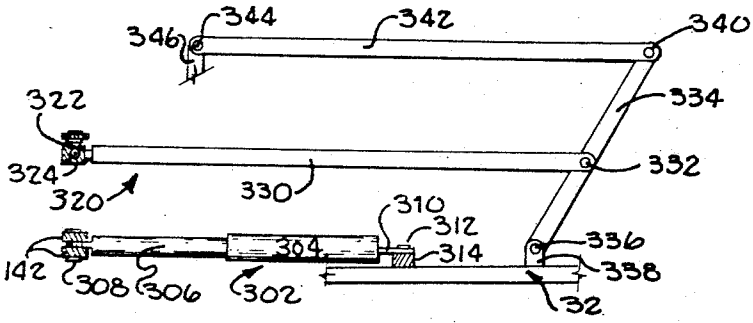


Fig. 5

INVENTOR
DEAN H. HALE

Lynn G. Foster
ATTORNEY

United States Patent Office 3,427,072 Patented Feb. 11, 1969

3,427,072

RECLINING DENTAL CHAIR

Dean Howard Hale, 2500 N. Main, Logan, Utah 84321

Filed Aug. 15, 1966, Ser. No. 572,281
U.S. Cl. 297—342 4 Claims
Int. Cl. A47c 1/032; A61g 15/00

ABSTRACT OF THE DISCLOSURE

A reclining dental chair apparatus and method, the apparatus featuring a chair seat and back pivotally joined together and supported by a base, (a) the seat being power-driven to move rectilinearly to the base and simultaneously pivot the back relative to the seat by force provided by the same power source, or (b) the back being power-driven to pivot relative to the seat and simultaneously shift the seat oppositely and rectilinearly relative to the base by force delivered from the same power source. The disclosed methods comprise positioning a reclining dental chair so that the disposition of the patient's head remains within essentially one predetermined and relatively narrow vertical corridor though occupying any one of a plurality of relatively erect or reclined positions by displacing the seat relative to the base and simultaneously oppositely pivoting the back relative to the seat or vice versa.

The present invention relates to improved dental and like reclining chairs and more particularly to such chairs having improved position control features (a) for easily maintaining the patient's head within a convenient work region regardless of whether the chair is fully erect, fully reclined or at an intermediate position and (b) for automatically varying the horizontal location of the center of gravity of the entire chair, including the occupant, relative to the base to compensate for oppositely varying the center of gravity of the patient in the chair responsive to reclining or erecting the chair.

In the reclining dental chair and like arts, as presently constituted, it has become almost a medical necessity, for purposes of time, accuracy and convenience, that the position of the patient's head at all times be essentially kept within a single, readily accessible work area, having close horizontal limits, without regard to whether or not the patient is upright or reclined. This enables placement of dental equipment, instruments, tools, materials, etc., in handy proximity, accommodates easy direct-vision illumination at the work site and accommodates direct, efficient and accurate work by the dentist upon any region of the oral cavity without the need for mirrors, etc.

Prior known reclining dental chair proposals for maintaining the occupant's head within such a work area have been disadvantageous to use, requiring careful, manually coordinated actuation of several position controls by the dentist to (a) recline the patient, in whole or in part, by pivoting the back of the chair relative to the seat of the chair and (b) to return the patient's head to the requisite position between the mentioned close horizontal limits. For example, see United States Patent 3,150,898. Also, some commercial adaptations of such prior proposed reclining chairs have, for positioning purposes, required that the base which supports the chair be materially offset from the center of gravity of the chair. Consequently, such chairs require an undue amount of floor space in the dentist's office and are economically burdensome because of the support and power actuating equipment must be constructed of especially heavy and/or strong materials to handle such offset loads.

