Feb. 7, 1967 M. LORY 3,302,971

DENTAL CHAIRS

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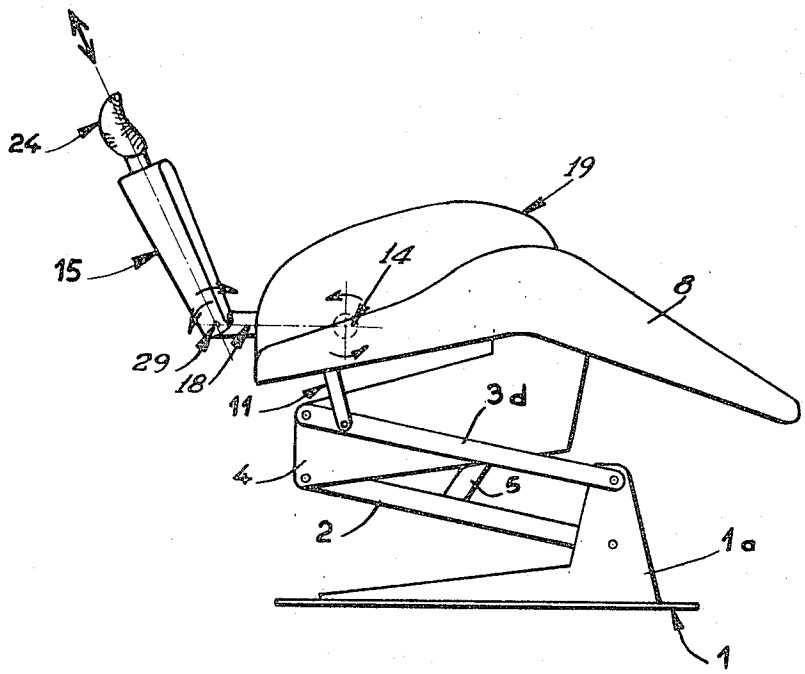


fig: 1

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DENTAL CHAIRS

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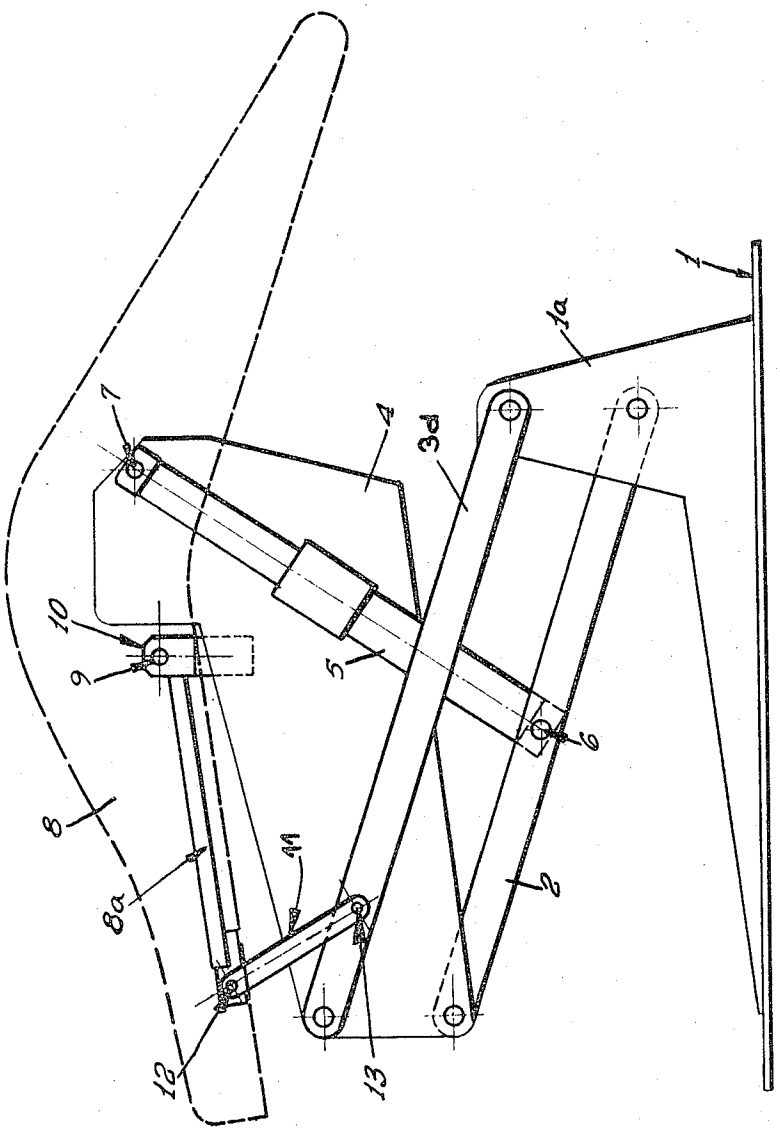


