United States Patent [19]

Page

[11] **3,826,531**

[45] **July 30, 1974**

[54] **DENTAL CHAIR**

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[22] Filed: **May 15, 1972**

[21] Appl. No.: **253,395**

[52] **U.S. Cl.** **297/188,** 312/209
[51] **Int. Cl.** **A47c 7/62,** A61c 19/00
[58] **Field of Search** 297/188, 170, 284, 345, 297/348, 330; 108/138; 32/22; 312/209

[56] **References Cited**

UNITED STATES PATENTS

1,952,744	3/1934	Chapman	297/345 X
2,187,283	1/1940	Schevtz	297/348 X
2,608,239	8/1952	Gorden	297/348
2,679,283	5/1954	Mahone	297/348
2,859,063	11/1958	Underland	297/348
3,089,741	5/1963	Burton	297/345 X
3,194,187	7/1965	Linder et al.	297/345 X
3,304,609	2/1967	Horowitz et al.	108/138
3,428,307	2/1969	Hunter et al.	108/138 X
3,591,234	7/1971	Condon	297/188

Primary Examiner—James T. McCall
Attorney, Agent, or Firm—W. R. Hulbert

[57] **ABSTRACT**

The patient-supporting structure of the chair is carried on a vertically adjustable platform which rides up and down on a laterally displaced post; the platform is kept level by vertically spaced opposed rollers riding on vertical tracks formed on the post, there being two sets of rollers acting in planes at right angles to each other so that lateral displacement and angular movement are prevented. The platform may move down practically to floor level. An instrument console is mounted for horizontal pivoting and vertical sliding on an offset shaft and has a lost motion connection to the platform so that it follows it only in the upper part of its adjustment range.

