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Yates et al.

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[54] **INVALID BED**

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[51] **Int. Cl.²** **A61G 7/02**

[58] **Field of Search** 5/66–69, 90, 5/91; 128/33

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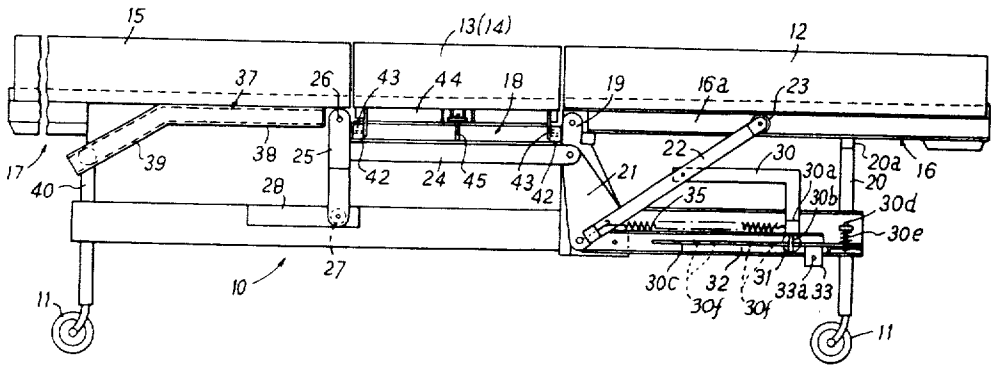
Primary Examiner—Casmir A. Nunberg

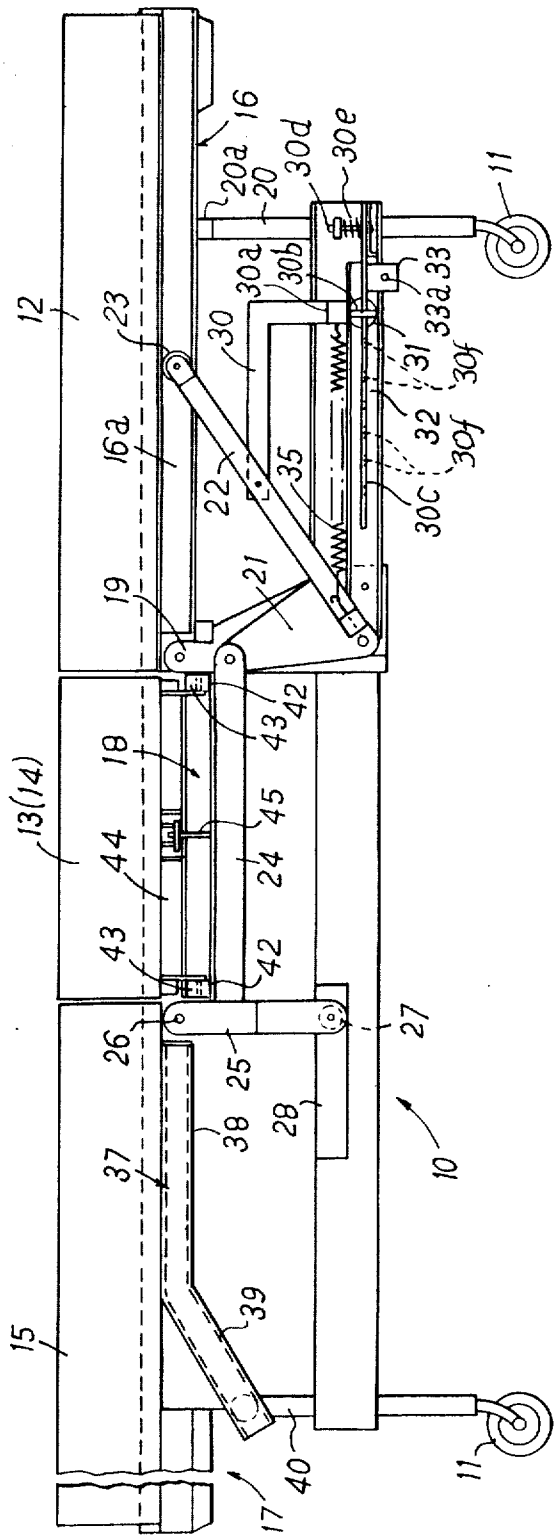
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[57] **ABSTRACT**

