

Sept. 13, 1932.

P. RUSSELL

1,877,690

DENTAL X-RAY UNIT

Filed Feb. 25, 1927

4 Sheets-Sheet 1

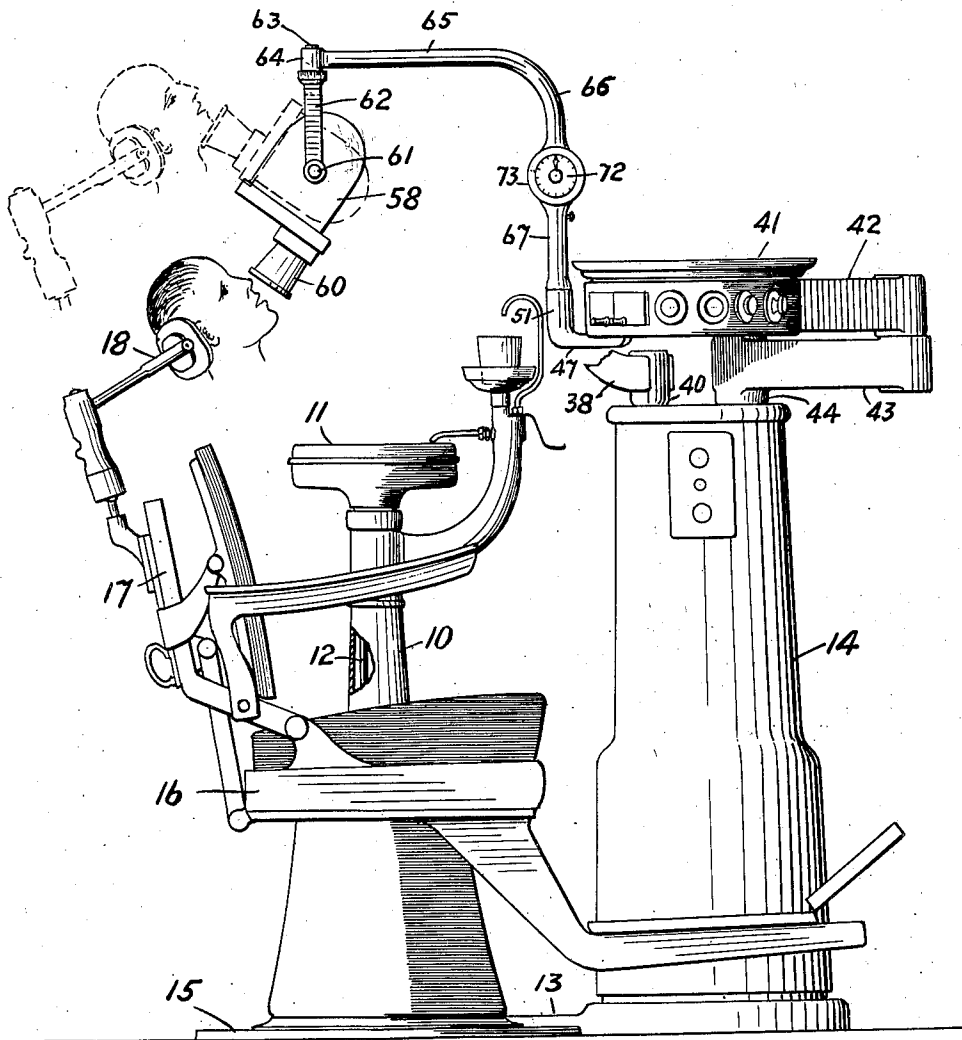


FIG. 1.

