



(11)

EP 1 053 734 A2

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
22.11.2000 Bulletin 2000/47

(51) Int. Cl.⁷: **A61G 7/015**

(21) Application number: **00104141.7**

(22) Date of filing: **29.02.2000**

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE**
Designated Extension States:
AL LT LV MK RO SI

(72) Inventor: **Uchida, Hiroshi**
Oumihachiman-shi, Shiga (JP)

(74) Representative:
Liedl, Christine, Dipl.-Chem. et al
Albert-Rosshaupter-Strasse 65
81369 München (DE)

(30) Priority: **20.05.1999 JP 13955799**

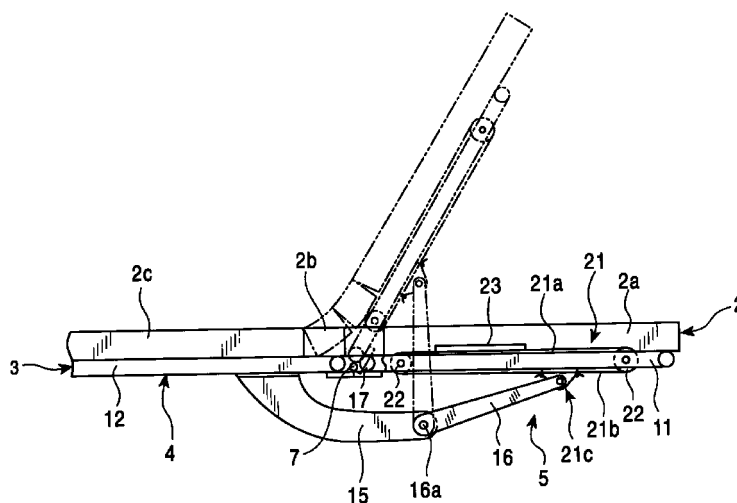
(71) Applicant:
MURATA KIKAI KABUSHIKI KAISHA
Kisshoin, Minami-ku Kyoto-shi 601 (JP)

(54) **Back-lifting device for rising and lying bed**

(57) The present invention relates to a back-lifting device having a slide mechanism constructed therein for sliding a back support section 5 in a direction in which slippage between the back support section 5 and a users back is avoided during both rising and lying of the back support section. The slide mechanism is constructed by attaching a surface 21a of an endless belt 21 to a rear surface of the back support section of a mat laid on a rising and lying bed, the endless belt capable

of being rotatively moved integrally with the back support section of the rising and lying bed around a rising and lying fulcrum 7 thereof, and by connecting a tip portion of a rising and lying lever 16 to a rear surface 21b of the endless belt, the rising and lying lever being rotatively moved wound a rotative-moving fulcrum shaft 16a located below the rising and lying fulcrum.

FIG. 2



Description

Field of the Invention

[0001] The present invention relates to a back-lifting device for raising and laying a back support section of a rising and lying bed which can be raised and laid relative to a seat section.

Background of the Invention

[0002] Rising and lying beds are conventionally known which are constructed to operate as multifunctional nursing beds and to have a back support section that can be raised and laid so that a person lying on the bed (hereafter referred to as a "bed user") can sit up easily on the bed.

[0003] Such a rising and lying bed comprises a seat section located under a lower body side of the bed user and a back support section located under an upper body side of the bed user and connected to the seat section for free bending.

[0004] The back support section is raised and laid by an electrically or manually operated back-lifting device so that raising the back support section allows the bed user to sit up easily on the bed.

[0005] In this manner, the use of the rising and lying bed allows even a person who cannot sit up without help to sit up easily to eat or read comfortably.

[0006] Since, however, the support section of the rising and lying bed and the bed user use different positions as a rising and lying fulcrum when the back support section is raised or laid, slippage may occur between the bed user and the back support section to dishevel the user's clothes or to rub the user's back, resulting in the user's uncomfortable feelings during the use of the bed.

[0007] It is thus an object of the present invention to solve this problem to provide a back-lifting device for a rising and lying bed which prevents rubbing between the bed user and the back support section when the back support section is raised or laid, thereby improving the user's feelings during the use of the rising and lying bed.

