

[54] **PATIENT'S COUCH**

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[51] Int. Cl.² **A61G 13/00**

[58] Field of Search **5/61, 62, 73, 74, 317 R, 5/327; 250/439-456; 269/322, 323, 328, 215**

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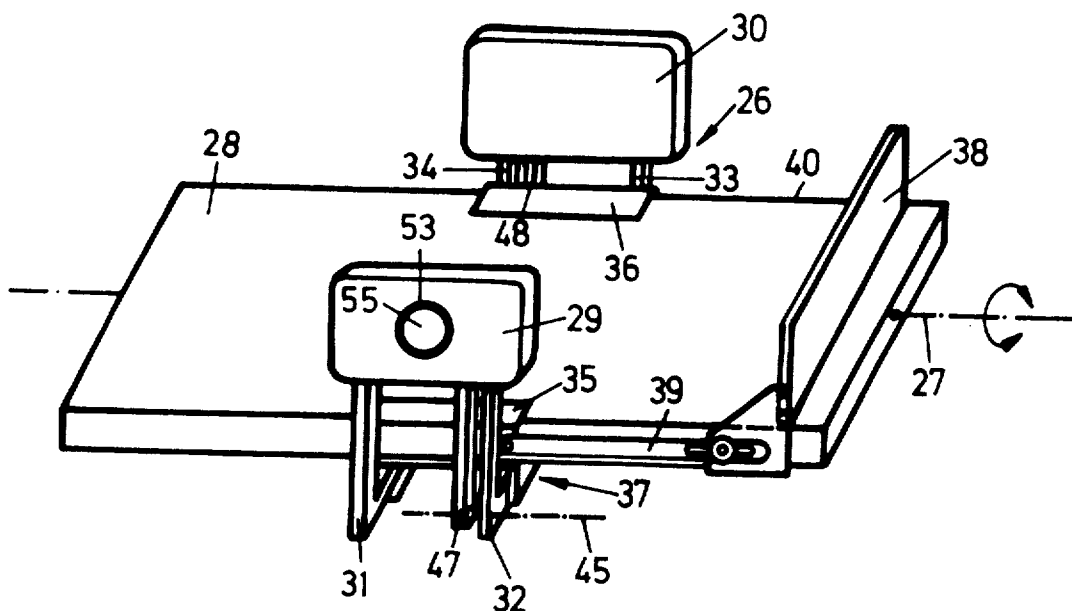
Attorney, Agent, or Firm—Richards & Geier

[57]

ABSTRACT

A patient's couch of an X-ray examining apparatus is swingable about its longitudinal axis and is mounted with its front side upon the instrument carrying device. The couch has holding means for the patient. The present invention is characterized by the use of a supporting member having a core consisting of a hard foam substance the cross-section of which is reduced from its longitudinal axis of symmetry toward the two longitudinal edges and ends with an acute angle at these longitudinal edges. The foam core is enclosed by covering layers of firm material of small elasticity and thickness which are joined at least at the longitudinal edges.

