This invention relates to electrically operated wall beds, especially designed to be operated from closed to open position, and vice versa, and to the provision of means for preventing the bed from being operated to its closed position when in use, or occupied by a person.

The primary objects of the invention are to produce such an improved bed that obviates the necessity of manual operation; that may be neatly, compactly, and easily folded into a cabinet or wall recess within the room; that likewise may be easily, quickly, and positively operated to its open position; and that when in the open position, or position for use, will obviate any danger of the bed being accidentally or carelessly actuated to its closed position.

Another and more specific object of the invention is to provide means for firmly and positively actuating a bed of the type described in the foregoing, to the extreme limit of its closed position, such means being embodied in a spring still under tension after the bed has been actuated to and past the center of its pivotal axis.

Another more specific object of the invention is to provide means whereby during the movement of the bed to its open position, vibration or jerking incident to the applied power for opening the bed is eliminated, and the bed caused to smoothly and positively move to the extreme limit of open position.

The foregoing and other objects and advantages of this invention will become more clearly understood and apparent from the following detailed description with reference to the accompanying drawings, which illustrate a definite form of the invention, although it is obvious that many modifications and changes in construction may be resorted to without departing from the scope of the invention, including the provision of means for manually operating the bed, as will hereinafter be claimed.

In these drawings:

Figure 1 is a view illustrating the bed in its closed position; Figure 2 is a side elevation view, partially broken away, of the bed in its closed position, looking in the direction of the arrow 2 in Figure 1; Figure 3 is a side elevation view, partially broken away, showing the bed in its open position, looking in the direction of the arrow 2 in Figure 1; Figure 4 is a side view of the friction clutch, looking in the direction of the arrow 4 in Figure 1, employed as a part of the mechanism to prevent the bed from being actuated to its closed position against a predetermined weight, or when occupied by a person; Figure 5 is an edge view of the friction clutch, looking in the direction of the arrow 5 in Figure 4; Figure 6 is also an edge view of the friction clutch, looking in the direction of the arrow 6 in Figure 4; Figure 7 is a view partially in cross section, looking in the direction of the arrow 7 in Figure 1, and illustrating the springs employed for positively throwing the bed to the extreme limit of closed position; and Figure 8 is a diagrammatic view of the electrical circuit employed in connection with the electrical motor which actuates the bed.

In the accompanying drawings similar numerals refer to similar parts throughout the several views.

Numerals 5 represents a cabinet or recess in the wall of the room, into which the bed, designated in its entirety by the numeral 6, is adapted to be received when closed, and occupy therein an approximately vertical position, as shown in Figures 1 and 2. When the bed is opened or placed in position for use, it is lowered to a horizontal position, as shown in Figure 3.

The numeral 7 represents an iron or other suitable strong base securely fastened to the floor of the cabinet 5, and integrally formed with said base 7, are vertical posts 8. These posts 8 each has a perforation therein near the top.

A transverse rectangular shaper bar 10 connects two side rails 12, of the bed frame at the head of the latter. Castings 14, with openings therethrough of counterpart shape, receive the shaft 10 and form a pivotal connection between the head of the bed and the posts 8, through the medium of journal pins 9 on the castings 14, and a perforation in and near the top of each of the posts 8. Thus, by means of this pivotal connection, the bed is...
movable through an arc on its pivot to and from its open and closed positions, the closed position of the bed being slightly past the center of the pivotal connection, whereby the bed occupies a firm or rigid position within the cabinet 5, preferably resting against the rear wall of the latter. The castings 14 are longitudinally adjustable on the bar 10 so that the pivotal connection above described may be disconnected, and for convenience in assembling and for adjusting the bed in proper position. These castings are held in fixed positions of adjustment on the shaft 10 in their relation to the posts 8 by means of set screws 15.

A casting 16, having an ear 17, protruding therefrom at a downward angle from the horizontal plane, is mounted in fixed position on the shaft 10. There is pivoted to this ear 17 a link 18, as shown at 19. At the end of this link, opposite the pivotal point 19, there are attached two spiral springs 20 and 21, which extend downwardly in opposite directions at angles of approximately 45 degrees, and are secured at their opposite ends to the base 7, as shown at 22. These two springs are under tension at all times, and exert their energy in aid of actuating the bed to its closed position, and the spring 21, by virtue of its position with reference to the axis of the bed, or its pivotal point, exerts the final energy to throw the bed beyond its pivotal center when in an exact vertical position. It will be noted that the special position referred to of the spring 21 is transverse or at right angles to the axis of the bed, whereby its energy may be more forcibly expended to throw the bed to its closed position beyond the pivotal center. When the bed is being opened or moved to its horizontal position, both of these springs 20 and 21 are being placed under greater tension until the maximum has been reached when the bed has moved to its completely open position, thereby relieving strain throughout the bed, and preventing vibration of the latter in its opening movement.

