May 8, 1934. A. C. NELSON 1,957,720

X-RAY TILT TABLE AND BUCKY UNIT

Filed Nov. 28, 1930 5 Sheets-Sheet 1

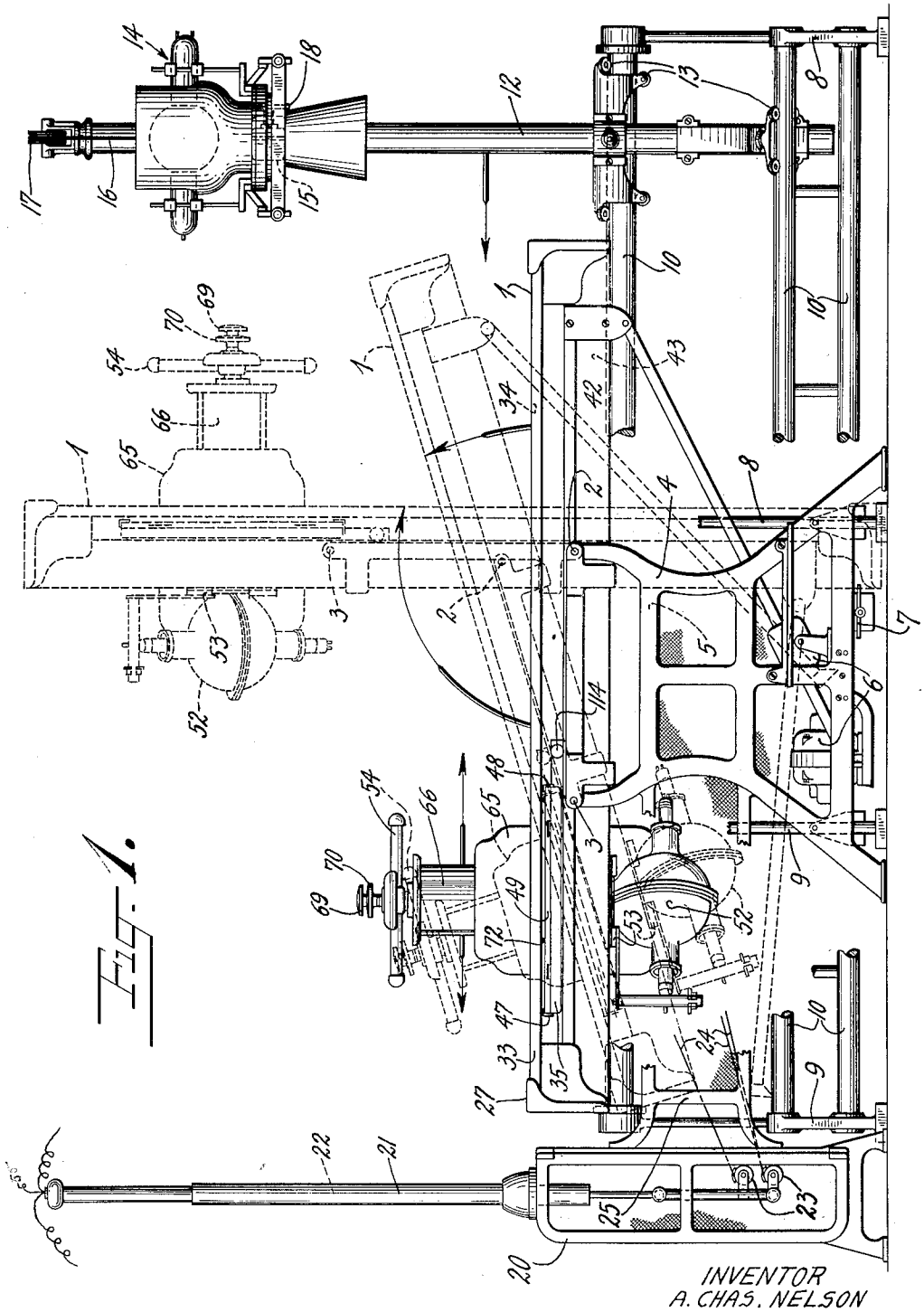


Fig. 1.

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X-RAY TILT TABLE AND BUCKY UNIT

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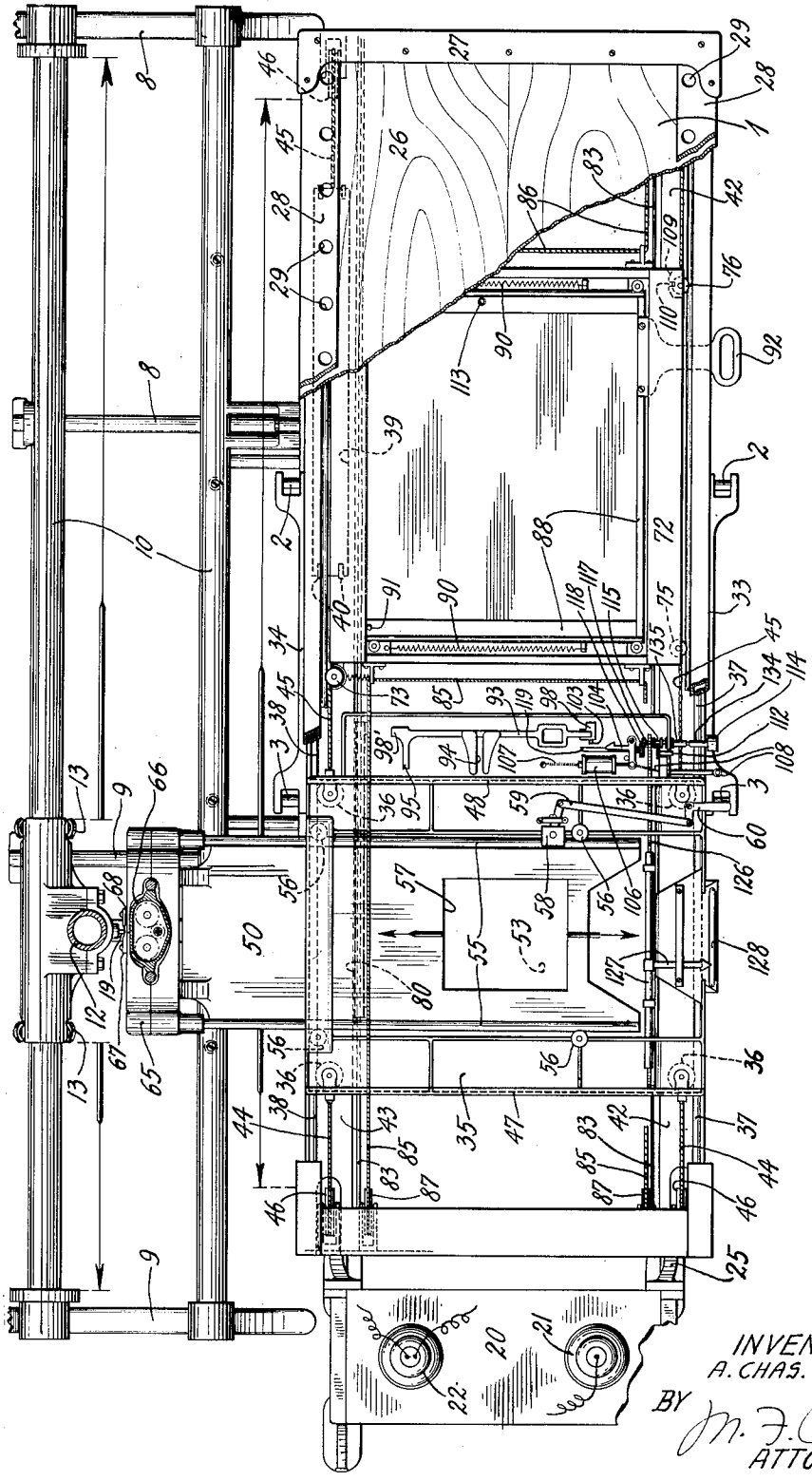


Fig. 2.

