

In the bed apparatus shown in Patent Literature 1, the back bed portion is configured by a central back portion and a pair of side back portions rotatably coupled to both sides of the central back portion. The back bed portion is formed of foamed resin, and a pair of ridges each having an inclined surface are integrally formed on the back surfaces of the pair of side back portions. An inclined portion is formed at

an end portion which becomes an upper end when the back is raised, of the ridge portion.

5 In contrast, a push-up roller is provided in addition to a back raising roller, on a back raising arm that raises and lowers the back raising bed portion. When the back raising arm is driven to rotate in the upward direction and the back raising bed portion is raised, the push-up roller rides on the ridge portion provided on the raised back of the side back portion from the inclined surface. The side back portion is thereby pressed toward the front side of the central back portion according to the height of the ridge portion.

10 At this time, since the pair of side back portions rotate forward with one side in the width direction coupled to the central back portion that serves as a fulcrum, the head of the user whose upper body is raised by the pair of rotated side back portions is prevented from falling to the side.

20 Citation List

Patent Literature

Patent Literature 1: JP 3910873 B

Summary of Invention

Technical Problem

25 According to the above-mentioned conventional structure, the back raising arm needs to be provided with a push-up roller and the side back portion needs to be provided with a ridge portion as components of a mechanism for inclining the side back portion.

30 That is, a back raising arm constituting the back raising mechanism that raises and lowers the back bed portion relative to the waist bed portion needs to be provided with a push-up roller that constitutes the mechanism of inclining the side back portion or the ridge portion needs to be formed on the back portion of

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the side back portion. Moreover, the back raising arm, the push-up roller, and the ridge must be positioned so as to be related to each other.

5 For this reason, relative assembling accuracy and manufacturing accuracy of the back raising mechanism and the mechanism of inclining the side back portion are required, and labor is required for the manufacturing and the assembling work.

10 The present invention aims to provide a bed apparatus capable of rotating the side back portions provided on both sides of the central back portion of the back bed portion in a forward direction when raising the back by a mechanism separated from the back raising mechanism.

15 Solution to Problem

According to an aspect of the invention, a bed apparatus comprises:

- a bed frame;

20 a bed plate comprising a fixed bed portion fixed to the bed frame, and a back bed portion provided to be rotatable with respect to the fixed bed portion, the back bed portion including a central back portion and a pair of side back portions coupled to both sides of the central back portion to be rotatable forward;

25 a back raising mechanism configured to raise the back bed portion of the bed plate;

an operating shaft rotatably supported by a back surface of the central back portion with an axis of the operating shaft arranged in a width direction of the central back portion;

30 an attachment member provided at a middle part of the operating shaft;

a transmission member having an end fixed to the attachment member and having the other end fixed to a part where tension is generated when the back raising

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mechanism is operated and the back bed portion is driven in a rising direction, the transmission member rotating the operating shaft in a predetermined direction with the tension; and

5 pressing members provided at both end parts of the operating shaft so as to be capable of changing an angle with respect to a circumferential direction of the operating shaft, the pressing members being positioned to an operative position where the pair of
10 side back portions are rotated forward or an inoperative position where the pair of side back portions are not rotated forward when the back bed portion is driven to the rising direction and the operating shaft is rotated by the transmission member.

15 Brief Description of Drawings

FIG. 1 is a perspective view showing a bed apparatus in which a back bed portion is raised, illustrating a first embodiment of the present invention.

20 FIG. 2 is a perspective view in which a bed plate of the bed apparatus is laid down.

FIG. 3 is a plan view showing a bed frame.

FIG. 4 is an explanatory diagram showing a drive mechanism of driving the bed plate to be raised and
25 lowered.

FIG. 5 is a diagram showing a back side of a back bed portion, first and second waist bed portions, and a fixed bed portion of the bed plate.

FIG. 6 is a diagram showing a stretched state of a
30 wire that drives the side back portions of the back bed portion in association with a back raising drive.

FIG. 7(a) is a plan view showing one end of the operating shaft provided with the pressing member, and FIG. 7(b) is a side view of the one end.

35 FIG. 8 is a side view of the bed plate showing the

head-up mechanism in a state where the back bed portion is not inclined forward when the back bed portion is raised.

5 FIG. 9 is a side view of the bed plate showing the head-up mechanism in a state where the back bed portion is inclined forward when the back bed portion is raised.

10 FIG. 10(a) is a rear view showing a state in which the side back portions of the back bed portion are not inclined to the front side of the central back portion, and FIG. 10(b) is a back view showing a state in which the side back portions are inclined toward the front side of the central back portion.

15 FIG. 11 is a diagram showing a back side of a back bed portion, first and second waist bed portions, and a fixed bed portion of the bed plate according to a second embodiment of the present invention.

20 FIG. 12(a) is a side view showing the bed plate shown in FIG. 11, and FIG. 12(b) is a side view showing a state in which the back bed portion is inclined forward by the head-up mechanism.

25 FIG. 13(a) is an enlarged side view showing the back bed portion of FIG. 12(a), and FIG. 13(b) is an enlarged side view showing the back bed portion of FIG. 12(b).

30 FIG. 14(a) is a plan view showing a side-up mechanism and a head-up mechanism provided on the back side of the back bed portion, FIG. 14(b) is a front view of the mechanisms, and FIG. 14(c) is a side view of the mechanisms.

FIG. 15 is an enlarged view showing a coupling portion between the attachment arm and the movable arm of the head-up mechanism.

Mode for Carrying Out the Invention

35 A first embodiment of the present invention will

be described hereinafter with reference to FIGS. 1 to 10.

FIG. 1 and FIG. 2 are perspective views showing a bed apparatus according to the present embodiment.

5 This bed apparatus comprises a base frame 1 shown in FIG. 2. The base frame 1 is formed in a rectangular shape, and installation legs 2 are provided at its four corners. Incidentally, casters may be provided instead of the installation legs 2.

10 As shown in FIG. 2, one-side ends of coupling rods 4 (shown at only three positions) constituting a vertical drive mechanism 3 are pivotally attached to upper surfaces of four corners of the base frame 1, and the other ends are pivotally attached to the four
15 corners of a rectangular frame-shaped bed frame 5 configured as described later.

