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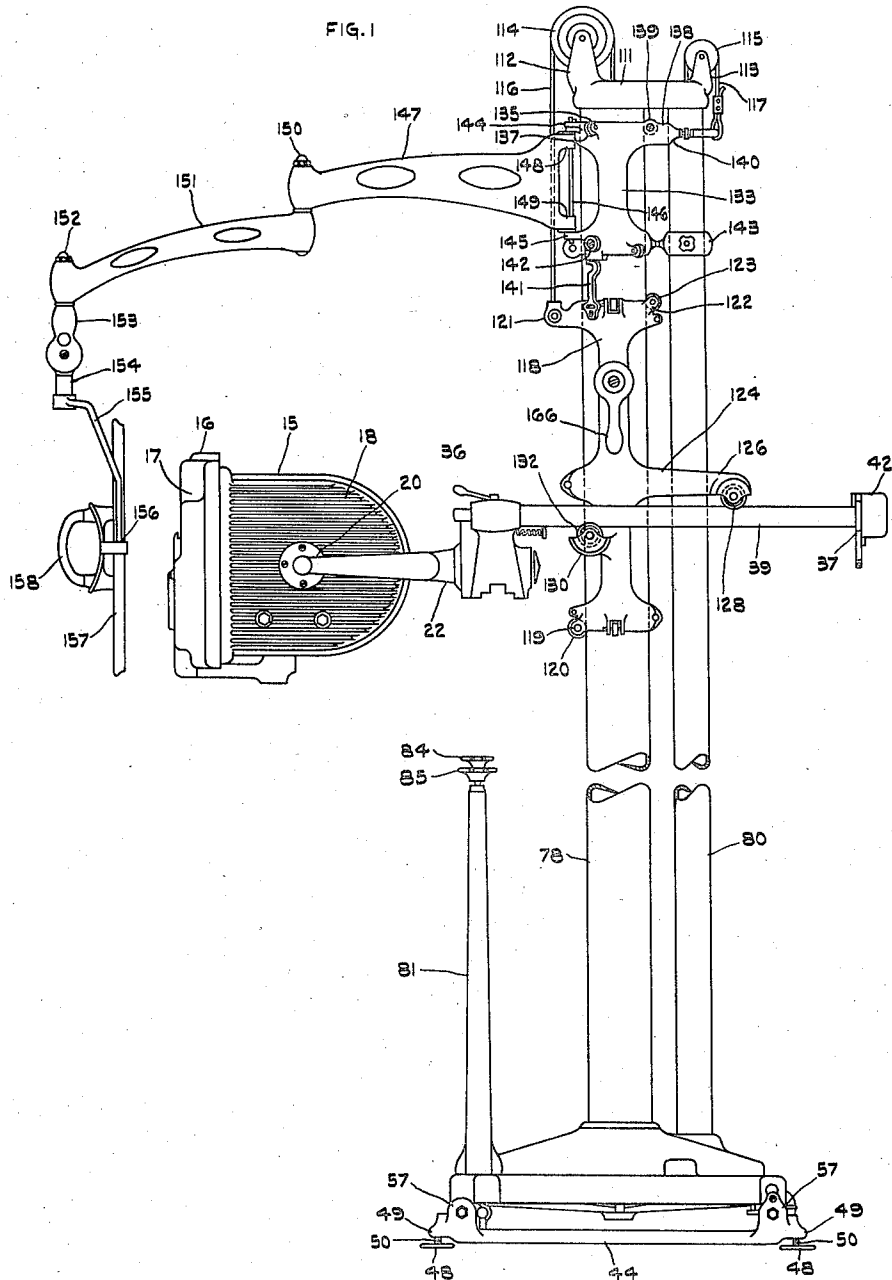
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X-RAY TUBE HOLDER

