Jan. 27, 1959 R. T. SANFORD 2,870,460

HOSPITAL BED

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FIG. 1

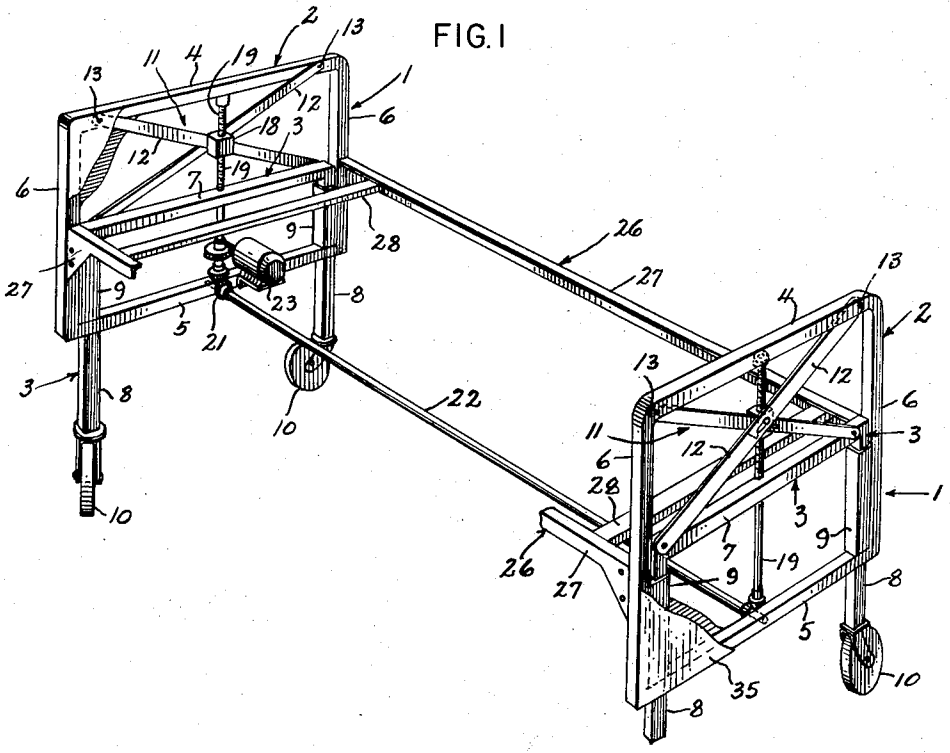
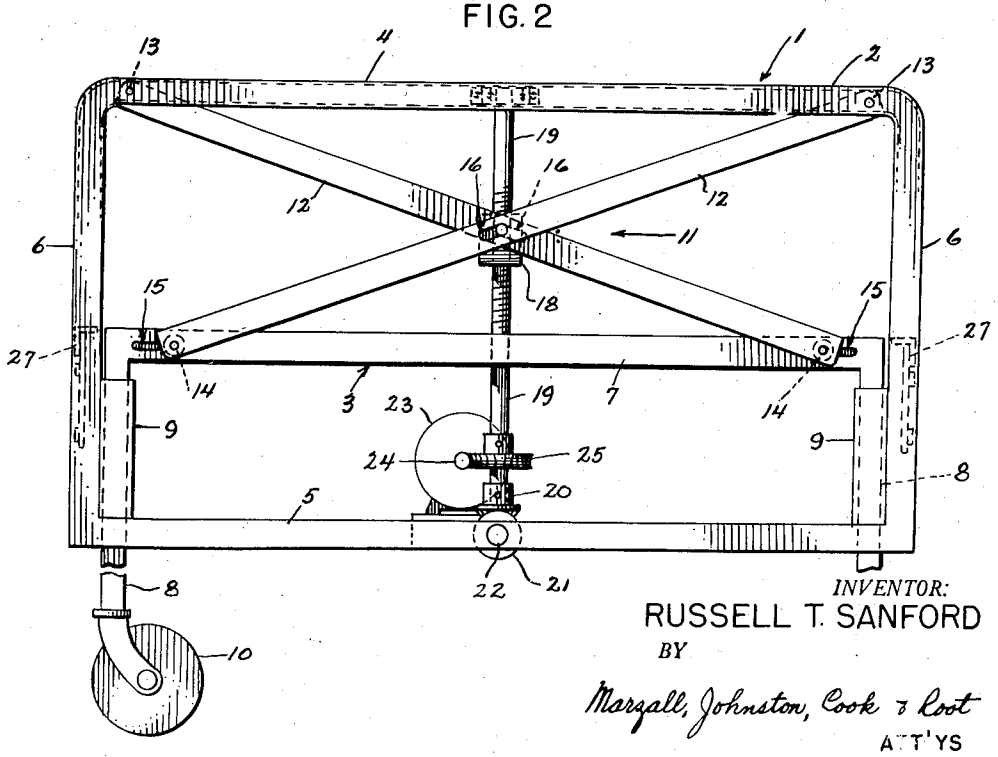


