Aug. 20, 1968 G. ROSSI 3,397,411

PATIENT-SUPPORTING DEVICE FOR RADIOLOGICAL TREATMENTS

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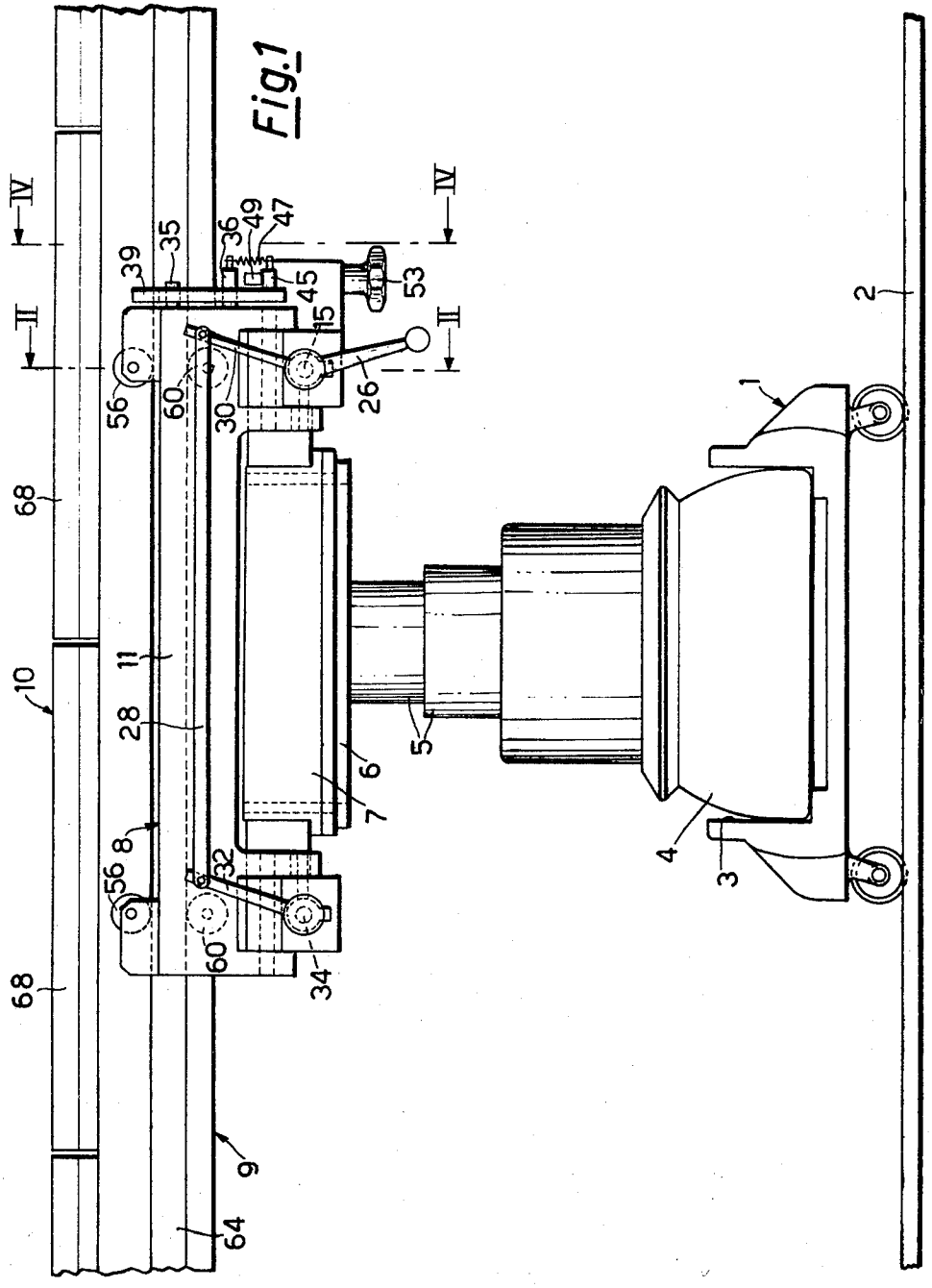
Fig.1



