Sept. 28, 1971 R. GOODMAN 3,608,102

HOSPITAL BED

Filed June 27, 1969 4 Sheets-Sheet 1

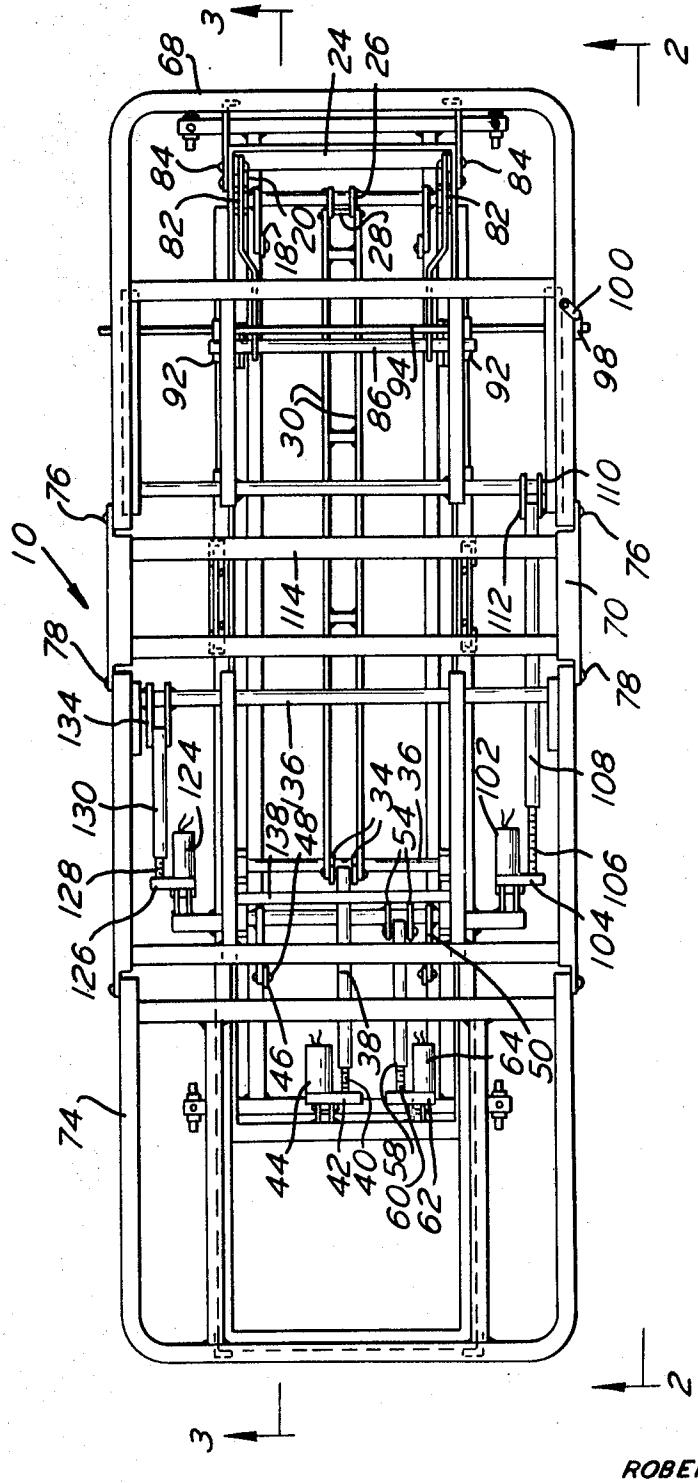


FIG. 1

