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Platz et al.

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[54] **SUPPORTING TABLE FOR PATIENTS**

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[52] **U.S. Cl.**..... **269/322,** 5/63, 108/147, 182/141, 254/10 R, 254/126

[51] **Int. Cl.**..... **A47b 9/00**

[58] **Field of Search** ..... 5/11, 63; 108/144, 145, 108/147; 182/141; 254/10 R, 10 B, 10 C, 124, 126; 269/322

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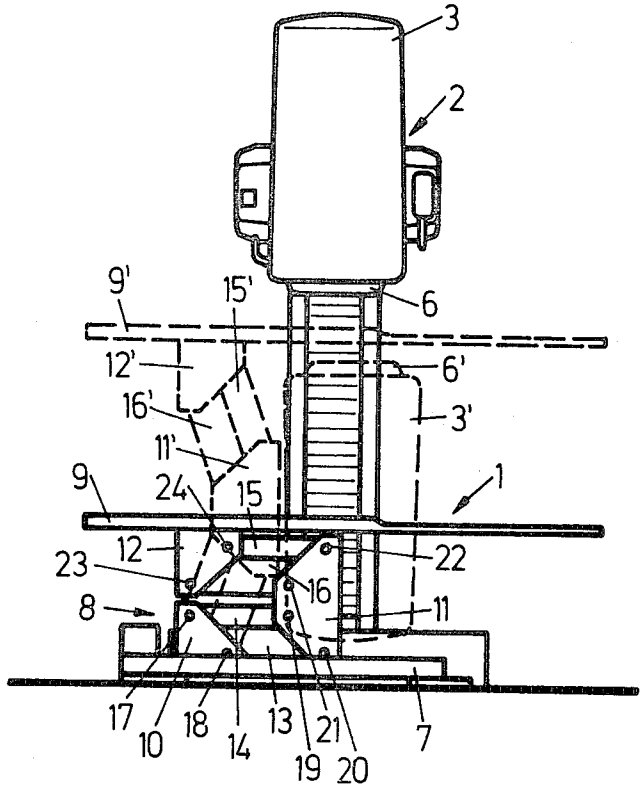
[57] **ABSTRACT**

A supporting table for patients has between its base and the table plate a height raising and lowering mechanism which includes rods forming two parallelogram sections connected one behind the other, a connecting member mechanically fixing the upper bearing of the lower section relatively to the lower bearing of the upper section, a motor connected with one of these sections and a power transmitting connection between these sections.

4 Claims, 5 Drawing Figures



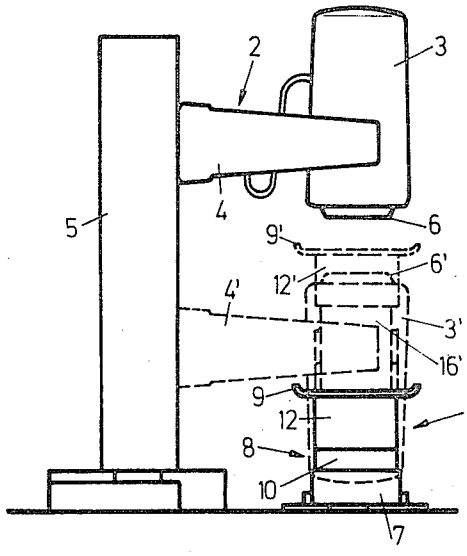


Fig.1

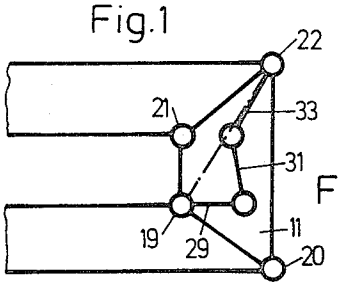
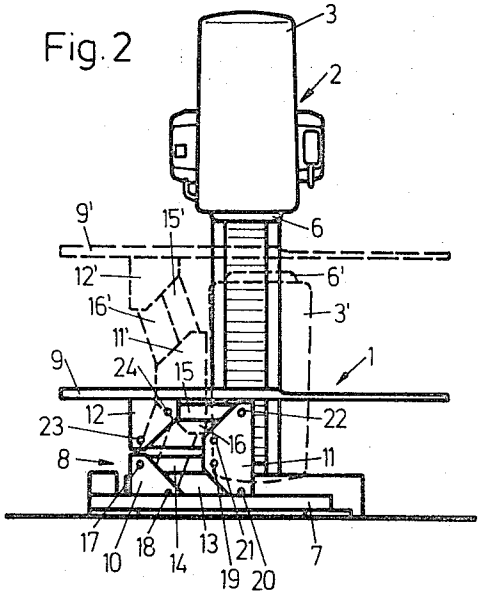