8 Claims, 4 Drawing Figures

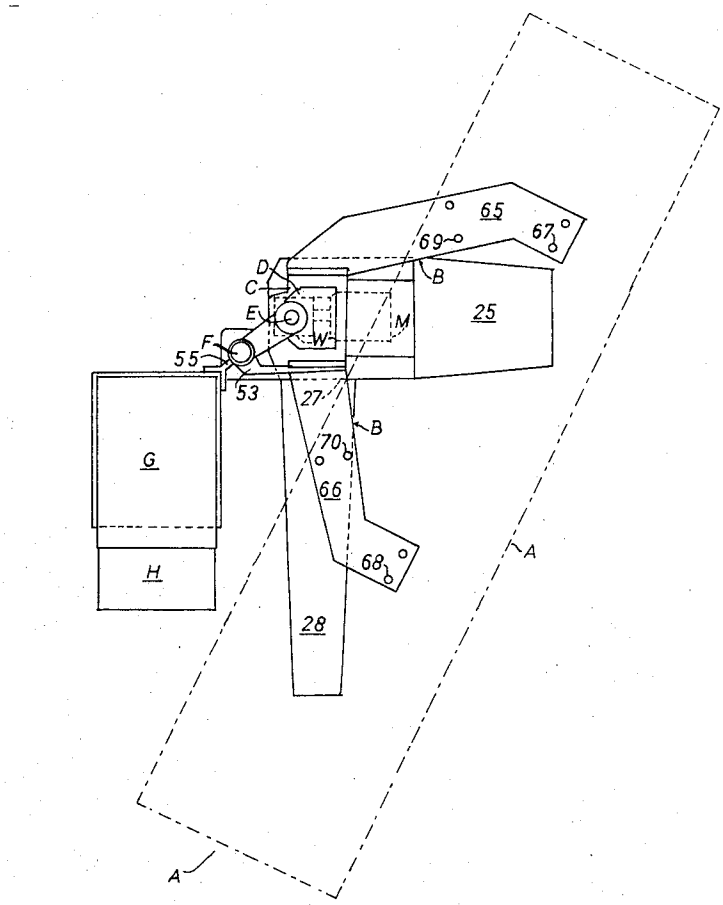


FIG. 1

