May 10, 1966 R. C. PARK ETAL 3,250,568

DENTAL CHAIR

Filed April 5. 1965 2 Sheets-Sheet 1

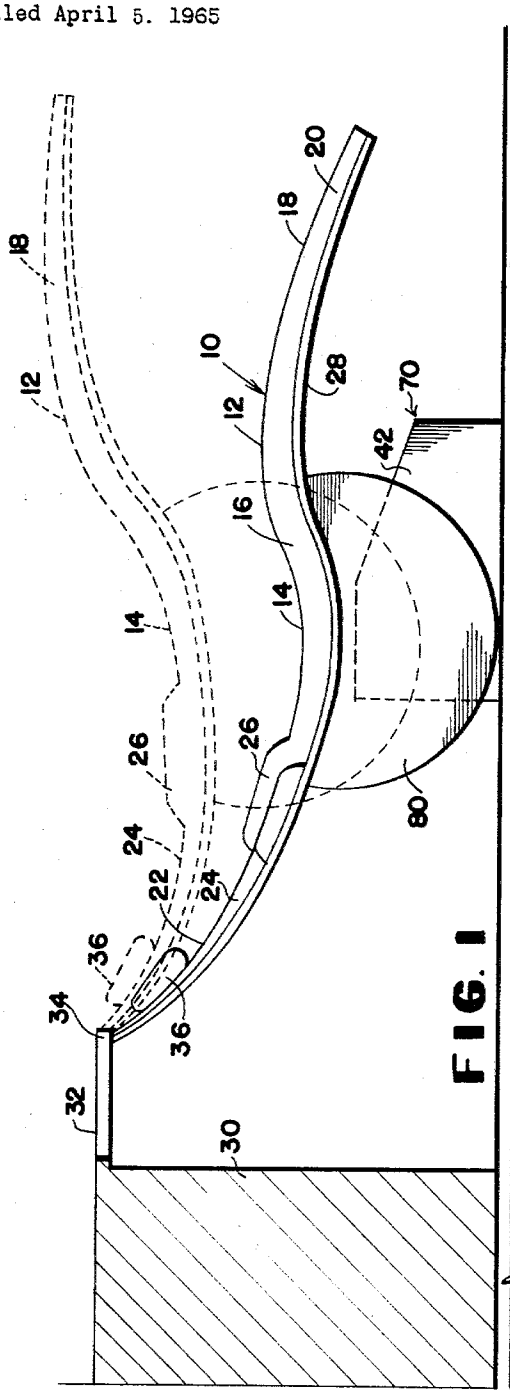


FIG. 1

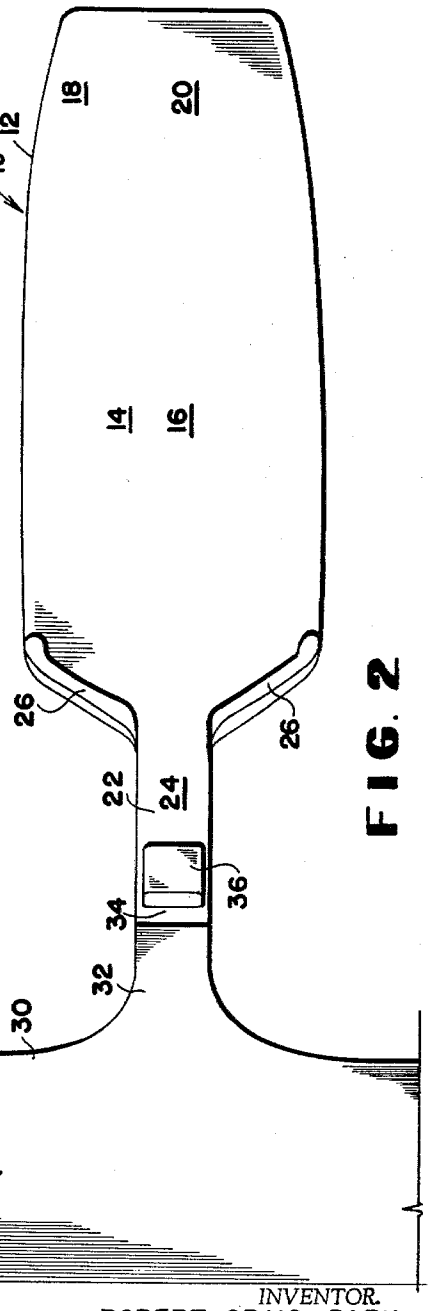


FIG. 2

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DENTAL CHAIR

Filed April 5, 1965 2 Sheets-Sheet 2

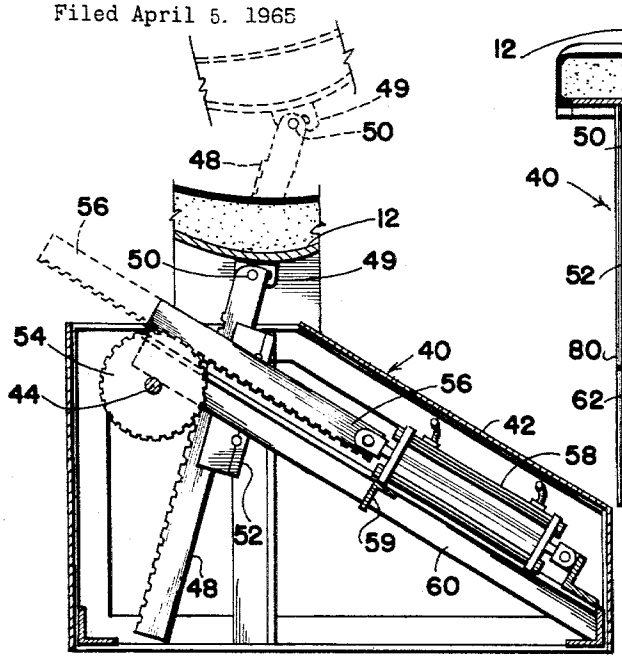


FIG. 3

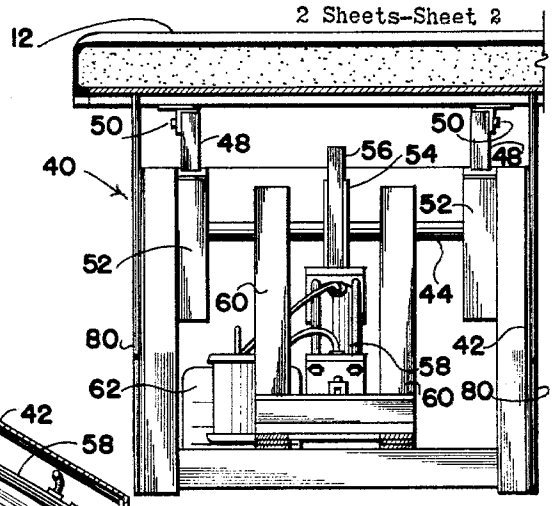


FIG. 4

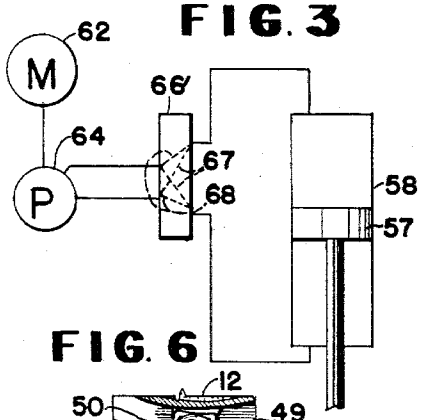


FIG. 6

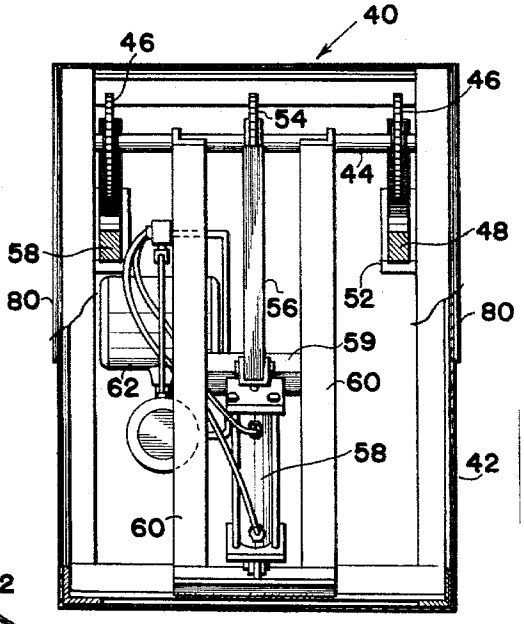


FIG. 5

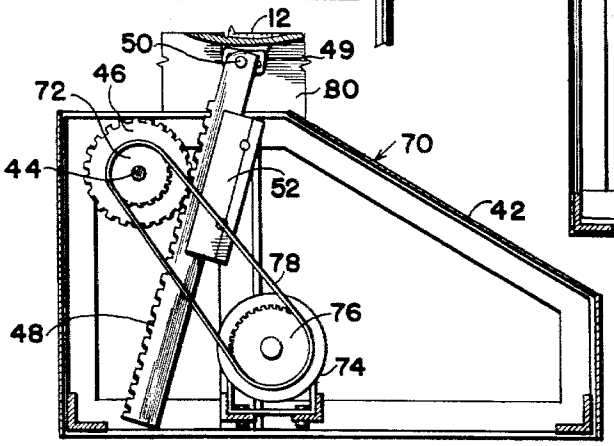


FIG. 7

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DENTAL CHAIR

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9 Claims. (Cl. 297—327)

The invention relates to dental equipment, more particularly to a new dental chair adapted to position the dental patient's head to greatly facilitate dental work. More particularly, this invention relates to a new contour type dental chair which pivots about an axis adjacent the head of a patient in the chair.

Dental chairs are in general old in the art. The conventional dental chair has a seat that is adapted to be raised, lowered, and tilted, and an adjustable head rest for supporting the patient's head. In spite of the numerous adjustable elements, it is impossible with known conventional dental chairs to place heads of successive patients of varying physical stature in the same position relative to instruments, lights, equipment, etc., and also maintain the position while inclining the head at various angles to facilitate work. It is