INVALID'S BED ADJUSTABLE TO SITTING UP POSITION AND HAVING TOILET FACILITIES

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ABSTRACT OF THE DISCLOSURE

The bed has an adjustable head section, an approximately horizontal intermediate or mid-section and an adjustable foot section. The head and foot sections are tiltable and are operated by self-locking power means which will hold them at any desired angle between a horizontal position for use as a bed and a generally upright position for use as a chair, there being a toilet bowl under the intermediate section and mattress parts of the intermediate section being retractable to uncover said bowl, there also being a foldable wash basin and mirror in a cabinet at the foot of the bed and a foldable bathtub alongside of the bed, the toilet bowl, wash basin and bathtub all having water supply and sewer connections.

BACKGROUND OF THE INVENTION

Field of the invention

My invention relates to improvements in invalid's beds of a type which are adjustable by the user of the bed into a sitting up position and which have toilet facilities embodied in the construction of the bed.

Discussion of the prior art

Numerous invalid's beds incorporating in their construction toilet bowl facilities to make the use of bed pans unnecessary have been designed and in some instances the toilet bowls are parts of the bed assembly and are provided with water supply and sewer disposal means. However, as far as is known to the applicant, none of these beds are in use at the present time.

SUMMARY OF THE INVENTION

A primary object of my invention is to provide a power operated invalid's bed which will enable most mentally competent invalids using the same to do more to help themselves than they can do when using an ordinary bed and which makes it possible for many invalids to move themselves into substantially any position between one in which they are lying down and one in which they are sitting approximately straight up.

Another object is to provide an invalid's bed having a head section and a foot section which are each tiltably movable between a horizontal position and an approximately upright position and having, between said head and foot sections, a mid-section wide enough to form a comfortable seat and which normally remains in a substantially horizontal position at all times, said head and foot sections being interconnected with each other for simultaneous movement and being provided with self-locking power operated means for swingingly moving them between the horizontal and the substantially upright positions and the mid-section being provided with means for imparting a slight back tilt to it when the two other sections are moved toward an upright position, the rear tilt thus imparted to the mid-section providing a more comfortable seat.

Another object is to provide an invalid's bed having a swingingly movable head section and foot section between which is an approximately horizontal mid-section positioned over a toilet bowl, said mid-section having retractable mattress parts movable between a normal position over said toilet bowl and a retracted position in which they are clear of said toilet bowl, whereby when the mattress parts are retracted said bowl can be used by an invalid in any desired position between a lying down and a full sitting up position thus enabling the users to choose the position best suited to their needs.

Another object is to provide an invalid's bed having a tiltably movable head section and foot section between which is a mid-section, which always remains approximately horizontal to form a seat and which further has, toward the foot of the bed, a foldable wash bowl and a foldable table and mirror, the wash bowl being normally folded when the several bed sections are positioned horizontally for use as a bed and the wash bowl being interconnected with the bed sections by means which will lower the wash bowl into a position for use by the invalid sitting on the bed when the head and foot sections are moved into an approximately upright position.

Another object is to provide an invalid's bed of this type which carries a set of power operated draw curtains for completely enclosing the bed and which has a bath tub foldably connected with the bed frame and positioned alongside of the bed so that some patients who are unable to get out of bed and onto their feet will be able to move from the bed into the bath tub and back into the bed thus making it possible for them to take a bath.

Other objects of my invention will be apparent from the following description taken in connection with the accompanying drawings.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevation of an invalid's bed constructed in accordance with my invention showing the several parts of the bed in a horizontal position as they would be for use by an invalid who is lying down, parts being broken away and other parts being shown in cross section.

FIG. 2 is a side elevation similar to FIG. 1 but showing the parts of the bed as they would be for use by an invalid in a sitting position, parts being broken away, parts being shown in section and the curtain being omitted.

FIG. 2A is an enlarged fragmentary view, partly in elevation and partly in section of a multiple part compression type truss member which connects the head section of the bed with means for imparting swinging movement to said head section.