FIG. 2



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FIG. 3

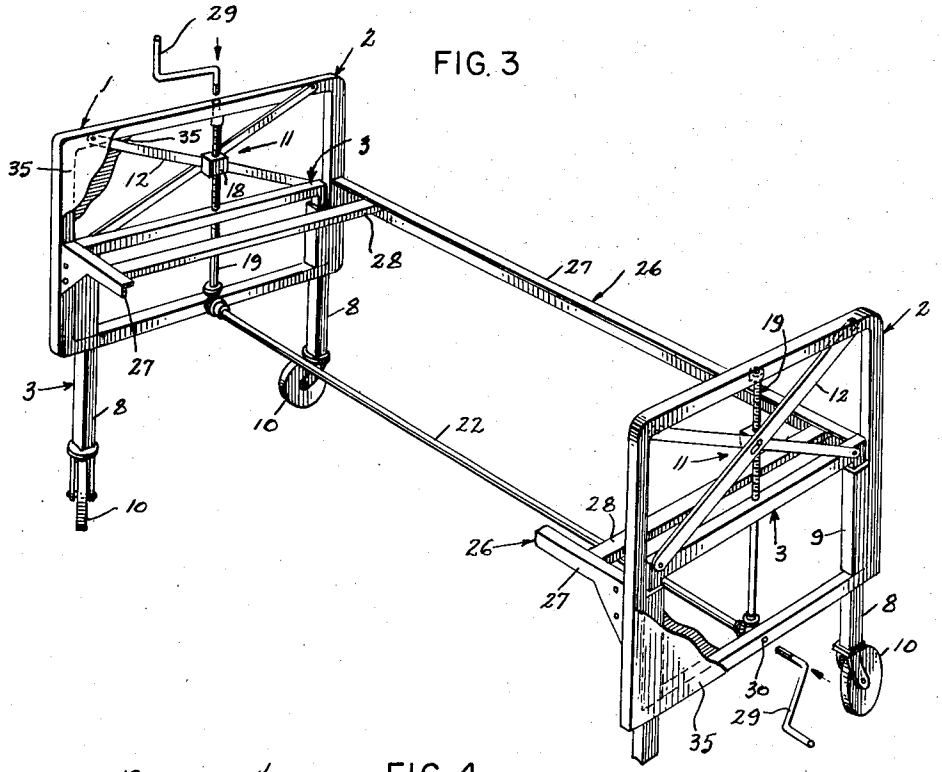
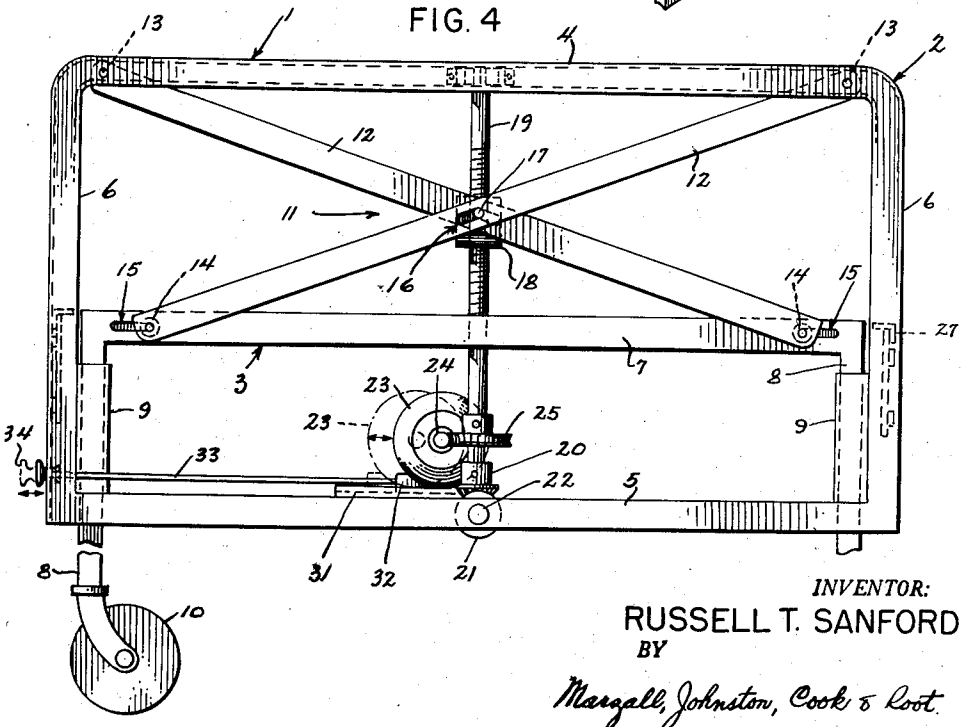


