April 7, 1953

A. DEVES ET AL

2,633,578

ADJUSTABLE HOSPITAL BED

Filed June 3, 1946

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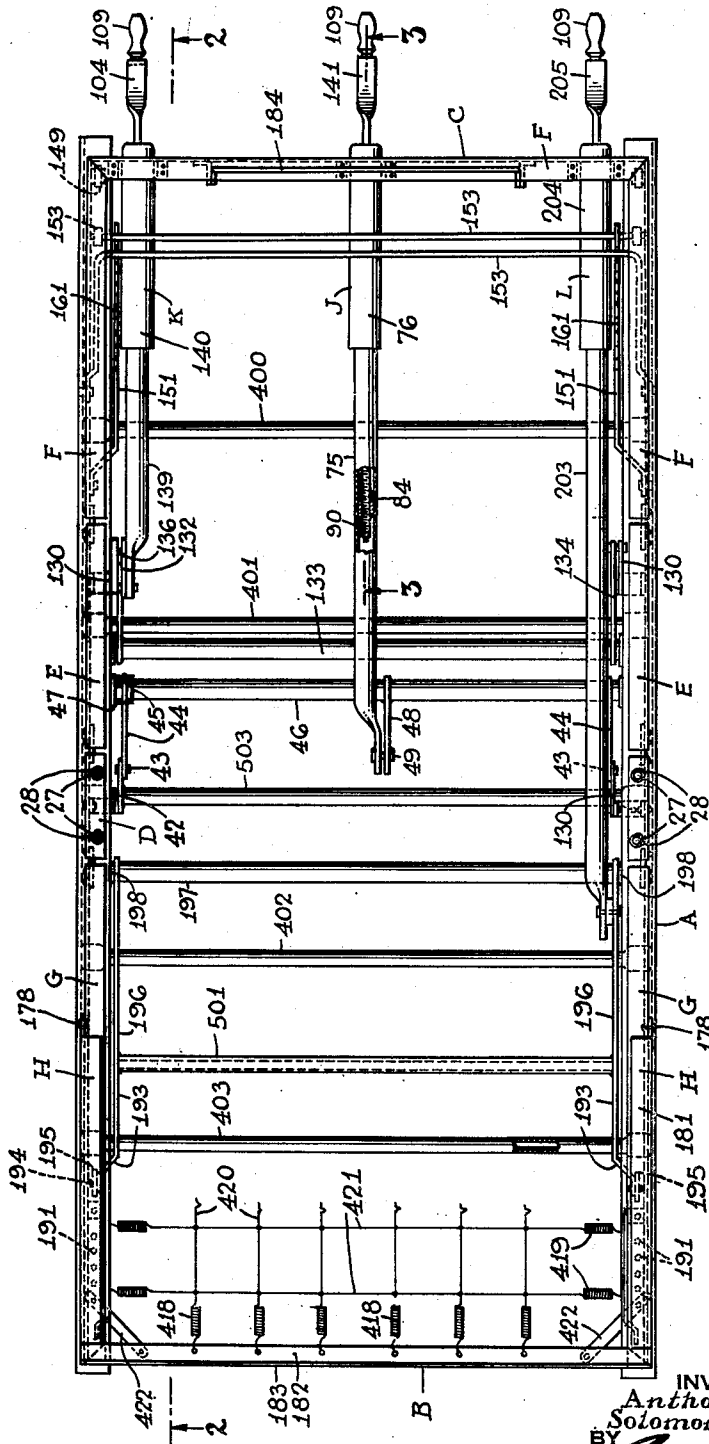


Fig. 1.