fig: 2

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DENTAL CHAIRS

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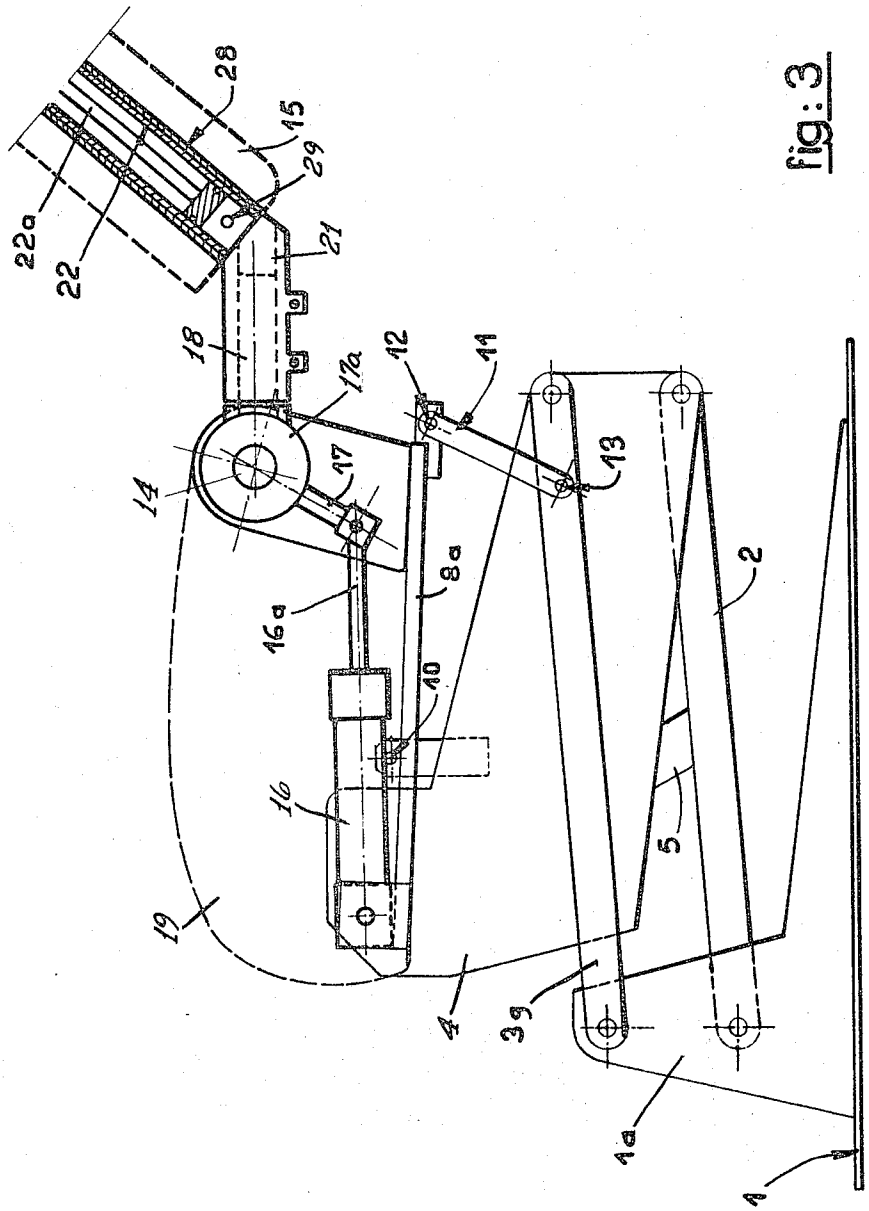


fig: 3

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DENTAL CHAIRS

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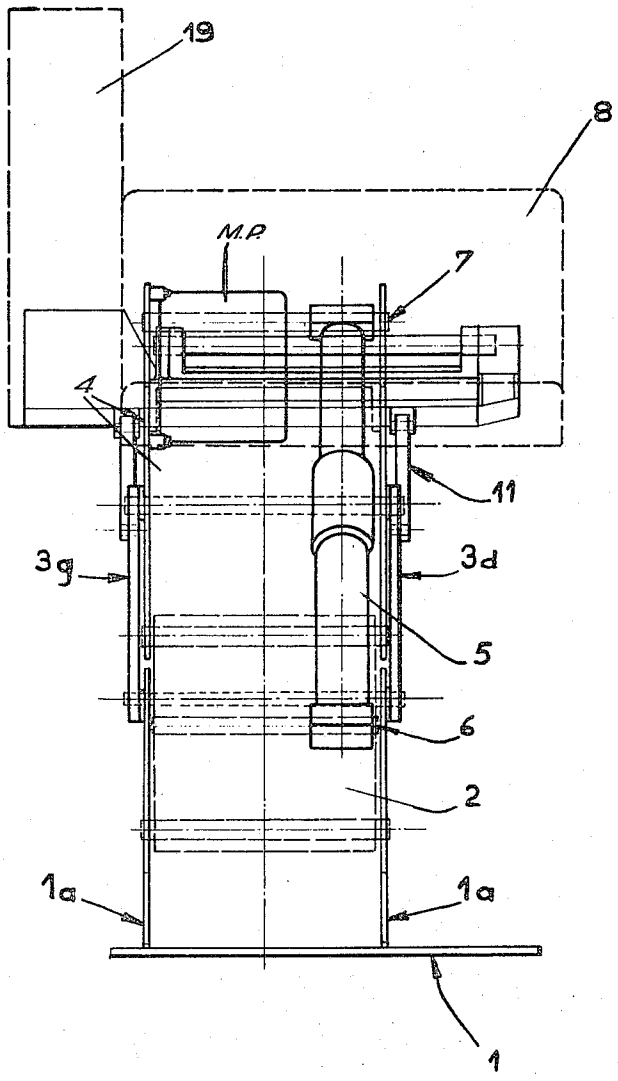


