Jan. 2, 1962 F. S. WALLEN 3,015,113

ADJUSTABLE BED

Filed Dec. 2, 1955 4 Sheets-Sheet 1

Fig. 1

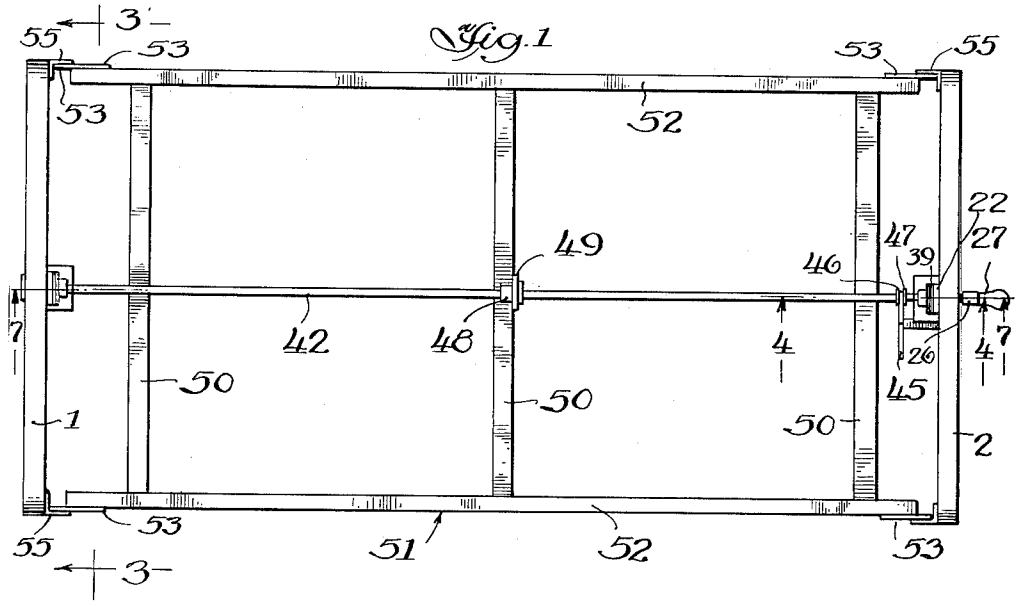
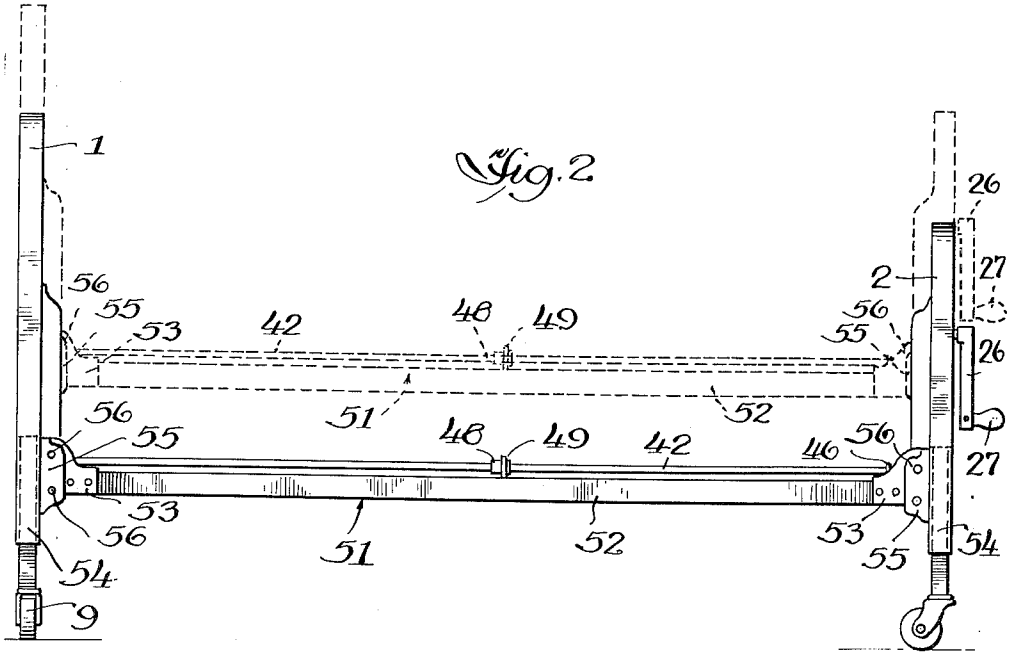