Summary of the Invention

[0008] In order to attain this object, the present invention uses the following means, namely, there is provided a back-lifting device for raising and laying a back support section of a rising and lying bed which can be raised and laid relative to a seat section, wherein the device has a slide mechanism constructed therein for sliding the back support section in a direction in which slippage between the back support section and a user's back is avoided during both rising and lying of the back support section.

[0009] In addition, the slide mechanism is con-

structed by attaching a surface of an endless belt to a rear surface of a back support section of a mat laid on the rising and lying bed, the endless belt capable of being rotatively moved integrally with the back support section of the rising and lying bed around a rising and lying fulcrum thereof, and by connecting a tip portion of a rising and lying lever to a rear surface of the endless belt, the rising and lying lever being rotatively moved around a point located below the rising and lying fulcrum and that is different therefrom.

[0010] In addition, a bending section of the mat laid on the rising and lying bed is divided into a plurality of mat pieces, and surfaces of the adjacent mat pieces are connected together.

Brief Description of the Drawing

[0011]

Figure 1 is an overall perspective view showing a rising and lying bed including a back-lifting device according to the present invention.

Figure 2 is a side view showing the rising and lying bed.

Figure 3 is a perspective view showing a back lifting mechanism.

Figure 4 is a side sectional view showing a connection section of an endless belt.

Figure 5 is a side view showing a vertical-rotative-moving mechanism of a rising and lying lever.

Figure 6 is a side view showing another embodiment of the vertical-rotative-moving mechanism of the rising and lying lever.

Figure 7 is a side view showing a bending section in a state where a mat is not bent.

Figure 8 is a side view showing the bending section in a state where the mat is bent.

Figure 9 is a perspective view showing another embodiment of a rising and lying bed to which the back-lifting device according to the present invention is applied.

Detailed Description of the Preferred Embodiments

[0012] An embodiment of the present invention will be described with reference to the drawings.

[0013] A general construction of a rising and lying bed including a back-lifting device according to the present invention will be explained.

[0014] A rising and lying bed 1 is comprised of a

bed body 3 and a mat 2 laid on a top surface of the bed body 3, as shown in Figure 1.

[0015] The bed body 3 is comprised of a seat section 4 located under a lower body of a bed user and a back support section 5 located under an upper body of the bed user. The seat section 4 has seat section frames 12 disposed in outer peripheral portions thereof, and the back seat section 5 has fixed frames 13 disposed in outer peripheral portions thereof. The fixed frames 13 are each extended from a middle portion of the corresponding seat section frame 12 toward the back support section 5 and fixedly installed on the seat section frame 12.

[0016] In addition, a rising and lying frame 11 is disposed above each of the fixed frames 13, and the seat section 4 side end portion of each of the rising and lying frames 11 and the back support section 5 side end portion of each of the seat section frames 12 are connected together via a connection member 17 such as a hinge in such a manner that the rising and lying frame 11 and the seat section frame 12 are flush with each other.

[0017] The rising and lying frame 11 is constructed to rotatively move around a rising and lying fulcrum 7 of the connection member 17 relative to the seat section frame 12.

[0018] Further, the seat section 4 of the bed body 3 and the back support section 5 each have leg sections 14, 14, ... attached at an outer corner portion thereof for supporting the bed body 3.

[0019] The bed body 3 has the mat 2 laid on the rising and lying frames 11 and the seat section frames 12. The mat 2 is comprised of a section located on the rising and lying frames 11 and constructed as a back support section 2a, a section located on the seat section frames 12 and constructed as a seat section 2c, and a bending section 2b formed between the back support section 2a and the seat section 2c.

[0020] In the rising and lying bed 1 constructed as described above, a back-lifting device, which will be described below, rotatively moves the rising and lying frames 11 to raise and lay the back support section 2a of the mat 2 together with the rising and lying frames 11.

[0021] Next, the back-lifting device for raising and laying the back support section 5 will be described.

[0022] As shown in Figures 2 and 3, the seat section frame 12 has a support arm 15 projecting downward to extend toward the back support section 5, and the support arm 15 has a rising and lying lever 16 supported at a tip portion thereof for rotative movement.

