Oct. 21, 1958 M. A. MANDELKO ET AL 2,856,613

MOTORIZED HOSPITAL BED

Filed April 13, 1955 2 Sheets-Sheet 1

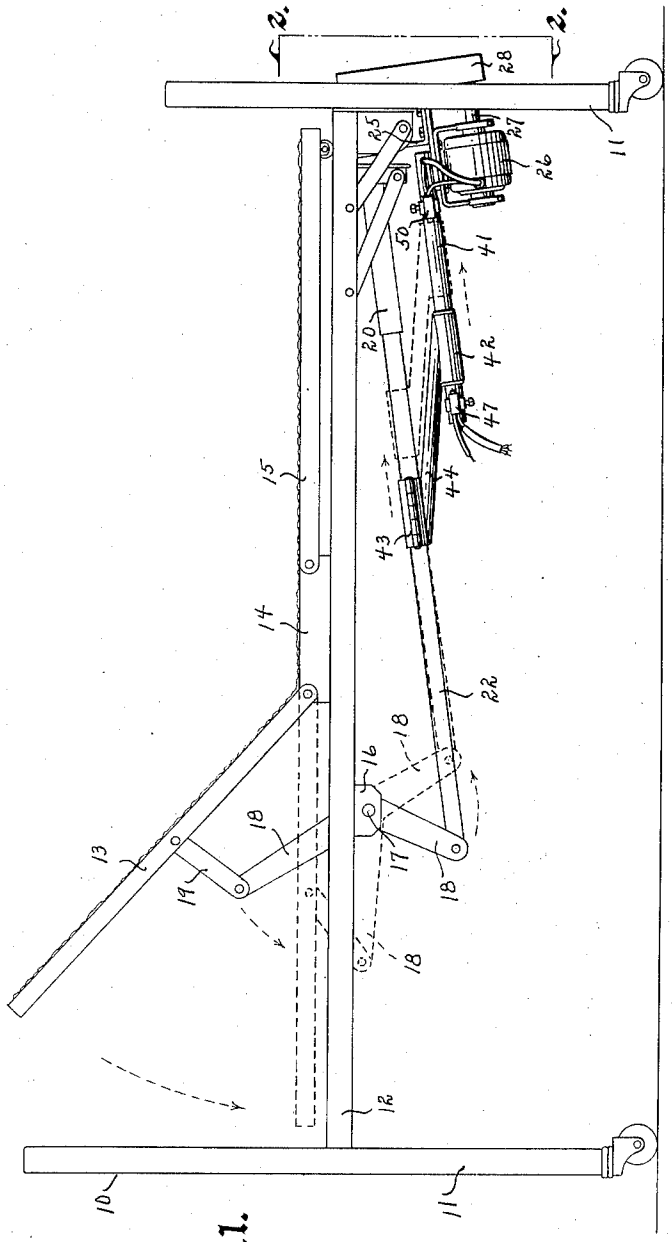


Fig. 1.

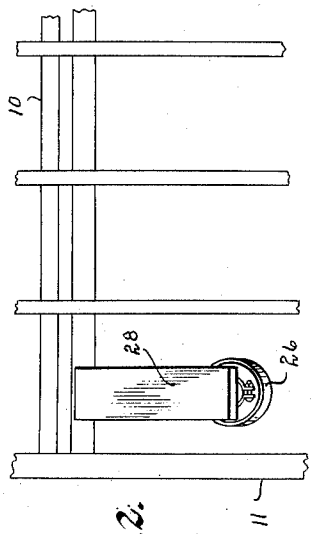


Fig. 2.