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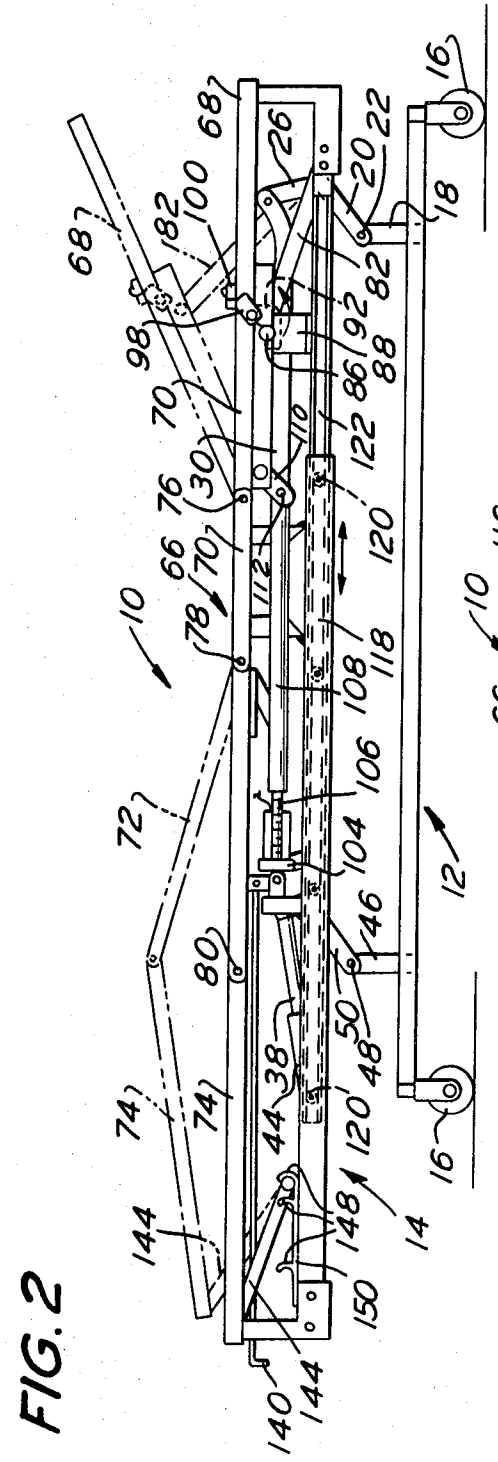


FIG. 2

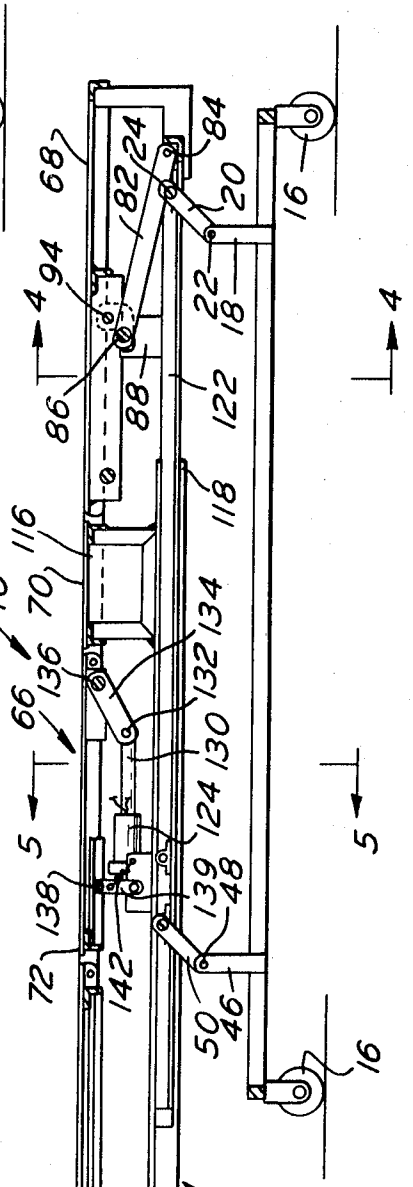
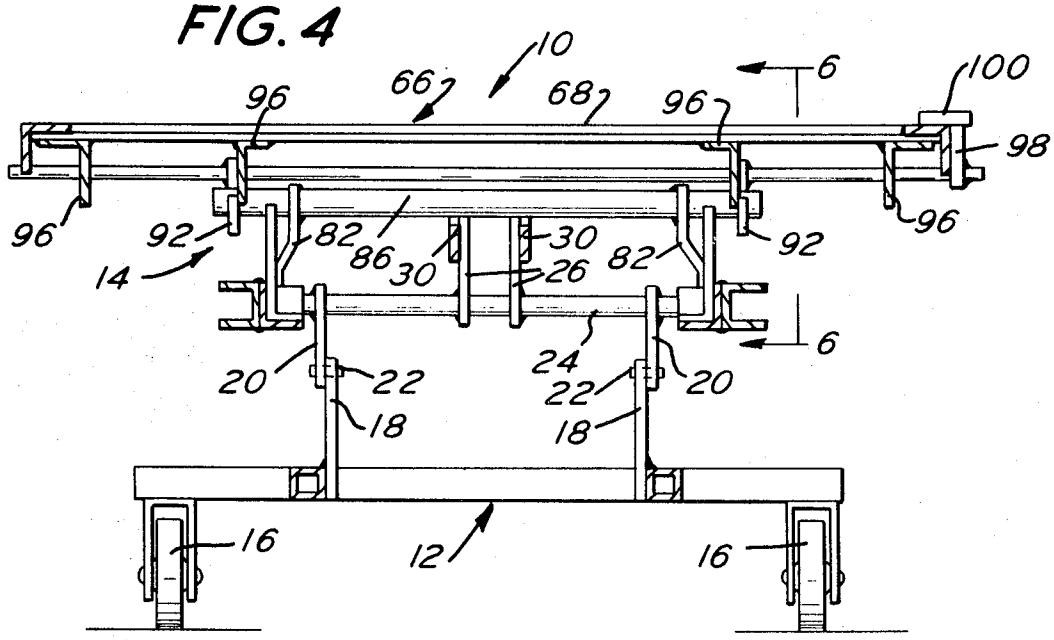