5 Claims, 7 Drawing Figures



SHEET 1 OF 2

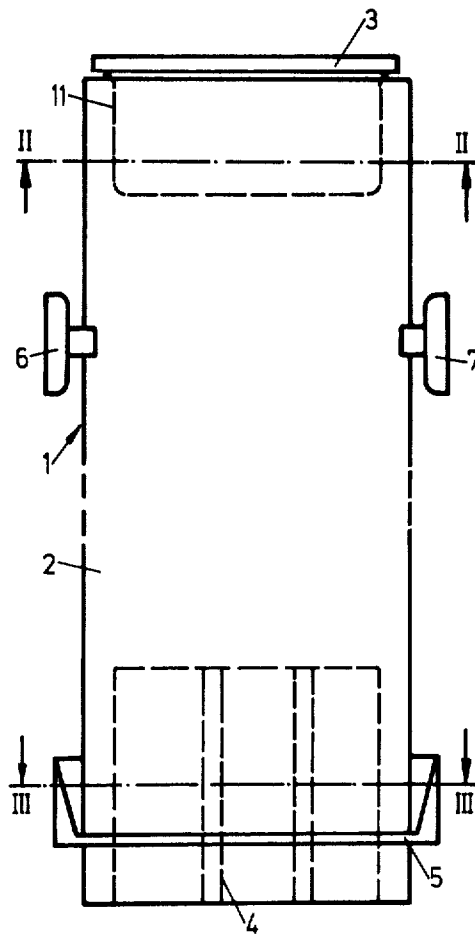


Fig. 1

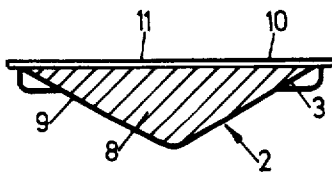


Fig. 2

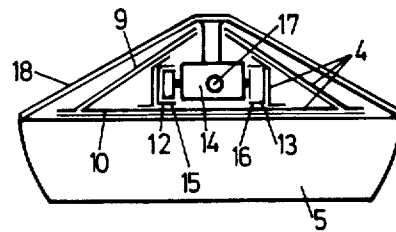


Fig. 3

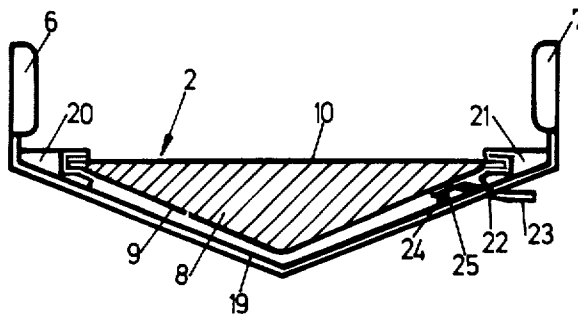
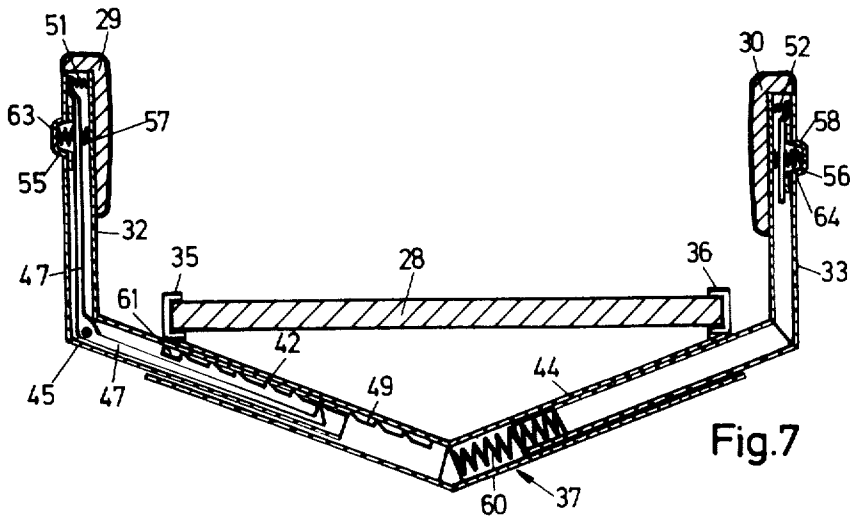
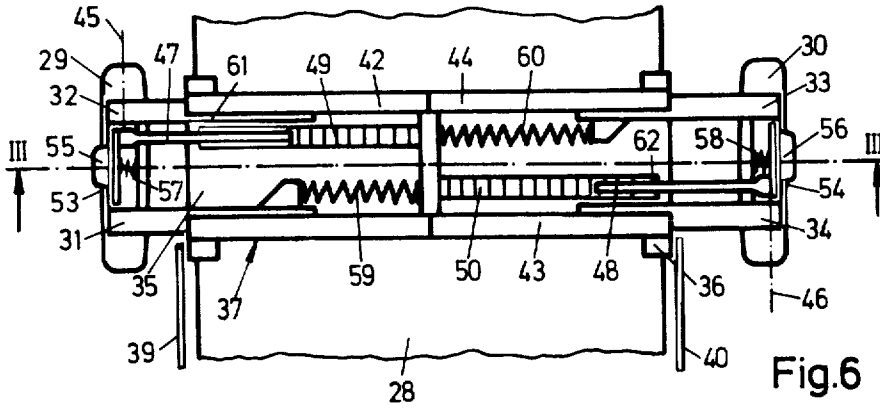
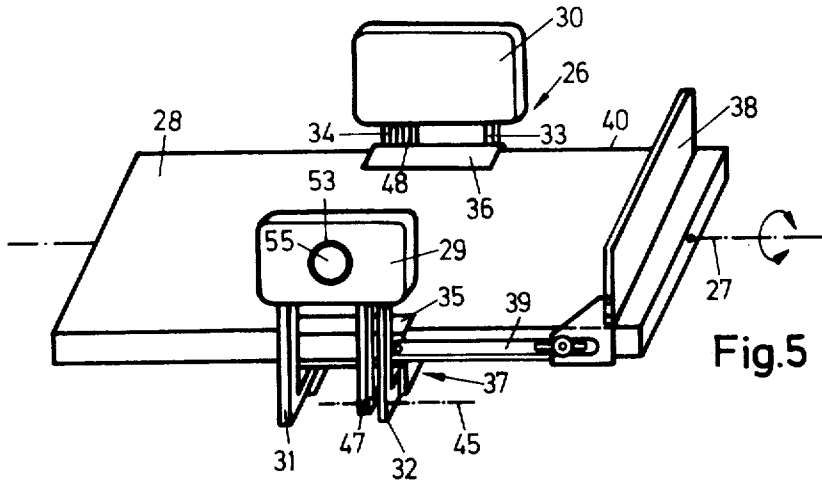


