E. W. KELLY.

X-RAY OPERATING TABLE.

APPLICATION FILED JULY 27, 1910.

1,015,187.

Patented Jan. 16, 1912.

4 SHEETS—SHEET 1.

FIG. 2.

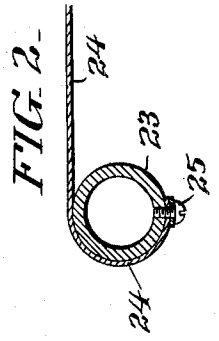

FIG. 1.

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4 SHEETS—SHEET 2.

FIG. 3.

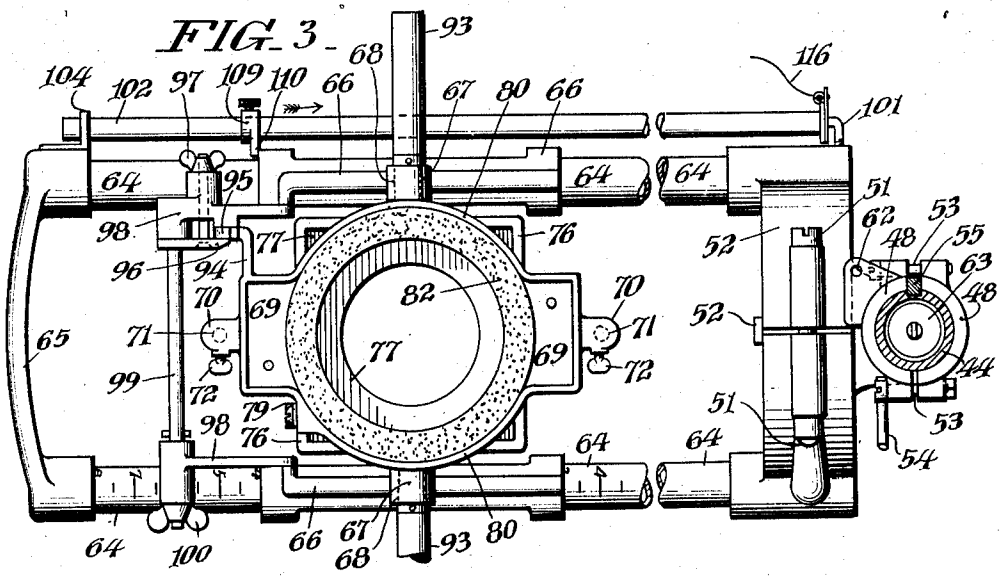


FIG. 4.

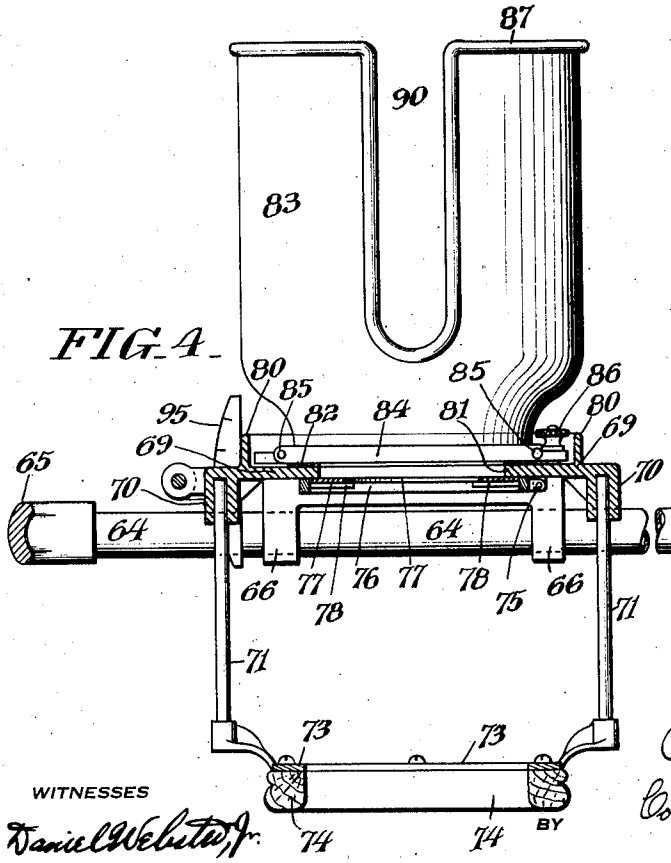
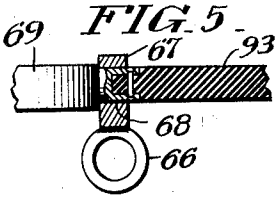
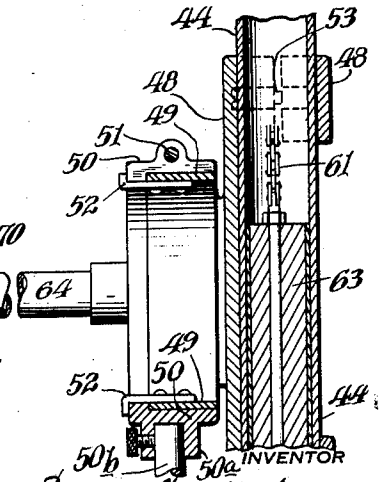


FIG. 5.





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4 SHEETS—SHEET 3.

FIG. 7.