Fig.3a

Fig.2



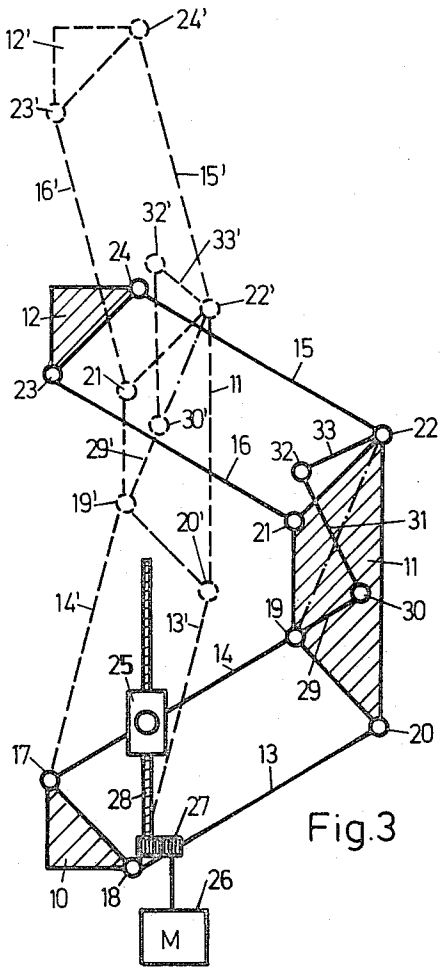


Fig.3

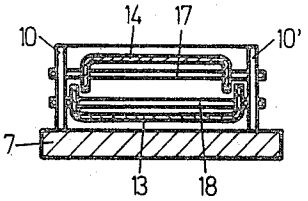


Fig.4

SUPPORTING TABLE FOR PATIENTS

This invention relates to a supporting table for patients.

Such tables are used, for example, in surgery as well as in irradiation devices and examining devices to securely support the patient in a suitable position.

Existing supporting tables have as a rule raising and lowering devices used to adapt the location of the patient to the various requirements. However, the existing raising and lowering devices change the height level only to a small extent. They are hydraulically, mechanically or electromechanically operated.

Austrian patent specification No. 214,023 describes a supporting table for patients wherein the table plate is swingable about a horizontal axis and wherein a chelate rod connection is used for height setting. Such rod connection has, however, the drawback that it takes a great deal of space and that it is comparatively expensive and complicated as far as its structure is concerned. It is therefore badly suitable for certain uses, particularly when utensils must be placed under the table. This Austrian patent specification also describes a parallel rod guide. However, this guide is not used for the height setting of the table but is connected with a device for swinging the table. Thus the parallel rod guide is an addition to the chelate rod connection.

Known supporting tables for patients are difficult to use in certain cases, for example in illuminating devices or ray measuring devices which have a large vertical extension, for example, an isotope camera, and which must be used above the table and also under the table. Specifically, in known patient supporting tables it is not possible due to their comparatively small height movement to place an isotope camera under the table to take measurements of the patient from below.

An object of the present invention is the provision of a supporting table for patients having means for raising and lowering the table to a great extent so that devices having a great length, as for example, an isotope camera can be placed under the table, while space required for the raising and lowering means is small.

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

In the accomplishment of the objectives of the present invention it was found desirable to provide a height raising and lowering mechanism having two specifically interconnected parallelogram rod sections. The mechanism is of small size but makes possible the height setting of the table within wide limits. Thus the supporting table of the present invention can be used in connection with an isotope camera.

The specific connection of the parallelogram rod sections includes a yoke and levers connected with the sections, providing a particularly simple and space saving embodiment of the present invention. The sizes of the yoke and levers are determined by the size of the stroke for raising and lowering the table.

According to an embodiment of the present invention the parallel sections have U-shaped interengaging shapes. This construction is particularly effective as a protection against accidents.

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

In the drawing:

FIG. 1 is a side view of an apparatus wherein the supporting table of the present invention is used.

FIG. 2 is a front view.

FIGS. 3 and 3a are diagrams illustrating the operation and size of the double parallelograms of the raising and lowering mechanism.

FIG. 4 is a section through one of the parallelogram rods.

As shown in FIGS. 1 and 2 the supporting table 1 for patients is combined with an isotope camera 2. The camera 2 consists of the actual camera head 3 and a support 4 which is shiftable vertically along a column 5, so that it can be moved from an upper position 3 shown by full lines to a lower position 3' indicated by broken lines in FIGS. 1 and 2.

The supporting table 1 for patients consists of a base 7 movable upon the floor by an air seating and carrying the raising and lowering mechanism 8 which extends as an intermediate part to the actual table 9. The table 9 is shown in full lines in its normal lower position and is indicated as 9' by broken lines in its raised position.

The actual raising mechanism 8 includes a support 10 fixed to the base 7, a trapeze-shaped connection 11 and a support 12 firmly fixed to the table 9. Parallel guides 13 and 14 provide a connection between the support 10 and the connection 11 while parallel guides 15 and 16 provide a connection between the connection 11 and the support 12. The first support 10 carries a rotary bearing 18 for the guide 13. The guides 14 and 13 are connected to rotary bearings 19 and 20, respectively, carried by the connection 11. The connection 11 also carries rotary bearings 21 and 22 opposite the bearings 19 and 20. The bearing 21 is connected with one end of the guide 16 the opposite end of which is connected with a rotary bearing 23 carried by the support 12. The bearing 22 is connected with one end of the guide 15 the opposite end of which is connected with a rotary bearing 24 carried by the support 12. These parts are also shown by broken lines in their raised position in FIG. 3 the numerals of the same parts being provided with primes.

