HYDRAULIC POSITIONING BED FOR RADIOISOTOPE SCANNING
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6 Claims

ABSTRACT OF THE DISCLOSURE
A positioning bed for use in radioisotopic scanning which is capable of vertical, horizontal, and angular adjustment and is comprised of three hingedly connected sections so that a variety of configurations may be assumed. The patient is supported on the bed by a material transparent to nuclear radiation so that there are no impediments to radiation scanning either above or below or lateral to the patient.

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

BACKGROUND OF THE INVENTION
(1) Field of the invention
This invention is an improved bed which is primarily intended for use in radioisotopic scanning applications, especially those applications in which dual opposed detectors are used, although the bed is also useful for any diagnostic study requiring body positioning for long periods of time.

(2) Description of the prior art
Previously available positioning beds were unsuitable in one or more of the following respects: Scanning was not possible from above and below the bed; the lower scanner could not move as close to the patient as the upper scanner; supporting elements provided impediments beneath or lateral to the patient; complete symmetry in lateral scans of the body was not possible; scanning of patients at angles other than horizontal was not possible; and power-driven actuating elements were not provided.

SUMMARY OF THE INVENTION
This invention overcomes all the above-mentioned limitations of the prior art by providing a powered, three-sectional, hingedly-connected body support element which is transparent to nuclear radiation. The support element is connected at one end through a ball and socket joint to a frame which is vertically adjustable, and the support element itself can be pivoted in the vertical direction about the ball and socket joint. The other end of the support element is connected to a U-shaped frame by rollers. The U-shaped frame is connected to an end frame of the bed through a thrust bearing and is mounted so that vertical and angular movement is possible. Thus, the position and configuration of the bed may be adjusted to properly position any part of the body for radioisotopic scanning, and due to the unique construction of the bed, the shortcomings of the prior art are avoided.

Accordingly, it is an object of this invention to provide a positioning bed for radioisotopic scanning which can be adjusted in vertical, horizontal, and angular attitudes so that any portion of the body may be properly positioned for radioisotopic scanning.

It is a further object of this invention to provide a radioisotopic scanning bed which is particularly suited for scanning both above and below the patient.

It is also an object of this invention to provide a radio-

isotopic scanning bed which is fully adjustable by means of hydraulically powered actuators.

BRIEF DESCRIPTION OF THE DRAWINGS
FIG. 1 is an isometric view of the entire bed.
FIG. 2 is an isometric view of the head end of the bed.
FIG. 3 is an isometric view of the foot end of the bed.

DESCRIPTION OF THE PREFERRED EMBODIMENT
Referring to FIGS. 1, 2, and 3, the bed comprises a U-shaped basic structure 1 on which are attached vertical members 2 at each corner and end. Casters 21 are mounted to the bottom of the U-shaped basic structure so that the bed may be easily moved. Slidably mounted on the vertical members 2 at each end of the frame 1 are plates 3 and 4 which serve as the bases for mounting the body support frame 17 and the hydraulic actuating elements. Each plate 3 and 4 is actuated in the vertical direction by double-acting hydraulic cylinders 5 and 6 so that each end plate may be independently raised and lowered. On the end plate 3 is rotatably mounted a T-shaped member 7 through a thrust bearing 8 in a manner to permit the member 7 to rotate about an axis perpendicular to the end plate 3. Rotation about this axis is produced by a double-acting hydraulic cylinder 11 connected between the end plate 3 and the lower end of the T-shaped member 7. Attached to the T-shaped member 7 by means of hinges 9 is a U-shaped member 10. A double-acting hydraulic cylinder 12 is connected between the U-shaped member 10 and a bracket 13 welded to the lower portion of the T-shaped member 7 so that its actuation will cause rotation of the member 10 about an axis through the hinges 9 on the T-shaped member 7.

On the end plate 4 is attached an L-shaped bracket 14 upon which is mounted a spherical bearing 15 and a double-acting hydraulic cylinder 16. The body support frame 17 is attached to the spherical bearing 15 by a member 18. The hydraulic cylinder 16 is attached to the member 18 by a ball and socket joint at its joint with the body support member 17. Thus, the head end of the bed is capable of vertical movement and the head of the body support element 17 may be pivoted vertically in relation to the spherical bearing 15 by the action of hydraulic cylinder 16. The use of spherical bearings allows the head end of the bed to rotate about an axis perpendicular to the plate 4 in response to rotation of the foot end of the bed.

The body support element 17 is composed of three hingedly connected sections. The two end sections are U-shaped, and the middle section comprises two tubular members which connect the two end sections by means of hinged joints 19. The foot end of the body support frame 17 is connected to the U-shaped member 10 by means of four roller guides 20. These roller guides roll on the member 10, so that the position of the body support frame 17 on the member 10 is a resultant of the positions of the member 10, the plates 3 and 4, and the member 18. The bed is capable of independent vertical movement at each end, of horizontal rotation, and of vertical inclination at each end. The supporting surface of the frame 17 is comprised of a material transparent to nuclear radiation; for example, plastic webbing. Since no structural cross-members can be tolerated under the body support surface, bracing in the form of a truss 23 is provided at the foot end of the body support frame 17.

The hydraulic cylinders are actuated by fluid pressure provided by an electric motor-driven pump 22. The direction of actuation is controlled by a double-pole double throw switch which reverses the direction of rotation of the motor. A pair of six-way directing valves 24 is used
to select the cylinder to be actuated, and a push-button switch 25 is used to control the degree of movement.

In operation a patient is placed on the bed and then the bed is moved to the proper diagnostic position by means of the hydraulic cylinders. If a dual radioisotopic scan is to be made, the two detector elements 31 are placed in position above and below the patient, and the scan is made. Since there are no obstructions above or below the patient, the scans can be symmetrical. If desired, a scan may be made only above or below the patient, or the patient may be positioned so that any desired diagnostic procedure may be carried out.

I claim:
1. A construction for a bed for radioisotopic scanning comprising:
   (a) a portable, elongated base member;
   (b) support means extending upwardly from opposite ends of the length of said base member;
   (c) planar support members vertically, adjustably carried by said support means in face relation;
   (d) a first rotatable bracket means mounted on a first one of said planar support members;
   (e) a second bracket member rigidly mounted on a second one of said planar support members;
   (f) forked bed frame support means hingedly mounted for rotation with said first bracket means and vertical angular rotation relative to the surface of said first planar support member facing said second planar support member;
   (g) foldable bed frame means slidably supported at one end by said hingedly mounted bed frame support means and universally supported by said second bracket member at the opposite end; and
   (h) drive means for rotating said first rotatable bracket means, said hingedly mounted support means, said planar support members, and said universally supported end of said bed frame means whereby elevational, rotational and longitudinal adjustment may be imparted to said bed frame means.

2. The device of claim 1 wherein said first rotatable bracket means comprises a T-shaped bracket rotatably mounted on said first planar support means through a thrust bearing.

3. The device of claim 2 wherein the bed frame support means comprises a U-shaped member rotatably connected to said first bracket means by a hinge joint.

4. The device of claim 1 wherein said bed frame means comprises a first U-shaped section having leg portions slidably carried by the forked bed frame support means and a second oppositely disposed U-shaped section universally carried by said rigidly mounted bracket member and an intermediate section hingedly secured to the open ends of said first and second U-shaped sections providing a longitudinally foldable bed frame means.

5. The device of claim 4 wherein said bed frame means is covered with a material transparent to nuclear radiation adapted to support a patient.

6. The device of claim 1 wherein the drive means are double acting hydraulic cylinders.

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5--62