desirable that all of the patients' heads assume the same relative position in order that the positions of the lights, hand pieces, and various other equipment need not be adjusted for each individual. Further, it is very desirable that the patient's head be inclined at various angles to facilitate work without the attended necessity of adjusting the various equipment.

The normal use of a conventional dental chair requires the dentist to stand erect while working on the patient because any adjustment in the patient's position alters the relative height, position, etc. of the head. In order to obtain reasonable efficiency, the dentist will normally stand and bend over the patient. This position is difficult to maintain for long periods of time, and causes back aches, fatigue, etc. Due to fatigue, the efficiency and physical control of a dentist using a conventional dental chair is decreased as the time passes.

While working in a sitting position is known to cause less discomfort, back aches, etc., the known dental chairs are not adapted to efficiently support a patient in a suitable position. Normally during work the head of a patient must be tilted to different positions. Tilting the head either changes the relative height, requiring readjustment of the equipment, and placing it in an undesirable working level, or a major chair readjustment is required. A major chair readjustment is time consuming, tedious, and difficult.

In general, known dental chairs are not capable of maintaining the same relative height of a patient's head as it is tilted during work, and also not capable of positioning the heads of successive patients having different physical stature in the same location relative to equipment, etc.

We have invented a new dental chair. The chair of our invention has a support having a body support portion and a head support portion. An upright means is provided adjacent to the support. A hinge means is provided to pivotally connect the head support portion of the support to the upright means. An elevating means is provided for pivoting the support about the axis of the hinge means.

The dental chair of our invention solves all of the problems associated with dental chairs known to the prior art. With our dental chair, it is possible to position the heads of successive patients of varying physical structure in exactly the same location relative to lights, instruments, equipment, etc. Use of the dental chair of our invention eliminates the necessity common to

dental chairs known to the prior art of readjusting the lights, equipment, etc. for each successive patient. The dental chair of our invention makes it possible to tilt the head of a patient to facilitate work in the mouth without materially altering the height of the head. This is quite important since it makes possible working on the patient while seated. The seated position is very desirable since it is less tiring, more comfortable, and also makes possible greater and more positive control and efficiency. Still further, the dental chair of our invention is very comfortable to the patient.