WITNESS:

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INVENTOR

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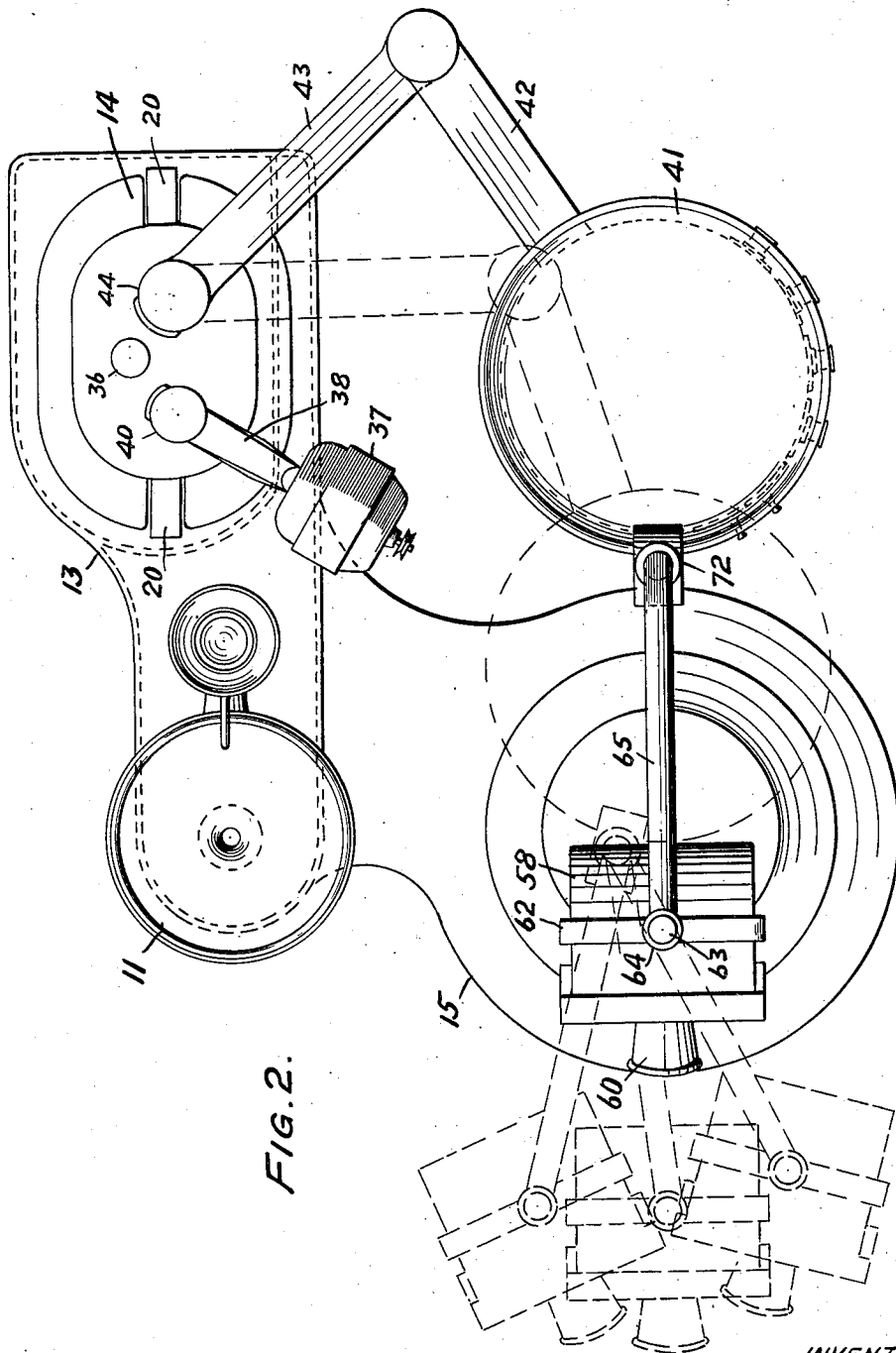


FIG. 2.

WITNESS:

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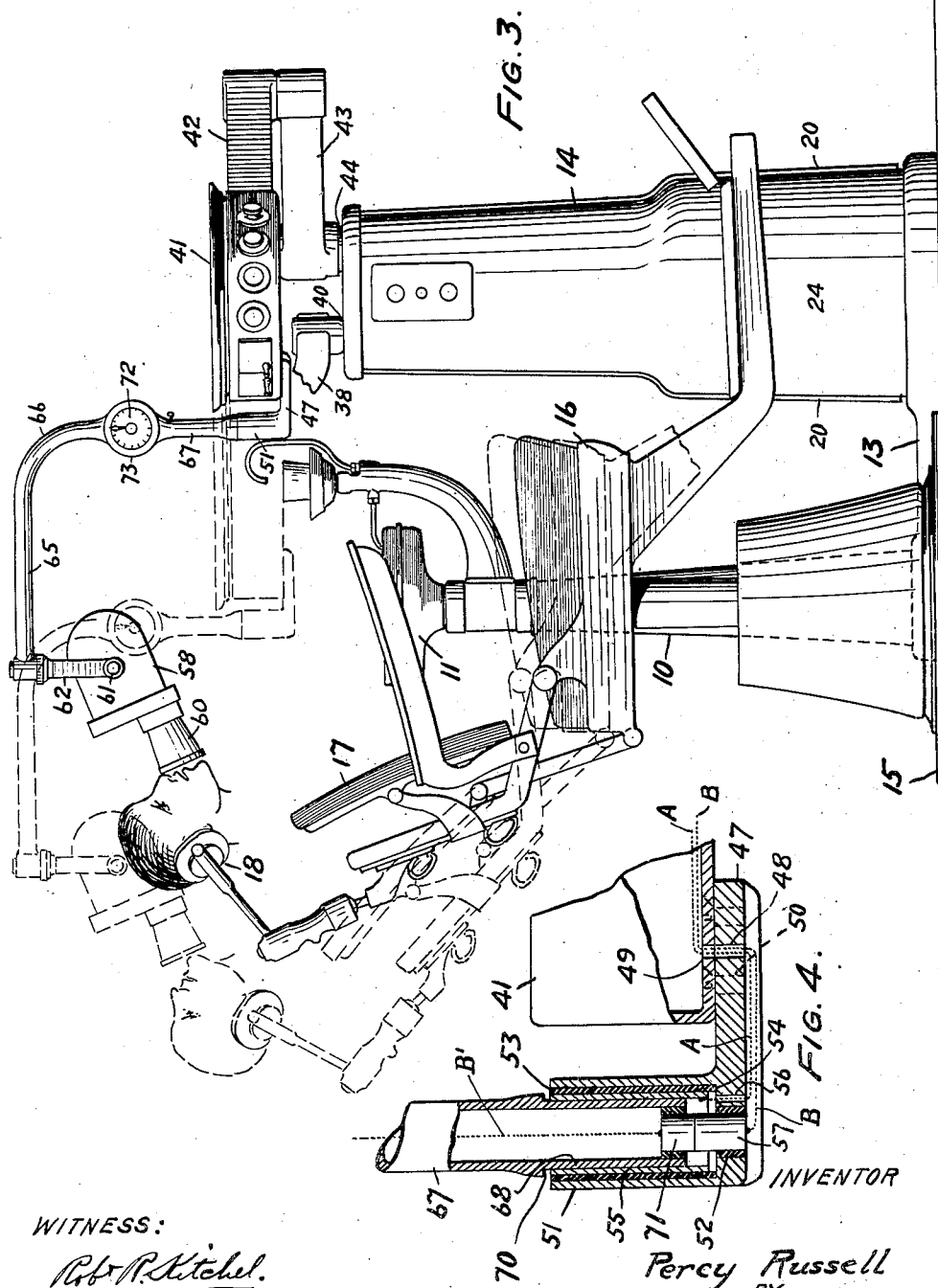
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4 Sheets-Sheet 3



WITNESS:

Robt. R. Kitchel.