Filed Aug. 30, 1930

4 Sheets-Sheet 1



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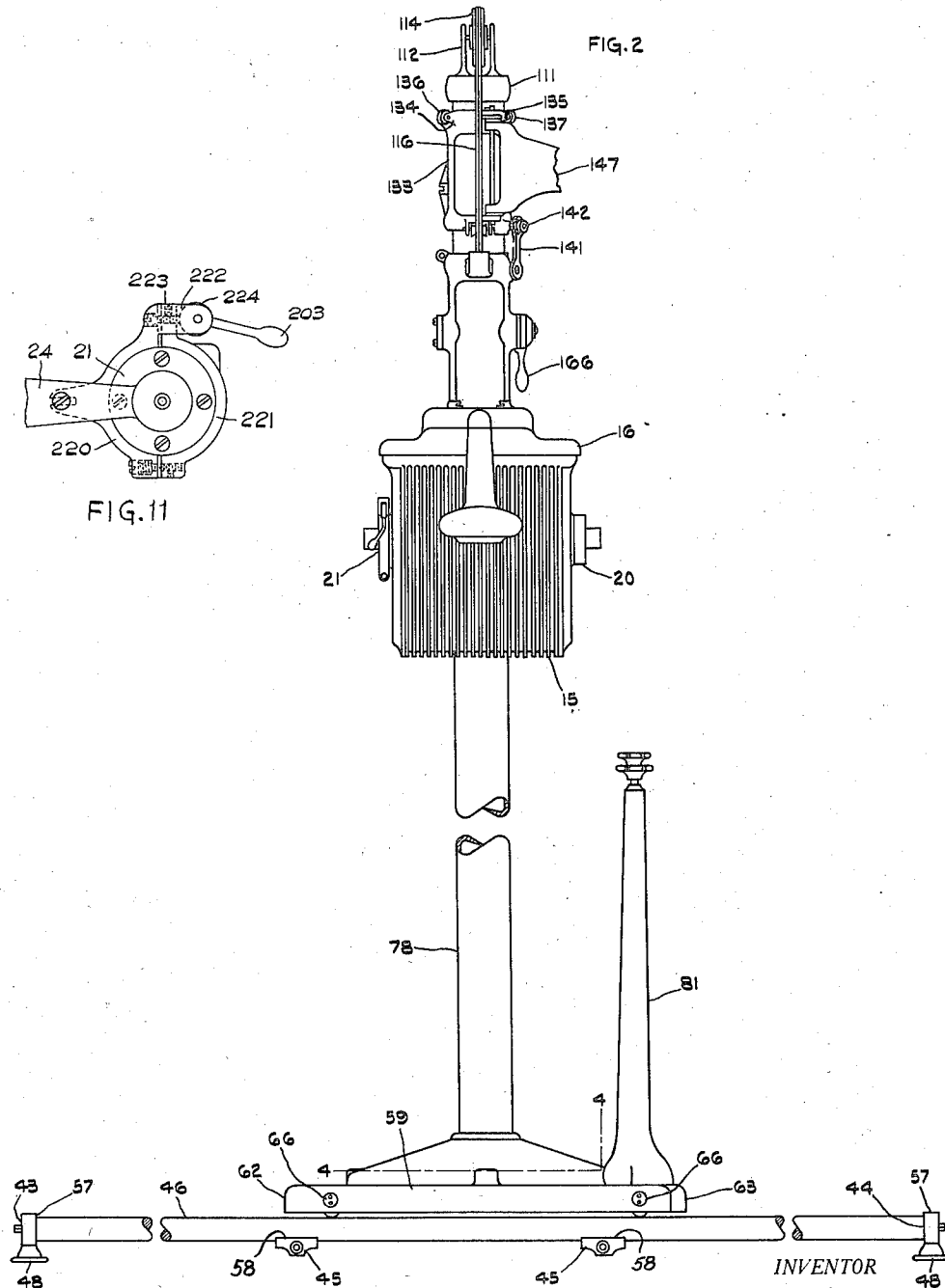
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X-RAY TUBE HOLDER

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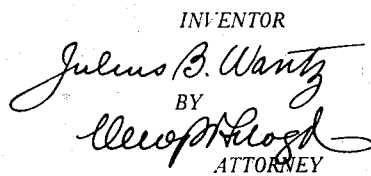
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X-RAY TUBE HOLDER

