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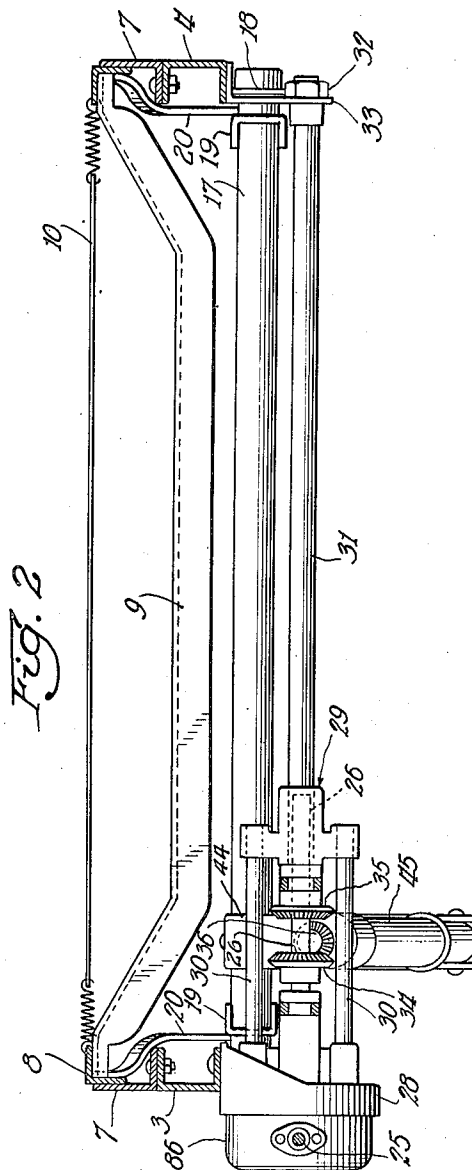
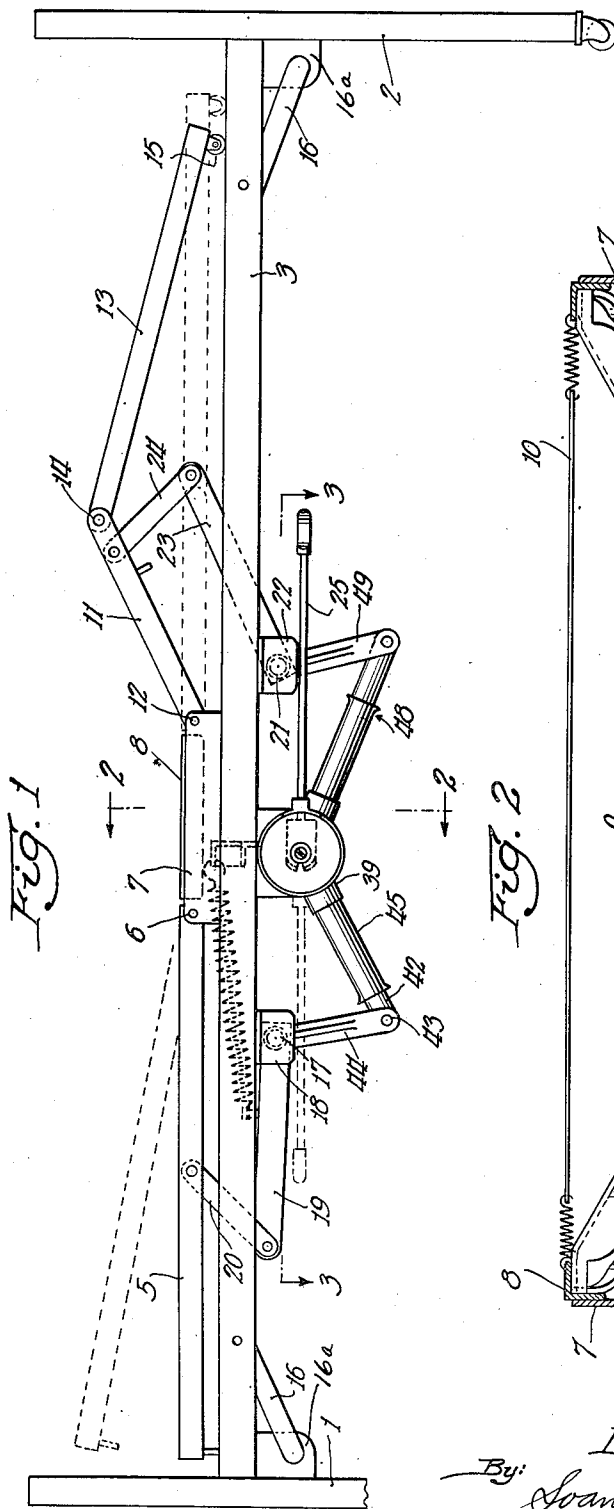
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HOSPITAL BED ADJUSTING MECHANISM

