

[54] **PATIENT POSITIONING APPARATUS FOR USE IN TAKING MEDICAL X-RAYS**

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[57] **ABSTRACT**

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Patient positioning apparatus for use in taking medical X-rays is designed for properly aligning the patient at the optimum angle to the X-ray camera and film. The apparatus includes a base, a horizontal arm, angle indicating means on the base, and arm mounting means for mounting the arm on the base at a horizontal angle selected on the angle indicating means. A head clamp also is provided. The horizontal arm and head clamp are so arranged as to require the patient to place his feet in alignment with the arm, and his head in alignment with his feet. This aligns his entire body at the desired angle with respect to the X-ray apparatus.

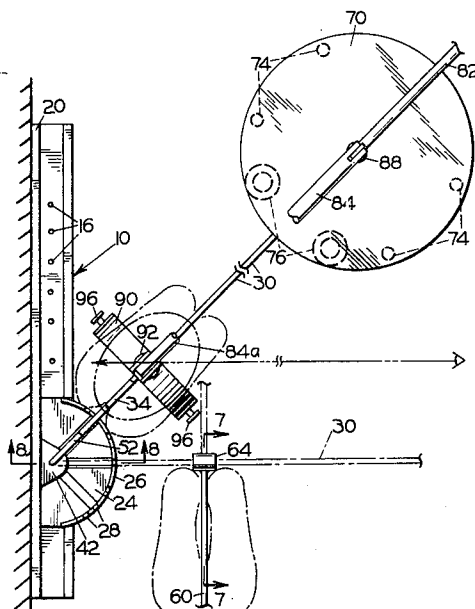
[52] U.S. Cl. ....**250/50, 250/61.5, 250/64**  
 [51] Int. Cl. ....**G01n 23/00**  
 [58] Field of Search.....250/50, 61.5, 64

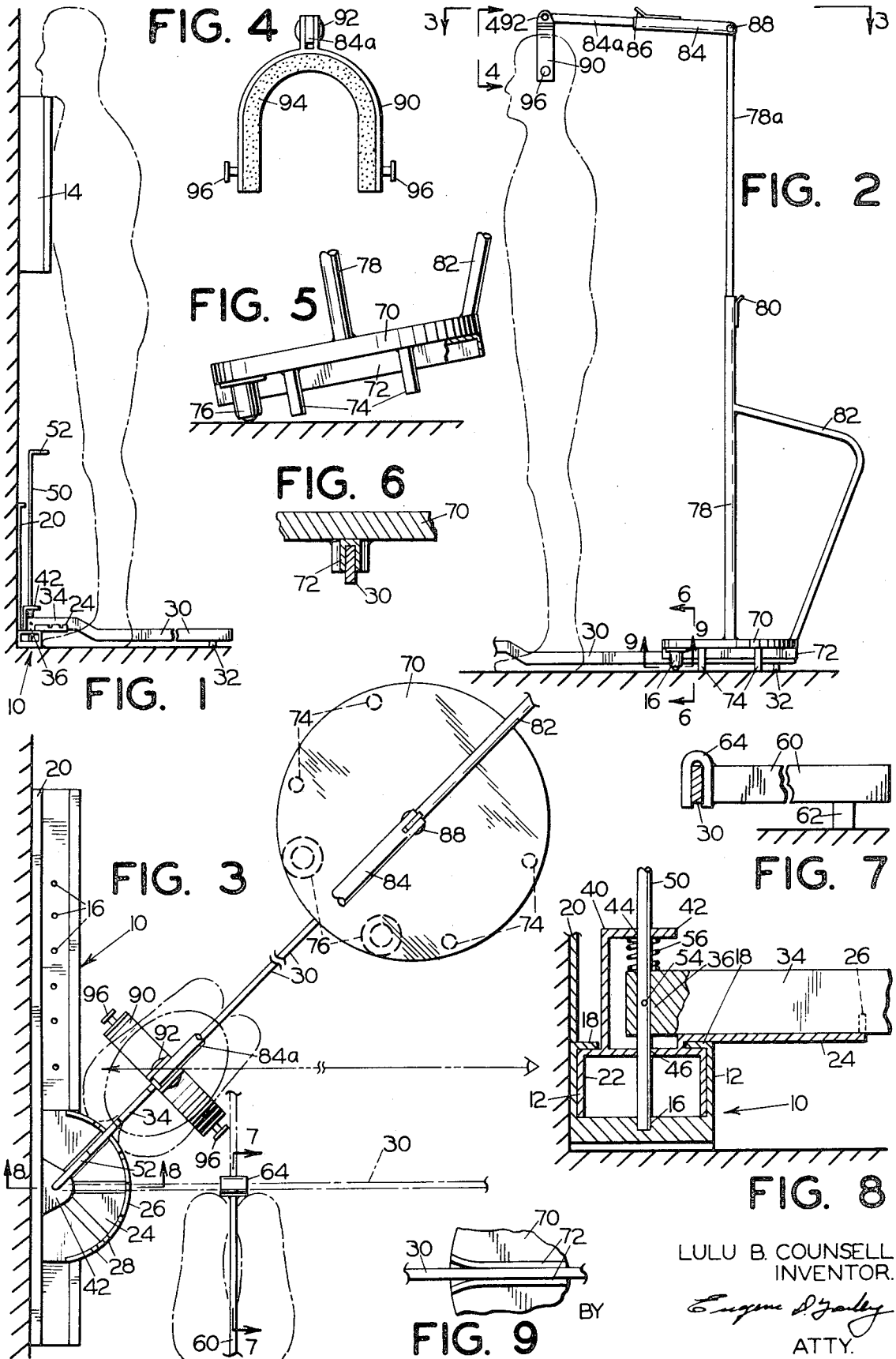
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**10 Claims, 9 Drawing Figures**