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X-RAY TUBE HOLDER

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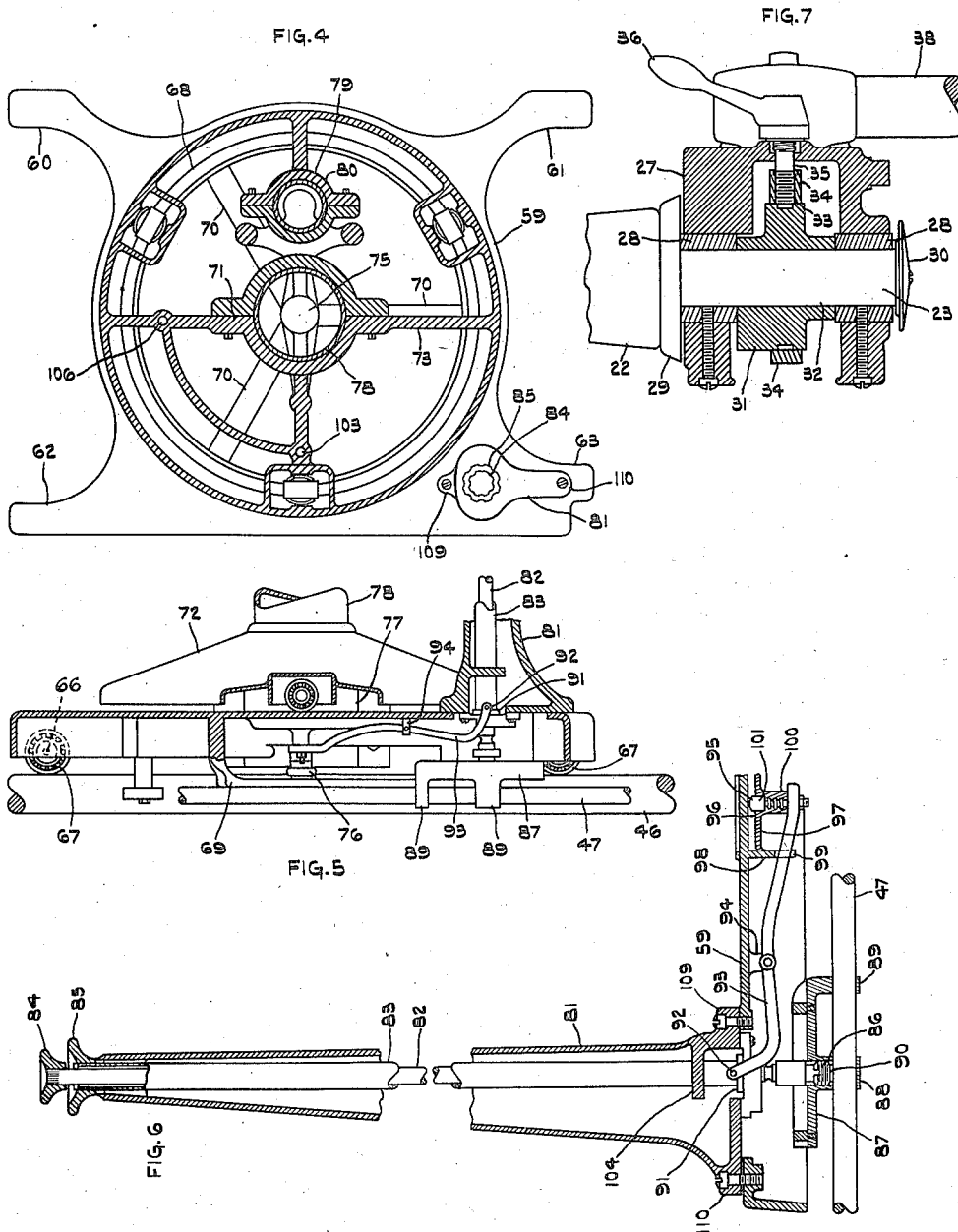


FIG.7

FIG. 5

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UNITED STATES PATENT OFFICE

2,001,004

X-RAY TUBE HOLDER

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Application August 30, 1930, Serial No. 478,944

8 Claims. (Cl. 250—34)

The present invention relates to X-ray apparatus and has particularly to do with a supporting stand for an X-ray tube and the mechanism associated therewith.

15 Rapid strides are being made in the X-ray art. Unification of the apparatus connected therewith is being had. Marked improvement in X-ray apparatus structure giving greater flexibility to such apparatus and producing finer results is being obtained.

10 With the introduction of oil immersion for X-ray tubes and transformers a tube being contained in a "head," the whole technique of the X-ray art has been modified and has been changed to such an extent that new, improved and different apparatus for holding such oil immersed tubes and their heads has been devised as a matter of necessity. While some of the structures now being produced may appear to be quite similar in principle to previously employed apparatus where an X-ray tube was used with its exposed high tension wires, there is a fundamental difference which may not be instantly perceived or discovered upon a casual examination of a drawing accompanying an application for patent for these improved devices.

25 An X-ray tube with its exposed wires and its shield was relatively light in weight. It was a cumbersome device, however, and there were many limitations to its operation. The ever presence of high tension wires in juxtaposition to the patient and the operator, as well as the inadequate protection which the conventional shield afforded from X-light made the whole apparatus a dangerous mechanism although its utility was omnipresent.

30 With the introduction of heads containing the high tension transformer and X-ray tube, and with the use of oil immersion for cooling and insulating the X-ray apparatus mounted in such a head, an entirely new field of X-ray development opened. The heads which are employed for containing X-ray tubes and transformers are quite large and extremely heavy. The supports for such heads and the apparatus needed for rendering the operation of such heads flexible are wholly different from the supports which could be and were employed in association with the relatively light tube and lead glass bowl shield thereabout. The changes in the suspension of the X-ray tube have led to many changes in the ancillary apparatus.

55 One of the objects of the present invention is to provide a suitable mechanism for association

with an X-ray head and which will provide an improved support for said head.

Another object of the invention is the provision of a support for an X-ray head which support cooperatively and independently maintains instrumentalities for use in association with such head.

Another object of the present invention is an improvement of the present type of support to lend greater strength and increased flexibility thereto.

A further object of the invention is the provision of improved manipulatory means for an X-ray head, as well as improved structure for the instrumentalities used in association therewith and for the support thereof.

Other objects of the invention include the improvement of the details of structure of mechanisms associated with X-ray tube head supports, and the accessories supplied for use with an X-ray tube.