Fig. 4



PATIENT'S COUCH

DESCRIPTION OF THE INVENTION

This is a continuation of application Ser. No. 75,116, filed Sept. 24, 1970, now abandoned.

This invention relates to a patient's couch of an X-ray examining apparatus which is swingable about its longitudinal axis, is mounted with its front side upon the instrument carrying device and has holding means for the patient.

Up to now patient's couches swingable about their longitudinal axes were always made in the shape of troughs. Such troughs provide a side hold for a patient who is also often additionally held firmly by belts; due to the rigidity of their shape their walls can be made comparatively thin. They have, however, the drawback that their ray absorption is not uniform throughout their width. Furthermore, they shade to a great extent the range of the spine at swinging angles of 90°. It is also disturbing that the patient lies in such troughs in an unnatural position with bent shoulders. However, the use of a normal flat support for the patient has the drawback of disturbing ray absorption by the edges in a position wherein the support is swung about its longitudinal axis; furthermore, there is no side hold for the patient.

It is also known to provide a grooved ledge at two longitudinal sides of a flat supporting plate for the patient, into which may be inserted ends of a longitudinally movable belt, the ends being provided with guides. The drawback of such a belt is that the patient can be held upon the plate only on his back and front positions and also under certain circumstances in the two side positions, but not in inclined positions. Furthermore, the patient held by the belt can be shifted between the two grooved ledges when the support is swung about its longitudinal axis even if the belt is tightly fixed. Finally, the ray absorption at the plate edges is disturbing when the plate supporting the patient is in a swung position.

An object of the present invention is to eliminate these drawbacks of prior art devices.

Another object is to provide a patient's couch of the above-described type which will be better adapted than existing devices to the requirements of X-ray examination in all its swinging positions.

Other objects of the present invention will become apparent in the course of the following specification.

In the accomplishment of the objectives of the present invention it was found advisable to use a supporting member the core of which consists of a hard foam substance, the cross-section of the core being reduced from its longitudinal axis of symmetry toward the two longitudinal edges and ending with an acute angle at these longitudinal edges. The foam core is enclosed by covering layers of firm material of small elasticity and thickness which are joined at least at the longitudinal edges.

Due to this construction any increase in absorption and consequently any shading of the object being examined is avoided in the range of the two longitudinal edges of the patient's couch as well. Then the replacement of a rotary trough by a flat surface constituting the patient's couch provides proper picture-taking requirements. A known patient's couch consisting of a flat supporting plate is constructed as a light weight plate with a synthetic hard foam core and mechanically

protecting and supporting coverings. However, the hard foam core is enclosed by a hollow profile frame which is integrally connected with the core and the covers and which is used to receive stretcher handles.

A supporting plate of this type is not suitable for a swinging movement about its longitudinal axis relatively to the central ray, since the hollow profile frame would shut off the X-ray image to a great extent.

According to an advantageous embodiment of the present invention, fastening members can be connected along wide surfaces with the covers of the supporting member at its head and feet ends. The fastening members are rotatably mounted in the instrument container. This makes it possible to attain a safe attachment of the couch body with the instrument container which is adapted to the construction of the supporting plate for the patient and which transmits forces along a wide surface.

According to a further particularly effective embodiment of the present invention the patient is held transversely to the longitudinal axis of the supporting plate and is also fixed in an inclined position relatively to the supporting plate by supporting means consisting of side supports which are located on both sides of the plate and which are movable along its side edges by sliding blocks. These side supports can be fixed by a bearing block which is pressed by spring force against the supporting plate and which can be released by hand. A supporting plate swingable about its longitudinal axis is shown, for example, in U.S. Pat. No. 3,434,165. This makes it possible to support the patient in a position which is swung sideways relatively to the central ray by making him lean against one of the side supports. This applies to a patient lying upon a supporting plate which is swung sideways, and also to a patient who lies sideways upon a horizontal supporting plate. Furthermore, then all shade forming guiding side ledges upon the supporting plate can be eliminated. Consequently, no shading is produced when edge zones enter the primary ray cone in case the supporting plate is inclined transversely to the central ray. In this manner the doctor has at his disposal for examination a useful swinging range on both sides of over 90° about the longitudinal axis of the supporting plate.