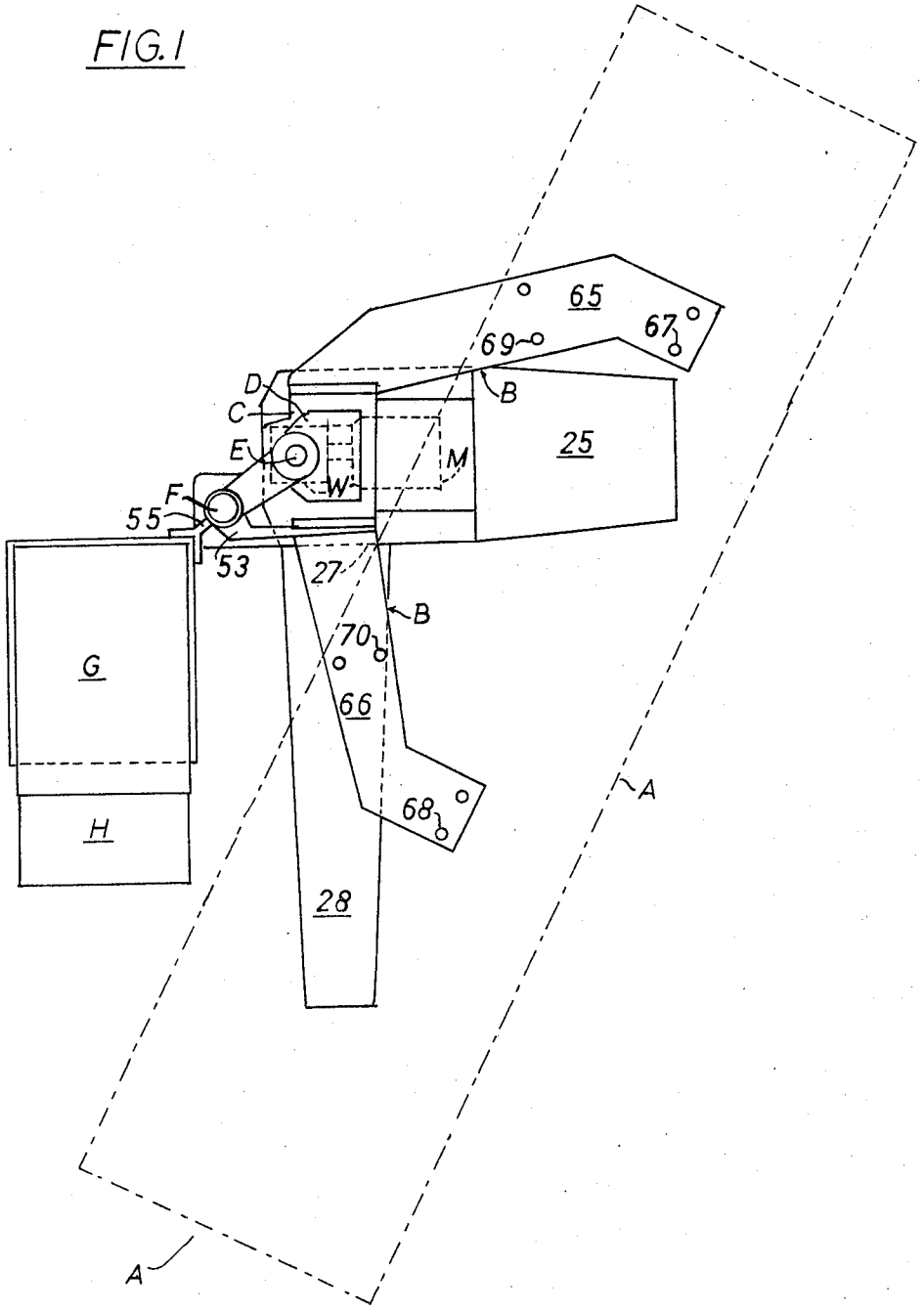


FIG. 2

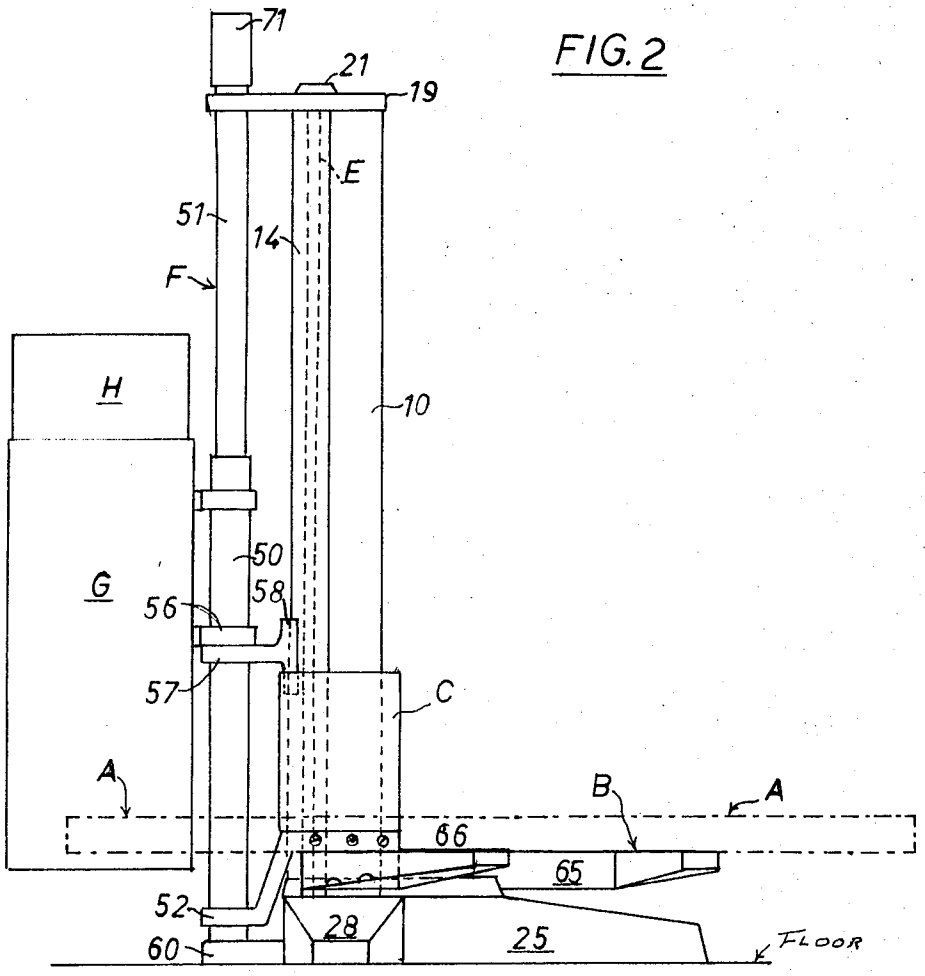


