July 27, 1954 L. SNYDER 2,684,488

AUXILIARY DRIVING UNIT FOR BED ELEVATING MECHANISM OF HOSPITAL BEDS

Filed Feb. 6, 1952 2 Sheets-Sheet 1

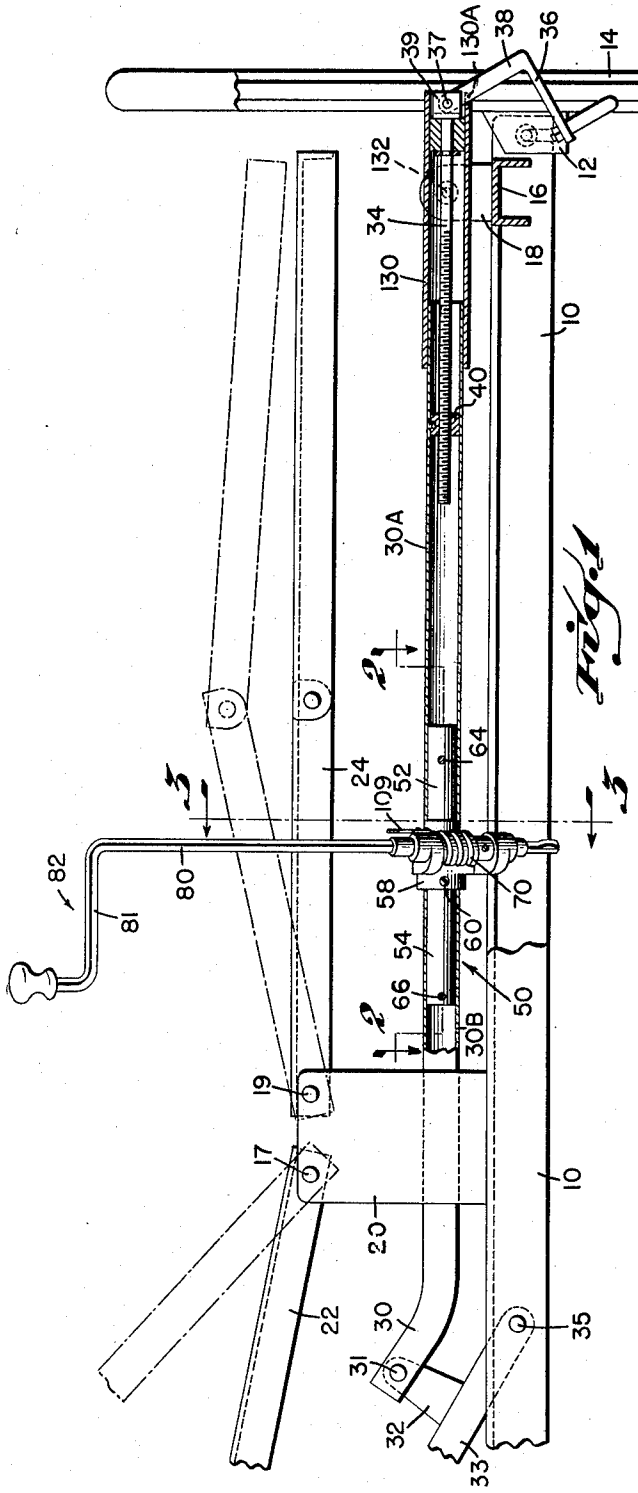


Fig. 1

