Aug. 29, 1969 E. A. MORRISON 3,462,772

CENTER-PIVOTING BED

Filed Aug. 11, 1967 2 Sheets-Sheet 1

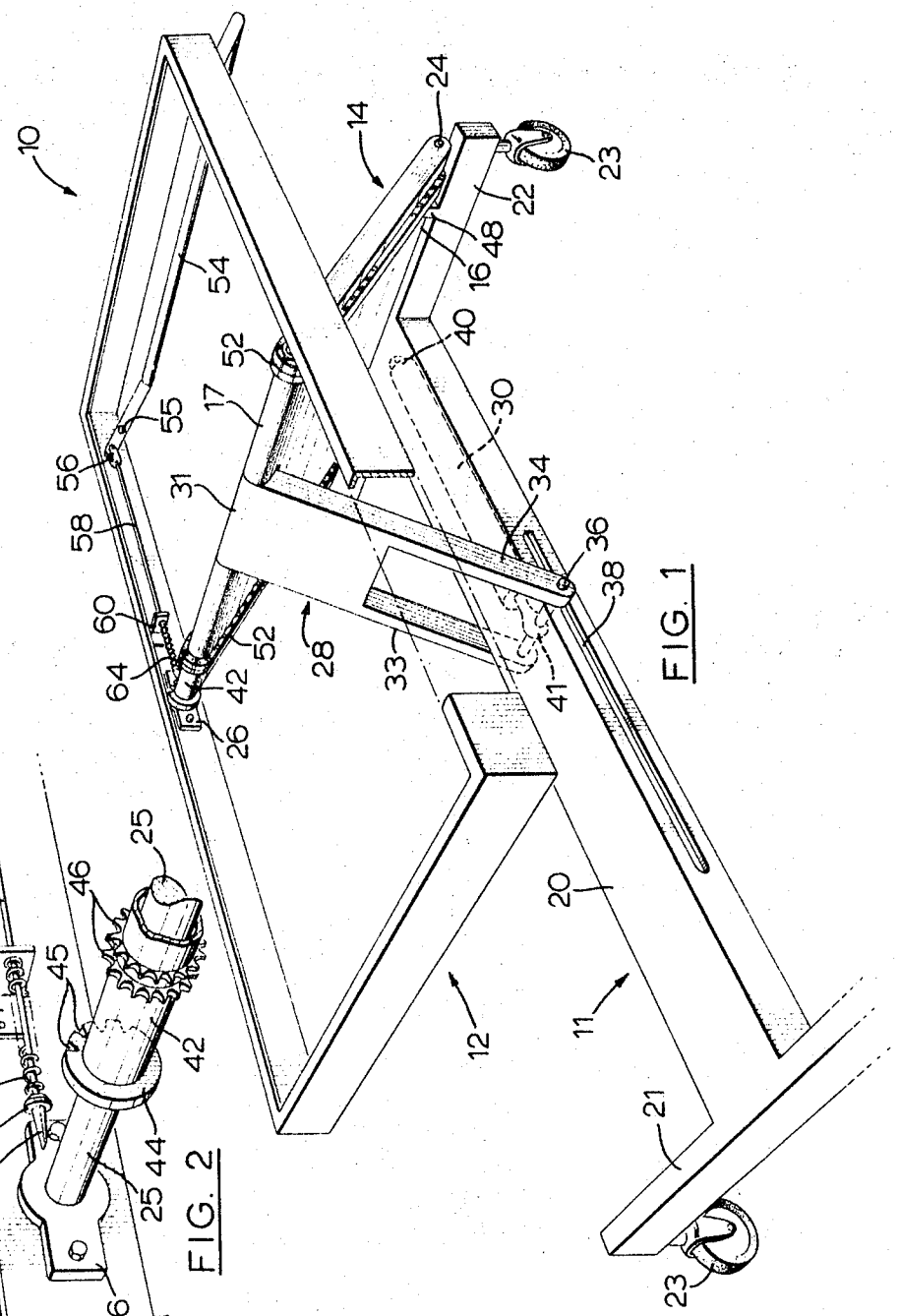


FIG. 1

FIG. 2

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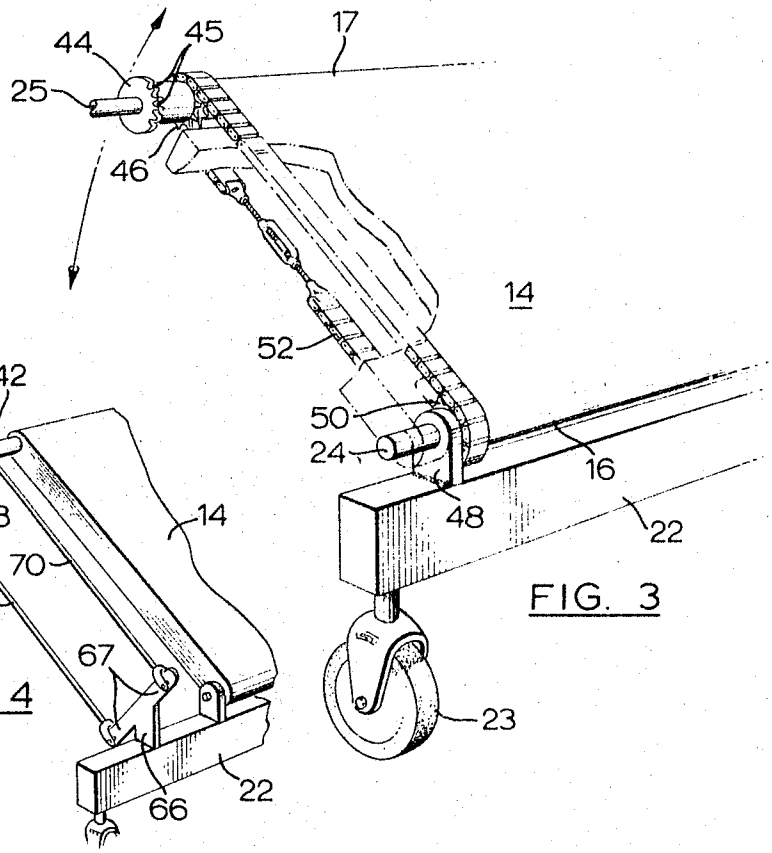


FIG. 3

FIG. 4

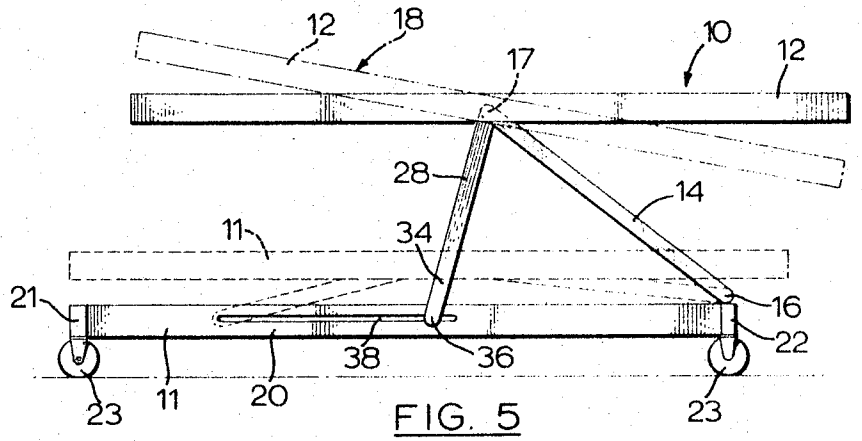


FIG. 5

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CENTER-PIVOTING BED

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ABSTRACT OF THE DISCLOSURE

A bed having a base and a vertically displaceable mattress-supporting frame which is pivoted at its mid-point to one end of a connecting arm of which the other end is pivoted to the base. Means are provided for keeping the frame in a horizontal position while being lowered or raised, but this means can be selectively disconnected from the frame to allow the latter to assume an angular orientation.

This invention relates to a bed of which the mattress-supporting frame is adapted to be raised and lowered with respect to the floor, and wherein the frame, at any vertical position, can be tilted to place the head-end either above or below the foot-end. The bed to which this invention relates is particularly suitable for use in hospitals.

The object of this invention is to provide a bed of the above type, simple in construction and easy to operate.

Accordingly, this invention provides a bed, comprising: a base, a frame for supporting a mattress above said base, a connecting arm mounted at one end to said base to pivot in a vertical plane about a first axis, said frame being mounted at substantially its mid-point to the other end of said connecting arm for pivotal movement with respect thereto about a second axis parallel with the first axis, means for pivoting said connecting arm about said first axis to raise and lower said frame, and means for maintaining said frame in a horizontal orientation during raising and lowering of said frame.

Two embodiments of this invention are shown in the accompanying drawings, in which like numerals denote like parts throughout the several views, and in which:

FIGURE 1 is a partly broken-away perspective view of a portion of the bed in accordance with this invention;

FIGURE 2 is a partly broken-away perspective view, to a larger scale than FIGURE 1, of one portion of the bed of FIGURE 1;

FIGURE 3 is a partly broken-away perspective view of another portion of the bed of FIGURE 1;

FIGURE 4 is a view similar to FIGURE 3, to a smaller scale, showing an alternate construction; and

FIGURE 5 is a schematic elevational view of the bed of FIGURE 1 showing three different orientations that the mattress-supporting frame is capable of assuming.

