May 12, 1964 W. W. HUNTRESS ETAL 3,132,351

HOSPITAL BED

Filed Oct. 17, 1961 2 Sheets-Sheet 1

FIG. 1

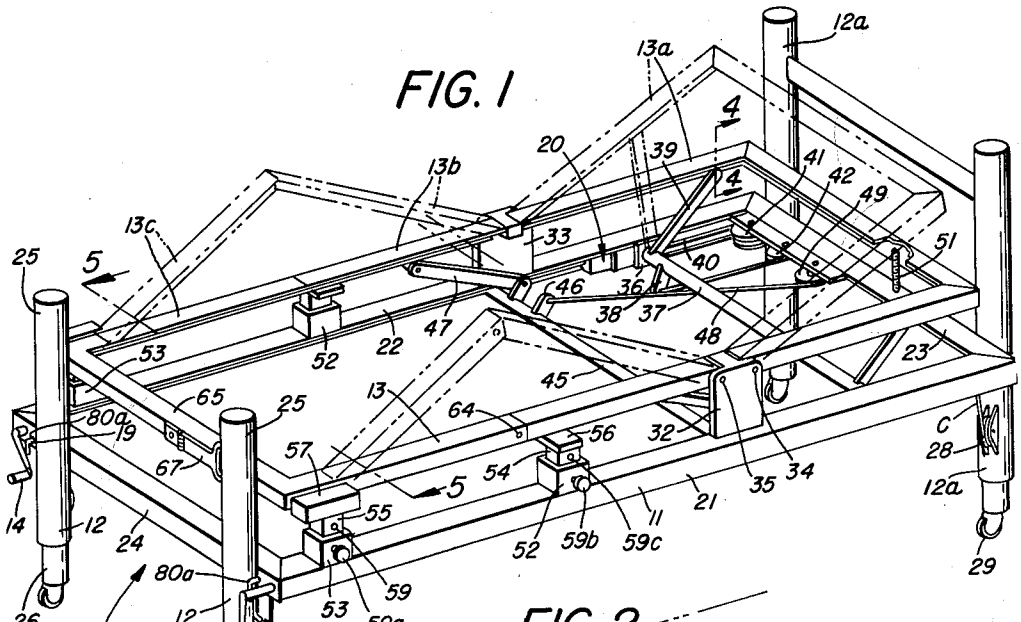
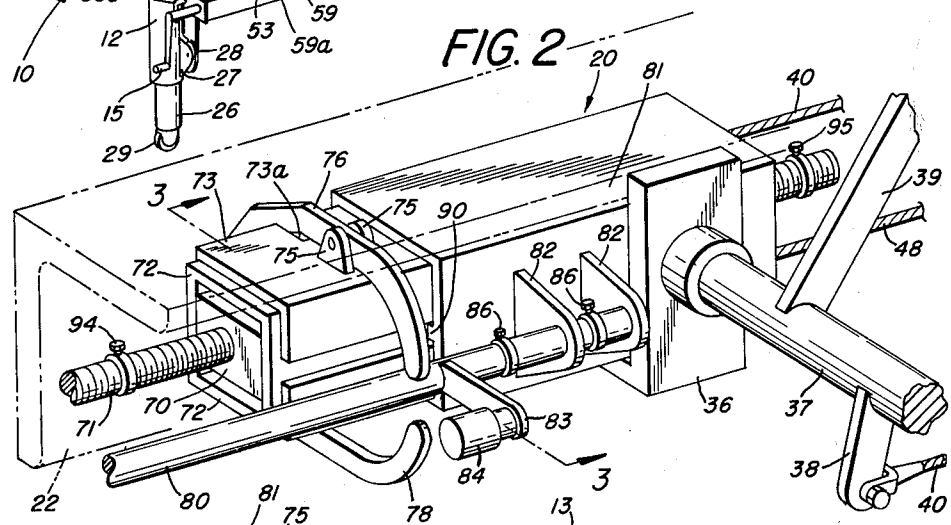