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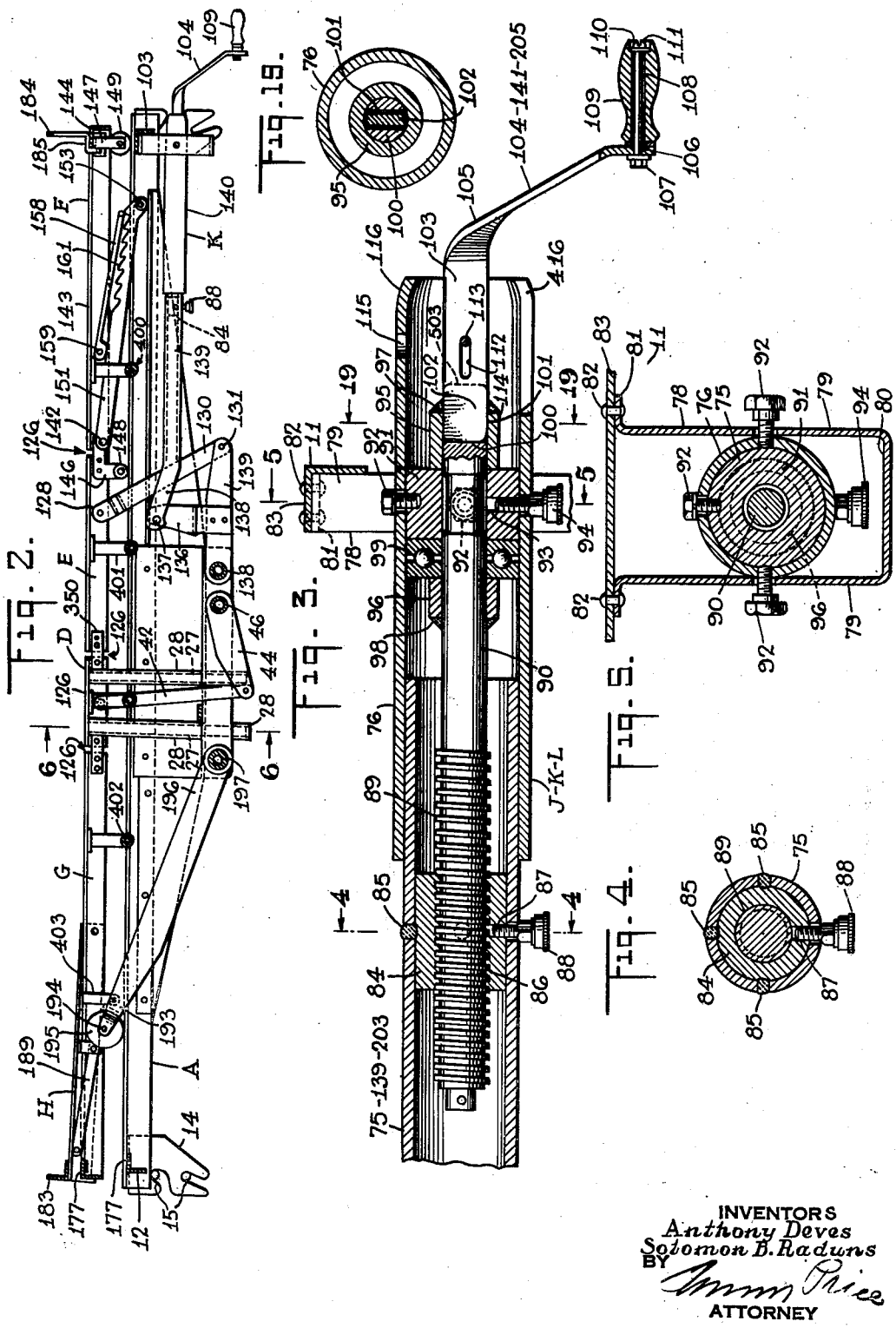


Fig. 2.

Fig. 1a.

Fig. 3.

Fig. 5.

Fig. 4.

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Fig. 7.