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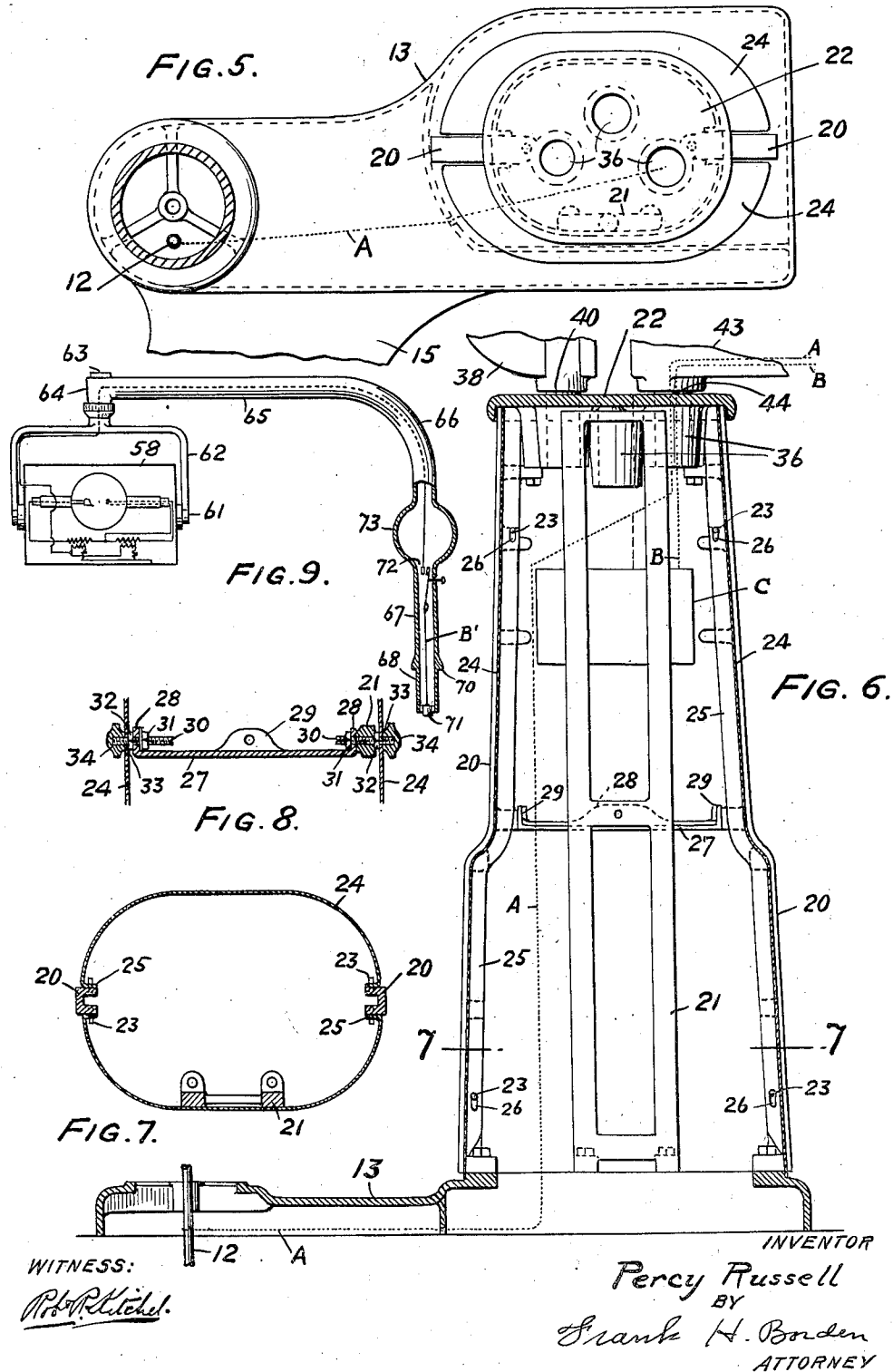
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DENTAL X-RAY UNIT

Filed Feb. 25, 1927

4 Sheets-Sheet 4



UNITED STATES PATENT OFFICE

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DENTAL X-RAY UNIT

Application filed February 25, 1927. Serial No. 171,016.

This invention relates to dental X-ray units.

X-ray units are becoming increasingly more important in the dental field, furnishing a recognized and appreciable supplemental income for dentists who are properly equipped, despite which the use of such units in the past has been limited.

The tendency in furnishing dental operating rooms has been toward simplification and unification of equipment, pursuant to which various items of equipment which were formerly disposed about the room in scattered and detached relation have been concentrated and simplified in the modern dental unit, such as is shown, for instance, in U. S. Patent No. 1,537,140. The combining of the several elements, as disclosed in that patent, was valuable not only from the standpoint of efficiency in reducing the number of steps and movements formerly necessary and because of the compactness of the whole, but also, incident to housing the connections and instruments, the apprehensions of the patients are allayed. The removal of fear from patients is a psychological factor in the esteem and consideration that the patients feel for a dentist, and is no inconsiderable element in his success.