[0023] In addition, the back support section 5 has an endless belt 21 wound around support shafts 22, 22 which are rotatively supported on a corresponding one of the right and left rising and lying frames 11.

[0024] The endless belts 21 are each constructed by connecting opposite end portions thereof together at a connection section 21c. The connection section 21c connects the opposite end portions of the endless belt 21 together by winding each of the opposite end por-

tions of the endless belts around a corresponding lock pin 26, sandwiching the end portion of the endless belt 21 wound around the lock pin 26, between a base plate 24 and a cover 25, and fastening the base plate 24 and the cover 25 together using a bolt 27, as shown in Figure 4.

[0025] The connection section 21c is located on a rear surface 21b side of the endless belt 21, and has support sections 24a formed at corresponding lateral end portions of the base plate 24 thereof and on which a tip portion of the rising and lying lever 16 is rotatively supported.

[0026] In addition, the endless belt 21 has a surface fastener 23 attached to a surface 21a side thereof, and the surface fastener 23 is releasably attached to a rear surface of the back support section 2a of the mat 2.

[0027] In this manner, the back-lifting device is comprised of the endless belt 21, the rising and lying lever 16, the support arm 15, etc.

[0028] When the rising and lying lever 16 is rotatively moved upward around a rotative-moving fulcrum shaft 16a, the endless belt 21 is pushed up by the rising and lying lever 16 to rotatively and integrally move the endless belt 21 and the rising and lying frame 11 upward around the rising and lying fulcrum 7.

[0029] In this case, since the rotative-moving fulcrum shaft 16a of the rising and lying lever 16 is located below the rising and lying fulcrum 7, that is a rotative-moving fulcrum of the endless belt 21, the connection section 21c of the endless belt 21 connected to the tip portion of the rising and lying lever 16 is moved toward the rising and lying fulcrum 7 as the rising and lying lever 16 is rotatively moved upward.

[0030] Namely, when the rising and lying lever 16 is rotatively moved upward, the connection section 21c of the endless belt 21 is pulled downward by the rising and lying lever 16 to rotate the endless belt 21 in a right direction in Figure 2.

[0031] Thus, the surface fastener 23 on the surface 21a side of the endless belt 21 moves upward, so that the back support section 2a of the mat 2, to which the surface fastener 23 is attached, is raised while being bent by the bending section 2b. Accordingly, the back support section 2a moves upward relative to the rising and lying frame 11.

[0032] If the back support section 2a of the mat 2 does not move upward relative to the rising and lying frame 11 when raised while being bent by the bending section 2b, the back support section 2a of the mat 2 any slip downward relative to the back of the bed user lying on the bed. As described above, however, the back support section 2a in fact moves upward relative to the rising and lying frame 11, thereby canceling the possible slippage between the bed user's back and the back support section 2a of the mat 2.

[0033] The rotative-moving fulcrum shaft 16a of the rising and lying lever 16 is located offset from the rising and lying fulcrum 7 so that the back support section 2a

can move upward in such a manner corresponding to the lack of the downward slippage of the back support section 2a relative to the bed user's back.

[0034] In addition, if the back support section 2a of the mat 2, which is standing up, is rotatively moved downward, then contrary to the above operation, the endless belt 21 rotates leftward to move the back support section 2a downward relative to the rising and lying frame 11, thereby avoiding the possible slippage between the bed user's back and the back support section 2a of the mat 2.

[0035] Thus, the back-lifting device has a slide mechanism constructed therein for sliding the back support section 2a of the mat 2 relative to the rising and lying frame 11 in a direction in which slippage between the back support section 2a and the bed user's back is avoided when the back support section 5 of the rising and lying bed 1 is raised or laid by the back-lifting device. Consequently, slippage between the back support section 2a and the bed user's back can be avoided to prevent the user's clothes from being disheveled while preventing the user's back from being rubbed, thereby significantly improving the user's feelings during the use of the bed.