PATIENT-SUPPORTING DEVICE FOR RADIOLOGICAL TREATMENTS

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Fig.2

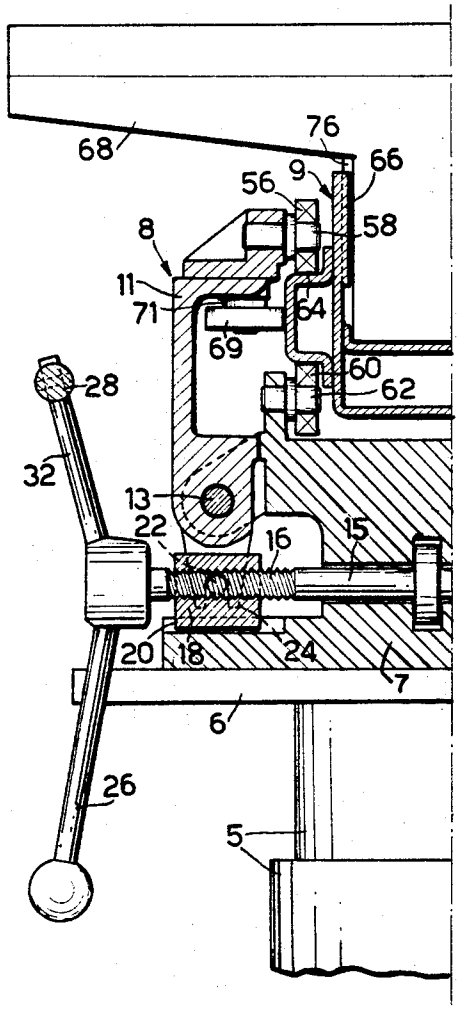

Fig.3

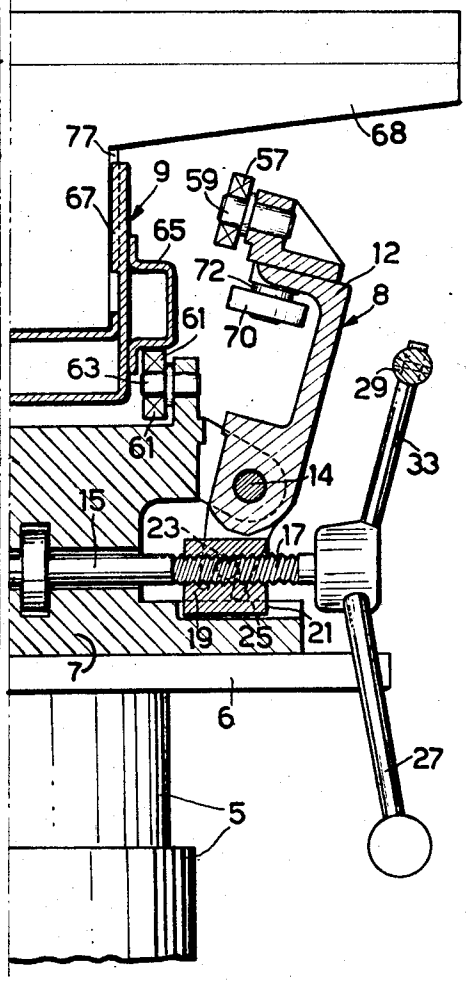