As X-ray units have been developed and used in the past, even in the dental field, they are bulky and obtrusive, impossible to conceal when not in use; they comprise a constant mental menace to the patients who survey them in the operating room, and are also of high cost. As provided, even though disposed against a more or less convenient wall, there was a continual problem of adjustment, both of the X-ray head for direction against the desired portion of a patient and of the adjustment of the more frequently used items of equipment so as to be out of the way during X-ray work. There was also a problem in the disposition of the conductors of the apparatus, whether supply or ground, as well as the conductors to the timing mechanism. The brackets and arms upon which the X-ray head was mounted involved accurate machining and the provision of a number of points of adjustment, and formed

an important element in the cost of the conventional dental X-ray unit. Moreover, the construction of the brackets heretofore, necessarily caused the timing mechanism and control switch to be separate from the apparatus, only connected therewith by dangling wires, as an additional unsightly factor.

This invention contemplates that the present expensive dental X-ray unit represents largely a substantial duplication of equipment already possessed by numbers of enterprising dentists, and that utilization of some, at least, of these facilities possessed by the dentist will simplify the dental X-ray unit, reduce its cost, provide a more compact assembly, eliminate exposed wires, and alleviate the undue apprehensions of the patients as to this item of equipment.

Among the objects of the invention are; to provide a dental unit as a support for an X-ray unit; to provide an adjustable support for an X-ray unit utilizing facilities already available to a dentist; to provide as an article of manufacture an X-ray unit arranged for removable attachment and support on a dental unit; to improve the construction of dental units; to provide a dental bracket table as a support for an X-ray unit; to provide a housing common to frequently used auxiliary dental apparatus and supplementary X-ray apparatus; to provide an X-ray unit and a support therefor in which all wiring is substantially concealed; to provide a dental X-ray unit in which the timing mechanism is built into the bracket support; to provide a dental unit as a support for an X-ray unit and having a cuspidor, in which the X-ray unit is grounded on the water supply for the cuspidor by concealed wiring; to provide an X-ray unit of reduced cost, of simplified construction and of reduced size; to eliminate superfluous apparatus in the use of X-ray units for dental purposes; to provide means whereby X-ray units may be supported and adjusted on conventional dental apparatus; to provide a simplified bracket support for X-ray units; to reduce the size of X-ray units so as to facilitate their disposition when not in active use; to combine an X-ray unit and a dental unit; and many other objects and ad-

vantages as will be more apparent as the description proceeds.

In carrying out the invention in a preferred form, a dental unit is provided which has a swinging bracket table, an X-ray unit is provided with a hinged or pivoted, relatively short, bracket, in which the timing and control mechanism may be permanently mounted; the X-ray bracket is pivotally and removably engaged with the bracket table so as to be adjustable relative thereto, but movable therewith to provide all of the necessary X-ray head adjustments in a horizontal plane, with which may be associated an adjustable dental chair to provide for relative vertical adjustments of the patient and the X-ray head.

In the accompanying drawings:

Fig. 1, represents a side elevation of an assembled dental unit, partially fragmentary as to the dental engine arm, an X-ray unit, and a dental chair, showing the X-ray head in dotted and full lines to indicate its rotative adjustment, with the head rest of the chair in dotted and full lines to indicate vertical adjustments of the chair to accord with positions of the X-ray head.

Fig. 2, represents a top plan of an assembled dental unit, X-ray unit and chair, showing in dotted lines several adjustments of the X-ray head relative the stationary portions of the dental unit and of the chair available by swinging the bracket table on the pedestal of the unit, and swinging the X-ray bracket on the bracket table.

Fig. 3, represents a side elevation similar to Fig. 1, in which relative vertical and horizontal adjustments of the patient and the X-ray head are indicated by dotted and full lines, as secured by horizontal adjustments of the X-ray head, and vertical and tilting adjustments of the chair.

Fig. 4, represents a vertical section through the X-ray bracket socket mounted on the bracket table and through the lower end of the X-ray bracket, disclosing the wiring therethrough and the insulation thereof.