FIG. 2



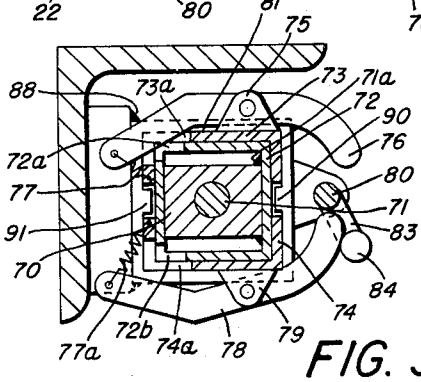


FIG. 3

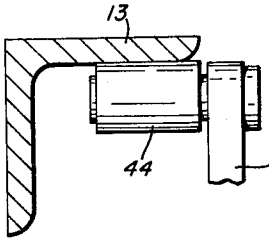


FIG. 4

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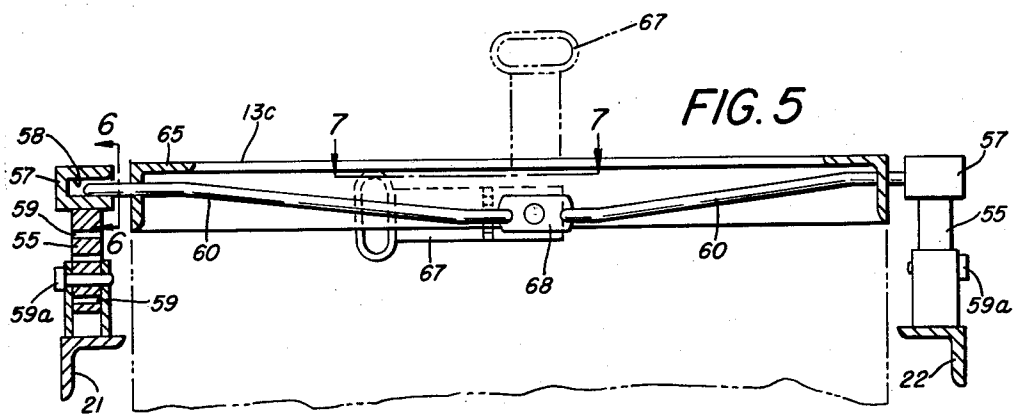


FIG. 5

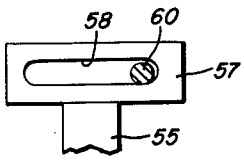


FIG. 6

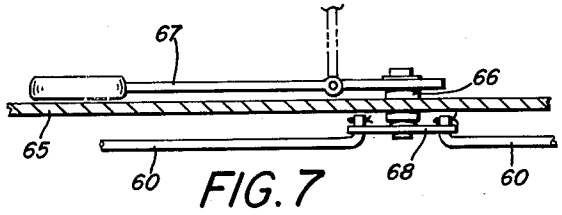


FIG. 7

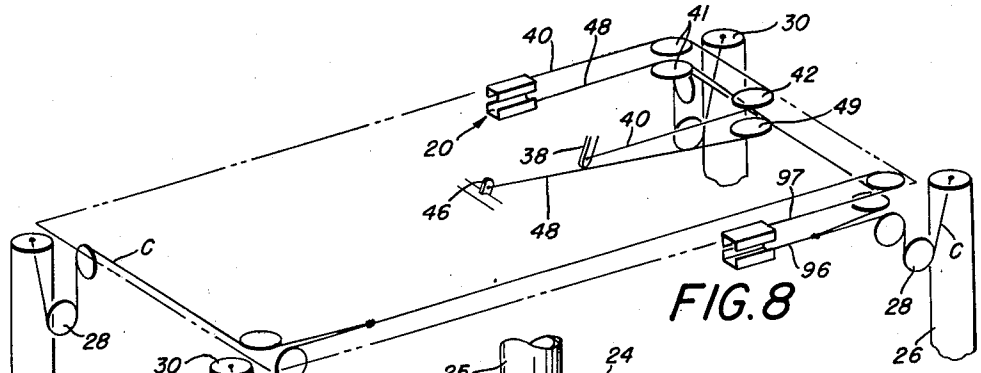


FIG. 8

FIG. 10

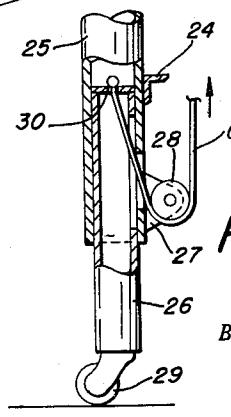


FIG. 9

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Filed Oct. 17, 1961, Ser. No. 149,478

13 Claims. (Cl. 5—63)

This invention relates to the art of bed construction and in particular has reference to improvements in hospital type beds.