fig: 4

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DENTAL CHAIRS

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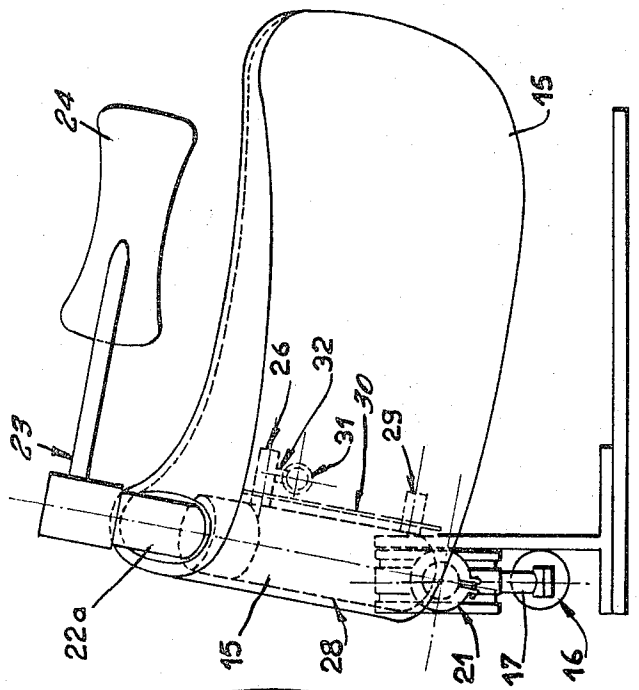