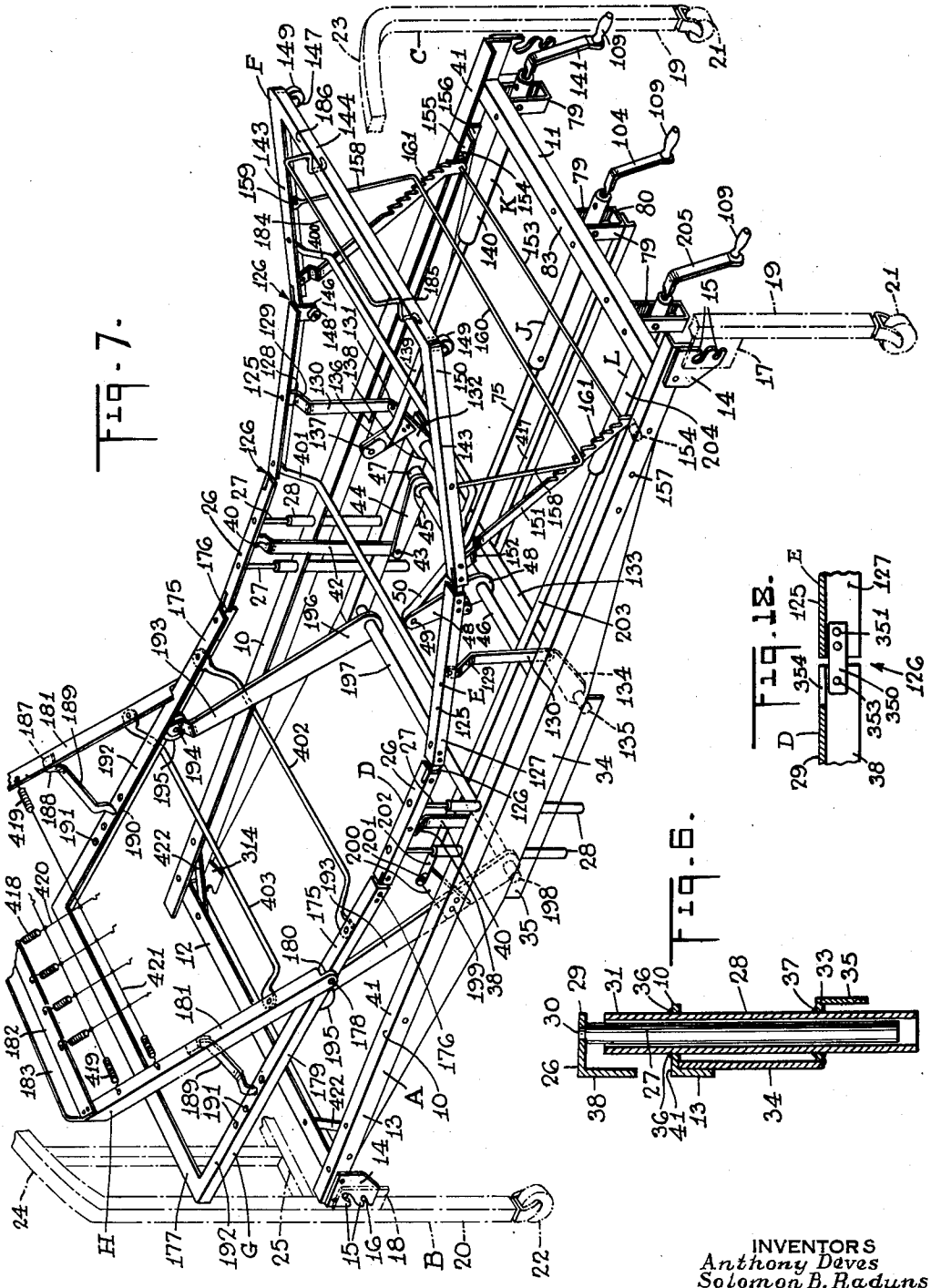


Fig. 18.

Fig. 6.

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Fig. 9.

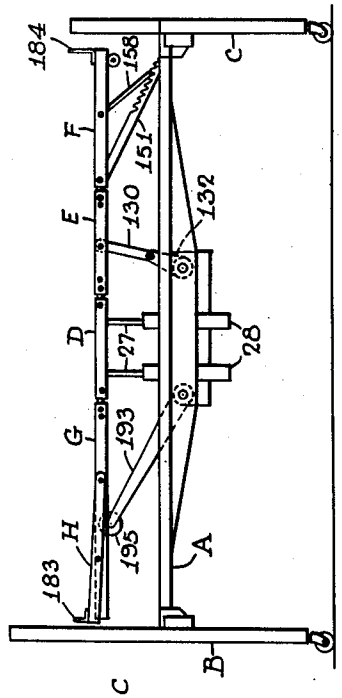


Fig. 11.

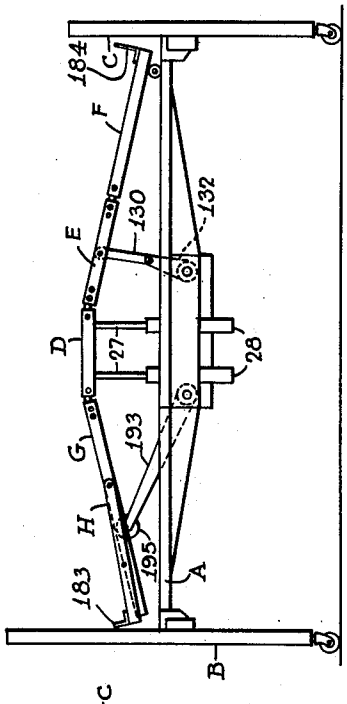


Fig. 8.