Fig. 2

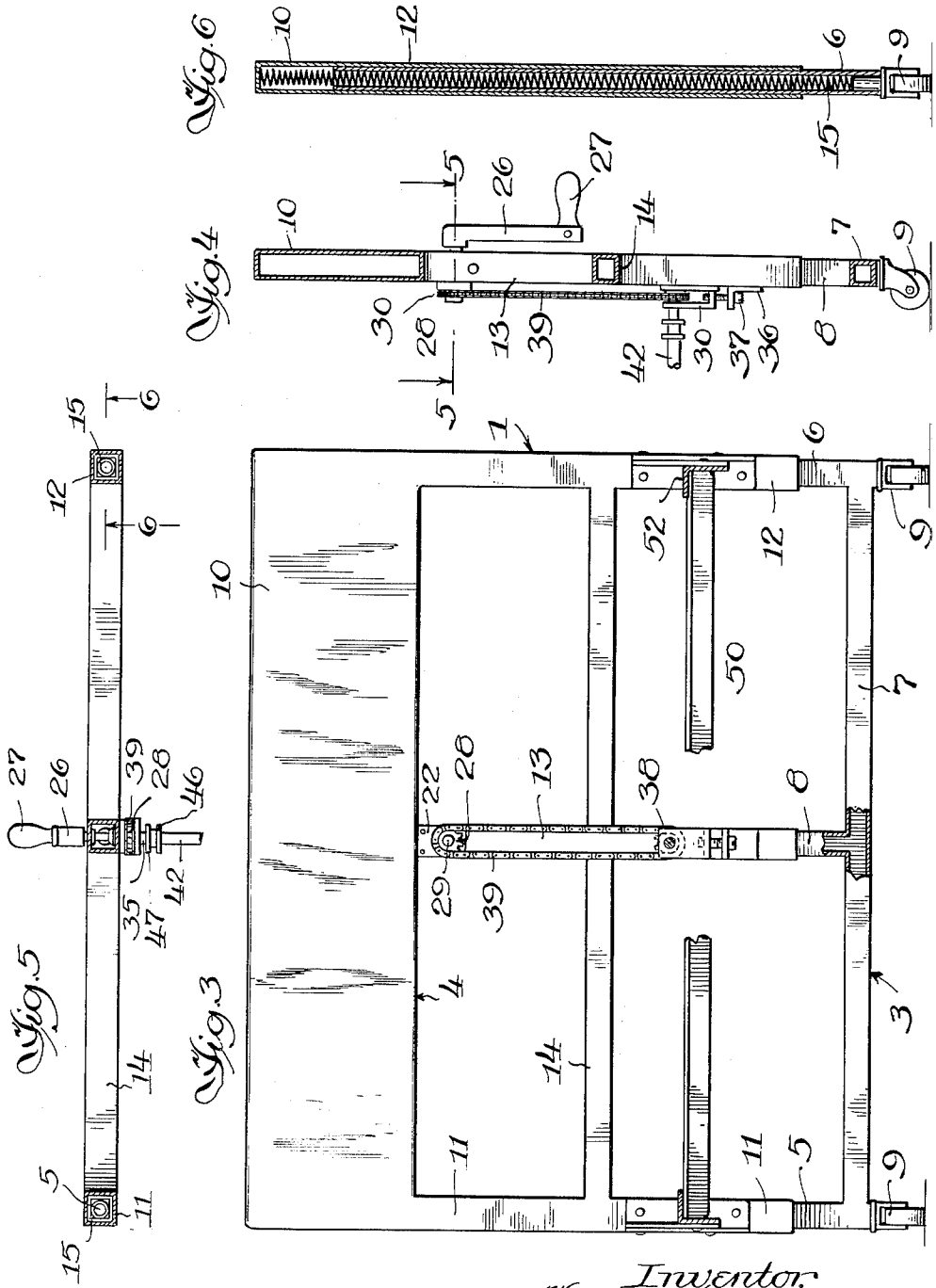


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Filed Dec. 2, 1955 4 Sheets-Sheet 2



