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3,524,057

X-RAY STAND FOR POSING SUBJECT'S FEET FOR A PLURALITY OF
X-RAY EXPOSURES FROM DIFFERENT POSITIONS

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2 Sheets-Sheet 1

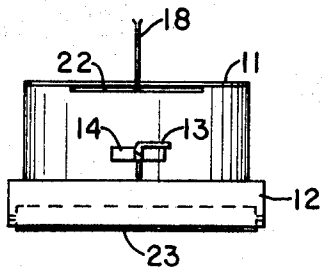


FIG_3

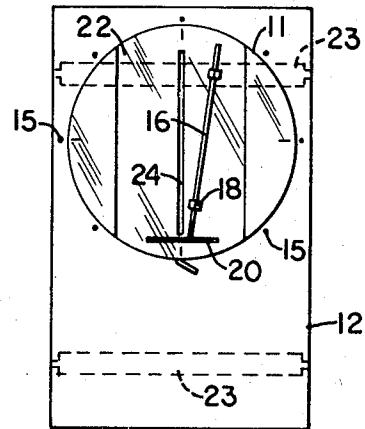
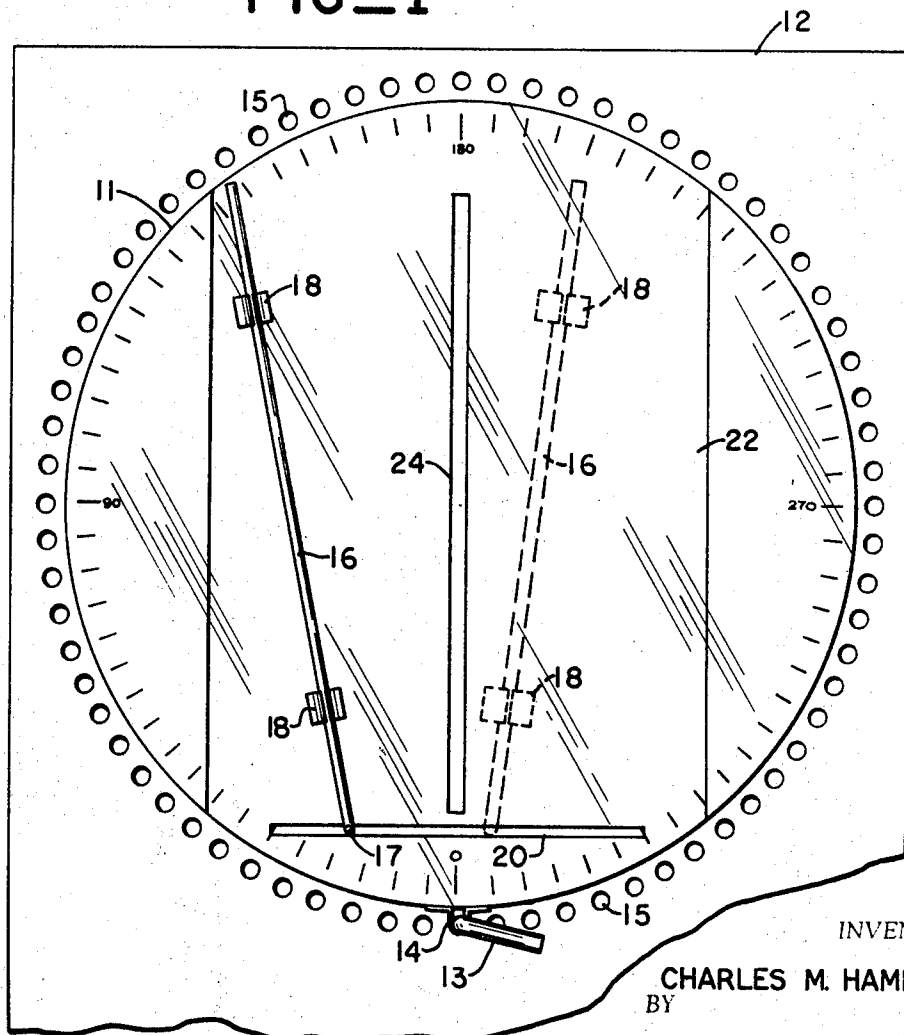


