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ROENTGENOGRAPHIC APPARATUS

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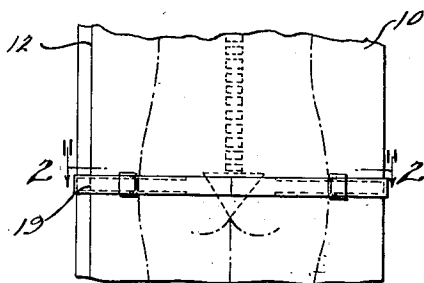


FIG. 1.

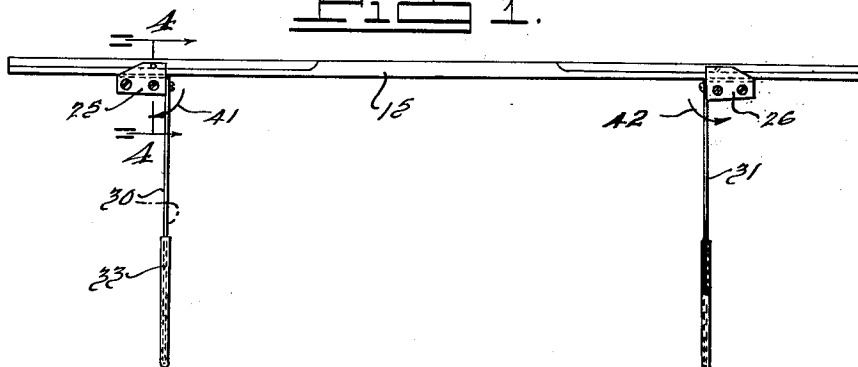


FIG. 2.

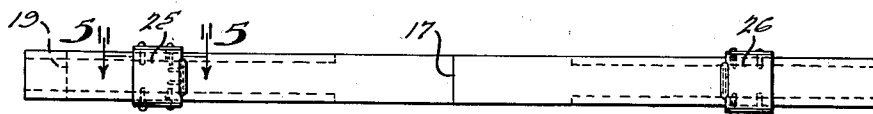


FIG. 3.

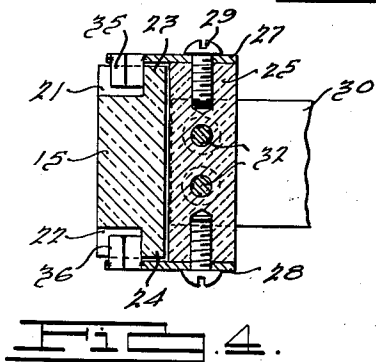


FIG. 4.

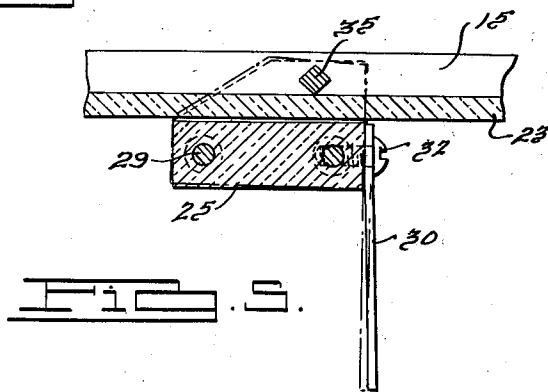


FIG. 5.

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UNITED STATES PATENT OFFICE

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ROENTGENOGRAPHIC APPARATUS

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2 Claims. (Cl. 33—158)

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This invention relates to X-ray photography, and particularly to improved accessory apparatus adapted to assist in the accurate location of human patients with respect to a film support and with respect to a source of radiation such as an X-ray tube.

In practicing the radiographic process disclosed in my Patent No. 2,293,324, issued August 18, 1942, relating to the taking of spinal radiographs, it is of great importance that the upper tubercle of the sacrum of the patient be accurately positioned with respect to the film, or with respect to a known reference point upon the film which serves as a basis for measurement to determine spinal deviation. The reference marking upon the film ordinarily comprises a vertical center line, and the film is so placed in the film holder that the line is in a known and predetermined position as for example at a known distance from the edge of the holder. It is an object of the present invention to provide improved means adapted to be attached to the body of the patient in such manner that a desired part of the body, such as the upper tubercle of the sacrum, which is invisible during the making of the X-ray exposure, may be accurately positioned with respect to the reference line upon the film, which is of course also invisible during the exposure, the arrangement also being such that the relative positioning of these parts may be observed by the operator at all times, and any deviations from the proper positioning detected and corrected before the exposure is made.