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Filed Dec. 2, 1955 4 Sheets-Sheet 3

Fig. 7

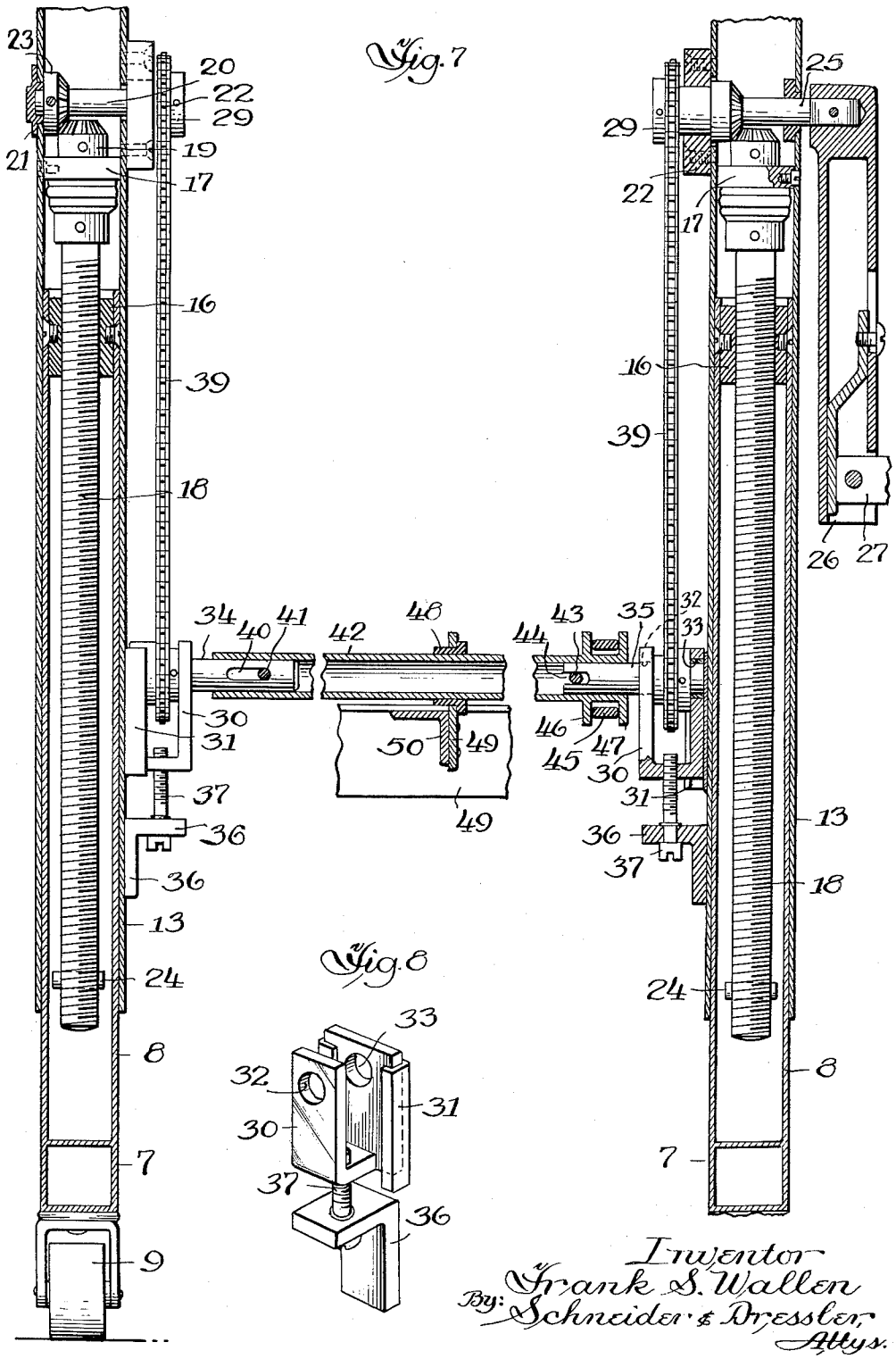


Fig. 8

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Jan. 2, 1962 F. S. WALLEN 3,015,113

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Filed Dec. 2, 1955 4 Sheets-Sheet 4