Filed July 13, 1946

4 Sheets-Sheet 1



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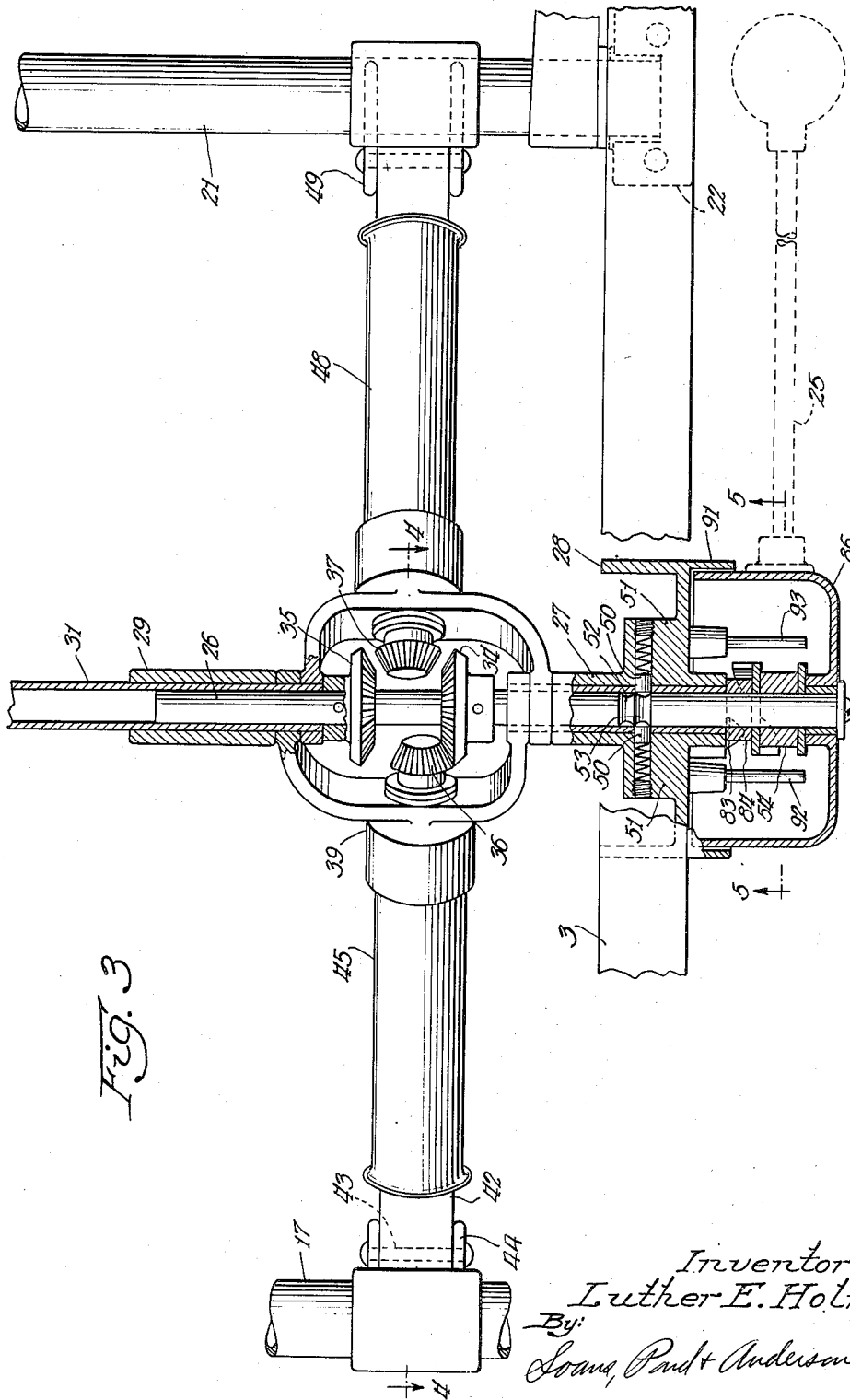
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HOSPITAL BED ADJUSTING MECHANISM