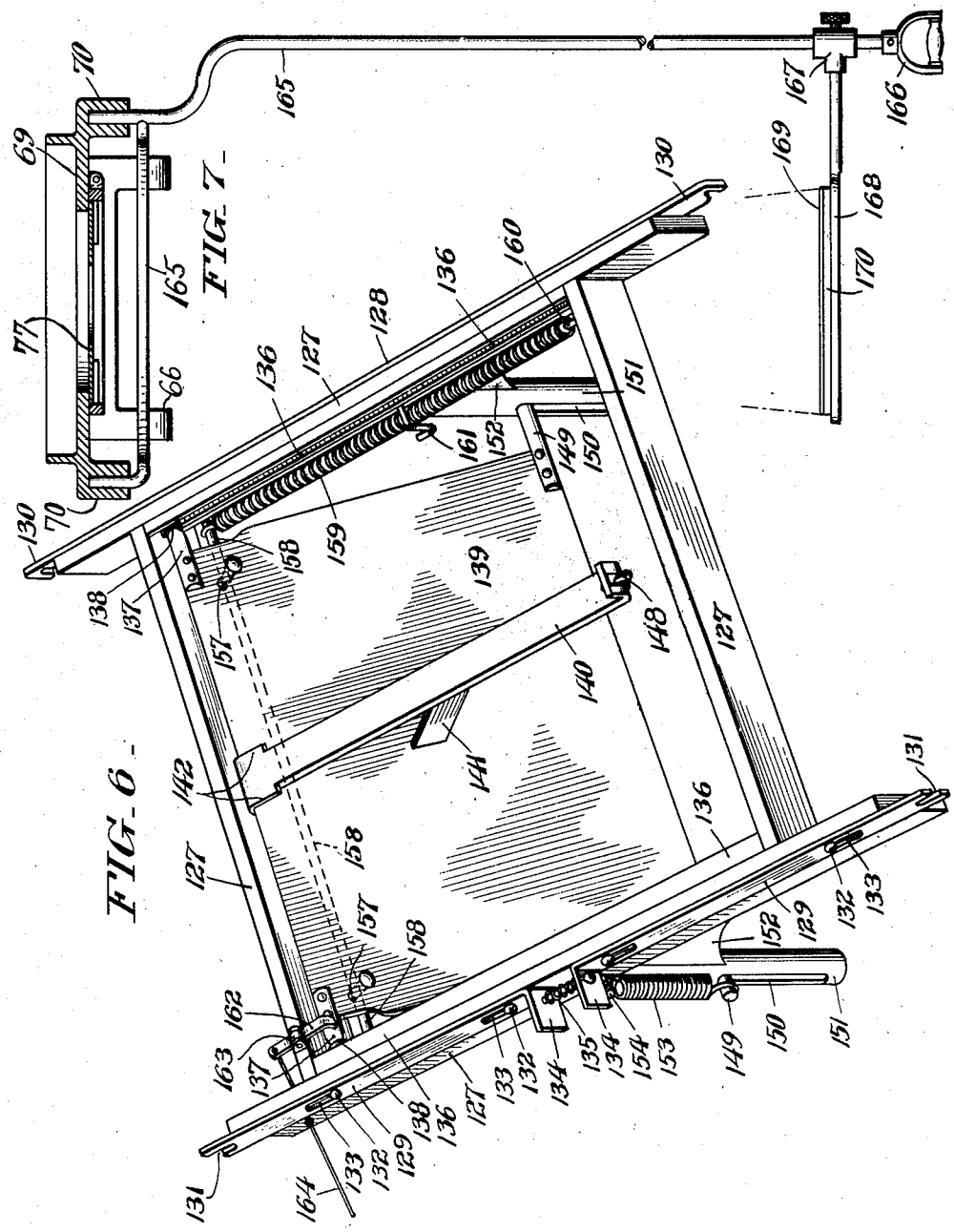

FIG. 6.

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4 SHEETS—SHEET 4.

FIG. 8.

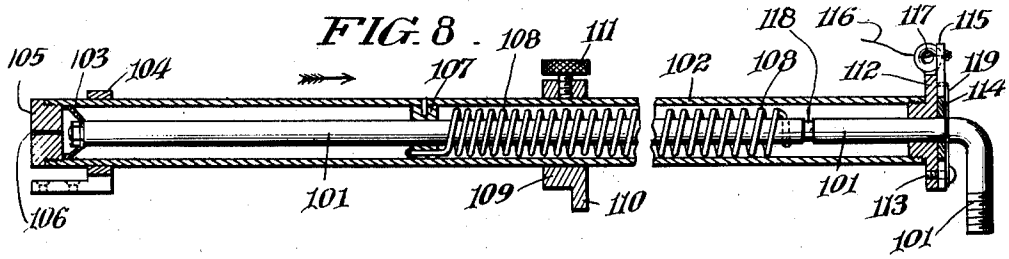
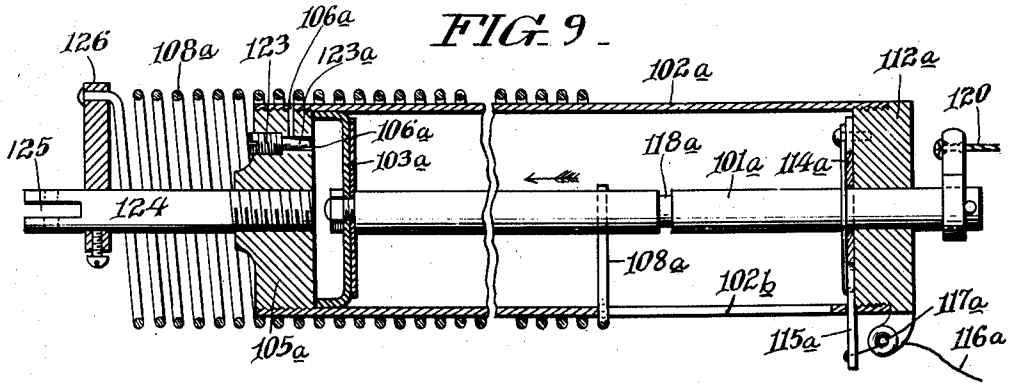


FIG. 9.



