CONTROL FOR ADJUSTABLE BED
Roland A. Benoit, Fresh Meadows, and Joseph Tripodi, Brooklyn, N.Y., assignors to InterRoyal Corporation, a corporation of Delaware
Filed Mar. 13, 1968, Ser. No. 712,740
Int. Cl. A61G 7/10
U.S. Cl. 5—63
9 Claims

ABSTRACT OF THE DISCLOSURE

A bed has an adjustable frame for adjusting a mattress support member to various positions. The head end and the foot end of the bed may be adjusted so the mattress support member is inclined either downwardly from the head end toward the foot end (Reverse Trendelenburg selection) or downwardly from the foot end toward the head end (Trendelenburg selection). A position selector mechanism cooperates with a suitable power unit to provide the bed operator with means for selecting the Reverse Trendelenburg or Trendelenburg positions or other positions of adjustment for the mattress support member of the bed.

The present invention relates to adjustable beds of the type disclosed in my U.S. Pat. No. 3,324,484 granted June 13, 1967. This patent discloses an adjustable bed having a mattress support member mounted upon an adjustable frame. The adjustable frame is mounted for vertical movement with respect to a pair of head and foot end vertical support posts which rest on the floor and support the bed. By vertically adjusting the frame at the foot end or at the head end, the mattress support member may be brought to either the Trendelenburg or Reverse Trendelenburg positions. Suitable power and control units move the adjustable frame to achieve the desired position for the mattress support member.

The bed described in the foregoing patent is further adjustable in that the mattress support member comprises a plurality of panels pivotally linked together for adjusting the mattress support member to various contours. Suitable power and control units are provided for selecting such contours.

According to the present invention a bed operator may adjust the bed to various positions by means of a position selector mechanism. For purposes of description and illustration the present invention will be described with particular reference to adjusting the frame portion of the bed to achieve the Trendelenburg or Reverse Trendelenburg positions for the mattress support member.

In a bed constructed according to the present invention, the bed operator manipulates the position selector mechanism according to whether elevation of the head end or the foot end is desired. After making such selection, a single power unit (actuated by the operator) elevates the head or foot end of the bed.

It is an object of the present invention to provide a new and improved adjustable bed.

Another object of the present invention is to provide a position selector mechanism which cooperates with a power unit to make for convenient and simple adjustment of a bed.

A further object of the present invention is to provide a new and improved adjustable bed having a position selector mechanism which resets itself after each bed adjustment.

A further object of the present invention is to provide a position selector mechanism for an adjustable bed which utilizes a single power source for adjusting different portions of the bed frame.

For a better understanding of the present invention together with other and further objects thereof, reference is had to the following description taken in connection with the accompanying drawings and its scope will be pointed out in the appended claims.

Referring to the drawings:

FIG. 1 is a perspective view of an adjustable bed with which the present invention may be used.
FIG. 2 is a section view taken along line 2—2 of FIG. 1 and illustrates a typical mechanism by which the bed frame may be adjustably mounted with respect to the vertical support posts of the bed.
FIG. 3 is a section view taken along line 3—3 of FIG. 2 for further illustrating the mechanism of FIG. 2.
FIG. 4 is a plan view of the position selector mechanism according to the present invention by which the bed frame may be moved between vertically adjusted positions.
FIG. 5 is a side-elevation view of the position selector mechanism shown in FIG. 4, illustrating the bed adjusting cables in a relaxed position.
FIG. 6 is a side elevation view of the selector mechanism illustrated in FIGS. 4 and 5 wherein the position selector mechanism has selected one of the bed adjusting cables.
FIG. 7 is a section view taken along line 7—7 of FIG. 5 to illustrate a portion of the position selector mechanism with the bed adjusting cables in a relaxed position.
FIG. 8 is a section view taken along line 8—8 of FIG. 6 to illustrate a portion of the position selector mechanism when one of the bed adjusting cables has been selected.

A bed 10 constructed according to the present invention is illustrated in FIG. 1 and includes a pair of vertical support posts 11 at the head 12 and foot 13 ends of the bed respectively. Typically each of the vertical posts 11 may be located along the center line of the bed, and each post rests on an elongated transversely extending support member 14 which engages casters 16 at its outer ends. Head and foot boards 17 and 18 may be mounted at the head and foot ends of the bed.