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X-RAY TILT TABLE AND BUCKY UNIT

Filed Nov. 28, 1930 5 Sheets-Sheet 3

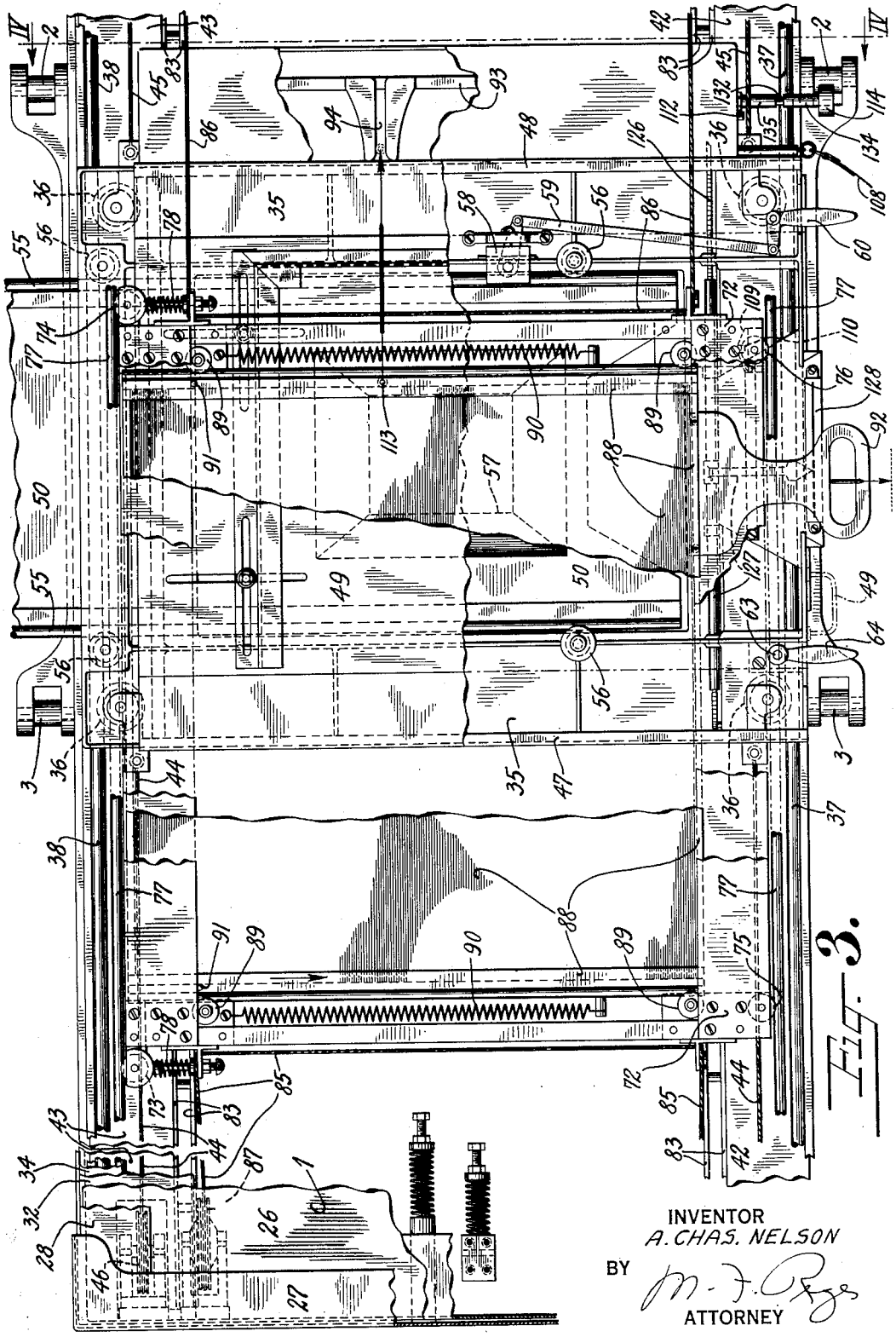


Fig. 3.

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X-RAY TILT TABLE AND BUCKY UNIT

