

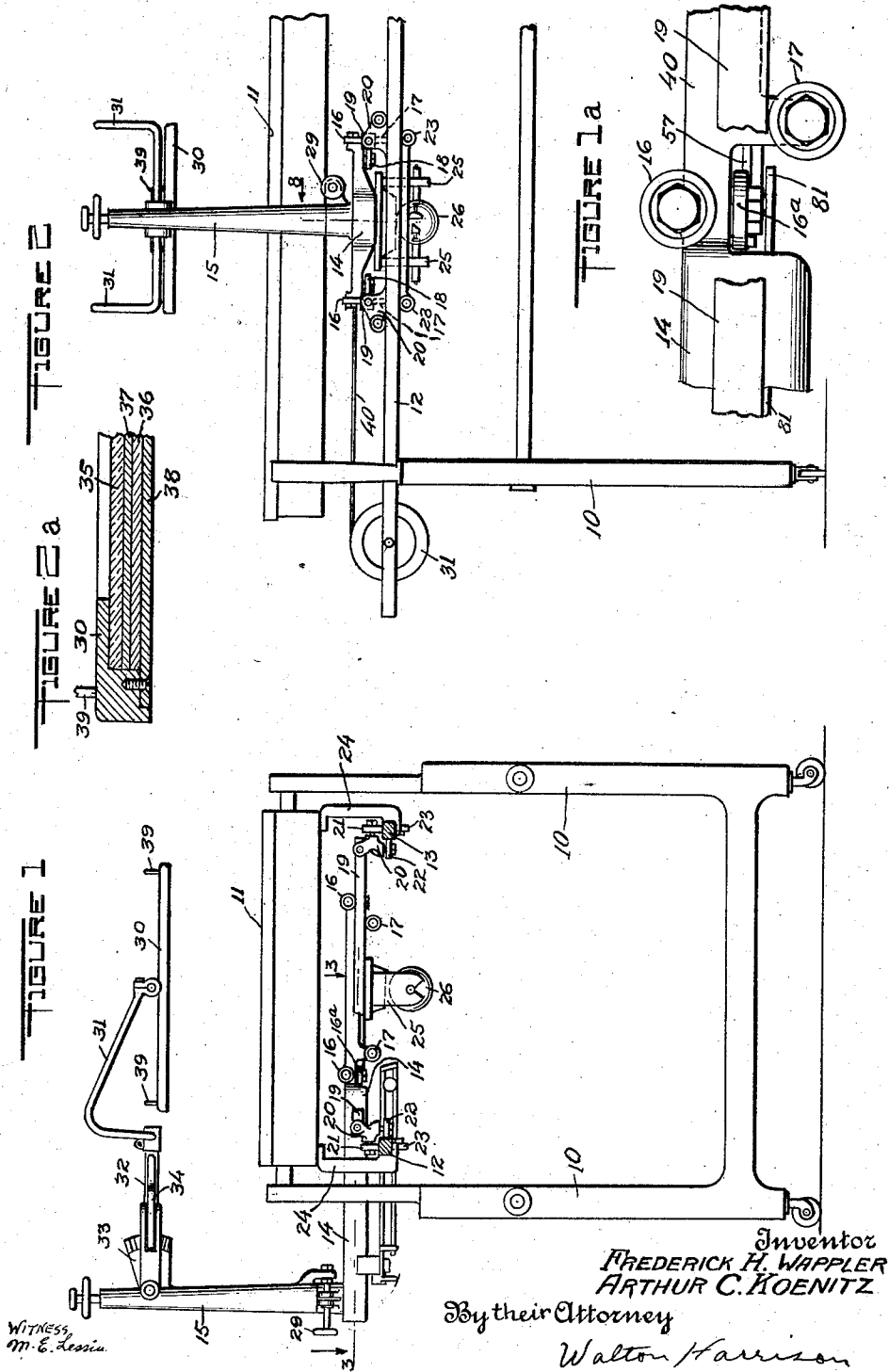
April 5, 1927.