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4 Sheets-Sheet 2



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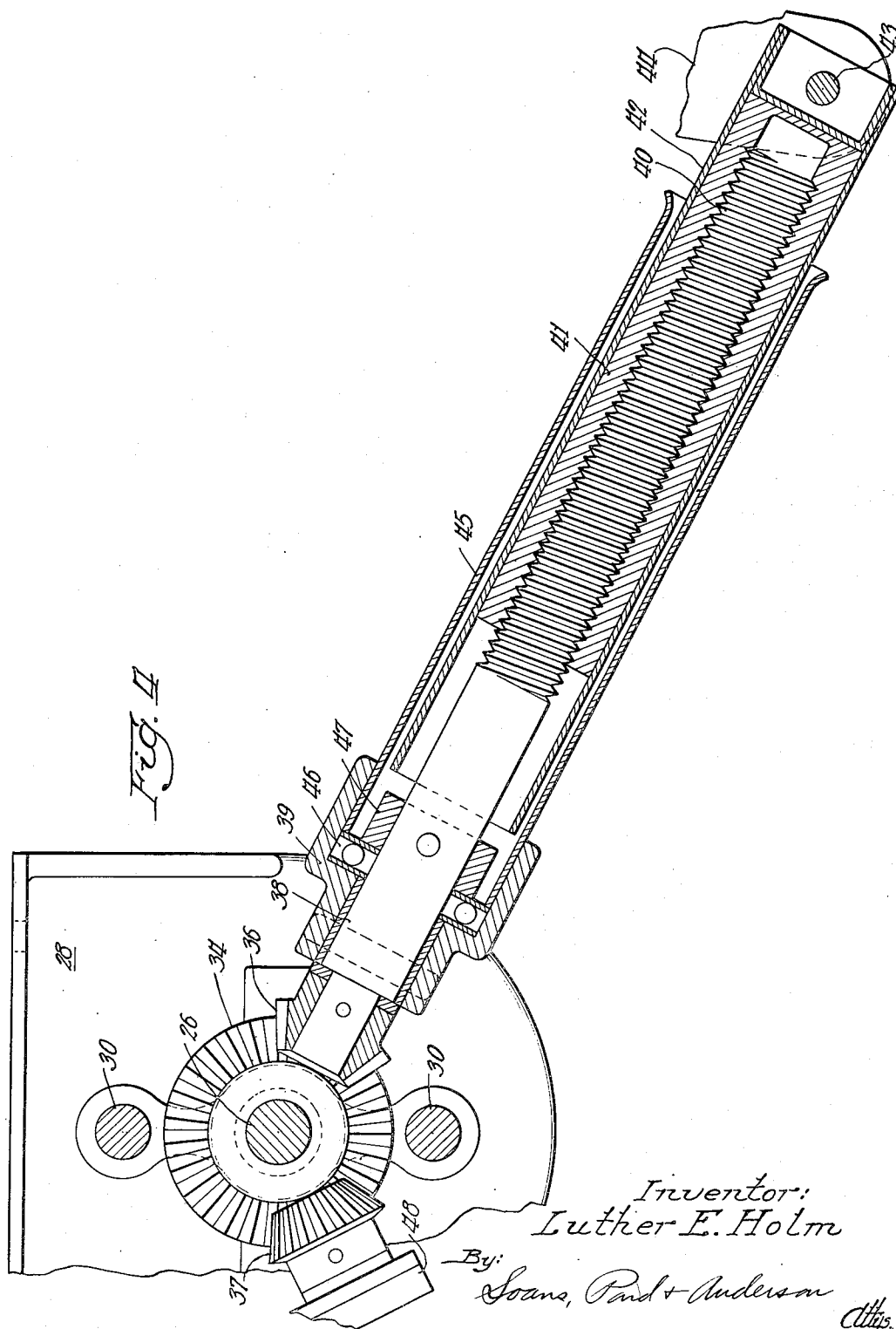
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HOSPITAL BED ADJUSTING MECHANISM