The present invention novelly overcomes the above-mentioned objectionable features of the prior art by providing a reclining dental and like chair having improved position control features accommodating synchronous (a) reclining of the back of the chair and (b) automatic advancing of the entire chair relative to the base an adequate distance to compensate in forward motion of the chair for rearward motion of the back to keep the patient's head within the prescribed horizontal limits, and vice versa. Thus, the center of gravity of the patient-supporting chair is uniquely and automatically repositioned each time the reclining position of the patient (along with the patient's center of gravity) is oppositely changed, without manipulation of multiple position controls.

The presently preferred embodiment of this invention comprises a fluid or comparable motor interposed between the reclining chair and a fixed anchor position, such as at the support base. Either (a) the back of the chair is powered by the motor for pivoting the back relative to the seat with a component of force, created by such pivoting, oppositely, though essentially rectilinearly shifting the entire chair relative to the base or (b) the seat of the chair is powered by the motor for essentially rectilinear displacement relative to the base with a component of force, created by such essentially rectilinear displacement, oppositely, though pivotal relocating the back of the chair relative to the seat. Thus, by singly controlling the one motor, the dentist may recline or erect the patient as desired without displacing the patient's head out of the work area beyond the horizontal limits. A second motor is used to locate the entire chair at a suitable working elevation.

With the foregoing in mind, it is a primary object of this invention to provide a novel dental and like chair system, including method and apparatus, having improved position control features accommodating accurate and convenient position regulation of the chair by the dentist.

Another significant object of this invention is the provision of a novel dental and like chair system wherein the center of gravity of the chair is automatically relocated to favorably reposition the chair relative to its supporting base each time the patient is reclined or erected, in whole or in part.

These and other objects and features of the present invention will become more fully apparent from the following description and appended claims taken in conjunction with the accompanying drawings wherein;

FIGURE 1 is a schematic side elevation, partly broken away for clarity, of the presently preferred embodiment of this invention illustrating several positions in which the chair may be disposed by actuation of a single motor;

FIGURE 2 is a fragmentary plan view taken along line 2—2 of FIGURE 1 of the motor and actuating linkage of the chair of FIGURE 1 which linkage causes the back of the chair to be automatically pivotally repositioned each time the position of the chair is rectilinearly altered relative to the base by actuation of the motor;

FIGURE 3 is a fragmentary cross-section taken along line 3—3 of FIGURE 1;

FIGURE 4 is a schematic side elevation of the second presently preferred embodiment of this invention, with parts omitted for clarity; and

FIGURE 5 is a fragmentary plan view taken along line 5—5 of FIGURE 4 of the motor and actuating linkage of the chair of FIGURE 4, which linkage causes the chair to be automatically rectilinearly repositioned relative to the base each time the pivotal position of the back of the chair is altered by actuation of the motor.

Reference is now made to the drawings wherein like numerals are used to designate like parts throughout. FIGURE 1 depicts a presently preferred reclining dental chair embodiment of the present invention, generally

designated **10**, adapted to situate a patient, generally designated **12**, in any one of a plurality of variously reclined positions, as illustrated in FIGURE 1. Broadly, the chair **10** has for its purpose the maintaining of the patient's head **14** within close horizontal limits so that the dentist's instruments, tools, equipment, and materials may be situated in close proximity to such a work area, the mentioned horizontal limits being indicated by the position of the patient's head **14** shown in solid lines and the lowest, fully reclined position of the patient's head shown at the left in dotted lines. The dotted head position shown to the right of the solid position is a manually-erected position quickly attained when the patient is choking or desires to express liquid from his mouth and is not a dental working position. In this way, the dentist may, with a minimum of time and inconvenience and with accuracy, complete his work.

Structurally, the chair **10** of FIGURE 1 comprises a reclining back, generally designated **16**, comprising a suitable rigid frame **18** including support members running coextensive with the back and designated **20** and transversely-extending cross members, including support member **22** which is rectangular in cross-section and disposed at the bottom of back **16** and near the pivotal connection **24** between the back **16** and a seat **26** of the chair **10**. The back **16** preferably is suitably padded and upholstered at the exterior **28**, the type and nature of upholstery forming no part of the present invention.