Turning first to FIGURE 5, the bed **10** of this invention is seen to comprise generally a base **11**, a frame **12** for supporting a mattress above the base **11**, a connecting arm **14** mounted at one end **16** for piovtal movement in a vertical plane parallel with the long dimension of the bed **10**, and connected at its other end **17** to the frame **12** at approximately the mid-point of the latter. Means, later to be described, are provided for causing the connecting arm **14** to pivot about its end **16**, and further means are provided, selectively operable, to cause the frame **12** to remain in a horizontal position during elevation and lowering. These latter means can be disconnected in order to permit the frame **12** to assume an angled position as shown at **18** in FIGURE 5.

Attention is now directed to FIGURE 1 which shows, in perspective, part of the base **11**, the frame **12**, the means by which the latter is raised and lowered, and the

means by which the frame **12** is kept in a horizontal position during raising and lowering.

The base **11** includes a hollow rectangular member **20**, connected at either end to T-bars **21** and **22**, both of which are supported on a pair of castor wheels **23** (only two of the four wheels **23** visible).

In FIGURE 1 the connecting arm **14** is shown to have a width comparable to the width of the frame **12**, and is pivoted about a shaft **24** to the T-bar **22**. At the end **17** of the connecting arm **14** is pivotally mounted a shaft **25**, which is not visible in FIGURE 1, but which can be seen in FIGURE 2. The shaft **25** is secured at either end to the frame **12** by means of plates **26** (only one such plate **26** visible in each of FIGURES 1 and 2). The connection between the shaft **25** and the frame **12** is at substantially the mid-point of the latter, such that the frame **12** can be easily pivoted away from the horizontal position, when and if this should become necessary.

The raising and lowering of the frame **12** is accomplished by means of a further connecting arm **28**, and a hydraulic cylinder **30** (shown in dotted lines in FIGURE 1). The connecting arm **28** is pivoted at its upper end **31** about the shaft **25**, and is thus pivoted to the upper end **17** of the connecting arm **14**. The lower end of the further connecting arm **28** is bifurcated into two arms **33** and **34**, which constitute a kind of clevis between which a clevis pin **36** extends. The clevis pin **36** is adapted to slide in a pair of slots **38** (only one visible) in the member **20** of the base **11**. The right hand end **40** of the hydraulic cylinder **30** is fixed to the base **11**, and the piston rod **41** of the hydraulic cylinder **30** is secured to the clevis pin **36**. Thus, extension and retraction of the piston rod **41** causes the connecting arms **14** and **28** to geniculate, thereby causing the frame **12** to be raised and lowered.

The means by which the frame **12** is maintained in a horizontal orientation during its raising and lowering will now be described with reference to FIGURES 2 and 3 of the drawings.

Referring to FIGURE 2, a short tubular element **42** is mounted rotatably about the shaft **25**. In FIGURE 1, element **42** is shown in its assembled position, adjacent the side of the frame **12**. A further identical tubular element **42** is located at the opposite end of the shaft **25** adjacent the other side of the frame **12**, but it is partly hidden by the frame **12**. Each tubular element **42** has, at one end, a flange **44** rigidly secured thereto. The flange **44** has a plurality of radial slots **45** for a purpose shortly to be described. At the other end of each tubular element **42** are rigidly secured two pinion members **46**. The T-bar **22** has two upstanding projections **48**, of which one is visible in FIGURE 3. The shaft **24** about which the connecting arm **14** pivots passes through the projections **48**. Rigidly secured to each projection **48** is a further pair of pinion members **50** identical to the pair **46** of pinion members. Thus, the connecting arm **14** may pivot about the shaft **25** while the pair **50** of pinion members remains in fixed relation with the T-bar **22**. An endless chain **52** is tightly engaged around both pairs **46** and **50** of pinion members such that the pinion members **46** always remain in the same orientation, regardless of the angular position of the connecting arm **14**. That is to say, the uppermost spoke or tooth of one of the pinion members **46** will always remain the uppermost tooth, regardless of the angular position of the connecting arm **14**.

In FIGURE 1 is shown a release bar **54** pivoted to the frame **12** at two pivot points **55**, of which one is visible in FIGURE 1. Connected at **56** to the release bar **54** is a rod **58** which runs parallel with the frame **12** and passes through a bracket **60** attached to the frame **12**. The rod **58** has a wedge-shaped end **61** and a flange **62** (see FIGURE 2). A compression coil spring **64** is compressed be-

tween the flange **62** and the bracket **60**, thereby urging the rod **58** to the left. When the tubular element **42** shown in FIGURE 2 has been slid along the shaft **25** to its proper position immediately adjacent the frame **12**, the wedge-shaped end **61** on the rod **58** is adapted to engage in one or the other of the radial slots **45** in the flange **44**. Because the flange **44** always maintains the same orientation regardless of the position of the connecting arm **14**, it is possible to lock the frame **12** in a horizontal position, maintained throughout its raising and lowering, merely by engaging the rod **58** into the appropriate one of the radial slots **45**. FIGURE 1 shows this engagement. There is, preferably, another rod **58** along the opposite "nearer" side of the frame **12**, engaging with the flange on the other tubular element, but none of this is visible, being hidden by the frame **12** itself.