[0036] In addition, the slide mechanism constructed in the back-lifting device is constructed by attaching the surface 21a of the endless belt 21 via the surface fastener 23 to the rear surface of the back support section 2a of the mat 2 laid on the rising and lying bed 1, the endless belt 21 capable of being rotatively moved integrally with the rising and lying frame 11 around the rising and lying fulcrum 7 of the rising and lying frame 11 of the back support section 5, and by connecting the tip portion of the rising and lying lever 16 to the rear surface 21a of the endless belt 21, the rising and lying lever 16 being rotatively moved around the rotative-moving fulcrum 16a located below the rising and lying fulcrum 7. As a result, during rising and lying of the back support section 5 of the rising and lying bed 1, the back support section 2a of the mat 2 can be slid sufficiently and reliably to prevent the user's clothes from being disheveled while preventing the user's back from being rubbed, thereby significantly improving the user's feelings during the use of the bed.

[0037] The rising and lying lever 16 can be constructed to be rotatively moved in a vertical direction of the device by a motor 31 such as an electric motor, as shown, for example, in Figure 5.

[0038] The rotative-moving fulcrum shaft 16a of the rising and lying lever 16 has a worn wheel 33 fixedly installed thereon and rotatively moving integrally with the rotative-moving fulcrum shaft 16a. The worn wheel 33 is meshed with a worn 32 fixedly installed on an output shaft 31a of the motor 31 so that the rising and lying lever 16 can be rotatively moved in the vertical direction by rotating the electric motor 31 in a forward and a backward directions.

[0039] In addition, as shown in Figure 6, a rod 35a

of a cylinder 35 such as an air cylinder may be connected to the rising and lying lever 16 so that the rising and lying lever 16 can be rotatively moved in the vertical direction by stretching and contracting the cylinder 35.

[0040] In addition, as shown in Figures 7 and 8, the bending section 2b of the mat 2 is divided into a plurality of mat pieces 37, 37 in such a manner that the adjacent mat pieces 37, 37 are connected together, that the mat piece 37 and the adjacent back support section 2a are connected together, and that the mat piece 37 and the adjacent seat section 2c are connected together.

[0041] Thus, if the mat 2 is bent at the bending section 2b, a gap may be formed on the rear surface side of the mat between the adjacent mat pieces 37, 37, between the mat piece 37 and the adjacent back support section 2a, and between the mat piece 37 and the adjacent seat section 2c.

[0042] Accordingly, even if the mat 2 is bent at the bending section 2b, the surface of the bending section 2b is precluded from being compressed, thereby preventing the bed user lying on the mat 2 from feeling pressure. In addition, even if the slide mechanism of the back-lifting device slides the back support section 2a of the mat 2 upward, the back support section 2a can accurately follow a slide operation of the slide mechanism.

[0043] In addition, the conventional rising and lying bed includes a mat comprised of a seat section and a back support section which are formed separately, whereby a gap may be formed between the seat section and the back support section when the back support section is raised, resulting in the user's uncomfortable feelings during the use of the bed.

[0044] On the other hand, by dividing the bending section 2b into the plurality of mat pieces 37, 37 and connecting the surfaces of the adjacent mat pieces 37, 37 together as in the mat 2, no gap is formed between the seat section 2c and the back support section 2a even if the back support section 2a of the mat 2 is raised while being slid upward. Furthermore, the bending section 2b is moved upward in accordance with the upward sliding of the back support section 2a, thereby bringing the bending section 2b in tight contact with a neighborhood of the bed user's lower back to significantly improve the user's feelings during the use of the bed.

[0045] In addition, the back-lifting device comprising the slide mechanism according to the present invention is applicable to a back-lifting device in a back support section 61 of a rising and lying bed comprised of a bed body 51 and a wheelchair section 52 having the bendable back support section 61 and a foot rest section 63 formed in a seat section 62, wherein the wheelchair section 52 can be separated from the bed body 51 for movement, as shown in Figure 9.

[0046] With the above construction, the present invention provides the following effects.