FIG 3

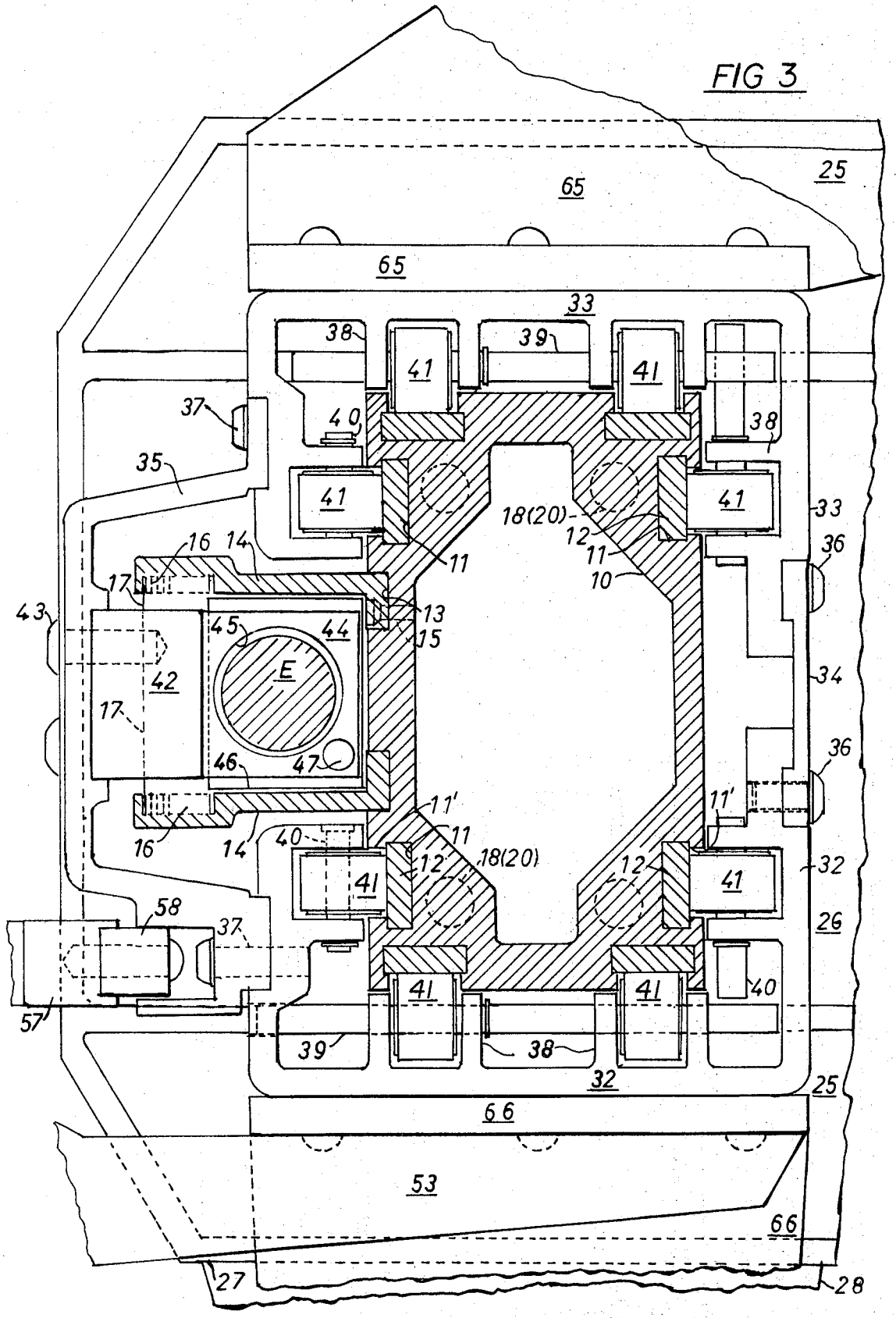