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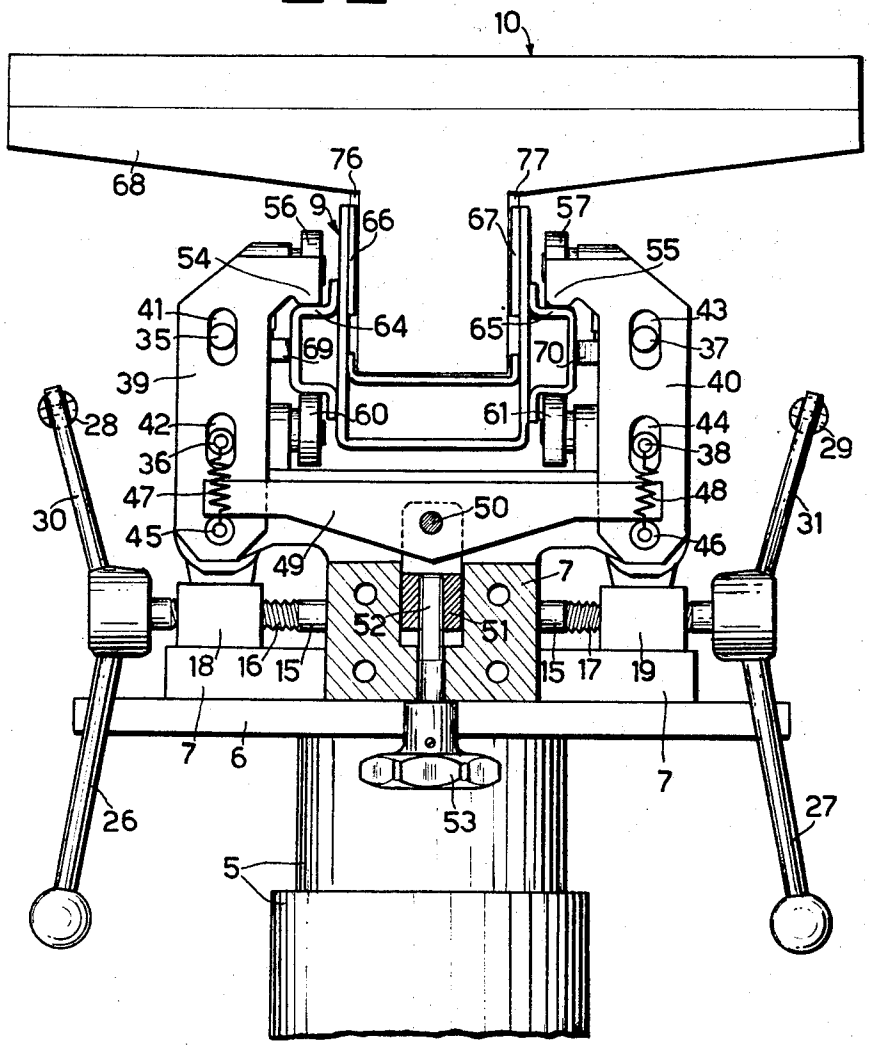
Fig.4



PATIENT-SUPPORTING DEVICE FOR RADIOLOGICAL TREATMENTS

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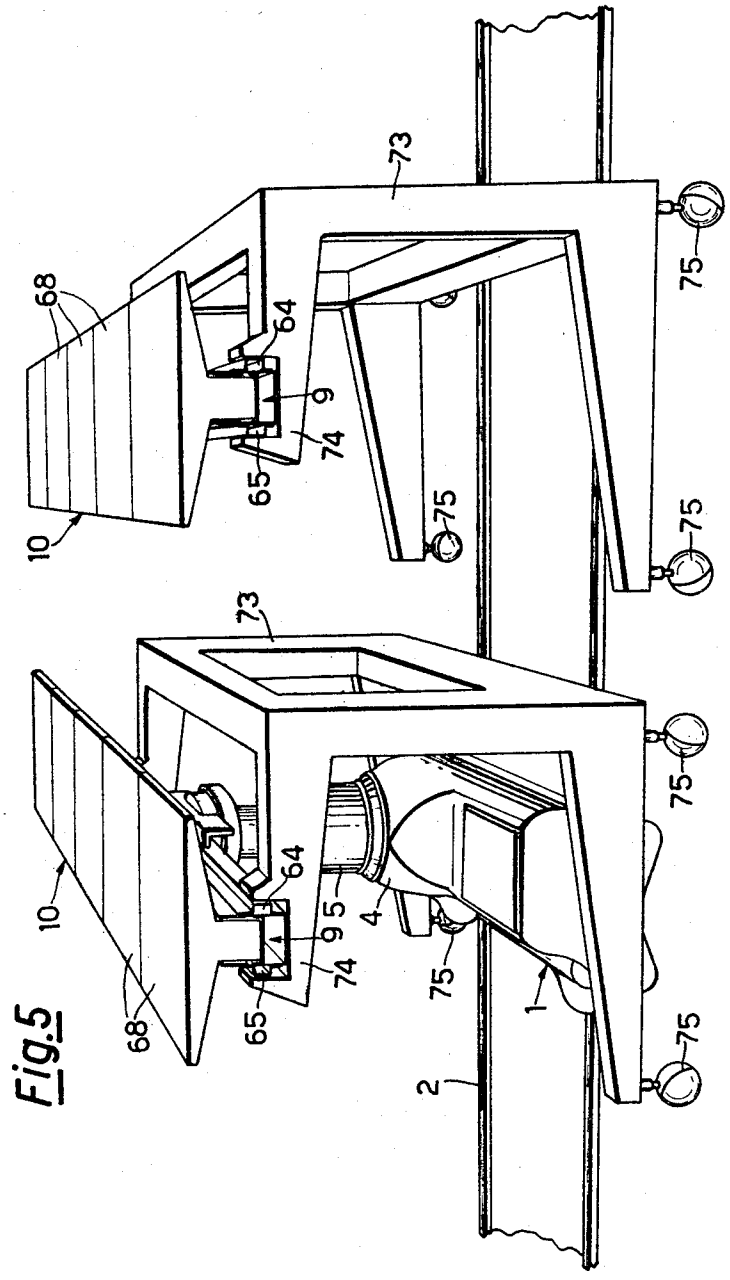