FIG_2

FIG_1



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2 Sheets-Sheet 2

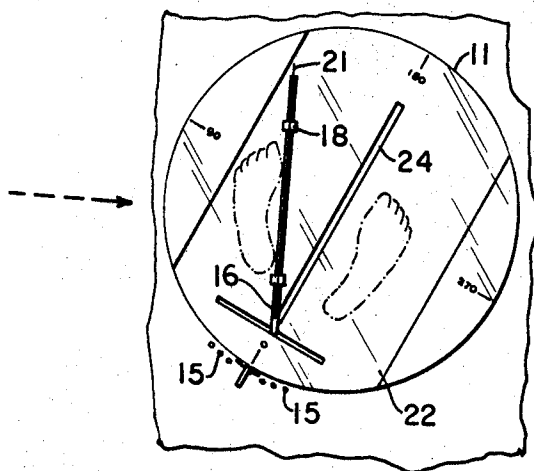


FIG_6

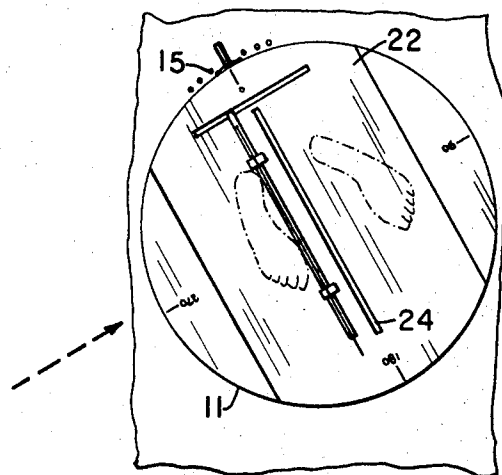


FIG_7

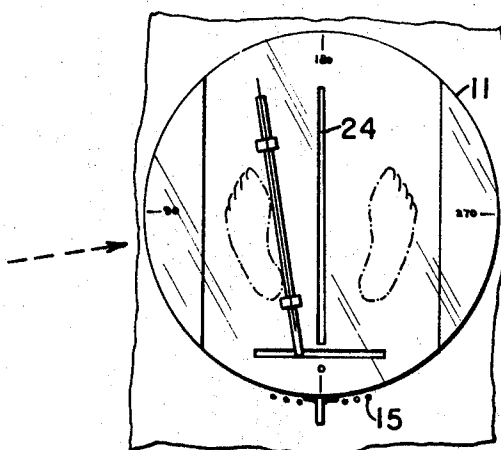


FIG_5

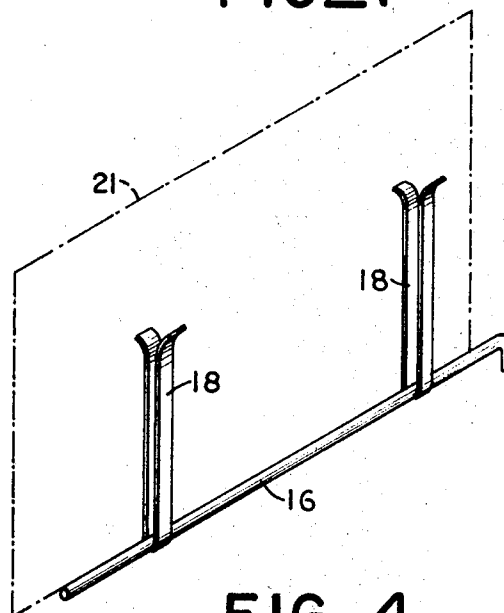


FIG_4

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3,524,057
**X-RAY STAND FOR POSING A SUBJECT'S FEET
FOR A PLURALITY OF X-RAY EXPOSURES
FROM DIFFERENT POSITIONS**

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7 Claims

ABSTRACT OF THE DISCLOSURE

An X-ray photographing stand is disclosed comprising a platform mounted for rotation and lateral translation on which the patient stands in the patient's normal base stance and a vertical X-ray film holder pivotally mounted on the platform intermediate the foot positions of the patient and also mounted for lateral translation across the platform whereby various weight bearing diagnostic X-ray photographs may be obtained without changing the normal base stance of the patient.

This invention relates to a new and improved X-ray stand useful for obtaining weight bearing diagnostic X-ray photographs of a patient.

For effective medical diagnosis from X-ray photographs showing comparative weight bearing views of the feet, pelvis and spine of a patient, it is necessary that the various comparative views be taken with the patient standing in the same position, and in particular standing in the patient's normal base stance. The normal base stance varies widely between individuals and is characterized by a spread of certain width between the respective foot positions, and a normal base stance angle between each foot and the median line defined by the perpendicular bisector of the body breadth.

An X-ray photograph is in effect a record of shadows produced by objects of varying opacity to X-rays on the sensitive film surface. The relative position of the objects and X-ray energy source is a determining factor in the size and contrast of the shadows comprising the photographic image. It is therefore extremely important that the patient remain in his normal base stance while each of the comparative views is taken. Any change in the angular position or spread position of the feet produces corresponding position changes in the bones of the pelvic and spinal areas which distort the resulting photographs and destroy the comparative value of the various views being taken. No device presently available permits comparative weight bearing diagnostic X-ray photographs to be taken of a patient in his normal base stance and without motion of the patient between photographic exposures.