fig: 6

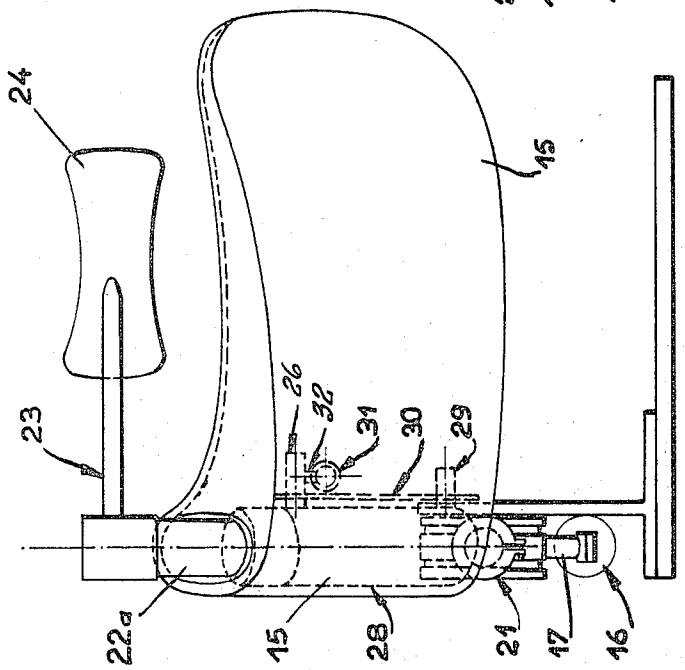


fig: 5

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DENTAL CHAIRS

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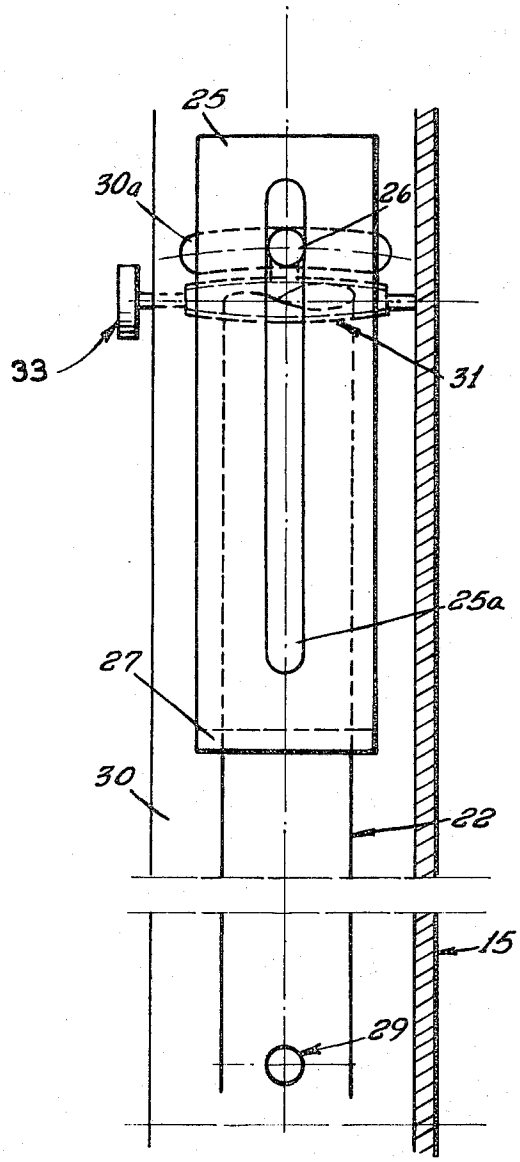


Fig: 7

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DENTAL CHAIRS

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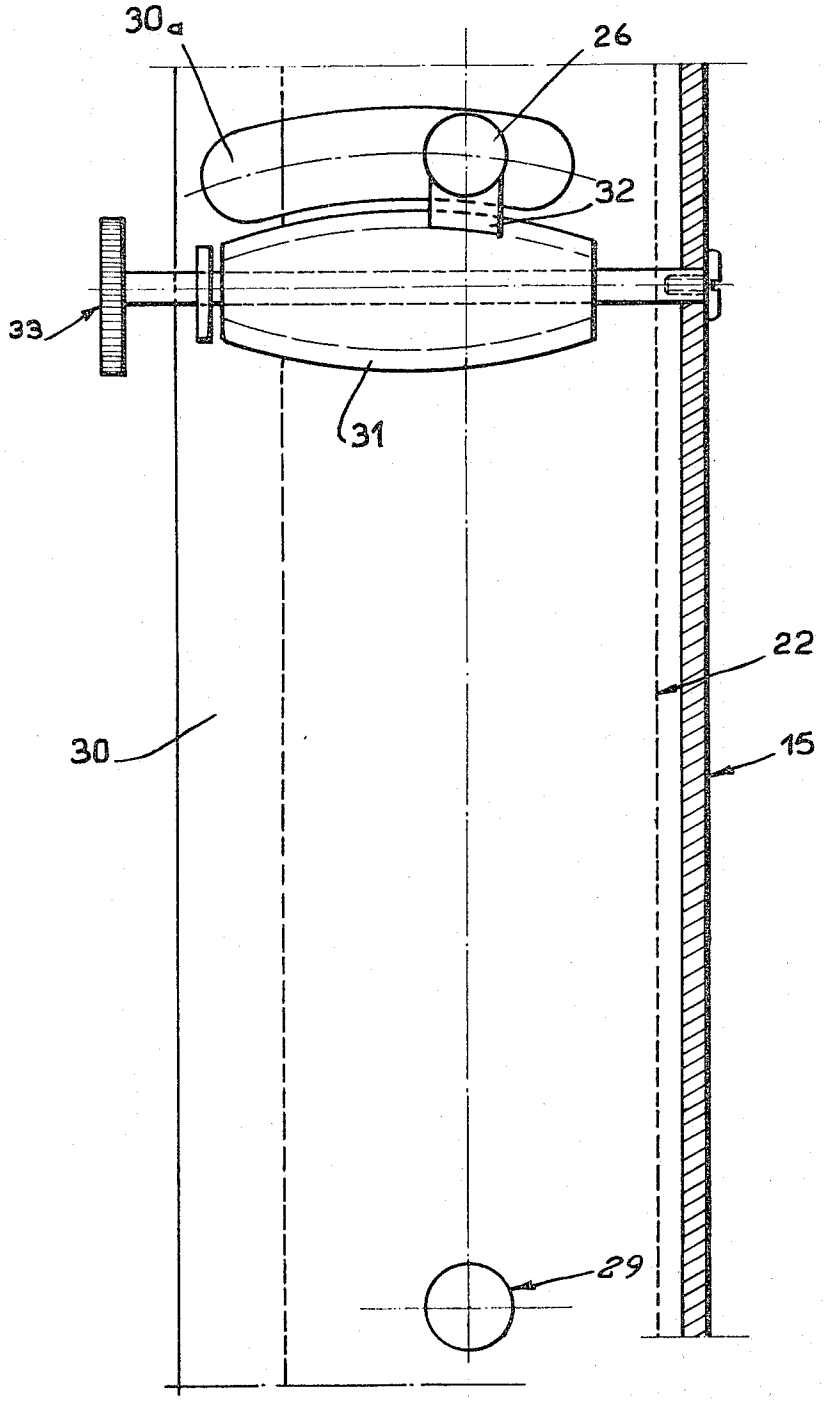


fig:8

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United States Patent Office 3,302,971 Patented Feb. 7, 1967