As shown in FIG. 4, the parallel guides 13, 14 and 15, 16 are of U-shaped outline, with the open U-sides of the parts being directed toward each other and interengaging. The supports 10 and 12 as well as the connection 11 are also U-shaped so that on both sides of the legs of the U-shaped profile of the guides 13 to 16 there is one supporting plate of the supports 10 and 12 as well as of the connection 11, as indicated by 10 and 10' in FIG. 4. Due to this construction the rods are closed on all sides so that there is no danger of accidients resulting from improper grasping.

As shown in FIGS. 3 and 3*a*, the action of the mechanism 8 is provided by the two parallel guides 13 and 14 the rotary axes of which are constituted by bearings 17 and 18 of the support 10 connected with the base 7. The two sides are moved relatively to each other by a ball bearing spindle 25, in that the motor 25 rotates the threaded rod 28 through the gear drive 27 in a direction corresponding as to whether the table 9 is to be raised or lowered. This causes a swinging of the guide 14 about its bearing and at the same time the lever 29 which is rigidly connected with the guide 14 and extends beyond the bearing 19, will turn the bearing 30 and move upwardly the yoke 31. This causes through the the bearing 32 a movement of the lever 33 rigidly connected with the guide 15, so that the guide 15 of the

second parallelogram connection is also moved. Thus the support **12** to which the table is attached is also raised when the spindle **25** is raised due to the provision of bearings **21** to **24.** In its final end location the support reaches the position **12'**. By rotating the threaded rod **28** of the spindle **25** in the opposite direction the table is lowered. The guides **13** and **16** participate in these movements and serve solely for the straight guiding of the support **12,** i.e., the table **9.**

In order to produce the desired free transmission and guiding the following is provided: the parallel guides **13** to **16** are of equal length and there are equal distances between the guides **13** and **14** as well as guides **15** and **16.** There are corresponding equal distances between the bearings **17** and **18, 19** and **20, 21** and **22** as well as **23** and **24.** Thus the movement of the support **12** and consequently that of the table takes place at least approximately along a vertical line. For that purpose the angle which the lever **33** forms with the parallel guide **15** is so selected that in the lowermost, namely, the basic or initial position the lever **33** extends in the direction of the line connecting the bearings **19** and **22** (FIG. 3*a*). In this position the lever **29** forms an angle with the above-mentioned connecting line between bearings **19** and **22** which corresponds with that through which the guides are moved when the stroke has reached its maximum position (maximum stroke angle). After reaching the maximum stroke the lever **33** will form the maximum stroke angle with the connecting line between bearings **19** and **22.** By suitably selecting the length of the yoke **31** and the length of the levers **29** and **33** a most uniform movement is provided for the table between its lower position **9** and its upper position **9'**. In this example of the present invention this is attained if the lengths of the levers **29** and **33,** which are equal to each other, are equal to a specific part of the distance between bearings **19** and **22** depending upon the maximum stroke angle. In case of an angle of 70° for calculating the length of the levers **29** and **33** there is the factor 0.46 as multiplier for the distance between bearings **19** and **22.** For 90° the factor is 0.41. This indicates that the multiplicator factor changes its amount relatively to the increase of the angle, even through the change is a small one in the range which is of interest. If the distance between bearings **19** and **20** is 30 cm. in case of a maximum stroke angle which for the above values is 75°, the average value of the multiplier is 0.43. Then the levers **29** and **33,** namely the distances between the bearings **19** and **30,** and **32** and **22,** have the length of 13 cm. The yoke **31** inserted between the bearings **30** and **32** has then a length of 18.5 cm. It is then immaterial which is the length of the guides **13** to **16** and at what distances from each other they are located, since these sizes have no effect upon the properties of the parts **29, 31** and **33** which carry out the stroke and transmit the drive. The length of the parallel guides **13** to **16** determines the absolute height of the stroke while the mutual distances of the guides **13, 14** and **15, 16** are selected when taking into consideration the division of mechanical load upon the supports **10** and **12** as well as the connection **11.**

What is claimed is:

1. A supporting table for patients, having a base, a table plate and a mechanism located between said base and said table plate for moving said table plate up and down relatively to said base, said mechanism comprising rods forming two parallelogram sections located one above the other, bearings carried by ends of said rods, a connecting member connecting the upper bearings of the lower section with the lower bearings of the upper section, a motor, a drive connecting said motor with one of said sections and power transmitting connecting means between the two sections.

2. A table in accordance with claim **1,** wherein said rods are of equal lengths.

3. A table in accordance with claim **1,** wherein said power transmitting means comprise a yoke, a lever constituting a continuation of one of the rods of the lower section and pivotally connected with one end of said yoke, and another lever extending at an angle from the lower end of one of the rods of the upper section and pivotally connected with the other end of said yoke.

4. A table in accordance with claim **1,** wherein said rods are U-shaped in cross-section and have interengaging profiles.

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