Dec. 21, 1943. R. W. URIE 2,337,284

HOSPITAL BED

Filed Nov. 8, 1940 3 Sheets-Sheet 1

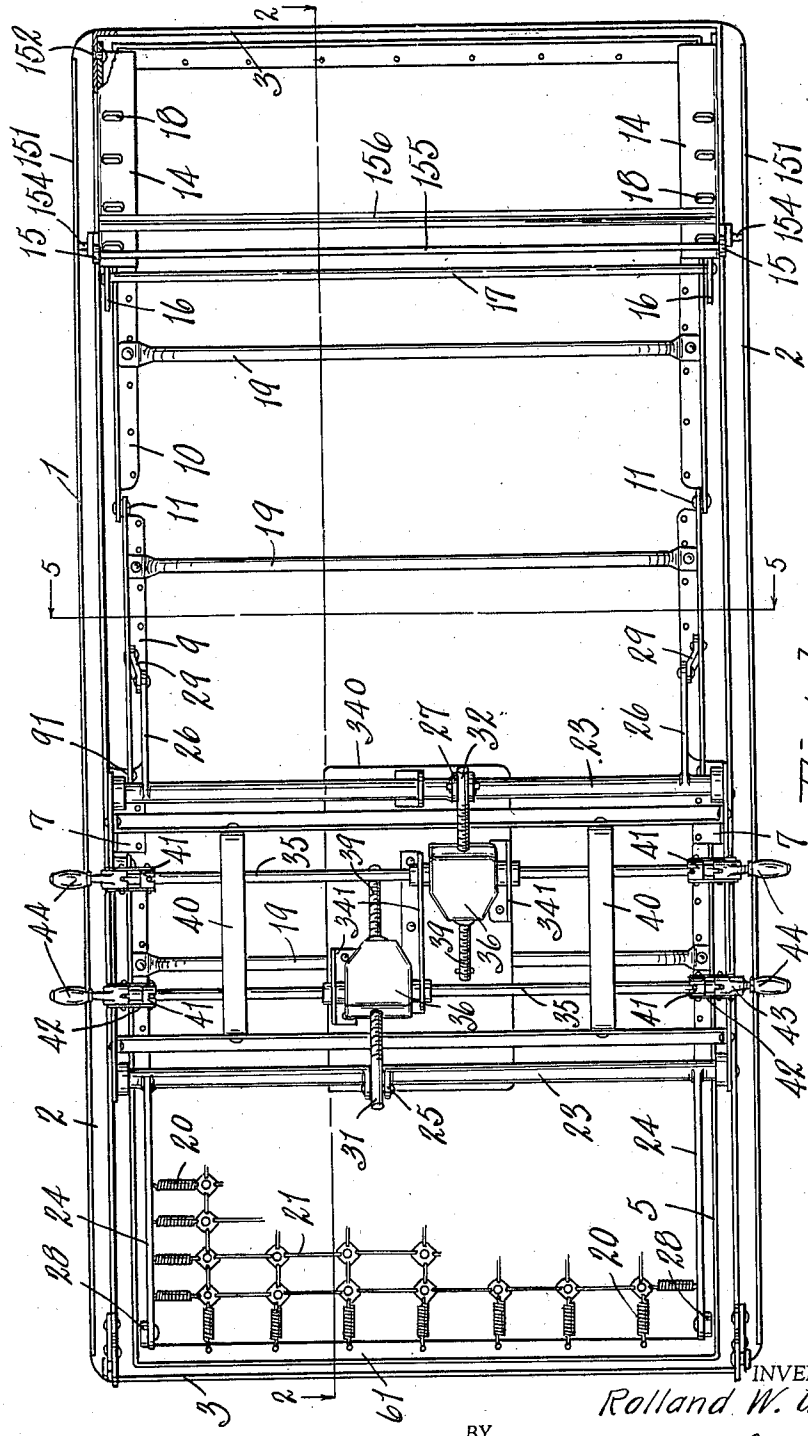


FIG. 1.