A bed frame 20 extends between the head and foot posts 11 and includes a pair of longitudinal side rails 21 joined at their ends to a pair of transverse end frames 22 by brackets 25. Each end frame 22 includes an integral housing 23 which is mounted for sliding vertical movement with respect to its corresponding post 11. By this mounting, the bed frame 20 is vertically adjustable with respect to both the head and foot posts 11. It is to be understood that both the head and foot ends are mounted in like manner for vertical adjustment. Consequently it is necessary to describe only the foot end mounting.

A central transverse channel 24 strengthens the bed frame 20 and provides a support base for a position selector mechanism 26 and adjusting cables described more fully below.

As also shown in FIG. 1 a mattress support member 27 is mounted on the bed frame 20 by suitable linkages 28. Typically, the mattress support member may comprise a plurality of sections pivotally joined to each other to achieve a variety of positions as is described by my U.S. Pat. No. 3,324,484.

As best shown in FIGS. 2 and 3, each end frame 22 includes space transverse bars 30 which are integral with the slide housing 23. The slide housing 23 is mounted for sliding vertical movement on the bed post 11. The slide housing 23 includes a slide block 31 which fits into a vertical recess 32 in the bed post 11. Upward movement of the slide block is limited by an abutment 33.

Preferably the vertical movement of each frame 22 with respect to each post 11 is accomplished by respective head and foot adjusting cables 33 and 34. The cable 34 terminates in a threaded fitting and nut 36 which rests on a bearing plate 37 atop the vertical post 11. The opposite end of the cable 34 is fixed to a power source 38.
FIG. 3

mounted on the bed frame 20 as described below.

By virtue of this cable arrangement as illustrated in Fig. 2 it will be understood that a pulling force on the free end of the cable produces an upward movement of the end frame 22 (and bed frame 20) with respect to the vertical post 11. In other words by attaching one end of cable 34 to the vertical post 11 and by attaching the free end of the cable to the bed frame 20, a pulling force on the free end of the cable will move the bed frame 20 upward with respect to the vertical post 11.

As shown in Figs. 2 and 3 the cable 34 is guided by a pulley 34a mounted on the housing 23.

A similar cable arrangement is provided for vertically adjusting the head end of the bed and need not be described in detail.

According to the present invention, the position selector mechanism 26 (Fig. 4) is provided to enable the bed operator to choose whether the head or the foot end of the bed will be brought to a vertically elevated position. By means of the position selector mechanism 26 bed movement is accomplished through the single power unit 38 in conjunction with the adjustment cables 33 and 34. When the power unit 38 is activated its effect on the bed will be determined by the position of the selector mechanism 26 now to be described.

Referring to Fig. 4, it will be observed that the head end cable 33 and the foot end cable 34 are turned over suitable guide sheaves 43 and come together at a central point in the bed frame as for example at the transverse channel member 24. Each of the cables 33 and 34 is slidably mounted with respect to the transverse channel 24 by means of a suitable slide bushing 40. Preferably, each slide bushing 40 is threaded into the channel 24 and abuts a stop bushing 41 to provide adjustment in the cable tension. Cable tension may be increased by threading the slide bushing 40 against stop bushing 41. A suitable nut 42 fixes the position of the slide bushing. As best shown in Fig. 5, an auxiliary channel 24a may be used to support each sheave 43. In addition space guide brackets 24b (Figs. 4 and 5) have recesses 24c for supporting and guiding the ends of the cables 33 and 34.

When the cables in the position of Fig. 4 the bed is in its down position, i.e., both the head and foot end of the bed are in their lowermost positions with respect to the vertical posts. It is to be understood that bed adjustments are made with respect to this down position. By moving the cable head end 33 to the left in Fig. 4 the head of the bed will be adjusted. By moving foot cable 34 to the right (Fig. 4), the head or foot end of the bed will be adjusted. If desired both cables may be moved at the same time to lift both the head and foot ends of the bed.