FIG. 4



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2,870,460

HOSPITAL BED

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Application April 15, 1955, Serial No. 501,555

1 Claim. (Cl. 5—63)

This invention relates to variable height beds, principally used in hospitals, whereby the spring supporting frame of the bed is shifted vertically to various heights, usually from a normal bed-making and nurse-serving position of twenty-seven inches floor-to-spring height to a normal domestic position eighteen inches floor-to-spring height.

The invention consists in general of a hospital type bed which has a head end and a foot end, each of which includes a frame member with which a leg frame telescopes. Each leg frame has oppositely disposed legs connected together at, or adjacent to, their upper end, preferably as an integral structure. The frames of both the head end and the foot end of the bed each include an upper or top bar, a lower or bottom bar, and spaced side bars all connected rigidly together, either integrally or by welding the same together. A bed spring frame including longitudinal side bars and rigidly connected end cross bars, is detachably connected to the frames of the head and foot ends. The leg member for the foot end is slidingly mounted in guides, such as rigid tubes, on the foot frame, and the leg member for the head end is slidingly mounted in guides on the head frame. Pantographic-like link structures each comprising spaced cross bars or links are pivotally and slidably connected to cross bars of the leg frames. The cross links of each head and foot end have diagonal slots which receive a cooperating pin on a translating nut. A vertical screw for each end is arranged between the top and bottom cross bars of the head and foot end frames, and passes through each nut. Rotation of the screw turning in the nut causes the nut to translate vertically and operate the pantographic linkage to raise or lower the head and foot ends in parallelism with respect to the head and foot leg members. The screws are rotated simultaneously by a driving member, either by hand or by motor, through gearing on respective screws and a longitudinal shaft. Thus, operation of the screws causes the head and foot frames to be operated and thereby raise or lower the spring frame which is connected to the head and foot frame.

The primary object of the present invention consists of the provision of new and novel positive and easy operating devices for raising or lowering the head and foot frames to raise or lower the spring frame which is connected to the said frames.

Another object of the invention consists in the provision of a bed having a head end and a foot end, each of which is provided with a frame with which a leg frame telescopes, there being pantograph-like linkage connecting each head and foot frame with its respective leg frame, so that the head and foot frames, which carry the bed spring frame, may be raised or lowered a predetermined distance from the floor.

A further object consists in a new and novel arrangement of parts for effecting the lowering and raising of a bed spring frame, either manually, by a crank, or by a motor, there being pantograph-like linkage to effect parallel movement of the spring frame which is connected to the respective head and foot frames.

Numerous other objects and advantages will be apparent throughout the progress of the specification which is to follow.

