May 12, 1970 R. A. BENOIT ET AL 3,510,886

CONTROL FOR ADJUSTABLE BED

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Fig. 1.

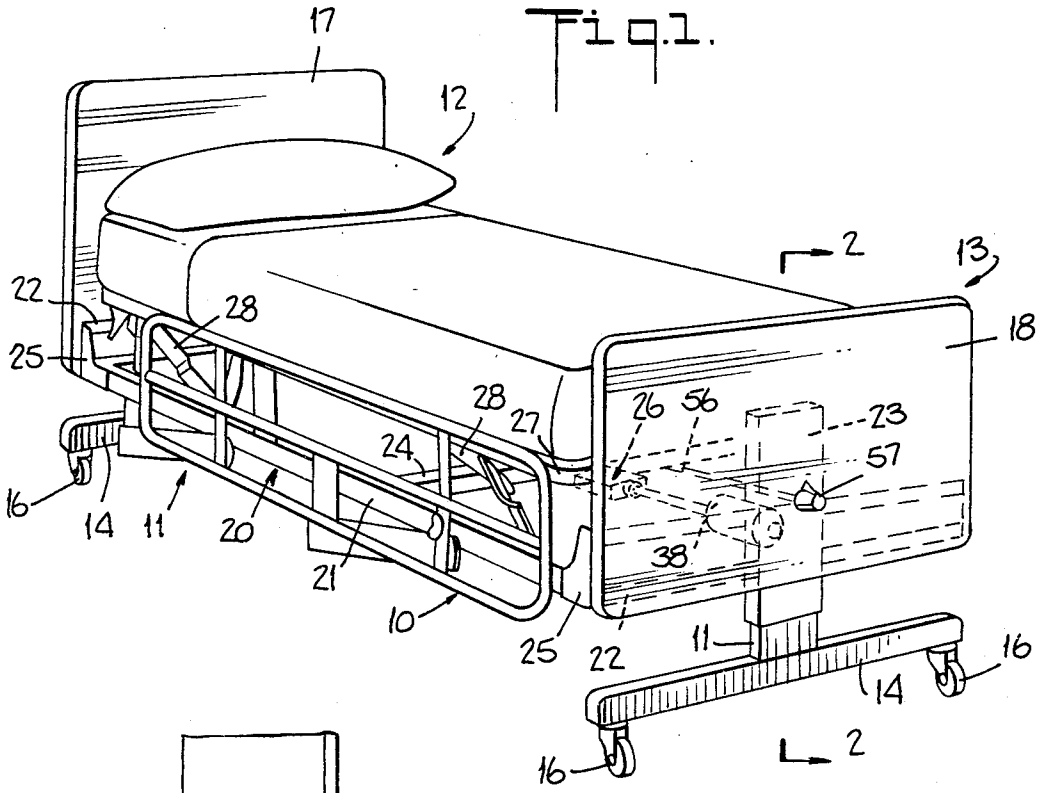
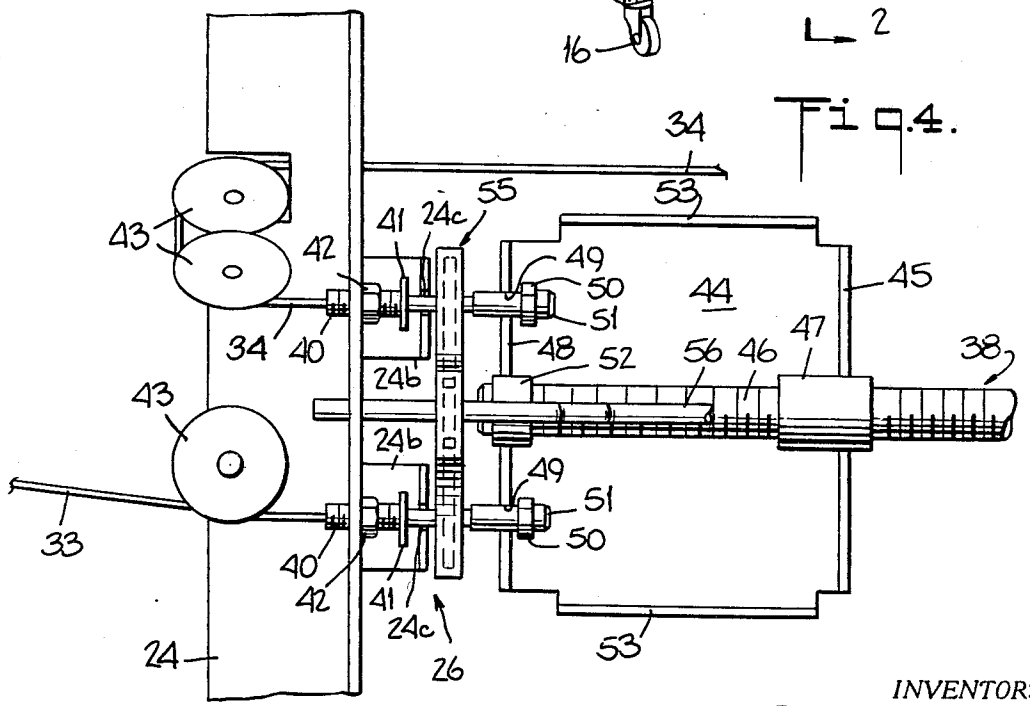