An electrical motor 23, of the reversible type, is firmly mounted upon the base 7, and transmits its power through a speed reducing transmission element 24, which may be of usual or well known construction, to an arm or crank 25, mounted upon a driven shaft 26, of the transmission element 24, said arm or crank 25 extending at right angles to said shaft 26, and forming an eccentric cam or fulcrum. The outer end of the arm 25 is provided with a journal pin 27 thereon, which is received in a perforation, forming a journal box in one end of a link 28. (See Figure 4.)

The friction clutch 30 consists of a sector 31, mounted in fixed position on the shaft 10 by means of an integrally formed lug 32, having an opening therein of counterpart shape with the shaft 10 to receive the latter there-through. This lug 32 is provided with a set screw 33, by means of which the sector 31 is secured in fixed position on the shaft 10 at the proper position thereon. Two other sectors 34 and 35, are positioned on opposite sides of the sector 31, and pivotally connected with the sector 31, as shown at 36. Perforated ears 37 and 38 are integrally formed on each of the sectors 34 and 35. A pin 29 passes through the ears 37, protrudes beyond the sector 35, as shown at 29, and forms the bearing pin to which one end of the link 28 is pivotally connected. A friction adjusting bolt 39 passes through the ears 38, and by adjustment of the nut thereon, the friction against a track 40 of the sector 31 may be increased or diminished for the purpose hereinafter described. The faces of the sectors 34 and 35 are provided with suitable friction packing 41, which engages on opposite sides of the track 40. The track 40 is of sufficient length to prevent disengagement from the faces of the sectors 33 and 34 within the arc necessary for the track 40 to move in either direction before the circuit of the electrical motor 23 is broken, as will be hereinafter more specifically described.

Through means of the friction adjusting bolt 39 connecting the two sectors 34 and 35, the latter are normally held in fixed relation to the sector 31, and by the intermediate power transmission elements between the motor 23 and the bed 6, including the crank 25 and the link 28, all three members of the friction clutch 30 are caused to move together in an arc and thereby close or open the bed, as the case may be.

The operation of the various elements of the bed may be more clearly understood by referring first to Figure 3, in which the positions of said elements are shown when the bed is in the open position. Now, by closing the circuit of the electric motor 23, the latter is started in operation, and with the crank 25 moving downwardly, the truck pulls the link 28 down and likewise causes the friction clutch 30 to move in a downward arc, thereby moving the bed 6 towards the vertical and closed position. With the weight of a person on the bed, or any other weight predetermined through adjustment of the friction adjusting bolt 39, the bed 6 will remain in its open position, while the sectors 34 and 35 will slip upon the track 40 of the sector 31, which likewise remains in a stationary position, being in rigid connection with the bed 6 through the medium of the shaft 10. After the motor has completed a predetermined number of revolutions for actuating the bed to its closed position, the circuit will be broken and the motor will cease operation. Now, in case this motor has operated without actuating the bed to the closed position, it will of course be necessary to close the circuit and reverse the operation of the motor so that the sectors 34 and 35
are moved in an upward arc to their normal position, as shown in Figure 3, whereupon the circuit of the motor will likewise be broken, and when the circuit is again closed, the various elements of the friction clutch will be in position to actuate the bed to its closed position.

Figure 8 illustrates a diagrammatic view of the electrical circuit of the motor 23, which is of simple and usual construction and need not be described further, except to state, as follows: Two pole changing switches 43 and 44 are employed, the switch 43 being intended for manual operation, while the switch 44 is operated through any suitable means in connection with the motor 23, so that when the motor has completed the necessary revolutions in either direction to close or open the bed, as the case may be, the switch 44 is operated to change the polarity of the motor through the medium of a third circuit conductor 45, whereby setting the circuit of the motor in position to be closed by manual operation of the switch 43, or ready for reverse rotation of the motor 23. Numerals 46 and 47 represent the main circuit conductors, and numerals 48 and 49 represent the two conductors of the motor's circuit, respectively connected with the main circuit conductors.