FIG. 3 is a plan view, with parts omitted showing the bed with the mattress parts thereof in a horizontal position, the wash basin lowered and the bath tub folded.

FIG. 3A is a somewhat schematic perspective view, with parts broken away, of draw curtain and draw curtain supporting and operating means for the bed.

FIG. 4 is a view in elevation looking in the direction indicated by broken line 4—4 of FIG. 1, showing a cabinet containing a wash basin and a table and mirror together with cables for swingingly moving the wash basin.

FIG. 5 is a view partly in elevation and partly in section taken substantially on broken line 5—5 of FIG. 1, parts being omitted.

FIG. 6 is a view similar to FIG. 5 taken substantially on broken line 6—6 of FIG. 1.

FIG. 7 is a view partly in section and partly in plan taken substantially on broken line 7—7 of FIG. 1.

FIG. 8 is a somewhat diagrammatic elevational view, with parts omitted, showing the mid-section of the bed, with the movable mattress parts thereof in horizontal bed forming position.

FIG. 9 is a view similar to FIG. 8 showing the movable mattress parts fully retracted to uncover a toilet bowl.
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FIG. 10 is a schematic perspective diagram illustrative of power operated devices for moving the retractable mattress parts 40 and 40' between a retracted and a horizontal position.

FIG. 11 is an enlarged fragmentary elevational view showing a flushing valve and flushing valve operating means connected with the retractable mattress parts of the mid-bed section.

FIG. 12 is an elevational view, with parts in section, looking in the direction of line 12—12 of FIG. 11.

FIG. 13 is a view similar to FIG. 11 but with parts shown in different operative positions.

FIG. 14 is a view similar to FIGS. 11 and 13 showing parts of the device in still different operative positions.

FIG. 15 is an enlarged fragmentary elevational view showing parts of the mechanism for imparting tilting movement to the bed sections and particularly the means for imparting a back tilt to the mid-bed section when it is being used as a seat.

FIG. 16 is a view similar to FIG. 15 showing different operative positions of the parts therein.

FIG. 17 is a side elevational view showing a bath tub which is connected with the bed, said tub being shown in a folded or lowered position.

FIG. 18 is an end view looking in the direction indicated by broken line 18—18 of FIG. 17.

FIG. 19 is an end view similar to FIG. 18, showing the bath tub in a raised position ready for use.

FIG. 20 is a fragmentary sectional view taken substantially on broken line 20—20 of FIG. 18.

Like reference numerals refer to like parts throughout the several views.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The bed frame, shown by way of illustration, comprises two upright head frame parts 25 connected by a top cross frame member 26 and another cross frame member 27. Also it includes two upright foot frame parts 28 connected by a cross frame member 29 and two longitudinally extending side rails 30 which connect the upright head posts 25 and foot posts 28 and are positioned a short distance below the level of the upper surface of the bed. The posts 25 and 28 rest on a floor 31 and can be secured thereto. The mattress portion of the bed comprises two rigidly supported sections herein referred to as a head section 32, an intermediate or mid-section 33 and a foot section 34. These three sections are interconnected for simultaneous adjustment as hereinafter described.

The mechanism for supporting and moving the three bed sections 32, 33 and 34 is in duplicate at the two sides of the bed. FIGS. 1 and 2 show the bed supporting and adjusting mechanism on the right side of the bed and it will be understood that the mechanism on the left side is similar, except that where necessary the parts are made left and right.

The head section 32 comprises a frame part 35 which may be metal and may be shaped somewhat like a tray with upturned edges and which supports a mattress part 36. The frame part 35 at each side of the bed is secured to and supported by a bar 37. Each bar 37 terminates at one end in an angularly disposed end part 38 which is fulcrummed on a fixed pivot 39 that is supported from the adjacent bed rail 30 by a slot type bracket 39'. FIGS. 1 and 5. This mounts the head section 32 so it can be swingly moved between a horizontal and a substantially upright position. Also this head section 32 can be supported at any desired angle between the horizontal and the substantially upright position, as hereinafter explained.