3,302,971

DENTAL CHAIRS

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Claims priority, application France, June 17, 1964, 978,628
10 Claims. (Cl. 297—346)

The present invention relates to an improved surgical chair for dental surgeons which has been specially designed with the object of allowing the practitioner to operate in all cases under the best conditions, together with the possibility of giving the most favourable position to the patient in every case.

As is known, the surgical chair is a very important item of the professional equipment of a dental surgeon. It is desirable that, on the one hand, the patient shall be comfortably settled in all positions which may be chosen by the practitioner having regard to the intended surgical action and, on the other hand, that the practitioner should be able, readily and with precision, to place the patient into the most favourable position.

At the same time the general arrangement and construction of the chair, consisting of a stand or base, seat, back rest, head rest, arm rest, leg rest should be such that the practioner is in no way inconvenienced in his work.

In order to be well understood, this important aspect requires a comment on the working positions of the practioner.

Whether he chooses to work sitting or standing, the practitioner may have to take up various working positions which, in brief, are located either in front of or behind the patient.

On the other hand, the patient himself can be sitting either upright with the head upright, or in more or less inclined positions down to the horizontal and unconscious position.

In addition, the desired level of the operating area above the floor can vary not only dependent on the height of the surgeon but also on the type of operation.

In even the most modern chairs of the "conventional" type there are a certain number of disadvantages:

(1) in certain cases the base prevents the surgeon from placing his feet normally flat on the floor,

(2) the shape of the seat, the articulation of the seat back rest, and the right arm support, inconveniences the practitioner when he wishes to work from the front and compels him to work bending down and by twisting his body over the basin. It is recognised that this is an important cause of vertebral pains, one of the gravest professional ailments of the dental surgeon.

(3) the construction of the back rest, by which is mentioned the disposition of and the space occupied by the various mechanisms for inclining the back rest relative to the seat and the control mechanism for the head rest both in height and in position relative to the back rest, constitutes an almost permanent inconvenience which, however, is even more pronounced if the practitioner desires to place himself behind or ¾ behind the patient.

(4) these surgical seats of the conventional type are designed essentially so that the patient should be located along a main axis which coincides with the main axis of the chair. As a result the patient places his head quite naturally along this axis whilst, according to all evidence, it is desirable that the practitioner placed on the right side (except for left handed surgeons) should be able, if necessary, to ask his patient to "look" at him, i.e., to put his head in a slightly oblique position. This simple gesture comes close to the operating area of the practitioner and saves him from taking a forward-leaning and twisted posture which is so customary and so detrimental to the health of the practitioner.

The chair, the subject of the present invention, has been specially designed to avoid or at least reduce the above-described disadvantages.

According to the invention there is provided a power operated dental chair in which the power unit is disposed in a casing located beneath the seat of the chair and connected thereto, said casing being displaced to one side of a vertical plane extending longitudinally and centrally of the chair in which plane is located the axis of an actuating member which serves in operation to raise and lower said seat and casing.

Chairs according to the invention will generally and preferably be operated by hydraulic or electric power and thus said casing will usually house the motor assembly, a hydraulic fluid reservoir, a motor and pump assembly and any required electrically actuated valves to control the fluid flow.

It will be seen that merely by displacing the said casing to one side of the said central plane one side of the chair, the right side for a right handed dentist is freed from the actuating member for raising and lowering the seat so that the dentist can place himself closer to the said central plane than in the case of conventional chairs.

The seat is preferably hingedly connected to the casing and is connected to a supporting device associated with the actuating member for elevation, in such a manner that upon elevation of the seat taking place a progressive longitudinal inclination is given to the seat.

In a preferred embodiment, the seat and casing assembly is supported on each side by a parallelogram linkage hinged at the front to the base or platform, and at the rear to the casing, and its elevation movement is controlled by a jack supported on the lower longitudinal member of such parallelogram linkage; the upper arms of the two parallelograms being connected at the rear by means of links to the rear part of the seat.

According to another feature of the invention, the back rest and head rest have a common support in two portions which are movable in the axial direction with respect to one another, for adjusting the height of the head-rest relative to the back rest, this support being disposed laterally on one side only of the chair, in the more general case of a chair for a right-handed practitioner on the left side. This support is mounted so as to be pivotable from this side, on the one hand on a transverse horizontal axis for the usual pivotal movement of the assembly, and on the other hand on an axis perpendicular to the said axis in a manner such that the whole assembly can assume a lateral inclination.