These objects and such other objects as may hereinafter appear, are obtained by the novel structure, unique arrangement, and improved combination of elements shown in the single embodiment of the invention illustrated in the accompanying four sheets of drawings, hereby made a part of this specification, and in which:

Figure 1 is a side elevation of one form of an X-ray apparatus embodying the invention, a part of the standards being broken away for compactness of illustration;

Figure 2 is a front elevation of the device shown in Figure 1;

Figure 3 is a plan view of the device shown in Figures 1 and 2;

Figure 4 is a transverse section of the base on the line 4—4 of Figure 2;

Figure 5 is a longitudinal or vertical section through said base;

Figure 6 is a vertical section through brake and release handles used in connection with the standards and base;

Figure 7 is a section through the locking mechanism for holding the head in angular relation to its carriage upon the standards;

Figure 8 is a fragmentary detail in plan view of the carriage lock;

Figure 9 is a transverse section through a portion of said lock;

Figure 10 is a fragmentary detail, partly in plan, of the means for locking said carriage in vertical position on said standards.

Figure 11 is a side elevation of the lock upon the tube head illustrated in Figure 2; and

Figure 12 is a front elevation of the locking device illustrated in Figure 10.

Like reference characters are used to designate similar parts in the drawings and in the description which follows.

What is hereinabove and hereinafter referred to as a "head" comprises a tank 15 and a cover 16 within which an X-ray tube and its high tension and filament transformer are disposed. Upon the tank 15 may be mounted a shutter mechanism (not shown) of conventional structure and through such cover 16 is a window 17, not clearly shown, but of material transparent to X-light as is conventional.

Such a head 15 in the present apparatus, includes an X-ray tube, not shown, a high tension transformer for such tube, and a transformer for filament current for said tube. The tube encased in such head generally comprises the well-known hot cathode (Coolidge) type of tube. Suitable conduits and connections are arranged intermediate the several named parts, the control of the tube being from the outside of the tube head.

There are no high tension conduits external to the tank portion of said head. By insulatory measures and grounding the head is maintained at ground potential and is wholly free from the danger of shocking a patient or attendant.

At each side of the tank 15 which is ribbed at 18 to provide for rapid radiation of the transformer and tube heat, are two bosses 20 and 21. The bosses 20 and 21 provide journals or axle like supports whereby the entire head is supported upon a bifurcated member 22 having a shank 23 extending into a frame support, best shown in Figure 3.

The arms of said bifurcated member 22 may be intermediate the stout shank 23 which is centrally disposed of the arms 24 and 25 of said bifurcated member 22, said shank 23 providing a shaft disposed horizontally in a cross member or yoke 25 which forms the front part or the front transverse member of a rectangular carriage (see Figure 3). Said shank 23 is adapted to be rotated in a boss 27 in said transverse member 26, there being in said boss two bushings 28 providing journals for the rotation of said shank 23. On said shank 23 adjacent said bushings are collars 29 and 30 to prevent axial displacement of said shank.

Intermediate said bushings 28 which are secured in position by screws, as shown, or in some other suitable manner, and about the shank 23 is a friction ring 31. This has an aperture 32, truly round with clearance, there-through, and in which shank 23 may freely rotate when no force is applied to the ring to cause a portion of its surface to engage said shank 23.

At one side, said ring 31 has a boss 33 and a sleeve 34. Secured therein, for rotation, is a threaded shank 35 which is mounted for rotation without axial movement in the top section of transverse member 26. The threads on said shank 35 extend into said sleeve 34 which has a complementally threaded portion to cause said ring 31 to be drawn upwardly when shank 35 is rotated in one direction by handle 36 secured thereto and forced downwardly when said handle is moved oppositely. The under portion of the secured end of handle 36 is adapted to ride on a horizontal section (boss 27) of the transverse member 26.

When drawn upwardly ring 31 engages at the under surface of aperture 32 the under surface of shank 23 whereby to prevent relative movement of said shank 23 to said transverse member 26. When lowered, ring member 31 disengages itself from close contact with member 23 so that the shank 23 and the head supported by bifurcated member 22 may be rotated on a horizontal axis and relatively to transverse member 26.

The remainder of the rectangular carriage of which member 26 is the front member includes a transverse back piece 37 and two tubular or side members 38 and 39 which extend from enlarged portions or bosses upon the front transverse member 26 to the rear transverse member 37 in both of which the rods are firmly anchored. At one side of member 37 is an extension 40, and on the same side of transverse member 26 is a rod support 41. The ends of said tubular members or bars 38 and 39 are securely fastened in said front transverse member 26 after extending through the bosses at the sides of said front member. A counterweight 42 may be secured to member 37.

For maintaining said head and the supporting members therefor at a desired and selected elevation above a patient, or a table upon which a patient is disposed, or in proper relation to a vertical panel used in association with a patient, there is provided a movable stand which supports the rectangular frame.

For flexibility just described, such movable stand is disposed upon a track or fixed base on which it may ride.

The fixed base for the device comprises end members 43 and 44, transverse members 45, two parallel rails 46, and an ancillary rail 47. The transverse members 43 and 44 have at each end a flat shoe 48 which is threaded into lugs 49 at the outside thereof. The lugs 49 are threaded vertically and the shanks 50 on the adjusting members extend therethrough.

