To all whom it may concern:

Be it known that I, William H. Thwaites, a citizen of the United States of America, residing at Grand Rapids, in the county of Kent and State of Michigan, have invented certain new and useful Improvements in X-Ray Apparatus for Dental Use; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to an appliance especially adapted for use by dentists in taking X-ray photographs of teeth of patients, though, of course, the invention is not limited to the one use. It is an object and purpose, primarily, of the invention to provide an installation of X-ray apparatus such that complete protection against the rays is had while, at the same time, the apparatus may be readily adjusted to different positions for different persons and the whole installed and assembled substantially as a single unit, whereby the taking of X-ray photographs is greatly facilitated and at the same time rendered harmless to all who have to do therewith. To these ends, as well as others not particularly stated, I have constructed the device embodying my invention which is shown in the accompanying drawings and in which:

Figure 1 is a front elevation thereof.

Fig. 2 is a plan view.

Fig. 3 is a side elevation, with parts broken away and shown in section to better disclose the interior mechanism.

Fig. 4 is a vertical section substantially on the line 4—4 of Fig. 5, and

Fig. 5 is a rear elevation.

Like reference characters refer to like parts throughout the several views of the drawings.

In the construction a cabinet or the like is provided having a front wall 1, sides 2, a top 3 and a base 4 below which, if desired, a drawer 4 ½ may be placed. The back of the cabinet may be closed if desired and it is contemplated that the sides 2 and the back shall be lined with a protective material such as lead, as indicated at 5.

A pair of vertical parallel and spaced apart guides 6 are secured on the back of the front wall 1 between which a slide 7 is located, which is vertically movable between the guides, the slide carrying rollers 8 which engage with suitable tracks 9 secured on the inner sides of said guides. Ropes or cables 10 lead from the slide over pulleys 11 suspended from the top 3, weights 12 being secured at the ends of said cables to counterbalance the weight of the slide and the mechanism carried thereon. A vertical slot 13 is made in the front wall 1 of the cabinet through which projects a funnel like member 14 formed of thick heavy glass and which is secured on the front face of the slide 7. Directly back of the member 14 is a Crooke’s tube 15 of usual and ordinary construction, the extensions 16 thereof passing through supports 17 which project rearwardly from the slide 7 thus serving to mount the tube in such manner that it may be turned when desired about a horizontal axis. An opening is made through the slide 7 so as to permit the passage of the rays through this opening out through the member 14. A guard 18 of lead surrounds the enlarged central part of the tube 15 guarding against the passage of the rays except those which may pass rearwardly and also laterally through the slots in the sides of the guard where parts 16 of the tube are entered into the supports 17. These rays, however, are taken care of by the protective linings 5 heretofore described.

The wires 19 connecting with the tube lead upwardly to tension rollers 20 which are connected with the main circuit wires 21. As the slide is raised and lowered the wires 19 are fed from and taken up by the rollers.

The mechanism for producing the high tension current including the rectifying disk 22, transformer 23, motor 24 and the like are of well known and conventional construction being located in the lower part of the cabinet and properly connected with the tube for the production of the rays. Likewise wires 25 lead from the supports 100 for rollers 20 to an apparatus indicated as a whole at 26 mounted on the top 3 and which, connecting with the rearwardly extending portion 27 of the tube 15, to shunt a part of the current for use in changing the degree of vacuum within the tube. However all of this apparatus is old and well known and need not be present invention be entered into in detail other than to show its positioning and assembly in the present invention.

With a construction as described, the
patient may be placed directly in front of the member 14 which, as it moves up and down with the slide 7, may be adjusted to any desired height best suited to the patient.

This adjustment may be effected by merely grasping the forward portion of the member 14 and raising or lowering the slide to the desired position, the counter weights 12 balancing the same such that it will stay in any position to which it is adjusted. The wires 10 at all times are taken up and a complete protection against harmful effects of the rays is had by the operator. This is very essential in conjunction with X-ray apparatus, especially in the office of dentists, where the same is used many times a day. Unless complete protection is had, the operator who continually uses the mechanism is liable to very severe and dangerous burns from the rays as is well understood. This construction is not only a complete insurance against danger but at the same time it is especially convenient in actual use. The only rays that pass through the cabinet are those which come through the member 14. This member is adjustable and the photograph to be taken may be taken with the patient standing up and without the necessity as heretofore of placing the patient in an awkward position and manipulating several different adjustments of several different sections of the apparatus in order to secure the photograph desired. Also by reason of my invention there is an additional advantage obtained, namely, the saving of time in taking the photograph which with my invention by actual practice has been reduced very greatly. Furthermore a complete incasement of the high tension current wires which must extend to the X-ray tube is provided insuring against the injury of any one, especially to those ignorant of the danger of such wires, such as children or the like. All of these advantages together with the relative simplicity and economy make it of great practical value and merit.

I claim:

1. In combination, a cabinet having a front wall provided with a vertical slot therein, a slide mounted for vertical movements back of said front wall, said slide having an opening therethrough, a member having a passage therethrough communicating with the opening in the slide secured to and in front of the slide and projecting through said slot, a Crooke's tube mounted on and back of the slide directly back of the opening therethrough and, means inclosed by the cabinet and connected with the tube for producing an electrical discharge through the tube with the resultant production of X-rays which are directed through said opening in the slide and member carried thereby, substantially as described.

2. A construction as claimed in claim 1 combined with means for counterbalancing the weight of the slide and parts carried thereby, and a protective cover of suitable material attached to the slide substantially covering the tube except at the front, substantially as described.

3. A construction as claimed in claim 1 combined with circuit wires leading to the opposite ends of the tubes, and means mounted on the cabinet for taking up or feeding out said wires as the slide and attached tube are raised and lowered, substantially as described.

4. In combination, a cabinet having a top and a front wall provided with a vertical slot therein, vertical uprights secured at the back of said front wall, one at each side of the slot, a track on each of the adjacent faces of the uprights, a slide having an opening therethrough disposed between the uprights, rollers on the slide engaging with the tracks, pulleys attached to the top of the cabinet, cables attached to the slide and leading over the pulleys, weights attached to the ends of said cables, means for producing X-rays mounted on and back of the slide directly back of the opening therein, a cover of ray intercepting material attached to the back of the slide to house the X-ray means, and a funnel-like member of ray intercepting material secured to the slide in front of the opening therein having a central passage for passing the rays through the member.

5. In combination, a cabinet having a front wall provided with a vertical slot therein, a slide provided with an opening therethrough mounted for vertical movements back of the front wall, spaced apart bearing supports projecting rearwardly from the rear side of the slide, a Crooke's tube including an enlarged central section and oppositely extending cylindrical extensions thereto located back of the slide, said extensions being rotatably carried by the bearing supports and the central section being located directly back of the opening on the slide, a ray intercepting cover secured to the slide and substantially enclosing the central portion of the tube, a funnel-like member of ray intercepting material attached to the front of the slide in front of the opening and extending through the slot in the front wall of the cabinet, and means to counterbalance the weight of the slide and attached parts, substantially as described.

In testimony whereof I affix my signature.

WILLIAM H. THWAITES.