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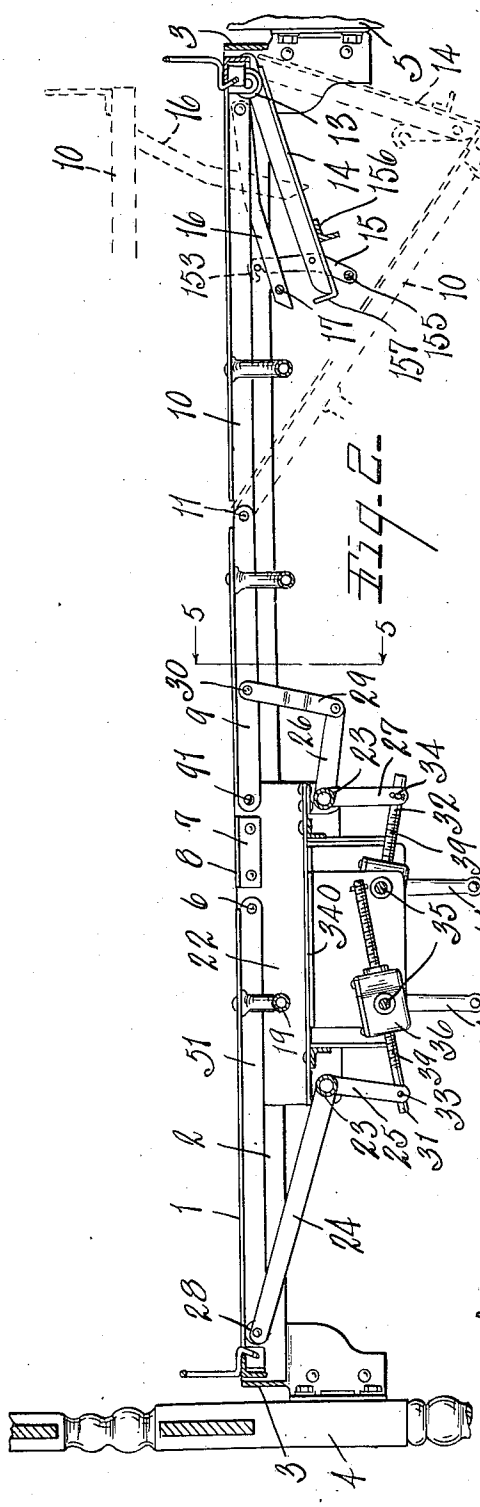


Fig. 2.

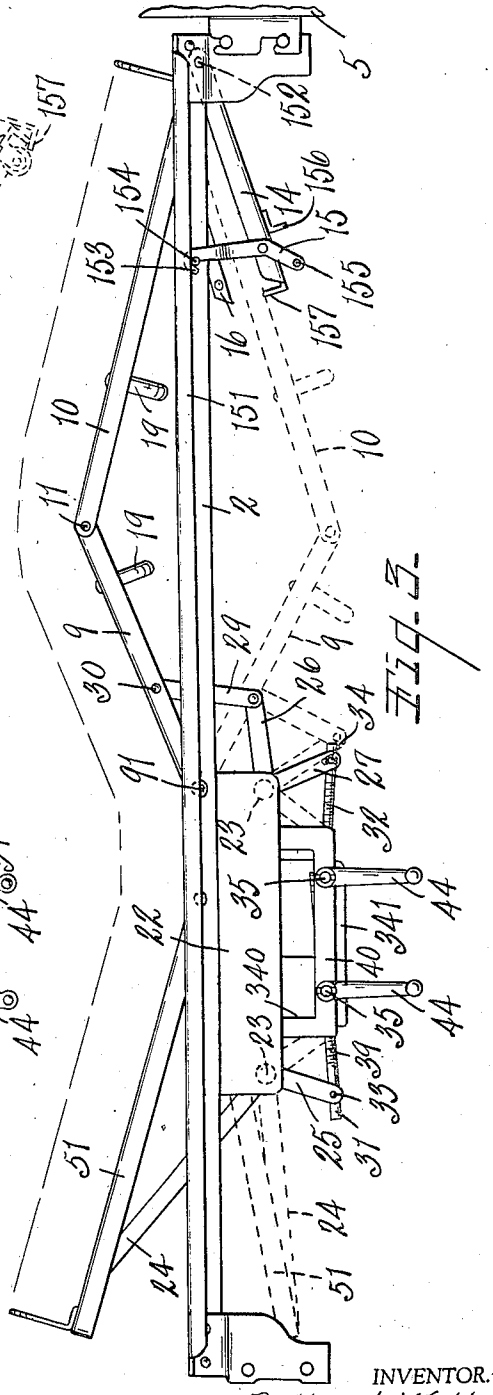


Fig. 3.