Filed Nov. 28, 1930 5 Sheets-Sheet 4

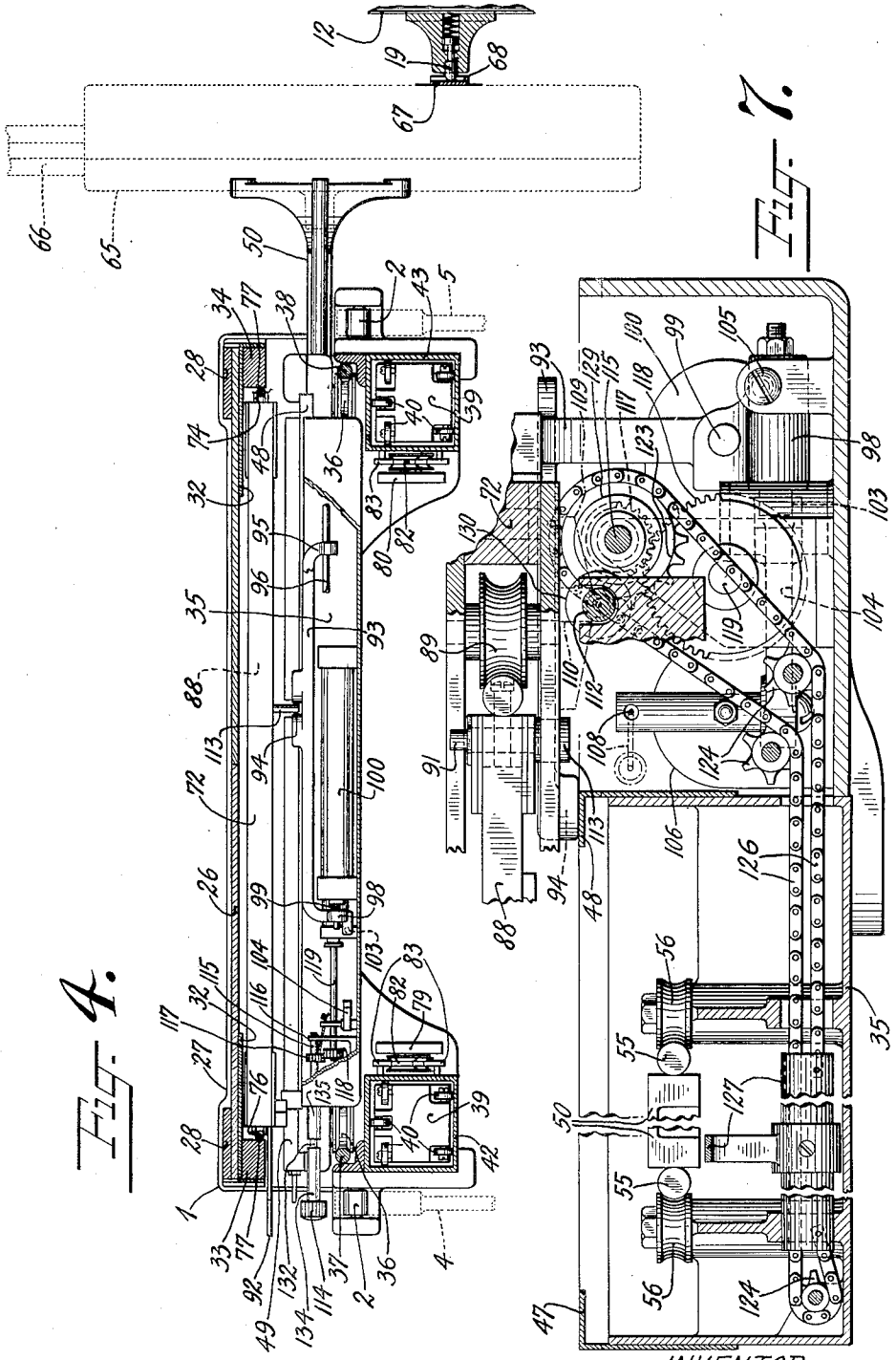


Fig. 4.

Fig. 7.

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X-RAY TILT TABLE AND BUCKY UNIT

Filed Nov. 28, 1930 5 Sheets-Sheet 5

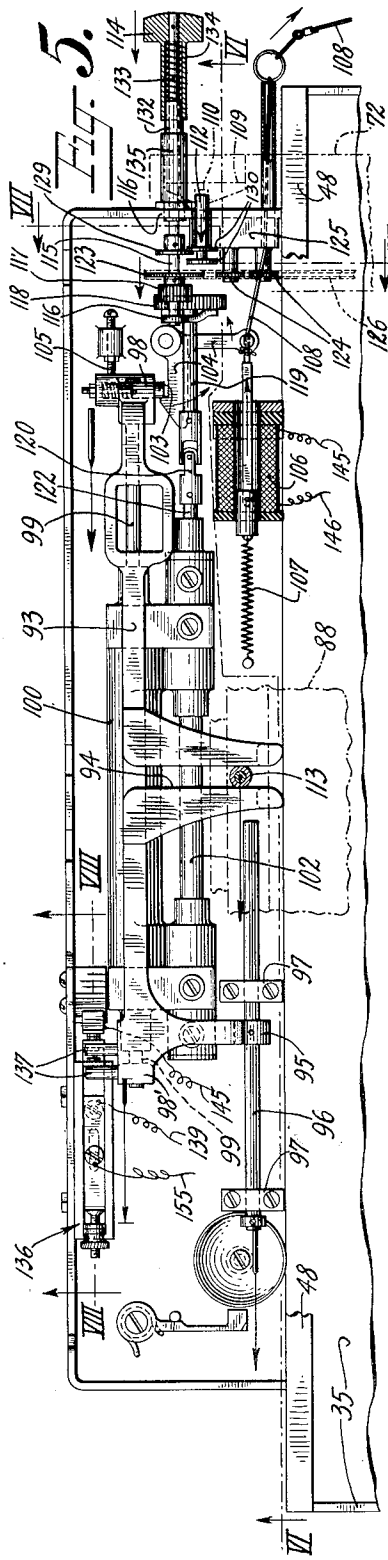


Fig. 5.

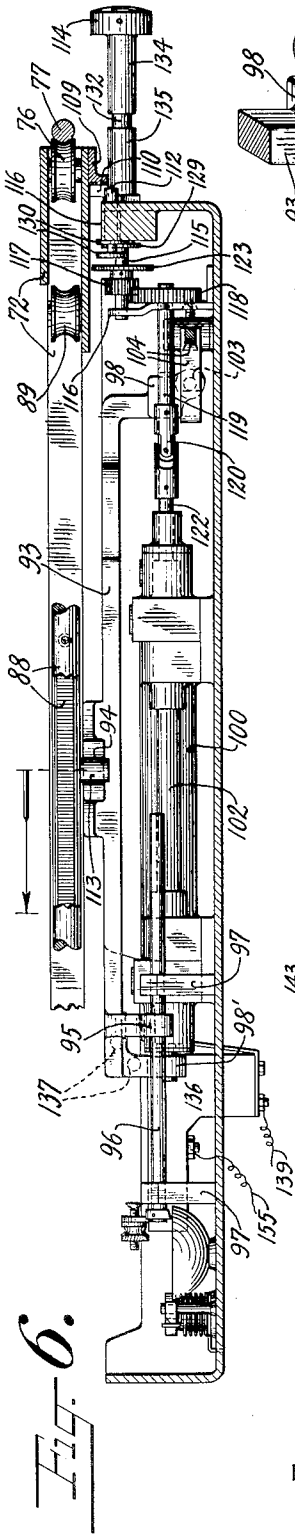


Fig. 6.

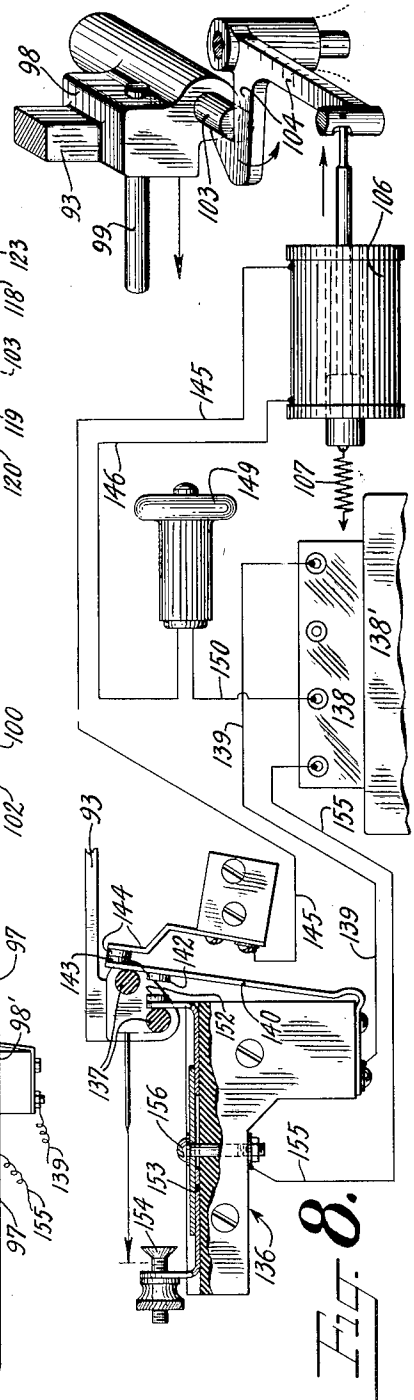


Fig. 8.