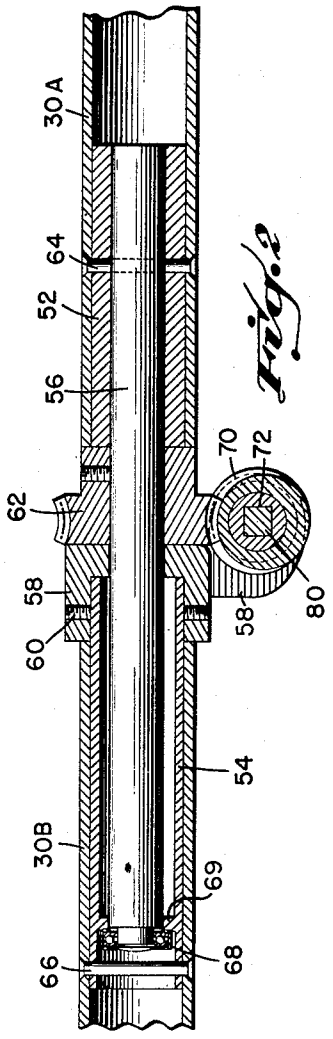


Fig. 2

INVENTOR.
LEE SNYDER
BY
J. Warren Kinney, Jr.
ATTORNEY

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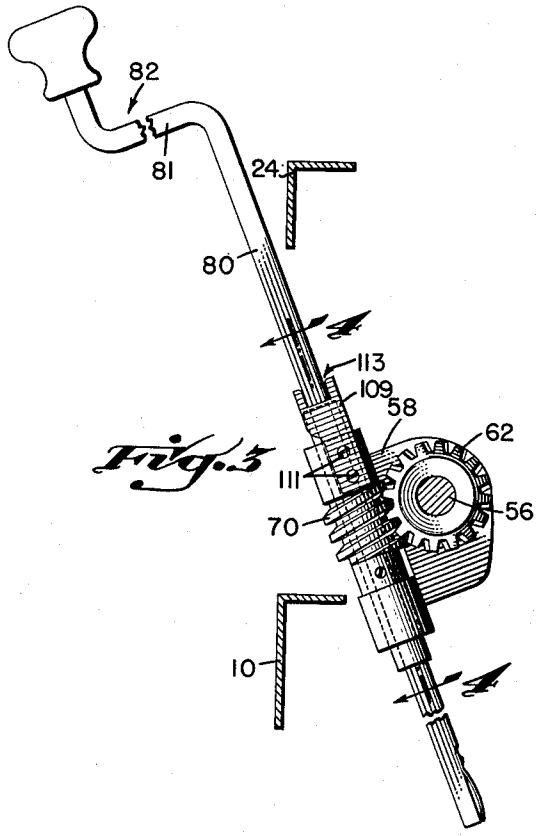