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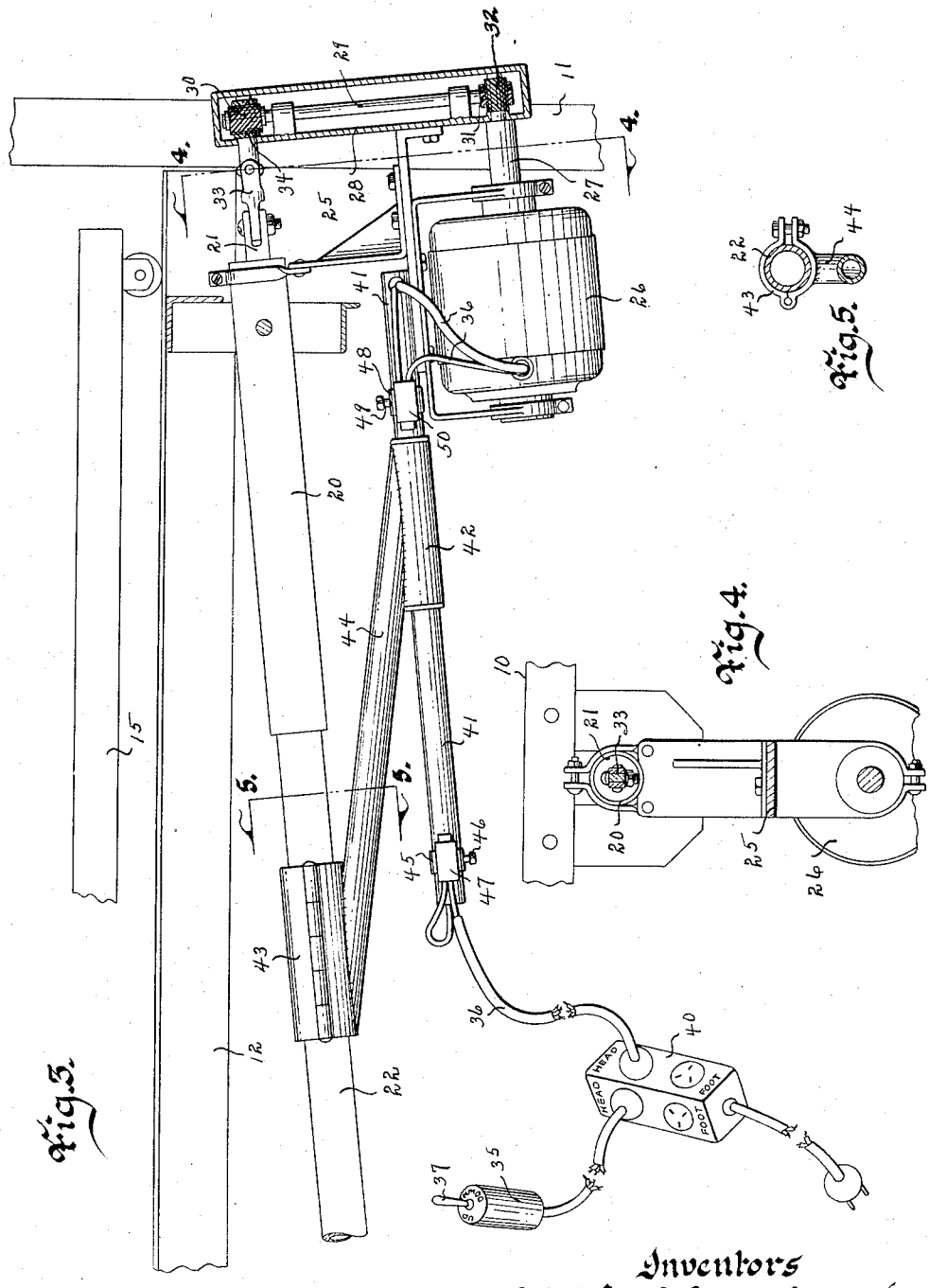


Fig. 3.

Fig. 5.

Fig. 4.

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MOTORIZED HOSPITAL BED

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12 Claims. (Cl. 5—68)

This invention relates to beds and more particularly to movably adjustable beds that permit the raising or lowering of either or both the head and/or foot sections.