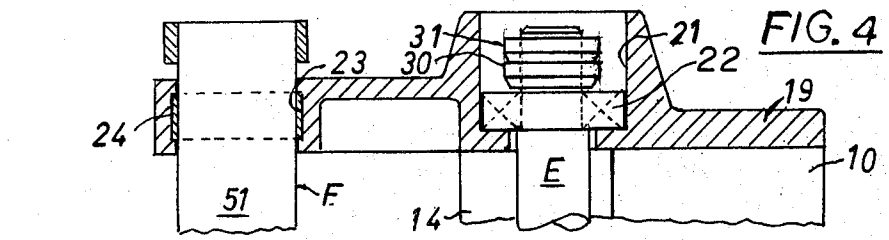
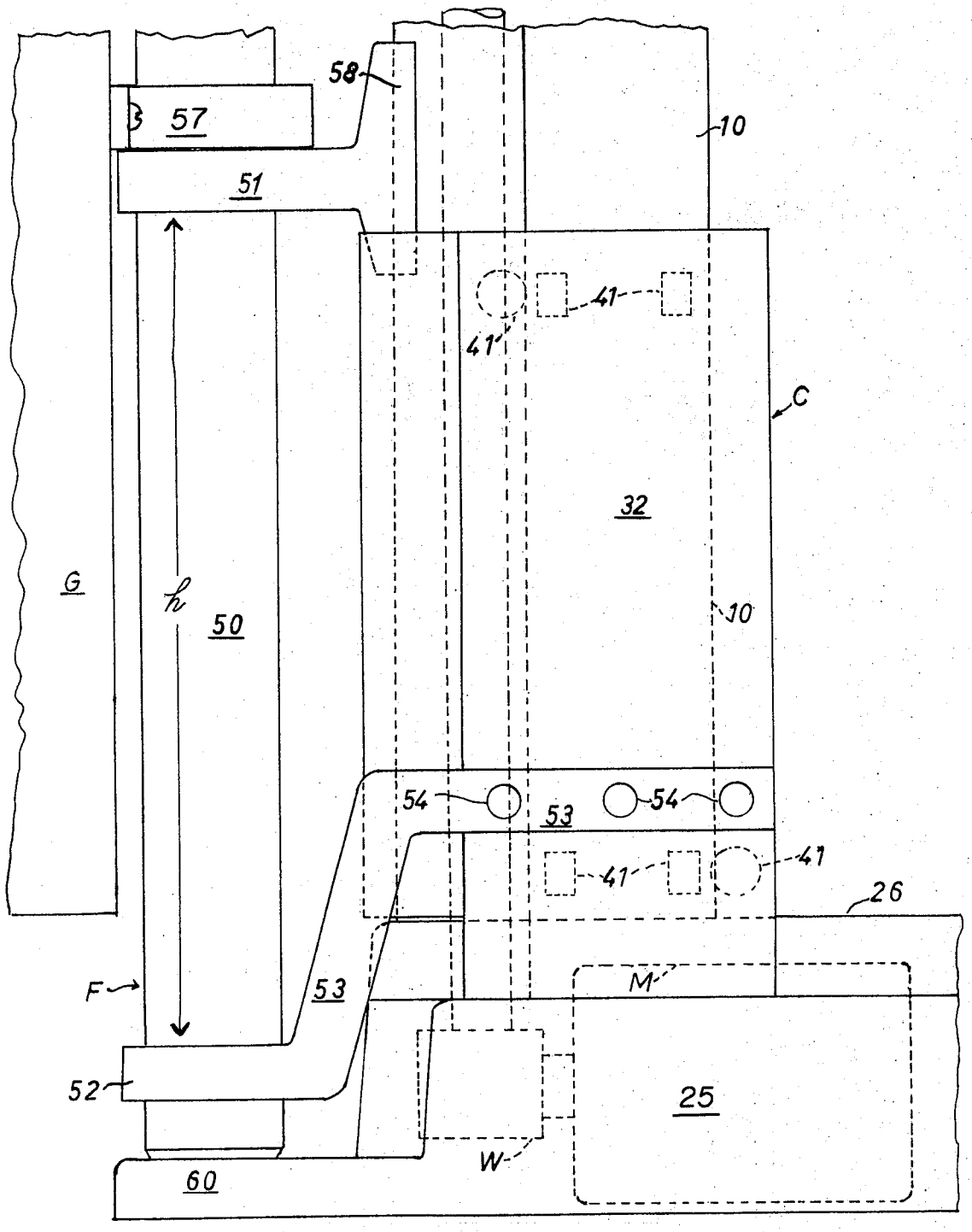