F. H. WAPPLER ET AL
ATTACHMENT FOR X-RAY TABLES

1,623,567

Filed Aug. 31, 1922

3 Sheets-Sheet 1



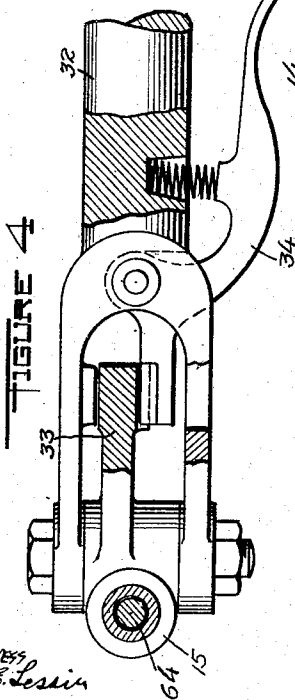
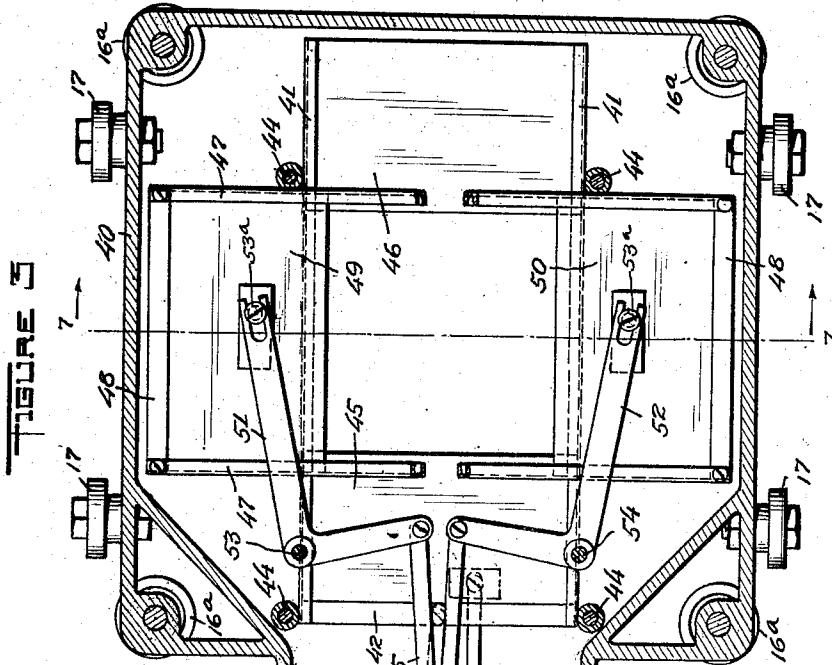
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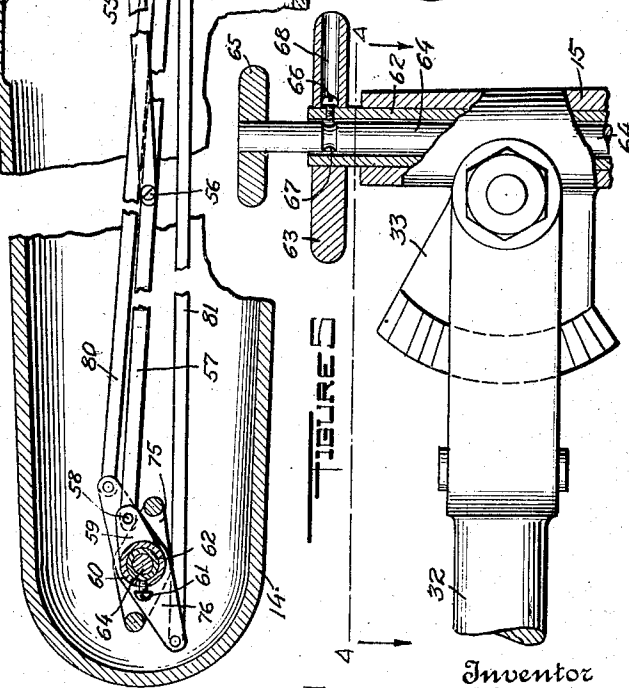
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Filed Aug. 31, 1922