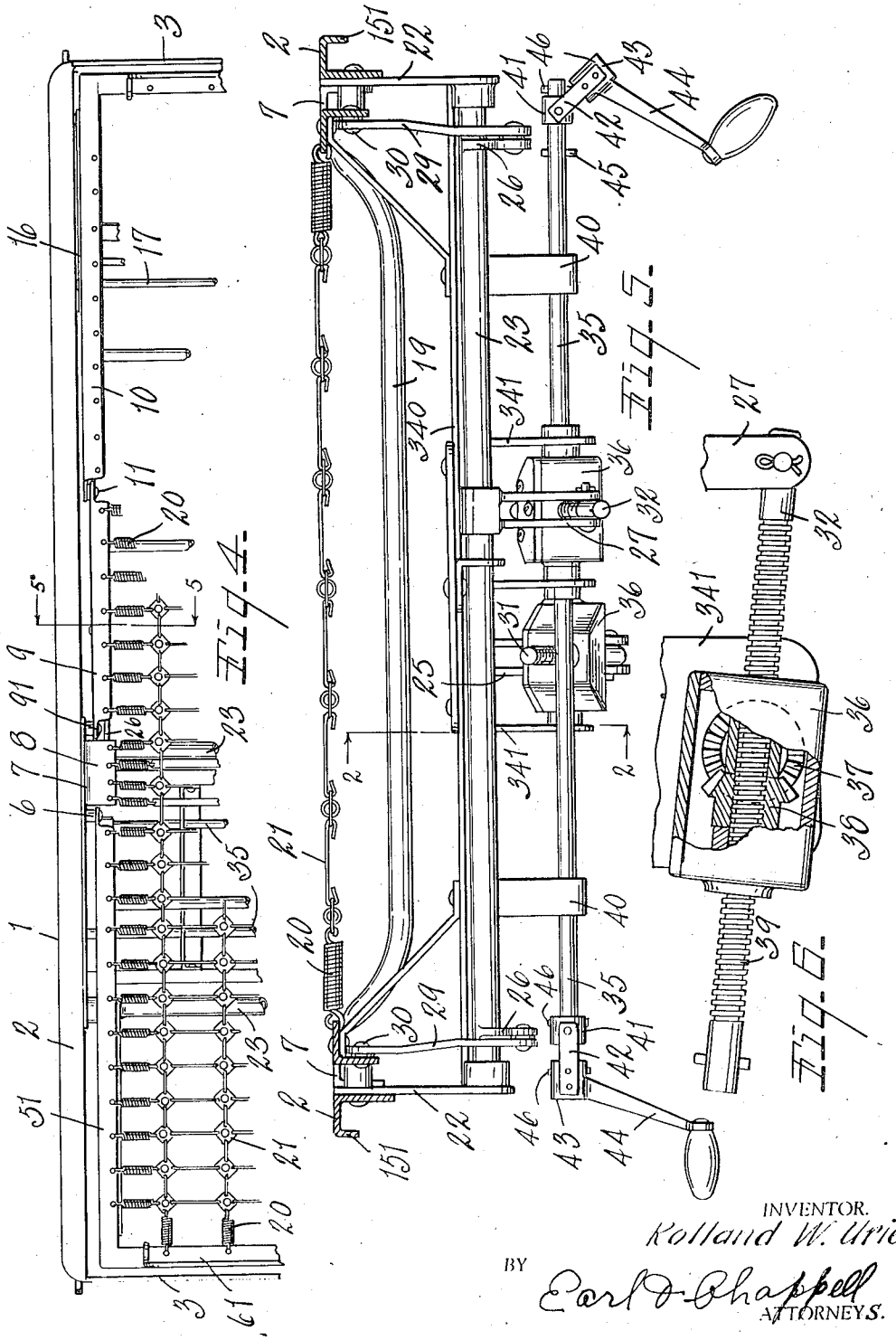
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UNITED STATES PATENT OFFICE

2,337,284

HOSPITAL BED

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Application November 8, 1940, Serial No 364,769

7 Claims. (Cl. 5—69)

This invention relates to improvements in hospital beds.

