Dec. 12, 1967 C. E. VAUGHN ETAL 3,357,740

DENTAL CHAIR

Filed Oct. 24, 1965 3 Sheets-Sheet 1

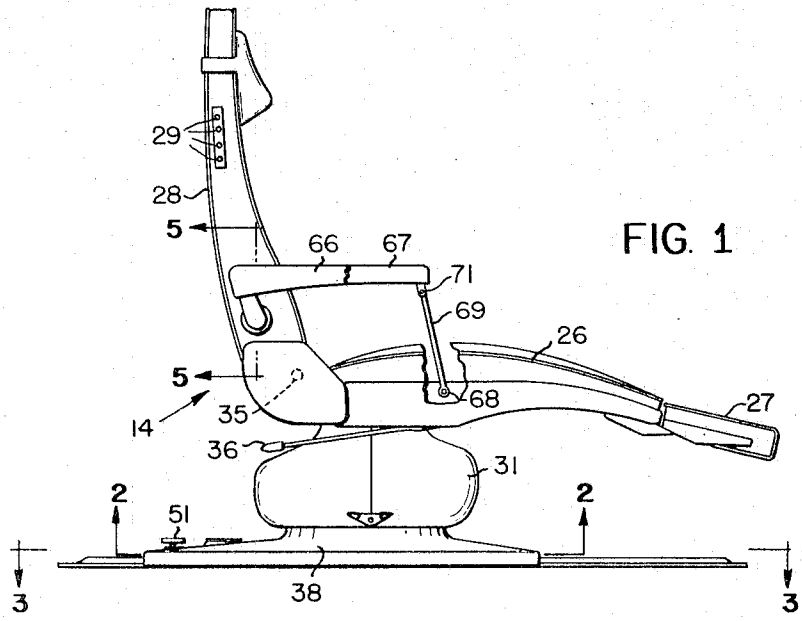


FIG. 1

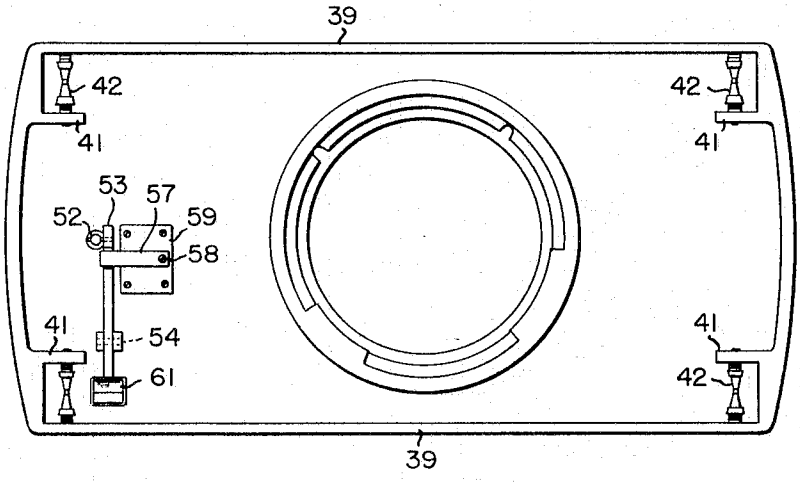


FIG. 2

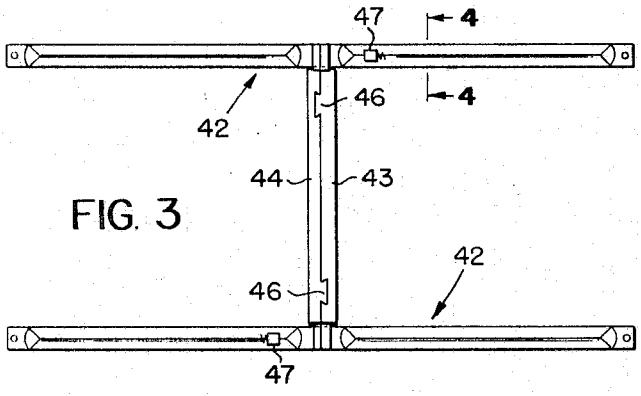


FIG. 3

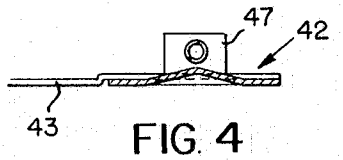


FIG. 4

INVENTORS
CHARLES E. VAUGHN AND
ARTHUR GILBERT BILLIN
BY
ATTORNEYS

Dec. 12, 1967 C. E. VAUGHN ETAL 3,357,740

DENTAL CHAIR

Filed Oct. 24, 1965 3 Sheets-Sheet 2

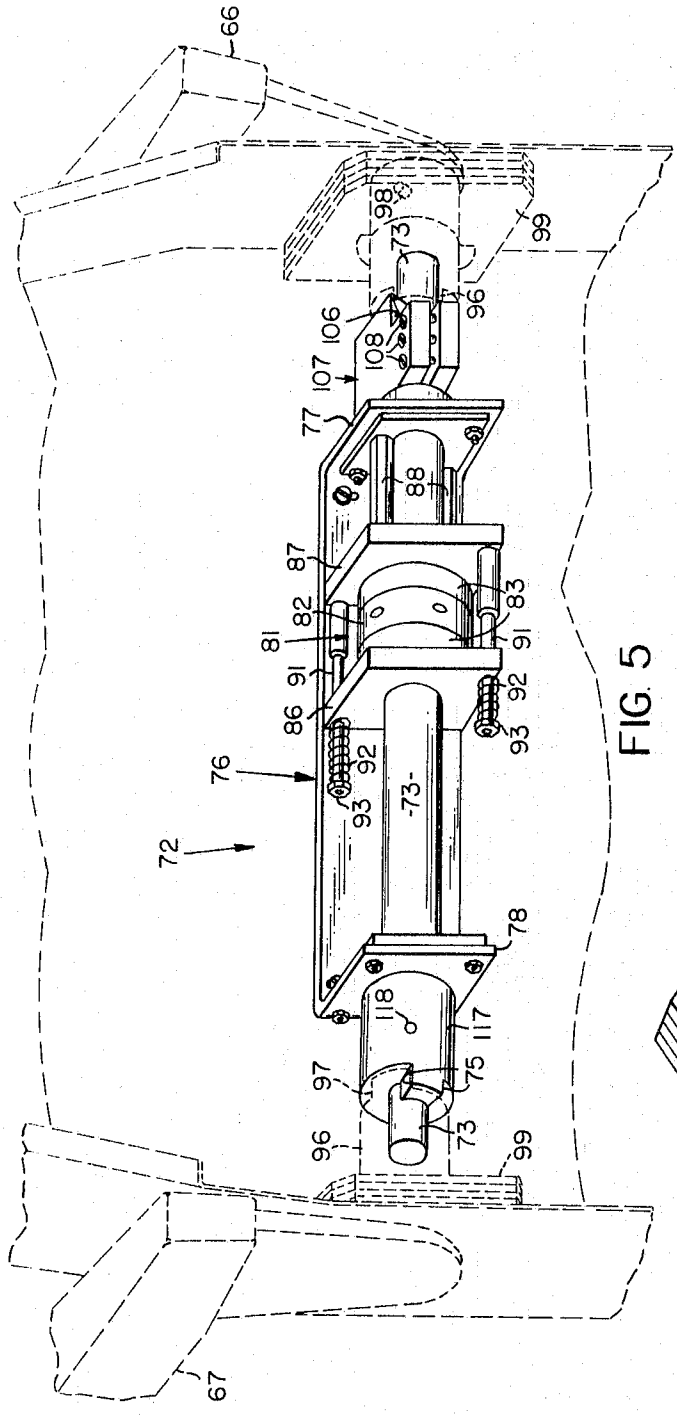


FIG. 5

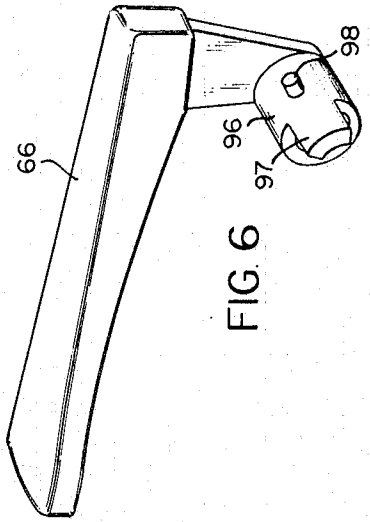


FIG. 6

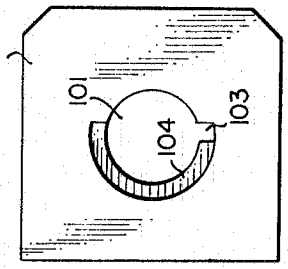


FIG. 8

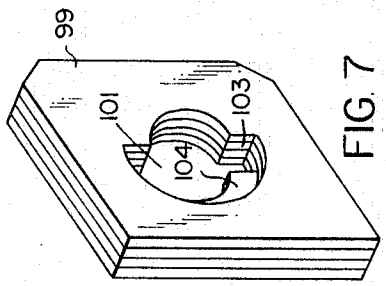


FIG. 7

INVENTORS
CHARLES E. VAUGHN AND
ARTHUR GILBERT BILLIN

BY Thomson & Sloane

ATTORNEYS

Dec. 12, 1967 C. E. VAUGHN ETAL 3,357,740

DENTAL CHAIR

Filed Oct. 24, 1965 3 Sheets-Sheet 3

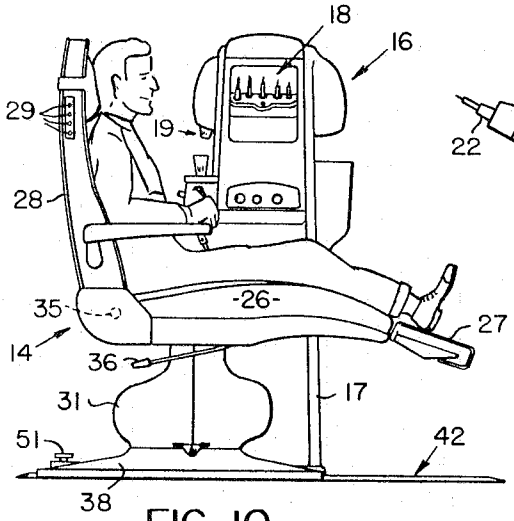


FIG. 10

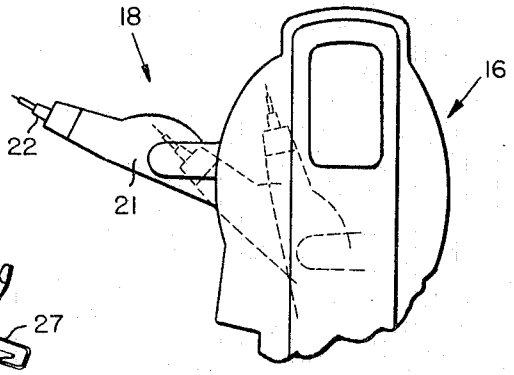


FIG. 9

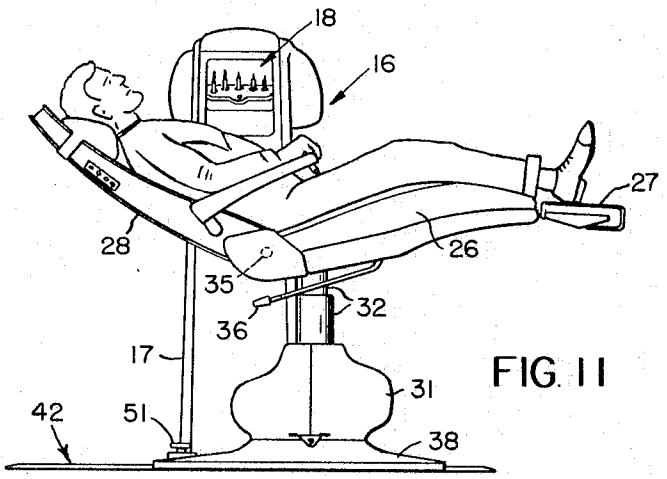


FIG. 11

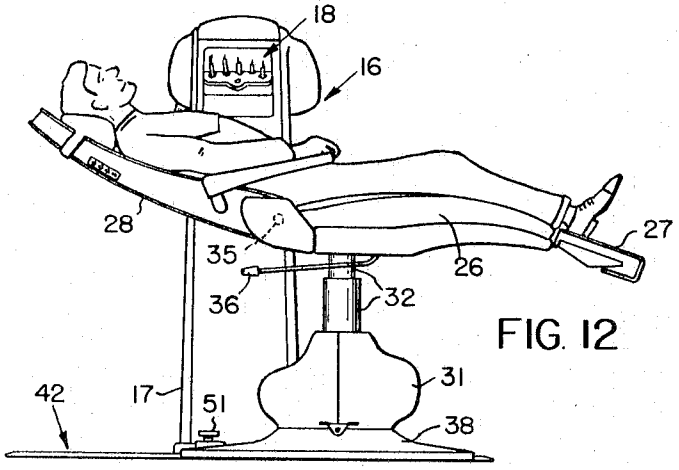


FIG. 12

INVENTORS
CHARLES E. VAUGHN AND
ARTHUR GILBERT BILLIN

BY Thomson & Scherer

ATTORNEYS

United States Patent Office 3,357,740 Patented Dec. 12, 1967

3,357,740

DENTAL CHAIR