The mid-section 33 comprises two lateral mattress parts 40 and 40' and two medial mattress parts 41 and 41'. The two lateral mattress parts 40 and 40' are herein illustrated as being supported on two similar frame plates 43 which preferably have turned up edges 43'. FIGS. 5, 6, 8 and 9. Except for a slight tilting movement these lateral mattress parts 40 and 40' remain substantially horizontal at all times. The two medial mattress parts 41 and 41' are carried on plate like frame members 44 and they can be moved in curved paths laterally and tiltably away from and toward each other between a horizontal position, FIG. 8 and an inclined, lowered and retracted position, FIG. 9.

Additionally upright frame members 45 and horizontal frame members 46 are provided at the sides of the bed frame alongside of the mid-section 33 and are rigid with the bed frame and help in supporting the devices which carry and operate the retractable mid-section parts 41 and 41'. The devices which carry and operate these retractable mattress parts 41 and 41' include two transversely disposed spaced apart upright frame members 45 and 46, FIGS. 5 and 6 respectively. The frame members 45 and 46 are secured by flanges 47 to the frame plates 43 which carry the lateral mattress parts 40 and 40' and they support means by which the two medial mattress parts 41 and 41' are guided and moved between the two positions in which they are shown from horizontal position. Frame members 45 and 46 also connect the two lateral mattress parts at opposite sides of the bed.

A toilet bowl 48 is positioned between the two frame members 45 and 46 and can be supported from the floor 31. A seat 49 on said bowl 48 is positioned so it is close to the lower sides of the mattress parts 41 and 41' when they are horizontal. The foot or lower end portions of the two lateral mattress parts 40 and 40' and the frame plate 46 and the forward end of the foot section 34 of the bed are all supported on two pivot members 50 and said pivot members 50 are supported from the adjacent bed rails 32 by sleeve type brackets 51 which are rigid with the bed frame. The other or head ends of frame plates 43 which carry the lateral mattress parts 40 and 40' and the frame members 45 are supported for limited vertical movement so that parts 40 and 40' will be horizontal when they are positioned for use as part of a bed and will be lowered slightly to give them a back tilt and provide a more comfortable seat when the bed sections are positioned to accommodate a person sitting up. This is accomplished by supporting the head end portions of these frame parts 43, see also FIGS. 15 and 16, from stud pins 52 which are rigid with the terminal parts 38 of the bars 37 and operate in longitudinal slots 53 in brackets 54. The brackets 54 are rigid with the head frame and the stud pins 52 lower them as the bars 37 are moved from a horizontal to an approximately upright position.

For clearance purposes and to permit the medial mattress parts 41 and 41' to be moved between the two positions shown respectively in FIGS. 8 and 9 1 bevel the lowermost sides of the inner edge portions of the lateral mattress parts 40 and 40', as indicated by 55, and provide a mating edge bevel, indicated by 56, on the outermost upper edge portions of the medial mattress parts 41 and 41'. These bevels provide close contact when mattress parts 41 and 41' are horizontal and allow clearance for their movement toward and away from each other. The mattress parts 41 and 41' operate between the frame members 45 and 56 and the means for supporting and moving these mattress parts 41 and 41' is carried by and incorporated in said frame members 45 and 46. To this end each frame member 45 and 46 is provided with a slot type bracket 57 which serves as a track for small rollers 58 carried by brackets 59. Two of the brackets 59 are secured to the bottom side of each medial mattress part near its innermost edge and these brackets 59 and the rollers 58 support the innermost edge portions of mattress parts 41 and 41' for movement between the positions shown in FIGS. 8 and 9. Brackets 59 and rollers 58 are omitted in somewhat diagrammatic FIGS. 5 and 6.