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Patented May 8, 1934 1,957,720

UNITED STATES PATENT OFFICE

1,957,720

X-RAY TILT TABLE AND BUCKY UNIT

Albert Charles Nelson, Flushing, N. Y., assignor, by mesne assignments, to Westinghouse X-Ray Company, Inc., a corporation of Delaware

Application November 28, 1930, Serial No. 498,589

19 Claims. (Cl. 250—34)

My invention relates to X-ray apparatus and has particular relation to X-ray tables employed to make X-ray examinations and radiographs.

X-ray tables employed for diagnostic and treatment purposes are known to the art as radiographic-fluoroscopic bucky tilt tables. These tables must be so constructed that the table, upon which the patient rests, can be moved to a plurality of angular positions from below a horizontal, known to the art as the Trendelenburg position, to the vertical position.

The X-ray tube together with the fluorescent screen and the carriage carrying the sensitized film, must likewise be so constructed that it is adjustable longitudinally of the table for radiographing, treating, or fluoroscopying various portions of the human anatomy.

Heretofore tables of this general type known to the art have usually been provided with two carriages one of which is utilized for radiography and the other being utilized for fluoroscopy. While one of these carriages was being utilized by the operator the other had to be out of the way to permit direct radiation to strike the film or screen. This feature is objectionable in doing fluoroscopy in that the relatively large spacing between the X-ray tube and the table top permits direct radiation from the tube to strike the operator which in the course of time leads to harmful results.

The spacing of the sensitized film below the table top has, heretofore, been relatively large and unnecessary distortion usually results when making radiographic pictures. Furthermore, these tables have been considerably higher than the height of normal tables and the controls for operating the various mechanisms have projected above the level of the table top.

These features render the transfer of patients from a hospital vehicle to the table a somewhat difficult task, as the patient must be lifted from the vehicle, over the controls, to the table top. In cases of serious illness this causes great inconvenience and may subject the patient to additional unnecessary injury.

It is an object of my invention to provide a novel tilt table carrying a bucky unit which is movable longitudinally the entire length of the table and in which the radiographic and fluoroscopic carriages are constructed in one unit.

Another object of my invention is the provision of a means, known as a bucky diaphragm grid, for wiping out the secondary rays from an X-ray target, which is readily movable into and out of the fluoroscopic field as desired.

Another object of my invention is the provision of a novel carriage mechanism that is so constructed as to materially lessen the spacing between the tube and carriage thus substantially preventing radiation from striking the operator when a fluoroscopic examination is being made.

Another object of my invention is to prevent distortion usually resulting when taking radiographic pictures by decreasing the spacing of the sensitized film below the table top to a minimum.

Another object of my invention is the provision of mechanism for counter-balancing all moving parts to substantially reduce all inertia.

A further object of my invention is to provide a tilt table adaptable to radiography and fluoroscopy which is of normal height and in which all of the controls are positioned below the table top.

A further object of my invention is the provision of a complete radiographic-fluoroscopic bucky tilt table in which all hazard parts are isolated in such a manner that all possibilities of injury to the operator or patient is obviated.

Still further objects of my invention will become apparent to those skilled in the art by reference to the accompanying drawings wherein:

Fig. 1 is a side elevational view of my X-ray table showing various angular positions thereof;

Fig. 2 is a top plan of my table shown in Fig. 1 on an enlarged scale with a portion broken away to better illustrate the mechanism and showing the radiographic tube in another horizontal position;

Fig. 3 is a plan view of a portion of my table on an enlarged scale showing another position of the grid and grid frame in respect to the carriage;

Fig. 4 is a cross section of my table taken on the line IV—IV of Fig. 3;

Fig. 5 is a top plan view of my grid operating and timing mechanism on an enlarged scale;

Fig. 6 is a view in cross-section taken on the line VI—VI of Fig. 5 further showing the timing mechanism in elevation;

Fig. 7 is a cross-sectional view of the timing mechanism taken on the line VII—VII of Fig. 5 better illustrating the structure;

Fig. 8 is a diagrammatical view of the switch arrangement and the electrical circuit of the timing mechanism.

Referring now to the drawings in detail I have shown in Fig. 1 a table top 1 fulcrumed at two points 2 and 3 to standards 4 and 5. This table is arranged to be automatically moved to any

desired position from below a horizontal plane, or the Trendelenburg position, to a vertical position by means of a mechanism generally indicated at 6 and comprising a motor controlled by a switch pedal 7.

The novel construction of this table forms the subject matter of my pending application, Serial No. 492,701 filed November 1, 1930. The details of construction and operation are therein fully set forth and further detail description is deemed unnecessary.

Auxiliary standards 8 and 9 rest upon the floor adjacent to the table and guide rods 10 extend lengthwise of the table between these auxiliary standards. A vertical tubular standard 12 is positioned to move upon the guide rods 10, by suitable means, such as rollers 13. This standard carries an X-ray tube holder 14 pivotally connected thereto through a slidable collar 15. A counter-weight (not shown) is disposed within this tubular standard and is connected to the X-ray tube holder, by means of a cable 16 and a sheave 17, for the purpose of counter-balancing the weight of the tube holder and to reduce the inertia in moving the holder longitudinally of the tubular standard. A clamp 18 maintains the tube holder in any desired vertical or radial position relative to the standard 12. A spring pressed plunger 19 (see Figs. 2 and 4) is carried by the vertical standard 12 for a purpose to be hereinafter described.

A housing 20 is positioned near one end of the table, and insulators 21 and 22 extend upwardly through the top of the housing for connection to a suitable source of electrical energy.

Insulated self-winding reels 23 of well known construction, are disposed within the housing 20 for the purpose of reeling and unreeling the electrical conductors 24 which connects one of the X-ray tubes with its source of energy supplied through the insulators 21 and 22, during the movement of the tube longitudinally of the table. A screen guard 25 is secured to the housing and the table standards 4 and 5 to prevent the operator or patient from accidentally contacting the electrical conductors 24.

Referring now more particularly to the various other figures, a table top 26, (see Fig. 2) pervious to X-rays and having a yieldable convex surface of wood veneer or the like, is held securely in position upon the table by angular end brackets 27. Side members 28 reinforce the top 26 and these members are provided with openings 29 for securing a combined head and foot rest (not shown) to the table.

Angular plates 32, (see Figs. 3—4) secured to side frame members 33 and 34, are disposed beneath the veneer top and are yieldable toward a horizontal plane to allow the convex table top to assume a horizontal position when a patient is placed thereon.

A main carriage 35 is positioned below the table top between the side frame members 33 and 34 of the table. This carriage is provided at the sides with rollers 36 which are adapted to traverse guide rails or tracks 37 and 38 secured to the frame members. Counter-weights 39, having rollers 40 secured thereto, are encased in housings 42 and 43. These housings extend lengthwise of the table and are also secured to the side frame members 33 and 34. Cables 44 and 45 are connected to opposite ends of the carriage 35 and pass through sheaves 46, at each end of the table, to the respective ends of the counter-weight 39 thus reducing the inertia in moving the carriage longitudinally upon the rails 37 and 38.