Another feature of the invention resides in the fact that the back rest is mounted so as to pivot separately, i.e. independently of the head rest, on an axis perpendicular to its supporting axis and situated in a transverse plane, in such a manner that the back rest is adjustable in depth relative to the head rest, in contrast to the arrangement in conventional chairs.

In a preferred embodiment, the common side support of the back rest and head rest assembly is provided by a hydraulic jack the body of which supports the back rest, whilst its piston rod supports the head rest.

On the other hand a jack disposed in a longitudinal vertical plane and hingedly connected with the seat, is connected to the body of the above mentioned jack in order to control the common pivotal movement of the back rest and head rest assembly about a transverse horizontal axis of the chair, by means of a two-armed lever and a sleeve which is usually locked on the second arm of this lever but is capable of being unlocked in order to allow—by pivoting on this arm—the

said assembly to take up the above-mentioned lateral inclination.

Finally, the back rest is pivotally mounted about a lower axis, such as the lower inlet pipe for the liquid to the supporting jack, and its movement of inclination relative to the head rest is controlled by an endless screw which is integral with said back rest and meshes with a threaded member which is rigidly connected to the upper inlet pipe for the liquid to the same jack.

Other features and advantages of the invention will become apparent in the course of the description which follows, of a preferred embodiment—by way of example—of a dental chair with reference to the accompanying drawings.

In these drawings, neither conventional fittings except some of them in outline nor the hydraulic or electric conduits have been shown.

FIGURE 1 is a right hand side view of the chair to a small scale,

FIGURE 2 is another right hand side view to a larger scale, showing the system for elevating the seat and the casing, the back rest being omitted and the seat being only indicated in outline, the seat and casing are shown in an intermediate position between the lower position of rest and the upper position.

FIGURE 3 is a left hand side view of the chair showing the lower part of the back rest and the control means for the pivotal movements of the back rest and head rest assembly about its transverse horizontal pivotal axis.

FIGURE 4 is a partial rear view of the chair.

FIGURE 5, another partial rear view, shows in particular the back rest and the head rest.

FIGURE 6 is a similar view to that of FIGURE 5 showing the back and head rest assembly inclined laterally.

FIGURE 7 which is a partial side view shows the guiding of the shaft of the supporting jack of the back and head rest assembly and the individual control for the inclination of the back rest so as to adjust it in depth relative to the head rest.

FIGURE 8 shows a detail of this latter control to a larger scale.

As can be seen from the drawings, especially FIGURES 1, 2 and 3, the base **1** of a chair according to the invention can be reduced to a simple metal sheet of a thickness of only a few millimetres. The surface of this base can be of any required size dependent upon whether it is to be fixed to the floor or merely placed on the floor.

This base or more precisely supports **1***a* fixed thereto have a double parallelogram hingedly connected thereto which consists of a hollow beam **2** and two rods **3***g* and **3***d*, one on each side, and carries a casing **4** situated beneath the seat, which casing is connected thereto as will be described and is displaced relative to the central longitudinal plane of the chair.

A hydraulic jack **5**, the body of which is hingedly connected at **6** to the rod **2**, and whose shaft is hingedly connected at **7** to the casing **4** is provided for the movements in elevation of the assembly of seat **8** and casing **4**, the axial plane of said jack being in the longitudinal central plane of the chair.

Inside the casing **4**, are disposed the elements of the power unit, i.e., with a system of hydraulic control: a motor and pump unit MP (FIG. 4), an oil reservoir and a series of electrically operated valves (not shown), said unit and the reservoir being obviously capable of being replaced especially by an oil-pneumatic accumulator, all these elements being well known per se and outside the scope of the present invention.

A support **8***a* for the seat **8** is hingedly connected with the casing **4**, for example by means of a shaft **9** mounted in ears **10** on casing **4**.

Already it can be seen that this construction provides two important advantages. Thus the base **1** is completely free, on all sides of the seat, from the elevation control or, in other words, the latter causes no inconvenience whatsoever to a dentist working from either side of the chair. Furthermore the relatively heavy weight of the casing and seat enables a single acting jack to be used which is a simple and economic solution which allows an easier equilibrium between the assembly so formed and the back rest.

As has been mentioned the longitudinal inclination movement of the seat is controlled by its elevation movement, for example by means of the two links **11**, each hinged to the seat at **12**, and to the respective rods **3***g* or **3***d*, at **13**, in such a manner that the inclination movement is strictly progressive with the elevating movement.

This is a very important factor for the comfort of the patient who thus passes imperceptibly from an "ordinary" sitting position into a "relaxed" position which is very favourable for his "psychological" preparation.