Rotation of a shank 50 changes the relative position of the adjusting member to the lug 49 whereby to take care of an unevenness in the floor or other supporting plane. Such an adjusting member is at each side of the end members 43 and 44.

Each of the end members 43 and 44 has a lug portion 57 to surround the standard supporting rails 46 and the supporting rails 46 are secured therein by any suitable means.

The transverse intermediate members 45 comprise lug portions 58 the top side of which engages a fraction of the under surface of the rails 46. From each of the transverse members, there is a lateral lug extension carrying an adjusting member similar to that on the end members. In assembly, opposite end members are reversed in position. The ancillary rail 47 is of smaller diameter than the supporting rails 46 and is secured at its under surface by screw or other means to the end members 43 and 44 and the transverse members 45 whereby it is maintained constantly in parallelism with the parallel supporting rails 46.

The movable standard support comprises an H shaped casting 59, having four legs 60, 61, 62 and 63. One of the legs, 63, is somewhat wider than the other three, 60, 61 and 62. All four of the legs are shaped like inverted U's in cross section, thus forming two sides providing journals for axles 66 upon which roller bearings 67 rotate.

The top surface of the casting 59 is substantially flat. Around its top is a circular track 68.

Secured to the H shaped casting 59 or integral therewith is a cast portion comprising a spider or web having arms 70 which terminate beneath and are secured to the dished center casting 59.

Above the casting 59 is a round casting 72 having reinforcing members on its under side which carry a two part clamp 71 and a short rod or shaft 75, both centered with relation to casting 72. Shaft 75 passes through a suitable aperture in casting 59 and the spider having the arms 70. A collar 76 is secured at the end of shaft 75 below casting 59 and the spider to maintain the upper casting 72 against raising or tilting in respect to casting 59 and to prevent accidental separation of said parts 59 and 72 while at the same time permitting of relative rotary motion between the two on a vertical axis.

In the central portion of the upper casting 72 is a standard seat 77 which is embodied in clamp 71 on the under side of the upper casting 72. A large vertical standard 78 projects down thereinto and is firmly anchored in said seat 77. Said top casting 72 also has a part thereof a second standard seat 79 in which a smaller standard 80 is adapted to be disposed, said smaller standard 80 being parallel with said larger standard 78. The two standards 78 and 80 combined provide the support for the mobile portions of the apparatus, later to be described.

Upon the larger leg 63 of casting 59, there is disposed a housing 81 which extends vertically upward. Said housing is suitably secured to the top of leg 63. In said housing 81 there are mounted for rotation therein, one shaft being within the other, two shafts 82 and 83 which terminate in handles 84 and 85. The smaller internal and longer shaft 82 is mounted in a threaded seat 86.

Suspended to the standards support for movement therewith is a brake shoe 87. This comprises an elongated member having two lugs 88 and 89 extending about but not around the smaller rail 47. The brake shoe 87 is so mounted that downward rotation of shaft 82 causes the end thereof to impinge upon a button lug 90 at the top of said shoe whereby to force said shoe 87 into right frictional engagement with the smaller rail 47 thereby causing said shoe 87 to become immovable along said rail 47 and concurrently rendering the standard support immovable along its supporting rails 46.

The outer shorter and hollow shaft 83 which rotates about the longer shaft 82 and is operated by the lower handle 85, extends downwardly to the top of the lower casting 59. There it is supplied with the collar 91 to prevent too great downward movement. To a pin 92 at the side thereof is a link or lever 93. Said hollow shaft 83 is slidable longitudinally on shaft 82 and when it is lifted it concurrently lifts the pin 92 and at the same time elevates one end of the link 93 just referred to.

Said link 93 is pivoted to a stud 94 in said lower casting 59 and at its other end it has extending therethrough a spring plunger 95.

Said spring plunger 95 is in a housing 96 comprising a transverse member 97 and a supporting member 98 having a slot 99 to receive lever 93. Said supporting member is suitably

secured to casting 59, the transverse member including a hub 100.

The under side of the link 93 engages the hub 100 and the plunger 95 extends through the link 93 up into such hub 100 where it is surrounded by a spring which extends from the top side of the link 93 to the head 101 of the plunger 95.

There are two pockets 106 and 103 into which the plunger head 101 is adapted to be seated in the upper casting 72. One of these is in the position shown in Figure 1 and the other is at a ninety degree angle therefrom, the movement being clockwise from the position shown in Figure 1. To limit the upper movement of the shaft 83, the pin 92 is adapted to engage a collar 104 secured in housing 81 and surrounding shaft 83.

The reason for the two positions of the standards is that in one position the head may be used over a table while in the other the head may be pushed to one side to allow free access to the table top to allow ready manipulation of the patient.

Stops are arranged to prevent the movement of the upper casting more than ninety degrees. Thus, if it is desired to move the standards 78 and 80, or their appendages, from one position to the other, the upper handle 85 is lifted whereby the spring catch 95 holding said castings 59 and 72 in one position is released by moving it out of seat 106. The standards are conjointly moved ninety degrees with the upper casting 72 when the spring catch 95, if released, will automatically engage pocket 103 provided therefor and lock the upper casting 72 in its second secure position. To get said casting 72 back to the original position, the same means of release are employed and the standards are swung manually with the casting 72 to the original position.