The seat **26** of the chair also preferably comprises a suitable type of exterior upholstery **30** and further comprises a rigid frame **32**. The rigid frame comprises a plurality of cambered members **34** extending generally coextensive with the seat **26** as well as the plurality of cross braces **36** integrally joined, such as by welding or the like, to the cambered members **34**. Thus, the frame **32** is an essentially rigid frame so that the patient **12** is firmly supported thereby and the frame will move unitarily to and fro across the base, which supports the chair, for purposes and in a manner subsequently to be explained.

A pair of depending hanger members **38** are integrally joined to the frame **32**, as for example by welding, and integrally carry a track **40** (FIGURE 3) at one side near the lower end, suitably secured by welding or the like. One such track is located at each side of the chair. Each track **40** is rectangular in cross-section and, therefore, provides an essentially flat top surface **42** and an essentially flat bottom surface **44**. The ends of both the left track and the right track are respectively integrally joined as for example, by welding, to the forward cross brace **36** and the rear cross brace **36** so that each track **40** integrally forms part of the seat frame **32** and moves to and fro with the seat frame.

Also, the rear cross brace **36** at both sides, is integrally joined to a pivotable lug **46** which in turn is pin-joined at **48** to lug **50**, lug **50** being integral with the back frame **18**. Thus, the back **16** is pivotally joined at **48** on each side of the chair to the seat **26** so that the patient **12** can be situated anywhere between a fully erected seated position and a fully reclined substantially horizontal position.

A skirt **52** may be disposed along each side of the seat **26** for appearance and protection purposes thereby concealing the structural and working parts disposed in beneath the seat **26**.

The chair **10** is supported by floor-engaging base, generally designated **60** with the relative horizontal positions of the chair and the base preferably being such as to place the center of gravity of the chair, as near as practicable, in vertical alignment with the base no matter to what degree the patient is reclined. Of course, if desired, the base **60** could be otherwise disposed relative to the chair.

The base **60** comprises a covering **62** adapted to conceal from view and enclose a fluid motor, generally designated **64**, comprising a cylinder **66** and a ram or piston rod **68**. The sole purpose of the motor **64** is to situate the entire chair **10** vertically at a suitable work elevation. A control lever **70** is used in conjunction with a suitable conventional hydraulic system (not shown) to selectively actuate the fluid motor **64**.

As best seen in FIGURE 3, the piston rod **68** of the fluid motor **64** is integrally joined to a base plate **72** from which a pair of right and left roller support plates **74** integrally depend. It is to be appreciated that while the base plate **72** is illustrated as being disposed in a substantially horizontally extending orientation, the orientation could be inclined with respect to the horizontal so that the chair **10** would be displaced essentially rectilinearly in the direction of such orientation across the base **60** as the inclination of the back **16** is modified, as will subsequently become better understood.

Each depending roller support plate **74** carries a plurality of combined top and bottom roller assemblies, generally designated **80** and **82**, respectively, at each side. Two of each such combined roller assemblies are illustrated as being situated along both the right and left hand sides of the chair. Apart from location, the idler roller assemblies **80** and **82** are identical and therefore only one will be explained.

The roller assemblies **80** and **82** each comprise a commercially available roller **84**, the circumferential surface **86** being in contiguous friction-bearing relationship with the respective surfaces **42** and **44** of the track member **40**. The roller **84** is joined by means of a suitable bearing (not shown) to a short shaft **88** which passes through an aperture **90** suitably located in the adjacent depending roller support plate **74**. The interior terminal end of the short shaft **88** is threaded at **92** and threadedly receives a nut **94** which is secured in its tightened position by a lock washer **96**. A spacer **100**, interposed between the plate **74** and the bearing (not shown) of each roller **84** maintains the roller surface **84** in proper alignment with the track **40**. A nylon or other suitable longitudinally extending guideblock **102**, secured to the adjacent plate **74** by means of countersunk bolt assemblies **104** passing through an aperture **106** in the plate **74**, also accommodates aligned displacement of the seat **26** relative to the base **60**. Thus, the top and bottom roller assemblies **80** and **82** accommodate fore and aft displacement of the chair **10** across the base, the track **40** being linearly displaced through the top and bottom rollers at such time to create opposite rotation of the idler rollers **84** of the assemblies **80** and **82**. Thus, the present construction avoids any need for pivotal connection between the base and the chair.