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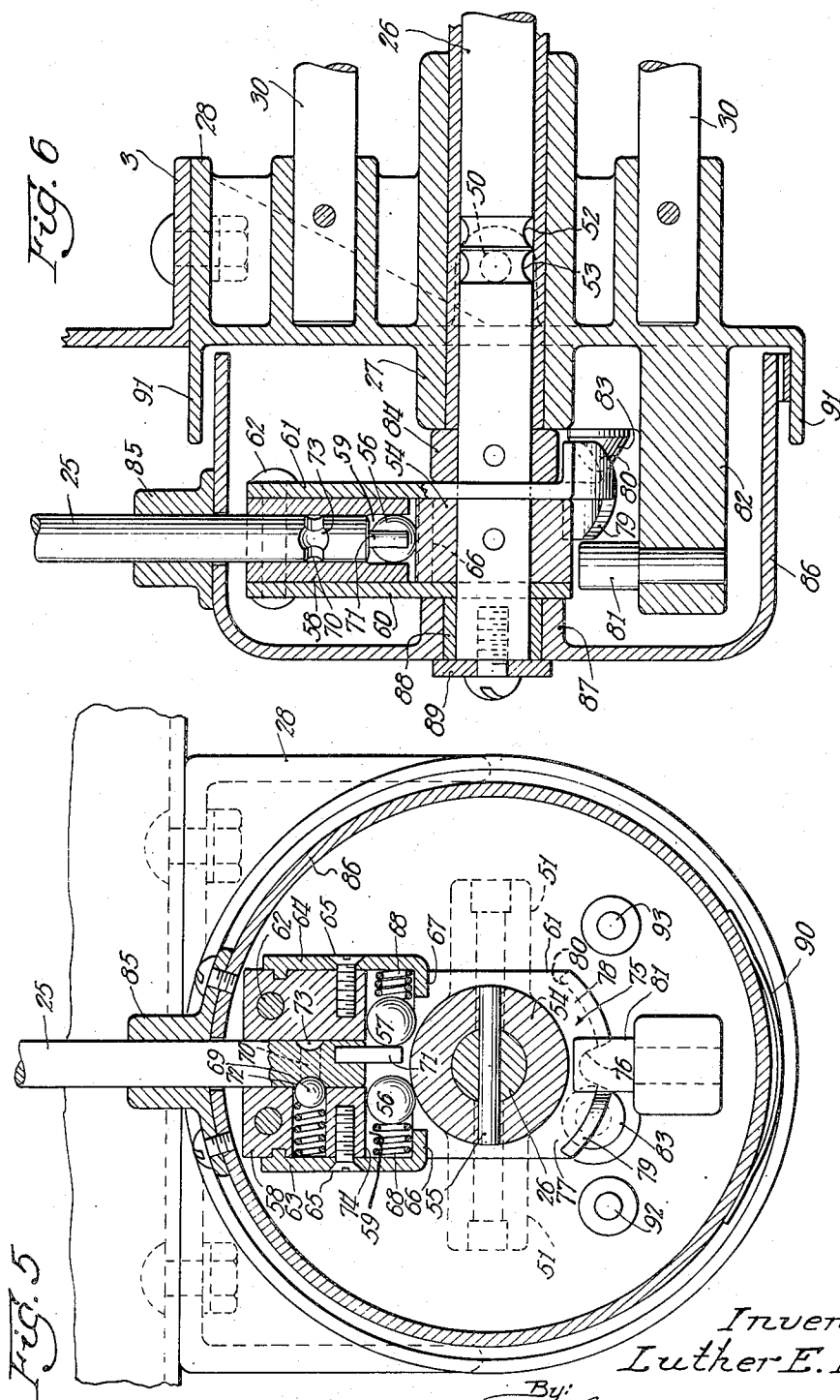
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HOSPITAL BED ADJUSTING MECHANISM

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8 Claims. (Cl. 5—68)

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This invention relates to a mechanism for adjusting the adjustable head, leg and foot portions of a hospital bed bottom, and more particularly to mechanism by which the occupant of the bed may effect adjustment of the various adjustable sections of the bed bottom.

The main objects of the invention are to provide a simple, easily operable mechanism readily accessible to an occupant of a hospital bed whereby the adjustable sections of a hospital bed bottom may be occupant-adjusted from time to time as may be desired; to provide such mechanism which will facilitate selective adjustment of the various bed bottom sections while the bed is occupied, either by the occupant of the bed or an attendant; and, in general, it is the object of the invention to provide an improved hospital bed adjusting mechanism of the character indicated.

Other objects and advantages of the invention will be apparent by reference to the following specification and accompanying drawings (4 sheets) wherein there is disclosed a hospital bed adjusting mechanism embodying a selected form of the invention.

In the drawings:

Fig. 1 is a side elevation illustrating the improved mechanism applied to a typical hospital bed;

Fig. 2 is a cross-section on the line 2—2 of Fig. 1;

Fig. 3 is a plan section on the line 3—3 of Fig. 1;

Fig. 4 is a vertical section on the line 4—4 of Fig. 3;

Fig. 5 is a vertical section on the line 5—5 of Fig. 3; and

Fig. 6 is a side view, partly broken away, of the structure shown in Fig. 5.

The typical hospital bed illustrated in Figs. 1 and 2 of the drawings comprises head and foot frames 1 and 2, respectively, said frames being interconnected by longitudinally extending side rails 3 and 4.