The accompanying drawings illustrate certain selected embodiments of the invention, and the views therein are as follows:

Fig. 1 is a detail perspective view of the telescoping head and foot end frames for raising or lowering the spring frame, which is detachably connected to the head and foot ends;

Fig. 2 is a detail end elevation of one bed end and showing motor operated means to raise or lower the head and foot frames;

Fig. 3 is a detail perspective view similar to Fig. 1 but showing the manner in which the head and foot frames may be operated mechanically; and

Fig. 4 is a detail end elevation of one bed end showing means for effecting disconnection of the motor to permit manual crank operation.

The particular construction herein shown for the purpose of illustrating the invention comprises a hospital bed 1 having a head and a foot frame which may be shifted to raise and lower the bed spring frame to a bed-making and nurse-serving position, or to a normal domestic position.

The bed 1 comprises an end frame 2 at the head end of the bed, and a second end frame 2 arranged at the foot end of the bed. A leg frame 3 is telescopingly received within each end frame 2. Each end frame 2 may be of any particular desired construction or configuration capable of performing the function intended, but is specifically shown herein as including a top bar or rail 4, a bottom bar or rail 5, and side bars or rails 6, 6. The side bars or rails 6 are connected to the top and bottom bars 4 and 5 in any desired manner, such as by making the same in one piece from tubular metal, or by securely welding the parts together.

The leg frame 3 comprises a transverse bar 7 from which there depends downwardly extending legs 8, 8. The transverse bar 7 and the legs 8 are preferably made of metal and are preferably tubular and integral in construction. The leg frame 3 is slidably mounted in guides 9 carried by the end frame 2 and are specifically shown herein as being elongated tubes which are rigidly secured to the inner side of each of the side bars 6 of each frame 2. A wheel 10 may be swivelly mounted on the lower end of each leg 8. Each frame 2 is connected to its respective leg frame 3 by means of pantographic-like linkage 11, whereby the end frame may be shifted vertically with respect to its stationary leg frame 3.

The linkage structure, or pantograph, 11 comprises a pair of crossing, diagonally positioned bars, links or rods 12 which have their upper ends pivotally connected at 13 to the top rail 4 of a frame 2 near its outer ends. The lower ends of the rods or links 12 carry guide means, such as pins or rollers 14, which engage slots 15 formed in the cross bar 7 of each leg frame 3, the slots 15 being located at or near the outer ends of the leg frame 3, as clearly shown in Fig. 2. The diagonal cross links 12, 12 are each provided with a diagonal slot 16 which is longitudinal with respect to the longitudinal links 12, whereby the slot in one link crosses the slot in its other cooperating link. A member 17, such as a pin on a traveling nut 18, is received in both slots 16, whereby translation of the nut 18 in a vertical direction will move the links 12, 12 and raise or lower each end frame 2 with respect to its cooperating leg frame 3.

The nut 18 is caused to travel or translate by means

of a vertical screw 19 which threadedly engages a threaded central bore in the nut, the upper and lower ends of the screw 19 being arranged between the top and bottom bars 4 and 5 of each end frame 2, and supported in proper fittings so as to permit free and easy rotation of the screw.

The screw 19 of each frame 2 is provided at its lower end with a bevel gear 20 engaging a cooperating bevel gear 21 on the end of a longitudinal rod or shaft 22 which is rotatably mounted in suitable fittings or bearings. The shaft 22, therefore, cooperates with screws 19 of the frames 2 and, therefore, both frames 2 will be caused to be raised or lowered simultaneously in proper parallelism when the shaft 22 is rotated.

The shaft 22 may be rotated by a motor 23 to drive a worm 24 meshing with a worm gear 25 on one of the screws 19, the gear 25 being specifically shown on the screw 19 at the head end. Of course, the motor 23 may be located at the foot end if desired, or if preferred the motor may be arranged intermediate the ends 2 to drive the shaft. It has been found more expedient, however, to mount the motor on the bottom cross bar 5 of the frame 2 at the head end of the bed, as shown in Figs. 1, 2 and 4.

The end frames 2 are detachably connected to a bed spring frame 26 which includes longitudinal side bars 27 and cross bars 28 rigidly connected to the side bars at opposite ends thereof.