It is an object of the present invention to provide a new and improved X-ray stand whereby various weight bearing diagnostic X-ray photographs of a patient may be taken without movement of the patient from his normal base stance. According to the present invention, anterior, posterior and lateral views of the pelvis and spine, dorsi-plantar views of the feet, medial oblique views, and lateral views of the feet and other views may be taken with the patient standing in his normal base stance, and without movement of the patient between photographic exposures.

In order to accomplish these results, the present invention contemplates the provision of a platform mounted for rotation about an axis and mounted for lateral translation on which the patient stands with feet positioned on the platform in the patient's normal base stance. The invention also contemplates providing a vertical X-ray film holder pivotally mounted on a vertical axis on the platform intermediate the foot positions of the patient and

also mounted for lateral translation across the platform between the foot positions whereby various weight bearing diagnostic X-ray photographs may be obtained without changing the normal base stance of the patient. The invention also provides for a horizontal X-ray film holder positioned beneath the foot positions of the patient on the platform.

Other objects, features and advantages of the present invention will become apparent in the following specification and accompanying drawings in which:

FIG. 1 is a partial plan view of one form of apparatus embodying the present invention;

FIG. 2 is a full plan view of the apparatus illustrated in FIG. 1;

FIG. 3 is a side elevation view of the apparatus illustrated in FIG. 2 with the vertical X-ray film holder in center position;

FIG. 4 is a detailed perspective view of the vertical X-ray film holder with a positioned film cassette shown in phantom;

FIGS. 5, 6 and 7 are partial plan views of the apparatus showing various foot positions on the platform.

In the embodiment of the present invention illustrated in FIG. 1 there is provided a platform 11 mounted for rotation on a base 12 by roller bearings or other suitable means. The platform 11 is of a size and strength sufficient to support a person standing on the platform in his normal base stance. A stop pin 13 secured to the platform 11 by a bracket 14 is adapted to slidably fit into one of the plurality of stop holes 15 positioned at suitable angular intervals about the perimeter of the platform in base 12. The platform 11 is maintained in the desired angular relationship with respect to base 12 by the stop pin 13 engaging the appropriate stop hole 15.

Positioned centrally on the platform is a vertical X-ray film holder 16 pivotally mounted at one end 17 on the platform 11 and having vertically projecting tension clips 18 in which may be supported in a vertical position an X-ray film cassette. The pivotally mounted end 17 of the vertical X-ray film holder 16 is also adapted for lateral translation along the slot 20 provided at one end of the platform. The vertical X-ray film holder 16 with a film cassette 21 positioned within the vertically projecting tension clips 18 is shown in FIG. 4. The platform is thus adapted to receive the feet of the patient in two foot position areas generally separated by the vertical X-ray film holder.

The vertical X-ray film holder may be pivotally mounted at its other end and mounted for lateral translation along a line in front of the toe ends of the foot positions; or, the vertical film holder might be pivotally mounted at some point along its length and laterally translatable along a line between the foot positions on the platform at the pivotal mounting.

The platform is provided with a horizontal X-ray film holder in the form of a lateral slot 22 formed beneath the upper surface of the platform 11 as shown more clearly in FIG. 3. For use as a horizontal X-ray film holder, the platform must be constructed of an X-ray transmitting material. The lateral slot 22 is adapted to receive either an X-ray film cassette, a drawer adapted to hold a variety of films, a monopack of nonscreen film or cardboard type nonscreen film holders.

The base 22 on which platform 11 is rotatably mounted is itself mounted on rollers 23 for lateral translation of the base and platform.

A central slot 24 may also be provided in the platform 11 to serve as a stationary vertical X-ray film holder if desired.

In the operation of the present invention, the patient assumes a standing position on the platform 11 in his normal base stance characterized by a spread width between

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the foot positions, and a normal base stance angle between each foot and the median line defined by the perpendicular bisecting line of the body's breadth dimension. A wide variety of normal base stances exist among different individuals, two examples of which are shown in FIGS. 5, 6 and 7 in which slot 24 lies along the median line. With the base and platform positioned adjacent to a vertical film support (bucky, stationary grid cassette or an X-ray table with bucky), anterior, posterior and lateral pictures of the pelvic area or spine in dimensions of 14 by 17 inches or 14 by 36 inches may be taken. Suitable X-ray film is then placed in the horizontal X-ray film holder. Such X-ray film may be of the screen type 14 by 17 inches in size, or a drawer may be positioned in the slots with suitable spacers for positioning a variety of film and film sizes such as 5 by 7 inches, 8 by 10 inches, 10 by 12 inches, etc. On the horizontal film, medial oblique exposures and dorsi-plantar exposures of the feet can be taken.