FIG. 3

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FIG. 4



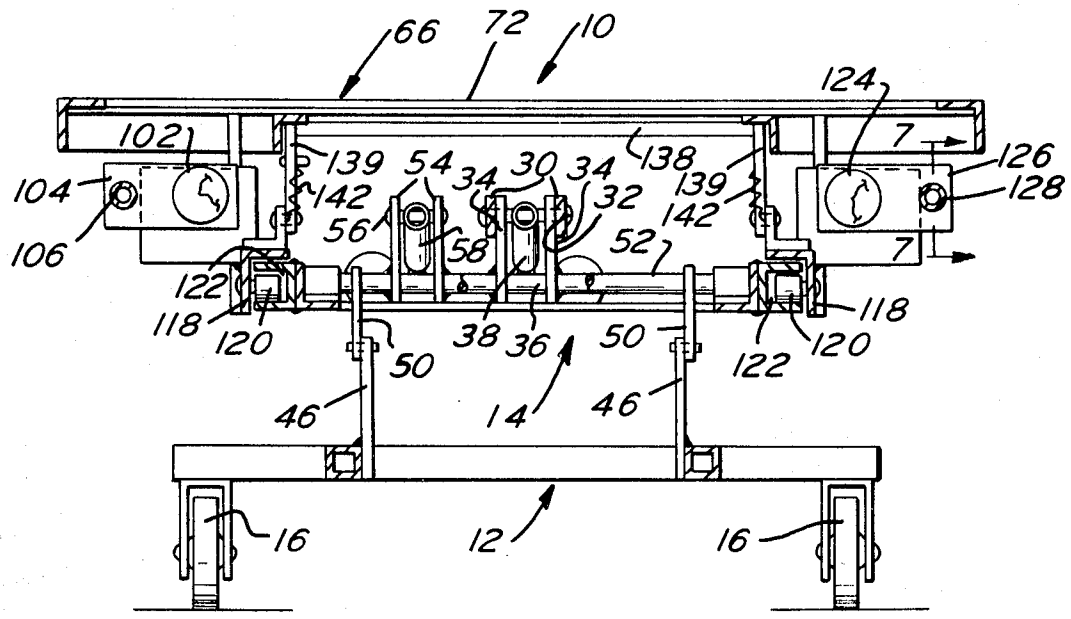


FIG. 5

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FIG. 6

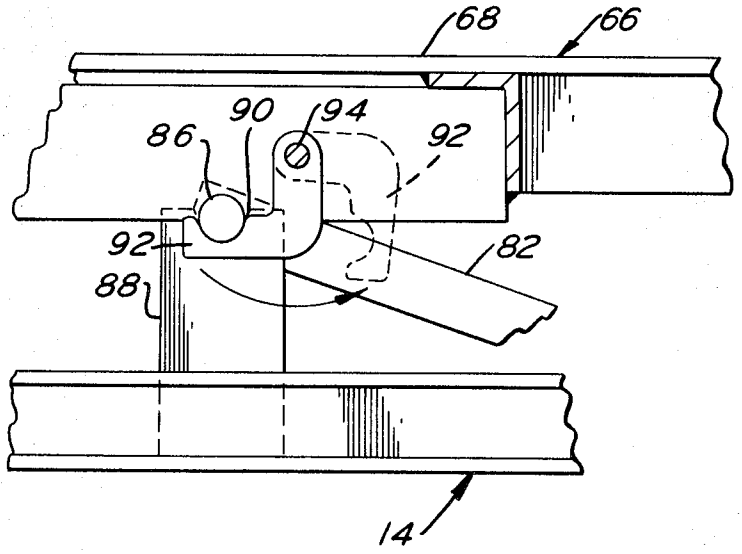


FIG. 7

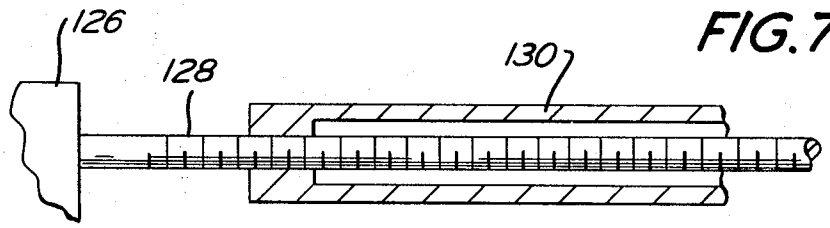
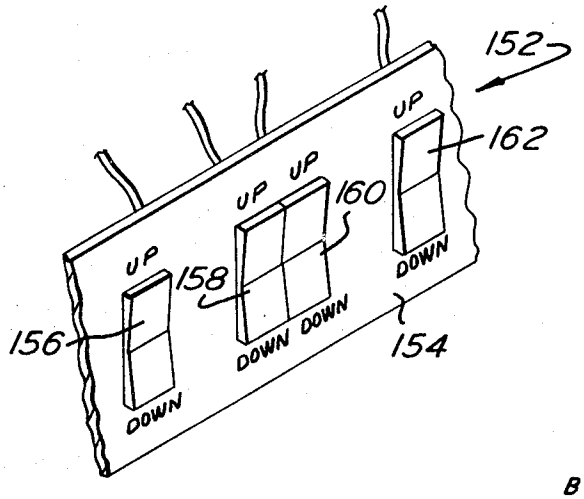


FIG. 8



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3,608,102

HOSPITAL BED

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Int. Cl. A61g 7/10
U.S. Cl. 5—63 9 Claims

ABSTRACT OF THE DISCLOSURE

A hospital bed having a supporting base frame and an upper frame which is vertically movable relative to the base frame by means of motor-actuated linkage. The linkage consists of two sets of links, each of which may be separately actuated to raise or lower the corresponding end of the upper frame, or both of which can be simultaneously actuated to raise the entire upper frame at one time. The upper frame supports a bed-spring assembly including a head section, a seat section, a knee section and a foot section, the head and knee sections being pivotally connected to the stationery seat section, and the foot section being pivotally connected to the knee section. The head and knee sections may be separately raised or lowered into and out of inclined positions. The head section is also provided with means for detachably connecting it to a slide on the upper frame. When the head section is attached to the slide, if the head section is pivoted upwardly, it moves the entire bed-spring assembly toward the front of the bed, and when it is lowered, it moves the entire bed-spring assembly toward the foot of the bed. When the head section is detached from the slide, it pivots up and down without affecting the horizontal position of the bed-spring assembly.

This invention relates to a so-called hospital bed, and it particularly relates to a bed of this type which has a plurality of variably adjustable bed-spring sections, including head, knee and foot sections.

Most prior beds of this type have provided means for raising the head section of the bed spring around a pivotal connection to the seat section, usually causing simultaneous pivotal movement of the other sections into inclined positions. However, in such prior beds, when the head section is raised, it not only acts to tilt the head and torso of the patient into a generally sitting or reclining position but also moves his head and torso toward the foot end of the bed. As a result, when there is a table, cabinet or the like, positioned next to the head of the bed for supporting medicines, pushbuttons, a telephone, etc., it becomes inaccessible to the patient.