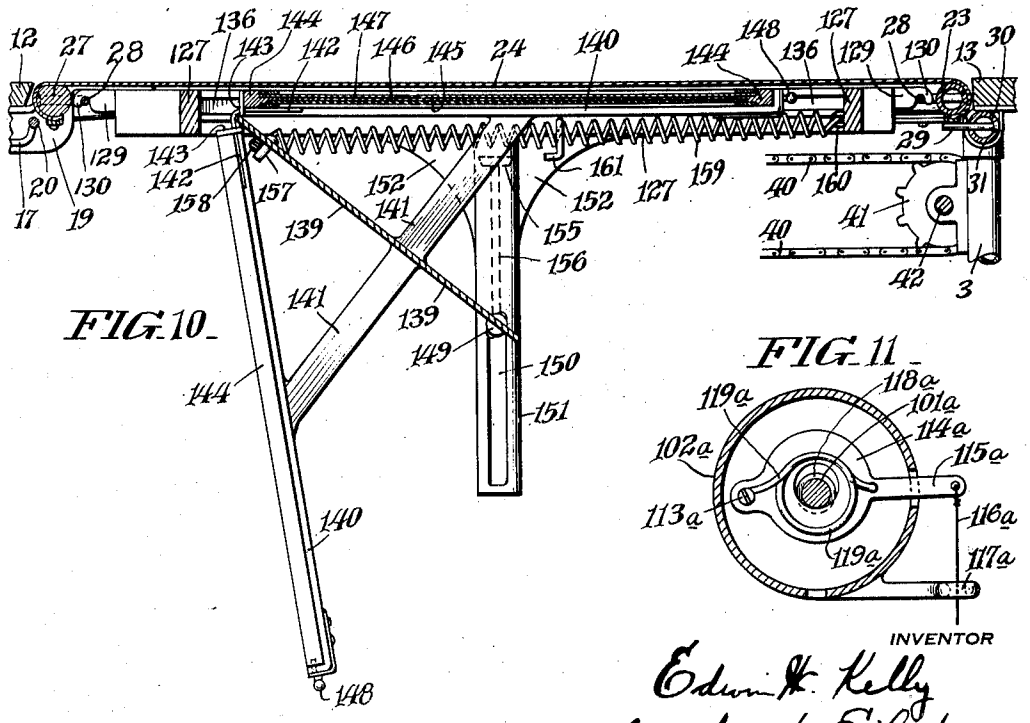


FIG. 10.

FIG. 11.

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X-RAY OPERATING-TABLE.

1,015,187. Specification of Letters Patent. Patented Jan. 16, 1912.

Application filed July 27, 1910. Serial No. 574,045.

To all whom it may concern:

Be it known that I, EDWIN W. KELLY, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new and useful X-Ray Operating-Table, of which the following is a specification.

My invention relates to X-ray apparatus, and particularly to apparatus which may be styled a "table" for use in the examination of patients under X-rays, or the like.

My invention resides in a table, such as above referred to, which is equipped with means for supporting a source of radiations in any suitable or desired position, such table and its equipment being preferably portable or movable as a whole.

My invention resides in the apparatus hereinafter described.

For an illustration of one of the forms my invention may take, reference is to be had to the accompanying drawings, in which:

Figure 1 is a perspective view of the table and its equipment. Fig. 2 is a fragmentary view, in section, illustrating construction of a part of the table. Fig. 3 is a plan view, some parts in section, illustrating the X-ray tube supporting apparatus. Fig. 4 is a side elevational view of the same, some parts in section. Fig. 5 is a detail view, partly in section, showing the mounting of a member for supporting the X-ray tube. Fig. 6 is a perspective view of plate shifting mechanism. Fig. 7 is a view, partly in section, of means for mounting a fluoroscopic screen in fixed relation with an X-ray tube. Fig. 8 is a longitudinal sectional view through means for shifting the X-ray tube upon its supporting apparatus. Fig. 9 is a longitudinal sectional view through means for shifting the tube supporting apparatus. Fig. 10 is a side elevational view, some parts in section, of plate shifting means shown in Fig. 6, together with parts of the table. Fig. 11 is a plan view, partly in section, showing a latch or trigger for shifting means such as shown in Figs. 8 and 9.

Referring to Fig. 1, there is illustrated my table with its equipment which, as a unit or as a whole, may be moved about as desired, the table proper and its equipment being supported as an entirety upon the same framework.

The main frame comprises the upper and lower members 1 and 2, which, with the other parts of the frame, are preferably made of metal tubing connected by the vertical tubular members 3 and 4. Extending toward the front from the main frame 1, 2, 3, 4, are the end frames consisting of the front vertical tubular members 5 and 6 and the lower horizontal tubular members 7 and 8, similar tubular members joining the tops of members 5 and 6 with the vertical members 3 and 4.

Upon the lower ends of the verticals 3, 4, 5 and 6 are provided casters 9 upon which the apparatus as an entirety may be moved about, as upon a floor.

It will be noted that there are no members at the front of the apparatus joining or tying the end frame portions, thus constituting an open frame within which a patient may be stood or seated, or otherwise placed, without necessity for the patient stepping over or around any part, the frame being rigid and self-sustaining without any such front tying or connecting members. And it is characteristic that to provide such open frame no part in front need be swung out or moved away, for the purposes above mentioned.

The table proper comprises the table member 10 and the additional leaves 11, 12 and 13. The main table member 10 is pivoted at 14 upon brackets 15, one at the front and one at the rear, supported upon the end frame members 4 and 5. A notched segment member 16 is fixed to the main frame and in the different notches is adapted to engage the rod 17 passing loosely through the lugs 18 upon the member 19 secured to the main table member 10. The upper end of the rod 17 is connected to the horizontally extending rod 20 having at its front end a handle 21 by which the rod 17 may be lifted out of any of the notches in opposition to spring 22.

The main table member 10 is here illustrated as constructed of a frame formed by the tubes 23, the front and rear tubes 23 being secured in sockets 26 upon the member

27 hinged upon the pivot 14, a sheet of aluminum 24, or other suitable means transparent to the X-rays or other radiations employed, being stretched upon the tubular frame 23, the edges of the sheet 24 being wrapped around the tubular members 23, as illustrated in Fig. 2, and secured thereto by screws 25.

At the top and bottom of the frame 10, as viewed in Fig. 1, are secured the rods 28 for supporting plate shifting apparatus hereinafter described.

By inserting the rod 17 in the different notches of the member 16, the main table member 10 may be held in any position between the vertical and horizontal, and when in horizontal position the sheet 24 of the table member 10 forms a substantially continuous surface with the leaf 12, and with the leaf 13 when the latter is in horizontal position.

When the main table member 10 is in horizontal position, the upper end thereof, as seen in Fig. 1, rests upon pins 29, (see Fig. 10), supported by the horizontal tubular frame member 30 extending between the verticals 3 and 6.