A position-controlling hydraulic motor, generally designated **120**, is interposed between the base plate **72** and the seat frame **32** (FIGURE 1) for the purpose of displacing the chair relative to the base when it is desired to reposition the degree of patient recline. The full stroke of the piston of motor **120** determines the forward and rear extreme positions of the chair with respect to the base. More specifically, the fluid motor **120** comprises a cylinder **122** from which a piston rod **124** extends. The base of a cylinder **122** at integral anchor **126** is pin-joined at **128** to a pair of depending lugs **130**, the lugs **130** being integrally joined to the base plate **72**, as for example by welding. Thus, the cylinder **122** is held in an essentially stationary position by such union with the base plate **72**.

On the other hand, the piston rod **124** is pivotally joined at pin **132** to a link **134**, which link is integrally joined to the seat frame **32** at the rear cross member **36**. The cylinder **122** is a two-way cylinder of conventional type accommodating both forward and rearward displacement under control of the dentist using suitable means including a satisfactory conventional hydraulic system (not shown) and a control lever (not shown) or the like in a manner generally well known in the art.

A linkage system, generally designated **140**, is inter-

posed between the back 16 and seat 26 of the chair 10 and anchored to the base 60 for the purpose of pivoting the back 16 relative to the seat 26 in response to and to an extent commensurate with the magnitude of any rectilinear displacement of the seat across base 60 caused by actuation of the fluid motor 126 through either extending or retracting the piston rod 124.

The linkage mechanism 140 (best seen in FIGURES 1 and 2) comprises a link 142, integrally and rigidly depending from the frame 18 of the back 16 at the lower cross member 22, and a telescopic member 144 comprising an outer hollow tube 146 and an inner rod 148, the rod being disposed within the hollow of the tube. The left end of the telescopic tube 146 is pivotally joined, using clevis and a pin 150, to the link 142 and the right end of the rod 148 is joined, to a diagonal link 158 at swivel connection 160. If desired, a one-piece member may be used in place of the two-piece telescopic member 144.

The diagonal link 158 by means of an end connection 164, is rotatably secured near the mid point thereof to a support block 162, which block is integral with the frame 32. The other end of the diagonal link 158 of the linkage system 140 is pivotally joined at pin 166 to a link 170 which extends generally parallel to the telescopic member 144 but is situated at the opposite side of the chair. The rearward end of the link 170 is pivotally joined at pin 172 to an anchor bracket 74, which bracket is suitably integrally secured to the base 60 so at all times to be situated in a stationary position.

With the foregoing in mind, the operation of the chair 10, as illustrated in FIGURES 1, 2, and 3, will now be described. It is to be appreciated that the patient 12 may be reclined or erected in any one of an infinite number of positions between the fully erected and the fully reclined positions, the fully erect position being illustrated with the patient's head shown in solid lines at 190 (FIGURE 1) and the fully reclined position being illustrated in dotted lines at 192. These intermediately reclined head positions are also illustrated at 194, 196 and 198. It is also to be appreciated that as the fluid motor 120, under control of the dentist, powers the seat 26 to and fro as desired rectilinearly across the base in a direction defined by the orientation of the base plate 72, a component of force caused by such rectilinear displacement will be transmitted through the linkage system 140 to pivotally relocate the back of the chair relative to the seat an amount proportional to the rectilinear distance traversed. Thus, by singly controlling the one fluid motor 120, the dentist may synchronously displace the seat 26 along with the back 16 forward relative to the base 60 and at the same time and under power of the same motor, through the linkage system 140 as accommodated by the counterclockwise moment exerted by the patient upon the back 16, recline the back 16 a corresponding amount. Where a one-piece member is used in place of the two-piece telescopic member, the moment exerted by the patient upon the back is irrelevant when reclining or erecting the back.