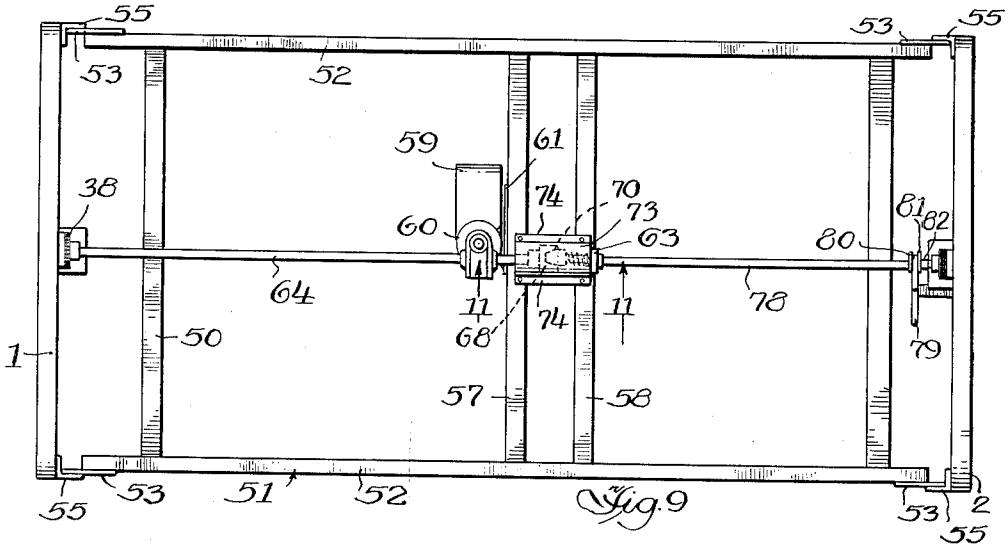


Fig. 9

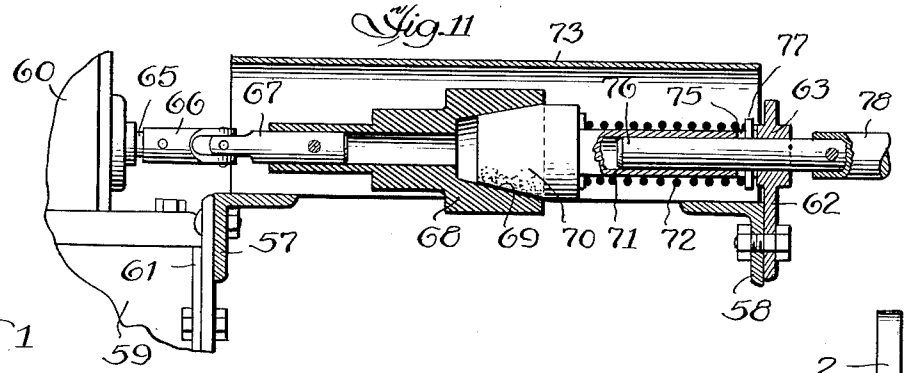


Fig. 11

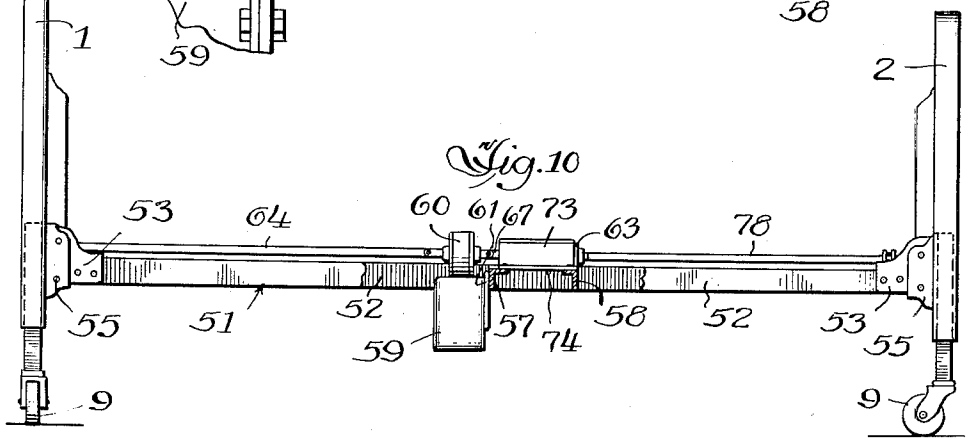


Fig. 10

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3,015,113

ADJUSTABLE BED

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1 Claim. (Cl. 5—63)

This invention relates to an adjustable bed, and is particularly concerned with means for simultaneously moving both ends of the spring section vertically or for moving one end of the spring section relative to the other.