[0047] First of all, the back-lifting device has the slide mechanism constructed therein for sliding the

back support section in a direction in which slippage between the back support section and a user's back is avoided during both rising and lying of the back support section. Consequently, slippage between the back support section and the bed user's back can be avoided to prevent the user's clothes from being disheveled while preventing the user's back from being rubbed, thereby significantly improving the user's feelings during the use of the bed.

[0048] Further, the slide mechanism is constructed by attaching the surface of the endless belt to the rear surface of the back support section of the mat laid on the rising and lying bed, the endless belt capable of being rotatively moved integrally with the back support section of the rising and lying bed around the rising and lying fulcrum thereof, and by connecting the tip portion of the rising and lying lever to the rear surface of the endless belt, the rising and lying lever being rotatively moved around the point located below the rising and lying fulcrum and that is different therefrom. As a result, during rising and lying of the back support section of the rising and lying bed, the back support section of the mat can be slid sufficiently and reliably to prevent the user's clothes from being disheveled while preventing the user's back from being rubbed, thereby significantly improving the user's feelings during the use of the bed.

[0049] In addition, the bending section of the mat laid on the rising and lying bed is divided into the plurality of mat pieces, and the surfaces of the adjacent mat pieces are connected together. As a result, even if the mat is bent at the bending section, the surface of the bending section is precluded from being compressed, thereby preventing the bed user lying on the mat from feeling pressure. In addition, even if the slide mechanism of the back-lifting device slides the back support section of the mat upward, the back support section can accurately follow a slide operation of the slide mechanism.

[0050] Further, no gap is formed between the seat section and the back support section even if the back support section of the mat is raised while being slid upward. Furthermore, the bending section is moved upward in accordance with the upward sliding of the back support section, thereby bringing the bending section in tight contact with a neighborhood of the bed user's lower back to significantly improve the user's feelings during the use of the bed.

Claims

1. A back-lifting device for raising and laying a back support section of a rising and lying bed which can be raised and laid relative to a seat section, characterized in that the device has a slide mechanism constructed therein for sliding the back support section in a direction in which slippage between the back support section and a user's back is avoided during both rising and lying of the back support sec-

tion.

2. A back-lifting device for a rising and lying bed as in Claim 1, characterized in that said back support section has a rising and lying frame and a mat laid on the frame so that said mat can slide relative to said rising and lying frame during rising and lying of the back support section.
3. A back-lifting device for a rising and lying bed as in Claim 1 or Claim 2, characterized in that said slide mechanism has a belt rotatively moving in synchronism with rising and lying operations of the rising and lying frame in an interlocking manner.
4. A back-lifting device for a rising and lying bed as in Claim 3, characterized in that said slide mechanism is constructed by connecting a belt member to the mat laid on the rising and lying bed, the belt member capable of being rotatively moved integrally with the rising and lying frame around a rising and lying fulcrum thereof, and by connecting a rising and lying lever to said belt member, the rising and lying lever being rotatively moved around a center different from said rising and lying fulcrum.
5. A back-lifting device for a rising and lying bed as in Claim 1 or Claim 2, characterized in that a bending section of the mat laid on said rising and lying bed is divided into a plurality of mat pieces, and in that the adjacent mat pieces are connected together.
6. A back-lifting device for a rising and lying bed as in any one of Claims 1 to 5, characterized in that said back-lifting device is mounted in a back support section of a wheelchair of a nursing bed comprising a bed body and the wheelchair having the bendable back support section and a foot rest section formed in a seat section, wherein the wheelchair can be separated from said bed body for movement.