Likewise, when under control of the dentist, the fluid motor 120 powers the seat 26 back, or to the left as viewed in FIGURE 1, relative to the base 60, the same power provided by such actuation of the motor 120 will displace the linkage system 140 causing the back 16 to be erected a distance proportional to such rear rectilinear displacement of the seat. Hence, the center of gravity of the chair, with patient residing therein, will be automatically relocated in a favorable and easily supported reposition with respect to the base 60 each time the patient is reclined or erected, in whole or in part, in the opposite direction. Therefore, the offset distance between the force of the combined center of gravity of the chair and patient and the reaction force exerted by the base 60 will be minimal at all times.

More specifically, when the dentist actuates the fluid motor 120 so as to displace the chair 26 toward the right relative to the base 60 sufficient to bring the pivotal connection 40, from the solid position 200 to the dotted position 202, the right edge of the seat 26 will be displaced from the position 204 to the position 206 (FIGURE 1), the swivel connection 160 will be displaced from the position 208 to the position 210 (FIGURES 1 and 2), the central pin connection 164 of link 158 (FIGURE 2) will be displaced by movement of the seat 26 from the position 212 to the position 214, the pivotal connection 166 will be displaced from the position 216 to the position 218 (FIGURE 2), and the pivotal connection 150 (FIGURE 1) will be displaced from the position 220 to the position 222.

The mentioned displacement of the connection 150 from the position 220 and to position 222 will cause counterclockwise rotation of the link 142 about pin connection 48, as viewed in FIGURE 1, reclining the back 16 from the position 224 to position 226 and altering the head 14 of the patient 12 from 190 to 194 (FIGURE 1), thereby retaining the head 14 of the patient within close horizontal limits so that the dentist may conveniently and accurately work on any region of the oral cavity without relocating his tools, instruments, materials and the like and without appreciable inconvenience or loss of time.

In like manner, the fluid motor may be actuated to advance the seat 26 rectilinearly within its limits of operation to any desired position and to correspondingly recline the seat 16, as, for example, by causing displacement of the pivot connection 48 to any of the positions 230, 232, and 234, and, accordingly, causing the right front edge of the seat 26 to be situated at positions 236, 238, and 240, respectively; relocating the swivel connection 160 at positions 242, 244, and 246, respectively; disposing the central joint 164 at the positions 248, 250 and 252, respectively; displacing the pivotal connection 166 serially to the positions 254, 256, and 258, respectively; correspondingly displacing the pivotal connection 150 to the positions 260, 262, and 264, respectively. Such combined displacement will rotate the link 142 counterclockwise about pin connection 48 repositioning the back 16 at the pivoted locations 266 and 268 and 270, respectively. This will correspondingly dispose the patient's head 14 at the positions 196, 198, and 192, respectively.

The same procedure may be followed in reverse with opposite actuation of the motor 120, under control of the dentist, to selectively erect the back 16.

Occasionally, for example, when a patient is choking, it is desirable to quickly move the patient from a reclined to a fully erected position. This can readily be accommodated because the telescopic member 144 enables free upward pivotal movement of the back 16 relative to the seat 26 while the seat 26 remains generally stationary. Thus, the dentist need only manually grasp the underside of the back 16 and manually lift the back. This will pivotally displace the back 16 around pin 48 and cause the members 146 and 148 to extend telescopically. Therefore, for example, when the back 16 of the chair is disposed in the fully reclined position 270 (FIGURE 1) and the patient's head 14 is located in the position 192, and the patient is choking, the dentist may manually lift the back 16 pivoting the back relative to the essentially stationary seat into the erect position designated 272 in FIGURE 1 thereby placing the patient's head in position 274. Thereafter, the patient may again be reclined, the dentist merely releasing his manual support of the back 16 allowing the member 148 to inwardly telescope into the hollow cavity of the member 146, air escaping from the cavity through a suitably sized aperture (not shown) located at the end of the member 146 near the pivot pin 150.