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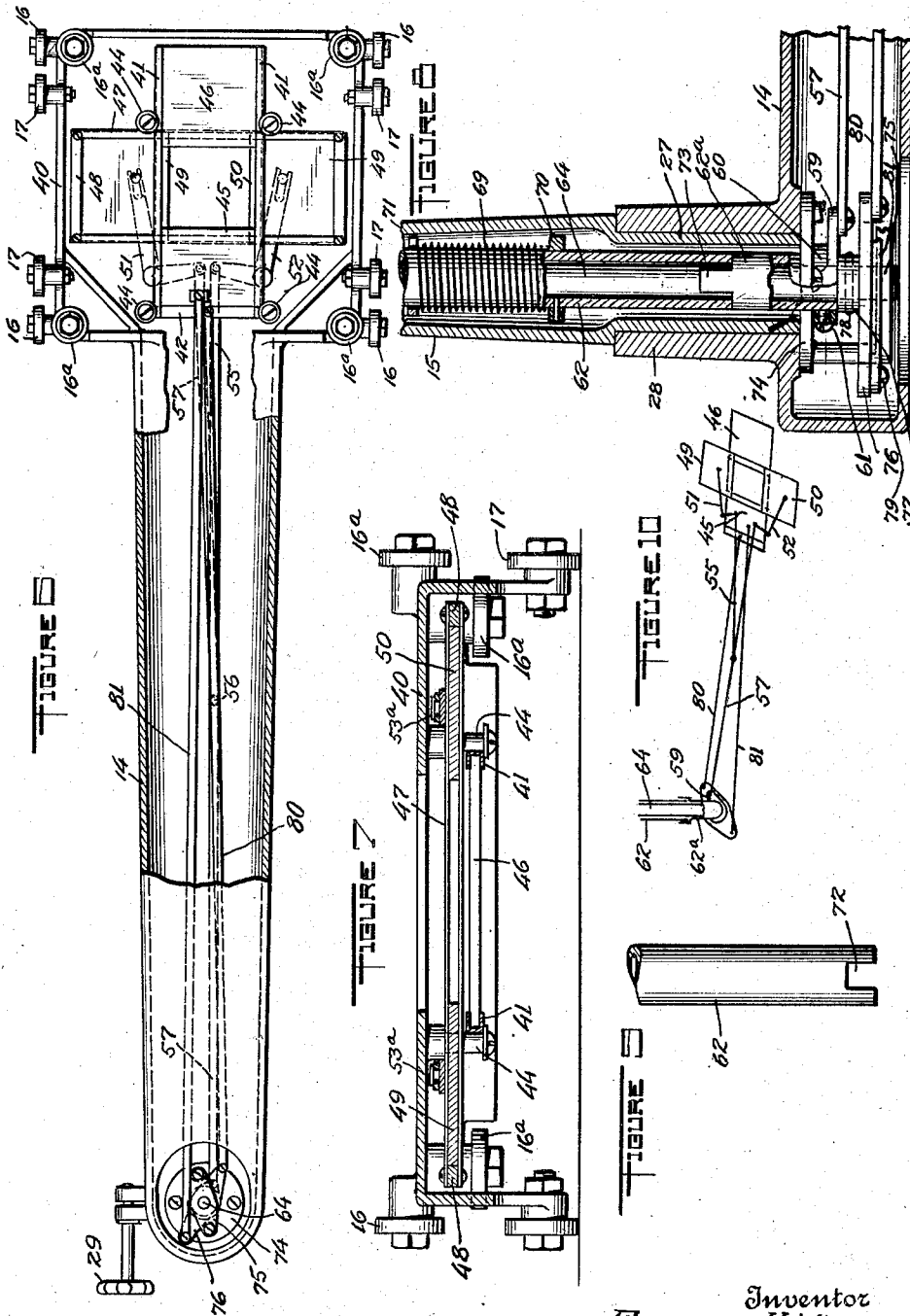
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE.

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ATTACHMENT FOR X-RAY TABLES.

Application filed August 31, 1922. Serial No. 585,467.

Our invention relates to appliances for X-ray tables, our more particular purpose to bring together certain distinct parts and incorporate the same in a unitary structure so arranged that as a whole they may be treated as a combinational attachment for X-ray tables or equivalent devices.

More particularly stated, we seek to incorporate an X-ray tube holder, shutter mechanism for limiting and screening the X-rays, and a support for holding a fluorescent screen, so that all of these parts are as a unit movable relatively to the X-ray table, and yet so that each of the parts is accessible for purposes of inspection, removal, adjustment, etc.

