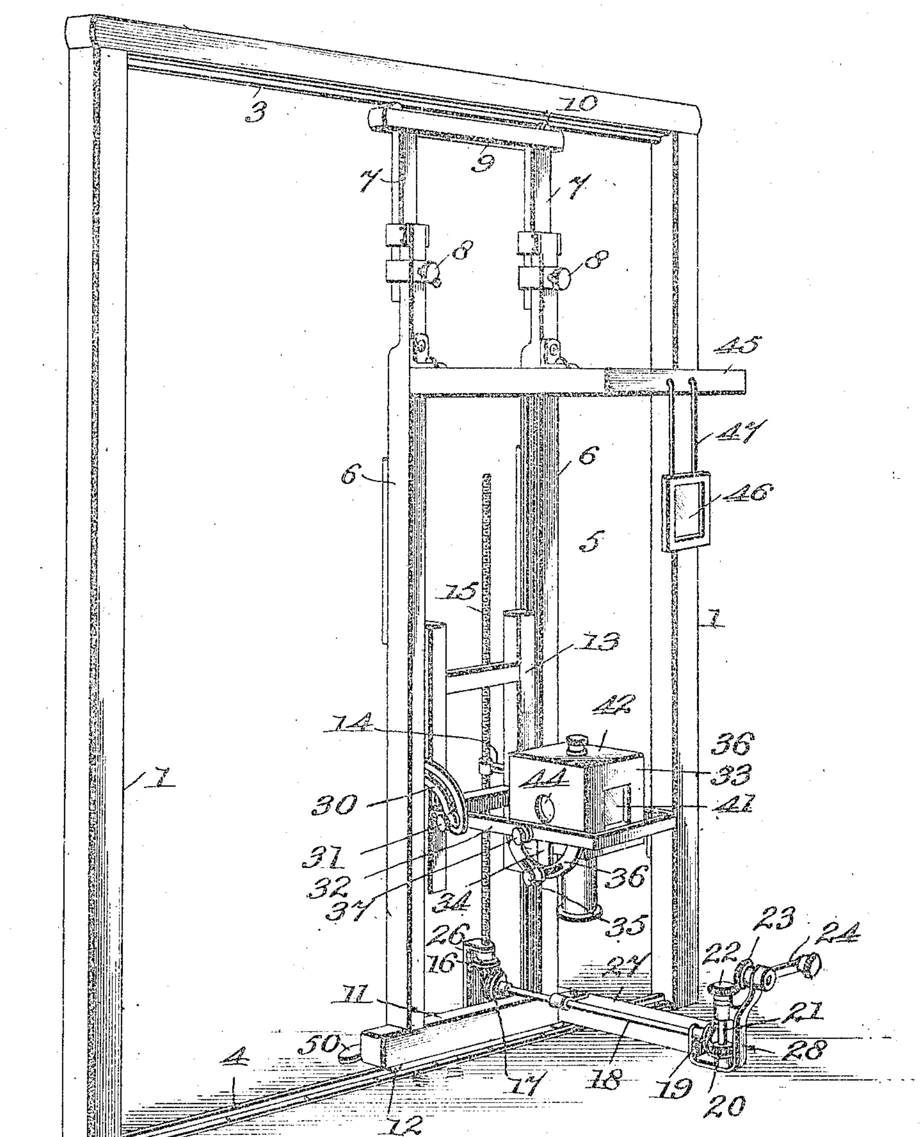
A. GRANGER.
X-RAY APPARATUS.
APPLICATION FILED FEB. 13, 1909.

961,607.

Patented June 14, 1910.

3 SHEETS—SHEET 1.

Fig. 1.



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3 SHEETS—SHEET 2.