The head member of the bed consists of two panels 60 and 61, hinged together as shown at 62. The panel 61 is adapted to fold outwardly from the cabinet 5 as the bed 6 is being actuated to its closed position, and when the latter is actuated to its open or lowered position, a spiral spring 63, connected with the panel 61 and with the rear wall of the cabinet 5, actuates the panel 61 back to its vertical position.

A telescoping connecting rod comprising male and female members 64 and 64a respectively, connects the leg member 63 of the bed with one of the posts 8, as shown at 66, which is a pivotal connection, and likewise, the male member 64 is pivotally connected with the leg member 63 of the bed through the medium of a cross piece 67, as shown at 68. The distance between the pivotal point 68 of the male member 64, and the pivotal point 66 of the female member 64a, is greater when the bed is in its closed position, than when in the open position, and while the bed is being lowered or opened, the male member 64 is received farther into the female member 64a until a stop 69 in the latter has been engaged, whereupon the leg member 65 of the bed, which is pivoted to the side rails 12 of the bed as shown at 70, is moved outwardly so that it occupies a vertical position to rest upon the floor when the bed is completely opened, as shown in Figure 3.

While there has been described and illustrated herein a specific form of this invention, it is nevertheless understood that it is not limited to all the details exactly as disclosed, and that there are many modifications, alterations, or changes in construction which may be readily and conveniently adopted, without departing from the spirit of the invention or the scope of the appended plans.

Having thus described my invention, what I now claim and desire to secure by United States Letters Patent, is as follows:

1. The combination with a pivotally mounted bed adapted to be actuated to opened and closed positions on its pivot, of means for transmitting power to actuate said bed to its opened and closed positions, comprising a friction member secured in fixed position on said bed, and a second friction member normally held in fixed relation with said first named friction member, and adapted to move against the latter under the influence of power and against predetermined pressure applied to the bed.

2. The combination with a pivotally mounted bed, adapted to be actuated to the opened and closed positions on its pivot, of means for transmitting power to actuate said bed to its opened and closed positions, consisting of a member secured in fixed relation to the bed, a second member frictionally held in normal fixed relation to said first named member, and adapted to move under predetermined minimum pressure against said first named friction member, and means for counterbalancing said bed during its movement to opened and closed positions.

3. The combination with a pivotally mounted bed adapted to be moved upon its pivot to opened and closed positions, of means for transmitting power to actuate said bed to its opened and closed positions, consisting of a sector secured to one end of the bed, a second sector pivotally mounted on the first named sector and frictionally engaging the first named sector in normal fixed relation and adapted to slide against said first named sector, against the influence of predetermined weight upon the bed, and means for adjusting the friction between said first and second named sectors, so that one of said sectors will slide against the other when the bed is submitted to any predetermined pressure.

4. The combination with a bed pivotally mounted to swing to open and closed positions, of automatically operable means for swinging said bed on its pivot to opened and closed positions, including a motor, said automatically operable means consisting of a track member fixed on the pivotal axis of the bed, a friction member pivoted on said track member and normally engaging the latter in fixed relation, and a fulcrum connection between said friction member and the motor, whereby when the motor is in operation said track and said friction member will be moved together to actuate the bed under its normal weight, to opened and closed positions, and
when under excess weight or pressure, said friction member will slide against the track member when the motor is operated without transmitting movement to said bed.

5. The combination with a bed pivotally mounted to swing to opened and closed positions, of automatically operable means for swinging said bed on its pivot to opened and closed positions, and means independent of the automatically operable means for actuating said bed past the center of its pivotal axis to its completely closed position after said automatically operable means has ceased to operate and for preventing vibration of said bed during its movement to opened and closed positions.

6. An electrically operated folding bed comprising: a base member; posts extending upwardly from said base member; a horizontal member; hangers secured to said horizontal member; bearings pivotally securing said hangers to said posts; a bed frame extending from said horizontal member; a first lever member extending from said horizontal member; a motor operated crank; a link connecting said first lever member with said motor operated crank to cause movement of said crank to rotate said horizontal member; a second lever member extending from said horizontal member; springs extending from said second lever member to said base member so that the tension in said springs will increase as said bed frame approaches a horizontal position.

In testimony whereof, I affix my signature.

MARCUS G. WRIGHT.