The carriage 35 is provided with channels 47 and 48 in which a cassette tray 49 is arranged to be moved into a central relation with the table top. These channels are so positioned in the carriage 35 that when a sensitized film is placed in the cassette tray the film and tray are disposed a minimum distance below the table top. The tray 49 is constructed with a thin sheet of metal, such as aluminum in the center thereof, which serves to give the proper filtration for fluoroscopy, and in this manner, renders removal of the tray unnecessary when a fluoroscopic examination is being made.

A support 50 for supporting an X-ray tube 52 and fluoroscopic shutters 53 below, and a fluorescent screen 54 above, the table top, is provided with guide rails 55 adapted to engage rollers 56 secured to the carriage. This arrangement permits movement of the support 50 transversely of the table top to align an opening 57, the tube 52, shutters 53 and screen 54, with any portion of the patient's body, thus allowing a lateral flexibility for the operator. A clamp 58 operable by means of a link member 59 and bell crank lever 60, maintains the support in the desired transverse position.

A similar clamp 63, operable by a lever 64, is arranged to engage one of the guide rails 37 and maintain the carriage 35 in the desired position longitudinally of the table. A casing 65, secured to one end of the support 50, is provided for housing counter-weights (not shown) for a vertically movable support 66 which carries the fluorescent screen 54. This casing has an elongated raised portion 67 and a groove 68 is provided in the center of this raised portion at the exact center of the carriage 35. This groove is engaged by the spring pressed plunger 19 carried by the tubular standard 12 for centering the X-ray tube holder 14 exactly over the carriage 35 and cassette tray 49.

The fluoroscopic shutters 53 are arranged to be controlled by means of control handles 69 and 70, carried by the fluorescent screen 54, for altering the relative size of the image cast upon the screen by the tube 52. The details of the fluoroscopic shutter control forms no part of this invention but are fully shown and described in my pending application Serial No. 497,140 filed November 21, 1930 and no further description herein is, therefore, necessary.

A "bucky diaphragm grid" frame 72 is provided with rollers 73, 74, 75 and 76 which are adapted to engage guide rails or tracks 77, secured to the table top to permit longitudinal movement of this frame relative to the table. The rollers 73 and 74 are biased against one of the tracks 77 by means of coil springs 78. The provision of these coil springs allows the removal of the grid frame from the table by a slight compression of the springs, permitting the frame to drop below the table. This frame 72 is counter-balanced by suitable counter-weights 79 and 80 movable lengthwise of the table by means of rollers 82, the engaging tracks 83 secured to the side of the housings 42 and 43. Cables 85 and 86 are connected to each end of the grid frame and pass around sheaves 87, at the ends of the table to each end of the counter-weights 79 and 80.

A "bucky grid" 88 is provided for wiping out the secondary rays, which grid is formed of a series of alternate vertically extending sections, one section being of wood, celluloid or "bakelite"

and the adjacent section of lead. This grid is arranged for transverse movement, relative to the movement of the grid frame 72, by the provision of rollers 89 carried by the frame engaging the rounded edges of the grid.

Coil springs 90 are secured to the frame and to the edges of the grid, in such a manner that when the handle 92 is pulled outwardly from the table top these coil springs are tensioned. A pair of pins 91 prevent these springs 90 from moving the grid beyond its normal position, in one direction, and constitute stops for the grid 88. When it is desired to maintain the grid frame 72, carrying the grid 88, in the fluoroscopic field it is held by means of a mechanism to be hereinafter described.

A yoke 93, extending transversely of the table, is carried by the carriage 35 and is provided with a forked portion 94. This yoke is provided with a laterally projecting supporting arm 95 to which a shaft 96 is rigidly secured. A pair of upright brackets 97 are secured to the carriage 35 through which the shaft 96 is arranged to slide. Each end of the yoke 93 is provided with depending lugs 98 and 98′ respectively, and a shaft 99 is rigidly secured to these lugs. A fluid actuated valve 100, comprising a piston (not shown) connected to the shaft 99 and encased in a cylinder, is secured to the carriage 35 for regulating the speed of movement of the grid 88. A conduit 102 interconnects the respective ends of the valve 100 for by-passing the fluid during operation of the valve.

The depending lug 98, of the yoke 93 carrying the shaft 99, has a lateral portion 103 arranged to engage one arm of a pivoted bell crank lever or latch piece 104 when the yoke is moved to its extreme limit of travel against an adjustable stop 105. The other arm of this bell crank 104 is pivotally connected to the plunger of a solenoid 106. This plunger is biased, by means of a coil spring 107, which tends to maintain the bell crank in the engaging position shown in Figs. 5 and 8.

When it is desired to release the engagement of the yoke 93 and the bell crank lever 104, the latter is rotated about its pivot by means of a manually operable cord 108, or by the energization of the solenoid 106, in a manner to be hereinafter described.

The grid frame 72 has a lateral extension 109 having a notch 110 therein, and this notch is adapted to be engaged by a plunger 112 affixed to the carriage 35, when the grid frame is moved into central location with the carriage. The grid 88 is provided with a depending pin 113 which is positioned in the forked portion 94 of the yoke when the grid frame is moved into the position just mentioned. Pulling of the grid outwardly by means of the handle 92, causes the yoke 93 through the engagement of the pin 113 to move transversely of the table until the stop 105 prevents further movement thereof. The bell crank lever 104 then engages the lateral portion 103 of the depending lug 98 and thus maintains the grid 88 and the yoke 93 in its extreme transverse limit of travel until released by the manually operable cord 108 or the solenoid 106.

The transverse movement of the grid tensions the springs 90 and, upon release of the engagement of the lug 98 and bell crank 104, these springs 90 will return the grid to its normal position in the grid frame as rapidly as the valve 100 will permit. The lug 98 being connected to the shaft 99, applies the tension of the springs 90 directly to the valve through its piston, thus preventing the potential energy of the springs 90 from becoming immediately effective until the fluid is forced out of the cylinder.

When it is desired to regulate the speed of movement of the grid 88 the jets (not shown) within the valve 100 are increased or decreased by means of a regulating knob 114 carried by the carriage 35. This knob 114 is connected to a shaft 115 which is journaled in suitable bearings 116 in the carriage 35.

A gear 117 is affixed to this shaft 115 and establishes a driving connection with another gear 118 secured to a second shaft 119. This latter shaft 119 is in turn connected by means of a universal joint 120 to a jet actuating shaft 122. In this manner rotation of the knob 114 will rotate the shaft 115, gears 117 and 118, shaft 119, universal joint 120 and shaft 122, thus altering the orifice of the valve jets.

The shaft 115 is further provided with a sprocket gear 123 and idler sprocket gears 124 are affixed to brackets 125 secured to the carriage 35. A link chain 126 is arranged to pass around the sprocket gears 123 and 124 and actuate an indicator 127 secured to this chain. Rotation of the shaft 115 rotates the sprocket gears and chain and moves the indicator 127 longitudinal of the table over a graduated scale 128 secured to the carriage 35. This scale is calibrated and setting of the indicator 127 thus predetermines the speed of movement of the grid 88 by changing the setting of the valve 100.