Such hospital beds are universally well known. They permit the crank lowering or raising of one or both ends of the bed and while they may be found in private homes, they are mostly used in hospitals and like institutions. While they are most useful and comfortable, they are usually not operable by the patient or one using the bed. This requires the summoning of a nurse or attendant by the patient to crank adjust the bed surface. Obviously, this change of bed position may well be quite frequent and even necesary for the welfare of the patient. If the bed user is perfectly capable of getting out of the bed and making such mechanical crank adjustment, the procedure is irksome and a task.

Therefore, one of the principal objects of our invention is to provide a powered mechanical bed that may be successfuly adjusted to the desired position, easily and quickly by the bed user and without getting out of bed.

A further object of this invention is to provide an electrically powered adjustable bed that may be adjusted as to possible maximum and minimum movements.

A still further object of our invention is to provide a power unit that may be easily and quickly attached to substantially any "hospital type" bed.

Still further objects of our invention are to provide a powered adjustable bed that is economical in manufacture, durable in use, and refined in appearance.

These and other objects will be apparent to those skilled in the art.

Our invention consists in the construction, arrangements, and combination, of the various parts of the device, whereby the objects contemplated are attained as hereinafter more fully set forth, specifically pointed out in our claims, and illustrated in the accompanying drawings, in which:

Fig. 1 is a side view of our powered bed unit secured to an adjustable bed and with the head area of the bed in raised condition,

Fig. 2 is an enlarged foot end view of the installed unit taken from line 2—2 of Fig. 1,

Fig. 3 is an enlarged side view of our device with sections cut away and more fully illustrates its construction. In this view the bed would be in a lowered attitude,

Fig. 4 is a cross sectional view taken on line 4—4 of Fig. 3, and

Fig. 5 is a cross sectional view of the unit taken on line 5—5 of Fig. 3.

Most hospital beds have both an adjustable movable head or upper end section and an adjustable movable foot or lower end section. In such beds, both top and lower sections are substantial duplicates, being separately lowered or raised in a like manner. Therefore, we will explain our unit for lowering and raising only one of these sections, it being understood that a duplicate unit

may be employed for raising or lowering the other section. In the drawings, for illustration, we use our device for lowering or raising the head or upper end portion.

We have used the numeral 10 to generally designate a bed frame having the usual legs 11, the two spaced apart horizontal bed side rails 12, and the numeral 13 designates the usual bed upper section hinged to the center element 14. The lower bottom end section 15 is hinged to the element 14. By this construction the free outer ends of the sections 13 and 15 may be swung upwardly away from the horizontal side rails 12, or swung downwardly to horizontal positions parallel with the side rails 12. Some hospital beds have an intermediate section between the element 14 and section 15. On the bedside frames are bearings 16 carrying a shaft 17. Lever arms 18 are secured between their two ends to this shaft 17. The numeral 19 designates links connecting the upper ends of the lever arms 18 to the under side of the section 13. The numeral 20 designates a cylinder bearing horizontally hinged at its rear end portion to the lower end of the bed frame. This cylinder bearing carries the rotatable element 21 and rear end portion of the pipe shaft arm 22. These two elements 21 and 22 are threaded to each other so that by rotating the member 21 in one direction it will advance the arm shaft 22 toward the head of the bed, and the rotating of the member 21 in the opposite direction will longitudinally move the arm shaft 22 in a direction away from the head of the bed. In such beds a crank arm (not shown) is used to manually rotate the member 21. The forward end of the arm shaft 22 is hingedly secured to the lower end of the levers 18, and thus by rotating the element 21, the head section of the bed will be accordingly raised or lowered.

Such beds are standard and it is to such a bed that we attach our device and which we will now describe in detail.