In order to overcome this, it was heretofore proposed to so construct the bed that, as the head section was tilted up, it would automatically move the entire bed-spring toward the head end of the bed. This served to solve the above problem but it created another problems, namely horizontal movement of the patient. Such horizontal movement is often quite undesirable in hospital beds, as for example, when tubes are connected to the patient's body and cannot be disturbed, or when a part of his body is in traction.

It is also often necessary to raise either one end or the entire bed in a vertical direction. The usual procedure for accomplishing this heretofore has been to provide four posts, one at each corner of the bed, which were provided with telescopic portions to permit up and down movement. However, this post arrangement required the use of complicated mechanisms, often including cables and the like which would tend to snap after a period of use. Although various linkage arrangements were proposed to be substituted for the posts, these linkage

arrangements were not sufficiently effective to permit satisfactory selective vertical adjustments of either end of the bed as well as the entire bed.

It is, therefore, one object of the present invention to provide a hospital bed having a plurality of relatively articulated sections whereby the head section may be moved into and out of an inclined position while, optionally, either moving the entire bed-spring toward the front end of the bed or retaining it in the original position.

Another object of the present invention is to provide a bed of the aforesaid type whereby either end of the bed or the entire bed may be vertically adjusted without the use of telescoping corner posts or any complicated mechanisms.

Another object of the present invention is to provide a bed of the aforesaid type which is sturdy and yet relatively simple in construction and which is relatively inexpensive to manufacture as compared to prior beds of this same general type.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following description when read in conjunction with the accompanying drawings wherein:

FIG. 1 is a top plan view of a bed embodying the present invention.

FIG. 2 is a side elevational view of the bed of FIG. 1, taken on line 2—2 of FIG. 1.

FIG. 3 is a sectional view taken on line 3—3 of FIG. 1.

FIG. 4 is a sectional view taken on line 4—4 of FIG. 3.

FIG. 5 is a sectional view taken on line 5—5 of FIG. 3.

FIG. 6 is an enlarged sectional view taken on line 6—6 of FIG. 4.

FIG. 7 is an enlarged view taken on line 7—7 of FIG. 5.

FIG. 8 is an enlarged fragmentary perspective view of the switch controls for actuating the various adjustments of the bed.

Referring now in greater detail to the various figures of the drawings wherein similar reference characters refer to similar parts, there is shown a bed, generally designated **10**, which includes a base frame **12** and an upper frame **14**. The base frame **12** is supported at each corner by casters **16**.

The upper frame **14** is adjustably supported at its front end on the base frame **12** by means of posts **18** and links **20**, the posts **18** being rigidly connected to the base frame **12** and the links **20** being pivotally connected at **22** to the posts **18**. The links **20**, at their opposite ends, are rigidly connected to a bar **24** mounted on the upper frame **14**. Rigidly connected to the bar **24** are a pair of links **26** to which are pivotally connected, as by a pivot pin **28**, a pair of parallel links **30**. The links **30** extend rearwardly and, at their rearmost ends, are pivoted at **32** to a pair of links **34** fixed to a bar **36** mounted on the upper frame **14**. The pivot pin **32** also supports the front end of an internally-threaded tube **38** in which is threadedly positioned a screw-threaded rod **40**. The rod **40** extends from a gear box **42** operatively associated with a reversible electric motor **44**.

When the motor **44** is actuated in one direction, it acts through the screw-threaded rod **40** and tube **38** to cause the links **30** to pivot upwardly. This pivotal movement is translated through the links **26** and bar **24** to the links **20**. These links **20** then pivot upwardly around the pivot pin **22** to move the front end of the upper frame **14** vertically upward. When the motor **44** is actuated in the opposite direction, it causes a downward movement of the front end of upper frame **14**.

The rear end of the upper frame **14** is supported on the base frame **12** by links **46** to which are pivoted, as at **48**, links **50**. The links **50** are fixed to a bar **52** mounted on the upper frame **14**. The bar **52** is provided with a pair

of links 54 to which is pivoted, as at 56, one end of an internally-threaded tube 58 into which extends a screw-threaded rod 60. The rod 60 is operatively connected to a gear box 62 which is operatively associated with a reversible electric motor 64.