The main objects of this invention are:

First, to provide a bed or bed frame particularly desirable for use in hospitals or the like, which is readily and quickly adjustable to a number of positions for increasing the comfort of the patient or facilitating his care or adjusting to the needs of the patient.

Second, to provide a bed or bed frame of the type described adapted to greatly facilitate the use of a bed pan.

Third, to provide an adjustable bed of the type described enabling the patient to be disposed in any desired position, either for use of the bed pan or in drainage position or in any other position enhancing the patient's comfort or facilitating the work of a nurse in taking care of the patient, or to the patient's conditions.

Fourth, to provide a bed frame of the type described having a plurality of adjustable sections, each adjustable in two directions, i. e., above or below the normal horizontal disposition thereof, thereby making possible many different positions of the patient as the particular treatment indicates, but so connected to and associated with one another as to enable a simple one-piece conventional mattress to be utilized.

Further objects relating to details and economies of the invention will appear from the description to follow. The invention is defined in the claims.

A structure embodying the features of my invention is illustrated in the accompanying drawings, wherein:

Fig. 1 is a bottom or inverted plan view of a bed structure embodying my invention, partially broken away and in section to illustrate a structural detail.

Fig. 2 is a fragmentary view in section on line 2—2 of Figs. 1 and 5, illustrating details of construction and arrangement of the parts whereby the various sections of the frame are quickly and easily manipulated to any desired position, certain of these permissible positions of the leg section being shown in dotted line.

Fig. 3 is a fragmentary view in side elevation illustrating in solid lines the sections of the frame in one adjusted position thereof and in dotted lines alternative selective adjusted positions of the parts as for facilitating the use of the bed pan, shock position, etc.

Fig. 4 is a fragmentary top plan view further illustrating the construction and arrangement of the parts of the bed frame.

Fig. 5 is a view in section on line 5—5 of Figs. 1, 2 and 4, illustrating the operating instrumentalities whereby the adjustment of the bed frame sections is controlled.

Fig. 6 is an enlarged fragmentary view partially broken away and in section to illustrate still further details of the aforesaid actuating means.

The present invention relates to a hospital bed of the type illustrated and described in my copending application Serial No. 233,039, filed October 3, 1938, which became Patent No. 2,285,474 on June 9, 1942, and of which the present application is a continuation in part. The present structure includes improvements and refinements on the structure of that application whereby the range of adjustability of the present bed is greatly increased, enabling the patient to be positioned in practically any manner desired, whether to facilitate the use of the bed pan, as primarily contemplated in my aforesaid application, or to increase the patient's comfort, or for the purposes of drainage, or for adapting to other conditions of the patient or treatment indicated thereby.

Referring to the drawings, in Fig. 1 the reference numeral 1 indicates a bed frame having parallel angle iron side members or rails 2 joined by end members 3 to provide a rigid frame structure which is adequately braced so as to support without springing the various adjustably associated sections to be hereafter described. The frame 1 is provided with end brackets adapting the same to be sustained by the usual bed head and foot boards 4, 5, respectively, shown in Fig. 2. The side rails 2 of the frame, it will be noted, are of inverted U section, providing an outer vertical flange or apron 151 to protect a nurse or attendant working at either side of the bed from leg bruises when leaning against the rails.

I have clearly illustrated in Figs. 2 and 3 the main frame 1 which carries a plurality of relatively swingable or pivotally mounted mattress supporting or bed bottom sections. These consist of the head section 51 which in the embodiment illustrated comprises a U shaped angle iron border frame or member, the parallel side arms of which are pivoted at their rear ends to the side rails of the frame as at 6 so as to swing within the side rails of the frame. The front cross member 61 of this head section 51, when the section is adjusted to a horizontal position, lies adjacent and within the head end member 3 of the frame, but, as stated, this head section

clears the main frame so that it may be swung therein.

