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(54) **Device for assisting disabled persons**

(57) A device and procedure for disabled, impaired or handicapped persons or patients in reaching or maintaining a standing position, in which they can be transported, undressed, dressed, and/or washed in the abdominal region. The device includes a knee support (15) and a movable torso support (10) extending transversely in front of the lower to middle part of the torso of the

person to be assisted. The person to be assisted leans with his/her torso slightly forward on the torso support during the raising movement in which the torso support moves simultaneously forward and upward until the person to be assisted has reached a position in which he/she is substantially standing whilst leaning forward over the torso support (10).

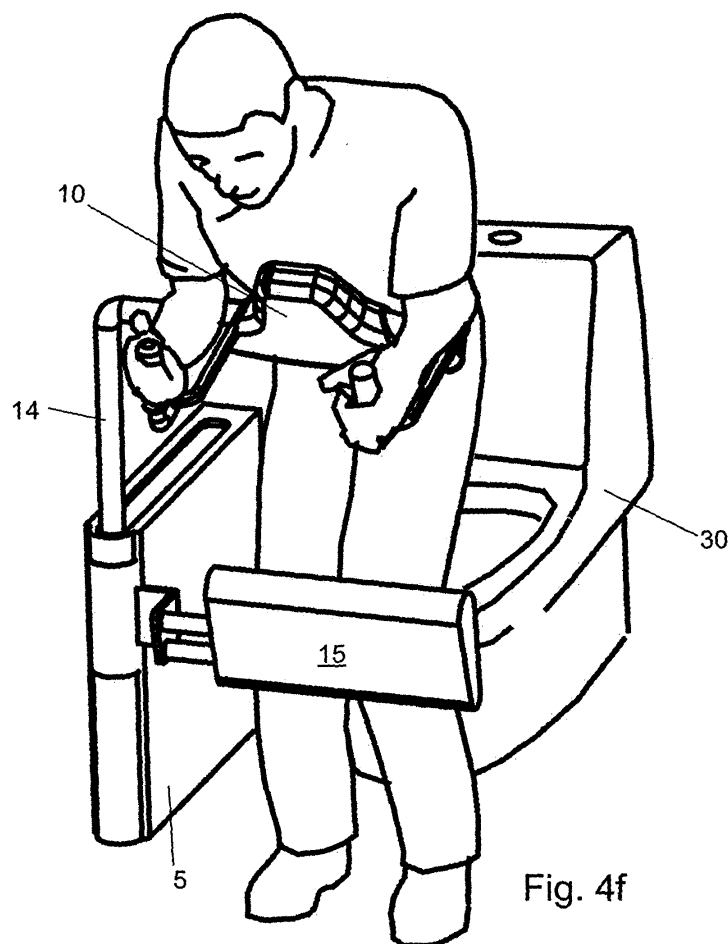


Fig. 4f

Description

[0001] The present invention relates to a device for disabled, impaired or handicapped persons or patients in reaching or maintaining a standing position in which they can be transported, undressed, dressed, and/or washed in the abdominal region, for example in connection with visits to the toilet. The device is intended for assisting persons that have reduced strength and control, and is not suitable for completely lamed or fully disabled persons.

BACKGROUND ART

[0002] In nursing and home care toilet seats and integral toileting assisting devices are used to raise and lower patients or persons e.g. in connection with toilet visits. WO 2004/098479 discloses a toilet chair that can move a seat between upper and lower positions, during which movement the seat and thus the patient sitting on it is continuously gradually inclined backwards in the movement to the upper position and forwards in the movement to the lower position. At the end of a toilet visit the seat is moved to the raised and rearwardly inclined position so that a carer will have access to the abdominal region for cleaning or washing and to the lower garments for dressing.

[0003] However, the inventor of the present invention has realized that the neither the access to the abdominal region nor the ease of dressing is optimal in the reclined position. Undressing and dressing the lower garment in the reclined position is hampered by the contact of the person's rear abdominal region with the seat. It can therefore be difficult to put a patient's pants up since the patient rests with a substantial part of his/her weight on the seat. Elderly persons often use diapers, which are even more difficult to place correctly when the person to be assisted rests with a part of his/her weight on rear abdominal region. Further, the rearwardly inclined position is often experienced by patients as humiliating.

[0004] In nursing and home care a variety of standing and lifting aids have been developed. Most of these devices are based on a pivoting lifting arm with sling attached thereto, in combination with a footplate and a knee support, as known from US 4,918,771. The lifting arm pivots from a substantially horizontal position upwards. All of these devices are based on the principle that the centre of gravity is positioned well behind the footplate/knee support during almost the complete lifting procedure so that the person "hangs" in the sling that is positioned around the persons back and/or abdominal region. With the centre of gravity of the person to be assisted so far behind the footplate/knee support the weight carried by the sling to the person to be assisted is quite significant, which leads to a high load on back and shoulders of the person to be assisted.