Charles E. Vaughn and Arthur Gilbert Billin, Rochester, N.Y., assignors to Ritter Corporation, Rochester, N.Y., a corporation of Delaware

Filed Oct. 24, 1965, Ser. No. 504,664
1 Claim. (Cl. 297—416)

This invention relates to dental equipment and, more particularly, to the construction and arrangement of the two major elements of dental equipment for the convenience of the dentist and to promote his efficiency.

In recent years, much attention has been given to studying the motions of a dentist. Dentists have been subjected to time and motion studies in an effort to improve their efficiency and reduce fatigue. The problem does not present an easy solution since the equipment must be constructed and arranged to accommodate the short dentist, the tall dentist, a dentist who desires to stand up during a major part of his work, and a dentist who likes to sit down while performing most of his operations. The problem is still further complicated by the fact that the same fundamental equipment must be used, unless the dentist has a separate operating room, for operating on tall patients, short patients and children.

An object of our invention is to provide a dental chair in which the elements thereof are more maneouverable than those employed in the past whereby the relationship between the dental instruments carried by a dental stand, the patient and the dentist are improved and more flexible.

Another object of our invention is to provide a dental chair in which the elements thereof are readily adjustable so that the dentist is always able to get the patient's mouth into a relationship with the dental instruments such that it meets his convenience regardless of whether he is tall, short, desires to stand or sit down during his practice, or whether the patient is tall or short.

More specifically, our invention contemplates a dental chair, the back and combined seat and footrest of which may be placed in an infinite number of relationships to meet the convenience of the dentist; combined with mechanism for raising and lowering the chair; and combined with a mobile base for the chair on which the chair may slide with relation to the usual associated dental unit whereby once the dentist has selected the patient's head to dental instruments distance or relationship he desires to use, he may maintain this same distance regardless of whether he wishes to operate on the patient in substantially an upright position, in a substantially fully reclining position, or in any intermediate position.

My invention further contemplates an improved structure or enabling convenient ingress and egress of the patient to and from the chair combined with mechanism for causing the dental chair arms always to follow the position of the patient seated or reclining in the chair.

Other objects and advantages of this invention will be particularly set forth in the claim and will be apparent from the following description, when taken in connection with the accompanying drawings in which:

FIG. 1 is a side elevation of the chair of our invention with parts broken away better to illustrate its construction, the chair being arranged with the back in an upright position with respect to the combined seat and footrest;

FIG. 2 is a bottom plan view of the chair base and taken substantially on the line 2—2 of FIG. 1 in the direction indicated by the arrows;

FIG. 3 is a top plan view of the chair base track taken substantially on the line 3—3 of FIG. 1 in the direction indicated by the arrows;

FIG. 4 is a sectional view taken substantially on the line 4—4 of FIG. 3 in the direction indicated by the arrows;

FIG. 5 is a perspective view of a part of the chair arm operating mechanism;