On the rear end portion of the member 20 we detachably hang a bracket base 25. The numeral 26 designates an electric motor hung to the bottom of the base 25, and having the armature shaft 27. The numeral 28 designates a gear housing on the rear of the base 25. In this housing is a bearinged shaft 29 having gear teeth 30 on its upper end and gear teeth 31 on its lower end. The numeral 32 designates gear teeth on the motor armature shaft in engagement with the gear teeth 31. The numeral 33 designates a universally jointed shaft secured to the unit 21 and having the gear teeth 34 in mesh with the gear teeth 30. By this arrangement, when the electric motor is running the shaft unit 21 will be rotated. By using a reversible electric motor the shaft unit 21 may be rotated in either direction, thus either lowering or raising the head section 13. For this selective control we use an ordinary two way switch 35 with a neutral position imposed in the electric circuit 36 of the motor and which is adapted to be in communication with a source of electric energy. When the handle 37 of the switch is manually held in one direction the motor will turn in one direction, raising the head section of the bed and when the handle is held in the opposite direction, the motor will turn in the opposite direction and the head section will be lowered. By releasing the handle it moves to a neutral position thereby breaking the circuit and stopping the electric motor. Due to the fact that there are worm gears in the gear housing, the shaft arm 22 will stay in any position of its longitudinal movement in which it is placed. Therefore, by stopping the motor at any desired position of the bed head section, such head section will be stabilized and held in that position until the motor is again started. With the switch 35 located within reach of the one using the bed, such person has

complete control of the adjustment and maintenance of the head section from horizontal to maximum upright positions. Any previously selected position may be instantly changed to a different new selected position by the bed user merely by manipulation of the switch handle 37. One electric unit 40 may be imposed in the circuit to handle two of our units for both head and foot sections.

For safety reasons, it is mandatory that limits be imposed as to the limits of swinging movement of a bed section. Also it is desirable that these safety stop limits be adjustable and especially is this true when the bed is being used by certain patients. In the drawings we have secured a pipe shaft 41 to the bracket 25. This shaft 41 extends forwardly under the bed frame as shown in Fig. 3. The numeral 42 designates a sleeve slidably embracing the shaft 41. The numeral 43 designates a sleeve adjustably clamped on the arm shaft 22. The numeral 44 designates a bar connecting the sleeve 42 to the clamp sleeve 43.

The numeral 45 designates a slidable adjustable bearing on the free end portion of the shaft 41, lockable thereon against accidental movement by a set screw 46. This bearing supports a spring loaded button cut out switch 47 capable of being contacted and actuated by the forward end of the sleeve 42. A like bearing 48 is slidably adjustably locked on the rear end portion of the shaft 41 and back of the sleeve 42. It is position-locked by the set screw 49. On this bearing member is a like spring loaded button cut out switch 50, capable of being contacted and actuated by the sleeve 42. These two spaced apart push button switches are independently imposed in the electric current of the motor and switch 35 so that when the sleeve 42 is moved forwardly by the forward movement of the shaft 22 and engages the switch 47, the switch 47 will break the circuit from the forward up side of the switch lever of the switch 35, thereby breaking the circuit and stopping the rotation of the motor in that direction. By moving the lever 37 to the opposite direction, it will make circuit contact for reversing the motor and lowering the bed section. The extreme rear sliding of the sleeve 42 will contact the switch 50 thereby breaking the circuit to the motor even when the lever 37 is being held on a "down" position. Obviously, the limit of either the downward or the upward movement of the bed section will depend on the position of the switches 47 and 50 on the pipe rod 41. The extent of the bed section movement in either direction is adjustably selectively obtained by the sliding adjustment of the switches 47 and 50. Such an adjustable safety means is not only for the protection of the user, but it would prevent breakage or the burning out of an electric motor or wiring.

The base 25 and tubular bearing 20 have swinging movement relative to the bed during the operation of the raising and lowering mechanism and the elements 44, 43, 42 and 41, aid in strengthening and supporting the assembly.

Some changes may be made in the construction and arrangement of our motorized hospital bed without departing from the real spirit and purpose of our invention, and it is our intention to cover by our claims, any modified forms of structure or use of mechanical equivalents which may be reasonably included within their scope.