In the known prior art of hospital bed construction, it has long been known that a spring frame can be pivotally associated with a main rigid supporting frame to permit a patient to be positioned thereon in any one of several different positions. In a normal instance, patients in hospitals are placed in beds wherein there is a pivoted torso portion that is swingable upwardly so as to be inclined from horizontal and thus elevate the head and shoulders of the patient using the same. Normally, this type of hospital bed is provided with a further hinged portion that is employed to support the hip and leg portions of a patient. In this regard, it is conventional to make this portion of the spring frame in two sections, with the hip section being pivoted to the main frame, while the leg portion is, in turn, pivoted to the free end of the hip portion of the frame. In this manner, there with be a "knee break" provided and the hips of the patient will be prevented from shifting during the time that the head portion of the bed is elevated.

While devices of this general type have been known for some time, the conventional prior art has contemplated the operation of the same by use of a plurality of crank handles normally provided adjacent the foot end of the bed. In this regard, it is customary to have one handle operate the torso portion of the spring frame, while another separate and independent handle is employed to create the pivotal movement necessary to form the knee break.

While devices of this general kind operate satisfactorily, the same are disadvantageous in that the need for two separate handles precludes the use of other operating handles at the foot of the bed for other purposes normally desirable in hospital bed construction. In this regard, it is often desired to elevate either the head or the foot portion of the bed so that the spring frame portion, when disposed in its flat condition, is inclined with respect to the floor. Thus, the feet or head of the patient would be elevated dependent upon which pair of leg portions were raised. In this regard, the present practice is to provide a hand threading adjustment that is manually manipulated by a nurse or other attendant to cause the legs to be raised as desired. In this regard, it is believed obvious that this is time consuming and additionally renders it difficult to raise one pair of legs the exact same amount, since if a screw type of arrangement is employed, each leg must be raised the exact same number of turns to cause an equal elevation to occur on each side of the bed.

In addition to the aforementioned disadvantages, the use of a pair of operating handles at the foot of the bed has been subject to the further disadvantage in that this arrangement prevents use of the hospital bed as a recovery chair. This is true because of the fact that these operating cranks normally have shaft portions that extend longitudinally of the bed in the central region thereof. Accordingly, there can be no pivoting or dropping of the foot section of the frame so that the bed could be shifted into the position of a chair, wherein the hip portion of the frame was horizontal, the head portion was elevated approximately to vertical and the leg portion having been dropped through the frame to be in a substantially vertical condition.

It has been found that all of the aforementioned disadvantages can be obviated by making each control handle perform two functions. Thus, by provision of two control handles, a total of four control functions can be performed.

More specifically, it has been found that if each control handle is operatively associated with a control mechanism that selectively operates either one or both of two control cables, that the individual control handle can do the work of two handles. Applied to hospital bed construction, it accordingly follows that one handle can be used to control the movement of either (1) the head section (2) the knee break or (3) the head portion and knee break in unison. Similarly, the second handle, also associated with a similar control mechanism, could elevate either (1) the foot of the bed (2) the head of the bed or (3) the head and foot of the bed in unison.

As a still further advantage over the prior art, it has been found that if these control elements are disposed in parallel proximity with the side rails of the rigid frame, and further if the spring frame is made slightly undersized with respect to the dimensions of the main frame, that the leg frame can be provided with retractable pins that will permit the leg frame, upon pin retraction, to pass through the plane of the main frame and in this fashion, the hospital bed can be converted to a chair type of structure having certain therapeutic advantages.