An adjustable hospital bed bottom comprises a head section 5 pivotally secured at its opposite sides as indicated at 6 to the vertical flanges of a pair of angle iron bracket members 7 which are rigidly secured to the respective side frame members or rails 3 and 4 in the proper location. A short stationary bed section 8 is supported by the bracket members 7, and a transverse drop center spacer 9 extending between the opposite side portions of the stationary bed section 8 serves to resist collapsing of the bed bottom

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structure incident to the tension of the mattress supporting spring fabric represented at 10 in Fig. 2.

The bed bottom also includes an intermediate or leg section 11 pivoted as indicated at 12 to the brackets 7 on opposite sides of the structure and a foot section 13 hingedly connected at its opposite sides as represented at 14 to the free end of the intermediate section 11. The free end portion of the foot section 13 is adjustably supported by suitable rollers, such as 15, which ride on the top surface of the underlying side frame members 3 and 4. To steady the structure, angularly disposed corner braces such as represented at 16 may extend between brackets 16a which are secured to the end frames 1 and 2 and the respective side members 3 and 4.

A shaft 17 extending transversely of the bed structure is suitably journaled in brackets such as represented at 18 secured to the side frames 3 and 4 and said shaft is provided with arms 19 secured rigidly to the shaft so as to turn therewith. The free ends of the arms 19 are connected by means of links 20 to the sides of the head frame section 5 of the bed bottom so that any rocking movement imparted to the shaft 17 will effect adjustment of the bed bottom section 5 about its pivots 6.

Similarly, a shaft 21 is rotatably mounted in suitable brackets 22 and said shaft 21 is connected by means of arms such as 23 and links such as 24 to the intermediate adjustable bed bottom section 11 so that any rotary movement imparted to the shaft 21 will effect adjustment of the intermediate section 11 about its pivots 12. The foot section 13 of the bed bottom will also be thereby adjusted as an incident to its hinged connection 14 to the foot section 11 and its roller support 15 at its free end.

The mechanism herein shown for selectively adjusting the bed bottom structure comprises a single operating lever 25 which operates through connections about to be described to rock the shafts 17 and 21 selectively in either direction of rotation. The lever 25 acts through suitable connections to rotate a shaft 26 in either direction of rotation, and also to shift said shaft lengthwise.

The shaft 26 is mounted for both rotary and longitudinal sliding movement in a bearing 27 which is formed as a part of a casting 28 which is rigidly secured to the stationary bed frame member 3 (see Figs. 2, 5 and 6). Said shaft 26 is also supported at a point spaced inwardly from the said frame 3 by means of a bracket 29 which

is rigidly supported by a pair of rods 30—39 which are fixedly mounted in suitable integral socket portions of the casting 28. Rigidity of the support for the bracket 29 is augmented by the provision of a tubular member 31 of which one end fits snugly in a hole bored in said bracket 29 and which at its other end is rigidly secured as indicated at 32 to a bracket 33 depending from the opposite side frame member 4. The shaft 26 is journaled and slidable within the tube 31 and within a suitable bushing provided in the bearing 27.

The shaft 26 has rigidly mounted on it a pair of bevel gears 34 and 35 which are respectively adapted to cooperate with bevel gears 36 and 37

The bevel gear 36 is secured to one end of a shaft 38 (see Figs. 3 and 4) which is journaled at one end in a supporting yoke 39. The yoke 39 is supported as shown in Fig. 3, on the tube 31 and on the shaft 26. The other end portion of the shaft 38 is provided with screw threading indicated at 40 which fits an internally threaded sleeve 41 which is suitably fixed in a tube 42 having one end pivotally connected as shown at 43 to the free end of an arm 44 which depends from the operating shaft 17. The tube 42 is a free fit within a casing or jacketing tube 45 which is rigidly mounted in a socket portion of the yoke 39 as clearly shown in Fig. 4. Inasmuch as the weight of the head section 5 of the bed bottom normally tends, through the described link and arm connection to the shaft 17, to rock the same in a direction which tends to move the sleeve 41 and threaded shaft 38 towards the shaft 26, a suitable anti-friction thrust bearing 46 is provided between a collar 47 pinned on the shaft 38 and a shoulder portion of the yoke 39.

It will be seen that by rotating the gear 34 while in mesh with the gear 36, the screw 40 will be rotated and that endwise movement will be imparted to the internally threaded sleeve 41 and its carrying tube 42. Such endwise movement of the tube 42 will of course, be transmitted through the arm 44 to the shaft 17 to effect adjustment of the head section 5 of the bed bottom.

The gear 37 is connected through a similar telescopic screw mechanism 48 to the free end of an arm 49 which depends from and is rigidly secured to the adjusting shaft 21 for the intermediate and foot sections of the bed bottom.