Fig. 4.



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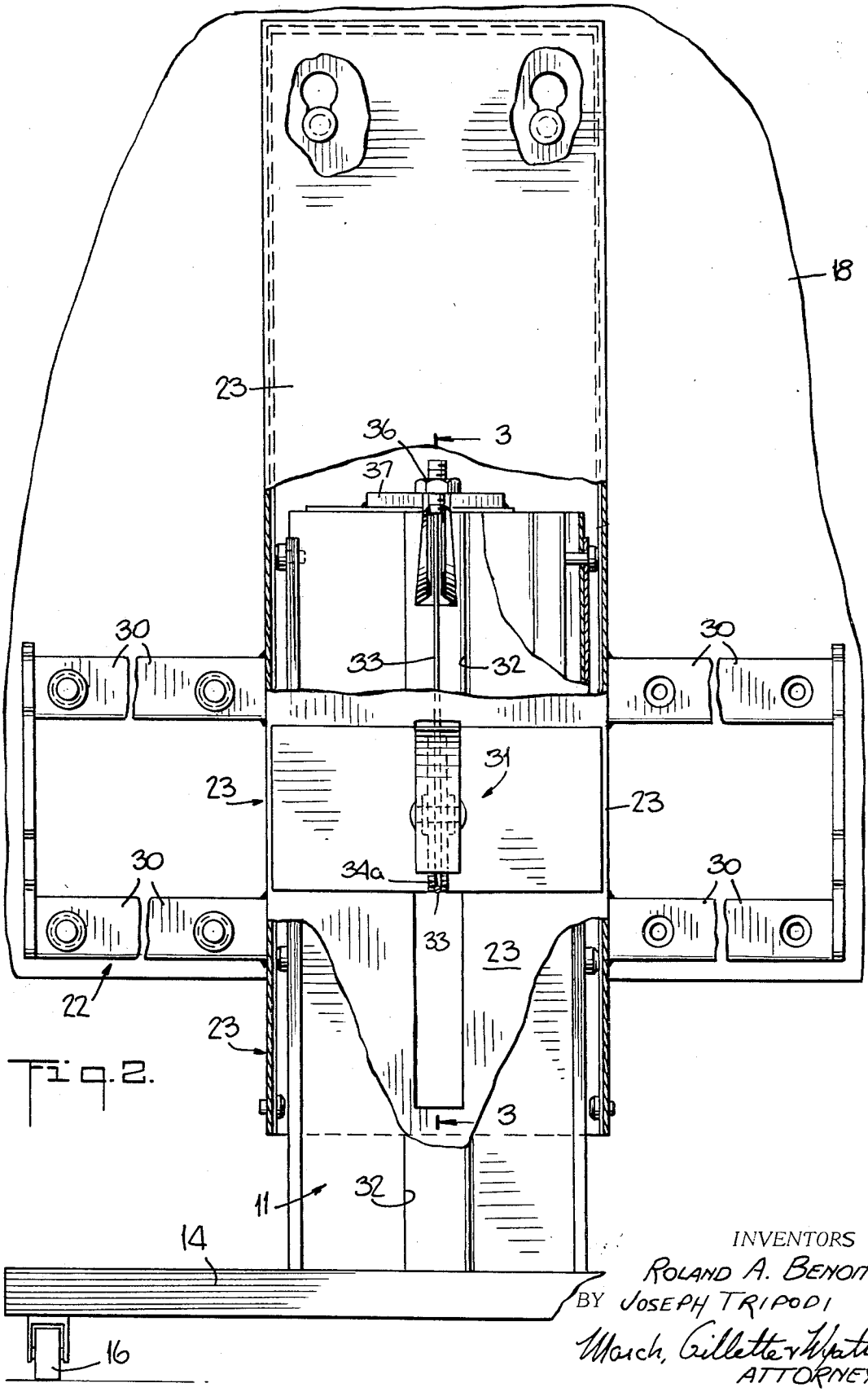


Fig. 2.