We claim:

1. In combination, a bed frame, a bed section hinged to said frame, an arm lever means associated with said bed section and said bed frame, a longitudinally movable shaft secured to said arm lever means, a rotatable shaft means threaded to said longitudinally movable shaft, a base bracket operatively secured to said bed frame, a reversible electric motor on said base bracket, gears operatively connected to said rotatable shaft means and said electric motor, an electric circuit connected to said motor and in communication with a source of electric energy, a two way switch having a neutral position imposed in said electric circuit for selectively reversing said motor or stopping said motor, a bar extending from said base bracket, two spaced apart bearing members mounted on said bar, a switch on each of said bearing members and imposed in said electric circuit, a sleeve slidably mounted on said bar and between said two bearing members, and a member connecting said sleeve with said longitudinally movable shaft.

2. In combination, a bed frame, a bed section hinged to said frame, an arm lever means associated with said bed section and said bed frame, a longitudinally movable shaft secured to said arm lever means, a rotatable shaft means threaded to said longitudinally movable shaft, a base bracket operatively secured to said bed frame, a reversible electric motor on said base bracket, gears operatively connected to said rotatable shaft means and said electric motor, an electric circuit connected to said motor and in communication with a source of electric energy, a two way switch having a neutral position imposed in said electric circuit for selectively reversing said motor or stopping said motor, a bar extending from said base bracket, two spaced apart bearing members adjustable mounted on said bar, a switch on each of said bearing members and imposed in said electric circuit, a sleeve slidably mounted on said bar and between said two bearing members, and a member connecting said sleeve with said longitudinally movable shaft.

3. In combination, a bed frame, a bed section hinged to said frame, an arm lever means associated with said bed section and said bed frame, a longitudinally movable shaft secured to said arm lever means, a rotatable shaft means threaded to said longitudinally movable shaft, a base bracket operatively secured to said bed frame, a reversible electric motor on said base bracket, gears operatively connected to said rotatable shaft means and said electric motor, an electric circuit connected to said motor and in communication with a source of electric energy, a two way switch having a neutral position imposed in said electric circuit for selectively reversing said motor or stopping said motor, a bar extending from said base bracket, two spaced apart bearing members mounted on said bar, a spring loaded push button switch on each of said bearing members and imposed in said electric circuit, a sleeve slidably mounted on said bar and between said two bearing members, and a member connecting said sleeve with said longitudinally movable shaft.

4. In combination, a bed frame, a bed section hinged to said frame, an arm lever means associated with said bed section and said bed frame, a longitudinally movable shaft secured to said arm lever means, a rotatable shaft means threaded to said longitudinally movable shaft, a base bracket operatively secured to said bed frame, a reversible electric motor on said base bracket, gears operatively connected to said rotatable shaft means and said electric motor, an electric circuit connected to said motor and in communication with a source of electric energy, a two way switch having a neutral position imposed in said electric circuit for selectively reversing said motor or stopping said motor, a bar extending from said base bracket, two spaced apart bearing members adjustably mounted on said bar, a spring loaded push button switch on each of said bearing members and imposed in said electric circuit, a sleeve slidably mounted on said bar and between said two bearing members, and a member connecting said sleeve with said longitudinally movable shaft.

5. In a device for motorizing a hospital bed having a frame, a raisable bed section, a lever linkage connected to said frame, a shaft associated with said lever linkage, and a second shaft threaded with said first shaft; said device comprising, a base, a reversible electric motor, gear means associated with said motor and adapted to be operatively connected to the second shaft of said hospital bed, an electric circuit associated with said motor, a two way switch imposed in said circuit, a beam extending from

said base, a movable member on said beam adapted to be connected to the first shaft of said hospital bed, a bearing member mounted on said beam in the path of said movable member, and an electric cut out switch on said bearing member and imposed in said electrical circuit.

6. In a device for motorizing a hospital bed having a frame, a raisable bed section, a lever linkage connected to said frame, a shaft associated with said lever linkage, and a second shaft threaded with said first shaft; said device comprising, a base, a reversible electric motor, gear means associated with said motor and adapted to be operatively connected to the second shaft of said hospital bed, an electric circuit associated with said motor, a two way switch imposed in said circuit, a beam extending from said base, a movable member on said beam adapted to be connected to the first shaft of said hospital bed, a bearing member adjustably mounted on said beam in the path of said movable member, and an electric cut out switch on said bearing member and imposed in said electrical circuit.