Fig.5

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PATIENT-SUPPORTING DEVICE FOR RADIOLOGICAL TREATMENTS

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4 Claims. (Cl. 5—66)

ABSTRACT OF THE DISCLOSURE

A support table for a patient having a horizontally movable base carrying a slide which is movable horizontally in a direction perpendicular to the base, a telescopic pillar being mounted on the base and supporting a head adapted for receiving a slidable beam thereon, the beam being retained by an openable clamp which is pivotably connected to the head and which can either lock the beam on the head or permit guidable displacement of the beam on the head. A patient supporting member composed of individual component parts is interengageable with the beam.

An object of the present invention is to provide a supporting member for a patient, permitting positioning said patient for X-ray or gamma radiation, both for diagnostic and therapeutic purposes.

The conventional supporting devices, when they consist of articulated sections, do allow to position the patient in the desired posture, but exhibit an extended opacity area which disturbs both the diagnosis and the therapeutic treatment. When, conversely, the supporting device consists of longitudinally arranged members, thus offering a narrower opaque area, it does not allow, for example, to position in an inclined posture the patient's limbs, pelvis or trunk as required.

Furthermore, in the conventional patient-supporting devices, the supporting board is firmly affixed to the head of said supporting device.

It is an object of the present invention to provide a supporting device for a patient to be subjected to radiological treatments, of the kind comprising a base-member displaceable in one direction, a slide displaceable on said base-member in a direction perpendicular to the former and a pillar-and-head assembly which can be vertically lowered or lifted with respect to said slide and which bears the patient-supporting board, characterized in that the head of the pillar carries a clamp rotatable about the vertical axis of said head so as to hold or to release a removable beam which supports the patient-carrying board. Preferably, the clamp has guiding means adapted to permit said beam to be translated along the direction of its own longitudinal axis, and locking means temporarily to affix the beam in a desired position.

An exemplary embodiment of the supporting device according to the invention, will be described in the following, reference being had to the accompanying drawing, wherein:

FIGURE 1 is a side elevational view of the supporting device, showing a portion of the beam which carries the patient-supporting board.

FIGURES 2 and 3 are cross-sectional views taken along the line II—II of FIG. 1, each showing one-half of the clamp in the beam-holding, and the beam-releasing position, respectively.

FIGURE 4 is a front view of the clamp with the beam-holding means taken along the line IV—IV of FIG. 1, and

FIGURE 5 is a perspective, diagrammatical view of

the supporting device and a carriage for inserting the beam in, and removing same from, the clamp.

The supporting device comprises a base **1** which can be wheeled on tracks **2** along a direction which is generally parallel to the wall (not shown) to which the apparatus for the X-ray (or gamma-ray) treatment is affixed. A slide **4** is mounted on guideways **3** on said base **1**, so as to be displaceable in a direction which is perpendicular to the translational direction of the base **1**. The slide **4** carries a pillar **5** having a vertical axis, and which can be telescopically extended by any conventional means (not shown) without, however, being permitted to rotate about its own axis. A head **6** of the pillar **5** rotatably supports in conventional manner (not shown) about its own vertical axis a structure **7** on which a clamp, generally indicated at **8**, is positioned, which is adapted to hold, or release, a beam **9**, a latter carrying the patient-supporting board, generally shown at **10**.

The clamp **8** comprises two jaws, **11** and **12** (FIG. 2 shows only the jaw **11** in closed position, whereas FIG. 3 shows the jaw **12** only, in open position) said jaws being pivotal about pins **13** and **14**, respectively, affixed to the structure **7**.