As best shown in Fig. 3, the gears 34 and 35 on the shaft 26 are so spaced that when the gear 34 is in mesh with the gear 36, the shaft gear 35 is disengaged from the gear 37. By moving the shaft 26 endwise, the gear 34 may be disengaged from the gear 36 as gear 35 is brought into meshing engagement with the gear 37. The shaft is yieldingly held in either of these two positions by means of spring pressed pins 50—59 mounted in suitable bosses 51—51 formed as a part of the casting 28. Said spring pressed pins 50—59 engage either of a pair of grooves 52 and 53 provided in the shaft 26. The spring pressed pins 50—59 together with certain elements which will presently be described offer sufficient resistance to the endwise movement of the shaft to maintain the selected gear engagement when adjusting the desired portion of the bed bottom structure.

As best shown in Figs. 3, 4 and 5, the shaft 26 projects outwardly beyond the frame side member 3 and it has mounted on it a collar 54, the said collar being rigidly secured to the shaft by a pin 55 or other suitable means. The collar 54 constitutes one member of a two-way ball clutch

device, the other principal parts of which are a pair of suitable clutch balls 56 and 57 and a clutch block 58 having a groove or recess 59 extending therethrough and in which said balls 56 and 57 are movable. The clutch block 58 is rockably mounted on the shaft 26 by means of a pair of side arms or mounting plates 60 and 61 which have their upper portions riveted or otherwise secured to said clutch block 58 as indicated at 62, and their lower portions apertured and journaled on the shaft 26 on opposite sides of said clutch collar 54. A pair of side plates 63 and 64 are secured to the clutch block 58 by screws such as indicated at 65—65 and said plates 63 and 64 have in-turned lower end portions 66 and 67, respectively, cooperating with the walls of the recess 59 in the block 58 to house the clutch balls 56 and 57 and a pair of clutch springs 68, which urge the clutch balls 56 and 57 to move inwardly or toward each other.

The operating lever or handle 25 has its lower end rotatably mounted in the block 58 and it is normally held against inward and outward movement by means of a spring-pressed ball 69 movable in a suitable bore in the block 58 and engageable with a groove 70 in the lever 25. A clutch ball control pin 71 is securely mounted in the inner end portion of the hand lever 25 and projects therefrom into the space between the clutch balls 56 and 57. As shown in Fig. 5, said clutch ball control pin 71 is eccentrically disposed relative to the axis of the lever 25 so that by turning the lever 25 about its own axis the pin 71 may be caused to engage either of the clutch balls 56 or 57 to move and hold the same in an outwardly offset inoperative position. For determining the desired operative positions of the control pin 71, the groove 70 of the hand lever is provided at proper diametrically opposed points with enlarged recess portions 72 and 73 which will cooperate with the spring-pressed ball 69 to yieldably hold the lever in either of two selected position.

When the lever 25 is in the position shown in Fig. 5, the clutch ball 57 is held in an outwardly offset position in which it is free of engagement with the clutch member 54. The other clutch ball 56 is, however, permitted to be driven by the spring 68 into wedged engagement with the overlying face portion 74 of the clutch block 58 and the periphery of the clutch member 54. Hence, if the lever 25 is swung in counter-clockwise direction about the axis of the shaft 26 from the position shown in Fig. 5, the clutch member 54 and the shaft 26 will be correspondingly rotated. Hence, in the arrangement shown, counter-clockwise swinging of the hand lever 25 from a vertical position will effect upward adjustment of the head section 5 of the adjustable bed bottom.

To lower the head section 5 from an elevated position, the handle 25 is turned 180 degrees about its own axis so as to disengage the clutch ball 56 and to effect engagement of the clutch ball 57 whereupon clockwise rotation of the lever 25 about the axis of the shaft 26 will effect rotation of the shaft 26 and the desired lowering of the head section of the bed bottom.

The rocking movement of the hand lever 25 for adjusting the head section 5 must be effected within a segment or arc of movement between the vertical position of the handle shown in Fig. 5 and a horizontal position extending toward the head end of the bed structure. Similarly rocking movement of the handle 25 to effect adjustment of the intermediate and foot sections of the bed bottom must be effected within a seg-

ment between the vertical position of the lever and a horizontal position extending toward the foot of the bed. This is due to the following described mechanism which automatically effects shifting of the shaft 26 lengthwise to control the driving engagement of the gears 34 and 35 with the gears 36 and 37, respectively.