The shaft 115 is also provided with a fixed collar 129 having a portion of its periphery extending laterally of the shaft. This extending portion is positioned between two collars 130 affixed to the plunger 112. A hollow shaft 132 surrounds the shaft 115, between the carriage 35 and the knob 114, and is maintained against the carriage by a coil spring 133.

This hollow shaft is in turn surrounded by two hollow shafts 134 and 135 provided with a spacing between their adjacent ends.

The hollow shaft 134 is secured at one end to the knob 114 while the shaft 135 is secured to the carriage 35. This structure permits a pushing motion on the knob 114 to release the plunger 112 from engagement with the grid frame. The contact of the extension on the collar 129 with one of the collars 130 moves the plunger 112 inwardly out of engagement with the notch 110. The grid frame carrying the grid may then be moved longitudinally of the table entirely independent of the carriage. When the knob 114 is released by the operator the coil spring 133 returns the shaft 115 and knob 114 to its normal position. The gears 117 and 118 are so arranged that movement of the shaft 115 does not disengage the driving connection therebetween, in any position of the shaft.

A switch 136 is secured to the carriage 35 and is arranged to be operated by the transverse movement of the grid 88. This switch is interposed in the X-ray tube circuit for the purpose of energizing the tube after the grid has started its transverse movement and for de-energizing the latter before the grid has ceased its movement. A pair of laterally extending lugs or pins 137 of suitable insulating material are secured to the yoke 93 and are positioned to operate the switch 136.

Referring now more particularly to Fig. 8 a diagrammatic view of a portion of my circuit is shown. A timing board terminal 138, of well known construction, is affixed to the usual transformer casing 138′.

A conductor 139 extends from this terminal board to a switch arm 140 which carries a pair of contact members 142 and 143. When the grid 88 is in its extreme transverse position ready for a radiographic exposure, the contact member 143 is forced into engagement with a contact member 144 by one of the pins 137. A conductor 145 is connected to the contact member 144 and extends to one end of the windings of the solenoid 106.

A conductor 146 extends from the other end of the coil of solenoid 106 to a manually operable switch 149, from which a conductor 150 extends to the terminal board 138. The contact members 143 and 144, solenoid 106, and manually operable switch 149 are thus in series connection with each other. Closing of the switch 149 energizes the solenoid, to release the grid in the manner before stated, which circuit may be traced from the terminal board 138, through the conductor 139, switch arm 140, contact members 143 and 144, conductor 145, solenoid 106 then by means of conductor 146, to the switch 149 and thence through conductor 150 back to terminal board 138.

The grid 88 and yoke 93 in moving causes the pin 137 to disengage the contact members 143 and 144. The spring action of the switch arm 140 then establishes a connection of the contact member 142 with a contact member 152. This latter contact member 152 is secured to a slidable conductor 153 provided with a vertical portion to which is affixed a suitable stop 154. The slidable conductor 153 is connected to the terminal board 138 by means of a conductor 155 and a conducting bolt 156. The movement of the grid 88 causes the lowermost pin 137 to contact the stop 154, thus sliding the conductor 153 and opening the contact members 142 and 152.

The X-ray tube (not shown) is connected to the transformer and timing device in a well known manner and no detailed description is, therefore, deemed necessary. It is sufficient, for the purposes herein contemplated, to state that the circuit, comprising the conductor 139, switch arm 140, contact members 142 and 152, slidable conductor 153, bolt 156 and conductor 155, is so arranged that the closing and opening of the contact members 142 and 152 energizes and de-energizes the X-ray tube utilized for radiography.

The operation of my device may best be understood from a given problem. Assuming, therefore, a patient is placed upon the table and it is desired to take a radiographic exposure of some particular organ. The operator withdraws the cassette tray 49 and places a sensitized film therein, sliding the tray again into the carriage 35 upon the channels 47 and 48, which thereupon centrally positions the tray and film relative to the carriage. The counter-balanced carriage 35 is then moved longitudinally of the table until the center thereof is directly under the desired portion of the patient's anatomy.

The carriage is then locked in this position by the lever 64 actuating the clamp 63 which grips the guide rail 37. The fluorescent screen 54 is rotated, from a transverse position above the table to an adjacent longitudinal position, and the vertical standard 12 is moved upon the guide rods 10. When this standard reaches the exact center of the carriage the spring pressed plunger 19 engages the groove 68 in the casing 65, thus centering the X-ray tube holder 14 immediately over the center of the carriage 35. The tube holder 14 is then adjusted vertically of the standard 12 for the proper height and moved horizontally over any particularly portion of the patient.

The operator rotates the knob 114 moving the indicator 127 above the scale 128 to the predetermined speed of movement desired for the grid. The filament of the X-ray tube is then heated from a suitable source of electrical energy and the counter-balanced grid frame 72 is moved toward a central position with the carriage 35 until the plunger 112 enters the notch 110 in the grid frame. The handle 92 secured to the grid, is then pulled outwardly against the tension of springs 90, until the lug 98 of the yoke 93, engages the bell crank lever 104 thus locking the grid.

The transformer controls (not shown) are set for the desired amount of current and a timing device, of well known construction, may also be regulated for predetermining the period of exposure. An auxiliary timing device is necessary only for periods of short duration exposures when the period desired is less than the maximum speed of movement of the grid 88. Under the usual conditions when a grid is utilized an auxiliary timing device may be dispensed with.

The operator actuates the manually operable switch 149 which energizes the solenoid 106 to release the grid 88. The coil springs 90 retract the grid as rapidly as the fluid flows out of the valve 100. Movement of the grid causes the upper pin 137 to first open the contact members 143 and 144 to de-energize the solenoid 106 and then to close the contact members 142 and 152 energizing the X-ray tube as before described. The lowermost pin 137 engages the stop 154 upon further movement of the grid sliding the conductor 153 and breaking the engagement of the contact members 142 and 152 thus de-energizing the tube before the grid has stopped its movement. The heating circuit to the filament of the X-ray tube is then interrupted and the film removed from the cassette tray, after which the tray is again returned to the carriage.

Assuming now that the diagnostician is desirous of making a fluoroscopic examination of some particular organ disclosed by the radiographic film. The patient is again placed upon the table and the X-ray tube holder 14 is rotated to a position longitudinally of the table. The vertical standard 12 is disengaged from the casing 65 and moved longitudinally of the guide rods 10 to an end of the table. The knob 114 is depressed slightly disengaging the plunger 112 from the notch 110 and the grid frame and grid are moved longitudinally of the table away from the carriage.

