

May 15, 1951

W. A. RUSH

2,552,592

STAND FOR POSING SUBJECTS FOR X-RAY PICTURES

Filed Sept. 30, 1947

3 Sheets-Sheet 1

Fig. 1.

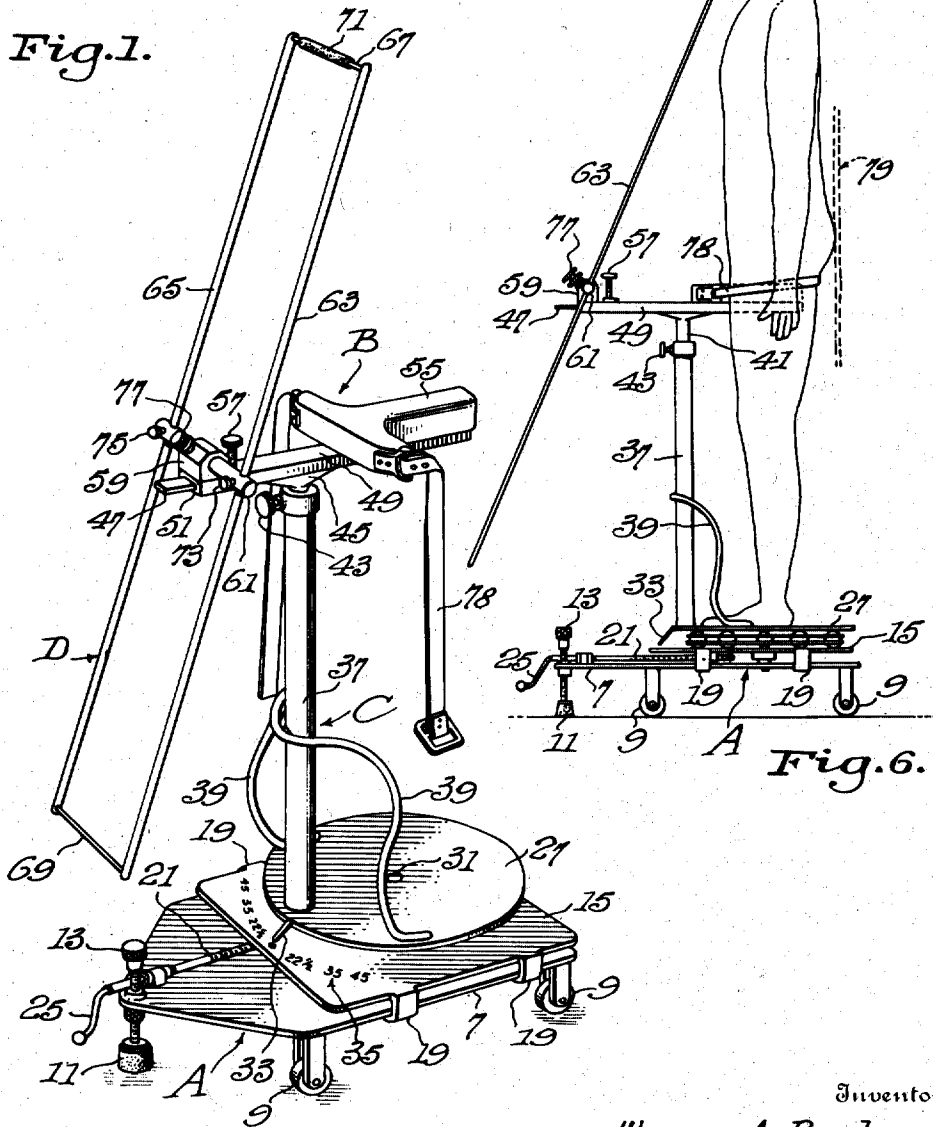


Fig. 6.