The new dental chair of our invention makes it conveniently possible by merely tilting the chair to place the head of any patient no matter his or her size in all of the necessary and desirable positions for doing the work of dentistry on the patient, and this is accomplished solely with our chair, thus eliminating all of the ancillary adjustable head rest and other equipment associated with the dental chair of the prior art.

An object of this invention is to provide new dental equipment.

Yet another object of this invention is to provide a new contour type dental chair that allows the patient to assume a comfortable, semi-reclining position.

Another object of this invention is to provide a new dental chair that makes possible the positive positioning of the heads of successive patients of varying stature in the same location.

Another object of this invention is to provide a new dental chair which permits the tilting of the head of a patient without materially changing the elevation of the patient's head.

Another object of this invention is to provide a new dental chair that is easy and simple to adjust.

Another object of this invention is to provide a new dental chair that has a power means for adjusting positions of the chair that is positive in operation.

Another object of this invention is to provide a new dental chair which allows the dentist using same to work from a sitting position.

Another object of this invention is to provide a new dental chair which greatly reduces fatigue, back aches, etc. of a dentist using same.

Still another object of this invention is to provide a new dental chair having a seat that is adjustable and which pivots about an axis positioned adjacent the patient's head when reclining on same.

Other objects and advantages of the new dental chair of our invention will become apparent to those skilled in the art upon reading the disclosure.

Drawings accompany and are a part of this disclosure. These drawings depict preferred specific embodiments of the new dental chair of our invention, and it is to be understood that such drawings are not to unduly limit the scope of our invention. In the drawings,

FIG. 1 is a side elevational view of a preferred specific embodiment of the new dental chair of our invention showing an alternate position of the couch in dotted lines.

FIG. 2 is a top plan view of a preferred specific embodiment of the chair of our invention.

FIG. 3 is a side elevational view in cross section of a preferred specific embodiment of the elevating means of our invention.

FIG. 4 is a cross sectional view taken on line 4—4 of FIG. 3.

FIG. 5 is a horizontal cross sectional view of the elevating means embodiment of our invention shown in FIG. 3.

FIG. 6 is a schematic diagram of the hydraulic circuit of the elevating means embodiment shown in FIG. 3 of our invention.

FIG. 7 is a side elevational view in cross section of another preferred specific embodiment of the elevating means of our invention.

The following is a description of the new dental chair of our invention made with reference to the drawings, wherein the same reference numerals are used to indicate the same or similar parts and/or structure. The discussion and description is of preferred specific embodiments of the dental chair of our invention and it is understood that such is not to unduly limit the scope of our invention.

Referring now to the drawings, FIGS. 1–7, there is shown a contour-type dental chair **10** of my invention. The contour-type dental chair of my invention has a movable unitary couch **12** having a relatively wide downwardly curved center portion **14** provided with a relatively thick resilient padding **16**. A relatively wide downwardly inclined leg support portion **18** is integrally joined to one end of central portion **14**. As shown in FIG. 1 a tapered resilient padding **20** is provided on leg support portion **18**. An elongated, centrally disposed, upwardly inclined, relatively narrow head support portion **22** is integrally joined to the opposite end of central portion **14**. A relatively thin padding **24** is provided on the head support portion **22** as shown in FIG. 1. Two upwardly projecting elbow retainer cushions **26** are disposed on the upper end of central portion **14** adjacent the head support portion **22**, as most clearly shown in FIGS. 1 and 2. The padding in portions **16**, **20** and **22**, and in retainer cushions **26** can be of any suitable type. Preferably the padding is foam rubber, with a suitable covering enclosing same. The padding **16**, **18** and **24** is mounted on the curved member **28** which can be of any suitable type of material. Preferably member **28** is formed of a relatively thick sheet of aluminum metal and shaped with a flange on the edge for strengthening same. The shape or curve of the couch **12** can be of any suitable shape. However, I have found a couch of the shape depicted in FIGS. 1 and 2 works very well. The padding **16** in the central portion **14** of the couch **12** is relatively thick in order to accommodate persons of varying stature. It is desirable in the use of the chair **10** of my invention that the head of the patient be disposed or positioned in a specific location on the head support portion **22**. By providing a relatively thick padding on the central portion **14**, the couch will accommodate in comfortable positions persons of very short, medium, and very long stature. The body of the patient will sink into the relatively thick cushion **16** to support him or her in a very comfortable position irrespective of height or weight. The upwardly projecting cushions **26** are shaped to comfortably retain the arms on the couch. The most common and perhaps most comfortable position for the arms of the patient is to fold the forearms over the chest with the elbows or upper arm portions lightly abutting cushions **26**.