FIG. 6 is a perspective view of the removable chair arm;

FIG. 7 is a view showing the plate carried by the chair in which the removable chair arm of FIG. 6 may be lodged, locked and connected with the arm operating shaft;

FIG. 8 is a face view of FIG. 7;

FIG. 9 is a fragmentary view in side elevation of the top of the dental unit and illustrating how the dental instruments may be extended;

FIG. 10 is a view showing the chair in an upright position with a patient supported therein;

FIG. 11 is a view similar to FIG. 10 in that it illustrates the same patient mouth to dental instruments relationship with the patient in a semi-reclining position in the chair; and

FIG. 12 is a view similar to FIGS. 10 and 11 showing the same mouth to instruments relationship but with the patient in an almost fully reclining position.

One important aspect of our invention (FIGS. 10 to 12) concerns the relationship of the dental chair, generally indicated by the numeral **14**, and a dental unit, generally indicated by the numeral **16**, and their relationship with the mouth of a patient seated in the dental chair. The relationship of these three factors together with the physical proportions of the dentist, and whether the dentist prefers to sit down or stand up for performing his work, are extremely important in cutting down the number and amplitude of the movements of the dentist in normally carrying out his practice and his fatigue at the end of a day.

The dental unit (FIGS. 10 and 11) comprises a stand **17**, a panel generally indicated by the numeral **18**, and an automatic drinking cup filler (FIG. 10) generally indicated by the numeral **19**. The instrument panel **18** comprises an instrument holder **21** adapted to be housed within the dental unit **16** when not in use and adapted, when in use, to pivot to the position shown (FIG. 9) or any intermediate position as indicated by the dotted lines. The instrument panel may be similar to that shown in Bronk Reissue Patent 24,087 issued Nov. 15, 1955.

The instrument holder **21** has a plurality of sockets for the reception of retractable instruments **22**. In the instant case we have shown five retractable instruments which may be one or more highspeed handpieces, a low speed handpiece which may be similar to that shown in application Ser. No. 347,813 filed Feb. 27, 1964; a cautery; and a syringe which may be similar to that shown in application Ser. No. 399,482 filed Sept. 28, 1964. All of the instruments are retractable to the positions shown in FIG. 9 by a mechanism which may be similar to that shown in the last mentioned application.

All of the above instruments are subject to constant, repetitive and successive use by the dentist during the normal course of a day. Perhaps the dentist will have to reach for one of the instruments and apply it to the mouth of a patient several hundred times during the course of a day. Moreover, usually the dentist has his eyes fixed on the mouth of the patient and it is therefore desirable that he be able to reach and extend the instrument for use without looking at the instrument and solely by feel. Some dentists, possibly a majority of them, prefer to work, regardless of the position of the dentist, with the instruments a constant distance away from the patient's mouth.

The relationship of the parts shown in FIGS. 10–12 inclusive is such as might be desired by a relatively short dentist operating in a stand-up position, or a relatively tall dentist operating from a seated position on a stool adjacent the dental chair. While we have shown one specific arrangement of the patient's mouth with relation to the dental instruments, it will be obvious from the

description that follows, that any desired relationship of the elements may be obtained to suit the preference of any particular dentist because of the versatility of positioning the patient in relationship to the dental instruments.

The dental chair shown is in general of the lounge type and includes a seat **26** which may be contoured to comfortably receive the patient's seat and upper and lower legs. Attached to the seat **26** is a foot rest **27**, the seat rest and footrest being movable as a unit. Pivoted at the rear end of the seat rest **26** is a backrest **28**. In the particular form of this invention, the backrest may be manually pivoted with respect to the seat rest as it has been found that this operation of the chair does not necessarily have to be power operated.

Carried by the backrest, preferably at the sides of the chair or any other convenient location, are a plurality of push-buttons **29**. In this case, four push buttons have been shown, two are provided to energize motors or a hydraulic mechanism for tilting the backrest about a horizontal axis **35**. The two other push buttons are for the purpose of raising and lowering the entire chair by applied power such as electric motor, but more usually, by a hydraulic system. The chair includes a housing **31** which has a pair of telescoping hydraulic cylinders **32** for the supporting and raising and lowering of the chair. These parts have only been diagrammatically illustrated since their function and operation are well-known in the art to which this invention applies.