The structure disclosed in Fig. 3 comprises the same end frames 2 and the same leg frames 3, and the parts are identical in all respects except the screws 19 are adapted to be operated mechanically instead of by means of the motor 23. The screws 19 may be rotated in their respective fittings by means of a crank 29, Fig. 3, either directly engaging a screw 19, or by engaging a fitting or part connected thereto, so that during manual operation of the crank 29 one screw 19 will be turned, causing rotative movement of the longitudinal shaft 22, and through the same bevel gearing previously described, operate the second screw 19. While it may be desirable to have the crank operating from the top of the head, as shown in Fig. 4, the crank 29 may, of course, be operated from the top of the frame 2 located at the foot end of the bed. Also, instead of having the crank operating means 29 engaging a screw 19 at the upper end of a frame, the crank 29 may engage a socket or projection 30 at one end of the longitudinal shaft 22, either at the head or at the foot end. It is probably more desirable that the crank be operated from the foot end, and perhaps at the top thereof.

The structure of the invention is also adapted to be operated manually as well as motor operated, and in this connection gears or clutches (not shown) may be provided to effect disconnection between the motor and the shaft 22 or a screw 19. The motor operated construction previously described comprises the worm and worm gear construction 24, 25, whereupon it would be practically impossible to operate the device by hand if the worm 24 were permitted to have engagement with the worm gear 25. The dual operation may be accomplished by mounting the motor 23 on a sliding bed 31 mounted on the bottom bar 5 of a frame 2, particularly at the head. The base 32 of the motor 23 may be slidable in the guide member 31 and pulled away from a screw 19 so that the worm 24 will become disengaged from the worm gear 25. Any suitable means may be provided or substituted, but the means for causing the disconnection between the worm and the worm gear may comprise a rod 33 connected to the motor base 32, and slidable along the guideway 31 from the position shown

in full lines to the position shown in dotted lines, Fig. 4, whereby the operation may be conducted in identically the same manner as that disclosed in Fig. 3. The rod 33 may have a knob 34 on its end and this rod may have certain connections (not shown) for locking the motor in either of its adjusted positions.

Each end frame 2 has its cooperating leg frame 3 nesting within it, and the outer surfaces of these members are relatively flush with each other. The operating mechanism is adapted to be concealed within the front to rear confines at each end by placing a smooth sheet 35 of metal, or other material, over opposite sides of each end frame so as to completely conceal all the structure and mechanism, which, too, is completely concealed (except the motor), thereby making neat, smooth, flush surfaces on both sides of both ends of each end frame.

The invention provides an inexpensive, positively operating construction which is economical to manufacture and install and definitely and positively maintains the shifting of both heads in parallelism so that the spring frame 26 may be raised to the proper desired elevation.

Changes may be made in the form, construction and arrangement of the parts without departing from the spirit of the invention or sacrificing any of its advantages, and the right is hereby reserved to make all such changes as fall fairly within the scope of the following claim.

The invention is claimed as follows:

A bed comprising a pair of spaced, upstanding units, each unit comprising a substantially rectangular end frame, a pair of vertical guides on said end frame, an upstanding, inverted U-shaped leg frame resting on the floor adjacent said end frame and having its vertical leg portions slidably received in the guides of said end frame for supporting the end frame above the floor, a pantograph connected to said end frame and leg frame, each pantograph including a first diagonal link pivotally connected at one end to the end frame adjacent an upper corner thereof and at the other end to the leg frame at the upper corner remote therefrom, a second diagonal link pivotally connected at one end to the end frame adjacent the other upper corner thereof and at the other end to the leg frame at the other upper corner remote therefrom, a slot in each link extending longitudinally thereof, said slots crossing each other, a pin pivotally and slidably received in said slots thereby connecting said links at the intersection thereof intermediate their ends, a nut carried on said pin, and a vertical screw threadedly engaging said nut and rotatably mounted on said end frame, and a horizontally extending bed spring frame connecting said end frames of said units together, whereby rotation of said screws actuates said pantographs to cause relative movement between the leg frames and the end frames thereby raising and lowering said end frames and bed spring frame relative to the floor.

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