A bed for a bed-ridden person has head, foot and intermediate mattress-carrying sections supported end-to-end on a main frame. The sections are supported by a system of levers, pivots and rollers, which enables the head section to be inclined upwards in any one of a number of angular positions and simultaneously causes the intermediate and foot sections to be moved in a direction towards the foot of the bed, the intermediate section to take up a position slightly inclined in the opposite sense to the head section, and the foot section to be lowered in height, whilst maintaining an overall smooth profile of the upper surface of mattress portions carried by the sections. The intermediate section is divided on the centre-line of the bed and enables a gap to be opened up between its two parts, the gap being central or to either side of the centre-line of the bed as desired.

5 Claims, 1 Drawing Figure




16
20a
20
30d
30e
11
12
23
30a
30b
33
33a
30
31
30f
16a
32
30f
22
35
30c
19
21
42
43
18
13(14)
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44
24
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40
11
17

INVALID BED

SUMMARY OF THE INVENTION

This invention relates to beds and more particularly to beds intended for bed-ridden persons.

According to this invention there is provided a bed comprising a main frame, first, second and third mattress section supports mounted end-to-end on the main frame, the first support having its end nearer the second support pivotally mounted on the main frame and providing a lengthwise extending guideway, a second guideway extending lengthwise of the frame and disposed beneath the third support, a guide element engaged in the second guideway, a first lever providing three pivot points arranged in the form of a triangle, such lever being pivotally mounted on the frame by one of the pivot points and having at a second of the pivot points a guide element engaged in the guideway, a second lever providing three pivot points arranged in the form of a triangle which pivot points are respectively connected to the end of the third support nearer the second support, to the third of the pivot points of the first lever at a location adjacent the end of the first support nearer the second support, and to the guide element which is engaged in the second guideway, a connection between the frame and a location on the third support spaced away from the end thereof which connection operates to lower the other end of the third section on movement of the third section lengthwise of the bed in a direction away from the second section, the second mattress section support being connected to the second lever, and means for locating the first mattress support in selected positions about its pivotal mounting on the main frame.

According to a preferred feature of the invention, the second support comprises a base member which is connected to the second lever, a pair of sub-frames which are mounted side by side on the base member and which are movable laterally towards and away from each other into any one of at least three positions, whereby the sub-frame can be positioned to form a gap between them in any one of three positions transversely of the bed, and means for locating each of the sub-frames in each of its three positions.

Preferably the connection comprises an inclined third guideway and an element movable along the guideway, which inclined guideway and element are connected one to the frame and the other to the third support at the above mentioned location.

BRIEF DESCRIPTION OF THE DRAWING

One embodiment of the invention will now be described by way of example with reference to the accompanying drawing showing a side elevation of a bed according to the invention.

DETAILED DESCRIPTION OF THE DRAWINGS

Referring to the drawing, the bed has a horizontally extending main frame **10** carried on castor wheels **11**. The mattress is formed in four sections **12, 13, 14, 15** of which sections **12** and **15** are mounted on respective frame supports **16** and **17**, sections **13** and **14** being mounted side by side on an intermediate frame support **18** which is shorter than the supports **16** and **17**.

Frame support **16** is disposed at the head end of the bed and is pivotally mounted at its end adjacent support **18** on two uprights **19** which are rigidly secured to the main frame. The head end of support **16** can thus be raised and lowered about these pivots. In its horizontal position the support rests on a cross-bar **20***a* attached to twin uprights **20** which form part of the main frame.