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FIG. 4


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DENTAL CHAIR

CROSS-REFERENCE TO RELATED APPLICATION

The present application is directed to an improvement on the dental chair disclosed in prior application of Richard W. Page, Ser. No. 135,634, filed Apr. 20, 1971, now U.S. Pat. No. 3,724,894, for Dental Operating Chair.

FIELD OF THE INVENTION

The invention relates to operating chairs and, more particularly, dental operating chairs and the means whereby the height of the chair is adjusted. The principal construction heretofore used has been a hydraulic cylinder supporting the chair and located under the seat portion thereof. While having many advantages, this arrangement interferes with adjusting the chair as low as is desired and may also prevent the dentist from placing his legs in their most comfortable position when operating in some sitting positions. An offset cylinder eliminates the obstructions under the chair, but is subject to heavy tilting forces, requires considerable headroom and tends to expose lubricated surfaces which require somewhat awkward cover arrangements. Jointed arrangements of various kinds have been proposed, but involve excessive stresses at certain points, present dead-center problems in some positions and are comparatively complicated, particularly when it is desired to have the height adjustment independent of the position of the patient.

SUMMARY OF THE INVENTION

The vertically adjustable platform takes the form of a bracket which slides up and down a post to one side of the chair, the bracket being positioned horizontally by means of rollers riding on tracks forming part of the post and being moved up and down by means of a vertical screw. The base which supports the post comprises horizontal elements extending from the post to a line well beyond the center of gravity of the supported chair elements and patient and to points well spaced from the center of gravity along the chair center line, insuring the stability of the entire structure. At the same time, the entire space under the chair is substantially free of obstruction by the base elements, along one side of the chair, while the space along the other side accommodates only a base element which may be two or three inches high, leaving ample space for the feet and legs of the dentist and assistant. The platform may be brought as close to floor level as required and may itself be comparatively thin, so that positioning of the patient in preferred operating positions is facilitated. The rollers which guide the bracket are arranged in vertically and horizontally displaced opposed sets in two perpendicular planes, so as to eliminate axial thrusts on the rollers and permit operation without lubrication of the roller tracks.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 is a somewhat schematic plan view of a dental operating chair embodying the invention in a preferred form;

FIG. 2 is an elevation view of the chair of FIG. 1, at right angles to the plane thereof;

FIG. 3 is a horizontal section on a larger scale;

FIG. 4 is a side elevation, to an intermediate scale.

In the drawing, there is indicated in dot-dash outline a chair superstructure A, which is carried by a platform or bracket structure B composed of two arms secured to a vertically moveable carriage C, which is adjusted to, and held at, any desired height on post D by motor-driven screw E. The post is mounted on an L-shaped pedestal base which extends beyond the center line of superstructure A and its center of gravity, including the the patient, as well as the center of gravity of the parts supported by the carriage C.

A vertical shaft F, offset from carriage C and post D, supports a dental instrument console indicated schematically at G, the console being pivotal horizontally about post D and vertically slidable thereon. The console is coupled to carriage C, as described below, for positioning it properly in relation to the chair superstructure A.

Post D may be, as shown, of uniform cross-sectional form, adapted to manufacture as an extruded unitary element, or it may be a composite structure of any of a variety of types, where preferred. It has a hollow generally rectangular form, a shape having high moment of inertia, with principal axes directed along the legs of the L-shaped pedestal.

The post body **10** has eight undercut grooves **11**, two to each face of the rectangle, forming two pairs of opposed symmetrical sets in two pairs of spaced parallel planes, arranged at right angles to each other. Each groove holds a piece of rectangular bar stock **12**, which is preferably of hardened steel and serves as a track for the rollers of carriage C. One wide face of the post has an additional pair of grooves **13** in which two walls **14**, forming part of a housing for screw E, fit and are fastened in place, as by screws **15**. Walls **14** are formed with slots **16**, in which plates **17** are slidably mounted so as to close off the space accomodating screw E, above and below the carriage C.

Post body **10** is secured to the pedestal base by four screws **18**, adjacent its four corners. The top of the post is covered by a cap member **19**, secured to the post body by screws **20**, and having a socket **21** supporting anti-friction thrust bearing **22** for screw E, and a bore **23** containing a nylon bushing slidably receiving the shaft F, on which the console G is carried.

Pedestal part **25** has a table **26** to which the post is secured by screws **18**, and a side wall **27** to which the other pedestal part **28** is bolted or welded. The part **25**, below table **26**, forms a housing for motor M and worm wheel assembly W which rotates screw E. The reduced upper end of screw E passes through thrust bearing **22** in socket **21** and is supported by nut and lock nut **30,31** so that the screw E is hung from the top of the post and carries the weight of the carriage C and associated parts in tension.

Carriage C comprises right and left members **32,33** secured together by a front cover plate **34** and back cover **35**, the cover elements being secured to members **32,33** by screws **36,37**. Members **32,33** have inner vertical walls or ribs **38** forming eight pairs of walls positioned respectively opposite the post rail grooves **11**. The walls **38** are bored to take shafts **39** and **40** upon which the wheels or rollers **41** are carried in position to ride on the rails **12**. Rollers **41** have clearance from the overhanging edges **11'** of the rail grooves **11** and from the walls **38**, so as not to transmit any forces axially of

shafts **39** and **40** upon which the rollers are carried. In consequence the surface of post D requires no lubrication. Rollers **41** are of the type commonly used as cam rollers and incorporating anti-friction bearings between hub and rim.