Additionally, it has been found that if the respective pivotal portions of the spring frame are engaged by projecting lugs carried by the main frame so as to limit pivotal movement thereof, further improved results will occur, particularly if the lugs employed are of an adjustable type wherein the extent of projection above the main frame can be controlled. In this fashion, the head portion, the hip portion and the leg portion can be positioned so as to be inclined at a certain degree with respect to the main frame.

Production of a hospital bed having the above advantageous features accordingly becomes the principal object of this invention, with other objects of the invention becoming more apparent upon a reading of the following brief specification, considered and interpreted in the light of the accompanying drawings.

Of the drawings:

FIGURE 1 is a perspective view of the improved hospital bed and showing the position of the component parts in full and chain-dotted lines.

FIGURE 2 is a perspective view of the improved transmission means.

FIGURE 3 is a sectional view taken on the lines 3—3 of FIGURE 2.

FIGURE 4 is a sectional view taken on the lines 4—4 of FIGURE 1.

FIGURE 5 is a sectional view taken on the lines 5—5 of FIGURE 1.

FIGURES 6 and 7 are sectional views taken on the lines 6—6 and 7—7 of FIGURE 5.

FIGURE 8 is a schematic, perspective view showing the cable layout of the improved hospital bed.

FIGURE 9 is a fragmentary view of one leg section being partly broken away and in section to show the means for effectuating relative movement.

FIGURE 10 is a fragmentary, perspective view of a modified form of the invention.

Referring now to the drawings and in particular to FIGURE 1 thereof, the improved hospital bed, generally designated by the numeral **10**, is shown being of generally rectangular configuration so as to include a main frame **11** and a spring frame **13**, with the respective frame members **11** and **13** being elevated above floor level by foot legs **12, 12** and head legs **12***a*, **12***a*; the arrangement being such that a handle **14** is operable to move head portion **13***a*, hip portion **13***b* and foot portion **13***c* of the spring frame **13** between the full and chain-dotted line positions of FIGURE 1 upon rotation thereof. Similarly, the handle **15** can be rotated to elevate either the foot or head of the bed above floor level, and in this regard, switching means **20, 20** are shown associated with each handle mechanism **14** and **15** so as to permit the same to perform different functions depending upon the setting of the switching means **20**, as will be described.

Considering first the structure of the main rigid frame **11**, it will be seen that the same is a generally rectangular configuration so as to include opposed side rails **21** and **22** that extend longitudinally of the bed **10** for interconnection with a head rail **23** and a foot rail **24**. Additionally, the rails **23** and **24** are shown having secured thereto, as shown in FIGURE 9, tubular leg elements **25, 25** within which may be telescoped tubular members **26, 26**. Each member **25** is shown as further including a bracket **27**, about which a pulley **28** is journalled, while each member **26** is provided with a caster **29** and an apertured top plate **30**, through which the cable C of FIGURE 9 may be passed and knotted. In this fashion, upward movement of cable C in FIGURE 9 as shown by the arrow, will result in relative upward movement of leg element **25** to, accordingly, cause elevation of frame **11**, with such upward movement being achieved by movement of the cables as shown in FIGURE 8, as will hereinafter be described.

In addition to the aforementioned component parts, the side rails **21** and **22** each include upright standards **32** and **33** that are illustrated as being transversely opposed to each other to permit pivotal mounting, as at **34** and **35**, of certain components of spring frame **13**. A pair of opposed mounting pads **36, 36** (see FIGURE 2) are also secured to rails **21** and **22** adjacent switching means **20** to receive and journal thereon rod **37**, with this rod **37** having lugs **38** and **39** secured thereto as shown in FIGURE 1; the arrangement being such that cable **40** may have one end attached to lug **38**, while the other end thereof may be played around pulleys **41** and **42** for connection with switching means **20**, as will be more fully described in the ensuing paragraphs. Also in this regard, the lug arm **39** (see FIGURE 4) is provided with a roller **44** that can engage the underside of the L-shaped frame component of spring frame **13** and in this manner, upon pivoting of rod **37**, the head portion **13***a* of spring frame **13** will be raised to the chain-dotted line position of FIGURE 1.