The jaw-opening and jaw-closing oscillatory motion for **11** and **12** is controlled by a shaft **15**, freely rotatably supported by the structure **7**, without being, however, displaced about its own axis. Said shaft **15** has a left-handed screw-thread **16** on one end and a right-handed screw-thread **17** on the opposite end, which threadably engage respective bushings **18** and **19**, guidably supported by special guideways **20** and **21** of the structure **7** so as to be displaced along the axis of the shaft **15** without being permitted to rotate about said axis. Each bushing has a pin, **22** and **23**, respectively, for engaging a forked extension **24** (and **25**, respectively) of the jaws **11**, and **12**, respectively. It is obvious that, by rotating the shaft **15** by means of a lever **26** (or **27**) solid therewith, the two bushings **18** and **19** are axially displaced in opposite directions, thus giving rise to opposite oscillations of the two jaws **11** and **12**, and, consequently, the closure or opening of the clamp **8**.

To obtain an even and balanced movement of the jaws, the drive of the shaft **15** at one end of said jaws, is transferred to the other end by means of articulated rods **28** and **29** universally connected at one of their ends to arms **30** and **31**, respectively, solid with the shaft **15** and, at the opposite ends, to arms **32** and **33**, respectively, solid with a shaft **34**. Said shaft **34** is freely rotatably supported by the structure **7**, no axial movement being permitted, and is thus very much the same as the shaft **15**. The axes of the shafts **15** and **34** are parallel to one another and the shaft **34** fulfills the same function as the shaft **15**, that is to say, it displaces, when rotated, two bushings, to which two extensions of the jaws **11** and **12** are affixed, in opposite directions.

At one end, the jaws **11** and **12** carry, through pins **35**, **36** and **37**, **38**, respectively, plates **39** and **40** which are mounted on said pins by slots **41**, **42** and **43**, **44**, respectively, so as to allow restricted displacements in the planes containing the axes of the pins **35**, **36** and **37**, **38**, respectively. Each plate carries a rigid protruding pin **45** and **46**, respectively, and, between said pins and the pins **36** and **38** rigid with the jaws, springs **47**, **48** are interposed which bias the plates **39** and **40** upwards (see FIGS. 1 and 4). A cross-tie **49**, articulated with a pivot **50** to the forked end of a displaceable block **51**, rests with its ends on the pins **45** and **46** of the plates **39** and **40**. The block **51** is guided in the structure **7** so as to be axially displaced without rotation and, in a threaded bore of the block there is screwably engaged the pin **52** of a knob **53** which can be rotated without undergoing axial

movement. The plates **39** and **40** have detent teeth **54** and **55**, respectively, adapted to cooperate with the beam **9** so as to lock it.

Each jaw carries a pair of rollers **56** and **57** respectively (in FIGS. 2 and 3 only a single roller can be seen) freely rotatable by means of bearings about pivots **58**, **59** solidly affixed to said jaws. The axes of said pivots **58**, **59** are all horizontal and lie on the same plane when the jaws are in the clamp-closing position (FIG. 2). Like pairs of rollers **60**, **61** are freely rotatable about pivots **62**, **63** having horizontal axes and solidly affixed to the structure **7**.

Each jaw has, moreover, a pair of rollers **69**, **70**, freely rotatable by means of bearings about pivots **71**, **72** solid with said jaws, the axes of said pivots being vertical when the jaws are closed.

The beam **9** is channel-shaped in cross-section, with the opening facing upwards. Attached to the sides of the beam are supporting and guiding ribs **64**, **65** longitudinally extending the entire length thereof. In the open space of the beam there are, positioned at regular intervals, confrontingly mounted guiding ribs **66**, **67** which act as a guide and a stop for members **68** intended to form the patient-carrying board **10**. Said members **68** have grooves **76** and the members **68**, **77** and are inserted from above into the opening in the beam, by causing the grooves **76** and **77** to engage the guiding ribs **66**, **67** which thus prevent the members **68** from being moved.

When the clamp **8** is open (FIG. 3) a beam **9** can be inserted between the jaws **11** and **12** by placing it with its ribs **64** and **65** over the pair of lower rollers **60** and **61** solid with the structure **7**.