Referring to Figs. 4 and 5, the cables either together or individually are moved by means of a position selector mechanism 26. The position selector mechanism includes a cable grip bracket 44 of suitable construction. Preferably the cable grip bracket is a sheet metal plate having a suitable upright leg 45 for receiving suitable power connection such as a drive screw 46 and its associated drive nut 47. The drive screw 46 may be driven by the usual motor 38 (Fig. 1) or by a hand crank (not shown). The bracket 44 has a front end shoulder 48 which is recessed at 49 to receive corresponding shoulders 50 on cable end fittings 51. The front end shoulder 48 also receives a selector pin 52 which threadingly engages the drive screw 46. It will be observed that by rotating the drive screw 46 the cable grip bracket 44 will translate to the right or to the left as illustrated in Figs. 4 and 5. By moving the cable grip bracket to the right either end of the bed or both ends of the bed may be vertically adjusted. If desired the cable grip bracket may be supported at its edges 53 by suitable tracks (not illustrated) for movement along the bed. From the foregoing it will be observed that the cable grip bracket 44 will move the cable 33 or 34 which is lodged in one of the recesses 49. When one of the cables is selected and moved, the corresponding end of the bed will be lifted.

For selecting a cable, a selector plate 55 (Figs. 4-8) is mounted in position for receiving and moving the cables 33 and 34 in and out of operative association with the cable grip bracket 44.

Referring to Figs. 5 and 7, it will be observed that the selector plate 55 is mounted on a suitably supported pivot rod 56. The rod fits into a suitable opening or bore 57 in the transverse support channel 24 and into a suitable support 58 (Fig. 1) at the foot board 18 of the bed which is available to the bed operator. Preferably, the pivot rod 56 is offset intermediate its ends at 59 in order to accentuate the arc traveled by the selector plate 55 during pivoting action of the pivot rod.

It will be seen therefore, that pivoting of the selector plate 55 provides for selective disengagement of one of the cables 33 or 34 from the cable grip bracket 44. As shown in Figs. 6 and 8, pivoting of the selector plate 55 is effective to disengage the head end cable 33 from the cable grip bracket 44. During this cable position, the cable grip bracket 44 (in response to turning movement of the screw 46) removes only one of the bed cables, i.e., the foot cable 34 so to move upwardly the foot end of the bed with respect to its vertical post.

A position pin 60 (Figs. 5-8) is fitted onto the underside of the cable grip bracket 44 to register with position holes 61 and 62 in the selector plate 55. That is to say when the operator dials the selector plate 55 to disengage one of the cables, the spring loaded position pin 63 will enter one of the holes 61 or 62 (according to the position selected) for the purpose of holding the selector plate 55 in the desired position. Thereafter, the bed operator may release the pivot rod 56 and the position pin 60 will hold the selector plate 55 in position. After the cable grip bracket 44 moves away from the selector plate 55, the position pin 60 is withdrawn from hole 62 and the selector plate returns to a central position (Fig. 7) by virtue of a spring 64. Thus, after each selection, the position selector plate 55 resets itself for the next bed adjustment.

When it is desired to lower the bed, the cable grip bracket 44 is returned to the left of Figs. 5 and 6 and the weight of the mattress support member and/or the patient moves the bed to the down position. As the cable grip bracket 44 approaches the now-selected cable, the cable end 33 rides over a cam surface 65 on the leading edge of theselector shoulder 48 and returns to its normal position with respect to the cable grip bracket 44, i.e., each cable fitting 51 now rests in a recess 49 in the cable grip bracket 44.

The operation of the cable selector mechanism 38 will be apparent from the foregoing description but for convenience the operation will be described with particular to Figs. 5 through 8.

As shown in Figs. 5 and 7, the mattress support member is in its down position and the head and foot end cables 33 and 34 are in a relaxed position. It will be observed that the position pin abuts the surface 66 (Fig. 5) of the selector plate.

When vertical adjustment of one end of the bed is desired, the bed operator actuates the pivot rod 56 by means of a suitable dial 57 (Fig. 1) at the operational end of the bed. Pivotal movement of the selector plate 55 as shown in Figs. 6 and 8 is effective to disengage the cables 33 from operative association with the cable grip bracket 44. It will be observed in Figs. 6 and 7 that the position pin 60 locks the selector plate 55 to enable the operator to release the pivot rod dial 57 and to hand crank or to actuate the motor for moving the drive screw 46. When the drive screw turns, the cable grip bracket 44 withdraws to the right as shown in Figs. 5 and 6. Such movement is effective to move the foot cables 34 and to adjust vertically the foot end of the bed. As the cable grip bracket 44 withdraws to the right the position pin 60 disengages from the selector plate 55. The selec-
tor plate under the bias of its spring 64 returns to its central position as shown in FIGS. 5 and 7. In this position the cable grip bracket 44 may receive in its recesses 49 the non-selected cable 33 when the bed is returned to its down position.