The outer edge portion of each mattress part 41 and 41' is provided, adjacent each corner thereof, with a
The two brackets 60 of each mattress part 41 and 41' are respectively connected by clamping means 61 with two endless cables 62 and 63. The cable 62 is operatively disposed on a set of lower rollers 64 and upper rollers 65. The cable 63 is operatively disposed on a similar set of lower rollers 66 and upper rollers 67. Two shafts 68 and 69 connect the lower rollers 64 and 66 at each side of the bed. The upper rollers 65 and 67 are rotatively mounted on and lie close to the respective upright frame members 45 and 46. Two of the lower rollers 64 and 66 are secured on the respective end portions of one mat. The other two lower rollers 64 and 66 are secured on a shaft 69 near the other side of the bed. The two shafts 68 and 69 are journaled in the frame members 45 and 46. All of the upper rollers 65 and 67 and the cable are journaled on suitable bearing pins which are rigid with the frame members 45 and 46. Said upper rollers 65 and 67 are thin and lie close to the frame members 45 and 46. The frame plates 44 of the mattress parts 41 and 41' are shaped so they will be clear of the upper rollers 65 and 67 at all times and the mattress parts 41 and 41' are made of soft and yieldable material so they will slide over the rollers 65 and 67 to the extent necessary when the mattress parts 41 and 41' are moved. Said upper rollers 65 and 67 are journaled in the frame plates 44 of the mattress parts 41 and 41'. A reversible motor 70 of the gear reduction type is connected by a belt 71 and sheaves 72 with the shaft 68 for driving the endless cables 62 and 63 in alternately different directions to move the mattress parts 41 and 41' between the two positions shown in FIGS. 8 and 9. The reversible motor 70 is operatively connected to the frame members 45 and 46. When the mattress parts 41 and 41' are in a horizontal position they serve as part of the bed or seat. When they are retracted, as shown in FIG. 9 they afford access to the toilet 48.

FIGS. 1, 2, 5, 6, 15 and 16 show means for tiltably adjusting the three bed sections between a position in which these sections are all substantially horizontal and a position in which the head section 32 and foot section 34 are generally upright and the middle section is approximately horizontal but has a slight back tilt for greater comfort of a person in a sitting position. This adjusting means, as herein disclosed, is in duplicate at the two sides of the bed and the following description applies to the parts as shown in FIGS. 1 and 2 and will apply equally well to those at the other side of the bed.

Said adjusting means comprises a reversible electric motor 74 having a driving connection with a cross shaft 75. The driving connection of motor 74 to shaft 75 includes a worm or equivalent device which makes the drive self-locking to the extent that it will not move except when moved by the motor. A winding drum 76 is secured to the shaft 75 at each side of the bed. A cable 77 is operatively connected with each winding drum 76 and extends in two directions from the drum 76. One end of each cable 77 is connected by means 78 with a lever arm 79 which is supported on the pivot member 39 on which the bar 37 is pivoted. The other end of the cable 77 passes under a guide sheave 80 and is secured by connector means 81 to a lever member 82 of generally triangular shape. The lever member 82 is secured to the frame member 42 which carries the mattress part 42' of the foot member 34. Thus the lever member 82 and foot section 34 are rigid with each other and they move angularly about the common pivot 50. A link 83 connects an apex portion of lever member 82 with the lever arm 79. Said lever arm 79 is connected with the frame 35 and bar 37 of head section 32 by an adjustable connecting mechanism formed by the member 84, member 85, 86, and 86. The member 86 is threaded onto part 84 only and slidably received the part 85 and has an internal stop shoulder 87 against which an end of the part 85 can abut. This makes it possible, when for instance, both the head and foot sections 32 and 34 are as nearly vertical as they can be positioned, to adjust the incline of the head section for greater comfort of the user by adjusting the effective compressive length of the truss members 84, 85, 86, without causing any binding or dis-alignment of the head and foot sections when they are moved back to a true horizontal position. Obviously this would not be true in the absence of the foot motion provided by the slatting movement of part 85 in member 86.