Four coupling rods 4 are interlocked with each other and driven by a vertical drive source 6 via an interlocking link (not shown). That is, the coupling
20 rods 4 are driven in the rising direction shown in FIG. 2 from a state in which the coupling rods 4 are horizontally laid down with one end pivotally attached to the base frame 1 serving as a fulcrum.

The bed frame 5 can be thereby transformed from
25 the lowered position shown in FIG. 1 to the raised position shown in FIG. 2.

As shown in FIG. 3, the bed frame 5 includes a main body frame portion 11 formed in a rectangular frame shape. Adjustment frames 12 are held at one-side
30 end and the other end of the main body frame portion 11 in the longitudinal direction, respectively.

A pair of adjustment frames 12 provided on one end side and the other end side of the main body frame portion 11 in the longitudinal direction are movable
35 along the longitudinal direction of the main body frame

portion 11 as indicated by an arrow X, and can be fixed at a predetermined movement position by stopper means (not shown).

That is, the entire length of the bed frame 5 can be changed according to the user's height by adjusting the positions of mounting the adjustment frames 12 to the main body frame portion 11.

A pair of support members 14 are provided on both sides of the pair of adjustment frames 12, respectively. One-side ends of arm members 15 are rotatably coupled to both ends of each of the support members 14, and the other ends of the arm members 15 are pivotally attached to the adjustment frame 12.

The support member 14 can be thereby moved between a position approaching the side portion of the adjustment frame 12 as indicated by a solid line in FIG. 3 and a position moving away from the side portion of the adjustment frame 12 as indicated by a chain line.

Support holes 16 are formed at both ends of the upper surface of the support member 14 in the longitudinal direction. A pair of legs of a side fence (not shown) are inserted into the support holes 16 when the support member 14 is moved to the position indicated by the chain line.

As shown in FIG. 1 and FIG. 2, board bodies 17 serving as a headboard and a footboard are provided in an upright state with lower end portions coupled to the short side portions of the adjustment frames 12.

Decorative members 18 are provided at parts between the pairs of support members 14, on both sides of the body frames 11. The decorative member 18 is provided such that the side surface thereof is substantially aligned with the side surface of the adjustment frame 12 when the support members 14 are

positioned at positions approaching the sides of the adjustment frames 12.

As a result, when the support members 14 are not used, the support members 14 and the decoration member 18 are prevented from being integrated with each other to prevent a step from being formed on the side surface of the bed frame 5, and a good appearance is thereby exhibited.

As shown in FIG. 1 and FIG. 2, a bed plate 25 is provided on the upper surface of the bed frame 5. The bed plate 25 includes a pair of fixed bed portions 26 that are divided into two parts and are attached to middle portions of the main body frame portion 11 in the longitudinal direction.

A first waist bed portion 27 and a second waist bed portion 28 are sequentially coupled to one of the fixed bed portions 26 so as to be rotatable. A coupling portion 29 protrudes from one side of the second waist bed portion 28, and a back bed portion 31 is coupled to the coupling portion 29.

As shown in FIG. 1, the back bed portion 31 includes a central back portion 32 having a lower end rotatably coupled to the coupling portion 29, and a pair of side back portions 33 coupled to both sides of the central back portion 32. The central back portion 32 is rotatable in the front direction (forward) without the lower end serving as a fulcrum, and the side back portion 33 is rotatable in the front direction with one side coupled to the central back portion 32 serving as a fulcrum.

A pair of first leg bed portions 35 and a second leg bed portion 36 are sequentially coupled to the other fixed bed portion 26 so as to be rotatable.

The first waist bed portion 27 and the second waist bed portion 28, and the first leg bed portion 35

and the second leg bed portion 36 of the bed plate 25 are composed of two overlaid members. With respect to one of the members, the other member is movably provided. Then, when the other movable member is moved
5 with respect to the one member, the other member can be fixed to the one member at a predetermined movement position.

Accordingly, when the length of the bed frame 5 is changed by moving the adjustment frames 12 with respect
10 to the main body frame portion 11, the bed plate 25 can be set to a length corresponding to the bed frame 5.

The bed frame 5 is provided with a back raising mechanism 37 shown in FIG. 4. The bed plate 25 can be driven in the direction in which the first waist bed
15 portion 27, the second waist bed portion 28, the back bed portion 31, the first leg bed portions 35, and the second leg bed portion 36 rise as shown in FIG. 1, in the state of being horizontally laid down by the back raising mechanism 37 as shown in FIG. 2.

The back raising mechanism 37 includes a drive
20 unit 38 containing a drive source (not shown). The drive unit 38 is provided with a first drive shaft 41 and a second drive shaft 42 with their axes parallel to each other. These drive shafts 41 and 42 are rotated
25 by a drive source (not shown).

Both ends of the first drive shaft 41 and the second drive shaft 42 are rotatably supported on both inner surfaces of the main body frame portion 11 of the bed frame 5.

A link 43 is provided at each of axial ends of the
30 first drive shaft 41 and the second drive shaft 42. One end and the other end of a coupling arm 44 are rotatably coupled to a pair of links 43. Accordingly, when the first drive shaft 41 is driven to rotate, the
35 second drive shaft 42 is interlocked with the rotation

via the coupling arm 44.

A pair of back raising arms 45 are provided to have their proximal ends coupled to both ends of the first drive shaft 41. A pair of back raising rollers 46 are rotatably provided and spaced part at predetermined intervals, at distal ends of the pair of back raising arms 45.

One-side ends of attachment links 47 are coupled to both ends of the second drive shaft 42. Proximal end parts of leg links 49 having leg raising rollers 48 rotatably provided at their tips are pivotally attached to the other ends of the attachment links 47.

One-side ends of the interlocking links 51 are pivotally attached to the proximal ends of the leg links 49, and the other ends of the interlocking links 51 are pivotally attached to the ends of the second drive shaft 42. When the second drive shaft 42 rotates in conjunction with the first drive shaft 41, the leg raising rollers 48, the interlocking links 51, the leg links 49, and the attachment links 47 interlock with the rotation, and the leg raising rollers 48 provided at the distal parts of the leg links 49 are driven in the rising direction from the lower position.

Accordingly, the back raising mechanism 37 drives the bed plate 25 in a state of being horizontally laid down as shown in FIG. 2, and the first and second waist bed portions 27 and 28 and the back bed portion 31 are raised as shown in FIG. 1. Furthermore, the back raising mechanism 37 raises the second leg bed portion 36 while bending the first leg bed portions 35.