A similar rod **45** extends transversely between the rails **22** and **21** and is also equipped with lugs **46** and **47**, with lug **46** connecting to the free end of cable **48**, while lug **47** has its outer end provided with a roller (not shown) that slidably engages the underside of hip frame **13***b* in a manner similar to the engagement of roller **44** with head portion **13***a*. In this regard, the cable **48** is played around pulley **49**, as well as pulley **41**, for connection with switching means **20**, as will be described.

In addition to the aforementioned component parts, the head rail **23** includes at least one upright pin **51**, with this pin **51** being preferably threaded so that its extent of projection above head rail **23** can be adjusted. In similar fashion, each side rail **21** and **22** includes sockets **52** and **53**, within which are slidably received shiftable blocks **54** and **55**, with block **54** terminating in a head member **56**, while block **55** terminates in a head member **57**, as shown in FIGURE 1. In this regard and referring particularly to FIGURES 5 and 6 of the drawings, the head member **57** has an elongate slot **58** provided on one face thereof for reception of the shaft **60** that is retractably carried by the foot portion **13***c* of spring frame **13**, as will be described. Similarly, each block **55** has transverse bores **59, 59** provided therein and in this manner, a pin **59***a* can be passed through appropriate openings in each socket **53** and positioned within any one of the openings **59** to control the height of the slot **58** above side rails **21** and **22**. It is to be understood in this regard that a similar pin **59***b* is provided for each socket **52**, with the block members **54, 54** thereof having bores **59***c*, **59***c* to facilitate adjustment of head member **56** thereof with respect to side rails **21** and **22**.

Turning next to a detailed consideration of the spring frame **13**, it has been previously described that the head portion **13***a* thereof and the hip portion **13***b* thereof are pivoted, as at **34** and **35**, to the upright standards **32** and **33**. Additionally, however, it will be seen that the leg portion **13***c* thereof is pivoted, as at **64**, to the projecting end of hip frame **13***b*, with the end transverse rail thereof defining the foot portion of spring frame **13**. In this regard, the rail **65** rotatably supports pin member **66**, with one axial end of this pin member **66** having secured thereto a hinged handle member **67**, while the opposed inner axial end is secured to a rectangular plate **68**, to which are pinned shafts **60, 60**. In this fashion, the shafts will move about the pivot point of pin **66** and the pin-like ends thereof will either be retracted from or inserted in opposed slots **58, 58** as shown in FIGURE 5.

As mentioned, the handle **67** is hinged as shown in FIGURES 1 and 7 so that after the same has been moved around its pivot point it may then be swung around the hinge point to avoid interference with the main frame during movement to the chair position.

Considering next the structure of the switching means **20**, it will first be understood that both switching means are preferably identical in structure and accordingly one structure only will be described, with it being understood that the remaining member is constructed in like fashion. Thus, referring to FIGURE 2, it will be seen that each means **20** includes an internal core member **70** that is provided with an internally threaded aperture that permits reception of the same about a threaded shaft member **71**, with one said shaft member **71** being rotated by handle **14**, while the opposed shaft member **71** is operated by handle **15**. Encircling each core member **70** is a hollow guide member **72**, preferably of generally square configuration and being fixed to core **70** as by weld **71***a*, with through notches **72***a* and **72***b* being provided on adjacent corners of each guide member **72** for purposes to be described. Slidably received about each guide member **72** are opposed control elements **73** and **74**, both of which are generally U-shaped in cross-sectional configuration and both of which slidably engage and overlie the guide member **72**, as best shown in FIGURES 2 and 3 of the drawings. Additionally, each control element **73** has provided thereon upright bosses **75, 75**, between which are pinned a lever arm **76**, with this lever arm **76** being capable of being moved into engagement with a notch **73***a* that is provided on one corner of the control element **73**. A spring **77** normally biases the lever arm **76** to the position of FIGURE 3, and in this regard, it is to be understood that a similar lever arm **78** is pivoted to the control element **74** and is received between bosses **79, 79** thereof so as to be engageable within slot **74***a* upon biasing thereof by spring **77***a*.