FIG. 1

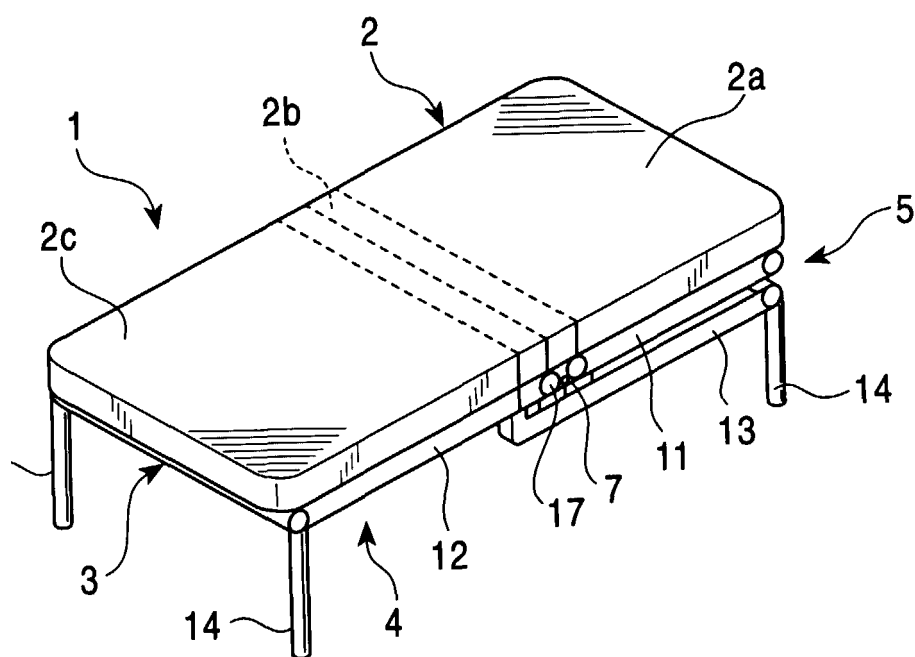


FIG. 2

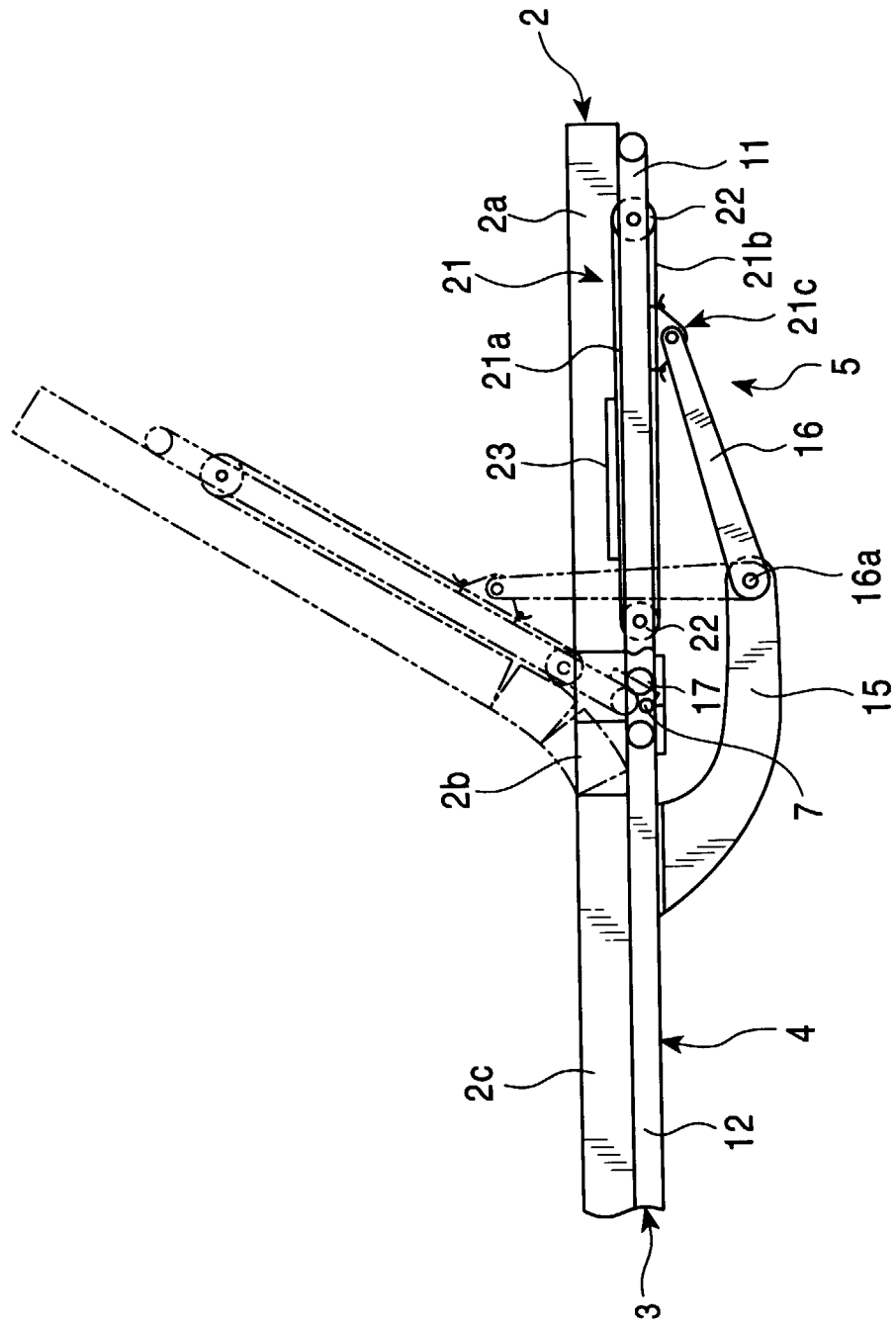


FIG. 3

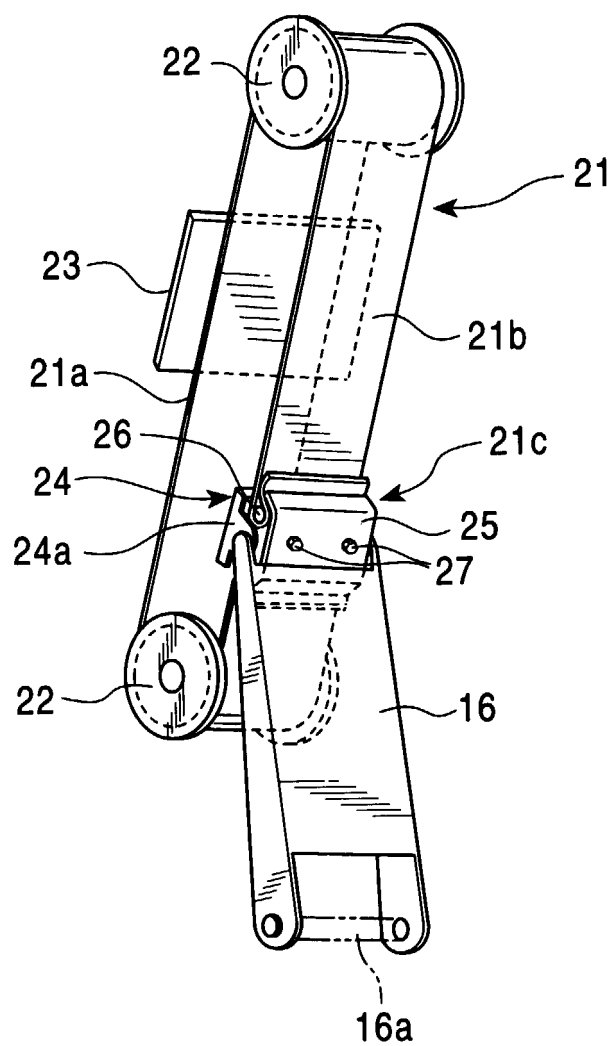