The reversible motor 64 may be actuated in one direction or the other, and acts through the screw-threaded rod 60, the tube 58, links 54, bar 52 and links 50 to raise and lower the rear portion of the upper frame 14 in the same manner as is accomplished by the previously described linkage with regard to the front portion.

By means of the above-described mechanism, the patient can himself selectively raise the front portion of the bed, the rear portion of the bed, or the entire bed, merely by actuating the proper switches, either individually or together, as will be hereinafter more fully explained.

Mounted on the upper frame 14 is a bed spring assembly generally designated 66. This bed-spring assembly 66 comprises a head section 68, a seat section 70, a knee section 72 and a foot section 74. The head section 68 is pivoted to the seat section 70 at 76, the seat section being fixed to the upper frame 14, while the knee section 72 is pivoted to the seat section at 78. The opposite end of the knee section is pivoted to the foot section 74 at 80.

The upper frame 14 is provided, at the head end, with a pair of arms 82. One end of these arms 82 are pivoted at 84 to the front end portion of the upper frame 14 while their opposite ends are connected to each other by a cross-bar 86 (best seen in FIG. 1). The frame 14 is also provided with a bracket 88 (best seen in FIG. 6) at each side, each bracket having a notch 90 in its upper edge. When the arms 82 are detached from the head section 68, the ends of the cross-bar 86, which project laterally from their corresponding arms 82 and which form lateral lug portions, rest in the notches 90. At such times, the head section 68 is free to pivot relative to the upper frame 14 without affecting the position of the bed-spring as a whole.

The head section 68 is provided with a latch member 92 at each side, each latch member comprising a hook-shaped finger and being mounted on a rotatable rod 94 supported by angle bars 96 attached to the head section (see FIG. 4). When these latch members 92 are pivoted into position to engage the laterally projecting ends of the cross-bar 86 (as shown in full line in FIG. 6), and when locked in such position, the arms 82 are pivotally movable with the head section 68. The mechanism for locking each of the latch members 92 to the cross-bar 86 comprises a finger 98 on the rod 94, this finger 98 being releasably held against rotation by a lever 100 (see FIGS. 1 and 4) which is adapted to frictionally engage or disengage the finger 98.

The head section 68 is actuated by a reversible electric motor 102 which is operatively connected through a gear box 104 to a screw-threaded rod 106 engaged within an internally threaded tube 108. The tube 108 is connected between a pair of links 110 by means of a pin 112. The links 110 are fixed to a rock shaft 114 on the head section 68. By this means, actuation of the motor 102 in one direction causes the head section 68 to pivot around pivot pins 78 into the inclined position, and actuation of the motor 102 in the opposite direction causes the head section to move toward the horizontal position.

The seat section 70 includes oppositely arranged vertical walls 116, each of which is mounted on a corresponding slide 118. As best shown in FIG. 5, these slides 118 are provided with rollers 120 movable in corresponding channels 122 on the upper frame 14.

When the arms 82 are latched to the head section 68, when the head section pivots upwardly, it pulls the slides 118 toward the front end of the bed, thereby moving the entire bed-spring assembly forwardly. When the arms 82 are disconnected from the head section 68, the pivotal movement of the head section does not affect the slides 118 and the bed-spring assembly remains in the same position.

The knee section 72 is separately actuatable by means of a reversible electric motor 124 which is provided with a gear box 126 operatively connected to a screw-threaded rod 128. The rod 128 is engaged within an internally-threaded tube 130 which is connected at 132 to links 134 fixed to a bar 136 attached to the knee section 72. Actuation of the motor 124 in one direction or the other pivots the knee section 72 around pivots 78 in the corresponding direction.

The angle to the horizontal of the knee section 72 is adjustable by means of a bar 138 bearing on the underside of the knee section. This bar 138 is provided with levers 139 that are adjusted by means of a rod 140 (see FIG. 2) which extends rearwardly of the bed and is provided with an end flange to provide a hand grip. The levers 139 are biased into position by springs 142 (see FIGS. 3 and 5).