Fig. 5

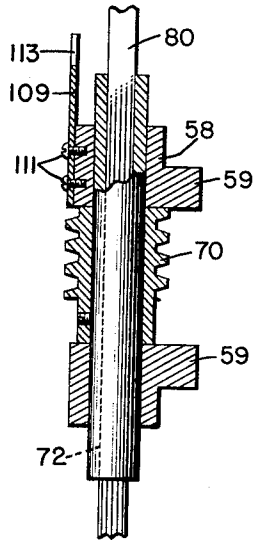


Fig. 4

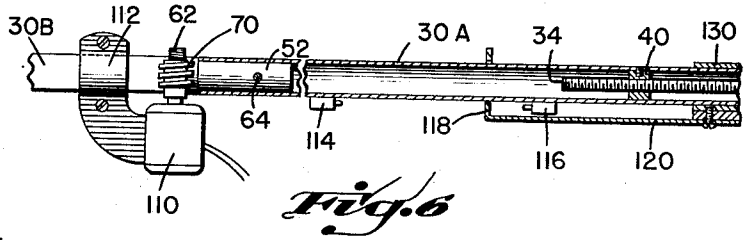


Fig. 6

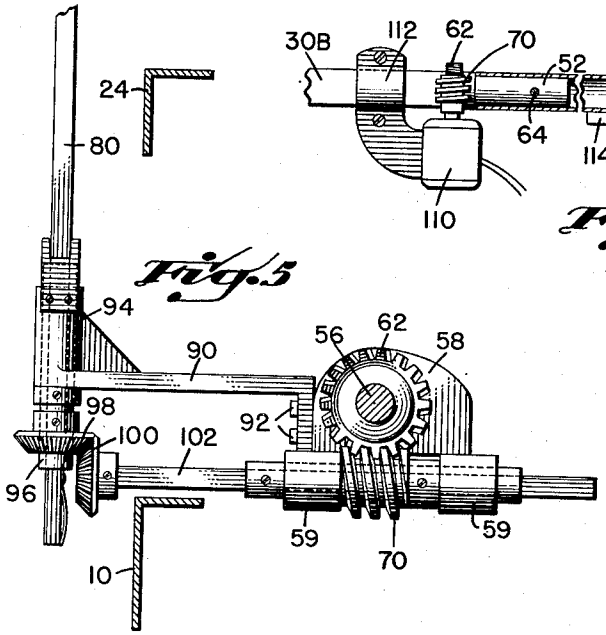


Fig. 5

INVENTOR.
LEE SNYDER
BY
J. Warren Kinney, Jr.
ATTORNEY

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AUXILIARY DRIVING UNIT FOR BED ELEVATING MECHANISM OF HOSPITAL BEDS

Lee Snyder, Cincinnati, Ohio

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13 Claims. (Cl. 5—68)

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This invention relates to hospital beds, and more particularly to an auxiliary driving unit that may be associated with a conventional hospital bed for enabling a bedded patient to operate the mattress or bed elevating means.

An object of the invention is to provide simple, yet highly effective, means for enabling a bedded patient to actuate the mattress elevating mechanism of a conventional hospital bed which will not impair or affect the operating characteristics of the conventional attendant-actuated crank-mechanism at the foot of such beds.

Another object of the invention is to provide an inexpensive auxiliary driving unit which may be simply and quickly associated with the axially shiftable actuator link of a conventional hospital bed for thereby selectively converting the bed from attendant to patient or attendant operation.

A further object of the invention is to provide an auxiliary drive unit for the axially shiftable actuator link of the bed elevating mechanism of a conventional hospital bed which will move with the said link and the patient as the patient actuates the driving unit, whereby the device will always be conveniently located for patient operation.

Still a further object of the invention is to provide an auxiliary driving unit having the hereinabove described characteristics which unit may be easily rendered inoperative for patient operation by the hospital authorities.

These and other objects are attained by the means described herein and as disclosed in the accompanying drawings, in which:

Fig. 1 is a partial side elevation, partly in section, of a typical hospital bed provided with my auxiliary drive unit;

Fig. 2 is a sectional view 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 view similar to Fig. 3 showing a modified form of construction, and

Fig. 6 is a side elevation, partly in section, showing my auxiliary driving unit provided with electric, instead of manual, driving means.

With particular reference now to Fig. 1, the numerals 10 denote the side bed rails, the opposite ends of which are secured to and carried by suitable brackets 12 which are in turn carried by a pair of laterally spaced end elements 14, only the right one being illustrated. End rails 16 spanningly engage and interconnect opposite ends of the side rails.

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Plates 20 suitably secured to and carried by side rails 10 are provided for pivotally mounting as at 17 and 19 the ends of a pair of hinged bed or mattress elevating frame portions 22 and 24, wherein portion 22 comprises the upper or head elevating frame of the bed and portion 24 comprises the lower or foot elevating portion of the bed.

For the purpose of this invention the actuating mechanism for only the head portion of the bed will be considered, it being understood that the actuating mechanism for the foot portion is similar.

The conventional, endwise or axially shiftable actuator link 30 is pivotally connected as at 31 to arm 32 of the mattress elevating member 33, one end of which is pivoted at 35 to side rail 10. The other end of member 33, not illustrated, engages frame 22 whereby clockwise movement of 33 results in elevation of the head elevating frame 22.

Axial or endwise movement may be imparted to actuator link 30 by means of a lead screw 34 suitably mounted for rotary motion while fixed against endwise movement. The lead screw may be actuated from the foot of the bed by means of a crank 36 which, when elevated to dispose portion 38 in axial alignment with screw 34, may be rotated for turning the lead screw.