Fig. 5, represents a top plan of the pedestal of the dental unit, partially in section through the cuspidor standard, with a water supply pipe in position therein, with a wire extending through an opening in the pedestal to ground on the water pipe.

Fig. 6, represents a section to show the detailed construction of the pedestal, and the disposition of the wires from the X-ray unit.

Fig. 7, represents a section on line 7-7 of Fig. 6, to show a detail of the attachment of the pressed metal walls of the pedestal.

Fig. 8, represents a section through a horizontal shelf in the pedestal to show the fastening devices for the cover plates.

Fig. 9, represents a diagrammatic showing of the wiring of the X-ray head, bracket, timing mechanism, and pintle of the bracket.

As disclosed in Patent 1,537,140, the preferred form of dental unit comprises broadly a standard 10, supporting a cuspidor 11, having a water supply pipe 12. The standard 10 is mounted on an elongated base 13, on the opposite end of which the hollow pedestal 14 is supported. It is preferred to extend the base as at 15, to support a dental chair 16 of any desired construction, which is susceptible to vertical movements, has a tiltable back 17, and terminates in a conventional head rest 18.

As it is desired that the transformers for the X-ray unit may be housed in the pedestal of the dental unit, the insertion thereof is facilitated by providing the pedestals with covers that can be easily removed and replaced, but which are rigid in place and not subject to covibration with apparatus in the pedestal. To that end, as shown in Fig. 6, the pedestal comprises a pair of side ribs 20, 20, and a front rib 21, connected at their upper ends to a flanged cast cover plate 22, and at their lower ends, to the base 13. At desired points on the side ribs, laterally extending pins 23 are mounted, as shown in Figs. 6 and 7. Front and rear shells 24, with in-turned flanges 25 are provided, which flanges have slots 26 arranged to register and cooperate with the pins 23 as shown. A horizontal shelf 27, arranged to receive desired apparatus auxiliary to the apparatus of the dental unit, has flanges 28, 28, and 29, 29, the latter two of which are connected to the side ribs 20, 20, by suitable means, as by bolts for instance, and the flanges 28, 28, carry each a bolt 30, rigidly held to the flange by lock nuts 31 and 32. Each bolt 30 is arranged to extend through a suitable hole or opening 33 in an adjacent shell cover, and to engage the covers by the impingement of nuts 34, as will be clear. In applying the shell covers to the pedestal the upper end of each shell is slid upwardly under the flange of the cast cover plate, in which position the pins 23 enter the lower ends of the appropriate slots 26 of the shell flanges 25. The shells are then pushed toward the ribs and permitted to slide down until the pins 23 abut the upper ends of the slots and the holes or openings 33 register with the appropriate bolts 30, permitting the shell to slide inward on the bolts until the flange faces of the shells, which are preferably covered with a vibration damper such as strips of felt, meet the rib faces. The nuts 34 are then applied and the shells pulled up into tight engagement with the ribs, with the lower edge of each shell in engagement with a flange on the base 13.

The foregoing effects a neat and compact assembly, which is readily disassembled for the insertion of such apparatus as it might be desired to house in the pedestal, not only for those items of apparatus auxiliary to the electrical apparatus of the dental unit, such as an air compressor, motor generator, trans-

formers, fuse boards, etc., but also such transformers and indicators as may be necessary for the proper functioning of the X-ray unit, and which heretofore have been disposed obtrusively and objectionably about the operating room. The provision of the readily removable covers expedites adjustments within the pedestal, and is of particular value in the event that the contained apparatus is one that is acquired after the acquisition of the dental unit, as for instance the dental X-ray unit disclosed. When additional transformers are to be used with the unit, they are easily inserted in the pedestal by the operator.

In the cast cover plate 22, a plurality of inwardly extending sockets 36 are provided, in which various items of dental equipment are pivotally mounted for the normal operation of the dental unit. Thus a dental engine 37, mounted on a hollow arm 38, is pivotally mounted by the insertion of the terminal pintle 40 in one of the sockets 36, as disclosed in said patent. In another socket a switchboard bracket table 41 is pivotally mounted, by means of an integral hollow arm 42, pivotally connected to a second hollow arm 43, terminating in a hollow pintle 44, the arms housing wires or conductors extending from within the pedestal to the bracket table. It is preferred that the bracket table be of the type known as a switchboard bracket table, arranged with a number of contained but extensible electrical instruments, the voltage of which instruments is controlled by switches radially disposed about the table, as is now well known in the art. The X-ray unit to be described, may, however, be applied to any desired portion of the dental unit, or to an incomplete or plain bracket table, i. e. to a table without the instruments.

