

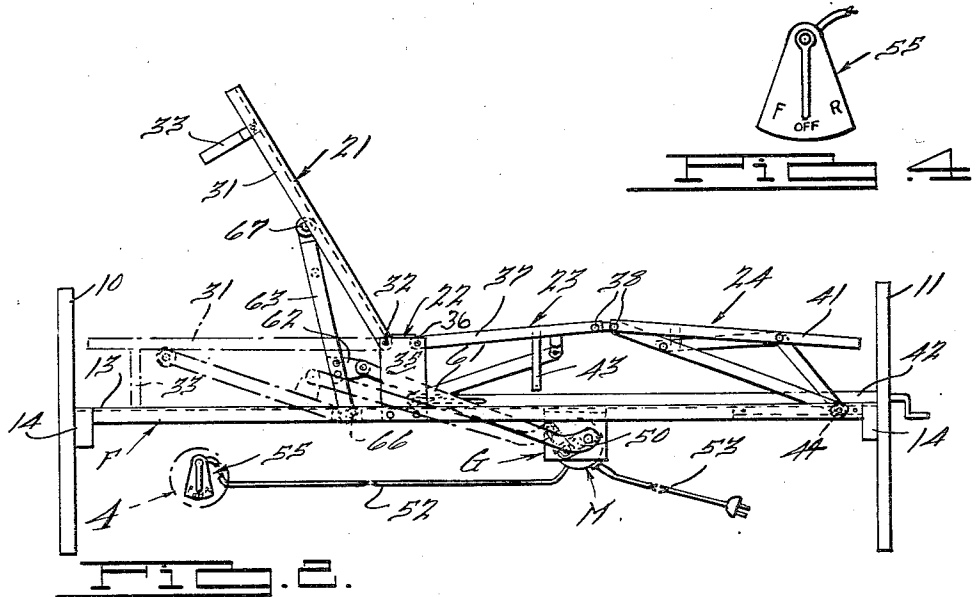
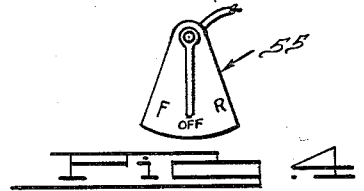
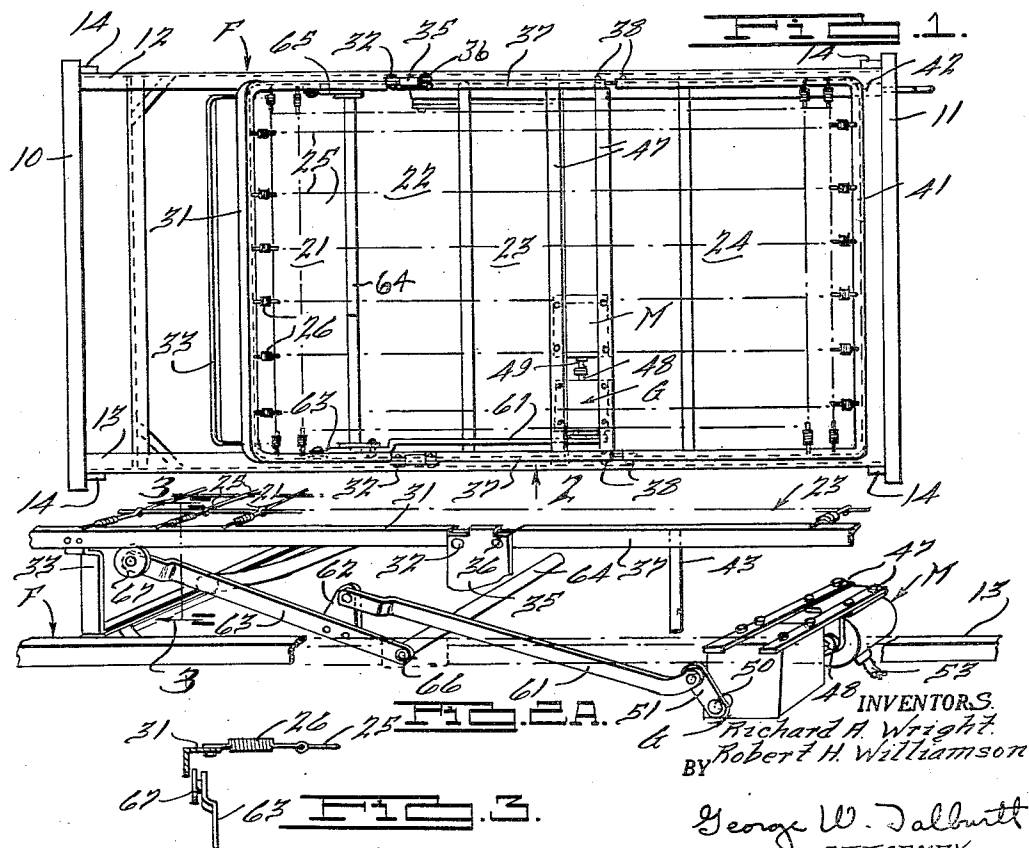
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R. A. WRIGHT ET AL