A cabinet **30** is positioned adjacent the head support portion **22** as most clearly shown in FIG. 1. In practice the cabinet is normally provided with swinging doors, with the various dental equipment mounted thereon. The cabinet can be of any suitable height. If a relatively high cabinet is provided, the couch **12** will be supported at a relatively greater height allowing the dentist using same to work standing up. If the cabinet is relatively low, the couch **12** will be positioned at a height allowing the dentist to work in a sitting position. A relatively narrow horizontally projecting arm **32** is mounted on the top of cabinet **30** and provided with a hinge means **34** on the end thereof. The hinge **34** is also joined to the extending end of the head support portion **22** of couch **12**. In use the couch **12** can be raised and lowered by pivoting same about the axis of hinge **34**. The two alternate positions are illustrated in FIG. 1, one of which

is shown in dotted lines. Preferably a relatively small pillow **36** is movably disposed on the head support portion **22** in order to provide additional range of position adjustment of the head of the patient positioned in the chair. In use the doctor, or the like, will be able to work from either side of the chair **10** of my invention in the area between the cabinet **30** and the upper end of center portion **14**. Whether or not the dentist will work from a sitting or standing position will depend on the height of cabinet **30**, and cabinet **30** can conveniently be varied in height in accordance with the physical stature of the dentist whether or not he desires to work in a sitting or standing position. In use the patient will be positioned on the couch **12** in a semi-reclining position with the head supported on the head support portion **22** and with the shoulders overhanging the upper edge of the center portion **14**. The cushions **26** provide a comfortable abutting support for the elbows in order to prevent same from falling off the couch **12**. A suitable elevating means is provided for elevating couch **12** to thereby rotate same about the horizontal axis of hinge **34**.

In FIGS. 3 through 6 is depicted a preferred specific embodiment of an elevating means **40** suitable for use in the chair **10** of our invention. The elevating means **40** has a housing **42** disposed below couch **12**. A horizontally disposed shaft **44** is rotatably mounted in housing **42**. Two spaced pinions **46** are rigidly mounted on shaft **44** adjacent each end as shown most clearly in FIG. 5. Two spacer gear racks **48** are positioned in operative engagement with pinions **46**. The gear racks **48** are movably and pivotally mounted on the underside of couch **12**. The arrangement for mounting the gear racks **48** on the underside of couch **12** is most clearly shown in FIG. 3. There is provided a lug **49** having an elongated slot therein which slot receives a bolt **50** disposed in the upper end of gear rack **48**. Gear rack guides **52**, mounted on housing **42**, slidably support the gear racks **48**. The gear rack guides are basically channel shaped elements which guide gear racks **48**. The gear racks **48** are thereby supported to slide relative to the housing in a generally vertical direction in gear rack guides **52**. The slidable connection on the top of the gear rack guides allow the necessary relative movement of the gear racks and couch in order that it can be pivoted about the axis of hinge **34**.

A center pinion **54** is rigidly mounted on shaft **44**, as most clearly indicated in FIG. 4 of the drawings. An inclined gear rack **56** is positoned in operative engagement with pinion **54** as most clearly shown in FIG. 3 of the drawings. A hydraulic cylinder **58** is mounted within housing **42**, preferably on cross members **59** secured to inclined frame members **60**. The piston of hydraulic cylinder **58** is attached to the lower end of gear rack **54**. It can be seen that actuation of hydraulic cylinder **58** will move gear rack **56** to thereby rotate shaft **44**, in turn activating gear racks **48** and raising and lowering couch **12** of dental chair **10** of my invention.