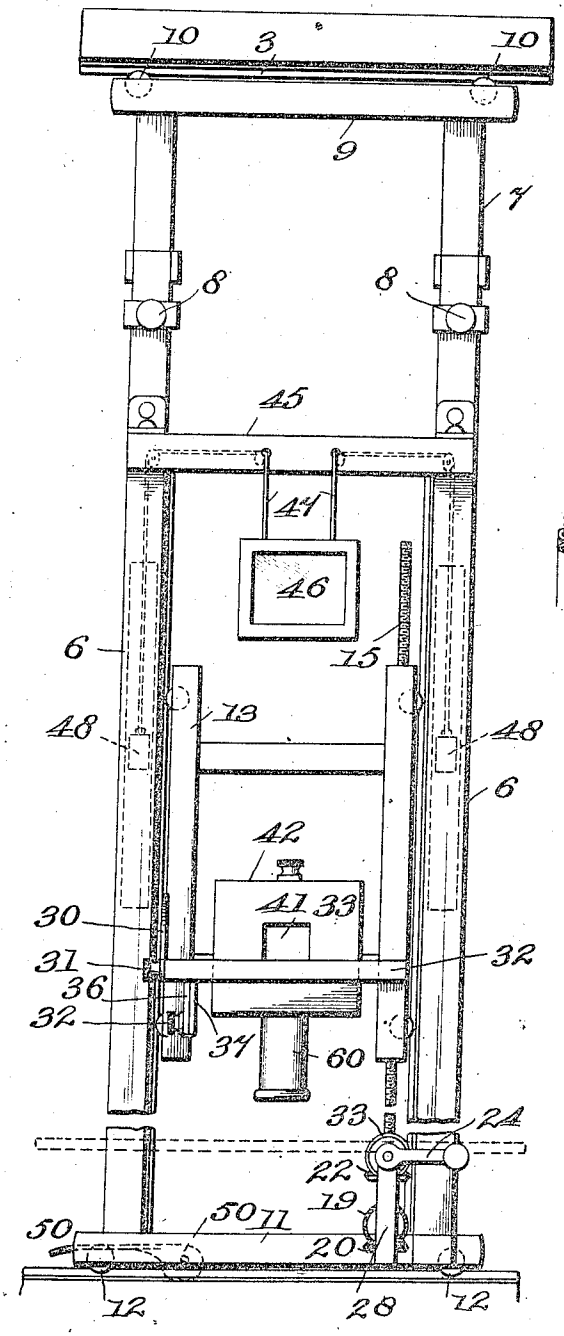


Fig. 2.

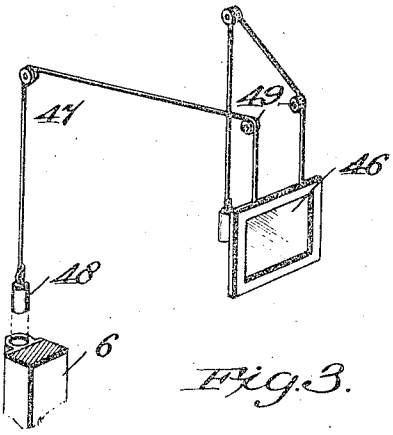
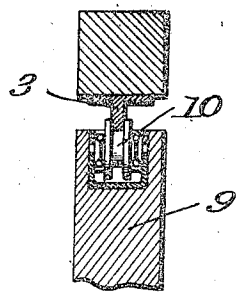


Fig. 3.

Fig. 4.



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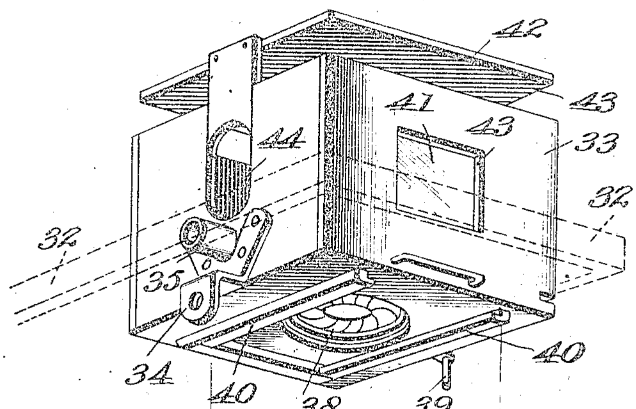
3 SHEETS—SHEET 3.

Fig. 5.



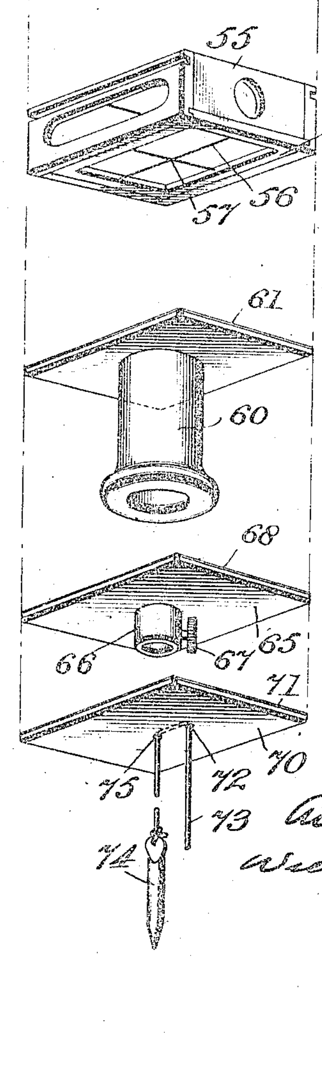


Fig. 6.