Another object of the invention is to provide an improved method of placement of patients in spinal radiography.

Still another object is to provide a centering device for the indicated purpose which is of neat and attractive appearance and sanitary character, and which is quickly and easily adjustable to fit patients of different size, easily applied and removed and comfortable while being worn. Other objects and advantages will be apparent upon consideration of the present disclosure in its entirety.

In the drawing:

Fig. 1 is a fragmentary front elevation view of a centering device constructed in accordance with the present invention, showing a portion of the film holder, diagrammatically indicating in dot-dash lines the relative positioning of the body of the patient, and illustrating the method of use of the centering device,

Fig. 2 is a plan view of the improved centering device,

Fig. 3 is a front elevational view thereof on a larger scale than Fig. 1,

Fig. 4 is a cross sectional view taken substantially on the line 4—4 of Fig. 2 and looking in the direction of the arrows, and

Fig 5 is a cross sectional view taken substantially on the line 5—5 of Fig. 3 and looking in the direction of the arrows.

Referring now to the drawing, reference character 10 designates a film holder of the type used in the taking of full length spinal radiographs. The details of construction of the film holder form no part of my present invention and will not be considered, although for a fuller description of the related apparatus in conjunction with which the present invention is adapted to be used, and the radiographic process, reference is made to my previously issued patent above-mentioned.

A line 12 extends vertically of the front face of the film holder near one edge at a known distance from the center of the film-receiving portion of the holder, and the film (not shown) is preferably provided with one or more vertical reference lines, as previously indicated.

The gauge bar 15 is preferably formed of relatively rigid lightweight and transparent material such as a transparent plastic, and carries means for attaching it to the body of the patient, the bar being preferably at least equal in length to the width of the film holder. The bar is provided with a center marking such as the vertical line 17 which is preferably inscribed upon the face of the bar which bears against the patient, designated as the front face. Upon the opposite or rear face of the bar and near one end a second vertical line 19 is inscribed. The spacing between the lines 17, 19 is the same as the spacing between the line 12 and the vertical center line of the film when the film is mounted in the holder.

The bar is adapted to be attached to the patient's back in a position which is substantially horizontal if the patient's limbs are of equal length and the sacrum erect, with the line 17 located directly over the upper tubercle of the sacrum, and during the exposure of the film the patient is placed with the bar against the film holder. If the limbs of the patient are of unequal length and the sacrum rotated, the bar is preferably tilted conformably, to lie along a line substantially parallel with the top of the sacrum.

Since the line 19 is inscribed upon the face of the bar which bears against the bucky or film supporting structure, line 19 may be accurately aligned with the line 12 when the bar is attached to the patient in the manner indicated, simply by adjusting the lateral positioning of the patient to achieve such alignment. If the bar is horizontal, the upper tubercle of the sacrum will then be accurately registered with the center of the film, as will be apparent. If the bar is tilted, the upper tubercle will still lie very close to the center, permitting accurate

measurements of deviations of the spine in either event. In either event also, the bar prevents any tendency to place the patient in a position in which the general plane of the sacrum is rotated about a vertical axis to a position out of parallelism with respect to the film and by inducing a parallel relation between the film and sacrum reduces image distortion.

The back of the bar is rabbeted along its upper and lower edges, as indicated at 21, 22. The rabbeted portions 21, 22, define top and bottom flanges 23, 24 of reduced thickness constituting tracks or slides extending inwardly from the ends of the bar, although as best shown in Figs. 2 and 3 they may stop short of the middle of the bar, so long as they extend inwardly far enough to permit the slide blocks 25, 26 carried thereby to move close enough together to fit the smallest or thinnest patient.