As the knee section 72 is moved up or down around its pivot, it also swings foot section 74 into an opposed inclination (note FIG. 2). The particular inclination of foot section 74 is determined by oppositely disposed arms 144 connected to the foot section 74 and having rollers 146 at their lower ends. The roller 146 on each arm 144 is selectively positioned against one of three arcuate flanges 148 extending from a corresponding plate 150 fixed to the top surface of the corresponding rail forming the upper frame 14. The angular position of the foot section depends on which of these flanges 148 is used.

In order to permit the patient to make any or all adjustments of the bed in a convenient manner, a switch console 152 (see FIG. 8) is provided in any desirable location. This console 152 includes a plate 154 having four switch fingers respectively designated 156, 158, 160 and 162. Each finger is provided with two oppositely inclined portions, so that it can either be in the neutral position or one portion can be pressed in to actuate the corresponding motor in one direction while the other portion can be pressed in to actuate the motor in the opposite direction.

The finger 156 actuates the head section of the bed-spring, the finger 162 actuates the foot section of the bed-spring and the fingers 158 and 160 respectively actuated the linkages for raising the front and rear portions of the upper frame 14.

The fingers 158 and 160 are positioned closely adjacent to each other so that either one can be actuated singly to raise only one end of the bed, or both fingers can be actuated simultaneously to raise the entire bed in one motion.

The invention claimed is:

1. A hospital bed comprising a base frame, an upper frame and a bed-spring assembly, vertical adjustment means connecting said upper frame to said base frame, said vertical adjustment means comprising articulated linkage that is constructed and arranged to selectively vertically adjust one or both ends of said upper frame relative to said base frame, said bed-spring assembly including a head section pivotally connected to the remainder of said bed-spring assembly, horizontally movable means on said upper frame, means releasably connecting said head section to said horizontally movable means, said horizontally movable means being horizontally movable relative to said upper frame upon pivotal movement of said head section when connected thereto, and said horizontally movable means being operatively connected to said remainder of said bed-spring assembly to move said remainder of said bed-spring assembly horizontally along therewith.

2. A hospital bed comprising a base frame, an upper frame and a bed-spring assembly, horizontally movable means on said upper frame, means releasably connecting said head section to said horizontally movable means, said horizontally movable means being horizontally mov-

able relative to said upper frame upon pivotal movement of said head section when connected thereto, and said horizontally movable means being operatively connected to said remainder of said bed-spring assembly to move said remainder of said bed-spring assembly horizontally along therewith, said means releasably connecting said head section to said horizontally movable means comprising at least one arm pivotally connected to said upper frame, a latch on said head section adapted to releasably connect said head section to said arm, and locking means on said head section for locking said latch in latching position on said arm.

3. The bed of claim 2 wherein said latch is a hook-shaped finger mounted on a rotatable rod supported by said head section, said latch being provided with a notch to receive a lug portion on said arm.

4. The bed of claim 3 wherein said locking means comprises a first finger fixed to said rotatable rod, and a second finger rotatably positioned on said head section and rotatably movable into and out of engagement with said first finger.

5. The bed of claim 3 wherein said upper frame is provided with a bracket, said bracket having a notch to receive said lug portion when said lug portion is released by said latch.

6. The bed of claim 1 wherein said horizontally movable means is a slide member having means to move it in a track means.

7. The bed of claim 6 wherein said means to move said slide in said track means comprise at least one roller connected to said slide member and movable in said track means.

8. The bed of claim 1 wherein said bed-spring assembly comprises a seat section, a knee section and a foot section as well as said head section, said seat section being fixed to said upper frame, said head section being pivotally connected to said seat section, said knee section being pivotally connected to said seat section, and said foot section being pivotally connected to said knee section, and means to pivot said knee section relative to said seat section independently of said head section.

9. The bed of claim 1 wherein said upper frame is connected to said base frame by a front linkage assembly and a rear linkage assembly, the front linkage assembly supporting the front portion of said upper frame and the rear linkage assembly supporting the rear portion of said upper frame, each of said linkage assemblies being separately connected to said base frame and to said upper frame, and means for individually or simultaneously actuating said linkage assemblies to selectively move said front and rear portions of the upper frame vertically relative to said base frame.

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U.S. Cl. X.R.

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