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May 15, 1951

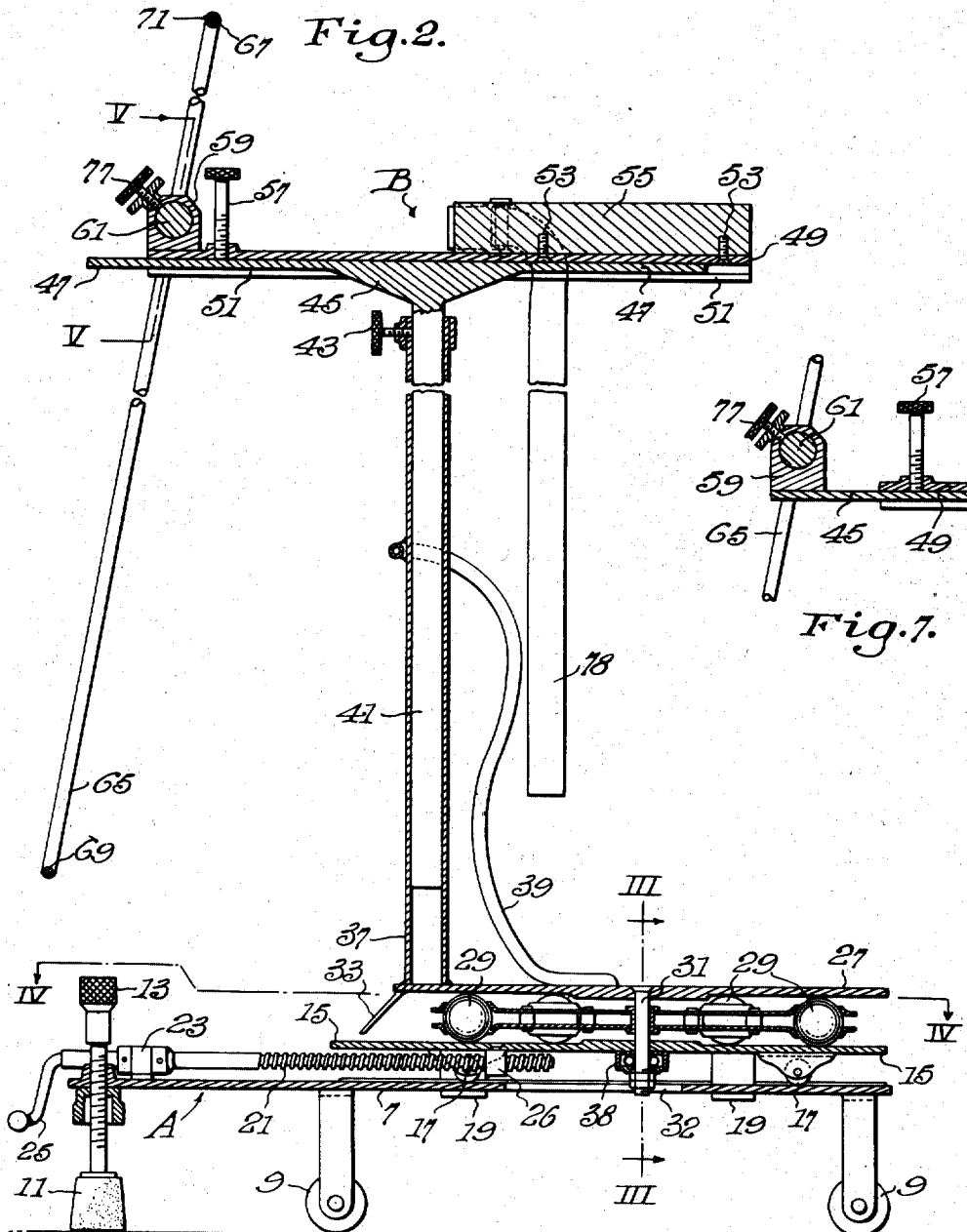
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3 Sheets-Sheet 2



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3 Sheets-Sheet 3

Fig. 3.

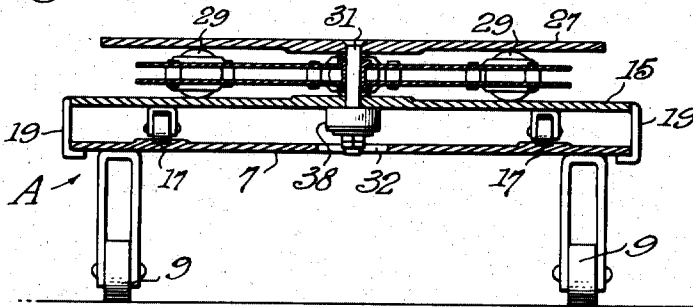


Fig. 4.