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## PATIENT POSITIONING APPARATUS FOR USE IN TAKING MEDICAL X-RAYS

This invention relates to patient positioning apparatus for use in taking medical X-rays. It pertains particularly to apparatus for insuring that the patient is positioned at the proper angle with respect to the X-ray equipment.

In X-ray technology, it is imperative that the patient be arranged at the proper angle with respect to the film and camera. This necessity exists particularly in taking X-ray photographs with the patient upright, as when he is standing, sitting, or placed on an X-ray table adjusted to its vertical "Bucky" position. This occurs, for example, when taking X-rays of the neck, dorsal and lumbar spine, pelvis and chest. In such situations the patient's body doesn't necessarily lie precisely at right angles to the film. It may lie obliquely, as in the case where pictures are to be taken at angles of 35°, 65° or opposite 45° angles. In such instances it is particularly important that the oblique angle be measured precisely in order to obtain accurate X-ray pictures which the physician can interpret correctly.

At the present time, the oblique angle is determined principally by a careful visual inspection of the patient's position. This is not always sufficiently precise, however, with the result that deficient X-ray pictures often are obtained.

It is the general purpose of the present invention to provide a patient-positioning apparatus for use in taking medical X-rays which positions the patient precisely at any desired angle with respect to the X-ray unit, thereby insuring the taking of accurate pictures, saving film, eliminating retakes, and increasing the convenience to the patient.

It is a further object of the present invention to provide patient positioning apparatus for use in taking medical X-rays which apparatus is easily set up and easily adjusted.

It is a further object of the invention to provide apparatus of the class described which is versatile in its application in that it is adapted for use with the patient, standing, sitting or positioned on an X-ray table when the latter is in its vertical position.

The manner in which the foregoing and other objects of this invention are accomplished will be apparent from the specification and claims considered together with the drawings, wherein:

FIG. 1 is a view in side elevation of the herein described patient positioning apparatus, illustrating its use in positioning a patient with respect to an X-ray unit.

FIG. 2 is a view in side elevation similar to FIG. 1, but illustrating the manner of application of a head-aligning attachment.

FIG. 3 is a broken plan view of the apparatus, looking in the direction of the arrows of line 3—3 of FIG. 2;

FIG. 4 is a fragmentary detail view in front elevation of the head aligning attachment, looking in the direction of the arrows of line 4—4 of FIG. 2.

FIG. 5 is a fragmentary detail view in elevation illustrating the manner of moving the head aligning attachment from place to place;

FIG. 6 is a fragmentary, sectional view, taken along line 6—6 of FIG. 2;

FIG. 7 is a fragmentary, sectional view taken along line 7—7 of FIG. 3;

FIG. 8 is a fragmentary, sectional view taken along line 8—8 of FIG. 3; and

FIG. 9 is a fragmentary bottom plan view looking in the direction of the arrows of line 9—9 of FIG. 2.

Generally stated, the patient positioning apparatus of my invention comprises a base adapted to be placed in a predetermined position adjacent a medical X-ray unit, angle-indicating means on the base, and a horizontal arm. Arm mounting means mount the arm on the base at a selected horizontal angle indicated on the angle indicating means. The arm is arranged to permit the patient to align his feet with the arm, the arm automatically aligning his body at a corresponding angle to the X-ray unit. Head aligning means adjustable to the angle of the arm further may be provided to align correctly the head of the patient, thereby further insuring proper positioning of his body.

Considering the foregoing in greater detail and with particular reference to the drawings:

The patient positioning apparatus of my invention is mounted on a base, indicated generally at 10. To enable appropriate adjustment of the apparatus, the base preferably comprises an elongated, trough-shaped guide 12 adapted to be placed transversely on the floor adjacent the cassette 14 which holds the X-ray film. Where an X-ray table is employed in upright position, base 10 may be mounted on the foot of the table.