In a hospital or sick room it is often desirable to position a patient at a high level to facilitate the work of a doctor or nurse. A high level bed is also desirable sometimes to keep a patient from getting out of bed or to facilitate cleaning under the bed. The bed must be kept at a low level to make it easier for a patient to get into or out of the bed. It is also necessary, upon some occasions, to have one end of the bed higher than the other to enable the patient to sleep with either his head or his feet elevated.

The mechanism of the present invention avoids causing discomfort to a patient when the entire spring section is being moved vertically by maintaining the level of the spring section. The longitudinal side rails which support the spring are each secured to sleeves slidably mounted on the bed posts. Similar mechanism is provided at each end of the bed but means for operating the mechanism is connected directly to only one end of the bed. A clutch is provided to connect or disconnect the mechanism at the opposite end of the bed. The operating means may be either a motor or a manually operated crank.

The structure by which the above mentioned and other advantages of the invention are attained will be described in the following specification, taken in conjunction with the accompanying drawings, showing two preferred illustrative embodiments of the invention, in which:

FIGURE 1 is a top plan view of a bed embodying the invention with a manually operable crank at one end of the bed;

FIG. 2 is a side elevational view of the bed shown in FIG. 1, with the spring section shown in raised position in dotted lines;

FIG. 3 is a cross sectional view, taken along the line 3—3 of FIG. 1, with portions broken away to facilitate illustration of the structure;

FIG. 4 is a cross sectional view, taken along the line 4—4 of FIG. 1;

FIG. 5 is a cross sectional view, taken along the line 5—5 of FIG. 4;

FIG. 6 is a cross sectional view, taken along the line 6—6 of FIG. 5;

FIG. 7 is an enlarged, fragmentary cross sectional view, taken along the line 7—7 of FIG. 1;

FIG. 8 is a detail perspective view of the supporting bracket secured to each end of the bed;

FIG. 9 is a top plan view, similar to FIG. 1, of an embodiment provided with a motor for operating the mechanism for raising or lowering the spring section of the bed;

FIG. 10 is a side elevational view of the bed shown in FIG. 9; and

FIG. 11 is a cross sectional view, taken along the line 11—11 of FIG. 9.

In the drawings, the reference numerals 1 and 2 indicate a head board and a foot board. These boards are similar in structure so that a description of one will suffice for both. Each comprises a base section 3, and an upper section 4. Base section 3 comprises a pair of tubular end posts 5, 6, and a transverse bar 7 connecting the lower ends of the posts 5 and 6 adjacent their lower

ends. A tubular post 8 extends upwardly from the center of transverse bar 7 and the base section is provided with casters 9. The upper section 4 comprises a transverse panel 10 having tubular posts 11, 12 depending from its opposite sides, and a tubular post 13 depending from its center. A transverse bar 14 spaced below panel 10 provides additional rigidity for tubular posts 11 and 12.

Each of the tubular posts 11, 12 and 13 is open at its bottom, and is adapted to telescope over the upstanding posts 5, 6 and 8, respectively. Although posts 5, 6, 8, and 11 to 13 are shown as being square in cross section, they may be of any desirable shape. The fit between the telescoped posts is snug, but is not tight enough to interfere with the vertical movement between the base and upper sections of the head or foot board. Each post 5 and 6 is provided with a long compression spring 15 which extends upwardly to engage the underside of the top of panel 10. Springs 15 help to counterbalance the weight of the upper bed section and facilitate its movement in the upward direction.