The leaf 13 is pivoted to the member 30 by the hinges 31, and the leaf 13 may be let down to vertical position or may be adjusted to any intervening position by the notched members 32 pivoted thereon and actuated by the handle 33 to cause any of the notches to engage pins 34 upon the verticals 3 and 6. And, similarly, the leaf 11 is pivoted so as to be moved from the vertical position, shown in Fig. 1, to a horizontal position, the notched members 35 controlled by a handle 36 being adapted to engage pins 37 upon the verticals 4 and 5.

The vertical rigid member 38, preferably of metal tubing, is provided with a socket member 39 between its upper and lower halves, the socket member 39 embracing the main frame tube 1 so that the member 38 and the parts carried thereby may be moved on tube 1 longitudinally of the table. To effect this longitudinal adjustment, a cord or chain 40 is provided and has its ends connected to the member 38, and passes over two pulleys or sprocket wheels, such as 41, Fig. 10, one supported by the vertical frame member 3 and the other by the vertical frame member 4. The right-hand sprocket wheel 41 is secured upon a shaft 42 extending to the front of the table, where it has secured thereto a crank 43, upon turning which the chain 40 is moved in the one direction or the other to adjust the member 38 longitudinally upon the member 1.

A tubular member 44 is rigidly supported at both of its ends upon the vertical member 38 in the bearings 45 in which the member 44 is rotatable about a vertical axis. To clamp the member 44 against rotation, a screw 46 is provided which clamps the upper bearing 45 snugly upon the member 44. At its lower end the member 44 is steadied against the frame tube 2 by a roller or caster 47 secured upon the lower bearing 45. A shoe carried upon the lower end of the member 38 bears against the rear side of the tube 2, so that the members 38 and 44 are incapable of any rotary movement about the upper frame tube 1. Slidable vertically upon the member 44 is a tube supporting apparatus, such as shown in Figs. 3 and 4. The tube supporting apparatus comprises a member 48 embracing and slidable vertically upon the member 44. Attached to the member 48 or integral therewith, is a ring 49 upon which bears a split ring 50 which may be adjusted to different degrees of snugness of fit on the ring 49 by the screw 51, Figs. 3 and 4. Several ears 52 are secured upon the inside of the ring 49 and engage the edge of ring 50 to prevent the same from becoming displaced from ring 49. The member 48 is in two parts, see Fig. 3, both engaging the member 44, the parts being held together by the screws 53, at the top and bottom of the member 48. To prevent the member 48 from adjustment vertically upon the member 44, that is, to lock the member 48 in desired position upon member 44, one of the screws 53 may be tightened by handle 54 for clamping the member 48 tightly against the member 44. There is cut in the external surface of the member 44 a vertically extending key-way adapted to receive the key 55 engaging in the member 48, the key 55, in consequence, preventing rotation of the member 48 upon member 44 in all positions of vertical adjustment of member 48 upon member 44. Upon the upper bearing 45, see Fig. 1, is mounted a sprocket wheel 56 secured upon the horizontal shaft 57 upon which is secured also the gear wheel 58 with which meshes a pinion, not shown, secured upon the shaft 59 to which is secured the handle crank 60. And upon the lower bearing member 45 is pivoted the sprocket wheel 56^a. A chain 61 is connected at its one end to the member 48 at 62, Fig. 3, and passes over the sprocket wheel 56 down into the bore of the member 44 within which is a counter-weight 63, see Figs. 3 and 4, to the upper end of which the chain 61 is attached. To the lower end of the counter-weight 63 is attached one end of the chain 61^a, which passes over the sprocket 56^a and is attached at its other end to the member 48. By turning the crank 60 the member 48 and attached parts may, therefore, be adjusted to any position vertically upon the member 44, the counter-weight serving to hold the parts stationary in any position, and member 44 may rotate in bearings 45 to swing the tube apparatus from above the table.

The ring 50 is movable circumferentially upon the ring 49 attached to the member 48, so that the parts supported by the member 50 may be rotated to any part of an entire circumference about a horizontal axis.

Attached to the ring 50 are the horizontally extending bars or tubes 64 connected at their outer ends by a member 65, which is used also for a handle for rotating the parts upon the ring 49. Slidable longitudinally upon the members 64 are the members 66 carrying the transverse bearings 67 in which bear cylindrical projections 68 upon a member 69 carrying lugs 70 in which engage the rods 71, held by set screws 72; upon the lower ends of the rods 71 is supported a ring or other open member 73 to which is secured a ring or other open member 74 of wood or other suitable material, preferably non-metallic. The ring 74 is adapted to be compressed against the body of the patient.

Upon the under side of the member 69 there is pivoted at 75 a holder 76 for diaphragms of different apertures, and opaque to X-rays, a diaphragm 77 being shown in position in Figs. 3 and 4, resting upon the corner webs 78 upon the diaphragm holder 76. The diaphragm holder is held in the position shown by a clip 79 secured to the member 69.

Upon the other side of the member 69, within its flange 80, and concentric with the opening 81 in said member 69, is a felt or other soft or yielding washer 82 upon which rests the lower edge or flange of the shield 83, which may be of lead glass or other suitable material to cause absorption of all the rays from the X-ray tube except those projected in desired direction. The shield 83 is clamped in position against the washer 82 by two clamp members 84 secured together at 85, the clamp members 84 adapted to surround the shield 83 and the members 84 secured to member 69 by thumb nuts 86. The shield 83 is open at its end 87 to receive an X-ray tube 88, Fig. 1, having target 89. The shield 83 has opposed slot openings 90 to receive the glass tubular projections 91 upon the X-ray tube, which are held by clamps 92 supported upon the members 93, of fiber or other insulating material, secured, as shown in Fig. 5, upon the cylindrical bearing projections 68 upon the member 69.