A nut denoted generally by the numeral 40 is fixably secured and carried by the actuator link 30, it being noted that the lead screw threadably engages this nut whereby relative rotary motion between the lead screw and nut will result in axial movement of link 30.

It should be understood that the present invention is neither directed to nor concerned with the particular structural details of the hereinabove described bed elevating mechanism which is merely illustrative of certain old and well known parts of conventional hospital beds.

The invention is specifically directed to the auxiliary driving unit denoted generally by the numeral 50, Fig. 1. This unit comprises, generally speaking, a pair of end members 52 and 54 in endwise spaced axial alignment which interconnect adjacent ends of the outer portion 30A and the inner portion 30B of link 30. The end members 52 and 54 are rotatably interconnected by means of a shaft 56 which likewise secures the end members against relative endwise axial movement, Fig. 2.

In the preferred embodiment of the invention a bracket 58 is secured to and carried by end member 54 to which it may be securably though releasably fastened by means of the set screws 60.

A worm wheel 62 is secured to and carried by shaft 56 for rotation therewith.

End member 52 and shaft 56 are fixedly secured to one another and to the outer portion of the actuator link denoted by the numeral 30A such as by means of a rivet, bolt or the like 64, whereby these parts will be fixed against relative movement. The other end member 54 is fixedly secured to the inner portion of the actuator link denoted by the numeral 30B such as by means of a rivet, bolt, or the like 66.

Suitable means such as a bearing 68 is secured to and carried by that end of shaft 56 remote from end member 52 in abutment with internal collar 69 formed integral with end member 54 for thereby maintaining the two end members in axial alignment, for relative rotation, but against relative endwise axial movement.

A worm 70 is rotatably secured between bosses 59 of bracket 58, said worm engaging worm wheel 62. In the preferred embodiment of the invention worm 70 is provided with a through axial, non-circular bore 72, note Figs. 2 and 4, for slidably receiving the elongated complementary shank 60 of a manually operable crank 32.

From the foregoing it will be noted that rotation of worm 70 will drive worm wheel 62 for effecting relative rotation of the outer portion of 30A of the actuator link between the unit and lead screw 34 for thereby effecting axial movement of the composite actuator link. Rotary motion of outer portion 30A will not be imparted to inner portion 30B by reason of the thrust bearing arrangement illustrated in Fig. 2 between shaft 56 and end member 54. However, rotary motion of crank 36 will not cause rotation of shaft 30A due to the self-locking action of the worm wheel 62 and the worm 70.

If desired, my auxiliary driving unit may be provided as new equipment. However, the device may be quickly and simply attached to any existing hospital bed by merely severing the standard actuator link 30 into aligned portions 30A and 30B for permitting the unit to be inserted therebetween, it being noted that the unit serves to interconnect the adjacent ends of portions 30A and 30B in the manner illustrated in Fig. 2.

With particular reference now to Fig. 5, it will be noted that I have provided an auxiliary bracket 90 which may be bolted as at 92 to support 58. A sleeve 94 may be provided on the free outer end of bracket 90, said sleeve housing a shaft 96 which is provided with a through, non-circular bore for slidably receiving shank 60 of the crank mechanism. A bevel gear 98 is secured in driven relationship to shaft 96, and a second bevel wheel 100 secured to and carried by shaft 102 which extends through and in driving relationship with worm 70 meshes with gear 98.

The primary distinction between the structure illustrated in Figs. 3 and 5 is that in Fig. 3 the lower end of the elongated shaft 80 of the crank extends under the bed so that the upper end will extend upwardly and outwardly, at an inclination to the bed. In Fig. 5 the elongated shaft 80 will, of course, extend in a vertical manner projecting upwardly beside the bed, thereby disposing the crank somewhat closer to the side of the bed.