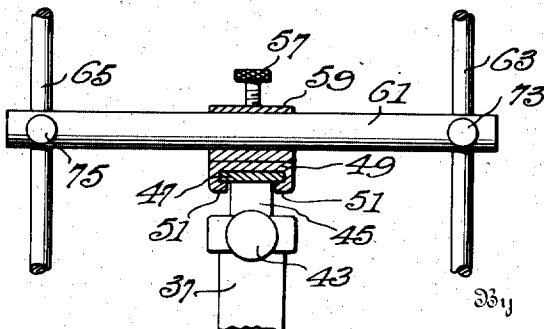
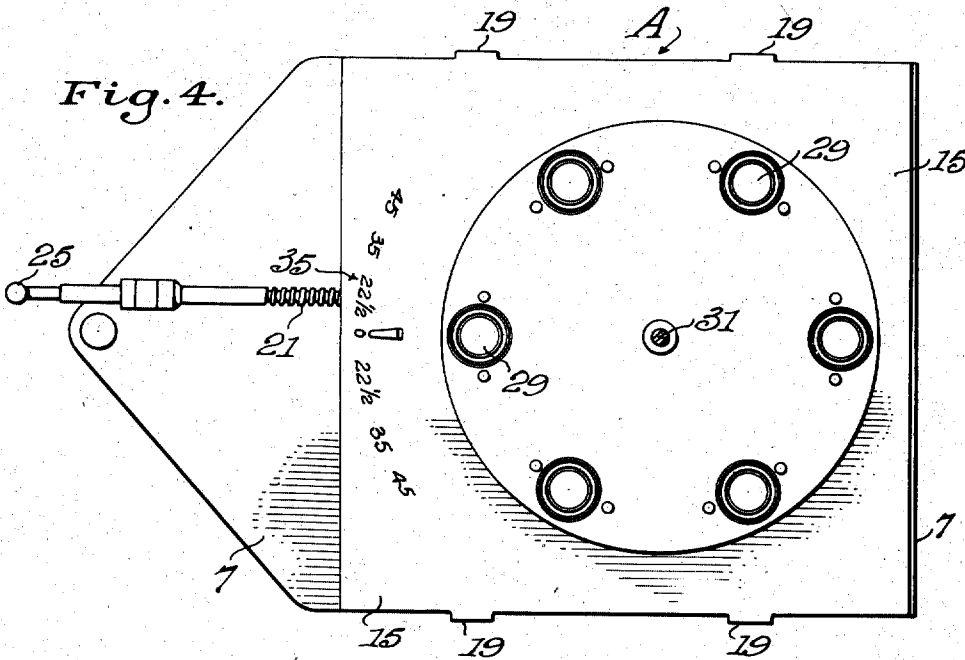


Fig. 5.

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STAND FOR POSING SUBJECTS FOR X-RAY PICTURES

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7 Claims. (Cl. 155—36)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

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The invention described herein may be manufactured and used by or for the Government for governmental purposes, without payment to me of any royalty thereon.

In accordance with the present invention, there is provided an improved apparatus facilitating rapid physical examinations of a large number of subjects, where only relatively unskilled operating personnel are available for such services.

More particularly the invention relates to equipment for facilitating the radiography of the spine and pelvis, and also of the chest.

In such examinations, both routine and special studies require accurate positioning for correct X-ray exposures, multiple positions being the rule. In fact, examinations of this character, on a conservative estimate, require 3.5 positions per person examined. Also, for diagnostic purposes, it frequently is necessary to reproduce former positions of the subject with ease and accuracy.

Heretofore, considerable difficulty has been experienced in obtaining of the desired results, particularly where relatively untrained operating personnel have been required to be employed, these difficulties causing excessive spoiling of film and economic loss, the greatest loss resulting from inadequate fixation and stabilization of position of the subjects being examined, and the virtual impossibility of exactly duplicating former positions of the subject when retakes of the former exposures are required for any purpose. To be able positively to reproduce former positions of a subject with ease and accuracy is not only gratifying to the radiologist but even more so to the orthopedist who requires internal check-ups on previous examinations and estimations of therapeutic results.

The present invention provides an improved positioning device for the radiological examinations of subjects and also for deep X-ray therapy, where the subjects are not too ill to stand.

One of the objects of the present invention is the provision of a positioning device for radiography of the chest, spine, pelvis and abdomen, which device is simple in construction and operation, and which permits radiography of the aforesaid parts of the human anatomy in a multitude of desired angles, which angles can be reproduced accurately at will at later examinations by referring to the recorded angles and re-establishing these angles.