FIG. 5 shows the back surface of the back bed portion 31 of the bed plate 25 (i.e., the lower surface of the back bed portion 31 when laid down horizontally as shown in FIG. 2). A pair of back raising rails 53 separated from each other at a predetermined interval

in the width direction of the second waist bed portion 28 are fixed to the back surface of the second waist bed portion 28.

5 The back raising rails 53 are formed by members which are bent such that their cross sections include three plate-shaped portions, and have a length extending from the first waist bed portion 27 to the back surface of the central back portion 32 of the back bed portion 31.

10 The back raising rollers 46 shown in FIG. 4 are engaged with the back raising rails 53 so as to roll. Accordingly, the first drive shaft 41 is rotated and the back raising arm 45 is driven in the rising direction, such that the back raising rollers 46 roll
15 along the back raising rails 53. At this time, the first waist bed portion 27 is interlocked with the second waist bed portion 28, the back bed portion 31, and the second waist bed portion 28 and is driven from the state of being laid down as shown in FIG. 2 to the
20 state of being raised upright as shown in FIG. 1.

 At this time, when the second drive shaft 42 is interlocked with the first drive shaft 41, the first leg bed portions 35 and the second leg bed portion 36 can be driven in the rising direction. Incidentally,
25 whether the second drive shaft 42 is interlocked with the first drive shaft 41 can be set selectively.

 A pair of head-up rails 55 are provided on an inner side than the pair of back raising rails 53 in the width direction, in the bed plate 25. One-side
30 ends of the head-up rails 55 are fixed to the lower surface (back surface) of the first waist bed portion 27. The head-up rails 55 are used to incline the central back portion 32 of the back bed portion 31 forward with the proximal end thereof serving as a
35 fulcrum, as described later.

As shown in FIG. 5, a hollow operating shaft 56 is provided on an upper side than the distal ends of the pair of back raising rails 53, on the back surface of the central back portion 32 of the back bed portion 31. Both ends of the operating shaft 56 are rotatably held by a holder 57.

An arm 58 serving as a mounting member having a predetermined length is provided with an end thereof fixed to a middle part of the operating shaft 56 along the axial direction. One end of a wire 59 serving as a conductive member is fixed to the other end of the arm 58. The wire 59 is engaged with the roller 60 and redirected to approach the back surface of the central back portion 32, and the other end thereof extends toward the back surface of the second waist bed portion 28.

A lateral member 61 is erected with its both ends fixed to one-side ends of the pair of back raising rails 53 located on the second waist bed portion 28 side. A holder 62 is provided in the middle of the lateral member 61.

As shown in FIG. 6, a winding shaft 63 having a pulley 63a attached thereto is rotatably supported by the holder 62. For example, a fastening member 64 such as a nut is provided at one end of the winding shaft 63. The winding shaft 63 can be held to be unrotatable by the fastening member 64.

One end of the wire 59 is wound by the pulley 63a of the winding shaft 63. Therefore, the length from one end of the wire 59 coupled to the arm 58 to the other end on the winding shaft 63 side can be adjusted by adjusting the winding length of the wire 59 by the pulley 63a.

When the back bed portion 31 is driven in the rising direction while bending the first and second

waist bed portions 27 and 28 by the back raising mechanism 37, the linear distance of connecting the one end to the other end of the wire 59 becomes shorter and tension is thereby generated.

5 When tension is generated on the wire 59, the tension is transmitted to the operating shaft 56 via the arm 58. Accordingly, the operating shaft 56 rotates in a direction in which the distal end side of the arm 58 approaches the back surface of the central
10 back portion 32.

 As described above, the other end of the wire 59 is wound around the winding shaft 63 of the holder 62 such that the length thereof can be adjusted. In contrast, the length of the bed plate 25 can be
15 adjusted as described above.

 For this reason, when the length of the bed plate 25 is changed in accordance with the user's height or the like, the winding amount of the other end of the wire 59 with respect to the winding shaft 63 is
20 adjusted in accordance with the length change, and the total length of the wire 59 is changed. Thus, even if the length of the bed plate 25 is changed, the back bed portion 31 can be certainly raised with a constant tension.

25 Incidentally, in the present embodiment, the other end of the wire 59 is fixed to the holder 62 provided on the lateral member 61 that is installed between the pair of back raising rails 53. As another example, the other end of the wire 59 may be fixed to a part where a
30 tension is generated on the wire 59, such as the first or second waist bed portions 27 or 28 or the fixed bed portion 26 when driving the part other than the lateral member 61 provided between the back raising rails 53, i.e., the back bed portion 31 in the rising direction.

35 Pressing members 66 composed of rollers that press

and cause the back surface of the side back portions 33 of the back bed portion 31 to rotate forward when the operating shaft 56 is rotated by the wire 59 are provided at both ends of the operating shaft 56.

5 That is, as shown in FIGS. 7(a) and (b), one end of a support shaft 67 is rotatably inserted into the end part of the operating shaft 56. An attachment groove 68 which penetrates in the radial direction and is opened to the front end surface of the support shaft
10 67 is formed at the other end of the support shaft 67. One end of a stopper member 69 having an L-shaped side surface is attached to the attachment groove 68. A gap 71 of a predetermined interval is formed between the other end of the stopper member 69 and the outer
15 peripheral surface of the support shaft 67, and one end of the peripheral wall of the operating shaft 56 in the circumferential direction is inserted into the gap 71.

 An attachment shaft 72 is attached to one end of the stopper member 69. An axis of the attachment shaft
20 72 is inclined at a predetermined angle, for example, 45 degrees with respect to the axis of the support shaft 67. The pressing member 66 is rotatably attached to the distal end of the attachment shaft 72.

 Plate-like holding members 73 having middle
25 portions in the vertical direction fixed along the axial direction of the outer peripheral surfaces of the support shafts 67 are provided at both ends of the operating shaft 56. Both ends in the vertical direction of the holding member 73 protrude outward in
30 the radial direction of the operating shaft 56.

 The holding member 73 is provided on one side surface side of the stopper member 69, i.e., on the front surface side of the stopper member 69 when the operating shaft 56 is attached to the back surface of
35 the central back portion 32.