A schematic diagram of the hydraulic circuit of the elevating means **40** of my invention is shown in FIG. 6 of the drawings. A motor **62** is connected in operative driving arrangement to a pump **64**, which motor is preferably positoned in housing **40**. A hydraulic valve **66** is operatively connected via fluid conduits to hydraulic cylinder **58**. Valve **66** is constructed to reverse the direction of fluid flow from pump **64** to cylinder **58**. As is believed evident, the hydraulic cylinder **58** is a two-way cylinder, and valve **66** is provided with two sets of passageways **67** and **68** which allow the fluid pumped by pump **64** to be admitted to either side of the piston **57**. With the elevating mechanism of our invention, the couch **12** of the dental chair can be positively lowered or raised.

In FIG. 7 is shown another preferred specific embodiment of an elevating means **70** suitable for use in the dental chair of our invention. The elevating means **70** has a housing **42** which can be of any suitable shape. A shaft **44** is rotatably mounted in the housing **42**. Two spaced

pinions 46 are rigidly mounted on shaft 44 adjacent each end. Two gear racks 48 are arranged in operative engagement with the two spaced pinions 46 and slidably secured to the underside of couch 12. The means for securing the gear racks 48 to the couch 12 is similar to the securing means described previously in relation to elevating means embodiment 40. Gear rack guides 52 are mounted in housing 42 to slidably support the gear racks 48. A sprocket 72 is rigidly mounted on shaft 44 preferably near the middle portion. A low speed reversible electric motor 74 is mounted within housing 42 and is provided with a sprocket 76 mounted on the drive shaft. The motor 74 can be of any suitable type, and should include a gear reduction means in order to provide a relatively low shaft speed, preferably on the order of one revolution per minute. A chain 78 is disposed on sprockets 72 and 76 as clearly shown in FIG. 7. The elevating means 70 is adapted in use to raise and lower the couch 12 of the dental chair 10 when the motor 74 is activated. Activation of motor 74 rotates shaft 44 which in turn raises or lowers the gear racks 48 in engagement with pinions 46 mounted on shaft 44.

In order to improve the appearance of the dental chair of our invention, two shield plates 80, preferably semicircular in shape, are attached to the underside of couch 12 and positioned on each side of the housing 42 of the elevating means. The shield plate 80 serves to make the chair safe for the patient and doctor against such as catching clothing, fingers, and the like, improve the appearance of the dental chair and also hide the gear racks when in extended position.

As will be obvious to those skilled in the art, various changes and modifications of the preferred dental chair of our invention as described herein can be made or followed without departing from the spirit of the disclosure or the scope of the claims.

We claim:

1. A contour-type dental chair comprising, a movable unitary couch having a relatively wide downwardly curved center portion, a relatively thick resilient padding on said center portion, a relative wide downwardly inclined leg support portion joined to one end of said center portion, padding means on said leg support portion, said last-mentioned padding means being tapered toward the extending end, a centrally disposed upwardly inclined, relatively narrow head support portion integrally joined to said center portion on the end opposite said leg support portion, a relatively thin padding means on said head support portion, upwardly projecting elbow retainer cushions disposed on the end of said central portion adjacent said head support portion, a cabinet having a relatively narrow horizontally projecting arm, a hinge means pivotally joining the projecting end of said head support portion of said couch and said projecting arm on said cabinet, a relatively small pillow movably disposed on said head support portion, and an elevating means disposed beneath and connected to said central portion of said couch to support and pivot same about the axis of said hinge means, said dental chair in use adapted to tiltably support the heads of patients on the head support portion of the couch in a desired given location irrespective of the physical stature of the patients.

2. A dental chair comprising, a movable couch having a relatively wide center portion, a relatively wide downwardly inclined leg support portion, and an elongated centrally disposed upwardly inclined relatively narrow head support portion joined to said center portion, padding means on said couch, an upright support having a relatively narrow outwardly projecting arm, a hinge means pivotally joining the projecting end of said head support portion of said couch and said projecting arm, and an elevating means for said couch to support and pivot same about the axis of said hinge means.