When the bed is moved to the down position the cable grip bracket 44 moves to the left and as the cam edge 65 approaches the cable end fitting 33 the cam surface lifts the cable fitting into the grip bracket recess 49. At this point the mattress support member and the bed frame are resting on the vertical posts 11 of the bed.

It will be observed that applicants have provided a new and improved bed which is vertically adjustable to achieve Trendelenburg and Reverse Trendelenburg selections. The bed adjustment is accomplished by a novel selector mechanism which needs only a single power unit. The selector mechanism is of simple and economic construction and requires a minimum of attention by the bed operator. The bed operator may move the selector control as desired and selector plate repositions automatically for the next bed position selection.

While there has been described what is at present considered the preferred embodiment of the invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the invention and it is therefore aimed to cover all such changes and modifications as fall within the true spirit and scope of the invention.

What is claimed is:

1. An adjustable bed comprising head and foot posts, a frame mounted on and being vertically movable relative to said posts, means for moving the frame vertically with respect to the foot post, drive means adapted to engage and actuate each of said frame moving means, and a mechanism for selectively disengaging one of said frame moving means from operative cooperation with said drive means so that one end of the bed may be adjusted vertically with respect to the other end of the bed, and wherein each of said means for moving the frame comprises a cable connecting the frame to the head post and a cable connecting the frame to the foot post, and further wherein said mechanism selectively engages the ends of the cables for vertical adjustment of the bed, and wherein said mechanism comprises a cable grip 44 bracket for receiving the cable ends, and a selector plate 55 pivotally mounted on the frame for selectively disengaging one cable end from the cable grip bracket.

2. The adjustable bed defined in claim 1 wherein said cable grip bracket is moved by said drive means for vertically adjusting the bed frame.

3. An adjustable bed comprising a head post and a foot post, a frame movable vertically with respect to the head and foot posts, a first cable for moving the movable frame vertically with respect to the head post, a second cable for moving the movable frame vertically with respect to the foot post, a cable grip bracket having recesses for engaging and moving the cables so that the head and foot ends of the bed may be adjusted, means for moving the cable grip bracket, a selector plate interposed between the cables and the cable grip bracket and being pivotally mounted with respect to the cable grip bracket, the selector plate having recesses for receiving the cables whereby the cables may be disengaged from the cable grip bracket by the selector plate, and means for pivoting the selector plate.

4. The adjustable bed recited in claim 3 which further includes a position pin mounted on the cable grip bracket and cooperating with the selector plate to hold the selector plate in the selected position until the cable grip bracket moves a cable.

5. The adjustable bed as defined in claim 3 wherein the cable grip bracket is provided with a cam surface at its leading edge for returning the cable ends to the cable bracket recesses.

6. The adjustable cable defined in claim 3 wherein the cable grip bracket moving means comprises a drive screw cooperating with drive nuts mounted on said cable grip bracket.

7. A selector mechanism for an adjustable bed having first and second cables for vertically lifting the foot and head ends of the bed, said selector mechanism comprising a cable grip bracket for receiving and imparting tension to said cables, a selector plate cooperating with the cable grip bracket for selectively disengaging one of the cables with respect to the cable grip bracket whereby either the head or the foot end of the bed may be lifted vertically, means for moving the selector plate to accomplish such selective cable disengagement, means for moving the cable grip bracket so as to move at least one of the cables and a cam surface on the leading edge of the cable grip bracket for returning the cables to their normal positions with respect to the cable grip bracket.

8. The selector mechanism defined by claim 7 which further includes a position pin mounted on the cable grip bracket for holding the selector plate in selected position until the cable grip bracket moves the selected cable, and means for returning the selector plate to its initial position after the position pin is disengaged from the selector plate.

9. The selector mechanism defined in claim 7 which further includes at least one drive nut on said cable grip bracket, and wherein said means for moving the cable grip bracket comprises a motor and a drive screw cooperating with said drive nut.

References Cited

UNITED STATES PATENTS

2,913,300 11/1959 Darnell et al. 5--68
2,913,300 11/1959 Darnell et al. 5--68
3,129,607 4/1964 Schaefer 74--665
3,246,540 4/1966 Pickles et al. 74--665
3,271,795 9/1966 Hillebrand et al. 5--63
3,281,873 11/1966 Stanley et al. 5--68

CASIMIR A. NUNBERG, Primary Examiner

U.S. Cl. X.R.

5--68