The slide blocks 25, 26, are alike in construction, and description of one will accordingly suffice, although they are mounted in oppositely facing positions upon the bar, as best shown in Figs. 2 and 3. Each block is of substantially rectangular cross section, slightly wider in a vertical dimension than the width of the bar, as shown in Fig. 4 and provided with guide plates 27, 28, attached to the top and bottom of the block as by screws 29. Plate 27 overlies the top edge of the bar, while plate 28 similarly projects beneath the bar, a slight clearance being left between the bar and the plate to permit free sliding movement of the block with respect to the bar.

Projecting downwardly from the plate 27 behind the flange 23 is a holding element 35 which may be rigidly formed of metal and has a vertically extending relatively sharp or knife-edge facing and adapted to bear against the back of the flange 23 but spaced from the rear face of the block 25 a distance somewhat greater than the thickness of flange 23 so that the block and parts carried thereby may slide along the bar when the knife edge is not pressed against the flange. As indicated in Fig. 5, the holding portion 35 may be of square cross section, although this is a matter of choice provided the relatively sharp or knife-edge portion is provided facing the back of the flange 23, as indicated. A similar holding member 36 is rigidly attached to and projects upwardly from the bottom plate 28 behind the bottom flange 24 and its construction and arrangement may correspond to those of the member 35 although reversed with respect thereto. By virtue of the spacing of the holding members 35, 36, from the rear face of the block 25, the block 25, and the body engaging arm 30 carried thereby, may be rocked about a vertical axis, as for example between the limits indicated by the full line showing of elements 25, 30 and the dotted line showing of these same elements, in Fig. 5.

Attached to the inwardly facing surface of each of the blocks 25, 26, as by means of screws 32 is an arm as 30, 31, one of which is attached to each block in position to project substantially perpendicularly from the bar 15. Arms 30 are formed of relatively heavy but slightly flexible sheet or strap metal and are adapted to bear against the sides of the body of the patient. They may be covered by means such as the rubber sleeve 33 to provide a surface which will cause minimum discomfort to the patient.

It will be appreciated that the mounting of the arms is such that the bar may be held upon the patient's back in transverse position as shown

with sufficient firmness for the intended purpose simply by moving blocks 25, 26 inwardly to urge the arms 30, 31 toward one another until the arms are slightly flexed outwardly by engagement with the sides of the patient. When so flexed, the arms react upon the blocks 25, 26, tending to rock them in the directions indicated by the curved arrows 41, 42 in Fig. 2, thereby driving the knife edges of the holding members 35, 36 into the rear surfaces of flanges 23, 24, while the outer vertical corners of the blocks engage the front face of the bar, the blocks 25, 26 and thereby the arms 30, 31 carried thereby being accordingly held against outward movement so that the bar is suspended in position upon the body of the patient.

While it will be apparent that the preferred embodiment of my invention herein disclosed is well calculated to fulfill the objects first above stated, it will be apparent that it is susceptible to variation, modification and change within the spirit and scope of the subjoined claims.

I claim:

1. In a device of the character described, a relatively rigid bar, a pair of slidable block members, each such member being loosely slidably mounted upon said bar and freely limitedly rockable with relation thereto about an axis transverse to the bar, a holding portion repeatedly carried by each of said slide block members and engageable with the bar when such members are rocked with relation thereto, to restrain such members against unwanted sliding movement, said holding portions comprising relatively sharp parts spaced from said axis, and an arm carried by each of said slide members and bodily movable therewith and projecting substantially perpendicularly to both the bar and to said axis, said arms being flexible relatively easily, as compared with the bar, in a direction away from one another.

2. A device as defined in claim 1 wherein the bar is transparent and of substantially rectangular cross section, an index marking near the center of one face of the bar, said arms projecting substantially perpendicularly from said same face of the bar, said bar being rabbeted longitudinally along the corners adjacent its opposite face, said holding portions comprising retaining elements having guide portions extending laterally beside the bar and combined retaining and holding elements projecting into said rabbeted portions and sharpened on the side which engages the bar, no parts of said arms or retaining and holding elements projecting beyond said opposite face.

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