[0005] Thus, there is a need for improving standing and raising aids, toileting chairs and assistive devices.

DISCLOSURE OF THE INVENTION

[0006] The inventors of the present invention have realized that the procedure of assisting a person from a seated to a substantially standing system can be improved by keeping the center of gravity of the person to be assisted less far behind the foot plate/knee support.

[0007] Further, the inventors of the present invention have realized that access to the abdominal region and ease of undressing and addressing of the lower garments will be highly improved when the person to be assisted is in a substantially standing position leaning somewhat forward.

[0008] Based on this insight, there is provided an improved device for assisting a person to move from a seated position on a seat to a substantially standing and at least slightly leaning forward position and vice versa. The device comprises a frame, a knee or shin support carried by said frame, a torso support movably suspended from said frame, at least a part of the torso support having a preferably substantially transversely and extending support surface that is disposed in front of the torso of the person to be assisted, the torso support is operably connected to actuating means for moving said torso support from a first position in which the lower to middle part of the torso and eventually also the underarms of the person to be assisted can rest thereon whilst the person to be assisted is in a seated position with his/her torso at least slightly bended forward to a second position in which the torso and eventually the arms of the person to be assisted can rest thereon whilst the person to be assisted is in a standing and at least slightly leaning forward position.

[0009] The novel use of a torso support, allowing person to be assisted to lean thereon with his/her torso and eventually underarms results in a standing aid on which the person to be assisted is leaning as opposed to hanging in a sling in the prior art devices. When properly used, the centre of gravity of the person to be assisted is not far behind or even above the knee support throughout the procedure. This results in an ergonomically improved raising procedure, with significantly less load on the back of the person to be assisted. Further, the resulting standing whilst leaning slightly forward position offers a much less humiliating position for undressing and dressing and washing of the abdominal region.

[0010] The torso support may comprise a transversely extending and forwardly inclined main support surface disposed substantially right in front of the torso of the person to be assisted. Such an almost upright and preferably upholstered support surface increases confidence in the device by the user and of course also increases comfort of use.

[0011] The torso support may also comprise underarm support surfaces, one on opposite sides of said main support surface. This measure further increases the confidence in the device by the user and of course also increases comfort of use, since this measure provides an additional support for the users body, thereby spreading

the load and reducing the risk of overloading any body part.

[0012] The torso support may further comprise two handles that move in unison with the torso support. These handles are preferably disposed in front of the main support surface for holding by the hands of the person to be assisted. The distance between the main support surface and the handles is preferably adjustable.

[0013] At the start of the raising procedure the under-arm support extends substantially horizontally from the torso support towards the handles.

[0014] The torso support may be able to tilt forward about a transversely extending axis disposed within the torso support, preferably against the force of a resilient member.

[0015] Preferably, the first position is substantially above the seat and the second position is substantially above or in front of the knee or shin support. The upper arms of the person to be assisted can during the raising procedure be directed substantially downwards whilst the underarms and the torso of the person to be assisted rest on the torso support.

[0016] Most of the movement of the torso support is in a forward direction, whilst a simultaneous movement upwards is typically of a lesser magnitude. Thus, the second position may be higher than the first position.

[0017] Preferably, the first and second positions are adjustable within a range of positions in order to adapt the device to the characteristics of the person to be assisted.

[0018] The torso support may include handles in front thereof for gripping by the hands of the person to be assisted, so as to assure that center of gravity of the torso of the person to be assisted is kept in a forward position.

[0019] In order to provide easy access to the seat, the torso support can be pivotally supported at one end so as to allow the torso support to pivot about a substantially vertical axis between a position with torso support extends substantially transversely in front of the torso of the person to be assisted and a position in which the torso support extends in a non-transverse direction. In the latter position, a person to be assisted can pass the torso support substantially unhindered.

[0020] The preferably height adjustable knee or shin support extends in use in a transverse and substantially horizontal direction and is disposed in front of at least one of the shins or knees of the person to be assisted. However, the knee or shin support may be pivotally supported at one end so as to allow the at least one arm rest to pivot about a substantially vertical axis between a position with the knee or shin support extends substantially transversely in front of shins or knees of the person to be assisted and a position in which the knee or shin support extends in a non-transverse direction thereby allowing a person to be assisted to pass the at least one knee or shin support substantially unhindered.

[0021] The seat can be the toilet itself, with the device arranged in the close vicinity of the toilet seat. Alternatively,

the frame also supports its own a seat with a front end and a rear end. This seat can be operably connected to actuating means for tilting the seat between a substantially horizontal position and a forwardly inclined position in which the rear end is higher than the front end. The actuating means can be resilient member, such as a gas spring.