Accordingly, the attachment shaft 72 rotates the support shaft 67 with respect to the operating shaft 56, such that the stopper member 69 abuts on the lower end part or the upper end part of the holding member 73 in the height direction and is thereby held, in a state (inoperative position) in which the axis of the attachment shaft 72 is inclined upward with respect to the axis of the operating shaft 56 or a state (operative position) in which the axis of the attachment shaft 72 is rotated at 180 degrees from the inoperative position and is inclined downward, as shown in FIG. 5.

FIG. 7(b) shows a state in which the attachment shaft 72 is held at the operative position and a state in which the stopper member 69 is engaged with the front surface side of a lower end part 73a of the holding member 73 in the vertical direction.

When the operating shaft 56 is rotated in the direction indicated by an arrow R in FIG. 7(b) with the tension of the wire 59 at the time of raising the back, the attachment shaft 72 is rotated toward the back side of the side back portion 33 via the holding member 73 and the operating shaft 56.

When the attachment shaft 72 is rotated, the pressing member 66 provided at the distal end thereof is rotated in the direction of pressing the back surface of the side back portion 33. The side back portions 33 are thereby driven from a state of being not inclined toward the front side of the central back portion 32 as shown in FIG. 10(a) to a state of being inclined toward the front side of the center back portion 32 as shown in FIG. 10(b).

As a result, the side back portions 33 become in a state of preventing the head of the user whose upper body is supported by the back bed portion 31 from

falling in the lateral direction.

The side back portions 33 can be freely rotated to the front side of the central back portion 32 with one side thereof serving as a fulcrum. For this reason,
5 when the side back portions 33 raised to the front side by the pressing members 66 are returned to the non-raised state, first, the side back portions 33 are moved further forward than the state of being raised by the pressing members 66.

10 Next, the attachment shaft 72 at the operative position is rotated to a non-operative position in which the axis thereof is inclined upward with respect to the axis of the operating shaft 56, and, at the position, the stopper member 69 is engaged with an
15 upper end part 73b of the holding member 73, and the attachment shaft 72 is held.

Accordingly, since the holding state of the side back portion 33 made by the pressing members 66 is canceled, the side back portions 33 can be returned to
20 the non-inclined state.

In addition, when the back bed portion 31 is raised while the attachment shaft 72 is held in the non-operative position, the back bed portion 31 can be raised without inclining the side back portions 33
25 forward.

That is, according to the above-described configuration, when the back bed portion 31 is raised, whether or not to rotate the side back portions 33 in the rising direction can be selected by rotating the
30 stopper member 69 and positioning the pressing members 66 at the operative position or the non-operative position.

Incidentally, a mechanism for driving the pair of side back portions 33 provided on both sides of the
35 central back portion 32 of the back bed portion 31 in

the direction of inclining forward is referred to as a side-up mechanism 74.

5 The central back portion 32 whose lower end is rotatably coupled to the coupling portion 29 of the second waist bed portion 28 in the forward direction, can be inclined forward by the head-up mechanism 75 shown in FIG. 5, FIG. 8 and FIG. 9.

10 As shown in FIG. 5, the head-up mechanism 75 includes a pair of head-up guides 76 provided at both ends in the width direction of the central back portion 32 of the back bed portion 31 along a direction intersecting with the width direction (i.e., a vertical direction). Both ends of the support shaft 77 are rotatably supported between one-side ends of the pair
15 of head-up guides 76 located on the upper end side.

As shown in FIG. 8 and FIG. 9, one end of a head-up arm 78 is coupled to each end of the support shaft 77. A head-up roller 79 engaged with the head-up rail 55 is rotatably supported at the other end of the head-up arm 78.
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On the side surface of the head-up guide 76, an arcuate first guide groove 81 is formed and a second guide groove 82 that is also arcuate is formed, concentrically with the first guide groove 81, at the same angle in the circumferential direction.
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As shown in FIG. 5, one end and the other end of a rod-shaped positioning member 83 are movably inserted into a pair of first guide grooves 81. One end of an arm member 84 is coupled to each of one end and the other end of the positioning member 83. The other ends
30 of a pair of arm members 84 are coupled to coupling rods 85.

A rod-shaped operating member 86 having one end fixed to the arm member 84 and the other end side protruding from the second guide groove 82 to the outer
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surface side of the head-up guide 76 is provided in the middle of the arm member 84.

As shown in FIG. 8, when the positioning member 83 is located at one end side of the first guide groove 81, the head-up arm 78 in which the head-up roller 79 provided at one end thereof is engaged with the head-up rail 55 is in a state of being unrotated forward while one side surface thereof is pressed by the positioning member 83. The back bed portion 31 is thereby held in a state of being not laid down forward with the lower end serving as a fulcrum.

As shown in FIG. 9, when the arm member 84 is rotated by the operating member 86 with the coupling rod 85 serving as a fulcrum and the positioning member 83 is moved from one end side to the other end side of the first guide groove 81, the middle part of the head-up arm 78 is pressed by the positioning member 83.

Thus, while the head-up roller 79 engaged with the head-up rail 55, that is, the head-up arm 78 has one end serving as a fulcrum, the other end side of the head-up arm 78 is rotated to the front side of the back bed portion 31 indicated by an arrow W in FIG. 9.

As a result, since the back bed portion 31 is rotated in the direction of being laid down forward with the lower end serving as a fulcrum, the head of the user who has the upper body positioned on the back bed portion 31 is raised forward.

As described above, after the back bed portion 31 is raised, the back bed portion 31 can be inclined forward by moving the positioning member 83 from one end to the other end of the first guide groove 81 by operating the operating member 86.

In addition, when the back bed portion 31 is in a state of being laid down, if the operating member 86 is operated in advance to move the positioning member 83

from one end to the other end of the first guide groove 81 and then the back bed portion 31 is raised, the gap between the second waist bed portion 28 of the head-up rail 55 and the other end part of the head-up rail 55 facing the back surface of the back bed portion 31 is increased from the state shown in FIG. 8 to that shown in FIG. 9 in accordance with the rise thereof.

Thus, as shown in FIG. 9, since the head-up arm 78 is pressed and is held in a state of being rotated forward with the head-up roller 79 serving as a fulcrum, by the positioning member 83, the back bed portion 31 can be inclined toward the front side.