As a matter of convenience, the housing 81 for said handles and shafts 82 and 83 may be arranged for ready attachment and detachment from the casting 59 by being provided with lugs on opposite sides thereof, one of said lugs 109 being short and being shown at the left in Figure 4, and the other 110 being longer and extending along the top surface of said support to provide adequate support for the housing 81 against angular strains when moving the carriage therewith. Suitable screws or bolts may be employed for holding said housing 81 upon said casting 59.

Said two standards 78 and 80 are locked together at their tops by a yoke 111, the ends of which have brackets 112 and 113 to support two pulleys 114 and 115. Suitable pulleys are selected so that the internal portion thereof falls in alignment with the axis of said standards, so that a weight, not shown, may be arranged to ride up and down it within each of said standards and be secured to cables 116 and 117 passing around said pulleys 114 and 115, the position of said pulleys 114 and 115 being such that no friction is produced by causing the weights or either of them to drag upon any particular portion of the surface of the internal periphery of said tubular standards 78 and 80.

Surrounding said larger standard is a sleeve 118. Said sleeve comprises at its bottom two forwardly projecting brackets 119 which provide journals for roller bearings 120 adapted to engage at spaced intervals the front portion of said standard 78. Opposite said brackets 119, the material of said sleeve extends about the standard 78 but does not engage this post, thereby avoiding friction.

At the top end said sleeve 118, there a forwardly projecting lug 121 which provides an anchor for the cable 116 adapted to be attached thereto, surround the pulley 114, and extend into the larger standard 78 where it is secured to a weight, not shown. The weight not shown provides a counterpoise for the head and the supporting members therefor.

At the back of said upper section of the sleeve 118 are two brackets 122 oppositely disposed with respect to the brackets 119 referred to hereinbefore, these brackets 122 supporting roller bearings 123 which are adapted to engage the rear section of the standard 78. The front bearings 120 are adapted to engage the standard 78 at the front and approximately forty five degrees from the middle front line at each side thereof, while the bearings 123 at the back are at forty five degrees from the middle line of the rear and at each side thereof, thus the sleeve 118 is supported by roller bearings engaging said upright standard ninety degrees apart. The bearings 120 at the front are below the point of the suspension of weight on said sleeve and those at the back being above the point of such suspension so as to distribute the weight suspended therefrom without unduly centered strain upon the sleeve 118 or the standard 78.

Projecting rearwardly from said sleeve 118 is a bifurcated section 124 which is adapted to engage each side of said smaller standard 80 to prevent rotary displacement of said sleeve 118 on standard 78 and which is adapted with other parts to maintain the head in selected position relative to said main standard 78.

Projecting rearwardly from said bifurcated portion 124 are two arms 125 and 126, the ends of which are provided with roller bearings 127 and 128. Beneath the central portion of said sleeve 118 are additional brackets 129 and 130 which project forwardly to provide journals for additional roller bearings 131 and 132.

The side members 38 and 39 of said head supporting carriage are adapted to ride upon said several rollers, the top surface beneath the rear rollers 127 and 128, and the bottom surface on top of the bearings 131 and 132, whereby said rectangular frame members 26, 37, 38 and 39 are held horizontally, but are readily movable transversely of said sleeve. The spacing apart of the supporting rollers 127, 128, 131 and 132 is sufficient to provide for a ready and free movement of said carriage without undue binding on the frame at either the front or back in relation to said rollers.

Above said sleeve 118 on said main standard is a second sleeve 133 which has a plurality of brackets 134 and 135 for roller bearings 136 and 137 which roller bearings are adapted to engage said main standard 78 at its front. At the back of said sleeve 133, is another bracket 138 in which is a bearing 139. The several bearings 136, 137 and 139 permit of the free movement of said sleeve 133 along said standard 78.

Rearwardly extending from said sleeve 133 is a lug 140 which projects to the rear of a device to form an anchor for pulley cable 117 which pulley cord 117 is adapted to be threaded over the pulley 115 and depend into the smaller standard 30, there to have hooked or attached thereto a weight forming a counterpoise for the part of the apparatus now to be described and which is supported wholly upon the upper sleeve.

Said lower and upper sleeves, 118 and 133, are adapted to be attached one to another by a hook 141 on the lower sleeve 118 passing over a stud

142 on the upper sleeve 133. Thus, when the two sleeves 118 and 133 are fastened together, they will move in unison. When the hook 141 is unhooked or released from stud 142, each one of sleeves 118 and 133 may be moved independently of the other. For purposes of convenience there is provided upon the smaller standard 80 a locking ring 143 by virtue of which the upper sleeve 133 may be locked in its uppermost position to prevent any tendency on its part to become misadjusted relatively to sleeve 118 when the two are detached.