Mounted adjacent the side of the chair is a lever **36**. As previously mentioned, the backrest **28** is pivoted with respect to the combined seat and footrest **26–27** so that the backrest **28** may be positioned by rotation on a pivot (not shown) in any desired angular relationship to the seat rest **26**. When released, the hand lever **36** automatically locks the combined seat and backrest in any desired position. Preferably, the lever **36** is hand operated and depressed to release the lock; the backrest and seat rest may then be shifted as a unit about a horizontal pivot to the various positions shown in FIGS. 10 to 12. The seat unit is relocked again with respect to the base automatically upon release of the lever **36**.

The housing **31** is mounted on a base **38** which is essentially rectangular in shape. The underside of the base is shown in FIG. 2. The base has depending side edges or a rim **39** and the forward and rearward ends carry legs or bosses **41** integral with the base casting. Legs **41** and the rim **39** carry rollers **42** mounted in the corners of the bottom plate. The rollers ride on V-shaped tracks, generally indicated by the numeral **42**, a sectional view of one of which is shown in FIG. 4. The track is made of two U-shaped sections **43** and **44** which are identical and oppositely directed. The tracks **43** and **44** are provided with interfitting parts **46** whereby the track section may be separated for shipment and be readily erected. The track sections may be bolted to the floor. However, the weight of the chair is sufficient to hold the tracks in position and bolting to the floor is unnecessary so that if desired, the chair may be lifted off the tracks to adjust the position of the tracks in relation to the dental unit. Carried by each of the tracks are stops **47** which are located adjacent the center of the track so that in any position of the base on the track, the stops **47** are hidden from view. More important, the location of the stops is such that the dentist cannot stumble over them in moving about the chair. The stops will always lie beneath the base and do not constitute a hazard to the dentist.

Mechanism is provided to lock the base with respect to the floor and track which comprises a foot pedal **51** which is located centrally of the base so that it may be foot operated conveniently by a right-handed dentist standing in the foreground of FIG. 1 or a left-handed dentist standing in the background of FIG. 1. It will readily be apparent that other adaptations may be made in the chair to set the chair up for a right-handed or left-handed dentist, as for example, the location of the push buttons **29**.

The foot pedal is mounted on a post **52** (see FIG. 2) connected to a lever **53** by a pin. The lever **53** is pivoted at **54** on a bracket carried on the underside of the base. The upper end of lever **53** is pivoted or biased downwardly, as viewed in FIG. 2, by a spring **57** fixed as shown at **58** to a plate **59** carried on the underside of the base plate. This raises the foot pedal **51** as shown in FIG. 1. A brake-pad **61** is provided at the end of the lever so that when the dentist releases foot pedal **51**, the spring **57** automatically rotates the lever **53** about the pivot **54** to apply the brake-pad **61** to the floor. The brake is released by pressing downwardly on the foot pedal **51**. When the brake-pad is in contact with the floor, the chair may be pushed along the track only with great difficulty and the chair is, for practical purposes, locked in position.

Referring now to FIGS. 1 and 5–8 inclusive, the arms **66** and **67** are arranged so that one of the arms, in the case of a right-handed dentist the forward arm **66** as viewed in FIG. 1, is removable as will presently appear. The rearward arm **67** is pivoted by means of a link on a pivot **68** to a rod **69** pivoted to a link **71** pivoted on the bottom of the arm **67**. Mounted in the back of the chair is a cross assembly, generally indicated by the numeral **72** which carries a shaft **73** which extends completely across the back of the chair. The shaft **73** rotates or more accurately, oscillates between a position in which the arm **67** is in its lowermost position as shown in FIG. 1 in which position the arm **67** is substantially horizontal, to the uppermost position which occurs when the backrest **28** is in the lowermost position as shown in FIG. 2.

The arm **67** has a sleeve section **96** which has clutch faces **97** which engage clutch faces **75** formed on the sleeve **117** and pinned as shown at **118** to the shaft **73**. The sleeve **117** is free with respect to the bracket **76** which is fixed to the back of the chair by means such as slots and screws. The bracket **76** includes a pair of integral bracket arms **77–78**.