Reference is made to the accompanying drawings forming a part of this specification, in which like reference characters indicate like parts throughout the several figures.

Figure 1 is an end elevation of an end table provided with my device, certain parts being shown in section.

Figure 1^a is a fragmentary end elevation showing certain parts appearing in Figure 1, but upon a larger scale.

Figure 2 is a fragmentary side elevation of the mechanism shown in Figure 1.

Figure 2^a is a fragmentary section showing the plate holder or mounting for supporting the fluorescent screen.

Figure 3 is a section on the line 3—3 of Figure 1 looking in the direction indicated by the arrows, and showing the shutter mechanism and a portion of the means for controlling the same.

Figure 4 shows a portion of the adjusting mechanism of the plate holder, and is a section on the line 4—4 of Figure 5, looking in a direction indicated by the arrows.

Figure 5 is a fragmentary side elevation of the mechanism shown in Figure 4.

Figure 6 is an inverted plan or bottom view of the mechanism shown in Figure 3, certain parts being broken away.

Figure 7 is a section on the line 7—7 of Figure 3, looking in the direction indicated by the arrows.

Figure 8 is a section on the line 8—8 of Figure 1, looking in the direction indicated by the arrows.

Figure 9 is a detail, and shows in elevation a portion of the tubular shaft used for actuating a pair of the shutters.

Figure 10 is a diagram of the shutter mechanism and its immediate connections.

The X-ray table appears at 10, and is of the usual or any preferred construction. It carries a fixed or tiltable flat top 11, adapted for supporting the body of a patient, or any article to be subjected to the action of X-rays. The table 11 may be either a horizontal X-ray table or a vertical fluoroscopic apparatus known in this art as the equivalent of a table.

The table is provided with a pair of lengthy rails 12 and 13 made of metal, preferably steel, and disposed parallel with each other so as to extend in the general direction of the length of the table.

A casing is shown at 14, and carries a number of working parts, as hereinafter described.

Mounted upon the casing 14 and extending upwardly therefrom is a hollow post 15, having preferably as shown a frusto-conical form. This post is for the purpose of supporting a number of parts and housing certain mechanism as hereinafter described.

The casing is provided with rollers 16, 17 and 18, and these rollers engage a pair of cross rails 19 supported upon small trucks 20, these trucks being provided with rollers 21, 22 and 23, which engage the lengthy rails 12 and 13 above mentioned. The casing 14 and the trucks 20 together constitute a carriage which as a whole is movable lengthwise of the rails 12 and 13. The mounting of the rollers 16 and 17 is so arranged as to permit the casing being moved crosswise of the table. The rails 12 and 13 are supported by hangers 24, which depend from the upper portion of the table. A tube holder appears at 25, and is used for supporting an X-ray tube 26.

By this arrangement the X-ray tube holder and tube can readily be shifted back and forth in two directions crossing each other.

For convenience in mounting the post 15, I provide it with a cylindrical portion 27 of reduced diameter, as indicated in Figure 8, this portion 27 being fitted into a clamping

collar 28, with which the casing 14 is provided.

The clamping collar 28 is provided with a handle 29, as shown in Figure 1, whereby it may be actuated so as to cause it to grip or release the portion 27 of the post. By this arrangement the post 15 may be removed and replaced relatively to the casing 4.

The fluorescent screen holder 30 is journaled upon a yoke 31, this yoke being mounted upon and supported by an arm 32, and the arm being journaled upon the post 15. A sector 33 is supported by the post 15. A thumb lever 34, carried by the arm 32, is used for holding this arm in different angular positions relatively to the sector, so as to support the screen holder 30 in different positions.

The screen holder 30 has the form of a shallow box, as may be understood from Figure 2^a. It carries a glass plate 35, a fluorescent screen 36, a cardboard member 37 and a facing 38 of bakelite or other appropriate material of low density. The screen holder 30 is provided with handles 39, and is preferably made of aluminum. As the screen holder is raised or lowered by adjustment of the arm 32, the screen holder 30 may be tilted or brought to a level by adjusting it slightly in relation to the yoke 31.