The bottom or floor of guideway 12 has a plurality of spaced, centrally located openings 16. Its side walls are shaped with retaining flanges 18. A lipped backboard 20 extends upwardly a substantial distance from the back wall of the guideway and serves as a shield.

Mounted within guideway 12 is a slide 22 which serves multiple functions: as a support for angle indicating means, as a support for an arm by means of which the patient is able to align his feet at an angle indicated on the angle indicating means, and as adjusting means for adjusting the angle of the arm. These functions are illustrated in detail in FIGS. 3 and 8.

The angle indicating means comprises a horizontal plate 24, preferably semi-circular in outline and provided along its outer margin with an upstanding flange 26. The flange has spaced slots 28 arranged at angles corresponding to the desired patient-positioning angles. Although the slots may be arranged at any desired angle with reference to the center of the plate, the indicated angles of 35°, 45°, 65° and 90° will fill the requirements of the majority of X-ray problems.

A positioning arm 30 is mounted on the base in working relation to angle-indicating plate 24. The arm comprises a flat bar, on edge and having a length at least sufficient to accommodate the patient's feet, one on each side. At its outer end it has a supporting foot 32; at its inner end, a raised segment 34 terminating in a sleeve 36. Raised segment 34 has a thickness such that it seats easily in the selected one of slots 28.

Mounting means are provided for arm 30 which permit its longitudinal adjustment within guideway 12, as well as its angular adjustment with reference to plate 24. For this purpose there is provided a vertically extending bracket 40 having its lower end welded to the upper surface of slide 22 and its upper end terminating in a horizontal flange 42. Flange 42 has a bearing opening 44 which is alignable with a cooperating bearing opening 46 in the top of slide 22. These two bearing

openings in turn are alignable with a selected one of sockets 16 in the bottom of guideway 12.

A manually operable pivot post 50 having a handle 52 at its upper end is dimensioned for reception in aligned openings 44, 46, 16. It penetrates sleeve 36 on positioning arm 34 and is secured thereto by suitable fastening means such as a pin or set screw 54. A coil spring 56 or other suitable resilient member is interposed between the under surface of flange 42 and the upper surface of sleeve 36, thereby tensioning the arm assembly.

Thus arm 30 may be suitably located and adjusted by lifting upwardly on pivot post 50 until its lower end clears socket 16, sliding the entire arm assembly on slide 22 until it is located over a selected one of sockets 16, turning the pivot post until arm 30 registers with the selected one of slots 28, dropping the arm into the selected slot, and lowering the post into the selected socket.

To increase the versatility of the apparatus, there is provided an auxiliary arm 60 which may be mounted at right angles on principal arm 30. This enables the patient to stand squarely at right angles to the X-ray cassette.

Supplemental arm 60 has at its outer end a supporting foot 62. At its inner end it has a yoke-shaped support 64 sized to slip snugly but releasably over principal arm 30. It thus may be easily mounted on and demounted from the latter arm at any desired location, and on either side.

While for many situations it suffices to position the feet only of the patient, greater accuracy may be obtained at difficult angles by positioning both the head and feet of the patient at the desired angle. His body necessarily then will be similarly positioned. A head-positioning accessory is illustrated in detail in FIGS. 5, 6 and 9.

To make possible its alternation between operative and inoperative positions, the head positioning accessory is mounted on a circular base 70 having on its under surface two parallel, spaced guide plates 72 having outwardly flared leading portions, and a plurality of spaced feet 74. A pair of casters 76 having a length somewhat less than the length of the feet 74 also are mounted on the underside of the base, forwardly of the feet.

Base 70 supports a telescoping, upright standard preferably formed in two sections 78, 78a with associated spring latch 80. A handle 82 interconnects the standard and base 70 in a location convenient to the operator.

The upright standard supports a horizontal arm preferably formed in two telescoping sections 84, 84a interconnected by spring latch 86. The inner end of the arm is connected to the upper end of the standard by means of a frictional, pivoting mounting 88. The outer end of the arm supports a depending head piece 90 by means of a pivotal connection 92, FIG. 4.

Head piece 90 is made of spring steel and is lined with a lining 94 of styrofoam or other padding material. For convenience, it also is provided with a pair of handles 96, by means of which it may be spread for resilient mounting on the head of the patient.

## OPERATION

The manner of operation of the herein described patient positioning apparatus in taking medical X-rays is as follows:

First, the entire unit is placed in the desired operative position with respect to X-ray film cassette 14. Next, slide 22 is positioned longitudinally with reference to guide 12 and post 50 inserted in the selected one of guideway sockets 16. Post 50 then is lifted and rotated, swinging arm 30 until raised segment 34 thereof registers with and engages the selected one of slots 28 in angle-indicating plate 24. If desired or necessary, supplemental arm 60 is placed over arm 30 at right angles to it. Any one of a number of possible arm angles thus may be achieved, as illustrated particularly in FIG. 3.