In Fig. 6 I have illustrated electrically driven means for actuating worm 70 in the form of a motor 110 suitably secured by a bracket 112 to actuator lever portion 30B. An electrical circuit to the motor may be completed by any suitable switching control means, not illustrated, conveniently located for manipulation by the patient.

Suitable limit switches 114 and 116 may be provided on link portion 30A whereby to engage stop member 118 secured to and carried by arm 120 which is in turn fastened relative to the bottom of the bed.

With reference now to Fig. 1, it will be noted that the right end of the outer portion 30A of the actuator link is adapted to slidably or telescopically be received within housing shaft 130 which is pivotally secured as at 132 to bracket 18, thereby permitting the entire actuator link assembly to move in a vertical plane incident to its axial or endwise movement which, in turn, moves member 33 about pivotal connection 35. When the crank 36 is in the lowered position it fits into the notch 130A formed in adjacent end of the housing shaft 130 and is thus prevented from having movement to turn the screw in either direction and this also prevents turning of the screw itself.

From the foregoing it will be noted that I have thus provided simple yet highly effective means for enabling a bedded patient to actuate the bed elevating mechanism. It will be further noted that these means do not in any way lessen the effectiveness or operating characteristics of the attendant-operable crank 36. In those instances wherein the hospital authorities do not desire for the patient to actuate the bed elevating mechanism, the entire crank assembly may be withdrawn from the unit to which it may be later applied without requiring the use of tools. Or, the crank unit may be shifted downwardly entirely out of the patient's reach, in which event arm 31 of the crank may be received within slotted portion 113 of a plate 109 secured to bracket 58 as at 111, see Figs. 3 and 4.

It should be understood that various changes and modifications may be made, within the scope of the appended claims, without departing from the spirit of the invention.

What is claimed is:

1. An auxiliary driving unit for the axially shiftable actuator link of the bed elevating mechanism of a hospital bed of the type which includes a lead screw rotatably mounted against endwise movement and threadably engaging a nut secured to the actuator link whereby relative rotary motion between the lead screw and nut will provide axial movement of said link, said unit comprising a pair of end members in endwise spaced axial alignment, means rotatably interconnecting said end members against relative endwise axial movement, means secured to, carried by and disposed between adjacent ends of said end members for rotating one of said end members relative to the other, said end members being attachable to and adapted to interconnect adjacent portions of an actuator link between its ends, whereby that portion of the actuator link between the unit and the lead screw is rotatable relative to said lead screw and to the other portion of the actuator link for imparting axial movement to the link.

2. An auxiliary driving unit for the axially shiftable actuator link of the bed elevating mechanism of a hospital bed of the type which includes a lead screw rotatably mounted against endwise movement and threadably engageable with a nut fixed relative to the actuator link whereby relative rotary motion between the lead screw and nut results in axial movement of said link, said unit comprising first and second end members in endwise spaced axial alignment, a shaft rotatably

interconnecting said end members against relative endwise axial movement, said shaft being fixed to the first end member for rotation therewith, a gear between and in axial alignment with said end members, said gear fixedly secured to and carried by the shaft, gear driving means secured to and carried by the second end member for rotating the shaft and the first end member relative to the second end member, means for securing the end members of the unit to adjacent portions of the actuator link between ends thereof, whereby that portion of the actuator link between the unit and lead screw is rotatable relative to said lead screw and to the other portion of the actuator link for imparting axial movement to the link, and means for actuating the gear driving means.