At the rear of and adjacent to the rear end of the head section, I provide a relatively fixed intermediate section comprising the brackets 7 having inwardly extending ledges 8 disposed opposite one another and adapted to support a section of the bed bottom. I provide an intermediate bed bottom section 9 which is pivotally mounted at 91 to the main frame adjacent the rear end of the fixed section, for adjustment either above or below the normal plane of the bed frame as indicated respectively in solid and dotted lines in Fig. 3. A foot section 10 is pivotally connected to the rear swinging end of the intermediate swingable section 9 at 11. The intermediate adjustable section and the adjustable foot section are likewise preferably formed of angle iron stock, the foot section 10 being in the embodiment illustrated of U conformation similar to the section 51. The rear end of the foot section 10 is free to shift longitudinally and is pivotally supported to permit the adjustment of the section 9 and therewith the adjustment of the section 10.

It will be noted that when the section 9 is swung or adjusted to a forwardly inclined position as shown in Fig. 3, the section 10 is adjusted to a rearwardly inclined position. When the section 9 is swung to a lowered rearwardly inclined position, the foot section is swung to a lowered forwardly inclined position as shown by dotted lines in Fig. 3.

The foot section is provided with rollers 13 which are arranged to travel on the tracks 14 which have downwardly and forwardly inclined portions as shown in the drawings. The tracks 14 are pivoted at 152 to the foot extremity of the frame and are suspended at the other or free ends thereof by the hangers 15 which are in the form of hook members pivoted to the respective tracks and provided with hooked ends 153 engageable with lugs 154 affixed to the frame side rails 2. The hangers 15 are connected for simultaneous swinging movement by a transverse rod 155, and tracks 14 are likewise swingable together, being connected by the transverse angle iron brace 156.

Struts 16 are pivoted to the foot section adjacent the foot end thereof and are connected to swing together by the cross rod 17. These supporting struts are selectively engageable in keeper recesses 18 provided in the tracks 14 so as to enable the section 10 to be variably adjusted to an elevated horizontal or inclined position relative to the frame 1 (see the upper dotted line showing of Fig. 2), while coacting tracks 14 and rollers 13 serve to support section 10 when the intermediate section 9 is in various positions of adjustment.

If it is desired to lower the foot section 10, the hooked track hangers 15 may be readily disengaged from lugs 154 to enable the tracks to be swung to the relatively steeply inclined position shown in the lower dotted lines in Fig. 2, where they are supported by appropriate means (not shown) from further swinging movement in this direction, and in turn supportingly engage the free end of the foot section 10, being provided with upturned hook-like fingers 157 which are disposed beneath and sustain the free end of said foot section.

It will be appreciated from the foregoing that my bed provides a wide range of adjustment of the bottom sections to assure the comfort of the patient or to support the patient in any position for the particular treatment indicated by the condition or requirements of the patient.

The various sections are effectively braced against wracking, the respective side elements thereof being rigidly connected for movement as a unit by means of tubular cross bars 19. Each section is provided with openings on the inwardly directed flanges thereof for the reception of the coil spring terminal connections 20 for the wire mattress supporting unit 21 in the manner clearly illustrated in Figs. 1 and 4.

Thus, I have provided a frame having three pivotally adjustable mattress supporting sections of which the pivotally articulated pair 9, 10 at the foot end of the frame are simultaneously adjustable upwardly to elevate the knees or feet of the patient, or downwardly, as illustrated in dotted lines in Fig. 3, to facilitate the use of a bed pan without requiring undue movement of or discommoding the patient. The other pivotal section 51 at the head end is readily adjustable upwardly when desired to the position illustrated in solid lines in Fig. 3, to increase the comfort of the patient, or downwardly if this is desired. Intermediate the aforesaid head end and foot end adjustable sections, there is provided a portion of the mattress support, namely, the section constituted by brackets 7, which is rigidly fixed relative to the outer frame so as to provide a definite and uniform horizontal support for the patient's body, regardless of the disposition or inclination of the other sections.

The excellent Fowler positions available with the foregoing construction make it particularly desirable in the treatment of goitres, cardiacs, pneumonias, asthmas, peritonitis, etc. The simple and effective bed pan service is of the utmost importance in the handling of major fractures. With the elevation of the foot of the bed and lowering the head the extreme of shock position is instantly effected without the use of blocks or extensions. The head and foot end work independently and the foot end section may be cranked to any standard position or adjusted permanently to four different heights by engagement of the struts 16 in any of four different keeper notches in tracks 14.