If it is desired to position the head of the patient also, the head positioning unit of FIG. 2 is moved into position. This is accomplished by grasping handle 82, tilting the unit as shown in FIG. 5, and sliding it on casters 76 until the flared leading end of guideway 72 receives and guides the outer end of arm 30. This automatically aligns upper arm 84, 84a of the head positioning unit with arm 30 of the foot positioning unit. After suitable adjustments for height and distance, head piece 90 is spread and slipped over the patient's head.

The patient thus is anchored head and foot, with his feet straddling and aligned with arm 30 of the foot unit, and his head secured and aligned with arms 84, 84a of the head unit. His body then necessarily is aligned properly at the desired angle with cassette 14. The technician then can take the X-ray and thereafter reposition the patient to take additional pictures. This can be done easily and quickly with minimum discomfort to the patient. Of greatest importance, however, it positions the patient precisely at the desired and necessary angle and insures the taking of clear and accurate X-rays.

Having thus described my invention in preferred embodiments, I claim as new and desire to protect by letters patent:

1. Patient positioning apparatus for use in taking medical X-rays comprising

- a. a base adapted to be placed in a predetermined position spaced from and independently of a medical X-ray film unit,
- b. an elongated, horizontal foot-aligning arm, and
- c. arm mounting means mounting the arm on the base for horizontal angular adjustment relative to the base and X-ray film unit,
- d. the arm being arranged to permit the alignment of a patient's feet with the arm, thereby aligning the patient's body relative to the X-ray film unit at an angle corresponding to the angular position of the arm relative to the X-ray film unit.

2. The patient positioning apparatus of claim 1 including a supplemental foot-aligning arm, and mounting means for mounting the supplemental arm on the first mentioned arm at right angles thereto.

3. The patient positioning apparatus of claim 1 wherein the arm is pivotable about a vertical axis relative to the base, and the arm mounting means includes an arcuate plate on the base having a plurality of vertical grooves spaced apart at predetermined angles relative to the pivot axis of the arm and each dimensioned to receive the arm removably therein for securing the

arm of various angles relative to the base and X-ray film unit.

4. The patient positioning apparatus of claim 1 wherein the base comprises an elongated, horizontally extending guide, and a slide member engaging the guide for horizontal movement relative thereto, the slide member supporting the arm mounting means for movement therewith.

5. The patient positioning apparatus of claim 4 wherein the arm mounting means includes a pin secured to the arm and movable vertically relative to the slide member, the guide having a plurality of horizontally spaced sockets for selectively receiving the pin, whereby to secure the slide member in selected positions of horizontal adjustment relative to the guide.

6. The patient positioning apparatus of claim 1 including head positioning means comprising

- a. a vertical standard,
- b. head gripping means on the upper end of the standard for engaging a patient's head, and
- c. guide means on the lower end of the standard arranged to releasably engage the arm and align the head gripping means with the arm, whereby to align the patient's head and feet at the same angle relative to the base and X-ray film unit.

7. The patient positioning apparatus of claim 6 wherein the head gripping means comprises a member of substantially inverted U-shape the spaced end portions of which are arranged to engage the sides of a patient's head.

8. The patient positioning apparatus of claim 6 wherein the guide means comprises a horizontal base mounting the standard, and guideway means on the standard-mounting base dimensioned to removably receive the arm.

9. The patient positioning apparatus of claim 8 including a plurality of spaced legs projecting downward from the standard-mounting base for supporting the latter a predetermined distance above a floor, and a caster means projecting downward from the standard-mounting base a distance shorter than the length of the legs, whereby to position the caster means normally out of contact with the floor when the standard is in its operative position, and to position the caster in engagement with the floor upon tilting of the standard-mounting base to elevate the legs above the floor.

10. The patient positioning apparatus of claim 1 wherein

- a. the base comprises an elongated, horizontally extending guide, and a slide member engaging the guide for horizontal movement relative thereto, the slide member supporting the arm mounting means for movement therewith,
- b. the arm mounting means includes a pin secured to the arm and movable vertically relative to the slide member, the guide having a plurality of horizontally spaced sockets for selectively receiving the pin, whereby to secure the slide member in selected positions of horizontal adjustment relative to the guide, and
- c. the apparatus includes head positioning means comprising a vertical standard, head gripping means on the upper end of the standard for engaging the patient's head, and guide means on the lower end of the standard arranged to releasably engage the arm and align the head gripping means with the arm, whereby to align the patient's head and feet at the same angle relative to the base and X-ray film unit.

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