3. An auxiliary driving unit for the axially shiftable hollow, tubular, actuator-link of the bed elevating mechanism of a hospital bed of the type which includes a lead screw rotatably mounted against endwise movement and in threadable engagement with a nut fixed relative to the actuator link whereby relative rotary motion between the lead screw and nut results in axial movement of said link, said unit comprising a pair of end members in endwise spaced axial alignment dimensioned to be received one each within adjacent ends of said tubular link, a shaft rotatably interconnecting said end members against relative endwise axial movement, a gear between adjacent ends of and in axial alignment with said end members, said gear secured to and carried by said shaft, a bracket secured to and carried by one of said end members, a second gear secured to and carried by said bracket and in driving relationship with the first gear, means fixedly connecting the shaft and the other of said end members to a portion of the actuator link adjacent the lead screw, means for fixedly securing said first end member to a portion of the actuator link remote from the lead screw wherein said unit is adapted to interconnect adjacent portions of the actuator link between its ends, and means for rotating the second gear for actuating said auxiliary driving unit.

4. An auxiliary driving unit as defined in and by claim 3 wherein the first and second gears comprise a worm wheel and worm, respectively.

5. An auxiliary driving unit as defined in and by claim 3 wherein the means for rotating the second gear comprises a patient operable crank which includes an elongated shank portion in driving engagement with said second gear.

6. An auxiliary driving unit as defined in and by claim 3 wherein the first and second gears comprise a worm wheel and worm, respectively, and wherein the worm is provided with an axial, through, noncircular bore, and wherein the means for rotating the worm comprises a patient manually operable crank having an elongated shank portion complementary to and slidably receivable in the bore of the worm.

7. An auxiliary driving unit for the axially shiftable actuator link of the bed elevating mechanism of a hospital bed of the type which includes a rotatable lead screw threadably engageable with means fixed relative to the actuator link whereby relative rotary motion between the lead screw and link results in axial movement of said link, and means for rotating the lead screw from an end of the bed; said unit comprising a first and a second end member in spaced, endwise axial alignment, a shaft extending axially through and rotatably interconnecting said end members against relative endwise axial movement, said shaft being fixed to the first end member for rotation therewith, a worm gear secured to and carried by said shaft at a location between the end members, a bracket secured to and carried by the second end member, a worm rotatably secured to and carried by the bracket in driving relationship with said worm gear for rotating the shaft and the first end member relative to the second end member, means for securing the end members to adjacent portions of the actuator link between its ends, means operable by a patient in the bed for rotating said worm whereby that portion of the actuator link between the unit and lead screw is rotatable relative to said lead screw, to the other end of the unit and to the other portion of the actuator link for imparting axial movement to the link, and wherein the association of said auxiliary driving unit with the actuator link does not impair the operating characteristics of the lead screw.

8. In combination with a hospital bed having a mattress elevating member, a tubular two-section operator link operatively connected with the mattress elevating member, a nut in and fixed against axial movement with one section of said link, a rotatable actuating screw extending into the said section of said link through an end thereof and threaded through said nut, an auxiliary patient operable unit interposed intermediate the length of the tubular link between the sections thereof, said unit comprising a shaft axially aligned with the link and having one end portion rigidly secured in the section of the link in which the nut is mounted and its other end portion rotatably mounted in the other section of the link and held against axial movement therein, a gear rigidly carried by said shaft between the adjacent ends of said sections of the said link, a bracket rigidly connected with the second mentioned section of the link, a gear rotatably carried by said bracket and meshing with the gear carried by said shaft, a crank for turning the second mentioned gear operatively connected therewith and extending upwardly and provided with a handle disposed in position to be grasped by a patient occupying the bed, the crank when turned serving to rotate the gears and the shaft to effect rotation of the first mentioned link section carrying the nut and thereby shift the link longitudinally, and means for selectively preventing rotation of the screw.

9. In combination with a hospital bed having a mattress elevating member, a tubular two-section operator link having one end operatively connected with said elevating member, a nut in one section of said link fixed against axial movement therein, a rotatable actuating screw extending into the said section of said link through an end thereof and threaded through said nut, means for selectively preventing turning of said screw, an auxiliary patient operable unit interposed intermediate the length of the tubular link in axial alignment with and between adjacent ends of the sections thereof, said unit comprising a shaft axially aligned with the link and having one end portion rigidly secured in the said section of the link in which the nut is mounted and its other end portion rotatably mounted in the other section of the link and fixed against axial movement therein, a gear rigidly carried by a portion of said shaft between the first and second mentioned sections of the said link, said

gear when turned causing rotation of the first mentioned section of the link and the nut therein about the screw to effect movement of the link along the screw, and mechanism carried by the second link section including a gear meshing with the gear on said shaft and also including means for controlling rotation of the gear of the said mechanism extending upwardly in position to be actuated by a patient occupying the bed.