The member 69 and the shield 83 and X-ray tube 88 supported thereby, together with the other parts supported thereby or secured thereto, are swingable about the axis of the bearings 68. On a projection 94 upon the member 69, Fig. 3, is carried a graduated segment 95 with which coöperates a pointer 96 for indicating the degree of inclination of the member 69 and attached parts. The member 69 may be clamped in any of its angularly adjusted positions by the thumb screw 97 which draws the pointer member 96 snugly against the side of the member 95, the pointer 96 being stationary with respect to the sliding members 66. Projections 98 upon the sliding members 66 serve to receive the clamping bolt 99 which may be drawn up by the thumb nut 100 to draw the sliding members 66 toward each other, and thereby tightly grip the members 64, whereby the member 69 and attached parts are clamped in any position of adjustment longitudinally of the members 64.

To the ring 50, Fig. 3, is secured a rod 101 which extends parallel with the members 64, within a tube 102, Fig. 8. At its front end the rod 101 carries a leather or other piston 103 fitting snugly within the tube 102, the latter movable freely through the guide 104 secured upon the member 65, Fig. 3. The left end of the tube 102, Figs. 3 and 8, is closed by a member 105 having a small perforation 106 communicating with the interior of the tube and serving to retard the exit of air from the tube 102 to one side of the piston 103. The rod 101 passes freely through a block 107 secured to and within the tube 102, and to the block 107 is connected one end of a spiral spring 108, whose other end is secured to the rod 101. Upon the outside of the tube 102 is a block 109 having lug 110 adapted to engage one of the sliding members 66. The block 109 may be adjusted to different positions on the tube 102 and there secured by thumb nut 111.

At the right-hand end of tube 102, Fig. 8, is a block 112, screw threaded into the tube 102, and provided with an aperture surrounding the rod 101. Pivoted at 113 upon the block 112 is a latch plate 114 having an extension 115 to which is attached a cord 116 passing through the eyelet 117. The rod 101 has a circumferential groove at 118 in which the latch plate 114 is adapted to engage, the latch plate 114 having an aperture allowing the free passage therethrough of the rod 101. A spring 119 is connected at its one end to the latch plate 114 and at its other end to the block 112, the spring urging the latch plate 114 to enter the groove 118. This construction will be better understood by reference to Fig. 11, where a similar latch is applied to the apparatus shown in Fig. 9.

With the clamping bolt 99 loosened, so that the members 66 may slide freely upon the member 64, and with the lug 110 engaging against a member 66, with the spring 108 under tension and the latch 114 engaging in the groove 118, upon pulling the string 116 the latch plate 114 will be moved in opposition to spring 119, removing the latch 114 from the groove 118, whereupon the spring 108 will pull the tube 102 in the direction of the arrows, Figs. 3 and 8, thereby moving the members 66, and therefore the member 69 and attached parts, including the X-ray

tube, in the direction of the arrows, a distance of substantially 2⅝ inches, the average distance between the human eyes, whereby an exposure may be made with the tube, first in one position and then in the second position. The movement of the parts is accomplished without shock due to the slow escape of the air from passage 106, the parts coming to rest in the shifted position without jar. By this mechanism, the X-ray tube may be moved upon the members 64 for stereoscopic exposures. Practice may require, however, that the X-ray tube shall not only be moved transversely to the table by the means described in connection with Fig. 8, but that the tube shall also be movable a similar distance for stereoscopic exposures in a longitudinal direction. This is accomplished by a similar mechanism shown in section in Fig. 9, and shown in Fig. 1 at the lower end of the member 44, whereby the member 38 and all attached parts, including the X-ray tube, will be moved longitudinally of the member 1 a desired distance for stereoscopic exposures. In this case, a cord or chain 120, Figs. 1 and 9, has its one end permanently attached at 121 to the main frame, and extends parallel with the tubular member 1 and over a pulley 122 upon the member 39 and then extends vertically downward parallel to the member 44 and attaches to the rod 101^a, Fig. 9. The rod 101^a extends into the tube 102^a through a block 112^a screw threaded into the tube 102^a. At its free end the rod 101^a carries the leather or other piston 103^a fitting snugly within the tube 102^a. The other end of the tube 102^a is closed by the block 105^a having an air passage 106^a which may be adjusted by the screw 123 having the tapered point 123^a. In the block 105^a is secured the rod 124 which is secured at its end 125 to the lower bearing 45 for the member 44, Fig. 1. A member 126 is secured upon the rod 124 and to the member 126 is secured one end of the spiral spring 108^a, surrounding the tube 102^a, and whose other end extends through a longitudinal slot 102^b, in tube 102^a, and is secured to the rod 101^a within the tube 102^a. The rod 101^a has a circumferential groove 118^a in which is adapted to engage the latch plate 114^a, see Fig. 11, pivoted at 113^a to the block 112^a. The latch plate 114^a has a projection 115^a extending outwardly through an aperture in the tube 102^a, and there is secured thereto a cord 116^a extending through eyelet 117^a upon the block 112^a. A spring 119^a is secured at its one end to the block 112^a and at its other end to the latch plate 114^a, the spring urging the latch to enter the groove 118^a.

The operator puts the spring 108^a under tension by moving the member 38 toward the left, Fig. 1, upon the member 1, thus pulling the rod 101^a upwardly and bringing the groove 118^a to position to be entered by latch plate 114^a. In this position one exposure is taken. Then, upon pulling the string 116^a, the latch 114^a is lifted out of the groove 118^a, whereupon the spring 108^a is free to move the rod 101^a downwardly in Fig. 1, or to the left as viewed in Fig. 9, as indicated by the arrow. This, in effect, pulls downwardly upon the cord 120 which, being fastened at 121, moves the member 39 and, therefore, the member 8 and all attached parts including the X-ray tube, toward the right, Fig. 1, upon member 1, the desired distance, whereupon the second exposure for stereoscopic purposes is made.