Reference is now made to FIGURES 4 and 5 which depict a second presently preferred embodiment of the present invention. Much of the structure previously explained in conjunction with chair 10 of FIGURES 1–3 may also comprise part of the chair, generally designated 300, of

FIGURES 4–5, and such corresponding structure will not again be described. For example, the base (including the frame and the roller assemblies), the back, the seat, and the pivotal connection between the seat and the back may be the same in each chair embodiment.

Fundamentally, the chair **300** differs from the chair **10** in that the back of the chair is powered by a single motor for pivotal displacement relative to the seat, with a component of force created by such pivoting oppositely though essentially rectilinearly shifting the entire chair relative to the base. In the previous embodiment, chair **10**, the seat was rectilinearly powered, as opposed to pivotally powering the back as is done with chair **300**.

Structurally, the two-way fluid motor **302**, comprising a cylinder **304** and a piston rod **306**, is interposed between the frame **32** and seat **26** and the back **16**, the piston rod **306** being pivotally joined by pin **308** to the depending integral link **142**. The cylinder **304** is integrally joined, through lug **310**, pin **312** and anchor bracket **314**, to a pair of diagonal frame members **316** and **318**. The frame members **316** and **318** are integrally joined, as for example by welding, to the frame **32**. Thus, under control of the dentist, actuation of the motor **302** to advance and retract the piston rod **306** will in turn rotate the link **142** along with the back **16** clockwise and counterclockwise, respectively, around pin **48**, as viewed in FIGURE 4, thereby controlling the pivotal disposition of the back **16** relative to the seat **26**.

A linkage system, generally designated **320** is interposed between the back **16** and the seat **26** and is anchored to the base **60** so that the seat **26** will be automatically rectilinear through oppositely displaced as the back **16** is reclined or erected, in whole or in part, responsive to actuation of the motor **302**. Structurally, a swivel connection **322** pivotally joins a lug **323**, which lug integrally depends from the frame **18**, to the linkage system **320** at recessed block. The block **324** is integrally attached to the left end of the link **330**, as viewed in FIGURES 4 and 5.

The link **330** is rotatably joined at pin connection **332** to a diagonal link **334**. The diagonal link **334** is joined at pin **336** for pivotal movement relative to the seat frame **32**, the pin **336** being retained in an anchor bracket or lug **338** integrally fastened to the seat frame **32**. The opposite end of the diagonal link **334** is pivotally joined at pin connection **340** to a link **342** which extends generally parallel but offset from the link **330**. A pin connection **344** joins the back end of the link **342** to an anchor bracket **346** which is suitably integrally secured to the base **60** of the chair.

The operation of chair **300** is essentially identical to the operation of the chair **10** previously described, except that actuation of the fluid motor **302** alters the pivotal position of the back **16** relative to the seat **26** and such actuation, through the linkage system **320**, causes the seat **26** to be essentially rectilinearly displaced across the base **16** in a direction opposite to the pivotal change of the back **16**. Thus, using the chair **10**, actuation of the motor **120** rectilinearly displaces the seat **26** across the base thereby causing the back **16** to pivot an amount proportional to such rectilinear displacement; and, using the chair **300**, actuation of the motor **302** pivotally repositions the back **16** relative to the seat and thereby causes the seat **26** to be rectilinearly displaced across the base responsive to such displacement.

It is to be appreciated that the link **330** of the linkage system **320** could comprise telescopic members to accommodate rapid manual erection of the back **16** when the patient is choking or the like. Using such telescope members, it would be necessary that the base plate **72** be inclined somewhat with respect to the horizontal so that when under compression the telescopic members comprising link **330** will be displaced unitarily counter to gravity as the back **16** is reclined and when under tension one such telescopic member will move responsive to the force of gravity generally in unison with the forced displacement of the other telescopic members induced by erection of the back **16**.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive. The scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore to be embraced therein.