10. In combination with a hospital bed having a mattress elevating member, a two-section operator link operatively connected with the mattress elevating member, said link having inner and outer ends, a nut rigidly mounted in one section of said link, a rotatable actuating screw extending longitudinally in the said section of said link through the outer end thereof, said screw being held against longitudinal movement and threaded through said nut, said screw when turned cooperating with the nut for shifting the link longitudinally and thereby adjusting the mattress elevating member, means for selectively preventing rotation of said screw, an auxiliary patient operable unit interposed between and axially spanning the adjacent ends of the said link sections, said unit including an elongate member one end of which is rigidly mounted in the said first link section with the other end of said member rotatably connected with the second mentioned link section, the said member when turned rotating the first link section and its nut as a unit to shift the link longitudinally along the screw and thereby adjust the mattress elevating member, and means for rotating the said member carried by the second mentioned link section and having an operating handle extending upwardly above the bed intermediate the length of the bed.

11. In combination with a hospital bed having a mattress elevating member, an operating link having one end connected with the mattress elevating member, said link having two sections, a nut carried by one link section in fixed relation thereto, an attendant-operable actuating screw rotatably mounted and having threaded engagement with said nut and when turned cooperating with the nut to shift the link longitudinally and thereby adjust the mattress elevating member, means for selectively preventing turning of said screw, the other link section having an inner end spaced from and in axial alignment with an adjacent end of the first mentioned link section, and an auxiliary patient-operable operating unit interposed between the spaced ends of said link sections, said unit being carried by the second mentioned link section and having driving connection with the first mentioned link section for rotating the first mentioned link section relative to the screw while the screw is held against turning and thereby shifting the link longitudinally to adjust the mattress elevating member.

12. In combination with a hospital bed having a mattress elevating member, a two-section operating link connected with the mattress elevating member, a nut carried by one link section in fixed relation thereto, an attendant-operable actuating screw rotatably mounted and in threaded engagement with said nut and when turned cooperating with the nut to shift the link longitudinally and thereby adjust the mattress elevating member, means for selectively preventing turning of said screw, the other link section having an end spaced from and in axial alignment with and adjacent of the first link section, and an auxiliary patient-operable operating unit interposed between the spaced ends of said link sections, said unit having driving connection with the first mentioned link section for rotating the said first mentioned link section relative to the screw while the screw is held against turning and thereby shifting the link longitudinally to adjust the mattress elevating member.

13. In combination with a hospital bed having a mattress elevating member, an operating link having two sections extending longitudinally of each other, one section being pivotally connected with the elevating member, said sections having adjacent ends in endwise, spaced axial alignment, a rotatably mounted attendant-operable operating member having threaded connection with the other section of said link, means for selectively preventing turning of said operating member, and a patient-operable operating unit interposed between the spaced ends of said link sections and having driving connection with the second mentioned link section for rotating the same relative to the said attendant-operable operating member and thereby causing shifting of the link longitudinally to adjust the mattress elevating member.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
347,024	Bonnefoy	Aug. 10, 1886
971,381	Keller	Sept. 27, 1910
2,189,325	Rich	Feb. 6, 1940
2,349,701	Buttikofer	May 23, 1944
2,481,477	Peery	Sept. 6, 1949
2,560,465	McVicker et al.	July 10, 1951
2,617,117	Putterbaugh	Nov. 11, 1952

FOREIGN PATENTS

Number	Country	Date
268	Germany	Sept. 6, 1877