As is shown in Fig. 1, there is to the left side of the table member 10 a plate shifting apparatus for holding two radiographic or X-ray plates for successive exposures, particularly for stereoscopic work. This apparatus may be secured on either side of the member 10 by attachments engaging the bars 28. When attached on the right-hand side of member 10, as viewed in Fig. 1, the exposures may be made with the patient sitting upon the leaf 12 with back against member 10, or may be made with the patient in reclining position with the member 10 closed down to make a flat table, the plate holding apparatus then being under the table. This plate shifting apparatus comprises the main frame 127 having secured upon two of its sides the strips 128 and 129, the former terminating in the hooks 130 adapted to engage the rods 28, see Fig. 10. The latter strips 129 have their ends slotted as at 121 which are also adapted to embrace the rods 28 and prevent the frame from separating therefrom. The strip 129 is divided into two parts slidable upon the side of the frame 127, the engagement being by screws 132 passing freely through the slots 133 in said members 129. Approximate the center of the frame the two parts 129 have outwardly turned ears 134 which may be gripped and forced toward each other in opposition to the spring 135, to withdraw the extreme ends of the members 129 to such position that upon release of the ears 134 the spring 135 will force the members 129 apart and cause the slots 131 to embrace the rods 28.

On the inner sides of two of the sides of the frame 127 are provided two parallel guides 136, in the form of channels, in which engage the pins 137 carrying rollers 138 which roll in the channels 136. The pins 137 are secured in alinement with each other at one edge of the plate or member 139, of steel or other material opaque to the X-rays or other radiations employed. This plate is secured substantially midway between the plate holder supports 140 to which it is braced by the struts 141, the plate holder supports 140 and the plate 139 being in fixed relation with respect to each other and mov-

ing as a unit. Where the supports 140 converge at one edge of the plate 139, they are provided with lateral extensions 142 over each of which slides a slotted member 143 carried by each of the plate holders 144, Fig. 10, the plate holders being omitted in Fig. 6 for the sake of clearness. As appears in section in Fig. 10, 145 is the one cover of the plate holder opaque to ordinary light, against which is shown the radiographic or X-ray plate 146 covered by a second cover 147 of aluminum or other material opaque to ordinary light but transparent to X-rays or other radiations employed.

At the outer ends of the plate holder supporters 140 are provided pins 148 which engage in the plate holders 144 to hold them in fixed relation to the supporters 140.

At the other edge of the plate or member 139 are provided the alined pins 149, which extend through slots 150 in the tubular posts 151 secured upon the main frame 127 and extending at right angles thereto and strengthened or supported by the webs 152. To each pin 149 is secured one end of a spiral tension spring 153 secured at its other end on a post 154 upon the main frame 127. Within each tube 150 is a plunger or piston 155 fitting snugly within said tube and secured upon a rod 156 pivoted at its outer end upon the pin 149. The movement of the pin 149 upwardly in the slot 150 is, therefore, retarded and the plate 139 and plate holders cushioned in their movement, suitable orifices being provided in the tubes 151 to allow escape of air at suitable rate for this purpose.

Approximate one edge of the plate 139 are supported pins 157 against which engages a transversely extending rod 158 lying against said pins and against said plate 139 but not secured thereto. At each end of the rod 158 engages a spiral tension spring 159 secured at its other end at 160 to the main frame 127. In the path of travel of the rod 158 are disposed hooks 161 secured in two sides of the frame 127.

In the position shown in Figs. 6 and 10, the springs 159 are under tension and the member 139 and the attached plate holder supporters 140 are held in that position by the latch 162 pivoted at 163 and engaging one of the pins 137, a string or rod 164 being attached to the latch 162 to lift the same to free the pin 137.

With loaded plate holders supported on the members 140, the parts are moved to the positions shown in Figs. 6 and 10, where the springs 159 are under tension and the parts held by the latch 162. In this position one of the plates is in position immediately back of the aluminum plate 24 ready to receive the exposure. After the exposure is made, and the X-ray tube shifted, as herein-before described, the operator pulls the string or rod 164 lifting the latch from the pin 137, whereupon the springs 159 contract and pull the rod 158 to the right, as viewed in Fig. 10, thereby causing the pins 149 to descend in the slots 150 in opposition to springs 153, the plate 139 and the holders 140 in the meantime rotating about said pins 149, and the pins 137 moving along in the channels 136. When the pins 149 have reached the lower limit of their travel, the springs 153 are under their maximum tension, and the pins 137 are directly in a vertical line with the pins 149, as viewed in Fig. 10. The further movement due to springs 159, carries the apparatus past this dead-center position, whereupon the springs 153 contract and cause the plungers 155 to again rise in the tubes 151 retarding the continued motion. The pins 137 continue to move to the right hand end of the channels 136 and the pins 149 continue to move to the tops of their slots 150. When the parts have reached this position, the other plate holder shown extending downwardly at the left of Fig. 10, has been brought into position immediately behind the aluminum plate 24 and the plate holder shown in section in Fig. 10 has been moved down to a similar position, but at the right. Then, the second exposure may be made. It will be noted that, as viewed in Fig. 10, the X-ray tube should be directly above the plate 24, and that the opaque member 139 shields the downwardly extending plate member at the left from the radiations. And, similarly, when this plate holder has been shifted to proper position to be exposed and the other plate holder has been removed to the position previously described, by the automatic action of the apparatus, the member 139 is in position to similarly shield the plate which has been first exposed.

The action of the apparatus just described is smooth without sudden jars or without jar at the limits of the movement.

In the travel of the rod 158 toward the right, as viewed in Fig. 10, it encounters the hooks 161 and remains in engagement with them and prevents further action by the springs 159. And the springs 153, due to the fact that the parts have now reached or passed slightly beyond dead-center position, carry the parts to their final position, the rod 158 being held by the hooks 161, while the plate 139 leaves the rod 158 and completes its movement.

As shown by Fig. 7, the rods 71, Fig. 4, may be removed from their socketed lugs 70, and there may be inserted therein projections from a member 165 provided at its outer end with a handle 166. Secured to and adjustable upon the member 165 is a member 167 carrying the member 168 upon which may be carried a fluorescent screen 169, which may be constituted of the fluo-

rescent material 169 mounted upon the lead glass 170 or upon any other transparent material which, however, absorbs the X-rays or other radiations employed. By this means the operator may look directly at the screen without any of the radiations penetrating to him, a diaphragm being employed to confine the radiations within the limits of the screen. The apparatus just described affords means for moving the X-ray tube and screen, always in fixed relation to each other, to different positions while the patient remains stationary, for exploring purposes. The operator, by grasping the handle 166, and with the clamps 97, 100, 51 and 46 loosened, may move the tube freely, and his screen is always maintained in fixed relation thereto.