Mounted on the shaft **73** is a brake assembly generally indicated by the numeral **81**. The brake assembly comprises a brake disc **82** secured to the shaft and a pair of brake shoes **83** mounted on opposite sides of brake disc **82**. The brake shoes **83** may be made of nylon or any suitable material. The nylon brake shoes **83** are pressed into engagement in the brake disc **82** by a pressure plate **86** and a plate **87** fixed by means of tie rods **88** to the bracket arm **78**.

Rods **91** extend from the backing plate **87** through openings in the pressure plate **86** and the pressure plate is urged to the right, as viewed in FIG. 5, by means of springs **92** which seat against nuts **93** threaded on the ends of the rods **91**.

The arm **66** has a sleeve section **96** (FIG. 6) which has clutch elements **97** integral therewith. Carried by the side of the chair are fittings **99**. The fittings are identical on each side of the chair and are fixed to the chair. The sleeve **96** at the right (FIG. 5) rotates in an opening **101** (FIG. 7) formed in the fitting **99**. A pin **98** extends from the arm sleeve **96**. The fittings **99**, for convenience of the manufacturer, are made up of stacked plates so that the opening **101** may be provided with an irregularly shaped groove.

The arm **66** is removable from the chair and is also freely rotatable from a substantially horizontal position to any one of the positions shown in FIGS. 10, 11 and 12 and to a vertical position. In a vertical position the pin **98** is in registry with a horizontally extending slot **103** making it possible for the dentist to remove the arm **66** when desired.

FIG. 7 is a perspective view looking in general from the left of FIG. 5. The groove from the horizontal slot **103** has a wall **104** and the pin **98** rides on this wall through approximately 90°. This allows the arm **66** to move through approximately 90° and also allows the

arm to be moved to a substantially vertical position at which time the pin **98** is in registry with the horizontally extending slot **103** and the arm may be removed.

The clutch faces of the clutch element **97** (FIG. 6) butt against and are driven by clutch elements **106** formed on a clamp **107**. The clamp is made up of a block of metal slotted and clamped together by screws **108**. The clamp member **107** has a bore so that upon tightening the screws **108** the clamp may be rigidly connected to the shaft **73**.

From what has been described it will be clear that movement of the arm **67**, at the left of FIG. 5, rotates the shaft **73** and through the clutch elements previously described, the arm **66**. The fixture **99** at the left of FIG. 5 has an effective circular opening to accommodate a sleeve **96** and cannot be removed from the chair. By turning the assembly **72** end for end and changing the location of the rod **69**, the arrangement of chair arms may be transposed so as to convert the chair from right-handed to left-handed for the convenience of left-handed dentists. The purpose of the clutch assembly **81** is to cushion the fall of the arm **66** and prevent it from dropping heavily on the arm of a patient and minimize noise.

While we have shown and described the preferred form of mechanism of our invention, it will be apparent that various modifications and changes may be made therein, particularly in the form and relation of parts, without departing from the spirit of our invention as set forth in the appended claim.

We claim:

A dental chair comprising the combination of a seat and a back pivoted thereto:

(a) a pair of chair arms;

(b) a link pivoted to the seat and one of said arms;

(c) an oscillatable shaft extending across the back and connected to the other arm so that when the back is pivoted with respect to the seat both arms move together as a unit;

(d) a disconnectable clutch between said other arm and said chair;

(e) means for removing said other arm from said shaft when said other arm is in a substantially vertical position; and

(f) means in connection with said shaft for braking the fall of said other arm from a position above the horizontal toward a horizontal position.

References Cited

UNITED STATES PATENTS

2,271,007	1/1942	Hanna	188—5
2,286,372	6/1942	Page	297—217
2,661,227	12/1953	Murphy	297—417
2,713,891	7/1955	Linquist	297—416
3,172,699	3/1965	Naughton	297—417
3,259,355	7/1966	Slouka	297—344

FOREIGN PATENTS

590,836	7/1947	Great Britain.

FRANCIS K. ZUGEL, *Primary Examiner.*