A cord 40, shown more particularly in Figure 2, engages a pulley 31 and may be used for shifting the casing in one direction.

A pair of channel bars 41 are disposed parallel with each other, as indicated in Figures 3 and 7. A channel bar 42 extends across from one of the channel bars 41 to the other, so that the three channel bars together form a frame. This frame is supported upon pintles 44, as indicated more particularly in Figure 7. The pair of channel bars 41 serve as a slideway, and mounted within this slideway are a pair of shutters 45 and 46, movable toward and from each other.

Resting crosswise upon the channel bars 41 and secured thereto are a pair of channel bars 47. A pair of cross bars 48 each extend from one of the channel bars 47 to the other, so as to form therewith a substantially rectangular frame. Slidably mounted within this frame are a pair of shutters 49 and 50, movable toward and from each other and located in the same plane. Thus the shutters 45 and 46 are crossed by the shutters 49 and 50, as may be understood from Figure 3. The shutters 49 and 50 are movable toward and from each other in a direction coinciding with the length of the table, and the shutters 45 and 46 are similarly movable toward and from each other, but in a direction coinciding with the width of the table.

For the purpose of operating the shutters 49 and 50, I use a pair of bell crank levers 51 and 52, mounted upon stub shafts 53 and 54 and connected with the sides mentioned by pins 53^a, as indicated in Figure 3. Pivottally connected with the bell crank 51 is an actuating rod 55. This rod is by means of a pivot pin 56 connected with another actuating rod 57, the latter being pivottally connected with the bell crank 52. The actuating rod 57 is by means of a pivot pin 58 connected with an arm 59, carried by a set collar 60 secured by a set screw 61 upon a short sleeve 62^a, coupled to and practically forming a continuation of the shaft 62, as hereinafter more completely described. The rocking shaft 62 extends upwardly through the post 15 and out of the top thereof, and carries a hand wheel 63. This hand wheel is for the purpose of enabling the operator to rock the shaft 62, thereby causing the shutters 49 and 50 to be moved toward and from each other as above described.

Extending through the tubular shaft 62, an thus located within the post 15, is another shaft 64, having the form of a solid cylindrical rod. The upper end of this shaft extends above the top of the tubular shaft 62, and carries a hand wheel 65. A set screw 66, carried by the hand wheel 63, extends through the wall of the tubular shaft 62, and into an annular groove 67 with which the shaft 64 is provided. The purpose of the screw 66 is to normally prevent axial movements of the shafts 62 and 64 relatively to each other.

The hand wheel 63 is provided with an opening 68 (shown more particularly in Figure 5), through which a screw driver may be inserted so as to engage the screw 66. The operator by turning the screw 66 can retract it from the groove 67, and this done the tubular shaft 62 may be moved upwardly in relation to the shaft 64.

Encircling the tubular shaft 62 is a helical spring 69, shown more particularly in Figure 8. One end of this spring is secured to a set collar 70, carried by the tubular shaft 62, and the opposite end is by means of a ring 71 secured to the inner surface of the post 15. By turning the tubular shaft 62 the spring 69 may be placed under tension, or if already under tension its tension may be increased, as may be understood from Figure 8.

The lower end of the tubular shaft 62 is provided with a slot 72, as indicated in Figure 9, and the upper end of the short sleeve 62^a is provided with a tongue 73 for fitting into the slot 72. Thus the lower end of the shaft 62 and the upper end of the short sleeve 62^a are so formed as to constitute a coupling for holding them together, and when they are thus held together they con-

stitute a single shaft of tubular form, by the rocking of which the shutters 49 and 50 are actuated as above described.

A plate 74 is mounted rigidly in position within the casing 14 and located at the bottom of the collar 28, as indicated more particularly in Figure 8. The plate 74 is provided with a downwardly extending stirrup-like portion 75, provided with a hole into which the shaft 64 is journaled at its lower end.

Mounted rigidly upon the lower end of the shaft 64 is a double-ended crank arm 76, carrying a collar 77, and a pin 78 extends diametrically through this collar and the shaft 64. The double-ended crank arm 76 is by means of bolts 79 connected with a pair of actuating rods 80 and 81, connected respectively with the two shutters 45 and 46 above mentioned.