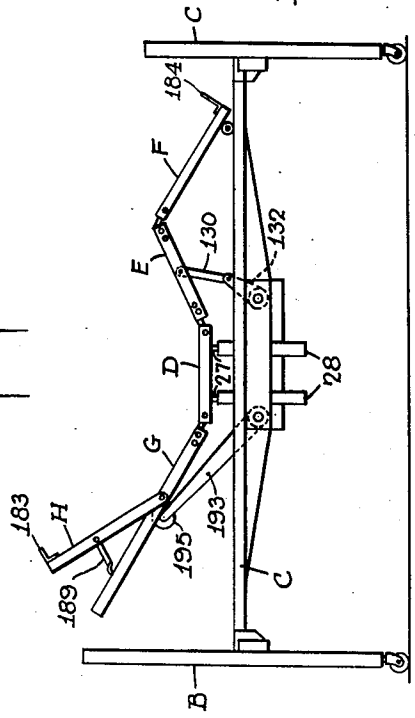
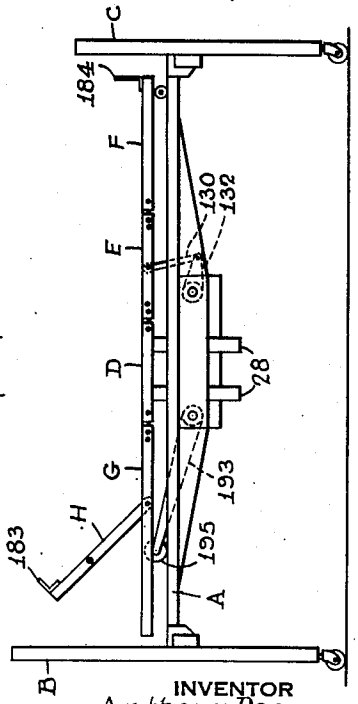


Fig. 10.



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Fig. 14.

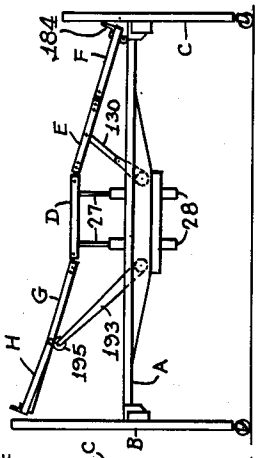


Fig. 13.

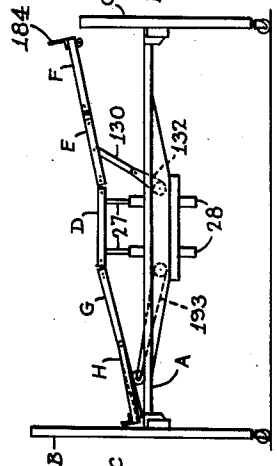


Fig. 12.

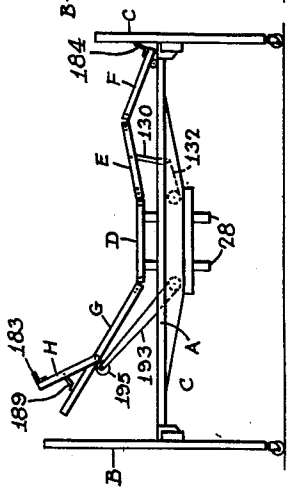


Fig. 17.

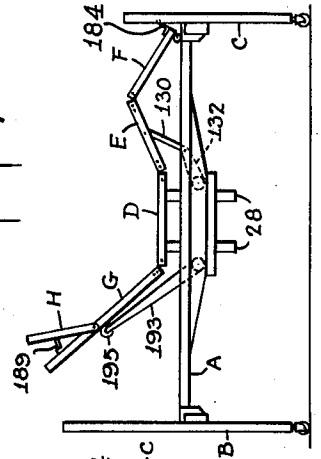


Fig. 16.

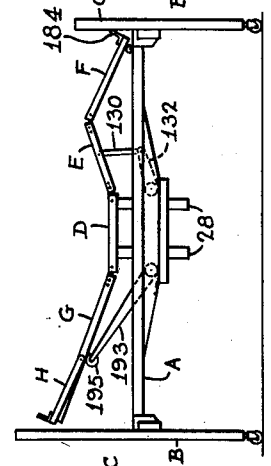
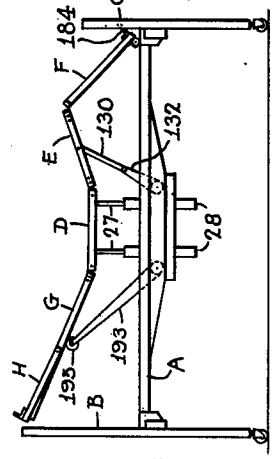


Fig. 15.