FIG. 4

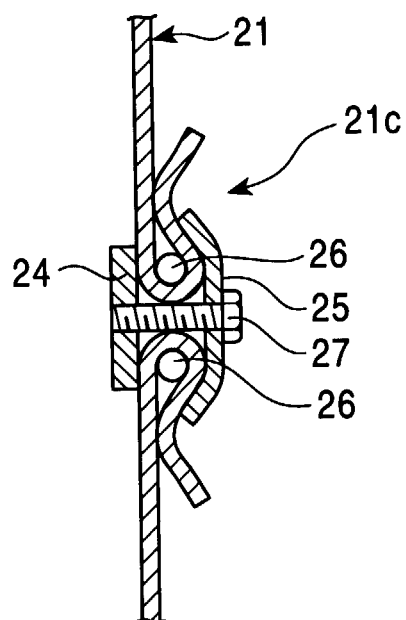


FIG. 5

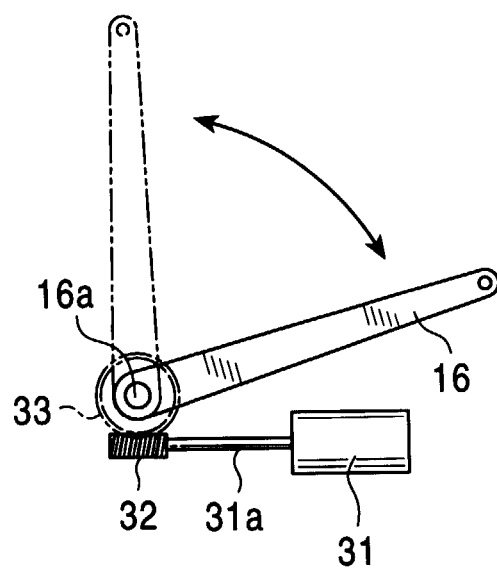


FIG. 6