The operation of our device may be readily understood from the foregoing description.

The working parts being assembled and arranged, and a fluorescent screen and parts immediately associated therewith being placed within the screen holder 30 as above described in connection with Figure 2^a, the mechanism is ready for use.

The object to be subjected to the action of the X-rays is rested upon the table 11, and the carriage, including the casing 14 and the X-ray tube 26 as above described, is moved into suitable position, so that the screen holder 30 is directly opposite the X-ray tube; and the object to be subjected to the X-rays is therefore between the X-ray tube and the fluorescent screen.

The slides 45, 46, 49 and 50 being actuated in the manner above set forth, and the X-ray tube being energized in the manner well known in this art, the required exposure or examination is made, and the fluorescent screen or plate affected accordingly.

While this description is of a table, it is to be understood that our device can be used equally well in connection with a vertical apparatus such as may be used for fluoroscopy or radiography, and which is known in this art generally as the equivalent of a table.

In our claims we use the word "table", therefore, in a broad sense, meaning thereby any support for the body or article to be subjected to the action of X-rays, and of which the X-ray table here shown is merely typical.

We do not limit ourselves to the precise mechanism shown, as variations may be made therein without departing from our invention the scope of which is commensurate with our claims.

We claim:—

1. The combination, with an X-ray table,

of a carriage supported by said table and movable relative thereto, said carriage being provided with a casing having an extending portion, an X-ray tube holder supported upon said carriage and movable therewith relatively to said X-ray table, shutter mechanism mounted within said casing and movable bodily therewith relatively to said X-ray table, connections extending from said shutter mechanism into the extending portion of said casing, a hollow post mounted upon said extending portion, mechanism mounted within said post and engaging said connections for the purpose of enabling the operator to actuate the connections and thereby operate said shutter mechanism, and a fluorescent screen holder supported by said post and extending out over said table, to enable said fluorescent screen holder to be shifted in position relatively to said table by bodily movements of said carriage.

2. The combination, with an X-ray table and a carriage movable relatively thereto, of an X-ray tube support mounted upon said carriage and movable therewith, shutter mechanism mounted upon said carriage for the purpose of controlling the distribution of X-rays, frame mechanism mounted upon said carriage and extending therefrom, mechanism connected with said shutter mechanism and supported by said frame mechanism for the purpose of enabling the operator to actuate said shutter mechanism, a fluorescent screen holder supported by said frame mechanism and movable bodily with said carriage relatively to said X-ray table; and mechanism controllable by the operator for adjusting said fluorescent screen holder relatively to said X-ray table.

3. The combination, with an X-ray table and a carriage movable relatively thereto, of an X-ray tube support mounted upon said carriage and movable therewith, shutter mechanism mounted upon said carriage and movable bodily with said carriage, frame mechanism supported by said carriage and extending therefrom, controlling mechanism carried by said frame mechanism and connected with said shutter mechanism for enabling the operator to control said shutter mechanism, supporting members carried by said frame mechanism and extending therefrom into proximity to a portion of said table, and a fluorescent screen holder mounted upon said frame members and supported thereby in proximity to said portion of said table, the fluorescent screen holder being movable bodily with the carriage, relatively to the said table.

4. The combination, with an X-ray table, of a carriage carried by said table and movable relatively thereto in a plurality of directions crossing each other, an X-ray tube holder mounted upon said carriage, shutter mechanism mounted upon said carriage, sup-

porting mechanism carried by said carriage and extending partially around said table, and a fluorescent screen holder mounted upon said supporting mechanism and there-
5 by supported in such position that a portion of said X-ray table is between the fluorescent screen and the tube holder.

5. The combination, with an X-ray table and a carriage connected with said table and
10 movable relatively thereto, of a casing supported by said carriage and provided with an extending portion, a hollow post mounted upon said extending portion, shutter mecha-

nism mounted within said casing, connections secured to said shutter mechanism and
15 extending through said hollow post for enabling the operator to actuate the shutter mechanism, an arm secured upon the outside of said post and thus mounted upon said
20 post, means for locking said arm in different angular positions relatively to said table, and a holder supported upon said arm for the purpose of holding a sensitive member upon which an X-ray image is to be formed.

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