That is, according to the above-described configuration, the back bed portion 31 can be inclined forward by operating the operating member 86 after driving the back bed portion 31 in the upward direction by the back raising mechanism 37.

Besides this, when the back bed portion 31 is in a state of being laid down, if the operating member 86 is operated to move the positioning member 83 from one end of the first guide groove 81 to the other end, the back bed 31 is moved. By raising the back, the back bed portion 31 can be laid down forward in conjunction with the raising.

According to the bed apparatus having such a configuration, the members such as the shaft 56, the wire 59, the pressing member 66, and the like for rotating the pair of side back portions 33 provided on both sides of the central back portion 32 of the back bed portion 31 forward in accordance with the rise of the back bed portion 31, can be provided on the back surface side of the bed plate 25, regardless of the operation, arrangement, or the like of the members configuring the back raising mechanism 37 for driving the back bed portion 31 to be laid down.

That is, the side back portions 33 provided on both sides of the central back portion 32 of the back bed portion 31 can be rotated forward at the time of raising the back, by the mechanism separated from the back raising mechanism 37.

For this reason, since the side back portions 33 can be rotated in the forward direction at the time of raising the back by a mechanism that does not require assembly precision or manufacturing precision relative to the back raising mechanism 37, manufacturing the mechanism and the assembly can be performed easily.

The length of the bed frame 5 and the bed plate 25 of the bed apparatus can be changed according to the user's height. When the lengths of the bed frame 5 and the bed plate 25 are changed, the length of the wire 59 used for rotating the side back portions 33 in the forward direction at the time of raising the back needs to be adjusted.

The other end of the wire 59, one end of which is coupled to the operating shaft 56 via the arm 58, is wound around the winding shaft 63 such that the length thereof can be adjusted. For this reason, when the lengths of the bed frame 5 and the bed plate 25 are changed, the length of the wire 59 can also be changed according to the change in the length. Therefore, even when the lengths of the bed frame 5 and the bed plate 25 are changed, the pair of side back portions 33 of the back bed portion 31 are surely moved forward so that the user's head can be held when raising the back. It can be rotated.

The head-up mechanism 75 can hold the back bed portion 31 in the state of being inclined forward by raising the back bed portion 31 and moving the positioning member 83 along the first guide groove 81 by the operating member 86.

Besides this, when the positioning member 83 is moved in advance along the first guide groove 81 before raising the back bed portion 31, the back bed portion 31 can be inclined forward in conjunction with the operation of raising the back bed portion 31 by the back raising mechanism 37.

For this reason, the situations of inclining the back bed portion 31 such as inclining the back bed portion 31 forward when raising the back bed portion 31, inclining the back bed portion 31 forward after raising the back bed portion 31, and returning the inclined back bed portion 31 to the initial state of being not inclined, can be selected depending on the user's physical conditions and the like. The usability of the bed apparatus can be thereby improved.

The side-up mechanism 74 can be operated by driving the back bed portion 31 in the rising direction, and the head-up mechanism 75 can be operated by setting the position of the positioning member 83 with respect to the first guide groove 81.

That is, the side-up mechanism 74 and the head-up mechanism 75 can be operated separately or simultaneously. For this reason, since the side-up mechanism 74 and the head-up mechanism 75 can be selectively used or used at the same time depending on the physical strength of the user, the convenience of the bed apparatus is further improved.

Incidentally, in the above-described first embodiment, the bed plate 25 is provided with the first and second waist bed portions 27 and 28, and the back bed portion 31 is coupled to the second waist bed portion 28. However, when the bed plate 25 cannot be provided with the first and second waist bed portions 27 and 28, the back bed portion 31 may be coupled to the fixed bed portions 26.

In addition, the pair of side back portions 33 provided on both sides of the central back portion 32 of the back bed portion 31 may be vertically divided into a plurality of pieces.

5 In addition, the bed apparatus may not comprise the first and second waist bed portions 27 and 28. In such a case, the central back portion 32 of the back bed portion 31 may be rotatably attached to the fixed bed portions 26. In short, the central back portion 32
10 may be rotatably provided directly or indirectly at the fixed bed portion 26.

Next, a second embodiment of the present invention will be described with reference to FIG. 11 to FIG. 15. Incidentally, the same parts as those in the first
15 embodiment are designated by the same reference numerals and the descriptions thereof will be omitted.

FIG. 11 shows a back side of a back bed portion 31, first and second waist bed portions 27 and 28, and a fixed bed portion 26 of a bed plate 25, similarly to
20 FIG. 6 of the first embodiment.

In the first embodiment, in order to configure the head-up mechanism 75, one end is fixed to the head-up rails 55 having one-side ends fixed to the lower surface (back surface) of the first waist bed portion
25 27, the head-up arms 78 and, furthermore, head-up guides 76, and the like are provided. In the second embodiment, however, the head-up mechanism 75 is configured without using the head-up rails 55, the head-up arms 78, the head-up guides 76, or the like.
30 In the second embodiment, the reference numeral indicating the head-up mechanism is 75A.

The head-up mechanism 75A of the second embodiment will be described below. An operating shaft 56 is provided on an upper part of a back surface of a
35 central back portion 32. The operating shaft 56 is

rotatably held by a pair of holding members 57. As shown in FIG. 11 and FIG. 14, one-side ends of a pair of strip-shaped attachment arms 101 are fixed to both ends of the operating shaft 56 in a state of being
5 orthogonal to an axis of the operating shaft 56.

Similarly, one-side ends of strip-shaped movable arms 102 are rotatably coupled to coupling shafts 103, at the other ends of the attachment arms 101. As shown in FIG. 13, a roller-shaped operating member 104 is
10 rotatably supported by a support shaft 105, at the other end of the movable arm 102.

A restriction means for restricting the angle at which the back bed portion 31 is inclined forward as described later is configured by the operating member
15 104 and the support shaft 105. Incidentally, the restriction means may be composed of only the support shaft 105.

The operating member 104 is movably provided in the back raising rail 53. The support shaft 105 is
20 movably inserted into an elongated hole 106 formed in the end part of the back raising rail 53 along the longitudinal direction.

As shown in FIG. 12, the elongated holes 106 are formed at both end parts in the longitudinal direction of the pair of back raising rails 53. Such a
25 configuration enables the pair of back raising rails 53 to be used without being restricted in positioning in the vertical direction. Incidentally, the elongated holes 106 may be provided substantially only at the end parts (upper end parts) of the back raising rails 53 on
30 the back bed portion 31 side.