For the purposes of effectuating adjustment of switching means **20**, the respective lever arms **76** and **78** may be moved out of engagement with the respective notches **73***a* and **74***a* by the rotation of a shaft member **80** that

is journaled about an outer casing **81**, with bosses **82, 82** permitting such journaling of the shaft **80** thereon. An arm **83** carried by shaft **80** has a roller element **84** provided thereon for engagement with the arcuate end of either lever arm **76** or lever arm **78** to cause the same to be pivoted and accordingly disengaged from a position within the aligned notches **72***a*, **73***a* or **72***b*, **74***a*. In this regard, axially spaced lugs **86, 86** limit axial shifting of rod **80**, and it is to be understood that each shaft **80** terminates adjacent foot rail **24** in a handle portion **80***a* that is disposed adjacent either handle **14** or **15** (see FIGURE 1).

With reference to the construction of the outer casing **81** and referring to FIGURE 3 of the drawings, it will be seen that this member is of generally hollow, square configuration so as to encircle, in sliding fit, the control elements **73** and **74**. Additionally, each outer casing **81** is secured to the appropriate side rail member **21** or **22** by use of welds **88**, with the internal wall of the outer casing **81** preferably being provided with opposed longitudinally extending guides **90** and **91** that serve to guide the elements **73** and **74** during relative movement thereof.

For the purpose of limiting the amount of movement of members **73** and/or **74** relative to casing **81** or shaft member **71**, the latter (shaft member **71**) has provided thereon spacer lugs **94** and **95** (see FIGURE 2), the arrangement being such that these lug members engage the core **70** and accordingly limit the extent of travel thereof. In this regard, lug **95** preferably limits the core **70** to movement to a position where notches **72***a* and **72***b* will be in alignment with notches **73***a* and **74***a*, respectively.

In connection with the description of the switching means **20**, it is to be remembered that one such switching means only has been described and it will be assumed that the switching means **20** described is associated with the cables **40** and **48**, as well as handle **14**. It is to be understood, however, that an identical switching unit is associated with the cables **97** and **96** to control the movement of the various leg members and which are operated by handle **15**.

In use or operation of the improved mechanism, it will be first assumed that the component parts have been assembled as indicated and at this time, it will further be assumed that the levers **76** and **78** of each member are locked in position between longitudinally aligned notches **73***a* and **74***a*. In this condition, rotational movement of member **71** will result in axial movement of both cables **40** and **48**, for example, in unison. If it is desired to move only the cable **40**, for example, the shaft **80** may be rotated, whereupon the roller **84** will pivot into engagement with the lever arm **78** so as to disengage the same from notches **74***a* and **72***b* (see FIGURE 3). Upon such disengagement, the members **70**, **72** and control element **73** will move relatively of the control element **74** as a unit with the result that cable **40** will move, while cable **48** will remain stationary. Conversely, if it is desired to move only the cable **48**, the shaft **80** may be moved in an opposite direction, at which time the lever **76** will be disengaged from notches **72***a* and **73***a* to permit relative movement to occur between members **72** and **73**. It is believed apparent that this arrangement will permit selective operation of either or both cables **40** and **48**, and accordingly, upon movement of either member **73** or **74** in the schematic view of FIGURE 8, cable movement will occur as indicated thereon.

Similarly, when the handle **15** is operated, the switching means associated therewith can control movement of either or both of cables **97** and **96**. In this fashion, either foot or head legs **12** and **12***a*, respectively, can be raised, or if desired, said legs can be raised in unison.

By like token, if it is desired to merely lower the end of the bed and create a chair type of structure, it is merely necessary that the handle **67** be pivoted, at which time an eccentric pivoting of shaft members **60, 60** will occur to cause the same to disengage from opposed slots **58, 58**, at which time the foot portion **13***c* may fall around its pivot point **64** so that the bed may be used as a chair upon elevation of head section **13***a*. Also to incline the head of the bed, the pin **51** may be adjusted, while inclination of the foot or hip portion may be achieved by adjustment of sockets **52** and **53**, as described.

The modified form of the invention shown in FIGURE 10 merely contemplates the provision of an alternate type of support arrangement between the spring frame portion **13***b* and the main frame **11** and is designed to replace the socket member **52** that has been described in connection with FIGURES 1 through 9 of the drawings.