If it is desired to release the frame **12** from its locking relation with the flange **44**, the operator merely pushes downwardly on the release bar **54**, thereby retracting the wedge-shaped end **61** from engagement with the flange **44**, releasing the frame to pivot about the shaft **25**. The operator can then, if desired, place the frame **12** in, for example, the Trendelenburg position, for which another slot **45** is provided in the flange **44**. Pressure on the release bar **54** is then relaxed, thereby letting the wedge-shaped end **61** move to the left and engage the appropriate Trendelenburg slot.

FIGURE 4 shows an alternate construction for assuring that the flange **44** always remains in the same orientation during the raising and lowering. Instead of the sprockets **46** and **50** and the chain **52**, there is provided on the T-bar **22** an upstanding member **66** having two wings **67** disposed at approximately a 45° angle to the horizontal. Two similar wings **68** are fixed to the tubular element **42**. Two parallel rods **70** extend between corresponding wings, as shown. Each rod **70** is pivotally connected at either end to a wing **67** and a wing **68**, and the length and direction of the line extending between the pivot axes of either rod are at all times the same as the length and direction of the line extending between the pivot axes of the connecting arm **14**. It will be appreciated that one of the rods **70** could be dispensed with without impairing the operation. Furthermore, the angle 45° is not critical. The pairs of wings could, for example, extend roughly vertically.

Although a hydraulic cylinder **30** has here been shown as the means by which the frame **12** is raised and lowered, those versed in this field will be aware that other means, such as an electrically or manually operated mechanical screw or a ratchet, could also be employed for this purpose.

What I claim as my invention is:

1. A bed comprising:
- a base,
- a frame for supporting a mattress above said base,
- a connecting arm mounted at one end to said base to pivot in a vertical plane about a first axis,
- said frame being mounted at substantially its mid-point to the other end of said connecting arm for pivotal movement with respect thereto about a second axis parallel with the first axis,
- means for pivoting said connecting arm about said first axis to raise and lower said frame,
- and means for maintaining said frame in a horizontal orienttion during raising and lowering of said frame, said last-mentioned means for maintaining including:
  - a first pinion member secured to said base and coaxial with said first axis,
  - a second pinion member mounted for rotation coaxially with said second axis, the two pinion members having the same diameter,

  - an endless, flexible member engaged tightly around both pinion members, and
  - means for selectively locking said frame to said second pinion member.

2. A bed as claimed in claim **1**, in which said endless flexible member is a chain, and in which said pinion members are spur gears adapted to engage with said chain.

3. A bed as claimed in claim **1** in which said means for pivoting comprises:
- a further connecting arm having its one end pivotally connected to said first-mentioned connecting arm at a location spaced from said first axis, and its other end slidable horizontally toward and away from said first axis, such that movement of the other end of said further connecting arm toward said first axis causes said frame to rise relative to said base.

4. A bed as claimed in claim **3**, in which a hydraulic cylinder provided in said base is operable to move said other end of said further connecting arm toward and away from said first axis.

5. A bed comprising:
- a base,
- a frame for supporting a mattress above said base,
- a connecting arm mounted at one end to said base to pivot in a vertical plane about a first axis,
- said frame being mounted at substantially its mid-point to the other end of said connecting arm for pivotal movement with respect thereto about a second axis parallel with the first axis,
- means for pivoting said connecting arm about said first axis to raise and lower said frame,
- and means for maintaining said frame in a horizontal orientation during raising and lowering of said frame, said last-mentioned means for maintaining including:
  - a member mounted for rotation coaxially with said second axis and carrying a first pivot remote from said second axis,
  - a second pivot fixed with respect to said base, the second pivot being spaced from said first axis the same distance as separates said first pivot from said second axis, and
  - an elongated rigid member pivoted at one end to said first pivot and at the other end to said second pivot, the elongated rigid member maintaining the first and second pivots apart the same distance as separates said first axis from said second axis.

6. A bed as claimed in claim **5**, in which said means for pivoting comprises:
- a further connecting arm having its one end pivotally connected to said first-mentioned connecting arm at a location spaced from said first axis, and its other end slidable horizontally toward and away from said first axis, such that movement of the other end of said further connecting arm toward said first axis causes said frame to rise relative to said base.

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U.S. Cl. X.R.

108—147; 254—122