The movable arm 102 can be unrotatably fixed to the attachment arm 101 in a linear state by the lock mechanism 108. As shown in FIGS. 13(a) and (b) and
35 FIGS. 14 (a), (b), and (c), the lock mechanisms 108

include a pair of movable pieces 111 having one-side ends rotatably attached to middle parts in the longitudinal direction of a pair of right and left attachment arms 101 by support shafts 110. One end
5 part and the other end part of a locking rod 112 are fixed to each of the other ends of the pair of movable pieces 111.

As shown in FIG. 12(a) and FIG. 13(a), a recess-shaped engaging portion 113 is formed at one side of
10 one end part of the movable arm 102 in the width direction, i.e., one side closer to the distal end side than a part coupled to the attachment arm 101 by the coupling shaft 103.

After the movable arm 102 is rotated to be
15 substantially linear with respect to the attachment arm 101 as shown in FIG. 12(b) and FIG. 13(b) from the state of being bent with respect to the attachment arm 101 as shown in FIG. 12(a) and FIG. 13(a), the locking rod 112 is rotated together with the movable piece 111
20 with the support shaft 110 supporting the movable piece 111, which serves as a fulcrum, such that the engaging portions 113 of the pair of movable arms 102 are engaged elastically.

As shown in FIG. 12(b) and FIG. 13(b), the movable
25 arm 102 is thereby held unrotatably in a substantially linear state with respect to the attachment arm 101.

When the attachment arm 101 and the movable arm 102 in the bent state are held linearly by the lock mechanism 108, the central back portion 32 of the back
30 bed portion 31 is pressed forward via the operating shaft 56 to which the attachment arm 101 is attached.

The back bed portion 31 provided with the operating shaft 56 on the back side is thereby inclined forward with the lower end pivotally attached to the
35 connecting portion 29 of the second waist bed portion

28, which serves as a fulcrum, as shown in FIG. 12(b) and FIG. 13(b), from the state shown in FIG. 12(a) and FIG. 13(a).

At this time, the operating member 104 provided at the other end of the movable arm 102 and engaged with the elongated hole 106 of the back raising rail 53 is moved to the direction of the upper end portion of the back raising rail 53 in FIG. 12(b) in accordance with the inclination of the central back portion 32.

Furthermore, the support shaft 105 provided with the operating member 104 is engaged with the elongated hole 106 of the back raising rail 53. For this reason, the back bed portion 31 is prevented from being laid down forward by the length or more formed by the attachment arm 101 and the movable arm 102, which are linearly held by the lock mechanism 108.

That is, the operating member 104 limits the inclination angle such that the back bed portion 31, i.e., the central back portion 32 is not inclined too much forward.

Thus, in the head-up mechanism 75A of the second embodiment, the attachment arm 101 and the movable arm 102 are attached to the operating shaft 56 used in a side-up mechanism 74 to be described later.

Furthermore, the back raising rail 53 holds the operating member 104 via the support shaft 105 inserted into the elongated hole 106 and, in the lock mechanism 108, the movable arm 102 rotatably coupled to the attachment arm 101 is held unrotatably and linearly by the locking rod 112.

For this reason, according to the head-up mechanism 75A in the present embodiment, it is possible to reduce the number of parts and simplify the configuration. Moreover, since the back bed portion 31 can be inclined and the inclined state can be canceled

only by operating the lock mechanism 108, the operation is also easy.

In contrast, the side-up mechanism 74 in the second embodiment has a configuration substantially similar to that of the first embodiment. That is, as shown in FIG. 11, the side-up mechanism 74 generates tension when the back bed portion 31 of the bed plate 25 is driven in the rising direction by the back raising mechanism 37, and includes a wire 59 serving as a transmission member which causes the operating shaft 56 to be rotated in a predetermined direction by the tension.

The wire 59 is inserted into an outer tube 121. One end of the wire 59 is attached to a fixture 122 provided on the lower surface of the first waist bed portion 27. One end part of the wire 59 is engaged with a first roller 124 rotatably provided on a first holder 123 provided on the lower surface of the fixed bed portion 26 to change its direction.

The outer tube 121 has one end fixed to the first holder 123. That is, one end part of the wire 59 is exposed from the outer tube 121 between one end of the outer tube 121 and the fixture 122.

The outer tube 121 is curved with a large slack in the middle portion, and the middle portion is held by a clip 125 provided on the back surface (lower surface) of the second waist bed portion 28. The other end part of the outer tube 121 is fixed to a second holder 127 provided on the upper end part of the central back portion 32.

The other end part of the wire 59 led out from the other end of the outer tube 121 is engaged with a second roller 128 rotatably supported by the second holder 127. The end of the wire 59 is coupled to an arm 58 serving as an attachment member provided at the

central part in the longitudinal direction of the operating shaft 56.

Accordingly, the back raising arms 45 are driven in the rising direction by the back raising mechanism 37 shown in FIG. 4, and the back raising rails 53 are driven in the rising direction by the back raising rollers 46 provided in the back raising arms 45.

Then, since the back bed portion 31 is raised in association with the back raising rails 53, the raising causes the tension to be generated on the wire 59. When the tension is generated on the wire 59, the tension causes the operating shaft 56 to rotate in a predetermined direction.

As shown in FIGS. 14(a) to (c), the pressing members 66 are provided at both ends of the operating shaft 56 such that the angle can be changed with respect to the circumferential direction of the operating shaft 56. Then, when the back bed portion 31 is driven in the rising direction and the operating shaft 56 is rotated by the wire 59, the pressing members 66 are rotated together with the operating shaft 56 in a predetermined direction to press the back surfaces of the pair of side back portions 33.

Accordingly, the pair of side back portions 33 are pressed from the inoperative position which is not rotated forward by the pressing members 66 and displaced to the operative position which is rotated forward. This configuration is the same as that of the first embodiment.

Incidentally, as shown in FIG. 11, the pressing members 66 are formed on flat recess portions 33a to roll smoothly, at the back surface parts of the side back portions 33 where the pressing members 66 roll.

The wire 59 serving as the transmission member is inserted into the outer tube 121. For this reason,

when the tension is generated on the wire 59 when raising the back, the wire 59 operates more smoothly than when it is not inserted into the outer tube 121.