Accordingly, in FIGURE 10, the hip portion **13***b* of spring frame **13** is shown having pivoted thereto a frame member **100**, with the usual bolt **101** being employed so as to permit swingable mounting of the member **100** with respect to the frame portion **13***b*. The depending end of member **100** is provided with a roller **102**, with this roller being journaled on the projecting end of a transversely extending shaft member **103**; the arrangement being such that an identical frame member **100** and roller **102** are provided on the transversely opposed hip portion **13***b* so as to be connected by the transversely extending shaft member **103**.

Additionally, each side rail portion **21** and **22** has the horizontal face **21***a* thereof provided with a groove **104**, within which each roller **102** may be received as shown in FIGURE 10. Similarly, a block **105** is secured to the face **21***a* at a longitudinally spaced distance from the slot **104** and in this fashion, the roller **102** can be moved out of slot or depression **104** and rolled into contact with block **105**. This will cause a general lowering of the hip portion **13***b* around pivot point **35**. In this regard, it is to be understood that upon operation of the handle **67** the shaft members **60, 60** could be retracted and subsequently engaged with the face surfaces **21***a*, **21***a* of the opposed side rails **21** and **22** and in this fashion, the hip portion **13***b* and foot portion **13***c* will be in coplanar relationship with each other but would be inclined with respect to the side rails **21** and **22**. In use of this type of arrangement, it is preferred that the head portion **13***a* also be lowered so as to permit the small area of the back to be elevated to the maximum height above main frame **11**, while the head and foot portions of the spring frame will be dropped into adjacency with end rails **23** and **24**, respectively.

It is to be understood that in this regard, the block **105** could be replaced by a "gatch" having a series of pockets within which the member **102** could be received, and in this manner, various settings could be obtained.

While a full and complete disclosure of the invention has been made in accordance with the dictates of the patent statutes, it is to be understood that the invention is not intended to be so limited. Accordingly, where appropriate, modifications of the invention may be resorted to without departing from the spirit hereof or the scope of the appended claims.

This application is a continuation-in-part of applicant's application, Serial No. 757,041, filed August 25, 1958, and now abandoned.

What is claimed is:

1. A control device for use with a pair of control cables, comprising; a frame; a screw rotatably carried by said frame and having an operating handle; a lug threaded on said screw; an elongate guide member fixed to and encircling said lug; a first control element secured to one said cable and partially surrounding said guide member in slidable relationship therewith; a second control element secured to said remaining cable and partially surrounding said guide member in slidable relationship therewith; first and second lever arms carried by said first and second control elements and each being selectively engageable with said guide member in interlocked relationship therewith; and means disposed adjacent said handle for selectively moving said levers into and out of interlocked relationship with said guide member.

2. A hospital bed of the character described, comprising; a rigid frame of substantially rectangular configuration; front and rear supporting legs connected to said frame; a spring frame including a head portion and a base portion, respectively pivoted to said frame; a first shaft extending longitudinally of said frame and being rotationally supported thereon; a first drive member movable axially of said first shaft; first and second control elements supported by said first drive member and being respectively connected to said head and base portion by control cables, with said first and second control elements respectively pivoting said head and base portion relatively of said rigid frame upon interlocking thereof with said first drive member, followed by movement of said first drive member axially of said first shaft; first cam and lever means carried by said rigid frame and selectively controlling interlocking of each of said first and second control elements with said first drive member during rotation of said first shaft; a second shaft extending longitudinally of said frame and being rotationally supported thereon; a second drive member movable axially of said second shaft; third and fourth control elements supported by said second drive member and being respectively connected to said front and rear supporting legs by control cables, with said third and fourth control elements respectively moving said front and rear supporting legs relatively of said rigid frame upon interlocking thereof with said second drive member followed by movement of said second drive member relatively of said second shaft; and second cam and lever means carried by said rigid frame and selectively controlling interlocking of said third and fourth control elements with said second driving member during rotation of said second shaft.