Adjacent the foot of each of the uprights **19**, a triangular plate **21** is pivotally mounted on the main frame and has an arm **22** rigidly connected to it. At its outer end the arm carries a roller **23** which engages in a horizontal inwardly-facing channel **16***a* formed in the adjacent side member of support **16**. The triangular plate **21** and arm **22** together constitute a bell crank lever of which the other arm is pivotally connected to one end of an arm **24**. The other end of arm **24** is rigidly connected to a member **25** intermediate the ends of the latter. The upper end of member **25** is pivotally connected at **26** to the head end of support member **17**. The lower end of member **25** carries a roller **27** which engages in a horizontal guideway **28** provided by the main frame. Arm **24** and member **25** thus constitute a second bell crank lever which carries the head end of support **17** above the main frame.

An L-shaped arm member **30** is pivotally connected at one end to the arm **22** intermediate the ends of the latter and carries at its other end a roller **31** which is engaged in an inwardly-facing guide channel **32** provided by the main frame. These other ends of the arm members **30** can be fixed in any one of a series of positions spaced along the main frame to fix the frame support **16** in corresponding angular positions. For thispurpose, the arm members **30** are interconnected by a horizontal cross-member **30***a* which has a U-shaped plate **30***b* secured to it at its midlength. A metal strip **30***c* having one of its ends clamped to the main frame by a bolt **30***d* and spring **30***e* extends through the aperture formed by plate **30***b* and has a series of notches **30***f* in its edges which notches are engageable with an inner edge of the plate. An angle piece **33** attached to strip **30***c* has an aperture by means of which a rod **33***a* is secured by one end to the angle piece. The other end of the rod is attached to a foot lever (not shown) at one side of the main frame. The lever is pivotally mounted on the frame, and a spring disposed between a washer on the rod and the main frame urges the metal strip **30***c* laterally in a sense to hold the notches in engagement with the U-shaped plate **30***b*. Pressure of the foot on the lever pulls the strip laterally to disengage the notch and to allow the inclination of the frame support **16** to be altered. When the head end of support **16** is raised, the member **30** is drawn along by the arm **22**, and the support can be held in a raised position by allowing the appropriate notch in strip **30***c* to engage the edge of plate **30***b*. A tension spring **35** interconnects the lower ends of the arm **22** and member **30** and tends to draw the member **30** leftwards to pivot the support **16** into an upright position, thus reducing the physical effort necessary to raise the support **16**.

The frame support **17** provides an inwardly facing guide channel **37** which includes a horizontal section **38** and a downwardly-inclined section **39**. An upright member **40** secured to the main frame has at its upper end a guide roller which engages in the guide channel **37**.

It will be understood that a similar arrangement of the uprights, levers and guides is provided symmetrically at the other side of the bed.

The two arms **24** carry spaced parallel transverse members **42** which form part of the intermediate frame support **18.** Members **42** provide transverse guide channels in which are engaged nylon rollers **43** secured to and supporting the inner ends of two sub-frames **44** which are disposed side by side and which abut on the longitudinal centre-line of the bed. The two sub-frames **44** respectively carry the two mattress sections **13** and **14.** The outer ends of the two sub-frames, i.e. their ends further from each other, each have a frame member carrying a downwardly projecting pin **45** which is engageable in one or other of three holes formed in the frame support **18** and spaced apart transversely of the bed. By this means the two sub-frames can abut on the centre-line of the bed, or a gap can be provided between then either on the centre-line or on either side of the centre-line. A platform (not shown) for supporting a bed-pan rests on the bed but is sufficiently wide to support the bed-pan wherever the gap between sub-frames is formed.