The head section 32 and foot section 34 move synchronously, except for the lost motion just herebefore mentioned, and because the drive between motor 74 and shaft 75 is self-locking, they can be stopped and held at any desired angle. The intermediate section 33 forms a seat when the other sections are raised and the edge portion thereof toward the end section 32 will move down a short distance as the head and foot sections are raised to give a back tilt to said seat.

An arm rest 88 is rigidly attached to each triangular lever member 82 and moves with said lever member between a folded position shown in FIGS. 1 and 2 when sections 32, 33 and 34 are in a bed forming position to the raised position of FIG. 2 when the bed sections are adjusted for sitting up.

A foot rest 90, FIGS. 1, 2 and 7, is movably supported by the foot section 34 and triangular lever member 82 and devices which are in duplicate at the two sides of the bed are provided for supporting the foot rest 90. Said foot section 34 to which the foot section of the bed is being lowered and downwardly toward the foot of the bed and out of the way as the foot section is being raised. Said foot rest 90 has a bracket 91 at each end. Each bracket 91 is slidable on a track rod 92 which is supported by mounting blocks 93 from the adjacent lever member 82. A pivot 94 is rigidly connected by a pivot 95 with each bracket 91 and the other end connected by a pivot 96 with one end of a lever 97. Each lever 97 is mounted by a fulcrum member 98 on the adjacent lever 82 and has its other end connected by a pivot 99 with one end of a link 100. The length of link 100 can be adjusted by a turnbuckle 101. The other end of the link 100 is connected by an adjustable pivot member 102 with a bracket 103 having therein a slot 104. The pivot member 102 is normally fixed to bracket 103 but it can be adjusted into different positions along the slot 104 to vary the position in which the foot rest 90 will be supported when fully lowered. Also the maximum lowered position of said foot rest 90 can be varied by using the turnbuckle 101 to vary the over all ength of the link 100. This adjustment of the foot rest 90 is desirable to provide maximum comfort for different users.

Devices illustrated in FIGS. 8 to 14 are provided for automatically flushing the toilet bowl 48 each time the mattress parts 41 and 41' are moved from their retracted position back to a horizontal position. Also preferably it is possible to manually flush this toilet bowl 48. Said bowl 48 is provided with a water supply pipe 110 and a discharge pipe 111. A flush valve 112 capable of being operated by an L-shaped lever 113 is interposed in the water inlet pipe 110. The valve 112 is self-closing upon release of lever 113. When valve 112 is closed the lever 113 rests on a bar 114 which is supported by a pivot 115 from the lower end of a link 116. The upper end of the link 116 is connected by a pivot 117 with the frame member 45. A tension spring 118 urges the bar 114 to the right, FIGS. 11, 13 and 14. The bearing pin 59 which is carried by bracket 59 of mattress part 41' has a valve operating member 119 rigidly attached to it. Said member 119 will be in engagement with link 116 and will hold the several parts in the position shown in FIG. 11 with lever 113 resting on the top of bar 114 when mattress part 41' is raised and horizontal.

The end portion of bar 114 shown at the left in FIGS. 11, 13 and 14 has an inclined upper surface 120 which terminates in a shoulder 121 and which slidably engages with a fixed pin 122. Pin 122 is rigid with frame member 45. Spring 118 holds the inclined surface 120 of bar 114 up against pin 122.
larly well adapted for use by invalids who are confined in bed but who are able and want to take care of them- selves to as great an extent as possible and thus saving about a saving in time and cost of their care. Separate motors are provided to operate the movable bed sections, the retractable mattress parts which cover and uncover the toilet bowl 48 and the draw curtains. A suitable switch controls the operation of each motor and can be made readily accessible to any user of the bed who is able and competent to operate it. This enables the occupant of the bed to adjust the bed sections 32 and 34 at will, to uncover and cover the toilet bowl 48 at will and to draw the curtains around the bed for complete privacy or to retract them. The part of the lower bed sheet which overlies the mattress parts 41 and 41' and the toilet bowl 48 is longitudinally split and movement of the parts 41 and 41' to uncover the bowl 48 will move the split portions of this lower bed sheet clear of the toilet bowl. Said toilet bowl is automatically flushed each time the mattress parts 41 and 41' are moved back to a position over the toilet bowl. The wash basin 131 and table 132 will be lowered each time the bed sections are moved to a full sitting up position and said wash basin and table are easily moved manually between an extended and a folded position by invalids able to use their hands and arms.