It will be readily understood that due to the action of the jack **5**, and its reaction which causes deformation of the parallelograms **2**–**3***g* and **2**–**3***d*, the two portions of the casing seat assembly **4**–**8** are raised from the lower position of rest in which the casing is supported against the supports **1***a* and, simultaneously, the links **11** effect a progressive longitudinal inclination of the seat towards the rear.

The arrangements relating to the back rest and head support or head rest will now be described.

It will be remembered that, in the design of the articulation of a back rest relative to the seat, it is useful to take various factors of adjustment into account, in a manner such that the patient does not get the impression while passing from the sitting position into the narcosis position and vice-versa that his clothing is pulled down or pulled up by the back rest.

Among the various possible solutions, it was decided to locate the axis of transverse horizontal rotation, **14** (FIG. 3) in a horizontal plane well above the plane of the seat and in a vertical plane situated well in front of the plane of the back rest.

As has been said above the back rest **15** (see FIGS. 3, 5 and 6) is supported and controlled from only one side, the left side in the case of a right-handed practitioner, and the same applies to the head rest, which is most advantageous in that in this embodiment the base **1** is completely free on the right side all along the chair so that working "from the front" by the practitioner is greatly facilitated.

The shaft **14** (FIG. 3) is thus provided on only one side and the pivotal movements about this shaft of the back rest and head rest assembly from the front to the rear and back again, are controlled by a double acting jack **16** (FIG. 3) articulated on the support **8***a* of the seat and the axial plane of which extends in a longitudinal vertical plane parallel to the central plane of the chair. The piston rod **16***a* of this jack is articulated to one of the arms **17** of a two armed lever **17**–**18**, the hub **17***a* of which can pivot on the shaft **14**, these elements, up to the head **17**, being adapted to receive an ornamental fitting **19** forming an arm support, whilst on the other lever arm **18** at the end there is mounted a split sleeve **21** shaped as a tubular angular extension **22**. This sleeve which is normally locked to arm **18** can be released for pivotal adjustment and the extension **22** forms the body of another double acting jack, the movable piston rod **22***a* of which has at its upper end a perpendicular arm **23** upon which the head rest **24** is pivotally mounted by a friction fit.

In order to prevent any relative rotary motion of the shaft **22***a* with respect to the body **22**, this shaft is rigidly connected (see FIG. 7) with a lateral slide **25** provided with a rectilinear slot **25***a* which engages a pin **26** fixed to the body **22** and consisting preferably of the

upper oil inlet pipe to the jack, whilst a collar **27** at right angles to the lower part of the slide, slides on the body **22** itself. This body **22** is preferably surrounded by a jacket **28** shown in FIGURES 3, 5 and 6 only.

By these means it will be seen that the longitudinal jack **16** will enable the back rest and head rest assembly to pivot about the transverse horizontal axis **14**. Further it will be seen that by pivoting the jack **22–22*a*** about lever arm **18** which can be effected manually, via the sleeve **21** after unlocking it from the lever arm **18**, a certain lateral inclination can be imparted to the back rest-head rest assembly, as can be seen by comparing FIGURE 6 with FIGURE 5.

On the other hand, the actuation of piston rod **22*a*** of the jack **22** will permit an adjustment in height of the head rest **24** relative to the back rest **15**.

Finally, means are provided whereby the back rest **15** can be actuated separately in order to give to it a relative inclination with respect to the transverse plane containing the axis of the jack **22** and that of the arm **23** carrying the head rest **24**, so as to adjust the back rest in depth relative to the head rest, contrary to the arrangements in conventional chairs.

For this purpose, on the one hand, the frame of the back rest **15** is mounted in such a manner that it can pivot separately on a lower horizontal axis which is rigid with the body of the jack **22** and consists preferably of the lower inlet pipe for the liquid to the jack. On the other hand a side plate **30** (FIGS. 5, 6, 7 and 8) rigid with said frame **15** of the back rest and guided by a curved slot **30*a*** on the upper inlet pipe **26** for the liquid to the same jack, which has already been mentioned, carries an endless screw **31** which meshes with a threaded member **32** carried by said pipe **26**. When this screw is rotated by means of an external knob **33**, the reaction of the member **32** causes this screw to be displaced and, consequently, inclines the back rest with respect to the head rest by pivotal movement about the axis formed by said pipe **29**, the stability of any position of adjustment being ensured by the irreversibility of the endless screw.

The plane of the plate **30** is parallel to that of the slide **25** and is located to the right thereof; this slide being omitted from FIGURES 5 and 6 for the sake of simplifying the drawings.

Practically, once the inclination of the back rest and head rest assembly has been adjusted by rotation about the axis **14**, and the head rest **24** has been independently adjusted in height by means of the jack **22–22*a***, the patient rests his head on said head rest which can pivot with a slight friction on the arm **23**. If necessary, the assembly **15–24** can be inclined laterally by pivoting it—as has already been explained—about the end of the longitudinal horizontal axis **18**. Finally, if necessary, the back rest is adjusted in depth relative to the head rest, by actuating the screw **31** in such a manner that the back of the patient is well supported.