3. The dental chair as defined in claim 2 wherein said elevating means is comprised of a housing disposed below said couch, a horizontally disposed shaft mounted in said housing, two spaced pinions rigidly mounted on said shafts adjacent each end, two spaced gear racks in operative engagement with said pinions, means slidably connecting the upper ends of said gear racks to the underside of the central portion of said couch, two gear rack guides mounted in said housing for slidably supporting said gear racks for longitudinal slidable movement, a first sprocket rigidly mounted in the intermediate portion of said shaft, a reversible motor having a drive shaft mounted in said housing, a second sprocket mounted on said drive shaft of said motor, an endless chain disposed on said first and said second sprockets, said elevating means adapted in use to raise and lower said couch of said dental chair when said motor is activated to rotate said shaft and thereby cause movement of said gear racks connected to said couch and in operative engagement with said pinions.

4. The dental chair as defined in claim 2 wherein said elevating means is comprised of, a housing disposed below said couch, a horizontally disposed shaft mounted in said housing, at least one pinion rigidly mounted on said shaft, a gear rack in operative engagement with said pinion, means connecting the end of said gear rack to said couch, a motor mounted in said housing, means connecting said motor and said shaft in driving relation, said elevating means adapted in use to raise and lower said couch of said dental chair.

5. The dental chair as defined in claim 2 wherein said elevating means is comprised of a housing disposed below said couch, a horizontally disposed shaft mounted in said housing, two spaced first pinions rigidly mounted on said shaft adjacent each end, two first gear racks in operative engagement with said first pinions, means slidably connecting the upper ends of said first gear racks to the underside of said center portion of said couch, gear rack guides mounted in said housing for slidably supporting said first gear racks for longitudinal slidable generally vertical movement, a second pinion rigidly mounted in the intermediate portion of said shaft, a second gear rack in operative engagement with said second pinion, a hydraulic cylinder having a piston rod rigidly connected to said second gear rack adapted to longitudinally move said second gear rack, means supporting said hydraulic cylinder relative to said shaft, a motor, a fluid pump operatively connected in driving relation to said motor, valve and conduit means connecting said fluid pump and said hydraulic cylinder in driving fluid communication, relatively large semi-circular shield plates affixed to the underside of said couch and positioned on each side of said housing, said elevating means adapted in use to raise and lower said couch of said dental chair when said motor is activated to rotate said shaft with said hydraulic cylinder to thereby cause vertical movement of said first gear racks, connected to said couch.

6. The dental chair as defined in claim 2 wherein said elevating means is comprised of a housing, a horizontally disposed shaft mounted in said housing, at least one first pinion mounted on said shaft, a first gear rack in operative engagement with said first pinion, means connecting the upper end of said first gear rack to said couch, a second pinion rigidly mounted on said shaft, a second gear rack in operative engagement with said second pinion, a fluid cylinder operatively connected to said second gear rack for longitudinally moving same, and a source of fluid under pressure, said elevating means adapted in use to raise and lower said couch of said dental chair when said fluid cylinder is activated.

7. The dental chair as defined in claim 2 wherein said elevating means is comprised of a housing, a shaft mounted on said shaft, a gear rack in operative engagement with said pinion, means connecting said gear rack to said couch, and a power means for rotating said shaft.

8. A contour-type dental chair, comprising, a movable couch having a center portion, a downwardly inclined leg support portion, and an elongated upwardly inclined

head support portion joined to said center portion, padding means on said couch, a support having a vertically spaced outwardly projecting arm, a hinge means pivotally joining the projecting end of said head support of said couch and said projecting arm, and an elevating means for said couch to support and pivot same about the axis of said hinge means.

9. A contour-type chair, comprising, a movable couch having a center portion, a leg support portion, and an upwardly inclined head support portion joined to said center portion, padding means on the couch, an upright support having a mounting portion, hinge means pivotally joining the outer end portion of said head support portion of said movable couch and said mounting portion of said upright support, and an elevating means for said couch to pivot same about the axis of said hinge means, said head support portion of said movable couch and said upright support being positioned and of relative size in respect to each other to provide space for a human being to sit on a chair or the like at the side of said couch in the vicinity of said head support portion and work on the head of a human being lying on said couch with the head resting in an outer end portion of said head support portion.

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