The carriage is equipped with two lower pairs of rollers, riding, respectively on the rails **12** in the front and right walls of the post body **10,** and two upper pairs riding on the rails **12** of the rear and left walls of the post body **10,** the upper rollers being about ten inches higher than the lower rollers. With these dimensions, the moment arm of the couple exerted by the rollers is sufficient to keep the loading of the rollers within comfortable design limits.

The carriage back cover **35** is bulged outwardly (rearwardly) to accommodate the screw housing walls **14** and carries a nut-block bracket **42,** secured to member **35** by screws **43** and having a thrust projection **44** with an opening **45** which accommodates the screw E with clearance. Ball nut **46** abuts against the underside of projection **44** and is secured thereto against rotation by screw **47.** As screw E turns in nut **46,** it accordingly raises or lowers nut **46,** thus moving the carriage C up or down. When motor M is deenergized, its drive shaft is braked, thus preventing screw E from turning and holding the Carriage C at the height to which it has been moved.

Neglecting friction, it will be apparent that the weight of the carriage and attached load (bracket, chair superstructure, patient, console) is balanced by a vertical tension in screw E, which has zero moment arm about the post section short (front to back) central axis, and a moment arm about the post section long (right to left) central axis, which is comparatively short (about one fourth that of the superstructure center of gravity). The moment of the tension in screw E, when the carriage is at rest, adds to the pressure of rollers **41** on rails **12,** and the increasing or elimination of this tension while the carriage height is being adjusted causes no reversal of over-all moments, and produces no irregularity in the movement. There is no perceptible play or looseness in the mounting of superstructure A about any horizontal or vertical axis, so that the action is smooth and rigid under all working conditions.

The console mounting shaft F comprises a lower section **50** and slightly smaller upper section **51,** and its vertical axis maintained in position by upper nylon bushing **24,** in which the upper section **51** is slidably and rotatively received, and by bushing **52** in the offset lower end of bracket member **53,** secured to carriage C by screws **54.** Shaft section **50** is slidable in bushing **52,** so that the movement of parts described below is obtained.

The console G is rotatively and slidably carried on shaft F by upper and lower bearing rings **55,56** secured to the console cabinet body and fitting slidably and rotatably on the shaft section **50.** Collar **57** is secured to shaft section **50** in position to abut bearing ring **56** and support the console from the carriage C for movement therewith. Collar **57** carries a slide block **58** which rides in vertical groove **59** running the length of back cover member **35** of the carriage and holds shaft F from turning about its axis.

With the parts in the position shown in FIG. **2,** the carriage C has been brought down to its lowermost position. Shaft F is resting on an extension **60** of the pedestal base, holding the console G in the indicated position, with collar **57** spaced by a distance h from bushing **52.** The distance h is determined by the setting of collar **57** and may vary to suit particular superstructures A and console geometries. In the case shown by way of illustration, the distance h is a little more than a foot.

In consequence of the lost motion between parts **57** and **52,** the raising of carriage C and chair superstructure A at first leaves the console G in its lowermost position and then, after collar **57** engages bearing ring **52,** the console moves up with carriage C and superstructure A, maintaining a fixed relation to the chair superstructure and patient.

The top and bottom of carriage C are closed off by covers fitting around post D, and there is no exposure of parts having relative movement such as to create danger of injury to the fingers of patient or others.

The platform or bracket B, which supports the chair superstructure, comprises bracket arms **65** and **66,** which are secured to the left and right faces of carriage C, as by bolts or screws **67.** These arms generally overlie the the pedestal sections **25** and **28,** and their configuration may vary to suit the particular superstructure A with which they are used. As shown, the arms **65** and **66** extend beyond the center line of the superstructure A, fastening thereunder by means of bolt holes **67,68** and also at bolt holes **69,70** under the rear edge of the superstructure.