The present spring makes possible a large number of positions using standard mattress and linen. The expense of special mattress, linen and the additional laundry problem are eliminated. Rubber draw sheets do not interfere with the use of the bed pan. The patient is entirely free from the annoyance caused by troublesome seams and joints of divided mattress. This exclusive bed pan action is quickly put into use by simply lowering the central section. No further manipulation of the spring is necessary. A natural position is provided because the patient is held by extra spring support at the point of downward flexion with variable pressure possible on the buttocks. Freer elimination is promoted both from the bowels and bladder with a consequent reduction of catherization in both sexes.

In order to effect the adjustment of the aforesaid sections with a minimum of inconvenience on the part of the nurse, so that she may do so without leaving the side of the patient, I have provided the improved and simplified adjusting mechanism shown in the drawings, including a rigid depending plate 22 at either side of the frame preferably riveted or welded to the rails 2. These plates have journaled at either end

thereof one of a pair of tubular rockshafts 23. One of the rockshafts has integrally or otherwise secured thereto a pair of elongated bell crank arms 24 and a pair of shorter arms 25, and the other thereof has similarly secured thereto a pair of bell crank arms 26 and 27. The arms 24 are disposed just inside of the side portions of the head section 51, and have rollers 28 thereon engaging the lateral flanges of said side portions to pivotally support the same, while the arms 26 are similarly spaced and are each pivotally connected to a thrust link 29 which is in turn pivotally connected at 30 to the section members 9 intermediate the length thereof. The respective other arms 25 and 27 on each bell crank are positioned relatively closely adjacent one another, as illustrated in Fig. 5, to in effect constitute a fork or yoke whereby arms 24, 26 may be actuated as desired. To this latter end, I provide the threaded force transmitting rods 31, 32 pivoted respectively at 33, 34 to the thus spaced bell crank arms or yokes 25, 27. Threaded rods 31, 32 are actuated longitudinally in either direction by similar instrumentalities similarly mounted on the frame, hence only one thereof will be illustrated, with similar reference numerals applied to designate corresponding parts of the other.

Referring to Figs. 1, 2, 5 and 6, I illustrate generally and indicate by the reference numeral 340 a strap metal hanger bracket construction secured to and supported by the side plates 22 and the side frame members or rails 2 and the fixed brackets 7. This structure includes a plurality of depending journal or bearing plate members 341 provided with apertures to receive and journal the parallel transversely extending crank shafts 35. As illustrated in Figs. 5 and 6, each of the shafts extends into a gear housing 36, the housing being rotatably mounted on the shaft, and has secured to the end thereof in the housing a bevel gear 37. This bevel gear is in mesh with an axially restrained bevel gear 38 which is threaded internally to constitute the same, a nut threadingly engaged with the thread 39 on the rods 31 or 32. These rods extend completely through and are longitudinally guided by the respective housings, so that as the rods are shifted longitudinally by rotation of the coacting bevel gears, the respective rockshafts 23 will be oscillated and the sections 51, 9 and 10 raised or lowered. During this operation the bevel gear housings 36 pivot freely on the respective crank shafts so that there is no binding or undue friction at this point. Skeleton hangers 40 support crank shafts 35 to prevent sway of the latter when manipulated, and each of the shafts extends to an operating point at either side of the frame.

It will be noted by reference to Fig. 2 that when the sections of the bed frame are in normal flat horizontal position, the rods 31, 32 are disposed with the ends of the threaded portion 39 thereof substantially spaced from the actuating bevel gear or nut 38 therefor. Thus, it is apparent that the bell crank arms 25, 27 can each be actuated a substantial distance in either direction from this neutral or normal bed position, with the result that the head end section 51 may be either raised or lowered substantially, likewise the pivotally connected sections 9 and 10. In either position the sections are rigidly supported by the self-locking screw arrangement.

As stated, the crank shafts 35 each have operating cranks, indicated by the reference numeral 44, disposed on both ends thereof so that the parts may be manipulated from either side of the bed. The crank assembly includes a collar or sleeve 41 which is normally freely slidable and rotatable on the shaft 35 and is pivotally connected by a strap 42 to a hollow boss 43 on the crank 44, the said boss being telescopingly receivable on the crank end of the crank shaft. Both the collar 41 and boss 43 are provided with diametrically opposed end recesses (not shown) engageable respectively with driving pins 45, 46 on the crank shaft, whereby with the collar and boss in axial alinement and fully telescoped inwardly on the crank shaft, the parts will engage for imparting rotative driving effort to the crank shafts. This position is illustrated at the left in Fig. 5, while the disengaged inoperative position, with the handle disposed downwardly out of the way is illustrated to the right of the same figure.