5 The outer tube 121 has a length such that the middle part is loosened together with the wire 59. For this reason, even if the length from the fixed bed portion 26 to the back bed portion 31, for example, the length dimension of the back bed portion 31 is changed to be long in accordance with the user's height or the like, the length can be changed depending on the
10 looseness.

 That is, even when the length of the bed plate 25 is changed, the side-up mechanism 74 having the above-described configuration can correspond to the change
15 without changing the length of the outer tube 121 or the wire 59, similarly to the first embodiment.

 In the head-up mechanism 75A of the bed apparatus according to the second embodiment configured as described above, when the movable arm 102 is linearly
20 rotated with respect to the attachment arm 101 and, in this state, the movable arm 102 is locked to be unrotatable by the lock mechanism 108, the central back portion 32 of the back bed portion 31 can be held in a state of being inclined forward as shown in FIG. 12(b) and FIG. 13(b). At this time, the pair of side back
25 portions 33 are also inclined integrally with the central back portion 32.

 Accordingly, since the user's head can be supported in a raised position by the inclined central
30 back portion 32, an advantage can be obtained that, for example, the user can maintain a posture in which the user can easily eat.

 In addition, the support shaft 105 supporting the operating member 104 is engaged with the elongated hole
35 106 of the back raising rail 53. For this reason, when

the back bed portion 31 is inclined forward while the movable arm 102 is locked with respect to the attachment arm 101 by the lock mechanism 108, the back bed portion 31 is prevented from being inclined forward
5 by the length dimension larger than that made by the attachment arm 101 and the movable arm 102.

That is, not only can the back bed portion 31 be inclined forward at a predetermined angle, but the portion can also be prevented from being inclined too
10 much.

In contrast, when the locked state of the movable arm 102 made by the lock mechanism 108 is canceled, the central back portion 32 is held in a state of being not inclined forward as shown in FIG. 12(a) and FIG. 13(a).
15 At this time, the central back portion 32, i.e., the back bed portion 31 is prevented from rattling in the inclined direction by the wire 59 even if an external force is applied.

The side-up mechanism 74 positions the pressing member 66 at either the operative position or the inoperative position, similarly to the first embodiment. Then, when raising the back bed portion 31, the side-up mechanism 74 rotates while pressing the back surface of the side back portions 33 to rotate
20 forward, and sets a state in which the side back portions are rotated forward or a state in which the side back portions 33 are not pressed without being rotated.
25

Therefore, when the back bed portion 31 is driven in the rising direction, the head-up mechanism 75A and the side-up mechanism 74 can be set to be operated selectively. That is, since either or both of the head-up mechanism 75A and the side-up mechanism 74 can be operated, the mechanisms can be used in the state
30 according to the user's request.
35

Incidentally, when the head-up mechanism 75A holds the movable arm 102 on the attachment arm 101 in the unrotatably locked state by the lock mechanism 108, regardless of whether the back raising mechanism 37 is
 5 driven to raise the back bed portion 31, the central back portion 32 can be maintained in a state of being inclined forward.

In the above-described first and second embodiments, the example of using the wire as the
 10 transmission member as the means for rotating the operating shaft at the time of raising the back is described. As the transmission member, a configuration capable of rotating the operating shaft by a rotary drive source such as a transmission motor, instead of
 15 the wire, may be used. Furthermore, the rotary drive source may operate in conjunction with the back raising mechanism when raising the back of the back bed portion.

Reference Signs List

20	5 . . . bed frame,
	11 . . . main body frame portion,
	12 . . . adjustment frame,
	25 . . . bed plate,
	26 . . . fixed bed portion,
25	27 . . . first waist bed portion,
	28 . . . second waist bed portion,
	29 . . . coupling portion,
	31 . . . back bed portion,
	32 . . . central back portion,
30	33 . . . side back portion,
	35 . . . first leg bed portion,
	36 . . . second leg bed portion,
	37 . . . back raising mechanism,
	38 . . . drive unit,
35	56 . . . operating shaft,

58 . . . arm (attachment member),
 59 . . . wire (transmission member),
 66 . . . pressing member,
 69 . . . stopper member,
 5 72 . . . attachment shaft,
 73 . . . holding member,
 74 . . . side-up mechanism,
 75 . . . head-up mechanism,
 76 . . . head-up guide,
 10 79 . . . head-up roller,
 81 . . . first guide groove,
 82 . . . second guide groove,
 83 . . . positioning member,
 84 . . . arm member,
 15 86 . . . operating member,
 101 . . . attachment arm,
 102 . . . movable Arm,
 104 . . . operating member (restriction means),
 110 . . . support shaft (restriction means),
 20 108 . . . lock mechanism, and
 112 . . . locking rod.

C L A I M S

1. A bed apparatus characterized by comprising:
a bed frame;

5 a bed plate comprising a fixed bed portion fixed
to the bed frame, and a back bed portion provided to be
rotatable with respect to the fixed bed portion, the
back bed portion including a central back portion and a
pair of side back portions coupled to both sides of the
central back portion to be rotatable forward;

10 a back raising mechanism configured to raise the
back bed portion of the bed plate;

an operating shaft rotatably supported by a back
surface of the central back portion with an axis of the
operating shaft arranged in a width direction of the
15 central back portion;

an attachment member provided at a middle part of
the operating shaft;

a transmission member having an end fixed to the
attachment member and having the other end fixed to a
20 part where tension is generated when the back raising
mechanism is operated and the back bed portion is
driven in a rising direction, the transmission member
rotating the operating shaft in a predetermined
direction with the tension; and

25 pressing members provided at both end parts of the
operating shaft so as to be capable of changing an
angle with respect to a circumferential direction of
the operating shaft, the pressing members being
positioned to an operative position where the pair of
30 side back portions are rotated forward or an
inoperative position where the pair of side back
portions are not rotated forward when the back bed
portion is driven to the rising direction and the
operating shaft is rotated by the transmission member.