A further object of the invention is to provide a positioning device for the indicated purpose which relatively unskilled technicians can master quickly while obtaining a multiplicity of positions by very simple manipulations.

A still further object of this invention is to provide an accurate means of measuring leg length and detecting readily even very slight inequalities in the length of the legs of a subject,

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the existence of which inequalities is becoming of increasing importance in analyzing structural instabilities as a determining factor in low back symptoms.

Further objects and advantages will become apparent as the description proceeds and the features of novelty will be pointed out in particularity in the appended claims.

The invention will be understood more readily from a consideration of the appended drawings, in which:

Fig. 1 is a perspective view of the positioning device of the present invention;

Fig. 2 is a sectional elevation of the positioning device of Fig. 1, the view being taken on the vertical axis of the device;

Fig. 3 is a sectional elevation on the line III—III of Fig. 2, looking in the direction of the arrows;

Fig. 4 is a sectional plan view taken along the line IV—IV of Fig. 2, looking in the direction of the arrows;

Fig. 5 is a sectional elevation taken along the line V—V of Fig. 2, looking in the direction of the arrows;

Fig. 6 is an elevational view showing the apparatus in use; and

Fig. 7 is a fragmentary sectional elevation of a modification.

Referring more particularly to the drawings, it will be seen that the improved positioning device of Fig. 1 comprises, generally, a base A, a mounting means B, a support C and an adjustable frame D.

The base A comprises a platform 7, mounted on rollers or casters 8 for ready transport to the station of use. The positioning device of the invention may be fixed in the desired location by means of a rubber shod foot 11 that is threadedly mounted in the platform 4, and operated by a knurled thumb-screw 13.

Mounted on the platform 7 is a second platform structure 15 which is mounted on rollers or casters 17 to permit longitudinal adjustment of the platform structure 15 relative to the platform 7 and is secured thereto by interlocking lateral flanges 19, movement of this second platform structure 15 being effected by a screw 21 mounted in a bearing 23 of the platform structure 15 and operated by a crank-handle 25 for turning the screw 21 which passes through a nut 26 attached to the platform 15 for adjusting the platform responsively to movement of the screw.

Above this platform structure 15 there is mounted a rotatable disc or turntable 27, which is carried by anti-friction bearings 29 that engage the upper surface of the platform structure 15, as is indicated clearly in Fig. 2. The turntable 27 rotates on a spindle 31 which is secured to the turntable 27 and extends through the platform structure 15 and the bottom platform

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7, which is provided with a slot 32 for enabling the bodily movement of the platform structure 15 and the turntable 27. The spindle 31 operates in anti-friction bearings 38. The turntable 27 carries a pointer 33 that points finger-like from the exact center of the base of standard 37 and cooperates with angular graduations 35 on platform structure 15, which enable the reproduction of angular positions, as will be explained hereinafter.

Mounted on the turntable 27 is the upright tubular standard 37 that is positioned on the periphery of the turntable 27 and braced by braces 39 secured to the standard 37 and the periphery of the turntable 27, so that the standard 37 is maintained rigidly perpendicular to the turntable. Telescopically mounted in the standard 37 is a mounting bar 41, adjustment of which relative to the standard 37 is maintained by a set screw 43. The top of the bar 41 is provided with a mounting bracket 45 which carries a metal strip 47 of adequate width, shape, and height, and which is mounted to coincide with a plane parallel to the surface of the turntable 27 and directly above a line drawn through the center of the turntable that bisects the base of the vertical standard 37.

On the strip 47 is slidably mounted a bar 49 which is held on the strip 47 by slide flanges 51. This bar 49 has mounted on it by means of screws 53, or equivalent fastening means, a saddle member 55, which preferably is made of wood and which is shaped to meet the anatomical contours of the fronts of the thighs and perineal crotch of the subject being examined or treated. This saddle member 55 is adjustable forwardly and backwardly along the strip 47, proper adjustment being fixed by means of a set screw 57. This horizontal adjustability is required because of variables in body thickness as between different individuals.