The operating structure for the various sections is extremely compact, occupying very little space beneath the bed and not interfering with or preventing the storage of the nurse's cot therebeneath. When not in use, the crank handles are entirely out of the way.

From the foregoing, it will be appreciated that I have provided a hospital bed which is universally adjustable as respects the position of the patient. It may be adjusted to substantially raise or lower the head and upper part of the body and likewise the knees or both the knees and feet. The sections 9 and 10 are readily and quickly adjusted downwardly a desired amount to facilitate the use of the bed pan. These adjustments are made without the necessity of manipulating any locking instrumentalities either for initial actuation or restoration to initial position, inasmuch as the nut and screw driving arrangement which I have described is self-locking in any position of the parts and constitutes a rigid support for the parts wherever they are located. At the same time, a minimum of effort is required to effect the desired adjustments by reason of the inherent power multiplication of such an actuating mechanism.

I have illustrated and described my improvements in an embodiment which is very practical. I have not attempted to illustrate or describe other embodiments or adaptations as it is believed this disclosure will enable those skilled in the art to embody my improvements as may be desired.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a hospital bed, a rigid frame disposed in a plane and having side members, a first mattress supporting section disposed adjacent the head end of the frame and pivotally connected to said side members in substantially spaced relation to said head end, said section terminating adjacent and inwardly of the head end of the frame and being adjustable to inclined position above or below the plane of the frame, a pair of further pivotally connected mattress supporting sections supported by the frame with the end of one thereof disposed at a point intermediate the length of the frame and adjacent but in spaced relation to the pivot of said first section thereto, and the other thereof terminating adjacent and inwardly of the foot of the frame, said pivotally connected sections being adjustable to inclined position above or below the plane of the frame, said one of said pivotally connected sec-

tions being pivoted to the frame side members at its end adjacent said first section, whereby to enable substantial raising or lowering thereof and of the portion of the patient's body beneath the waist or trunk to inclined position, the other pivotally connected section being free at the foot end thereof for longitudinal movement relative to the frame and having a roller thereon, said frame at the foot end thereof being provided with an inclined track engageable by said roller for sustaining the same during said longitudinal movement, means for adjusting the inclination of said track, an intermediate fixed section disposed between said first and further sections and coacting therewith in supporting a wire mattress supporting unit, and self-locking means including means having actuating connection respectively to said first and further sections and means on said frame actuable from either side of the frame and connected to said last named means for selectively actuating the first and further sections to and from adjusted position.

2. In a hospital bed, a rigid frame disposed in a plane and having side members, a first mattress supporting section disposed adjacent the head end of the frame and pivotally connected to said side members in substantially spaced relation to said head end, said section terminating adjacent and inwardly of the head end of the frame and being adjustable to inclined position above or below the plane of the frame, a pair of further pivotally connected mattress supporting sections supported by the frame with the end of one thereof disposed at a point intermediate the length of the frame and adjacent the pivot of said first section thereto, and the other thereof terminating adjacent and inwardly of the foot of the frame, said pivotally connected sections being adjustable to inclined position above or below the plane of the frame, said one of said pivotally connected sections being pivoted to the frame side members at its end adjacent said first section, whereby to enable substantial raising or lowering thereof and of the portion of the patient's body beneath the waist or trunk to inclined position, the other pivotally connected section being free at the foot end thereof for longitudinal movement relative to the frame and being supported by the frame during said longitudinal movement, an inclined supporting member pivotally connected to said frame adjacent the foot end thereof and supportingly engageable by the foot end of said other section in selected adjusted positions thereof, means for sustaining said last named member in selected inclined positions thereof, and self-locking means including means having actuating connection respectively to said first and further sections and means on said frame actuable from either side of the frame and connected to said last named means for selectively actuating the first and further sections to and from adjusted position.