Console G may be of any of a variety of arrangements, one such arrangement being that of Page & Kilpatrick U.S. Pat. No. 3,311,411 issued Mar. 28, 1967. The head H of the console may have a telescoping mounting to permit extending it across the superstructure A and up to the head (right) end thereof. Alternatively, or additionally, the head H may swing up and down vertically about an axis in the cabinet of console G. In addition, the rotary adjustment about shaft F which is possible without interference with the superstructure A by the cabinet body (about 22 ½° in the illustrated embodiment) gives considerable overhang of head H over the chair superstructure A, and permits eliminating telescoping adjustment, where desired. Similarly, the vertical movement of console G permits dispensing with vertical pivoting of head H on the console body in some cases. Console G may also be swung away from the chair, (clockwise in FIG. **1**), to practically any extent desired.

Shaft F is surmounted by a cap **71,** which may be replaced by any of a variety of instrument, lighting, or other arrangements. Such arrangements will then adjust vertically, along with the console G.

As mentioned above, the chair superstructure may be of any of various types in addition to the molded one piece arrangement. In particular, a hinged back structure may be used (e.g., as in above U.S. Pat. No. 3,311,411) or a flexble structure (as in prior Page application Ser. No. 135,634 filed Apr. 20, 1971 for Dental Operating Chair). All that is required for such adaptations is a sitable rearrangement of the platform or bracket structure B.

While eight rollers **41,** arranged as described are sufficient to carry all normal working stresses, these active rollers may be supplemented by additional upper or lower rollers facing the active rollers and level therewith. Such additional rollers may be called into action if a violent lifting or horizontal twisting force is exerted on the bracket B, as by impact of furniture, accidental dropping of a heavy object on one

end of the upper structure A or attempts to twist the structure A for any reason.

What is claimed is:

1. A dental operating chair having a patient-supporting superstructure and height-adjusting support for said superstructure, characterized in that the support comprises a post positioned to one side of the superstructure, a carriage vertically moveable on said post and having bracket means extending under the superstructure to support the same on the carriage, and a vertical motor-driven screw drive for the carriage said post having rails in two sets of spaced parallel vertical planes, the planes of the two sets being at right angles to each other, and the carriage having upper rollers running on a plane of each set and lower rollers running on the remaining plane of each set.

2. A dental operating chair according to claim 1, in which the said rollers running on the rails of a said set are free to move laterally along with the carriage in the plane of said set, and restrained from such lateral movement by the rollers engaging the other set of rails.

3. A dental operating chair having a patient-supporting superstructure and height-adjusting support for said superstructure, characterized in that the support comprises a post positioned to one side of the superstructure, a carriage vertically moveable on said post and having bracket means extending under the superstructure to support the same on the carriage, a vertical motor-driven screw drive for the carriage, a vertical shaft adjacent said post, a dental console mounted for sliding vertically of said shaft and means connecting said to of said carriage for moving the console vertically along with the carriage.

4. A dental operating chair according to claim 3, in which the means connecting the console to the carriage comprises a lost motion connection, whereby the console follows the carriage during its movement within an upper range of positions but remains at set level while the carriage moves in a lower range of positions.

5. A dental operating chair according to claim 4, in which the post is located toward the foot end of the superstructure and the console is supported for pivoting on an axis adjacent the post and on the far side thereof from the chair superstructure.

6. A dental operating chair according to claim 2, in which the post has a hollow rectangular cross-section and the said rails are in the four planar faces of the post.

7. A dental operating chair according to claim 6, in which the said post comprises an upper support for the said screw drive and spaced vertically extending walls forming an open sided housing therefore and included within the said carriage, the screw drive comprising a vertical screw suspended from said upper support, a nut on said screw and movable vertically by rotation thereof, a bracket fixed to the carriage and extending over said nut in abutting relation thereto and flexible means closing off the open side of said housing while permitting vertical movement of said last-mentioned bracket.

8. A dental operating chair according to claim 7, in which the said last-mentioned bracket comprises a narrow web section and the said flexible means comprises a pair of flexible strips substantially meeting above and below the same.

* * * * *

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,826,531 Dated July 30, 1974

Inventor(s) Richard W. Page

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Col. 3, line 47, after "axis" insert --is--; and

Claim 3, col. 5, line 33, after "said," first occurrence, insert -- console -- and delete "of"

Signed and sealed this 26th day of November 1974.

(SEAL)
Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

FORM PO-1050 (10-69)

USCOMM-DC 60376-P69
* U.S. GOVERNMENT PRINTING OFFICE : 1969 O—366-334