By the construction herein shown the X-ray tube carried by the members 64 may be moved the entire length of member 44 and be disposed either above or below the table level. Indeed, the tube may be lowered to such position that the main table member 10 may be lowered to horizontal position with the tube completely below the same. And in view of the open frame construction heretofore referred to, the members 64 carrying the X-ray tube, may be thus lowered to position beneath the table without engaging or connecting any tying member.

When the tube is below the table member 10, the latter being then in horizontal position, the patient is above and upon the table 10 and the radiographic plate is held above the patient by an arm 50^b adapted to engage in lug 50^a upon ring 50, see Fig. 4. Or this arm 50^b may carry the plate shifting apparatus, such as shown in Fig. 6, for stereoscopic purposes.

It will be noted also that the main tubular member 1 and members 44 and 64 have engraved thereon suitable scales to assist the operator in setting and operating his apparatus.

The table herein described is intended to be of universal application; and to be capable of all the operations which heretofore have required separate and distinct pieces of apparatus.

The apparatus herein described is a unitary construction having, as aforementioned, all the adjustments and features making possible all the operations which heretofore have only been possible in different pieces of apparatus.

What I claim is:

1. The combination with a table, of an X-ray tube, a plurality of plate holders secured together, a pivotal support for said plate holders, means for rotating said plate holders about said pivotal support, and means for translating said pivotal support.

2. In combination, a table, a member translucent to X-rays, a frame attachable on one side of said translucent member, a plurality of plate holders secured together, a pivotal support for said plate holders in said frame, and means for rotating and translating said plate holders, whereby said plate holders are successively in operative relation to said translucent member.

3. In combination, a table, a pivoted member translucent to X-rays supported thereon, a frame detachably secured to said member, a plurality of plate holders in fixed relation at an angle to each other supported by said frame, and means for rotating and translating said plate holders.

4. In combination, a table, a pivoted member translucent to X-rays supported thereon, a frame detachably secured to said member, a plurality of plate holders in fixed relation at an angle to each other supported by said frame, means for rotating and translating said plate holders, and an opaque member between said plate holders and movable therewith.

5. An operating table comprising an open front frame and a table member, said frame comprising back and end frames rigidly secured together and movable as a unit, said table member being pivoted and adapted to bridge said end frames, an X-ray tube, and means supporting the same carried by said operating table and adjustable with respect thereto.

6. An operating table comprising an open front frame and a table member, said frame comprising back and end frames rigidly secured together and movable as a unit, said table member being pivoted and adapted to bridge said end frames, an X-ray tube, and means movable longitudinally upon said back frame for supporting said X-ray tube.

7. An operating table comprising an open front frame and a table member, said frame comprising back and end frames rigidly secured together and movable as a unit, said table member being pivoted and adapted to bridge said end frames, an X-ray tube, means movable longitudinally upon said back frame for supporting said X-ray tube, and means for adjusting said tube transversely of said operating table.

8. An operating table comprising an open front frame and a table member, said frame comprising back and end frames rigidly secured together and movable as a unit, said table member being pivoted and adapted to bridge said end frames, an X-ray tube, means movable longitudinally upon said back frame for supporting said X-ray tube, means for adjusting said tube transversely of said operating table, and means for adjusting said X-ray tube vertically with respect to said operating table.

9. In an operating table, the combination with a frame, of a vertically extending member adjustable longitudinally with respect to

said frame and carried thereby, a second vertically extending member supported at its ends upon said first mentioned member, an X-ray tube, means supporting said tube supported by said second vertically extending member and angularly adjustable with respect thereto, a pivoted table member supported by said frame, and means for adjusting said X-ray tube to a position either above or below said table member.

10. In an operating table, the combination with a frame, of a vertically extending member supported thereby and adjustable longitudinally thereof, of a second vertically extending member supported and rotatable at its ends in bearings carried by said first mentioned member, an X-ray tube, and means supporting said tube and supported by said second vertically extending member and rotatable through an entire circumference thereon.

11. In an operating table, the combination with a frame, of a vertically extending member supported thereby and adjustable longitudinally thereof, of a second vertically extending member supported and rotatable at its ends in bearings carried by said first mentioned member, an X-ray tube, means supporting said tube and supported by said second vertically extending member and rotatable through an entire circumference thereon, and means for adjusting said tube longitudinally of said means.

12. In an operating table, the combination with a frame, of a member carried thereby and movable longitudinally thereof, an X-ray tube, a member supporting said X-ray tube upon said vertically extending member, means for automatically shifting said vertically extending member a predetermined distance, and means for automatically shifting said tube with respect to its supporting member.

13. In an operating table, the combination with a frame, of a member carried thereby and movable thereon, an X-ray tube carried by said member, a cord secured at its one end to said frame and at its other end to a motive device carried by said tube carrying member, and a latch for releasing said motive device.

14. The combination with a supporting member, of a ring supported thereby, a second ring engaging said ring and movable circumferentially thereof, means supported by said second ring, an X-ray tube, and a pivotal support therefor, said pivotal support movable upon said means.

15. The combination with a glass shield, of a supporting member therefor, said shield having a neck integral therewith, means for clamping said neck to said member, extensions on said member, an X-ray tube supported on said extensions within said shield, slots in said shield adapted to receive the tubular extensions on said X-ray tube, a diaphragm, and a compressor supported upon said member.

16. The combination with a shield, of a member for supporting the same, a pivotal support for said member, said pivotal support having an extension, and an X-ray tube supported on said extension within said shield.

17. The combination with a shield, of a member for supporting the same, a pivotal support for said member, said pivotal support having an extension, an X-ray tube supported on said extension within said shield, and means supporting said pivotal support, said pivotal support being movable longitudinally upon said means.

18. The combination with an X-ray tube, of means supporting the same, a longitudinally extending member upon which said means are movable, a rod secured to said longitudinally extending member, a coöperating movable tube, a member for causing said X-ray tube supporting means to move with said tube, a spring joining said tube and rod, and a latch for releasing said spring.