There also may be other electrically actuated devices associated with the table, such as atomizer heaters, water glass heaters, radioscope, etc. (not shown). A feature of the bracket table disclosed which is of importance in the present connection is that it is adjustable in all directions in a horizontal plane, and at the same time furnishes a rigid and inflexible support, amply strong to sustain the relatively heavy though compact X-ray unit to be described.

The attaching element interposed intermediate of the X-ray unit, and the support, obviously may assume many forms, and the specific one disclosed is to be considered as purely illustrative. As shown in Fig. 4, a longitudinally ribbed plate 47 has a hole 48 in registry with a hole 49 in the lower face of the bracket table 41, and is rigidly affixed thereto, as by means of screws 50. The outer end of the plate has a vertical socket 51, concentric with a second vertical hole 52 in the plate between the ribs. An insulating bushing 53 extends into the socket abutting a shoulder 54 therein, and a metal sleeve 55 is disposed

within the insulating bushing in intimate electrical contact with a ground conductor or wire A, extending through a small bore 56 in the plate. A permanent axial contact 57, which may be resilient is insulatedly mounted in the hole 52, in contact with a supply conductor B. Conductors A and B extend from their points of attachment along the lower face of the plate, between the ribs, which substantially conceal them, through the registering holes in the plate and bracket table, through the table, and the pivoted arms, into the pedestal. From the pedestal the ground conductor A extends through the base to ground upon the water pipe 12. The supply conductor B is shown, in Fig. 6, as being attached to the common fuse block C of the pedestal, although it may lead to such transformers or other devices as may be disposed in the pedestal, as desired.

In the preferred form, which is the simplest and least costly, the X-ray unit, as shown in Figs. 1, 2 and 3, comprises the X-ray head 58, containing the X-ray tube, which head has a cone 60, and is rotatable about a horizontal pivot through trunnions 61, journaled in the ends of a yoke 62. The yoke has a shank 63 rotatable in a vertical socket 64 at the end of the horizontal portion of a hollow bracket arm 65, which bends or curves at 66 into a vertical arm 67, terminating in a pintle 68, having a shoulder 70. A contact 71 is axially disposed and insulated in the end of the pintle in position to contact with the axial contact 57 in the socket of the bracket table. A supply conductor B' extends upwardly from the contact 71 through the arm 67 to a time switch 72 of conventional internal construction, disposed in an enlargement 73 of the arm 67, in which it is permanently housed, as will be clear. The built-in time switch effects a compact bracket, simplifying the timing of exposures, eliminates the dangling wires heretofore associated with such X-ray units, and reduces the cost of the assembly; and at the same time provides the control mechanism in a position of convenience to the operator, in which he is shielded from the rays emanating from the head during exposures. Further it will be noted that the X-ray unit thus described provides a compact, portable structure, comprising simply the head, the yoke, and the relatively short bracket arm.

The X-ray tube is grounded to the bracket arm in which it is mounted, and grounded from the end of the bracket arm to the water pipe of the dental unit so that no harmful result may attach to either the operator, the patient, or the other electrical apparatus of the unit in the use of the X-ray unit. The X-ray unit, and the dental unit, combine to provide a self-contained and self grounded unit.

It will be appreciated that the X-ray unit

described is readily attached or detached by the insertion of the X-ray bracket arm into or removal from the socket 51. It is readily portable and can be removed from the bracket table whenever desired, and being relatively small and compact, it can be disposed in a convenient closet or other receptacle, as by its insertion into a modified socket affixed to a convenient point in the receptacle, (not shown), and thus be out of sight during the normal use of the dental unit, and yet readily accessible and insertable when desired.