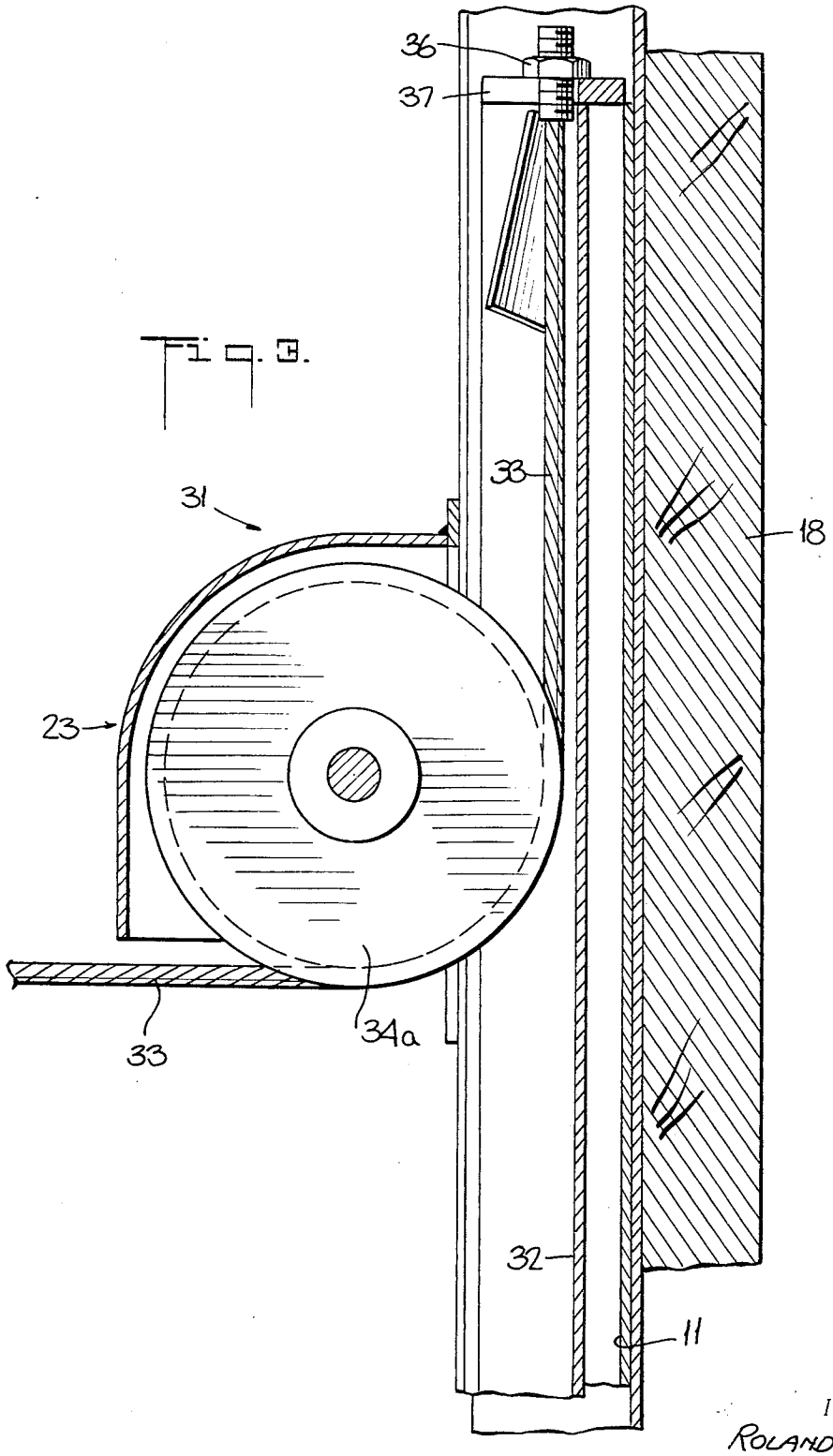
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Fig. 3.



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CONTROL FOR ADJUSTABLE BED

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Fig. 5.

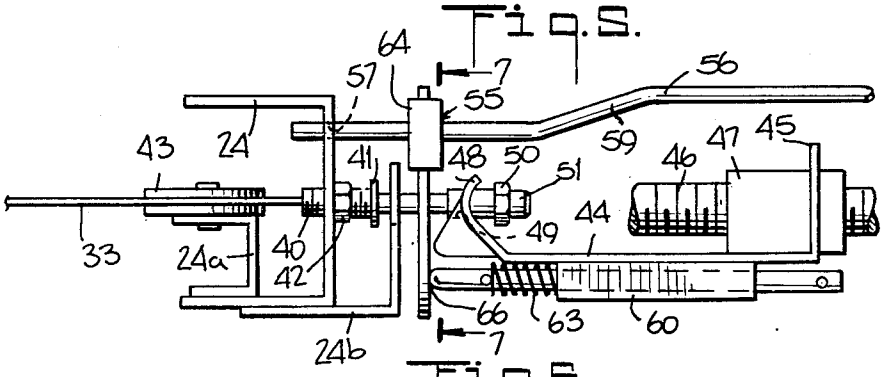


Fig. 6.