I claim:
1. An invalid's bed comprising a bed frame; a head section having its lower end portion pivoted to the bed frame; for pivotal movement about an axis transverse to the bed frame; a foot section having its upper end portion pivoted to the bed frame for pivotal movement about an axis transverse to the bed frame and parallel to an spaced a substantial distance from the lower end portion of the head section; and approximately horizontal midsection supported between the hinged end portions of said head and foot sections; a toilet bowl supported directly beneath and in close proximity to said mid-section, said mid-section comprising two spaced apart lateral mattress parts having innermost edge portions beveled on their undersides and two medial mattress parts having outermost edge portions beveled on their upper sides to mate with the bevels of said lateral mattress parts; means supporting said two medial mattress parts for movement in curved parts toward and away from each other between a horizontal bed forming position between said two lateral mattress parts and above said toilet bowl and a retracted position below said two lateral mattress parts and clear of said toilet bowl; and self-locking power operated devices interconnecting said head and foot sections operable in pivotally moving said head and foot sections between a horizontal and a generally upright position.
2. The invalid's bed as claimed in claim 1 in which a water supply conduit is connected with said toilet bowl through a self-closing flush valve and flush valve actuating devices interconnected said flush valve and the medial mattress parts and are operable in opening said flush valve each time the two medial mattress parts are moved from a retracted position clear of said toilet bowl to a bed forming position of said toilet bowl.
3. The invalid's bed as claimed in claim 1 in which a wash basin is pivotally supported adjacent the foot of the bed and above the level of the bed for movement between an approximately horizontal position of use and a generally upright folded position, and in which a cable is connected between the wash basin and the lever arms and bed sections, said cable being operative to move said wash basin into a horizontal position of use in response to movement of said bed section into a generally upright position.
4. The invalid's bed as claimed in claim 3 in which a combined table and mirror is pivotally supported from said wash basin and is movable with said wash basin between a generally horizontal and a generally upright position, said table and mirror being independently movable manually between a position of use close to the upper side of said wash basin when said wash basin is approximately horizontal and a folded position in which the table extends upwardly and is generally perpendicular to the wash basin.
5. The invalid's bed as claimed in claim 1 in which an arm rest is secured to at least one of the lever arms which are connected with the foot section and is movable with said lever arm between a position of use alongside of and above the level of the mid-section of the bed when the foot section is approximately vertical and an out of the way position alongside of the bed when the foot section is approximately horizontal.
6. In an invalid's bed, substantially horizontal midbed section adapted to serve as a seat; a head section pivotally supported adjacent one edge of said mid-bed section; a foot section pivotally supported adjacent the other edge of said mid-bed section; means operable in pivotally moving said head and foot sections between a substantially horizontal bed forming position and a sitting up position in which the head section extends upwardly and the foot section extends downwardly from the mid-bed section; two lateral mattress parts supported in spaced apart relation on said mid-bed section providing between them an accommodation opening of substantially rectangular outline, the edge portions of the lateral mattress parts which form the lateral edges of said opening being inclined on a bevel; two similar movable mattress parts adapted to fill said accommodation opening and having beveled upper lateral edge portions adapted to rest snugly against the beveled lateral edges of the two lateral mattress parts at the sides of the opening when the movable mattress parts are fully within the opening; and means supporting said movable mattress parts for movement in downwardly curving paths away from a position in which said movable parts fill said opening, the beveled edges of the lateral mattress parts and the movable mattress parts providing clearance for movement of said movable parts into and out of said opening.

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