Affixed transversely to the frontal extremity of the bar 49 is a hub housing 59 for shaft 61. This shaft 61 is perforated to receive slidably adjustable rods 63 and 65 which are joined together at their ends by upper cross bar or bit bar 67 and lower cross bar 69. The labial or bit bar 67 is provided with a resilient tubular cushion 71. The resulting frame consequently is adjustable vertically and angularly, through rotation of the shaft 61, relatively to a subject positioned on the saddle 55, so that the subject may receive the bit bar 67 in his mouth and bite upon the tubular cushion 71, which is replaceable by other similar cushions for each use. Vertical adjustment of the rods 63 and 65 is secured by set screws 73 and 75, and the angular adjustment of the rods and shaft 61 is secured by set screws 77, extending through the housing 59 into engagement with the shaft 61. The adjustable rods 63 and 65 and the top cross bar 67 provide an adjustable head and upper spine fixation attachment.

In operation, the patient is instructed to remove all clothing, including shoes, step up onto the turntable 27, mount the saddle 55 and draw it firmly into his crotch so that the forward position of the thighs closely engage the wide forward portion of the saddle in the recesses formed therewith by the stem portion of the saddle. It is important that the patient make the proper adjustment of the saddle 55 himself. The proper height of the saddle 55 thus being determined, it is maintained by tightening set screw 43. Having accomplished this, a web belt

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78, fastened to the saddle 55 as shown clearly in Figs. 1 and 2, is passed around his thigh and snugly drawn and buckled securely, thus accomplishing secure fixation of the thighs against the saddle.

The patient then is positioned before a vertical Bucky diaphragm 79 with the indicator 33 pointing to the zero point on the scale 35. The platform 15 is moved forwardly or backwardly as seems desirable to the operator by rotation of handle 25 and screw 21. The saddle 55 is adjusted horizontally so that the patient's buttocks contact the Bucky diaphragm 79 and an X-ray tube is centered accurately for an anterior-posterior exposure. Lateral positions are provided by simply rotating the turntable 27 to ninety degrees. Angle films may be made at any degree desired, and these angles can be reproduced accurately at will at later examination by referring to the recorded angle and re-establishing it.

Using the positioning device of the present invention, the entire spine, chest and abdomen of a patient may be examined at all angles without requiring any manipulation other than the simple rotation of the turntable 27 with the patient positioned upon it, as has been described.

The posture of a patient positioned by means of the device of the present invention is indicated diagrammatically by Fig. 6 which posture can be duplicated at will at any time desired for checking findings or for treatment. In Fig. 6, reference numeral 79 indicates the Bucky diaphragm.

Fig. 7 indicates a slight modification in the previously described construction. In the modification of this view, the hub housing 59 is shown as being mounted on the metal strip 47 so that the saddle 55 can be adjusted horizontally relative to the hub housing 59.

Having thus described my invention, what I claim as new and wish to secure by Letters Patent is:

1. An X-ray stand adapted to position a subject immovably relative to X-ray apparatus, which comprises, in combination, a base, a turntable mounted on the base, means for horizontally adjusting the turntable relative to the base, a mounting standard mounted on the turntable peripherally thereof, a vertically adjustable carrying member mounted on the mounting standard member, a horizontal bar mounted on the carrying member, a saddle seat carried by the bar, means enabling adjustment of the saddle seat relative to the bar, the said saddle seat being adapted to fit snugly to the fronts of the thigh and perineal crotch of the subject, means carried by the saddle for securing the subject to the saddle, and an adjustable frame mounted on the bar and including a labial bar adapted to be gripped in the mouth of the subject while the subject is mounted on the saddle member, thereby fixedly securing the subject rigidly upright in a readily duplicatable position for re-examination when desired.

2. An X-ray stand adapted to position a subject immovably relative to X-ray apparatus, which comprises, in combination, a base, a turntable mounted on the base, means for horizontally adjusting the turntable relative to the base, a mounting standard secured vertically to the turntable adjacent to the periphery thereof, a carrying member telescopically mounted in the mounting standard for vertical adjustment relative thereto, means for fixing the carrying member in predetermined vertical adjustment, a hori-

zontal bar mounted on the carrying member, a saddle seat mounted on the horizontal bar, means for horizontally adjusting the saddle seat along the bar, the saddle seat having a shape adapted to fit snugly the fronts of the thighs and perineal crotch of the subject, means carried by the saddle for securing the subject to the saddle, a tubular housing carried by the bar, a shaft turnable in the housing, a frame adjustably mounted in the shaft and having a labial cross bar on the frame adapted to be gripped by the teeth of a subject, whereby the subject is postured fixedly uprightly in a readily duplicatable position for re-examination when desired.