7. In a device for motorizing a hospital bed having a frame, a raisable bed section, a lever linkage connected to said frame, a shaft associated with said lever linkage, and a second shaft threaded with said first shaft; said device comprising, a base, a reversible electric motor, gear means associated with said motor and adapted to be operatively connected to the second shaft of said hospital bed, an electric circuit associated with said motor, a two way switch imposed in said circuit, a beam extending from said base, a movable member on said beam adapted to be connected to the first shaft of said hospital bed, a bearing member mounted on said beam in the path of said movable member, and an electric spring loaded push control cut out switch on said bearing member and imposed in said electrical circuit.

8. In a device for motorizing a hospital bed having a frame, a raisable bed section, a lever linkage connected to said frame, a shaft associated with said linkage, and a second shaft threaded with said first shaft; said device comprising, a base, a reversible electric motor, gear means associated with said motor and adapted to be operatively connected to the second shaft of said hospital bed, an electric circuit associated with said motor, a two way switch imposed in said circuit, a beam extending from said base, a movable member on said beam adapted to be connected to the first shaft of said hospital bed, a bearing member adjustably mounted on said beam in the path of said movable member, and an electric spring loaded push control cut out switch on said bearing member and imposed in said electrical circuit.

9. In a device for motorizing a hospital bed having a frame, a raisable bed section, a lever linkage connected to said frame, a shaft associated with said lever linkage, and a second shaft threaded with said first shaft; said device comprising, a base, a reversible electric motor, gear means associated with said motor and adapted to be operatively connected to the second shaft of said hospital bed, an electric circuit, a beam extending from said base, two spaced apart bearing members mounted on said beam, a switch on each of said bearing members and imposed in said circuit, a sleeve slidably mounted on said beam between said two bearing members, and a connecting means on said sleeve adapted to be secured to the first shaft of said hospital bed.

10. In a device for motorizing a hospital bed having a frame, a raisable bed section, a lever linkage connected to said frame, a shaft associated with said lever linkage, and a second shaft threaded with said first shaft; said device comprising, a base, a reversible electric motor, gear means associated with said motor and adapted to be operatively connected to the second shaft of said hospital bed, an electric circuit associated with said motor, a two-way switch imposed in said circuit, a beam extending from said base, two spaced apart bearing members adjustably mounted on said beam, a switch on each of said bearing members and imposed in said circuit, a sleeve slidably mounted on said beam between said two bearing members, and a connecting means on said sleeve adapted to be secured to the first shaft of said hospital bed.

11. In a device for motorizing a hospital bed having a frame, a raisable bed section, a lever linkage connected to said frame, a shaft associated with said lever linkage, and a second shaft threaded with said first shaft; said device comprising, a base, a reversible electric motor, gear means associated with said motor and adapted to be operatively connected to the second shaft of said hospital bed, an electric circuit associated with said motor, a two-way switch imposed in said circuit, a beam extending from said base, two spaced apart bearing members mounted on said beam, a spring loaded push control switch on each of said bearing members and imposed in said circuit, a sleeve slidably mounted on said beam between said two bearing members, and a connecting means on said sleeve adapted to be secured to the first shaft of said hospital bed.

12. In a device for motorizing a hospital bed having a frame, a raisable bed section, a lever linkage connected to said frame, a shaft associated with said lever linkage, and a second shaft threaded with said first shaft; said device comprising, a base, a reversible electric motor, gear means associated with said motor and adapted to be operatively connected to the second shaft of said hospital bed, an electric circuit associated with said motor, a two way switch imposed in said circuit, a beam extending from said base, two spaced apart bearing members adjustably mounted on said beam, a spring loaded push control switch on each of said bearing members and imposed in said circuit, a sleeve slidably mounted on said beam between said two bearing members, and a connecting means on said sleeve adapted to be secured to the first shaft of said hospital bed.

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