When the head end of the frame support **16** is raised as previously described, the engagement of roller **23** in the guideway **16***a* rotates the plate **21** and arm **22** anti-clockwise, thus moving leftwards and rotating clockwise the bell crank lever constituted by arm **24** and member **25.** The rotation lowers pivot point **26** and hence the right hand end of frame support **17,** and the leftward movement of the frame support causes the left hand end of the support **17** also to be lowered because of the engagement of the roller on upright **40** in the inclined section **39** of guideway **37.** The leftward and rotational movement of arm **24** causes the sub-frames **44** and mattress sections **13** and **14** to move leftward and dip to the right to remain close to and generally in alignment with the mattress **15.** The leftward movement of mattress sections **13** and **14** and their dipping to the right causes their upper edges adjoining the mattress section **12** to remain in substantially a constant position relative to the adjacent edge of the section **12** during the raising of mattress section **12.**

The intermediate frame support **18** includes a platform underlying the position at which a gap can be formed between the mattress sections **13** and **14,** which platform is for supporting a bed pan or other toilet receptacle. Thus it will be understood that a patient can be rolled or rocked a little to one side to enable one sub-frame **44** to be shifted away from the other sub-frame and can then be rolled or rocked a little to the other side to enable the other sub-frame to be shifted and the receptacle to be inserted in the gap. There is therefore no necessity to lift the patient. If the patient happens to be lying or sitting non-centrally of the bed, the gap can be provided correspondingly non-centrally by appropriate positioning of the sub-frames whilst still providing the full gap necessary to accommodate the toilet receptacle. Whatever the patient's position he is supported by the two mattress sections **13, 14** and not by the toilet receptacle.

We claim:

1. A bed comprising:

a main frame;

head-end, middle and foot-end mattress supports mounted end-to-end on said main frame;

said head-end support having its end nearer the middle support pivotally mounted on said main frame for adjustment of the angle of inclination of said head-end support;

a first guideway provided in said head-end support and extending lengthwise thereof;

a second guideway provided in said main frame and disposed beneath said foot-end support, said second guideway extending lengthwise of said main frame;

a guide element engaged in and movable along said second guideway;

a first lever having three pivot points arranged in the form of a triangle, said first lever being pivotally mounted on said main frame by a first of said pivot points thereof and having at a second of said pivot points thereof a guide element engaged in the first said guideway;

a second lever to which said middle support is secured and which has three pivot points arranged in the form of a triangle, which pivot points are respectively connected to a first end of said foot-end support nearer said middle support, to the third of the pivot points of said first lever at a location adjacent the said end of the head-end support nearer the middle support, and to said guide element which is engaged in said second guideway;

whereby said middle and foot-end supports and said second lever are mounted for movement lengthwise of said main frame in dependence on the angle of inclination of said head-end support;

a connection means between said main frame and a location on said foot-end support spaced away from said first end thereof, said connection means being operative for lowering the opposite end of said foot-end support on movement of said foot-end support lengthwise of the bed in a direction away from said middle support; and

means for locating said head-end support in selected positions of inclination about its pivotal mounting on said main frame.

2. A bed as claimed in claim **1,** wherein the middle support comprises a base member which is connected to said second lever, a pair of subframes which are mounted side by side on the base member and which are movable laterally towards and away from each other into any one of at least three positions, whereby the sub-frames can be positioned to form a gap between them in any one of three positions transversely of the bed, and means for locating each of said sub-frames in each of its three positions.

3. A bed as claimed in claim **1,** wherein said connection means comprises an inclined third guideway and an element movable along the guideway, which inclined guideway and element are connected one to the frame and the other to said foot end support at said location.

4. A bed as claimed in claim **1,** further comprising a third guideway provided in the main frame and extending lengthwise thereof, and an arm member which has one end pivotally attached to the first lever and which has at its other end a guide element engaged in and movable along the third guideway, said means for locating the head-end mattress support in selected positions comprising an element fixed to the main frame and extending lengthwise thereof, said element having apertures at intervals along its length, a pin which is attached to said arm member adjacent said other end thereof and which is releasably engageable in any one of said apertures, and a spring urging the pin into engagement with such aperture.

5. A bed as claimed in claim **1,** further comprising a counter-balancing spring operatively urging said head-end mattress section support towards an upright position.

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