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Patented Apr. 7, 1953 2,633,578

UNITED STATES PATENT OFFICE

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ADJUSTABLE HOSPITAL BED

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Application June 3, 1946, Serial No. 674,080

3 Claims. (Cl. 5—68)

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The present invention relates to an adjustable invalid's bed and it particularly relates to an adjustable hospital bed.

It is among the objects of the present invention to provide an improved hospital bed of inexpensive and modern design, which will provide an elevated adaptability for treatment of a patient in all the various desirable positions without requiring manual exertion or lifting of the patient by the nurse and by relatively simple, immediately available and readily operated manual actuators.

Another object is to provide an adjustable hospital bed which may readily be adjusted into low and high cardiac, Fowler, bronchoscopic, respiratory, Trendelenburg, spinal and hyper-extension positions, as well as resting, bedpan, reading and eating positions and which may readily receive an over-bed table in the latter position without need of a depression-break in the middle of the spring or mattresses, and which will utilize the entire length of a standard size mattress for the patient's comfort, as well as supporting the patient in anatomically correct position.

A further object is to provide a silent, noiseless, simple, smooth working elevating and adjusting mechanism with an easily adjustable head and back rest, eliminating need for using pillows and bolsters and without tendency toward slipping of the mattress during adjustment and with a maximum feeling of security against slipping by the patient during the adjustment and when in any desirable adjusted position.

Still further objects and advantages will appear in the more detailed description set forth below, it being understood, however, that this more detailed description is given by way of illustration and explanation only and not by way of limitation, since various changes therein may be made by those skilled in the art without departing from the scope and spirit of the present invention.

A particular feature of the present invention resides in the provision of a 5 section adjustable bed spring arrangement with a central horizontal section which is not hinged to a main or permanent frame, but which may be elevated entirely from the main or permanent frame upon a guided elevator piston construction. Hinged to the central section are main head and foot sections to which main head and foot sections in turn are hingedly connected auxiliary head and foot sections.

At the front of the bed are three readily available actuators or handles which drive or adjust

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the central and main head and foot sections. The auxiliary sections are adjusted relatively to the main head and foot sections by suitable ratchet or brace members.

In the drawings, in which is shown one embodiment of a bed according to the present invention by way of illustration and not by way of limitation,

Fig. 1 is a top plan view of the adjustable spring bottom for an invalid's or hospital bed without the front and back support members,

Fig. 2 is a sectional view upon the line 2—2 of Fig. 1,

Fig. 3 is a longitudinal sectional view upon the line 3—3 of Fig. 1, upon an enlarged scale as compared to Figs. 1 and 2,

Figs. 4 and 5 are transverse sectional views upon the lines 4—4 and 5—5 of Fig. 3 upon the same scale at Fig. 3,

Fig. 6 is a sectional view upon the line 6—6 of Fig. 2 upon an enlarged scale as compared to Fig. 2,

Fig. 7 is a top perspective view of the spring bottom showing the front and rear vertical support members of the bed in dotted lines and upon about the same scale as Figs. 1 and 2,

Figs. 8 to 17 are side elevational, diagrammatic views upon a reduced scale as compared to Figs. 1, 2 and 7 showing ten of the typical positions into which the spring or bed bottom may be adjusted,

Fig. 18 is a detail sectional view upon an enlarged scale showing the hinge connection between sections of the adjustable spring, and

Fig. 19 is a transverse sectional view on line 19—19 of Fig. 3.

Referring to Figs. 1, 2 and 7, a bed bottom or spring support or main frame A is carried on a rear bed upright support section B and a forward bed upright support section C.

Mounted upon the rectangular frame A is the center horizontal section D, the foot section E with the end adjustment or auxiliary foot section F and the head section with the head adjustment or auxiliary head section H. The center section D is provided with an adjusting arrangement J, while the foot section E and the head section G are respectively provided with the adjusting arrangements K and L.

Referring particularly to Fig. 7, the main frame A is formed of side angle members or beams 10 and the end angle members or end rails 11 and 12 which extend between and are rigidly connected to the side angle members 10. The side flanges 13 of the angle beams 10 carry the plates

14 having the corner lock or hook members 15. The hook members 15 engage studs on the plates 17 and 18 attached to the legs 19 and 20 of the upright members B and C. The upright members B and C have floor contacting rollers 21 and 22, with the connecting top bars 23 and 24 and the vertical members 24 and the horizontal members 25 (see Fig. 7).