In order to take the lateral views of the feet, the pelvis and spine, the base and platform are displaced away from the vertical film holder. Various lateral views of the feet with the vertical film positioned at right angles to the X-ray energy source may be taken by using the pivotally mounted laterally translatable vertical film holder and rotating platform. In the example illustrated in FIG. 5, a person with a wide base stance is positioned on the platform. Such a wide stance, as is found in heavier or knock-kneed persons, requires that the vertical film holder be not only pivotally mounted but also laterally translatable so that the vertically held X-ray film may be positioned at right angles to the X-ray energy source and adjacent to the foot. An X-ray cassette is positioned in the vertically projecting tension clamps 18 and the cassette and holder are positioned against the foot to be photographed so that it is touching at the heel and first metatarsal phalangeal joint. The platform 11 is then rotated until the cassette is at right angles to the X-ray energy source. The same procedure is followed with a second cassette in the vertical film holder for the other foot. Meanwhile, through each of the various X-ray photograph views taken, the patient has not once moved from his normal base stance.

FIGS. 6 and 7 show another situation in which the patient has an asymmetrical normal base stance with different normal base stance angles between the respective feet and the median line indicated by slot 24. As in the example already described, the vertical cassette is positioned against the heel and first metatarsal phalangeal joint and the platform rotated until the cassette is at right angles to the X-ray source, as shown in FIG. 6. The same procedure is then followed with the other foot using a second cassette in the vertical film holder as shown in FIG. 7.

Thus, according to the present invention, each of the weight bearing comparative views of the feet, pelvis and spine may be obtained with the patient in his normal base stance and without movement of the patient from his original position, thereby providing corresponding comparative views for effective medical diagnosis.

While one embodiment of the invention has been shown and described, it will be apparent that other adaptations and modifications can be made without departing from the true spirit and scope of the invention.

What is claimed:

1. An X-ray stand for obtaining weight bearing diagnostic X-ray photographs of a patient comprising: a base; a platform mounted on the base for rotation about an

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axis, said platform being adapted to bear a patient standing thereon, the patient standing with feet positioned in the patient's normal base stance with the heels being substantially closer together than the toes on foot receiving areas formed on the platform; a vertical X-ray film holder positioned intermediate the foot receiving areas of the platform movably mounted on the platform for angular rotation and lateral translation between the foot positions of a patient standing on the platform whereby various weight bearing diagnostic X-ray photographs may be obtained without changing the normal base stance of the patient and means mounted at the bottom of said base to allow said base to move laterally.

2. An X-ray stand as set forth in claim 1 wherein there is provided a horizontal X-ray film holder for positioning X-ray film horizontally beneath the foot positions of the patient.

3. An X-ray stand as set forth in claim 2 wherein the horizontal X-ray film holder is a lateral slot in the platform beneath the foot positions of the patient, and wherein the platform is formed of an X-ray penetrable material.

4. An X-ray stand as set forth in claim 1 wherein the vertical film holder is pivotally mounted on the platform on a vertical axis at the end of the holder adjacent the heel ends of the foot positions and wherein the vertical film holder is mounted for lateral translation along a slot on the platform behind the heel positions.

5. An X-ray stand as set forth in claim 4 wherein said vertical X-ray film holder comprises at least one vertically extending clip means attached to a horizontally extending rod, said rod being pivotally mounted at one end in an elongated track formed on the platform for angular rotation and lateral translation of the rod and clip.

6. An X-ray stand for obtaining weight bearing, diagnostic X-rays of a patient comprising: a base; a platform mounted for rotary movement upon said base, a pair of spaced apart patient foot receiving areas in which the position for the heels of the patient are located substantially closer together than the position for the toes to allow the patient to maintain a stance with the feet being angled to accommodate normal posture located on the top portion of said platform; a vertical X-ray film holder mounted on said platform including means mounting said X-ray holder for lateral and pivotal movement between said two foot receiving areas, said platform being formed of X-ray penetrable material and having formed therebeneath a lateral slot for inserting an X-ray film immediately under said platform spanning the foot receiving areas and means mounted at the bottom of said base to allow said base to move laterally.

7. An X-ray stand as set forth in claim 6 wherein said vertical X-ray film holder comprises at least one vertically extending clip means attached to a horizontally extending rod, said rod being pivotally mounted at one end in an elongated track formed on the platform for angular rotation and lateral translation of the rod and clip.

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