As the clamp **8** (FIG. 2) is closed, the upper rollers **56**, **57**, movable with the jaws **11**, **12** are brought onto the ribs **64** and **65** and the beam **9** whereas the rollers **71** and **72** come to rest laterally of the ribs **64** and **65**. Under these conditions, the beam **9** is held by the clamp, while being axially movable on both the fixed and the movable rollers. The beam can be locked in any optional position by turning the knob **53** so as to lower, via the cross-tie **49**, the plates **39** and **40** against the bias of the springs **47**, **48**. Thus, the teeth **54** and **55** of said plates press downwards against the ribs **64** and **65** of the beam, locking the latter against the lower rollers **60** and **61**.

For the conveyance of a beam **9** with a patient-carrying board **10**, a carriage **73**, as shown FIG. 5, can be used, equipped with resting arms **74** for a beam and displaceable on wheels **75**. FIGURE 5 shows in dash and dot outline, the position of the carriage **73** as a beam **9** is either inserted into, or removed from, the clamp **8** of the supporting device. The foregoing description clearly shows how the movability of the several component parts of the supporting device permits the beam **9** to be positioned in the desired posture, level and orientation, with the patient-carrying board **10**, and how said beam can be either centrally positioned with respect to the clamp, or it can be mounted in a fully overhanging position on both sides, or, also in any intermediate position therebetween.

The cross-sectional area of the beam **9** is extremely small but it is sufficient to bear the patient's weight irrespective of his posture. By such an arrangement, the beam interferes only with a reduced portion of the rays from the radiation source, irrespective of the direction and orientation thereof.

The beam **9** could not be, by itself alone, a sufficient support for the patient, nor could it permit to place him in any "articulated" posture, either.

Therefore, the members **68** are used, which, being of a reduced length and in a greater number, can be placed wherever desired and can be dispensed with wherever no interference is desired betwen the rays and opaque areas.

The drawing shows flat and symmetrical members **68** which, assembled together, will form a centered, normal patient-supporting surface.

Instead of one or more of said members **68**, asymmetrical members can be inserted (and thus the resting surface is entirely on a side of the beam), or members whose surface can be tilted both with respect to the longitudinal axis of the beam **9** and to an axis perpendicular thereto.

The possibility is thus afforded of providing, for the patient, a supporting surface, either inclined or articulated, while still avoiding any possible presence of opaque structures in correspondence with the radiation-scanned area.

Special members can be furthermore provided, having articulated supports for the skull, the legs, the trunk, so as to hold said parts of the body in the position which is suitable for radiological diagnosis or treatments.

Another considerable practical advantage is the removability of the beam from its support.

As a matter of fact, to position the patient in the desired posture, often an intricate one, takes a long time, especially when it is intended to duplicate in an identical manner, a position already taken in a prior operation.

With the conventional supporting devices, the time taken for the preparation was wholly subtracted from the operational time proper of the radiological apparatus: said apparatus is expensive and thus a higher efficiency thereof would be desirable.

On the contrary, by adopting the inventive supporting device equipped with a removable beam it is possible to prepare, in separate rooms, one or more patients on one or more beams which, as soon as the apparatus is available, can be brought, for example with the carriage **73**, to the radiological room, to be inserted in the clamp **8**.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A supporting device for a patient who is to be subjected to radiological treatments, said device comprising a base adapted to be moved in a horizontal direction, a slide movable on said base in a horizontal direction perpendicular to the first said horizontal direction, a pillar with a head adapted to be vertically lowered or lifted with respect to said slide, a beam removably supported on said head for slidable displacement thereon, clamp means pivotably mounted on said head for movement between a first position in which the beam can be introduced on and removed from the head, and a second position in which the beam is retained on the head by the clamp means, guide means on said clamp means for enabling displacement of said beam relative to the head with said clamp means in said second position, and means for acting on said clamp means to cause the same to lock the beam relative to the head when the clamp means is in said second position, and a patient supporting member engageable with said beam.

2. A device as claimed in claim **1** wherein said beam has a channel shape which is open upwards, and said patient supporting member is insertable into said beam, said beam and patient supporting member including means for interengagement therebetween.

3. A device as claimed in claim **2** wherein said patient supporting member includes a plurality of individual elements which are engageable in said beam.

4. A device as claimed in claim **1** wherein said guide means on the clamp means comprises rollers arranged at right angles to one another to rollably engage the beam.

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