What is therefore claimed and desired to be secured by U.S. Letters Patent is:

1. In a base-mounted, reclining dental chair and the like adapted to maintain a patient's head within a convenient working area between narrowly spaced vertically extending limits without regard to the relative orientation of the components of the chair comprising a back portion pivotally associated with and supported in cantilever relation at the rear of a seat portion of the chair, antifriction means interposed between the seat and the base accommodating ready selective displacement of the chair across the base, a selectively operable single power mechanism interposed between a fixed anchor and the chair and linkage interposed between the back and seat of the chair and the base accommodating reorientation of the patient and the chair by concurrent displacement of the chair across the base and pivoting in exact time relation of the chair back relative to the chair seat intermediate an erect nearly vertical position and a fully reclined substantially horizontal position, and other selectively operable power means solely for changing the elevation of the chair.

2. In a method of manipulating a base-supported dental or like chair having a back movable from a substantially vertically erect position to a substantially horizontally reclined position comprising the steps of: (a) lowering the headrest portion of the back of the chair essentially vertically downward within a narrow vertical corridor intermediate the erect and reclined positions by synchronously (1) arcuately pivoting the back downwardly relative to the seat about a pivotal axis disposed in the region between the back and the seat with the back being cantilever-supported only in the mentioned region and (2) jointly advancing the back and the seat across the base so that the effective horizontal rearward movement of the headrest portion is substantially equal to the effective horizontal forward movement of the seat at any instant of time during the pivoting and advancing, (b) elevating the headrest portion of the back of the chair essentially vertically upward within the narrow vertical corridor intermediate the erect and reclined positions by synchronously (1) arcuately pivoting the back upwardly relative to the seat about the pivotal axis and (2) jointly rearwardly displacing the back and the seat across the base so that the effective horizontal forward movement of the headrest caused by the pivoting is substantially equal to the effective horizontal rearward displacement of the seat at any instant in time during the pivoting and displacing.

3. In a reclining chair for retaining an occupant's head at any selected one of several available elevations within close horizontally spaced limits no matter how the chair is inclined relative to the vertical, the chair comprising a back portion and a seat portion, the back portion being mechanically movable through pivot action between a primarily vertical disposition and a primarily horizontal disposition, a base interposed between the floor and the seat of the chair, antifriction means supporting the chair for essentially rectilinear displacement to and fro across the base, selectively-controlled motor means disposed to directly displace one said chair portion in the manner mentioned between available positions, and pivotally-related linkage means disposed generally beneath the seat and interposed between said chair portions, said linkage restraining the other chair portion in a selected position

when the motor means are inactive, said displacement of the one chair portion causing the linkage at least in part to follow said one portion when the motor means are active with the linkage follow action accommodating the mentioned displacement of the other chair portion to retain the occupant's head within the close horizontally spaced limits at all times.

4. An apparatus as defined in claim 3 wherein said linkage means comprises telescopic members adapted to be telescopically extended by manually elevating the back relative to the seat while retaining the seat in an essentially stationary position so that the occupant may be promptly moved from a reclined position to an erect seated position, when desired.

References Cited

UNITED STATES PATENTS

1,822,427	9/1931	Wenn et al.	297—342
2,028,633	1/1936	Thomas	297—322
3,172,699	3/1965	Naughton	297—330
3,222,105	12/1965	Cross	297—314
3,224,808	12/1965	Spielman	297—378
3,232,575	2/1966	Ferro	297—329
3,329,463	7/1967	Zimmerman	297—342

FOREIGN PATENTS

15,112	9/1897	Switzerland.

FRANCIS K. ZUGEL, *Primary Examiner.*

U.S. Cl. X.R.

297—330, 316