The fluorescent screen 54 is again rotated to a position transversely above the table and patient, and the X-ray tube 52 encased in the ray opaque housing is energized. The fluorescent screen 54, being secured to a vertically movable counter-balanced support 66, is movable vertically of the table within certain limits. The support 50 carrying the X-ray tube 52 fluoroscopic shutters 53, and fluorescent screen 54, being movable transversely of the table allows the operator the necessary laterally flexibility of the entire fluoroscopic unit, while the carriage 35 which carries the unit allows a longitudinal movement the length of the table. In this manner the fluorescent screen may be moved to any desired position over the patient and the shutters, which are controlled from the fluorescent screen may be regulated to confine the image cast upon the screen to any particular area.

The cassette tray 49 having a thin metallic lining in alignment with the shutter aperture

acts as a filter during the fluoroscopic examination.

The positioning of this tray 49 immediately below the table top and dispensing with the necessity for its removal, during a fluoroscopic examination, together with a minimum spacing between the X-ray tube 52, shutters 53, carriage 35 and table top 1, thus prevents direct radiation from the tube 52 from striking the operator during an examination of this character. Should the operator prefer to make a fluoroscopic examination in the vertical instead of the horizontal position, depression of the switch pedal 7, in the proper direction, operates the mechanism 6 to move the table to the desired position.

It can thus be readily seen that I have provided an X-ray table adaptable for radiography and fluoroscopy wherein a single counter-balanced carriage is utilized for both examinations.

The carriage being movable longitudinally the entire length of the table and carrying a transversely movable fluoroscopic unit allows a requisite flexibility over the entire surface of the table. A counter-balanced grid frame carrying a transversely movable grid is also movable longitudinally the entire length of the table and may be moved into engagement with the unitary carriage when desired.

The structure of the carriage is such that direct radiation is prevented from striking the operator during a fluoroscopic examination and the cassette tray is utilized in an examination of this character as an advantageous filter. Furthermore the sensitized film encased in the cassette tray during a radiographic examination is so positioned relative to the table top and patient that the usual resulting distortion is entirely obviated. The various controls for the entire unit are carried by the carriage and are arranged thereupon, in such manner, that they are below the level of the table top, allowing the transfer of patients to and from the table a comparatively simple procedure.

Although I have shown and described one specific embodiment of my invention I do not desire to be limited thereto as various other modifications of the same may be made without departing from the spirit and scope of the appended claims.

What is claimed is:

1. In an X-ray device, a pair of standards, a table top fulcrumed thereto, a unitary carriage movable longitudinally of said table top adapted for radiography and fluoroscopy, a cassette tray carried by said carriage below said table top and movable therewith for holding sensitized films during a radiographic examination and operable as a filter during fluoroscopic examinations, a support carrying a fluoroscopic unit attached to said carriage and movable transversely thereof comprising a fluorescent screen above, and fluoroscopic shutters and an X-ray tube below, said table top; a grid frame movable longitudinally of said table top into engagement with said carriage and into radiographic relation with said cassette tray during a radiographic examination, and a grid carried by said grid frame and movable transversely thereto.

2. In an X-ray device, a pair of standards, a table top fulcrumed to rotate about two transverse axes extending between said standards, a unitary carriage movable longitudinally of said table top adapted for radiography and fluoroscopy, a cassette tray engageable with said carriage and movable therewith for holding sensitized films during a radiographic examination and operable as a filter during fluoroscopic examinations, timing mechanism carried by said carriage, a support carrying a fluoroscopic unit attached to said carriage and movable transversely thereof comprising a fluorescent screen above, and fluoroscopic shutters and an X-ray tube below, said table top; a grid frame movable longitudinally of said table top into engagement with said carriage and into radiographic relation with said cassette tray, and a grid carried by said grid frame movable transversely thereto and engageable with said timing mechanism for controlling the speed of the transverse movement of said grid in one direction.

3. In an X-ray device, a pair of standards, a table top fulcrumed to said standards, mechanism carried by said standards and connected to said table top for rotating said top in two arcuate directions about said fulcrum, a carriage movable longitudinally of said table, a support carrying an X-ray tube and fluoroscopic shutters below and a fluorescent screen above, said table top and arranged to engage said carriage and move transversely thereto, a cassette tray carried by said carriage for holding a sensitized film, a grid frame movable longitudinally of said table top, a grid carried by said frame movable transversely thereto, and means to maintain said grid and frame in radiographic relation with said carriage.

4. In an X-ray device a pair of standards, a table top fulcrumed to said standards, a carriage movable longitudinally the length of said table top, a cassette tray carried by said carriage for holding a sensitized film, a support attachable to said carriage and adjustable transversely of the movement of said carriage, an X-ray tube, a fluorescent screen and fluoroscopic shutters carried by said support and movable therewith, a grid frame movable longitudinally of said table top, a grid carried by said frame and movable transversely thereto and means carried by said carriage for maintaining said frame in radiographic relation with said carriage and for maintaining said grid in the desired transverse position relative to said grid frame.

5. In an X-ray device, a pair of standards, a table top fulcrumed to said standards, a carriage movable longitudinally the length of said table top adapted for radiography and fluoroscopy, means to maintain said cariage in any desired longitudinal position relative to said table top, a support carrying a fluoroscopic unit attachable to said carriage and movable transversely thereof, means carried by said carriage for maintaining said support in any desired transverse position relative to the movement of said carriage, a grid frame movable longitudinally of said table into engagement with said carriage, a grid carried by said frame and movable transversely thereto, and means carried by said carriage for maintaining said grid frame in engagement with said carriage and said grid in the desired transverse position relative to said frame.

6. In an X-ray device, a pair of standards, a table top fulcrumed to said standards, a standard adjacent said table top arranged to move longitudinally of said table, an X-ray tube pivotally connected to and adjustable vertically of said last mentioned standard, a carriage movable longitudinally the length of said table adapted for radiography and fluoroscopy, a cassette tray carried by said carriage and movable therewith

for holding sensitized films during a radiographic examination, a fluoroscopic unit carried by said carriage and movable transversely thereof comprising a support carrying an X-ray tube and fluoroscopic shutters below, and a fluorescent screen above, said table top; a grid frame movable into engagement and radiographic relation with said carriage, and a grid carried by said grid frame.

7. In an X-ray device, a pair of standards, a table top fulcrumed to said standards, a standard adjacent said table top arranged to move longitudinally of said table, an X-ray tube pivotally connected to and adjustable vertically of said last mentioned standard, a unitary carriage movable longitudinally of said table adapted for radiography and fluoroscopy, a cassette tray carried by said carriage and movable therewith for holding sensitized films during a radiographic examination, a fluoroscopic unit carried by said carriage and movable transversely thereof comprising a support carried by said carriage and provided with a fluorescent screen above, and an X-ray tube and fluoroscopic shutters below, said table top; and means carried by said last mentioned standard and engageable with said fluoroscopic unit for centering the X-ray tube carried by said last mentioned standard with said carriage.

8. In an X-ray device, a pair of standards, a table top fulcrumed thereto, a carriage movable longitudinally of said table top adapted for radiography and fluoroscopy, a grid frame movable longitudinally of said table into engagement with said carriage, a grid carried by said grid frame movable transversely thereto, tensioning means interconnecting said grid and grid frame and placed under tension by transverse movement of said grid relative to said frame, means carried by said carriage for maintaining said grid in its maximum transverse position relative to said grid frame against the action of said tensioning means, and means carried by said carriage for releasing said maintaining means to cause said tensioning means to return said grid to its normal position in said grid frame.