A nut 16 is secured within the upper end portion of post 8. A ball bearing thrust collar 17 is secured inside post 13. Collar 17 is positioned so that it is spaced above the upper end of post 8 when post 13 is in its lowermost position. A screw 18 secured to collar 17 depends therefrom to approximately the lower end of post 13. A bevel gear 19 is secured to screw 18 above collar 17. A shaft 20, rotatably mounted in bearings 21 and 22, extends transversely through post 13 above bevel gear 19 and carries a bevel gear 23 which meshes with bevel gear 19 to rotate screw 18 when shaft 20 is rotated. The lower end of screw 18 is provided with a pin 24 which extends through a transverse aperture and projects beyond the opposite edges of the screw. When post 13 is moved upwardly by the rotation of screw 18 in nut 16, the projecting portions of pin 24 move upwardly until pin 24 engages the bottom of nut 16 to limit the upward movement of post 13.

The structure of the foot board is essentially the same as the head board structure hereinabove described, and the description will not be repeated. Identical structure will be referred to by the same reference numbers. In the foot board a shaft 25, similar to shaft 20, extends through post 13 and a manually operable crank arm 26 is secured to the projecting portion of the shaft. A handle 27 is secured to the end of the crank arm to facilitate its rotation. Handle 27 is preferably pivoted to crank arm 26 so that it may be folded out of the way when the bed is not to be raised or lowered.

Each shaft 20 and 25 has a sprocket 28 mounted on its inner end beyond bearing 22 and held in place by a collar 29. A U-shaped bracket 30 is slidably mounted in a guide 31 rigidly secured to post 13 a short distance above the lower end of the post. Each bracket 30 is provided with a pair of aligned apertures 32 and 33. A stub shaft 34 is rotatably mounted in the apertures of bracket 30 secured to the head board, and a stub shaft 35 is similarly mounted in the bracket secured to the foot board. An angle bracket 36, secured to post 13 below bracket 30, rotatably supports a screw 37 threaded into an aperture in the bottom of bracket 30. Each of the stub shafts 34 and 35 has a sprocket 38 mounted thereon. An endless chain 39 extends around sprockets 28 and 38 at each end of the bed. Screws 37 adjust the position of each bracket 30 to maintain the proper degree of tautness in chains 39.

Stub shaft 34 is provided with a longitudinally extending slot 40 adapted to receive a pin 41 extending diametrically across a tubular sleeve 42 having one end fitting over the inner end of stud shaft 34. Slot 40 permits limited longitudinal movement between sleeve 42 and

stub shaft 34. A pin 43 extends transversely across sleeve 42 adjacent its opposite end. An open-ended notch 44 in the inner end of stub shaft 35 is adapted to be engaged or disengaged by a clutch 45 comprising a bifurcated lever straddling sleeve 42 between spaced flanges 46 and 47. Lever 45 is rotatable to one side of sleeve 42 to keep it out of the way when it is not being used. Lever 45 may be shifted to the right (FIG. 7) to bring pin 43 into engagement with slot 44, thereby causing sleeve 42 to rotate with stub shaft 35, or may be shifted to the left to disengage pin 43 from slot 44 so that sleeve 42 is not rotated with shaft 35. Sleeve 42 is always connected to stud shaft 34 through the engagement of pin 41 and slot 40 so that shaft 34 is rotated whenever sleeve 42 is rotated. Sleeve 42 is rotatably supported intermediate its length by a bearing 48 supported by a plate 49 mounted on an angle iron 50.

The bed is provided with a spring section 51 comprising a pair of longitudinal rails 52 tied together by a plurality of angle irons 50. A notched plate 53 is secured to each end of each rail 52 with the notched portion projecting longitudinally beyond the end of the rail. A bracket 54 rigidly secured to each post 11 and 12 has a flange 55 projecting therefrom. Notched plates 53 are detachably engageable with pins 56 projecting from flanges 55 to secure the spring section 51 to the upper, movable section of the bed.

The operation of the bed is very simple. Rotation of handle 27 rotates shaft 25, and the rotary movement is transmitted to screw 18 in the foot end of the bed by level gears 23 and 19. Since screw 18 is rigidly secured to post 13, and nut 16, through which screw 18 is threaded, is rigidly secured to post 8, rotation of screw 18 moves post 13 vertically relative to post 8. The upper section 4 is rigidly secured to post 13 and carries spring section 51 with it when post 13 is moved upwardly or downwardly. If both ends of the bed are to be raised or lowered, clutch 45 is moved to the right (as seen in FIG. 7). If only the foot end of the bed is to be moved, clutch 45 is moved to the left.