To better reach the sides of patients of different shapes the side supports can have the form of narrow gripping jaws which extend over the supporting plate approximately at a height corresponding to that of a lying patient; they can be movable on both sides of the supporting plate longitudinally as well as transversely thereto and they can be held firm. Thus the side supports can be adapted, as far as their distance from each other is concerned, to the effective body width corresponding to the actual position of the patient. This also effectively prevents any possible side sliding of the patient during the swinging movement, without it being necessary to press the patient firmly against the supporting plate, as would have been the case if a belt was used.

According to a further particularly advantageous embodiment of the present invention each of the side supports can be mounted by guiding means in a carriage slidably guided upon the bottom surface of the supporting plate along the longitudinal edges thereof transversely thereto. The carriage can be stopped and the guiding means with the holding means can be clamped

to the carriage. This facilitates the fixing of the side supports to the supporting plate.

According to a further particularly useful embodiment of the present invention the guiding means can be mounted in the carriage in a plate inclined to the supporting plate to provide a compensation in height in case of a transverse setting. This provides in the simplest possible way a compensation for the fact that the center of gravity of patients of a somewhat wider shape lies as a rule higher above the supporting plate.

The invention will appear more clearly from the following detailed description when taken in connection with the accompanying drawings showing by way of example only, preferred embodiments of the inventive idea.

In the drawings:

FIG. 1 is a top view of a patient's couch consisting of a flat supporting plate with simple side supports for holding the patient.

FIG. 2 is a section along the line II—II of FIG. 1.

FIG. 3 is a section along the line III—III of FIG. 1.

FIG. 4 is a section through a supporting plate with simple side supports.

FIG. 5 is a perspective view of a simple supporting plate with side supports which are movable longitudinally and transversely.

FIG. 6 shows the bottom side of the longitudinally and transversely movable side supports.

FIG. 7 is a section along the line VII—VII of FIG. 6.

The patient's couch shaped as a flat supporting plate and shown in top view in FIG. 1, consists of a body 2 and holding members 3 and 4 flatly glued to the head and foot ends of the body 2. The holding members are shown by cross lines to the extent that they project into the body 2. A foot step 5 is fixed to the body and two side supports 6 and 7 are longitudinally slidable upon it.

As shown in cross-section in FIG. 2, the body 2 consists of a foam body 8 and two covering layers 9 and 10 glued flatly to the foam body. The holding member 3 located at the head end is glued to the foam body 8 and the upper cover by means of a tongue-like extension 11.

The inner structure of the holding member 4 located at the foot end and the attachment of the foot step 5 are shown in FIG. 3. The holding member 4 is hollow, it follows the inner surfaces of the covers and is glued to them. Two U-shaped rails 12 and 13 which are fixed to the instrument container (not shown) extend into the holding member 4. A carriage 14 runs along these U-shaped rails by four ball bearings 15 and 16 (only two of them are shown in FIG. 4). The carriage is moved by a sprindle 17 actuated from the instrument container. A supporting frame 18 is fixed to the carriage and is also connected with the foot step.

Side supports 6 and 7 are shown in section in FIG. 4. They are connected with each other by a carrier 19 which is slidably mounted by sliding jaws 20 and 21 upon the two longitudinal edges of the body 2. A two-armed lever 23 is connected to the carrier and is swingable about an axis 22. One end of the lever is pressed by a spring 24 against the lower side of the body 2 and is shaped as a brake shoe 25.

FIG. 5 illustrates the arrangement of side supports 29 and 30 which are movable longitudinally and transversely relatively to a simple supporting plate 28 which is swingable about its longitudinal axis 27. Each of the

side supports 29 and 30 extends over a longitudinal side of the plate 28 and is located above the surface of the plate to the extent of about 15cm. The side supports are guided by a carriage 37 through the use of guides 31, 32, 33 and 34. The carriage 37 is movable along the supporting plate by sliding blocks 35 and 36 and is substantially adjustable transversely to the supporting plate. Furthermore, the carriage 37 is connected by guiding rods 39 and 40 which can be firmly clamped, upon both sides of the supporting plate with a foot rest 38 which can be shifted along the supporting plate.