19. The combination with an X-ray tube and a support therefor, of a plural plate holder carried by and movable with respect to said support, and automatic means for shifting said plate holder with respect to said tube.

20. The combination with an X-ray tube and a support therefor, of a plurality of plate holders, a frame carried by and movable with respect to said support for supporting said plate holders, and means for automatically shifting said frame, whereby said plate holders are shifted with respect to said tube.

21. The combination with a support, of an X-ray tube carried thereby, a plurality of plate holders secured together, and means for rotating and translating said plate holders.

22. The combination with a support, of an X-ray tube carried thereby, plate holders disposed at an angle with respect to each other, an opaque member between said plate holders, and means for shifting said plate holders and said opaque member with respect to said X-ray tube.

23. The combination with an operating table, of an X-ray tube supported thereby, plate holders supported in angular relation with respect to each other, and means for interchanging said plate holders with respect to said X-ray tube.

24. In an operating table, the combination with a pivoted table member, of automatic plate shifting apparatus supported thereby.

25. The combination with an X-ray tube, of a member for supporting the same, said

member movable about a plurality of axes at right angles to each other, a handle member secured to said member, and a fluorescent screen upon said handle member, whereby said tube and screen may be moved and maintained in fixed relation with respect to each other.

26. The combination with an operating table, of an X-ray tube, a support therefor comprising a member movable with respect to said table, a ring supported by said member, a second ring engaging and movable circumferentially upon said first mentioned ring, a frame secured to and extending axially of said second ring, a carriage movable longitudinally of said frame, and a pivotal support for said X-ray tube upon said carriage.

27. The combination with an operating table, of an X-ray tube movable on axes at an angle with respect to each other, means for shifting said X-ray tube, a plural plate holder supported by said table, and means for automatically shifting said plural plate holder.

28. An operating table comprising an open front frame and a table member, said table member pivoted upon said frame, said table member comprising a plate translucent to X-rays, and an X-ray tube supported upon said table.

29. The combination with an operating table, of an X-ray tube supported thereby, means for automatically shifting said tube longitudinally of said table, means for automatically shifting said tube transversely of said table, a plural plate holder supported by said table, and means for shifting said plate holder with respect to said X-ray tube.

30. The combination with an operating table having a horizontally extending member, of a vertically extending member movable upon said member, a supporting frame movable through an entire circumference supported by said vertically extending member and movable vertically thereon, a carriage movable longitudinally of said frame, and an X-ray tube pivoted upon said carriage.

31. The combination with an operating table having a horizontally extending member, of a vertically extending member movable upon said member, a supporting frame movable through an entire circumference supported by said vertically extending member and movable vertically thereon a carriage movable longitudinally of said frame, an X-ray tube pivoted upon said carriage, a pivoted table member, and plate shifting apparatus supported thereby.

32. The combination with a support, of an X-ray tube carried thereby, a plurality of plate holders carried by said support and disposed at an angle with respect to each other, and a pivotal support for said plate holders disposed within the angle between them.

33. The combination with a support, of an X-ray tube carried thereby, a plurality of plate holders carried by said support and disposed at an angle with respect to each other, a pivotal support for said plate holders disposed within the angle between them, and means for translating said pivotal support.

34. The combination with a support, of an X-ray tube carried thereby, a plurality of plate holders carried by said support and disposed at an angle with respect to each other, a pivotal support for said plate holders disposed within the angle between them, and means for automatically rotating said plate holders upon said pivotal support and translating said pivotal support.

35. The combination with a support, of an X-ray tube carried thereby, a plurality of plate holders carried by said support and disposed at an angle with respect to each other, a pivotal support for said plate holders disposed within the angle between them, and a member opaque to X-rays movable with said plate holders and supported between them.

36. The combination with an operating table, of an X-ray tube supported thereby, means for automatically shifting said tube longitudinally of said table, means for automatically shifting said tube transversely of said table, plate holders disposed at an angle with respect to each other detachably supported upon said table, and means for automatically shifting said plate holders with respect to said X-ray tube.

37. An operating table comprising a frame, a leaf horizontally pivoted on said frame, a table member translucent to X-rays horizontally pivoted to said frame, a fixed horizontal table member between said pivoted table member and said leaf, and an X-ray tube supported by said frame.

38. An operating table comprising a frame, leaves pivoted on opposite ends of said frame, a table member translucent to X-rays pivoted to said frame intermediate said leaves, a fixed horizontal table member, an X-ray tube supported by said frame, and means for moving said X-ray tube with respect to said frame.

39. An operating table comprising an open front frame, leaves pivoted on opposite ends of said frame, a table member translucent to X-rays pivoted to said frame intermediate said leaves, a fixed horizontal table member, an X-ray tube supported by said frame, means for moving said X-ray tube with respect to said frame, and means for detachably securing a plate holder to either side of said pivoted table member.

40. The combination with an X-ray tube,

of a support therefor, a longitudinally extending member upon which said support is movable, an automatic motive device for moving said X-ray tube longitudinally of said member consisting of relatively movable tube and rod members, a spring joining said tube and rod members, one of said movable members secured to said longitudinally extending member, and a projection on the other of said movable members adapted to engage said X-ray tube support.

41. The combination with an X-ray tube, of a support therefor, a longitudinally extending member upon which said support is movable, an automatic motive device for moving said X-ray tube longitudinally of said member consisting of relatively movable tube and rod members, a spring joining said tube and rod members, one of said movable members secured to said longitudinally extending member, a projection on the other of said movable members adapted to engage said X-ray tube support, and a latch normally restraining said spring.

42. The combination with a support, of an X-ray tube carried thereby, means for automatically shifting said tube with respect to said support, means holding a plurality of plates associated with said tube, and means for automatically shifting said plate holding means with respect to said X-ray tube.

In testimony whereof I have hereunto affixed my signature in the presence of the two subscribing witnesses.

EDWIN W. KELLY.

Witnesses:

WILLIAM CONWAY,

ANNA E. STEINBOCK.