At the front of said upper sleeve 133 are two projections 144 and 145 intermediate which, is a suitable bolt 146, the ends of which extend through said projections to be secured against displacement.

Between said projections is an arm 147 having apertured lugs 148 and 149 through which bolt 146 projects, thus providing pivotal mounting for said arm 147 which extends outwardly from the device. Pivotaly mounted to arm 147 by a vertically disposed bolt 150 is a second arm 151 and by a similar bolt 152 there is attached to the second arm a section 153 forming one half of an adjustable connecting member. The other half 154 of said adjustable member terminates in a highly adjustable support for a fluoroscopic screen, comprising a bifurcated support 155, between which at points 156 is a fluoroscopic screen 157 having handles 158. Said support is a bifurcated bracket which extends to the side of said screen 157, the screen being freely adjustable and moving almost at the will of the attendant. The handles 158 are provided upon said screen 157 so that it may be readily moved about the pivots 156 in said bifurcated portion 155 and may be further adjusted by said handles by the force applied thereto, causing said pivoted arms 147 and 151 to angularly adjust themselves to any selected position desired by the operative or attendant.

For locking said main sleeve 118 in vertical adjustment upon said standard 78, there is provided at the side thereof a locking lever member which, by rotation, is adapted to release spring pressure upon the sleeve member 118, whereby a pair of blocks loosely secured one to another are adapted to be forced against or released from said standard 118 thereby securing said carriage in any adjusted position upon said standard 78, or releasing said sleeve from such position.

The sleeve 118, at its side, has a locking device that is illustrated in detail in Figures 10 and 12. A shoe 159 engages the standard 78. A follower block 160 riding in a slot in sleeve 118 supports shoe 159 and has a shank 167 surrounded by a spiral spring 163. Shank 167 can not revolve. The spring 163, shank 167, block 160 and shoe 159 comprise a plunger 162.

A housing 164 attached to sleeve 118 by screws 214 encloses the shank 167. The outer face of housing 164 comprises an angularly cut camming surface. The inner part of the housing outwardly of the camming surface forms an apertured hub over which is an apertured cap 165, which has a camming surface 210 slidably engaging the camming surface on housing 164.

One end of the spring 163 presses against the inner part of the closed end of housing 164. Shank 167 passes through an aperture or opening in the housing and through the opening in cap 165 which registers with the opening in the housing 164. A ring washer 205 is disposed between the housing 164 and cap 165. A cap 211

is fastened to the end of shank 167 by a screw 212. Stops 213 may be provided between the camming surfaces if desired.

The cap 211 is pressed against housing 165 by screw 212, the cap 165 being relatively movable to the cap 211. The spring 163 serves to force the shoe 159 and attached members inwardly. As lever 166 on cap 165 is moved, the camming surfaces cooperate to force the cap 165 outwardly, compressing the spring 167, and moving the entire plunger 162 outwardly, freeing the shoe 159 from stand 78 to allow the sleeve 118 to be moved relatively thereto.

It will be noted that the transverse sliding frame is provided with a cushioned member 206 disposed upon transverse member 26 whereby it is impossible to move said frame beyond a predetermined distance in a rearward direction.

Also on the bifurcated member 124 is a similar bumper 169 which is adapted to retard too great forward movement by engagement with transverse member 37.

For the purpose of taking stereoscopic views, there is provided upon the side of said horizontal carriage as previously described a pair of brackets which support a rod which is adapted to be rotated therein in the manner hereinafter described. By rotation it may be caused to actuate a locking mechanism. Along said rod is a sleeve. This sleeve is adapted to be secured in a selected position by a thumb nut which is threaded in the top surface thereof and which is adapted to be threaded into engagement with said rod. By adjustments, the carriage may be moved predetermined distances.

At the left hand side of the device through an ear 41 at the front and an ear 40 at the rear is a rod 170 having a handle 171 at the front so that it may be moved through an angle.

Said rod 170 is slotted longitudinally at 172 to facilitate its being locked in a selected position.

Intermediate the length of the horizontal frame is a yoke 173 which surrounds the left hand frame rod 38 but through which yoke 173 said rod 170 slides. Said yoke 173 also surrounds said rod 170 disposed in the two eyes 40 and 41 and there is intermediate the yoke 173 and the vertical movable sleeve 118 a flexible but secure connection 174 to maintain the yoke 173 in alignment with the sleeve 118.

On the under part of the yoke 173 is a shoe 175 which is adapted to be moved against the rod 38 as an incident to the movement of the handle or lever 171 hereafter called the locking lever. Movement of the handle 171 brings shoe 175 against rod 38 as is shown in Figure 9. When so disposed, the horizontal carriage cannot move, but when the handle 171 is rotated to another position, the carriage is released for movement in and out.

By turning the rod handle 171 in a clockwise direction the cam or shoe 175 is forced against the larger rod 38 gripping the larger rod 38 to prevent movement of the horizontal frame frontwardly and backwardly because, of said yoke 173 so secured to the said vertically moving sleeve.