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INVALID BED

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1

2,836,835

INVALID BED

Richard A. Wright, Detroit, and Robert H. Williamson,
Highland Park, Mich.

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This invention relates to invalid beds and particularly to the actuating mechanism for controlling raising and lowering movement of a pivoted section such as the pivoted head section of a sectionalized, invalid bed, mattress supporting spring frame. While the invention is shown as applied to the pivoted head section of a sectionalized spring frame, still, it is thought to be obvious that this invention may be applied to any of the pivotally mounted sections of a sectionalized bed spring frame or any other type of pivotally mounted framework.

It is a primary object of this invention to provide a mechanism for actuating a pivoted section of a sectionalized bed spring frame that is simple and sturdy in construction, economical to manufacture, easily attachable to any conventional sectionalized bed spring frame, and one that may be readily controlled by a bed ridden patient by the simple operation of a forward and reverse electric motor control switch.

It is a further object of this invention to provide an electric motor operated mechanism for actuating one or more of the pivoted sections of a sectionalized bed spring frame which mechanism eliminates the need for motor control limit switches, forward and reverse drive clutch mechanisms, elongated screw shafts and mating threaded sleeves, complicated motor control switch boxes, and the like.

It is a further object of this invention to provide an electric motor operated mechanism for actuating a pivoted section of a sectionalized bed spring frame that is of the simplest possible construction for the functions that it can accomplish, provides the greatest possible range of controlled adjustable movement, and is arranged such that it can be readily operated by any patient who has at least some use of one finger.

It is still another object of this invention to provide an electric motor operated, patient controlled, bed spring section actuating mechanism that will permit a bed ridden patient to readjust his position without the help of a nurse or an attendant and thereby relieve the load on the nursing staff and at the same time make the patient more self sufficient and more comfortable during his infirmity.

Other objects and advantages of this invention will become readily apparent from a reading of the following description and a consideration of the related drawings wherein:

Fig. 1 is a plan view of an invalid bed having a sectionalized bed spring frame to which this invention has been applied;

Fig. 2 is a side elevational view taken in the direction of the arrow 2 of Fig. 1;

Fig. 2A is an enlarged fragmentary side elevational view of the linkage structure for actuating the pivoted head section of the bed spring frame shown in Figs. 1 and 2;

Fig. 3 is a fragmentary, sectional elevational view taken along the line 3—3 of Fig. 2A; and

Fig. 4 is an enlarged fragmentary plan view of the electric motor control switch for the actuating mechanism

2

embodying this invention which switch is shown within the circle 4 of Fig. 1.

Figs. 1 and 2 of the drawings shows a more or less conventional invalid bed that comprises a headboard 10, a footboard 11 and a base frame F arranged between and connecting the headboard and footboard. Base frame F includes a pair of spaced side rails 12 and 13. The opposite ends of the side rails 12 and 13 are connected respectively to the headboard 10 and footboard 11 by conventional side rail fastener means 14. The base frame F supports a more or less conventional sectionalized mattress supporting bed spring frame that comprises a pivotally mounted head section 21, a stationary butt section 22, a pivotally mounted thigh section 23 and a pivotally mounted, roller supported, foot section 24. Each of these spring frame sections 21—24 mounts a portion of a link type spring fabric 25 that is connected to the frame rails of the respective sections by a plurality of springs 26.

The head section 21 includes a U-shaped frame 31 (see Figs. 1—3) that is preferably formed of angle iron stock. The free ends of the legs of the U-shaped head section frame 31 are pivotally connected at 32 to the side plates 35 of the butt section 22. Head section 21 also includes a depending U-shaped frame 33 that is adapted to seat on the side rails 12, 13 and support the head section 21 when the head section has been lowered to a horizontal position.

The butt section 22 includes a pair of inverted L-type side plates 35 that are fixedly mounted on the spaced side rails 12 and 13. In addition, to pivotally supporting the head section 21 by the pivots 32, the butt section plates 35 also provide bearing supports for the pivots 36 that pivotally mount the thigh section 23.