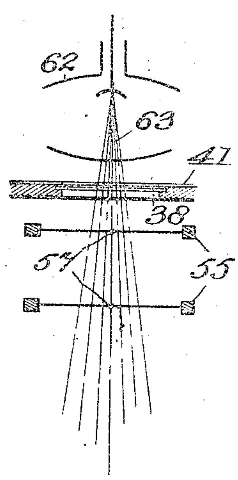
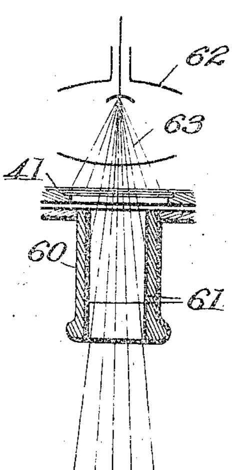


Fig. 7.



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UNITED STATES PATENT OFFICE.

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X-RAY APPARATUS.

961,607. Specification of Letters Patent. Patented June 14, 1910.

Application filed February 13, 1909. Serial No. 477,689.

To all whom it may concern:

Be it known that I, AMÉDÉE GRANGER, a citizen of the United States, residing at New Orleans, in the parish of Orleans and State of Louisiana, have invented certain new and useful Improvements in X-Ray Apparatus; 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.

My invention relates to X-ray apparatus, and has for its object the production of an improved frame supporting said apparatus which is capable of being slid along and moved in front of the patient, and when not in use can be pushed to one side.

A further object of the invention is to provide such a frame that will not necessitate the patient to be moved, and which will enable a fluorescent screen to be moved over him for the purpose of making examinations of different parts of the body.

With these and other objects in view the invention consists in the novel details of construction and combinations of parts more fully hereinafter described and particularly pointed out in the claims.

Referring to the accompanying drawings forming a part of this specification in which like numerals refer to like parts in all the views—Figure 1 is a perspective view of the improved apparatus which may be either supported from the floor or from a table; Fig. 2 is an elevational view of the X-ray frame-holding parts proper; Figs. 3 and 4 are detailed views of different portions of the apparatus. Fig. 5 is a perspective view of the X-ray tube-holding box and its attachments, and Figs. 6 and 7 are sectional diagrammatic views showing the operation of certain of the attachments.

1 indicates the uprights of a main frame, preferably rectangular in shape, provided with the upper track 3 and lower track 4 on which the sliding frame 5 moves.

The main frame is preferably supported upon an operating table, but, of course, may be supported from the floor or other suitable surface.

The sliding frame is provided with the uprights 6, which, at their upper ends have the sliding extensions 7 secured to the uprights 6 by the clamps 8 and which are provided at their upper ends by the cross piece 9. The cross piece 9 is suitably provided with the rollers or other anti-friction devices 10 engaging the upper track 3 of the main frame as illustrated. The lower ends of the uprights 6 carry the cross piece 11, which is likewise suitably provided with rollers or other anti-friction devices 11 which engage the lower track 4 of the main frame. Within the uprights 6 is slidingly fitted a suitable frame 13 to which is attached the bracket 14, accommodating the screw 15, carrying at its lower end the bevel pinion 16, engaging a similar pinion 17 on the horizontal shaft 18, which at its outer end carries the pinion 19 engaging a similar pinion 20 on the shaft 21, carrying at its upper end the pinion 22 engaging the pinion 23, which is operated by the hand lever 24.

The lower end of the screw 15 is supported by the bracket 26 carried by the cross piece 11, and the shaft 18 is suitably supported from an angular extending piece 27 carrying at its outer end a bracket 28, which supports the gears or pinions 19, 20, 22 and 23. The sliding frame 13 also carries the slotted bracket 30 in which fits the thumb screw 31 attached to the rectangular frame 32, the inner end of which is secured to said sliding frame 13, as shown.