3. An X-ray stand adapted to position a subject immovably relative to X-ray apparatus, which comprises, in combination, a base, a turntable mounted on the base, means for horizontally adjusting the turntable relative to the base, a mounting standard secured vertically to the turntable adjacent to the periphery thereof, a carrying member telescopically mounted in the mounting standard for vertical adjustment relative thereto, means for securing the carrying member in desired vertical adjustment, a horizontal bar mounted on the carrying member, a saddle seat mounted on the horizontal bar, means for horizontally adjusting the saddle seat along the bar, the saddle seat having a shape adapted to fit snugly the fronts of the thighs and perineal crotch of the subject, means carried by the saddle for securing the subject to the saddle, a hub housing carried by the horizontal bar, a shaft turnable in the housing, a frame including spaced lateral bar members adjustably mounted in the shaft for vertical movement relative to the shaft and a labial cross bar for the frame adapted to be gripped by the teeth of a subject mounted on the saddle member, means for securing the frame in vertical and angular positions of adjustment whereby the subject is erectly postured in a duplicatable upright position, means for securing the saddle in adjusted position, rotation of the turntable positioning the subject in any desired angular position relative to the X-ray apparatus, and cooperating means on the base and turntable for indicating angular positions of the subject relative to the X-ray apparatus.

4. An X-ray stand for posturing a subject for X-ray examinations or treatments, which comprises a base, a rotatable turntable mounted on the base, a vertical stand mounted on the turntable, means for vertically adjusting the stand, a horizontal mounting bar carried by the stand, a saddle member mounted on the bar above the turntable for holding the subject to be examined, and a vertically and angularly adjustable frame carried by the stand including a bit bar adapted to be gripped by the teeth of the subject for maintaining the subject in rigidly erect posture.

5. An X-ray stand for posturing a subject in upright position for X-ray examinations or treatments which comprises, in combination, a base, a turntable rotatably mounted on the base upon which the subject stands, a mounting member carried by the turntable, a saddle member carried by the mounting member, instrumentalities carried by the mounting member for vertically adjusting the saddle member for bringing the saddle member into snug engagement with the perineal crotch of the subject, the said instrumentalities including means mounted on the said instrumentalities for producing horizontal ad-

justment of the saddle member, a frame mounted on the said means and provided with a bit bar adapted to be gripped in the teeth of the subject mounted on the saddle member, and mounting means carried by the saddle member-adjusting means for vertically and angularly adjusting the frame relative to the subject to permit the subject to grip the bit bar with his teeth while positioned on the saddle member, the said subject thereby becoming postured erectly and rigidly upright, and cooperating means on the base and on the turntable for enabling any desired reproduction of the position of the subject relative to the X-ray apparatus.

6. An X-ray stand for posturing a subject in upright position for X-ray examinations or treatments which comprises, in combination, a base, a turntable rotatably mounted on the base upon which the subject stands, a mounting member carried by the turntable, a saddle member carried by the mounting member, instrumentalities carried by the mounting member for vertically adjusting the saddle member for bringing the saddle member into snug engagement with the perineal crotch of the subject, the said instrumentalities including means mounted on the said instrumentalities for producing horizontal adjustment of the saddle member, a frame mounted on the said means and provided with a bit cross bar adapted to be gripped in the teeth of the subject mounted on the saddle member, means carried by the saddle member for holding the subject firmly on the saddle member, and instrumentalities carried by the saddle-member-adjusting means for vertically and angularly adjusting the frame relative to the subject to enable the subject to grip the bit bar in his teeth while positioned on the saddle member, the subject thereby being held erectly and rigidly upright for exposure to the X-rays.

7. An X-ray stand for posturing a subject for X-ray examinations or treatments, which comprises, in combination, a base, a turntable rotatably mounted on the base, a vertical stand mounted on the turntable, a seat member for receiving the subject to be X-rayed, means for mounting the seat member on the stand, means carried by the stand for vertically adjusting the seat member relative to the stand and subject, means on the seat member-mounting means for horizontally adjusting the seat member, a posture frame carried by the stand and including a cross bar adapted to be gripped by the teeth of the subject, means also mounted on the seat-member-mounting means for vertically adjusting the posture frame, the said means also angularly adjusting the posture frame for enabling the cross bar to be brought into teeth-grasping position relative to the subject for securing the subject in a fixed upright position, and means carried by the stand for securing the subject on the seat member.

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