The thigh section 23 includes a pair of spaced angle iron side rails 37, 37 that have their inner ends pivotally connected at 36 to the butt section side plates 35. The extreme outer ends of the thigh section rails 37, 37 are pivotally connected at 38, 38 to the inner free ends of the U-shaped foot section frame 41. A suitable mechanism such as a screw shaft 42, operable by a crank or the like from the foot of the bed and connected to the thigh section 23 by suitable linkage, is provided for varying the inclination of the thigh section. Obviously any type of thigh section actuating mechanism can be provided for raising and lowering the thigh section 23.

The screw shaft 42 shown could be replaced with any known actuating device or with an actuating device such as that shown associated with the head section 21. The thigh section 23 may include support legs 43 that rest on the side rails 12, 13 when the thigh section 23 is in a horizontal position.

The foot section 24 has its U-shaped frame 41 formed from angle iron stock similar to that used for the other sections of the spring frame. As previously mentioned, the free inner ends of the frame 41 are pivotally connected at 38, 38 to the thigh section rails 37, 37. The outer ends of the legs of the U-shaped foot section frame 41 mount rollers 44 that are adapted to roll along the side rails 12, 13 as the thigh section 23 is raised and lowered. When the thigh section 23 is lowered to its horizontal position then the rollers 44 on the foot section are at the footboard ends of the side rails 12, 13 and the foot section is supported in a horizontal position. Obviously some other type of foot section elevation control mechanism, other than that shown, could be used provided it permits free pivotal movement of the thigh section 23.

The prime feature of this invention is associated with the actuating mechanism for the pivotally mounted head section 21 and that will now be described in detail. Extending crosswise between and mounted on the spaced

apart side rails 12, 13 beneath the thigh section 23 are a pair of support bars 47, 47. These support bars mount a conventional reversible electric motor M that in this instance rotates at about 1750 R. P. M. when energized. Also mounted on the pair of spaced support bars 47, 47 is a reduction gear box G. This gear box G has an input shaft 48 that is drivingly connected to the output shaft 49 of the electric motor M. The gear box G may be of the planetary or countershaft type or it may be some other type of transmission mechanism that is capable of providing a gear reduction of about 1000 to 1 between the gear box input shaft 48 and the gear box output shaft 50. Drivingly connected to the gear box output shaft is a crank arm 51. Crank arm 51 is adapted to be rotated through a full 360 degrees in either direction by the electric motor M. The electric motor M is adapted to be controlled by the reversing switch 55 that is connected to the motor M by the flexible conductor 52. Flexible conductor 53 is adapted to connect the motor M to a conventional plug-in power source connection such as a wall type plug-in receptacle. From Fig. 4 it will be noted that the control switch 55 for the electric motor M has a single pivotally mounted operating lever that can be moved from the "off" position to either a forward position F, to rotate the electric motor M in one direction, or to a reversing position R to rotate the electric motor M in the opposite direction. While a pivoted lever has been shown as a part of switch 55 for controlling the reversing motor M, it is also possible to use a conventional two button electric switch wherein either one or the other of the buttons R or F can be depressed to effect rotation of the motor M in opposite directions. From the foregoing it is thought to be obvious how the bed-ridden patient can selectively control reversible rotation of the crank arm 51 with the simple movement of the lever of the switch 55.

From Fig. 2A it will be noted that the crank arm 51 of gear box G is pivotally connected to one end of a connecting rod 61. The opposite end of connecting rod 61 is pivotally connected to an arm 62 that is fixedly mounted on the pivotally supported lever 63. Lever 63 is one leg of a U-shaped actuating frame for the head section 21 which frame also includes an axle portion 64 and another leg portion 65. The axle portion 64 is suitably journaled at 66 in the spaced apart base frame side rails 12, 13. Each of the free ends of the legs 63, 65 of the head section actuating frame mounts rollers 67 that are adapted to roll along the underside of the side rails of the U-shaped head section frame 31 during oscillating movement of the lever legs 63, 65. While only the lever leg 63 is directly connected to the motor driven crank arm 51 by the connecting rod 61, still, both lever legs 63, 65 of the actuating frame act on the head section 21 to effect movement thereof due to the fact that the lever legs 63, 65 and the axle 64 constitute a rigid unitary frame.