In the embodiment of FIGS. 9, 10 and 11, the structure of the bed, including the posts 8 and 13, is substantially the same as that previously described except for the means for rotating the sprockets 38 to raise and lower the spring section. The same reference numerals will be used to indicate identical structure.

Two angle irons 57 and 58 are provided intermediate the length of the bed instead of the single angle iron 50 shown in the manually operable embodiment of FIGS. 1 to 8. A reversible motor 59 and speed reducer 60 are supported by a plate 61 secured to angle iron 57. A suitable switch (not shown) for controlling motor 59 may be fixed in any desirable position. A plate 62 apertured to provide a bearing 63 is secured to angle iron 58. A shaft 64 rotated by motor 59 through speed reducer 60 is secured to sprocket 38 which it rotates. Conventional limit switches (not shown) are provided to shut off the motor whenever the head end of the bed is moved upwardly or downwardly to a predetermined limit.

A shaft 65 projecting from the other side of speed reducer 60 is connected through a clevis 66 and a link 67 to a clutch member 68 having a tapered recess 69 at one end. The other half of the clutch comprises a conical member 70 provided with a sleeve 71 extending through bushing 63. Conical member 70 is provided with a surface of rubberized material to provide frictional contact between it and tapered recess 69. A coiled spring 72 encircles sleeve 71 and bears against conical member 70 and the hub of bushing 63 to urge the conical member into frictional engagement with recess 69. The frictional engagement of conical member 70 with recess 69 insures

rotation of sleeve 71 when the motor is operated except when the foot end of the bed is in its uppermost or lowermost position. If the spring section is being raised, the clutch begins to slip when the foot end reaches its uppermost limit and the head end is below its uppermost position. A semi-cylindrical housing 73 is positioned over the frictional clutch and is provided at its lower edges with flanges 74 secured to angle irons 57 and 58.

Sleeve 71, which is rigidly secured to conical member 70 and rotates therewith, is provided adjacent bushing 63 with a longitudinal slot 75. A rod 76 fitting into sleeve 71 is provided with a pin 77 projecting into slot 75 to cause rod 76 to rotate with sleeve 71. Pin 77 is shown as projecting on both sides of rod 76 into two slots 75, but it is obvious that pin 77 may project from only one side of rod 76, and sleeve 71 may have only a single slot 75. Slot 75 permits limited axial movement of rod 76 relative to sleeve 71.

Rod 76 is rigidly secured at one end to a sleeve 78. The right hand end (FIG. 11) of sleeve 78 is like the right hand end (FIG. 7) of sleeve 42 except that the clutch mechanism is reversed. A bifurcated clutch lever 79, similar to lever 45, is mounted on sleeve 78 between two flanges 80, 81 (FIG. 9). A shaft 82 similar to shaft 35, is rotatably mounted adjacent foot board 2 in the same manner as shaft 35 and has an open-ended slot (not shown), similar to slot 44 adapted to engage a pin (not shown) extending transversely through sleeve 78. When clutch lever 79 is moved towards the foot end of the bed the pin, similar to pin 43, moves into the open-ended slot to cause rotation of shaft 35 with shaft 65. If only the head end of the bed is to be moved, clutch lever 79 is moved towards the head end, to move the pin out of the slot and permit sleeve 78 to rotate without rotating shaft 35.

Although I have described two preferred embodiments of my invention in considerable detail, it will be understood that the description thereof is intended to be illustrative, rather than restrictive, as many details of the structure may be modified or changed without departing from the spirit or scope of the invention. Accordingly, I do not desire to be restricted to the exact construction described.

I claim:

An adjustable bed comprising a head board, a foot board, a centrally disposed pair of vertically telescoping posts secured to each of said boards, and a spring section having each of its ends secured to one of said boards, a nut rigidly secured in one post of each of said pairs of posts, a screw rotatably mounted in said other post of each pair of posts, each of said screws being threaded into one of said nuts, a separate shaft for rotating each of said screws, a handle secured to one of said shafts for rotating it, means interconnecting said shafts, said means including a clutch operable to disengage said other shaft, telescoping posts at each end of said head board and said foot board, and spring means in each of said last mentioned posts to facilitate upward movement of said spring section.

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