3. In a hospital bed, a rigid frame disposed in a plane and having side members, a first mattress supporting section disposed between said members adjacent the head end of the frame, a pair of further pivotally connected mattress supporting sections supported by the frame with one thereof pivoted to the frame adjacent the first section and the other terminating adjacent and inwardly of the foot of the frame, said pivotally connected sections being adjustable to inclined position below the plane of the frame, said other section being free at the foot end thereof for longitudinal movement relative to the frame, means on the frame for supporting the free end of said other section below the plane of the frame during said longitudinal movement, comprising an inclined element on the foot end of the frame supportingly engageable by said free end in adjusted position thereof, and strut means independent of said last named supporting means engageable with said other section and with the frame to support the section above the plane of the frame.

4. In a hospital bed, the combination with a frame disposed in a plane, of a bed bottom inwardly of said frame comprising a relatively fixed intermediate section, a swingable head section pivoted to said frame adjacent the head of said fixed intermediate section, a swingable intermediate section pivoted to said frame at the rear of and adjacent the said fixed section, a foot section pivoted to the swinging end of said swingable intermediate section, said frame having downwardly and forwardly inclined supporting tracks for the free end of said foot section extending below the plane of said frame and adapted to support said free end below the plane of the frame, adjustable supporting struts for the free end of said foot section, said tracks being provided with keepers with which said struts may be selectively engaged for supporting the free end of said foot section at different elevations above the plane of the frame, means for swingably adjusting and supporting said head section in its adjusted positions, and means for swingably adjusting and supporting said swingable intermediate section in a forwardly inclined raised position or in a rearwardly inclined lowered position comprising coacting threaded members mounted on said frame and operatively connected to said swingable head and intermediate sections, said threaded members constituting locking means for maintaining the parts in their adjusted positions.

5. In a hospital bed, the combination with a frame disposed in a plane, of a bed bottom inwardly of said frame comprising a relatively fixed intermediate section, a swingable head section pivoted to said frame adjacent the head of said fixed intermediate section, a swingable intermediate section pivoted to said frame at the rear of and adjacent the said fixed section, a foot section pivoted to the swinging end of said swingable intermediate section, said frame having downwardly and forwardly inclined supporting tracks for the free end of said foot section extending below the plane of said frame and adapted to support said free end below the plane of the frame, adjustable supporting struts for the free end of said foot section, said tracks being provided with keepers with which said struts may be selectively engaged for supporting the free end of said foot section at different elevations above the plane of the frame, means for swingably adjusting and supporting said head section in its adjusted positions, and means for swingably adjusting and supporting said swingable intermediate section in a forwardly inclined raised position or in a rearwardly inclined lowered position.

6. In a hospital bed, the combination with a frame disposed in a plane, of a bed bottom inwardly of said frame comprising an intermediate relatively fixed section, a head section pivoted adjacent said fixed intermediate section and swingable relative thereto, an intermediate swingable section disposed at the rear of said fixed section and pivoted adjacent thereto so that it may be swung to a forwardly inclined position

or to a rearwardly inclined position, a foot section pivoted at its forward end to and supported by the swinging end of said intermediate adjustable section, a support pivoted on said frame adjacent the foot end thereof and pivotally adjustable from a position in the plane of said frame to a position below the plane thereof the rear end of said foot section being releasably engageable with said support in selective positions thereof below or in the plane of the frame, means for adjustably supporting the rear end of said foot section above the plane of the frame while the rear end of the intermediate section is in a raised position, and means for independently adjusting said head and said intermediate sections and supporting them in their adjusted positions.

7. In a hospital bed, a rigid frame disposed in a plane and having side members, a first mattress supporting section disposed between said members adjacent and inwardly of the head end of the frame, a pair of pivotally connected mattress supporting sections supported by the frame inwardly thereof with one thereof pivoted to the frame side members on the side of the first section rearwardly of the foot end of the first section and the other terminating adjacent and inwardly of the foot of the frame, said pivotally connected sections being adjustable to inclined positions above or below the plane of the frame, an inclined track on the foot end of the frame, said other section being free at the foot end thereof for longitudinal movement relative to the frame and having a roller thereon engageable with said inclined track on the foot end of the frame for sustaining the same below the plane of said frame during said longitudinal movement, said track being pivotally connected to the foot end of the frame, and means for releasably supporting and sustaining the free end of the track on the frame enabling the track to be adjusted to a plurality of inclined positions, said other section being supportingly engageable by the track in the downwardly swung position thereof.

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