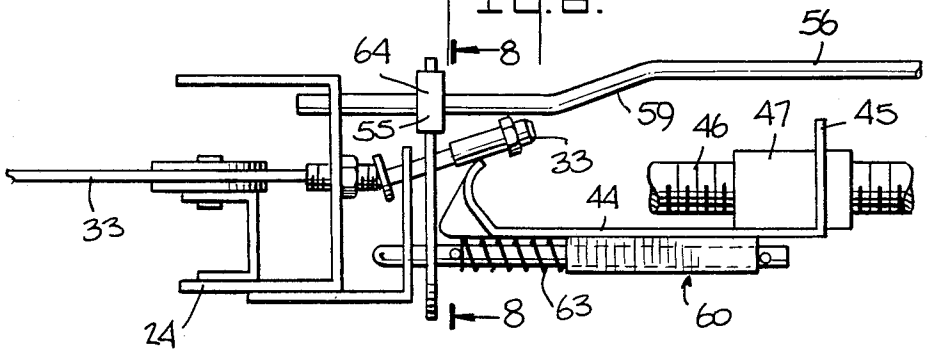


Fig. 7.

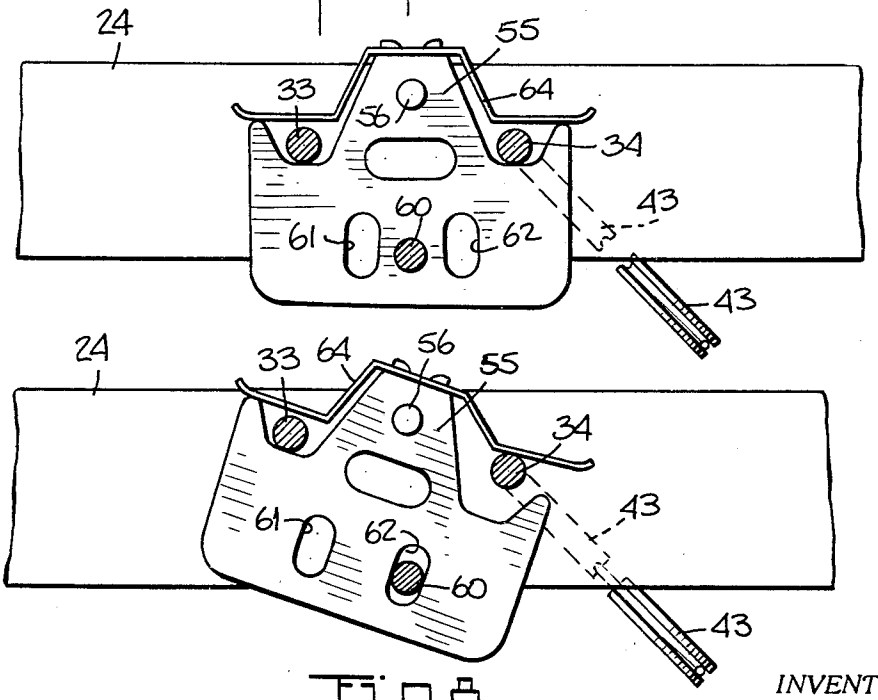


Fig. 8.

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3,510,886

CONTROL FOR ADJUSTABLE BED

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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 to-

gether with other and further objects thereof, reference is had to the folowing 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 receives 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. 1) 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** upwardly with respect to the vertical post **11**.

As shown in FIGS. 2 and 3 the cable **34** is guided by a pulley **34***a* 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 postion. By means of the position selector mechanism **26** bed movement is accomplished through the single power unit **38** in cooperation 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 trained 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 **24***a* may be used to support each sheave **43**. In addition space guide brackets **24***b* (FIGS. 4 and 5) have recesses **24***e* for supporting and guiding the ends of the cables **33** and **34**.

With 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 head cable **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 fitments **51**. The front end shoulder **48** also receives a second drive nut **52** which threadably 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** into or 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**) moves 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 the cable grip bracket 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 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 cooperation with the cable grip bracket **44**. It will be observed in FIGS. 6 and 8 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 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 need only 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 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 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.

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5—68