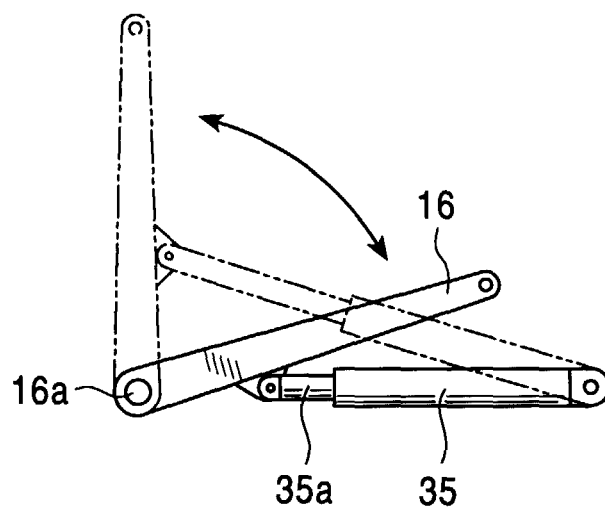


FIG. 7

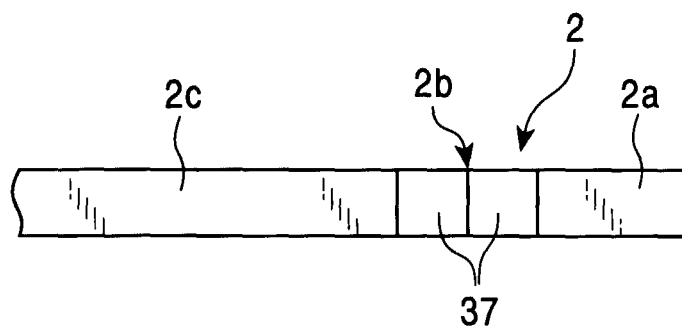


FIG. 8

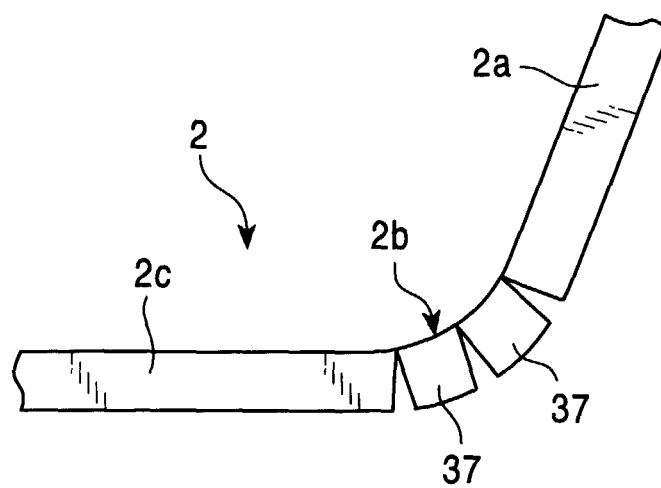


FIG. 9