The clutch mechanism side plate 61 is provided at its lower end with an extension portion 75 which projects beyond the periphery of the clutch member 54. Said extension 75 is centrally notched as indicated at 76 to provide a pair of arms 77 and 78. The arm 77 has its free end portion bent laterally outwardly to form a cam ledge 79 and the arm portion 78 has its end portion bent laterally inwardly to form a cam ledge 80. The cam ledge 79 acts against a fixed pin 81 carried by a projection 82 of the main casting 28 and serves, when the hand lever 25 is rocked in the segment toward the head of the bed to force the shaft 26 inwardly (to the right in Fig. 6) to thereby establish operative engagement between the gears 34 and 36 as illustrated in Fig. 3. The cam ledge 80 cooperates with a cam button 83 mounted in a portion of the casting 28 to force the shaft 26 outwardly when the hand lever is rocked in the segment which extends towards the foot of the bed. It will be seen that so long as the hand lever 25 is operated in one segment of movement, the shaft 26 will remain in the corresponding position of longitudinal adjustment and that when the lever is shifted from one such segment of movement to the other segment, the shaft will immediately be shifted longitudinally to thereby change the relationship of the gears 34 to 37, inclusive.

The housing side portion 61 which carries the cam ledges 79 and 80 is held against movement longitudinally of the shaft 26 by being confined between the clutch member 54 and a collar 84 pinned to the shaft 26 as illustrated in Figs. 3 and 6.

The hand lever 25 is additionally supported by being journaled in a boss 85 secured to a casing or shell 86 which is journaled as indicated at 87 on the free outer end portion of the shaft 26. The shell 86 may be so journaled on a bushing 88 and retained in place by means of a washer 89 secured to the end of the shaft by screw means as illustrated or otherwise. The bushing 88 constitutes a spacer for preventing clamping of the hub portion 87 of the shell between marginal portions of the retaining washer 89 and the adjacent face of the clutch housing plate 60. A friction spring 90 may be suitably secured to a portion of the shell 86 for frictionally engaging a flange portion 91 of the casting 28 which surrounds an inner portion of said shell. Said friction spring 90 will serve to yieldably hold the handle 25 in the upwardly projecting position illustrated or in any other desired position.

The hand lever 25 may be disposed in an out-of-the-way position by being horizontally positioned as illustrated in Fig. 1. In this position the lever may be additionally supported by fixed stop pins 92 and 93 which project from portions of the main casting 28 in proper positions for this purpose.

Various changes in the described structure may be made without departing from the principles of the invention as described and as represented by the illustrated embodiment of the invention. I claim:

1. In a hospital bed having an adjustable bed bottom structure including at least two inde-

pendently adjustable sections, a hand lever pivotally mounted on the side of the bed for rocking movement, a shaft, two-way clutch means interconnecting said hand lever and shaft for transmitting motion of said hand lever in either direction to said shaft, selectively engageable and disengageable driving connections between said shaft and the respective adjustable bed bottom sections, and means cooperating with said shaft and actuated by the shifting of said hand lever from one predetermined zone of movement to another for selectively effecting engagement of said driving connections so as to thereby effect selective adjustment of the desired bed sections as an incident to a continued actuation of said lever.

2. A hospital bed having a bed bottom structure embodying a pair of relatively independently adjustable bed bottom sections, a rotatably mounted shaft extending transversely of the bed bottom, a hand lever mounted for rocking movement about the axis of said shaft at one side of said bed-bottom, two-way clutch means interconnecting said hand lever and shaft and selectively adjustable to transmit rocking movement of said lever in either direction to said shaft, selectively engageable and disengageable driving connections between said shaft and the respective adjustable bed bottom sections for effecting adjustment of said sections independently of each other as an incident to rocking of said hand lever, and means co-operating with said shaft and actuated by rocking movement of said lever for effecting engagement and disengagement of said driving connections.

3. A hospital bed having a bed bottom structure embodying a pair of relatively independently adjustable bed bottom sections, a rotatably mounted shaft extending transversely of the bed bottom, a hand lever mounted for rocking movement about the axis of said shaft at one side of said bed bottom, two-way clutch means interconnecting said hand lever and shaft and selectively adjustable to transmit rocking movement of said lever in either direction to said shaft, selectively engageable and disengageable driving connections between said shaft and the respective adjustable bed bottom sections for effecting adjustment of said sections independently of each other as an incident to rocking of said hand lever, and means co-operating with said shaft and actuated by the shifting of said lever from one predetermined zone of rocking movement to another such zone for selectively effecting engagement and disengagement of said driving connections.