On the top of the yoke 173 is a stud 177. On the small rod 170 and adjustable therealong is a shoe 178 carrying therethrough a thumb screw 179 whereby it may be made to take any selected position along said rod 170. Said shoe 178 has a lateral projection 180 one side of which terminates in a pointer or arrow 181 in

order to indicate a central position. Said extension 180 is slotted at 182 substantially its entire length and the stud 177 upon the yoke 173 projects therethrough, said stud 177 terminating in an enlarged head 183, as for example, a screw head, to prevent displacement of the extension 180 from the stud.

By this arrangement, the distance of a stereo-shift is determined. For example, the starting position for such stereo-shift is obtained by an adjustment of the horizontal frame. There then is an adjustment of the extension member to indicate the length of the stereo-shift. By the locking means adjacent to the extension, heretofore described, the extent of stereoscopic shift is determined and the adjustment made permanent. When the first exposure is taken, the horizontal frame is moved backwardly the distance admitted by the remaining portion of the slot, and when the end of the slot is attained the second radiograph is taken.

When it is desired to prevent any movement whatever of the horizontal frame, then the other locking member is employed after the proper position for the head has been determined.

The tube head tank 15 has at its side a means for sustaining it in a selected angular position. A semi-circular member 220 is attached to the arm 24. A second semi-circular member 221 is mounted on arm 24 opposed to member 221 and the two are combined to form a slit ring fitting closely about circular boss 21. One end of member 220 terminates in a split lug 222 between the legs of which a tongue 223 on member 221 extends. A lever 203 is pivoted between the legs of the split lug 222, and has at its inner end an eccentric 224. As lever 203 is moved, the eccentric 224 contacts the tongue 223 to press the two members 220 and 221 together to grip the boss 21, and as the movement is reversed, the lever 203 disengages the lug 223 to loosen the grip of members 220 and 221 to free the boss, permitting the tank 15 to be swung freely upon its pivotal supports. A screw as shown may firmly connect members 220 and 221 at one side and another screw loosely connects such members at their other side.

I claim:

1. X-ray apparatus comprising a base, tracks for said base and along which it is movable, means for locking said base on said tracks, a turntable on said base, standards on said turntable, and X-ray apparatus of different kinds secured to one of said standards.

2. Means for determining the horizontal limits of movement of an X-ray tube for stereoscopy, comprising a horizontal frame, a head depending from and beyond said frame, standards within said frame, a collar commonly engaging said standards to prevent rotation, movable vertically thereof, and having arms to support said frame, a yoke connected to said collar, a rod rotatably supported by said frame and movable longitudinally through said yoke, a stop member adjustable on said rod to determine the limit of movement of said rod through said yoke, and means held against axial displacement by said yoke and rotatable with said rod for engaging said frame thereby rendering said frame immovable with respect to said yoke.

3. In X-ray apparatus, a track, a base movable along said track, a platform rotatable on said base about a vertical axis, standards mounted on said platform, an X-ray tube head support upon one of said standards and maintained by

another of said standards in constant alinement with the axes of said several standards, and an X-ray tube head on said X-ray tube head support.

5 4. X-ray tube supporting apparatus comprising a track, a base movable along said track, a turntable on said base and rotatable thereon about a vertical axis, a plurality of standards on said turntable, an X-ray tube head support on
10 one of said standards, an X-ray tube head on said support, and means cooperating with said turntable for locking said turntable in predetermined selected positions on said base.

5. X-ray tube supporting apparatus comprising a track, a base movable along said track, a
15 turntable on said base and rotatable thereon about a vertical axis, a plurality of standards on said turntable, an X-ray tube head support on one of said standards, an X-ray tube head on
20 said support, latch means for engaging a plurality of seats on said turntable for locking said turntable in predetermined selected positions, and a release means for freeing said latch from any of said several seats.

25 6. Means for mounting an X-ray head comprising a turntable and supporting means therefor, upright standards on said turntable, one of said standards having an axis coinciding with the axis of said turntable, the other standard
30 being separated from said first standard, a collar

on one of said standards and guided by the other of said standards, arms each provided with a bearing and depending from said collar, a frame upon said bearings, and an X-ray tube head containing an X-ray tube depending from said
5 frame.

7. Means for mounting an X-ray tube head for vertical and horizontal movement comprising a base, a turntable on said base, spaced apart
10 upright standards mounted on said turntable, a collar about one of said standards and guided by the second of said standards, legs from said collar about the second standard and having bearings therebeneath, shorter legs extending
15 from said collar in the opposite direction and having bearings thereabove, a frame on said bearings, and an X-ray head containing an X-ray tube rotatably mounted at one end of said frame.

8. Means for mounting an X-ray tube head
20 comprising a track, a plurality of standards, a platform therefor, a base movable along said track and on which said platform is rotatable, a tank for an X-ray tube and tube energizing instrumentalities and containing oil insulation
25 therefor, a tube and tube energizing instrumentalities in said tank, and means on one of said standards for supporting said tank.

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