In use, it will be understood that the X-ray unit is brought from its closet, (if it is desired to remove it from the bracket table during non-use, which is not essential); and inserted vertically in the socket 51, completing a circuit from the pedestal to the timing mechanism upon the engagement of the contacts, then through the two pivots on the X-ray bracket, and the two pivots on the bracket table arms, as well as the tilting pivot of the X-ray head, such minute adjustments of the head in a horizontal plane as may be required may quickly be made. The vertically adjustable chair in which the patient is disposed is used to effect vertical adjustments of the patient relative the X-ray head. Thus in a simple and economical form the invention utilizes in a large measure those facilities already available to an operator, and provides a compact, rigid and simple X-ray unit that can be attached and detached easily and quickly.

If desired the X-ray bracket arm may be modified by including a vertical adjustment of the X-ray head, to supplement the vertical adjustments of the chair.

It will be understood that the X-ray bracket, and the attaching means, such as the socket, may both be provided for attachment to dental units already in use.

I claim:

1. In a dental X-ray unit, an X-ray head; a pivotal support therefor including a housed timing mechanism; a contact mounted in the end of the support in electrical connection with the timing mechanism.

2. As a unit in a dental X-ray apparatus, an X-ray head; a hollow bracket arm upon which the head is pivotally mounted, the arm having an enlargement; a timing mechanism disposed in the enlargement of the arm; and conductors connected with the timing mechanism and housed in the hollow bracket arm.

3. In a dental X-ray apparatus, in combination; a support; a socket arranged for attachment to the support; contacts in the socket; an X-ray unit including a hollow bracket arm provided with cooperating contacts and removably insertable in the socket and rotatable therein.

4. In a dental X-ray apparatus, in combination; a horizontally adjustable support; a socket mounted thereon; an arm having a por-

tion removably seated in the socket; an X-ray head pivotally mounted on the arm and electrically grounded thereto; a conductor leading to the head terminating in a contact in the seat portion of said arm; cooperating contacts disposed in the socket; and conductors extending from the cooperating contacts into the adjustable support.

5. In a dental X-ray apparatus, in combination; a horizontally adjustable bracket table of a dental unit; a vertical socket mounted thereon; a hollow arm having a vertical portion removably engageable in said socket; the vertical portion housing a timing and control mechanism and a contact for a supply conductor thereto; the hollow arm supporting an X-ray head and housing a conductor between the timing mechanism and the head; contacts in the socket and conductors to the contacts leading into the bracket table to establish supply and ground connections between the dental unit and the X-ray head.

6. A dental X-ray unit, comprising a support including a horizontally movable element; electric conductors concealed in the support and movable element; a bracket arm mounted removably on the movable element and concealing a supplemental electric conductor; an X-ray head carried by the bracket in electrical connection with the supplemental conductor, the supplemental and one of said electric conductors being in contact upon mounting the bracket arm on the movable element, the frame of said bracket arm forming a grounded return to the other of said electric conductors, and all of the wiring of the X-ray unit being substantially concealed during its use.

7. In a dental X-ray apparatus, in combination; a dental unit including a pedestal, an electrically grounded water pipe, and a bracket table pivotally mounted on the pedestal; an X-ray unit auxiliary apparatus for the unit housed in the pedestal; conductors extending into the pedestal from such auxiliary apparatus therein and through the bracket table; a socket element mounted on the table; the X-ray unit including a head containing a tube mounted in said element; a conductor extending from the bracket table to the X-ray head; and a ground connection from the X-ray head inside of the pedestal grounded on said water pipe, with the whole so arranged that the electrical connectors are substantially concealed in any use of the dental unit.

8. A dental X-ray unit, comprising a support including a horizontally movable element, an electric ground conductor extending into the support, electric conductors housed in the support and the movable element one of which is in electrical connection with said grounded conductor; a bracket arm removably mounted on the movable element; an

X-ray head carried by the bracket arm and electrically grounded thereto; and a supplemental electrical conductor housed by the bracket arm in electrical connection with the X-ray head, the supplemental electrical conductor and one of second mentioned conductors being in contact, and the electrically grounded bracket arm being in contact with the electrical ground conductor through the other of said second mentioned electrical conductors upon mounting the bracket arm on the movable element, all of said wires being substantially concealed during the use of the X-ray head.

In testimony whereof, I affix my signature.

PERCY RUSSELL.