9. In an X-ray device, a pair of standards, a table top fulcrumed thereto, a carriage movable longitudinally of said table top adapted for radiography and fluoroscopy, a grid frame movable longitudinally of said table into engagement with said carriage, a grid carried by said grid frame movable transversely thereto, tensioning means interconnecting said grid and grid frame and placed under tension by transverse movement of said grid relative to said frame, means carried by said carriage for maintaining said grid in its maximum transverse position relative to said grid frame against the action of said tensioning means, and automatic means carried by said carriage for releasing said maintaining means to cause said tensioning means to effect the return of said grid to its normal position in said grid frame.

10. In an X-ray device, a pair of standards, a table top fulcrumed thereto and having a portion thereof yieldable toward a horizontal plane, a unitary carriage movable longitudinally of said table adapted for radiography and fluoroscopy, a cassette tray carried by said carriage for holding sensitized films during a radiographic examination, fluoroscopic mechanism carried by said carriage comprising a support movable transversely of said carriage provided with fluoroscopic shutters and an X-ray tube below, and a fluorescent screen above, said table top; said cassette tray and said fluoroscopic shutters and X-ray tube being disposed below said table top in the closest proximity thereto allowing longitudinal movement of said carriage relative to said table and transverse movement of said fluoroscopic mechanism, a grid frame movable longitudinally into engagement with said carriage and radiographic relation with said cassette tray, and a grid carried by said grid frame and movable transversely thereto.

11. In an X-ray device, a pair of standards, a substantially horizontal table top fulcrumed to said standards, a unitary carriage movable longitudinally of said table adapted for radiography and fluoroscopy, fluoroscopic mechanism carried by said carriage comprising a support movable transversely of said carriage provided with fluoroscopic shutters and an X-ray tube below, and a fluorescent screen above said table top, a cassette tray carried by said carriage below said table top for carrying a sensitized film during a radiographic examination and constituting a filter during a fluoroscopic examination, timing mechanism carried by said carriage below said table top, a grid frame movable longitudinally of said table into engagement with said carriage and into radiographic relation with said cassette tray, and a grid carried by said grid frame movable transversely thereto and engageable with the timing mechanism carried by said carriage.

12. In an X-ray device, a pair of standards, a table top fulcrumed to said standards, a unitary carriage disposed below said table and movable longitudinally thereof adapted for radiography and fluoroscopy, a fluoroscopic unit carried by said carriage and movable transversely thereof comprising a support provided with fluoroscopic shutters and an X-ray tube below, and a fluorescent screen above said table, a cassette tray carried by said carriage for holding sensitized films during a radiographic examination, timing mechanism carried by said carriage below said table top, a grid frame movable longitudinally of said table into engagement with said carriage and radiographic relation with said cassette tray, a grid carried by said grid frame movable transversely thereto and engageable with said timing mechanism, mechanism for maintaining said carriage, support, grid frame, and grid in any desired position relative to said table and to each other, and all portions of said carriage being disposed below the level of said table top at one side thereof to facilitate the transfer of patients to and from said table top.

13. In an X-ray device, a pair of standards, a table top fulcrumed to said standards, a unitary carriage disposed immediately below said table and movable longitudinally thereof adapted for radiography and fluoroscopy, a fluoroscopic unit carried by said carriage and movable transversely thereof comprising a support provided with a fluorescent screen above said table, fluoroscopic shutters disposed immediately below said table, and an X-ray tube immediately below said shutters, a cassette tray carried by said carriage immediately below said table top for holding sensitized films during a radiographic examination, and said table, carriage, cassette tray, and fluoroscopic mechanism having the smallest possible spacing therebetween to allow respective movements thereof and to prevent stray radiation from said X-ray tube from striking the operator.

14. In an X-ray device, a pair of standards, a table top fulcrumed to said standards, an X-ray tube above said table energizable for radiography,

an X-ray tube below said table energizable for fluoroscopy, a carriage movable longitudinally of said table adapted for radiography and fluoroscopy, a grid frame movable longitudinally of said table into engagement with said carriage, a grid carried by said frame movable transversely thereto, and an electric switch affixed to said carriage adjacent the path of movement of said grid, and means cooperating with said grid and said switch to cause said switch to complete a circuit for energizing said first mentioned X-ray tube.

15. In an X-ray device, a pair of standards, a table top fulcrumed thereto, a carriage movable longitudinally of said table top adapted for radiography and fluoroscopy, a grid frame movable longitudinally of said table into engagement with said carriage, a grid carried by said grid frame movable transversely thereto, tensioning means connecting said grid and grid frame and placed under tension by transverse movement of said grid relative to said frame, transversely movable means carried by said carriage and engageable by said grid and operable upon movement of said grid to its maximum transverse position relative to said grid frame against the action of said tensioning means, releasable means carried by said carriage and engageable with said transversely movable means to maintain said grid in its maximum transverse positon, and means carried by said carriage and connected to said transversely movable means for retarding the movement of said grid to its normal position in said grid frame in response to the action of said tensioning means upon release of said releasable means.

16. In an X-ray device, a pair of standards, a table top fulcrumed thereto, a carriage movable longitudinally of said table adapted for radiography and fluoroscopy, a grid frame movable longitudinally of said table into engagement with said carriage, a grid carried by said grid frame movable transversely thereto, and means carried by said carriage for regulating the speed of transverse movement in one direction of said grid.

17. In an X-ray device, a pair of standards, a table top fulcrumed thereto, a unitary carriage movable longitudinally of said table top adapted for radiography and fluoroscopy, a cassette tray carried by said carriage for holding sensitized films during a radiographic examination, fluoroscopic mechanism movably mounted upon said carriage comprising a support provided with fluoroscopic shutters and an X-ray tube below, and a fluorescent screen above said table top, and all portions of said carriage and parts carried thereby being disposed below the level of said table top at one side thereof to facilitate transfer of patients to and from said table top.

18. In an X-ray device, a pair of standards, a table top fulcrumed thereto with its plane above the upper extremity of said standards, a unitary carriage movable longitudinally of said table top adapted for radiography and fluoroscopy, a cassette tray carried by said carriage for holding sensitized films during a radiographic examination, fluoroscopic mechanism movably mounted upon said carriage comprising a support provided with fluoroscopic shutters and an X-ray tube below, and a fluorescent screen above said table top, and all portions of said carriage and parts carried thereby extending above said table top being disposed entirely on one side of said table.

19. In an X-ray device, a pair of standards, a table top fulcrumed thereto, a unitary carriage movable longitudinally of said table top adapted for radiography and fluoroscopy, fluoroscopic mechanism movably mounted upon said carriage comprising a support provided with fluoroscopic shutters and an X-ray tube below, and a fluorescent screen above said table top, a cassette tray carried by said carriage below said table top for holding sensitized films during a radiographic examination, said cassette tray being movable transversely of said unitary carriage independently of all other mechanism carried by said carriage to enable said cassette tray to be loaded and unloaded with sensitized films at any longitudinal position of said carriage relative to said table top.

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