3. The device of claim 2 further characterized by the fact that said first drive member will move said first control element axially of said first shaft during interlocking between said drive member and said first control element, will move said second control element axially of said first shaft during interlocking between said drive member and said second control element, and will move said first and second control elements axially of said first shaft in unison during interlocking between said drive member and said first and second control elements.

4. The device of claim 2 further characterized by the fact that said second drive member will move said third control element axially of said second shaft during interlocking between said drive member and said third control element; will move said fourth control element axially of said second shaft during interlocking between said drive member and said fourth control element; and will move said third and fourth control elements axially of said second shaft in unison during interlocking between said drive member and said third and fourth control elements.

5. A hospital bed of the character described, comprising; a rigid frame; a spring frame having head and base portions pivoted to said rigid frame; first and second pairs of supporting legs secured to opposed ends of said rigid frame; an operating handle disposed adjacent one end of said rigid frame; a driving member movable relatively of said rigid frame in a lineal direction upon operation of said operating handle; first and second control elements secured to said head and base portions by control cables and effectuating pivotal movement thereof relatively of said frame upon movement of said control elements relatively of said rigid frame; and cam and lever means for selectively interlocking either of said control elements with said driving member for movement therewith upon operation of said operating handle; said control member that is interlocked with said driving member pivoting said spring frame portion associated therewith upon movement of said driving member.

6. The device of claim 5 further characterized by the fact that said first and second control elements will pivot said base and head portions together when both of said

control elements are interlocked with said moving drive element.

7. The device of claim 5 further characterized by the presence of a second drive member; third and fourth control elements secured to said first and second pairs of legs by cables and second cam and lever means for selectively interlocking either of said control elements with said drive member; said third and fourth control elements shifting said first and second pairs of legs in unison relatively of said frame during interlocking between said second drive member and said third and fourth control elements; said third control element shifting said first pair of legs in unison relatively of said frame during interlocking between said second drive means and said third control element; said fourth control element shifting said second pair of legs in unison relatively of said frame during interlocking between said second drive means and said fourth control element.

8. A hospital bed of the character described, comprising; a rigid frame of substantially rectangular configuration; front and rear supporting legs connected to said frame; a spring frame including a head portion and a base portion respectively pivoted to said frame; a first shaft extending longitudinally of said frame and being rotationally supported thereon; a driving member movable axially of said shaft; first and second control elements supported by said driving member and being respectively connected to said head and base portions by control cables, with said control elements respectively pivoting said head and base portions relatively of said rigid frame upon interlocking thereof with said drive member followed by movement of said drive member relatively of said shaft; and cam and lever means carried by said frame and selectively interlocking said control elements with said drive member for movement thereon during rotation of said shaft.

9. The device of claim 8 further characterized by the presence of means for selectively moving said front and rear supporting legs relatively of said frame.

10. A hospital bed of the character described, comprising; a rigid frame of substantially rectangular configuration; front and rear supporting legs connected to said frame; a spring frame including a head portion and a base portion respectively pivoted to said frame; a shaft extending longitudinally of said frame and being rotationally supported thereon; a driving member movable axially of said shaft; first and second control elements supported by said driving member and being respectively connected to said front and rear supporting legs by control cables, with said control elements respectively moving said front and rear supporting legs relatively of said rigid frame upon interlocking thereof with said driving member followed by movement of said driving member relatively of said shaft; and cam and lever means carried by said frame and selectively controlling interlocking of said control elements with said driving member during rotation of said shaft.

11. The device of claim 10 further characterized by the presence of means for pivoting said head and base portions of said base frame relatively of said rigid frame.

12. The device of claim 8 further characterized by the fact that said drive member moves said first control element axially of said shaft upon interlocking between said drive member and said first control element; moves said second control element axially of said shaft upon interlocking between said drive member and said second control element; and moves said first and second control elements in unison axially of said shaft upon interlocking of said drive member with said first and second control elements.

13. The device of claim 10 further characterized by the fact that said drive member moves said first control element axially of said shaft during interlocking between said drive member and said first control element; moves said second control element axially of said shaft during

interlocking between said drive member and said second control element; and moves said first and second control elements in unison axially of said shaft during interlocking between said drive member and said first and second control elements.

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