FIG. 6 shows the mounting of the guides 31, 32, 33 and 34 in the U-shaped rails 41, 42, 43 and 44 of the carriage 37. Stop levers 47 and 48 swingable about axes 45 and 46 are swingably mounted upon the guides 32 and 33. One end of each of the stop levers engages in its rest position a rack 49 or 50 fixed to the carriage. The other end of each stop lever extends into the interior of a separate side support and is connected there with a spring 51 or 52 (FIG. 7), which presses the stop lever with its other end against the rack 49 or 50. There are openings 53 and 54 provided upon the outer sides of the side supports and pressure keys 55 and 56 are located in these openings for actuating the stop levers. The keys 55 and 56 are pressed against the openings by pressure springs 57 and 58. Springs 59 and 60 are located in the carriage 38 adjacent separate side supports to press the side supports outwardly in engagement with one of the guides 31 and 33.

FIG. 7 shows that the U-shaped rails of the carriage are inclined relatively to the plane of the supporting plate. It is also apparent that the last teeth 61 and 62 of the racks 49 and 50 in the pulling direction of the respective side supports have been made higher than the other teeth and that the pressure keys 55 and 56 are provided with stop pins 63 and 64, respectively.

When the doctor presses the key 55 or 56 into the side support 29 or 30, the corresponding lever 47 or 48 is also moved against the action of the spring 51 or 52 and its other end is raised from the rack 49 or 50. The side support is not held any more and is pressed outwardly by the corresponding spring 59 or 60 against the hand of the doctor. The doctor can now push the side support closer to the patient or move it away from the patient depending as to whether he will press harder or will give in. When the pressure key is released the side support is immediately locked in its new position due to the engagement of the lever 47 or 48.

Stop pins 63 and 64 prevent the raising of the levers 47 and 48 by keys 55 and 56 away from the teeth of the racks 49 and 50 to such an extent, that the levers would move beyond the last high teeth 61 and 62 of the racks. Furthermore, this is only possible if when the side support is pulled out the doctor would press downwardly directly by hand the lower arm of the corresponding lever.

When the foot step is moved by motor, the side supports 29 and 30 are also taken along automatically by guiding rods 39 and 40. This maintains the supporting location of the side supports relatively to the patient when the patient is moved longitudinally by motor. If a belt is to be used in addition to the side supports in case of swingings of the supporting plate about its longitudinal axis to the extent of more than 45°, such belt can be attached to the carriage 37. This arrangement will not interfere with the possibility of shifting the patient longitudinally by means of the foot step. Further-

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more, this avoids the now usual arrangement of rods along the longitudinal edges of the supporting plate for attaching the belt.

The best conditions exist when side supports shown in FIGS. 5 to 7 are arranged upon the patient's supporting plate 2.

The illustrated arrangement of side supports upon slide jaws makes it possible to eliminate the provision of ray absorbing holding elements for the side supports at the longitudinal edges of the supporting member. Obviously, the slide jaws can be replaced by rollers which would run upon the surface of the supporting body without the use of rails or grooves.

We claim:

1. In a patient's couch swingable about its longitudinal axis and having a table top, a foot step adjustable in the longitudinal direction of said table top and side supports for fixing the patient, a carriage for said side supports, sliding clamps, said carriage being located under said table top and being guided by said sliding clamps for movement along longitudinal edges of said table top, said carriage having guides for said supports, said guides being mounted in the carriage in a plane inclined to the table top and having means for fixing said side supports at selectable positions relative to said guides, said side supports having the shape of narrow

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gripping jaws extending above said table top to substantially the height of a lying patient.

2. A patient's couch in accordance with claim 1, wherein the last-mentioned means comprise at least one rack connected to said carriage, a swingable stop lever, a spring pressing said stop lever into engagement with said rack, and a pressure key carried by a side support and adapted to move said stop lever out of engagement with said rack.

3. A patient's couch in accordance with claim 2, wherein said pressure key is located upon that side of the side support which is directed away from the patient, the carriage further comprising springs pressing said side supports outwardly transversely to said table top.

4. A patient's couch in accordance with claim 2, wherein said rack has a tooth which is the last one when pulling the side supports outwardly, said tooth being higher than the other teeth of the rack and wherein said pressure key has a stop pin preventing the raising of said stop lever above said higher tooth.

5. A patient's couch in accordance with claim 1, comprising guiding rods adjustably connecting said carriage with said foot step, said foot step being movable with said carriage along said table top.

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