35 2. A bed apparatus characterized by comprising:

a bed frame;

a bed plate comprising a back bed portion which includes a central back portion and a pair of side back portions coupled to both sides of the central back portion to be rotatable forward;

a back raising mechanism configured to raise the back bed portion of the bed plate;

an operating shaft rotatably supported by a back surface of the central back portion with an axis of the operating shaft arranged in a width direction of the central back portion; and

pressing members provided at both end parts of the operating shaft so as to be capable of changing an angle with respect to a circumferential direction of the operating shaft, the pressing members being positioned to an operative position where the pair of side back portions are rotated forward or an inoperative position where the pair of side back portions are not rotated forward when the back bed portion is driven to the rising direction and the operating shaft is rotated.

3. The bed apparatus of claim 1, characterized in that

the attachment member is shaped in an arm having one end coupled to the operating shaft and the other end protruding outside the operating shaft in a radial direction, and one end of the transmission member is coupled to the other end of the attachment member.

4. The bed apparatus of claim 1 or 2, characterized in that

the pressing member is provided at the operating shaft to be positioned at the operative position and the inoperative positioned by a positioning mechanism, and

the positioning mechanism includes:

a support shaft inserted into an end part of the operating shaft to be rotatable and axially movable;

a stopper member provided at a distal part of the support shaft;

5 an attachment shaft provided with an axis inclined to an axis of the operating shaft at a predetermined angle, and provided with the pressing member at a distal end thereof; and

10 a holding member provided at an end part of the operating shaft, and positioning and holding the pressing member provided at the other end of the attachment member, at the operative position, when the back bed portion is driven in a rising direction by the back raising mechanism.

15 5. The bed apparatus of claim 1, characterized in that

the transmission member is provided to have a length adjustable,

20 the bed frame is configured to have a length adjustable, and

the length of the transmission member is set in accordance with the length of the bed frame.

6. The bed apparatus of claim 1 or 2, characterized in that

25 a member configuring a mechanism of driving the side back portions of the back bed portion forward is not overlaid on a member configuring the back raising mechanism when the back bed portion is driven in a rising direction.

30 7. A bed apparatus characterized by comprising:
a bed frame;

35 a bed plate comprising a fixed bed portion fixed to the bed frame, a waist bed portion rotatably provided at the fixed bed portion, and a back bed portion;

a back raising mechanism configured to raise the waist bed portion and the back bed portion of the bed plate;

5 a head-up guide provided at an end part on the waist bed portion side of a back surface of the back bed portion with an arcuate first guide groove formed on an edge thereof;

10 a head-up rail having an end fixed to the waist bed portion and being provided across the back bed portion and the waist bed portion;

15 a head-up arm including a head-up roller having one end pivotally attached to the head-up guide and the other end rotatably engaged with the head-up rail, rolling the head-up roller along the head-up rail, thereby rotating together with the head-up guide with the end serving as a fulcrum, and rotating the back bed portion forward with respect to the waist bed portion; and

20 a positioning member having an end part inserted into the first guide groove, and selectively positioned to a first position where the back bed portion is not rotated forward by the head-up arm when positioned at an end of the first guide groove and a second position where the back bed portion is rotated forward by the head-up arm when located at the other end of the first guide groove.

8. The bed apparatus of claim 7, characterized in that

30 at an edge of the head-up guide, an arcuate second guide groove parallel to the first guide groove is formed, and an arm member having an end pivotally attached to a side surface of the head-up guide and the other end coupled to an end part of the positioning member is provided, and

35 an operating member moving the positioning member

between an end part and the other end part of the first guide groove by rotating the arm member is provided in the second guide groove.

5 9. The bed apparatus of claim 7, characterized in that

 when the back bed portion is in a state of being laid down before driven in the rising direction by the back raising mechanism, the back bed portion is capable of being laid down forward in conjunction with raising
10 the back bed portion by the back raising mechanism, by positioning the positioning member at the second position of the first guide groove.

 10. A bed apparatus characterized by comprising:
 a bed frame;

15 a bed plate including a waist bed portion having an end rotatably provided at the bed frame and a back bed portion having an end rotatably coupled to the other end of the waist bed portion;

 a back raising mechanism configured raise the back
20 bed portion of the bed plate; and

 a head-up mechanism configured to rotate the back bed portion forward when the back bed portion of the bed plate is driven in the rising direction by the back raising mechanism, wherein

25 the back raising mechanism comprising:

 a back raising arm having an end serving as a fulcrum and the other end provided with a back raising roller, the back raising arm configured to be rotatable in a state of being laid down to raise the other end;
30 and

 a back raising rail having an end attached to a lower surface side of the waist bed portion, the back raising roller being rotatably engaged with the back raising rail, and wherein

35 the head-up mechanism comprising:

an operating shaft rotatably supported by a back surface of the back bed portion with an axis arranged in a width direction of the back bed portion;

an attachment arm having an end unrotatably
5 attached to the operating shaft;

a movable arm having an end rotatably coupled to the other end of the attachment arm;

a lock mechanism configured to unrotatably hold the movable arm at the attachment arm and to incline the
10 back bed portion forward with a lower end of the back bed portion serving as a fulcrum; and

a restriction means movably provided at the other end of the movable arm along the other end part of the back raising rail, the restriction means configured to
15 restrict an angle at which the back bed portion is inclined forward when the back bed portion is held in a state of being inclined forward with the lower end of the back bed portion serving as a fulcrum by the lock mechanism.

20 11. The bed apparatus of claim 10, characterized in that

the back bed portion includes a central back portion and a pair of side back portions coupled to both sides of the central back portion to be rotatable
25 forward,

the bed apparatus further comprises a side-up mechanism configured to rotate the pair of side back portions forward when the back bed portion driven in the rising direction by the back raising mechanism, and

30 the side-up mechanism includes:

a transmission member configured to rotate the operating shaft in a predetermined direction when the back bed portion of the bed plate is driven in a rising direction by the back raising mechanism; and

35 pressing members provided at both end parts of the

operating shaft so as to be capable of changing an angle with respect to a circumferential direction of the operating shaft, and positioned to an operative position where the pair of side back portions are rotated forward or an inoperative position where the pair of side back portions are not rotated forward when the back bed portion is driven to the rising direction and the operating shaft is rotated by the transmission member.

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12. The bed apparatus of claim 11, characterized in that

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the head-up mechanism and the side-up mechanism are selectively operable in accordance with driving the back bed portion in the rising direction, by setting of whether or not to integrate the movable arm with the attachment arm by the lock mechanism and setting of the pressing member at the operative position or the inoperative position.