The center section D is formed of the two short angle members 26 which are guided by the elevator piston rods 27 riding in the piston tubes or guides 28. As shown in Fig. 6, the top flange 29 of the angle member 26 is rigidly mounted on the reduced diameter portion 30 at the upper end of the rod 27 which reduced diameter portion fits into an opening in the top flange 29. It will be noted that in the lowermost position as shown in Fig. 6, the top flange 29 of the angle member 26 abuts and rests upon the upper end 31 of the tube 28.

The vertical tube or guide 28 extends downwardly through openings in the horizontal flanges 41 and 33. The flange 33 extends inwardly from the panel member 34, which is riveted to the vertical flange 13 of the main angle beam 10. The vertical flange 35 extends downwardly inside of the tube 28 as shown best in Fig. 6. The tube 28 is fixed rigidly to the flanges 10 and 33 by the welding 36 and 37.

Pivotally connected to and extending downwardly from the vertical flange 38 of the angle member 26 is the bar 42. The bar 42 is bent inwardly and downwardly as indicated at 40 so that the lower portion 42 thereof will be inside of the horizontal flange 41 of the main angle member 10 of the bed bottom. Its lower end is pivotally connected at 43 to the arm 44. The arm 44 is rigidly connected at 45 to the rotary cross tube 46. The cross tube 46 is rotatably mounted at its ends 47 in the web member 34. The tube 46 is also provided with the arm 48 which is pivotally connected at 49 to the forwardly extending tube 50 forming part of the operating mechanism J for the central section D.

The operating mechanisms J, K and L, being specifically shown in Figs. 3 to 5, are generally the same for the central section D, the foot section E and the head section G.

The tube 50 (see Fig. 7) at first inclines downwardly and then is bent so that it has a horizontal forward extension 75, which fits into the slides within the tube 76 (see Fig. 3). The tube 76 is carried by the U-shaped bracket 78 having the side legs 79 (see also Fig. 5), the base 80 and the two horizontal flanges 81. The flanges 81 are riveted at 82 to the horizontal flange 83 of the cross bar member 11.

Within the tube 75 is fitted the internally tapped bushing 84. The bushing 84 (see also Fig. 4) is fixed in position by the brazed drilled openings 85. The internal threaded opening 86 is lubricated through the transverse opening 87 which receives the grease cup 88. Through the graphite cup 88 the bearing of the thread 89 on the rod 90 in the sleeve 84 may be lubricated. The thread 89 is desirably a square acme thread.

The rod 90 is provided with a sleeve 91, which is fixed in position in the tube 76 by the set screws 92. The sleeve 91 is also provided with an opening 93 to receive the graphite cup 94. The sleeves 95 and 96 are fixed to the rod 90 at each side of the bearing sleeve 91 by the welding 97 and 98. The roller thrust bearing 99 is positioned between the sleeves 91 and 96. The sleeve 95 extends beyond the end 100 of the shaft 90 and forms a recess 101. The end 102 of the section 103 of the handle 104 is designed to be inserted in said recess 101. The handle 104 is made of flat stock and is bent substantially 90° at 105 to form a portion which fits into the recess 101.

The end of the handle bar 104 carries the rod or bolt 106 held in position by the lock nut and washer 107. The rod 106 extends through the axial opening 108 in the wooden handle 109. The handle 109 is recessed at 110 to receive the head 111 of the bolt or rod 106. The flat portion 103 is slotted at 112 to receive the rod or pin 113.

When the handle 109 is elevated and pressed forwardly, the insert portion 102 will slide forward into the recess 101 and enable the rod 90 and the acme thread 89 to be turned in respect to the bushing 84 and the bearing sleeve 96. This will cause the tube 75 to move inwardly or outwardly in respect to the tube 76. When the adjustment is completed, by grasping the handle 109, the flat portion 102 may be pulled out of the recess 101. The handle 109 may then be swung downwardly out of the way in the stud 113 with the corner 114 fitting into the recess 115 in the outer end 116 of the tube 76.

Referring again to Fig. 7, the foot section E is composed of two angle sections 125, which are hingedly connected at 126 (see also Fig. 18) to the central section D. As shown the hinge bar 350 is rigidly riveted at 351 to the vertical flange 127 of the angle sections 125. At 353, the bar 350 is pivotally mounted on the vertical flange 38 of the angle member 26. Upon hinging movement, the bar 350 will move in the slot 354 in the top flange 29 of the angle member 26.

Depending downwardly from the vertical flanges 127 are the bars 128, which turn inwardly and downwardly at 129. The lower portions 130 of the bars 128 are pivotally connected at 131 to the arms 132 and 134, which are mounted upon the rotary tubes 133. The ends of the tube 133 are pivotally mounted at 135 in the flange members 35 of the side plates 34 of the main frame.