With the above-described head section actuating linkage, it is thought to be obvious that as the crank arm 51 rotates in either direction for 180 degrees of its rotation it will cause a gradual raising of the head section 21 from its lowermost horizontal position to its maximum elevated position. Thereafter for the next 180 degrees of rotation of the crank arm 51, the head section 21 will be gradually lowered from its uppermost position to its lowermost horizontal position. One of the prime features of this invention is the fact that no limit switches or the like are required to shut off the electric motor operated actuating means MG when the head section 21 has been raised or lowered to either of its limiting positions. The described head section actuating means with its specific type of connections to the head section frame 21 causes a continuous up and down cycle of movement of the head section 21 as long as the lever of the motor control switch 55 is held in either its R or F positions. If during movement of the head section in either a raising or lowering direction, it is moved a little bit too far for the patient's

comfort, then the control switch 55 (Fig. 4) is merely operated to effect a reverse rotation of the crank arm 51 from its previous direction of rotation and the head section can be retracted to a passed over position. Not only is the described head section actuating linkage one that gives maximum flexibility and patient control with a minimum of complexity, but in addition, it provides a maximum of installation tolerance due to the fact that the rollers 67 are not positively connected to the head section frame 31. The lever legs 63, 65 can lower the head section 21 to its lowermost horizontal position and then continue to move counterclockwise for several degrees and actually break engagement with the head section frame 31. The head section 21 will be supported in its lowermost horizontal position by the support frame 33 after the lever arms 63, 65 have broken off engagement with the head section frame 31. Due to the roller contact between the lever leg rollers 67 and the head section frame 31, in combination with the head section support frame 33, no precise adjustment of the crank arm cycle is required during installation of this head section actuating mechanism on a conventional sectionalized bed spring frame.

It is thought to be apparent that the thigh section 23 could be operated by the same type of mechanism as used for the head section 21. In fact, with the use of a suitable clutch mechanism it is possible to selectively operate both the head section 21 and the thigh section 23 from the same motor M and gear box G if it should be found advantageous to do so.

We claim:

1. In an invalid bed having a base frame and a mattress supporting spring frame section mounted thereabove and pivotally connected thereto for oscillatory movement between a position substantially parallel to said base frame to a position elevated thereabove, an electric motor mounted on said base frame, a crank arm drivingly connected to said motor and mounted for rotation about an axis extending transversely of and substantially parallel to said base frame, a lever pivotally connected to said base frame for oscillatory rotation about an axis extending transversely of said base frame, said lever having a free end portion thereof carrying a roller arranged for rolling engagement with said spring frame section to effect oscillatory movement thereof during oscillatory movement of said lever, and a link connected between said crank arm and said lever arranged to transmit continuous rotary motion of the crank arm into cyclic oscillatory movement of said lever to effect alternate, power operated, raising and lowering movement of the spring frame section.

2. An invalid bed comprising spaced headboards and footboards that are interconnected by a base frame, said base frame having a mattress supporting spring frame section mounted thereon and pivotally connected thereto for oscillatory movement between a position substantially parallel to said base frame to a position elevated at an angle thereto, an electric motor mounted on said base frame, a crank arm drivingly connected to said motor and mounted for rotation thereby, a lever pivotally connected to said base frame for oscillation with respect to said base frame, said lever having a free end portion thereof arranged for shiftable engagement with said spring frame section during oscillation thereof to effect oscillatory movement of said frame section between raised and lowered limiting positions, linkage connected between said crank arm and said lever arranged to transmit the rotary motion of the crank arm into oscillatory movement of said lever whereby said frame section will be continuously oscillated between limiting positions during cycles of rotation of said crank and a control switch connected to said electric motor to provide for selective power operated rotation of said crank arm in opposite directions.

3. An invalid bed comprising a headboard and a footboard that are interconnected by a base frame that has

a mattress supporting spring frame mounted thereon and positioned thereabove, said spring frame including a pivotally mounted head section, a butt section and adjustable thigh and foot sections, said head section being connected to said base frame for oscillatory movement between a first limiting position substantially parallel to said base frame to a second limiting position elevated thereabove, an electric motor driven gear box mounted on said base frame, a crank arm drivingly connected to the output shaft of said motor driven gear box and mounted for rotation about an axis extending transversely of said base frame, a lever pivotally connected to said base frame for oscillation about an axis extending transversely of said base frame, said lever having an end portion thereof arranged for free rolling engagement with said head section to effect oscillatory movement thereof, and a link con-

nected between said crank arm and said lever arranged to transmit the rotary motion of the crank arm into power operated oscillatory movement of said lever whereby said head section will be continuously oscillated between limiting positions during cycles of rotation of said crank.

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