4. A hospital bed having a bed bottom structure embodying adjustable head and leg sections respectively adjacent the opposite ends of the bed bottom, a rotatably mounted shaft extending transversely of the bed bottom, a hand lever mounted for rocking movement about the axis of said shaft at one side of said bed bottom, two-way clutch means interconnecting said hand lever and shaft and selectively adjustable to transmit rocking movement of said hand lever in either direction to said shaft, selectively engageable and disengageable driving connections between said shaft and the respective adjustable bed bottom sections for effecting adjustment of said sections independently of each other as an incident to rocking of said hand lever, and means co-operating with said shaft and actuated by the shifting of said lever from one predetermined zone of rocking movement to another such zone for selectively effecting engagement and disengagement

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of said driving connections, the arrangement being such that the zone of rocking movement for adjusting said head section extends largely from the axis of said shaft toward said head section and the zone of rocking movement for adjusting the other section extends largely from said axis toward said other section.

5. A hospital bed having a bed bottom structure embodying a pair of relatively independently adjustable bed bottom sections, a rotatably mounted shaft extending transversely of the bed bottom, a hand lever mounted for rocking movement about the axis of said shaft at one side of said bed bottom, two-way clutch means interconnecting said hand lever and shaft and selectively adjustable to transmit rocking movement of said hand lever in either direction to shaft, said lever being also mounted for turning movement on an axis extending transversely of said shaft axis, means whereby turning of said lever effects adjustment of said two-way clutch for transmitting movement selectively as aforesaid, selectively engageable and disengageable driving connections between said shaft and the respective adjustable bed bottom sections for effecting adjustment of said sections independently of each other, and means co-operating with said shaft and actuated by the rocking of said hand lever for selectively effecting engagement and disengagement of said driving connections.

6. A hospital bed having a bed bottom structure embodying a pair of relatively independently adjustable bed bottom sections, a rotatable and axially movable shaft mounted on the bed bottom structure transversely thereof, a hand lever mounted for rocking movement about the axis of said shaft at one side of said bed bottom, two-way clutch means interconnecting said hand lever and shaft and selectively adjustable to transmit rocking movement of said lever in either direction to said shaft, selectively engageable and disengageable driving connections between said shaft and each of said bed bottom sections comprising inter-engaging elements which are selectively separable and engageable by endwise movement of said shaft, said lever being anchored to said shaft against movement lengthwise thereof, and interengageable cam means on said lever and said bed bottom structure effective upon movement of said lever from one predetermined zone of movement to another to shift said shaft endwise and thereby to selectively engage one of said driving connections and to disengage the other.

7. A hospital bed having a bed bottom structure embodying a pair of relatively independently adjustable bed bottom sections, a rotatable and axially movable shaft mounted on the bed bottom transversely thereof, a hand lever mounted for rocking movement about the axis of said shaft at one side of said bed bottom, two-way clutch means interconnecting said hand lever and shaft and selectively adjustable to transmit rocking movement of said lever in either direction to said shaft, selectively engageable and disengageable driving connections between said shaft and each

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of said bed-bottom sections comprising inter-engaging elements which are selectively separable and engageable by endwise movement to said shaft, said lever being anchored to said shaft against movement lengthwise thereof, and two pairs of cam members each pair comprising a cam member on said lever and a cam member on said bed bottom, said cam members of one pair being inter-engageable by movement of said lever from one predetermined zone of movement to another such zone to shift said shaft lengthwise in one direction, and the other pair of cam members being engageable by movement of said lever between said zones in reverse order to shift said shaft endwise in the opposite direction, thereby to selectively engage and disengage said driving connections.

8. A hospital bed having a bed bottom structure embodying a pair of relatively independently adjustable bed bottom sections, a rotatable and axially movable shaft mounted on the bed bottom transversely thereof, a hand lever mounted for rocking movement about the axis of said shaft at one side of said bed bottom, two-way clutch means interconnecting said hand lever and shaft and selectively adjustable to transmit rocking movement of said lever in either direction to said shaft, selectively engageable and disengageable driving connections between said shaft and each of said bed bottom sections comprising interengaging elements which are selectively separable and engageable by endwise movement of said shaft, said lever being anchored to said shaft against movement endwise thereof, interengageable cam means on said lever and said bed bottom structure effective upon movement of said lever from one predetermined zone of movement to another such zone to shift said shaft endwise and thereby to selectively engage one of said driving connections and to disengage the other, and a two-part housing enclosing said clutch and said cam means, one part of said housing being fixed to said bed bottom and the other part being fixed to said shaft so as to rotate and move axially therewith, said housing parts having telescopic inter-fitting portions which are relatively rotatable, whereby said housing is, in effect, expandable and contractible in the direction of the length of said shaft so as to completely enclose said clutch and cam means in all operative positions of said shaft and lever.

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