Extending upwardly from the lever or arm 132 is the arm 136. To the arm 136 at 137 is pivotally connected the flattened upturned position 138 of the tubular member 139. The tubular member 139 fits inside of the tubular member 140 and is actuated by the manual operating member 141. These members 139, 140 and 141 may be of the same construction and operate in the manner already indicated in the Fig. 3.

The foot section E has a U-shaped auxiliary frame F pivotally connected to it at 142. The frame F has the side members 143 and the end member 144. The members 125 of the foot section E and the side members 143 of the auxiliary frame F have depending ears 146 and 147 with rollers 148 and 149 to support structures E and F on the horizontal flange 41 of the side frame members 10.

Extending downwardly from the horizontal flanges 150 of the side members 143 of the U-frame F are the rack members 151 having outturned connections 152 at their upper ends to the vertical flanges 150. The rack members 151 are connected by a cross bar 153 and the roller or slide pins 154, which ride on the flanges 155 extending inwardly from the angle members 156 riveted at 157 to the vertical flanges 13 of the main frame members 10.

Also extending downwardly from the vertical flanges 150 of the side members 143 of the frame F is the U-shaped pawl member 158 pivotally connected at 159 to the flanges 150 and having base section 160 which engages the teeth 161 on the depending rack members 151. By adjusting

the transverse horizontal base rod 160 in the various teeth or notches 161, the frame F may be kept in the same plane as the frame E or in the plane inclined upwardly or downwardly from the frame E in the direction of the feet of the patient. Similarly by the relative adjustment of the mechanisms J and K the frame E may be caused to incline upwardly from the frame D or to be in the same plane as the frame D or incline downwardly from the frame D.

The head frame G consisting of the side channel members 175 is pivotally connected at 176 to the center section D. The side members 175 are connected at the rear of the structure by the cross member 177. Pivotally mounted at 178 on the vertical flanges 179 of the angle members 175 are the ears 180 of the side angle members 181 of the adjustable U-frame or auxiliary head frame H. The members 181 are connected at their rear ends by the cross bar 182 which has an upturned rear flange 183 serving as a mattress stop.

The foot section F is also provided with a similar mattress stop consisting of the U-shaped wire 184 having downwardly and outwardly bent portions 185 which engage the horizontal flange 186 of the member 144.

Referring to the section H (see Fig. 7), there are provided the angle members 187, attached to the side beams 181. The downwardly projecting ears 188 of the members 187 carry the depending arms 189 which have reduced diameter stud portions 190 to fit into the series of adjustment holes 191 in the top flange 192 of the side members 179 of the structure G.

Elevating the section G are the arms 193 having the outturned portions 194 carrying the rollers 195. The rollers 195 ride under the top flanges 192 inside of the angle members 179. The arms 193 at their lower ends 196 are connected to the rods 197, which are rotatably mounted at their ends 198 in the apron flanges 35. Riveted to the levers 193 at 199 are the arms 200. To the upper ends 201 of the arms 200 are pivotally connected the flattened ends 202 of the tube 203. The tube 203 fits into and slides within the tube 204 of the adjustment arrangement L.

By the rotation of the actuator 205, it is possible to incline the head section G upwardly from the structure D or position it in the same plane as the structure D or to incline it downwardly from the section D.

Carried by the sections D, E, F, G and H is the bed bottom or mattress support consisting of the longitudinal wires 420 with the end connecting coil springs 418 and the crossing lateral wires 421 with the connecting coil springs 419.

Extending between the side members 143 of the auxiliary frame F, the side members 125 of the main foot frame E, the side members 175 of the main head frame G and the side members 181 of the auxiliary head frame H are the cross braces or the tubular members 400, 401, 402 and 403.

In Figs. 1 to 17 are shown ten of the various adjustments which may most readily be made. In all of these adjustments the mattress may be considered as on the five section adjustable frame D—E—F—G—H, held in position by the stops 184 at the foot of the bed and 183 at the head of the bed. The adjustable frame D—E—F—G—H may initially be considered to be in the position shown in Fig. 2. The central horizontal section D is first elevated to the desired height by turning the lever 104 at the front of the bed.