In the frame 32 fits the lead-lined box 33 which carries the X-ray tube. The bracket 34, sector 35 and thumb screw 36 afford an angular adjusting means for said box, which has its pivot on the trunnion 37. Said box is provided with an iris diaphragm 38 preferably of lead controlled by the lever 39, inside of which are the slide pieces 40, as best seen in Fig. 5. Said box is also provided with the lead glass window 41, the removable cover 42 and the openings 44 to accommodate the supports for the X-ray tube. 43 represents the lead lining of the box 33.

The X-ray tube is preferably mounted on a screw-controlled carriage inside the box, not shown, so that the same may be adjusted longitudinally as well as transversely of its axis.

The uprights 6 carry the projecting pieces 45 which support the fluorescent screen 46 by means of the cords or other attachments 47, to the ends of which are secured the weights 48, as best seen in Figs. 2 and 3. The cords 47 preferably pass inside the pieces 45, and are conveniently accommodated behind the uprights 6. 49 represents pulleys over which the said cords pass.

50 represents a suitable cam lever attached

to the cross piece 11 and which serves to jam the sliding frame 5 between its tracks 3 and 4, and thereby to secure the X-ray tube and its co-acting parts in any position to which the frame 5 might have been adjusted. It is often very desirable to find the central rays emitted from the cathode, and to this end I have provided the box-like frame 55 provided with a double set of cross wires 56 having their centers 57 separated several inches apart, and so disposed that when the said frame 55 is fitted between the slide pieces 40 of the box, the said centers 57 will come opposite the center of the opening in the iris diaphragm, as diagrammatically indicated in Fig. 6. By this arrangement, when the centers 57 of the cross wires cast substantially a single shadow, it is known that the central rays pass through said centers, and therefore the operator knows with certainty just what portion of the pencil of rays emitted by the cathode he is using.

The frame 58 carrying the outer center 57 is slidably removable from the box-like frame 55 as shown, and, therefore, when only a single cross wire is desired, said frame may be taken away, and only the single wires 56 employed. It is also sometimes desirable to cut off all of the rays except those emerging from a particular portion of the pencil emitted from the cathode, and to this end I have provided what I term a compression cylinder 60, which is provided with a lead lining 61, and which slidingly fits the pieces 40 on the box 33 so as to come opposite the center of the iris diaphragm as diagrammatically indicated in Fig. 7. With this attachment, if the center of the tube 60 is opposite the center of the cathode, the central rays will be utilized, as indicated, but if the X-ray tube 62 is adjusted by any suitable means, then any other portion of the pencil 63 may be emitted through said compression cylinder 60. This compression cylinder is found to be exceedingly useful in sciagraphic work, and by its means the secondary rays may be entirely eliminated, and when necessary a very firm compression of the pencil, so to speak, may be secured.

It often happens that, in treating diseased surfaces of various sizes, the patient becomes burned at points other than those intended to be treated, and therefore it is desirable to provide a shield holder to confine the rays to the exact spots intended to be acted upon. To these ends I have provided the plates 65 having a tubular attachment 66 provided with the clamp screw 67 and the lead lining 68. This plate 65 adjustably fits the channel pieces 40, and the tubular projection 66 readily accommodates lead glass shields which need not be more than two inches in length, and a half inch to two inches in diameter at the free end. It is also often desirable to provide some means for centering the X-ray tube over a given point of the patient, of the photographic plate, or over the fluorescent screen. To these ends I have provided the centering plate 70 having the lead lining 71, and the two perforations 72 and 75 through which passes the cord 73 to which is attached the weight 74. The plate 70 likewise fits the channel pieces 40, and the plumb weight 74 is adapted to reach down to any given point over the patient, photographic plate or fluorescent screen. The orifice 75, through which the weight end of the cord passes, being exactly opposite the center of the iris diaphragm, the weight 74 will naturally locate the exact center desired, and therefore the path of the central rays emitted from the X-ray tube.

The operation of the device will be clear from the foregoing, but may be briefly summarized as follows:—When it is desired to use the X-rays, the uprights 6—6 are adjusted along the tracks 3 and 4 until the box 33 comes about opposite the point on which it is desired to focus the X-rays. The frame 32, which may be normally folded up out of the way by means of the bracket 30 and thumb screw 31, is let down into the horizontal position shown in Fig. 1, and the X-ray tube is adjusted until it is thought that it is in about the right position for use. To determine the exact position the fluorescent screen 46 may be pulled down and placed opposite the iris diaphragm, when, if the rays are turned on, the approximate position will be indicated. In order to get the proper focus the hand lever 24 may be operated so as to adjust the box 33, and with it the X-ray tube up and down, until the proper focus is attained. In case the angle of the rays is not just right, the box may be angularly adjusted on its trunnion 35 until the rays reach the right spot.