By means of this construction of chair all working positions can thus be obtained.

Besides the advantages, already mentioned, it should be noted that during the elevation movement of the seat—since it pivots forwardly—a forward movement of said seat and thus of the seat and back rest assembly takes place, which tends to come closer to the instrument-carrying fittings, but since this forward movement will be corrected by the subsequent pivotal movement of the back rest to the rear, the distance between the instruments and the operating area will ultimately only vary between very narrow limits.

It will be apparent that the invention is not limited to the embodiment described and shown, and that modifications and variations may be made based on the same principle of construction without departing from the scope of the appended claims.

I claim:

1. A power operated dental chair comprising a dental chair having a seat, a base for said chair, an actuating member, a power unit disposed in a casing immediately beneath said seat of said chair and connected with said chair and said actuating member, said casing and power unit being displaced to one side of a vertical plane extending longitudinally and centrally of said chair in which plane is located the axis of said actuating member which serves to raise and lower said seat of said chair, said seat being hingedly connected to said casing and to a parallelogram linkage on each side of said chair, said linkages being hingedly connected to said base of said chair at the front, and to said casing at the rear, said actuating member being hingedly connected to the lower arm of said linkages in such a manner that elevating movements of said actuating member simultaneously effect a longitudinal inclination of said seat.

2. A dental chair as claimed in claim **1** in which the upper arms of said linkages are each connected to the rear of said seat by links hingedly connected to the seat and the linkages respectively.

3. A power operated dental chair comprising a dental chair having a seat, a back rest and a head rest, an actuating member, a power unit disposed in a casing immediately beneath the seat of said chair and connected with said chair and said actuating member, said casing and power unit being displaced to one side of a vertical plane extending longitudinally and centrally of said chair in which plane is located the axis of said actuating member which serves to raise and lower said seat of said chair, said back rest and said head rest are carried on one side of said chair by a common support comprising two parts axially movable with respect to each other to permit adjustment of said head rest with respect to said back rest, said common support being pivotally mounted about a transverse horizontal axis and about an axis at right angles thereto to permit respectively longitudinal and lateral inclinations of said back rest and head rest assembly.

4. A dental chair as claimed in claim **3** in which said transverse horizontal axis is disposed above the plane of said seat and in front of the plane of said back rest.

5. A dental chair as claimed in claim **3** in which said common support comprises a hydraulic jack the cylinder of which carries said back rest while the piston rod carries said head rest.

6. A dental chair as claimed in claim **5** including a further jack extending longitudinally of and pivotally connected to said seat, which jack is connected to the cylinder of said first mentioned jack through the intermediary of a two armed lever to control pivotal movement of said back rest and head rest assembly about said transverse axis.

7. A dental chair as claimed in claim **6** in which said connection between an arm of said lever and said cylinder is effected through the intermediary of a sleeve which is lockable on said arm, and which when unlocked is pivotable about the axis of the arm to permit lateral inclination of said back rest-head rest assembly to be effected.

8. A power operated dental chair comprising a dental chair having a seat, a base for said chair, a back rest and a head rest, an actuating member, a power unit disposed in a casing immediately beneath the seat of said chair and connected with said chair and said actuating member, said casing and power unit being displaced to one side of a vertical plane extending longitudinally and centrally of said chair in which plane is located the axis of said actuating member which serves to raise and lower said seat of said chair, said back rest and said head rest are carried on one side of said chair by a common support comprising two parts axially movable with respect to each other to permit adjustment of said head rest with respect to said back rest, said common support being pivotally mounted about a transverse horizontal axis and

about an axis at right angles thereto to permit respectively longitudinal and lateral inclinations of said back rest and head rest assembly in which said back rest is mounted for pivotal movement about an axis at right angles to the axis of the said common support to permit adjustment of the inclination of said back rest with respect to said head rest.

9. A dental chair as claimed in claim **8** in which said common support is a hydraulic jack and in which said back rest is hingedly mounted about a lower fluid inlet pipe to said jack and its inclination with respect to said head rest is controlled by an endless screw rigidly connected to said back rest and engageable by a threaded member rigidly connected to the upper fluid inlet tube to said jack.

10. A dental chair as claimed in claim **9**, in which said seat is hingedly connected to said casing and to a parallelogram linkage on each side of said chair, each of said linkages being hingedly connected to said base of said chair at the front, and to said casing at the rear, the upper arms of said linkages being connected to the rear of said seat by links hingedly connected to the seat and to the linkages respectively, said actuating member being hingedly connected to the lower arm of said linkages and being operatively associated with said parallelogram linkages in such a manner that elevating movements of said actuating member simultaneously effect a longitudinal inclination of said seat.

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