Assuming the lever 141 (see Fig. 3) is in down position with the nose or corner 114 fitting into the opening 115, with the flat portion 103 in the slot 416 and the pin 113 in the left end of the slot 112, the handle 141 is elevated and pushed forward with portion 102 fitting into the slot 100. Then the handle 104 is turned, causing the rod 90 and thread 89 to turn in the sleeve 84 moving the tube 75. The tube 75 will turn the arm 48 which in turn will rotate the rod 46 and the arm 44. The arm 44 acting through the pivotally connected link 42 will elevate the central horizontal section D which will always move parallelly to the main frame A by reason of the coaction of the guide rods 27 fitting in the guide tubes 28.

When the central section D has been elevated to the desired position, the handle 141 may be withdrawn and dropped in back of the frame C, with the portion 103 passing into the slot 416. Then the actuators or handles 141 and 205 may be operated to lift or lower the main foot and head sections E and G. The handle 141 will move the tube 139, the arm 136, the arm 132, the tube 133, and the link 130 to elevate or depress the section E on the hinge 126. The handle 205 will move the tube 203, the arm 200 and the lever 193 to raise or lower the main head section G.

The auxiliary head section H may be raised or lowered by adjustment of the arms 189 in respect to the holes 191, while the auxiliary foot section F may be raised or lowered by engagement of the rod 160 with the ratchet 161. The ratchet bars 151 will always depend from the frame E since their rollers will slide on the angle guide members 155.

In Figs. 8 to 17 are shown various adjustments which may be readily made, these adjustments respectively being low position in Fig. 8, bronchoscopic or eye position in Fig. 9, high cardiac position in Fig. 10, spinal hyper-extension position in Fig. 11, Trendelenburg position in Fig. 13, Fowler or drainage position in Fig. 14, bed pan position in Fig. 16 and reading or eating position in Fig. 17.

In Figs. 10, 12 and 17 an overhead table may be readily employed. In no position is there an abrupt transverse break across the back of the patient and in all positions the patient will be given a feeling of maximum security. The horizontal position of the central section D in all adjustments will give anatomically correct support and positioning and maximum comfort. When the patient is in any treatment position, he or she may then be readily moved to reading, eating or bed pan positions without great exertion on the part of the nurse or attendant and without discomfort or injury to the patient or feeling of unsecurity on the part of the patient.

The rollers 148 and 149 of the foot sections E and F, as well as roller 195 of the head section G will assure smoother and noisless operation with less friction. The roller 195 for example may be 2⅜" in diameter. The hinge 126 of Fig. 18 will assure enhanced strength to the hinge connections between the frames D, E, F and G and enable better spacing of said frames. The diagonal braces 422 increase the strength of the corners of the section G. The longitudinal angle 417 will strengthen the elevating mechanism J for the central section D.

All corners and edges are rounded to prevent tearing of the bed clothing and injury to nurses and patients. The folding handles 104, 141 and 204 can only fold vertically downwardly between

the vertical bars of the foot frame C, and will not strike or mar the foot frame, because of the coaction between the bars 103 and the slots 416. The hand grips 109 are easy to remove and quiet and non binding in operation.

The corner hook plates 14 hold the bed and spring firm and rigid and permit moving of patient on the bed from room to room without danger of the spring becoming loose. In operation 12½ lbs. pressure applied to the ends of the handles 104, 141 and 205 will readily enable lifting and movement of a 200 lb. person.

As many changes could be made in the above adjustable hospital bed and many apparently widely different embodiments of this invention could be made without departing from the scope of the claims, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. In a hospital bed having front and rear vertical upright support sections and a main lower rectangular supporting frame extending the full length and width of the bed, an upper adjustable rectangular frame also extending the full length and width of the bed and movable upwardly and downwardly from and in respect to the lower rectangular supporting frame, said upper adjustable frame having a central short horizontal section terminating a substantial distance away from the front and rear upright sections and from the ends of the lower rectangular frame, adjustable rectangular head and foot sections forming part of said upper adjustable frame and hinged respectively to the ends of said central short horizontal section, and guide means for said central section mounted upon said lower rectangular frame and comprising a plurality of

vertical tubular members on each side of said bed centrally mounted on one of said frames, a corresponding pair of vertical guide rods to be fitted in and to move upwardly and downwardly within said tubular members, said guide rods being attached centrally to the other frame and said guide rods sliding in and being guided in said tubular members, and means on the support frame for raising and lowering said central short horizontal section and other means for adjusting the position of said foot and said head sections in respect to said central short vertical section.

2. The bed of claim 1, a pair of said tubular members and a pair of said guide rods being positioned centrally at each side of said bed.

3. The bed of claim 1, said raising and lowering for said central section consisting of a bell crank lever arrangement connected to the central sides of said short horizontal section between said guide rods and tubular members.

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