After the center of the iris diaphragm is in line with the center of the spot to be operated upon, then the center of the pencil of rays emitted from the cathode may be determined by placing the box-like frame 55 in the channel pieces 40 and noting when the centers 57 make substantially a single shadow. If they do not make a single shadow the X-ray tube itself is then adjusted in the box 33 until substantially a single shadow is observed. Or if it is not desired to get the exact center, the approximate center, either of the central portion of the rays or of any other portion, may be attained by removing the slide 58 of the box-like frame 55 and using only a single center 57.

If only a portion of the central rays are desired to be used, or in other words if the said rays are desired to be compressed, so to speak, then the compression tube 60 is employed. When treating diseased surfaces of

varying sizes, and it is desired to confine the rays only to small portions or particular parts of said surfaces, then the shield plate 65 is used. When it is desired to locate the exact center of the diaphragm over a particular point of the patient, before the rays are turned on, then the centering plate 70 is employed. In all cases the fluorescent screen may be brought in front of the iris diaphragm and used, or if desired the box may be unclamped from the screw 35 and swung on its axis through 90° and the fluorescent screen 46 used in the usual way, with the rays projected in a horizontal direction.

Of course I do not wish to be limited to the exact details of construction and arrangements of parts above disclosed, except as may be rendered necessary by the claims, for it is evident that my device may be varied by those skilled in the art without departing from the spirit of my invention.

What I claim is:—

1. In an X-ray apparatus, the combination of a main frame; a second frame adjustable with relation to said main frame; a third frame adjustable with relation to said second frame; a screw for adjusting said third frame; a crank for operating the screw; an X-ray tube supported by said third frame; and means by which the supports of said tube may be folded up out of the way, when not in use, substantially as described.

2. In an X-ray apparatus, the combination of a main frame; a second frame slidingly adjustable with relation to said main frame; a third frame slidingly adjustable with relation to said second frame; an X-ray tube supported by said third frame; and means comprising a slotted bracket by which the supports of said tube may be folded up out of the way, when not in use, substantially as described.

3. In an X-ray apparatus, the combination of a main frame provided with upper and lower tracks; a second frame slidingly supported on said tracks; means for locking said second frame in position; a third frame slidable in said second frame; means for adjusting said third frame; a box adapted to contain an X-ray tube; and means for supporting said box from said third frame, substantially as described.

4. In an X-ray apparatus, the combination of a main frame provided with upper and lower tracks; a second frame slidingly supported on said tracks; means comprising a cam lever for locking said second frame in position; a third frame slidable in said second frame; means comprising a screw for adjusting said third frame; a box adapted to contain an X-ray tube; and means comprising a bracket and clamp for supporting said box from said third frame, substantially as described.

5. In an X-ray apparatus, the combination of an adjustable frame; means for locking the same in position; means for supporting a screen therefrom; a sliding frame fitted to said adjustable frame; a screw for adjusting said sliding frame; a lever and connections for operating the screw; a support pivotally secured to said sliding frame; a box adapted to hold an X-ray tube carried by the support; and means for angularly adjusting said box, substantially as described.

6. In an X-ray apparatus, the combination of an adjustable frame; means for locking the same in position; means for supporting a screen therefrom; extensions 7 carried by said frame; clamps for securing said extensions in place; a sliding frame fitted to said adjustable frame; a screw for adjusting said sliding frame; a lever and connections comprising gears for operating the screw; a support pivotally secured to said sliding frame; a box adapted to hold an X-ray tube carried by the support; and means for angularly adjusting said box, substantially as described.

7. In an X-ray apparatus, the combination of a main frame provided with tracks; a sliding frame provided with rollers running on said tracks; a clamping lever to hold said sliding frame in place; a third frame slidingly fitted to said sliding frame; a screw for adjusting said third frame; an extension 27 rigid with said third frame; a shaft carried by said extension; gear connections between said shaft and said screw; a bracket carried by said extension; gears supported by said bracket and connected with said shaft; a handle lever connected with said last mentioned gears; a pivoted support on said third frame; a box on said support adapted to accommodate an X-ray tube; and means for angularly adjusting said box with relation to said support, substantially as described.

In testimony whereof, I affix my signature, in presence of two witnesses.

AMÉDÉE GRANGER.

Witnesses:

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F. D. CHARBONNET, Jr.