[0022] The device may also comprise a footplate which is preferably disposed substantially directly below the knee and shin support. If the device is stationary equipment there is no need of a footplate since the floor could be used for supporting the feet of the person to be assisted. However, if the device is mobile and used to transport the person to be assisted, e.g. from a bed to a wheelchair, a proper footplate supported by the frame is required.

[0023] The torso support may move from the first to the second position simultaneously with the movement of the seat from the horizontal position to the inclined position.

[0024] In order to provide a mobile device, the frame can be supported by a wheeled carriage.

[0025] For stationary devices, the frame may be adapted for floor- wall- or toilet mounting.

[0026] The seat can be a toilet seat and the device is adapted to be used in connection with toilet visits of handicapped invalid person or patients.

[0027] The device may comprise a sling attached to transversely spaced attachment points at the torso support for placing around the torso of the patient to be supported. The sling is used to keep the torso of the person to be assisted in abutment with the torso support and to keep the torso leaning forward. The sling is thus not lifting or carrying the weight of the person to be assisted,

[0028] It is a further object of the invention to provide an improved method of assisting a handicapped or invalid person in moving from a seated position to a substantially standing and slightly leaning forward position

[0029] This object is achieved by providing a method for assisting a handicapped or invalid person in moving from a seated position to a substantially standing and slightly leaning forward position employing a device with a knee support and a movable torso support, comprising a procedure in which the feet of the patient are positioned on the floor or on a footplate of said device, with the legs below the knees substantially vertical or slightly leaning forward against the knee or shin support, the movable torso support is placed in front of lower to middle part of the torso with the torso at least slightly leaning forward and resting on said torso support, optionally also the underarms of the person to be assisted resting on the torso support with the upper arms of the person to be assisted in a substantially downward direction, and moving said torso support forward and upward until the person to be assisted reaches a substantially standing and slightly leaning forward position.

[0030] Further objects, features, advantages and properties of the device and procedure according to the

invention will become apparent from the detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

[0031] In the following detailed portion of the present description, the invention will be explained in more detail with reference to the exemplary embodiments shown in the drawings, in which:

Fig. 1 is a an elevated view of an embodiment of the device for assisting disabled persons according to an embodiment of the invention,

Fig. 2 is an elevated view of the device according to Fig. 1 from another viewpoint,

Figs. 3a to 3c are side views illustrating the action of a torso support of the device according to Fig. 1,

Fig. 3d is a graph illustrating the path of the movement of the torso support of the device as shown in Figs. 3a to 3c,

Figs. 3e and 3f illustrate in a cut-open side view a first embodiment of an actuator system in two positions of the torso support,

Figs. 3g and 3h illustrate in a cut-open side view a second embodiment of an actuator system in two positions of the torso support,

Figs. 4a to 4d are side views of a person to be assisted being moved with the device shown in Fig. 1 from a seated position to a substantially standing up and leaning forward position,

Fig. 4e is a perspective view corresponding to Fig. 4b,

Fig. 4f is a perspective view corresponding to Fig. 4d,

Figs. 4g and 4h illustrate a variation of the device illustrated in Fig. 1 by two side views with a person in different stages of the raising procedure,

Figs. 5a and 5b show two stages of the raising procedure with a device according to a further preferred embodiment of the device and procedure according to the invention in which a sling is used to aid the person to be assisted in remaining proximity to the torso support, and

Fig. 6a illustrates yet an embodiment of the device also including also a footplate in an elevated view,

Figs. 6b and 6c. illustrate top views on the device according to the embodiment of Fig. 6a in two differ-

ent positions.

Fig. 7 illustrates yet another embodiment of the invention in which a two-parted torso support and a two-parted knee support are deployed,

Figs. 8a to 8c are elevated views on an embodiment in which the device according to the invention is a mobile raising/standing aid,

Fig. 9 illustrates another preferred embodiment of the invention with an alternative shape for the torso support, and

Fig. 10 is a diagrammatic representation of the procedure for raising a person according to the invention.

DETAILED DESCRIPTION

[0032] With reference to Figs. 1 and 2 a device 1 for assisting a person from a seated position to a substantially standing and slightly leaning forward position according to a preferred embodiment of the invention is illustrated. The device 1 includes a frame 5 that supports a movable torso support 10 and a knee support 15. The term "knee support" as used here includes any support that provides an abutment surface for the higher shins and/or for the knees. The frame 5 is adapted to be either floor- wall- or toilet mounted by suitable fastening means as a well-known in the art and therefore not illustrated here.

[0033] The torso support 10 includes a substantially transversely and forwardly inclined main support surface. At least the main support surface of the torso support is upholstered, i.e. covered with a soft resilient layer under a skin or textile lining, to create a comfortable pillow like structure.

[0034] Two handles 12 protrude forwardly from the torso support 10. The distance between the main support surface and the handles 12 corresponds to the average length of the human underarm and can be adjusted to match individual variations. The adjustment mechanism is not shown but concentric tube arrangements with suitable arresting means in various positions are well known in the art.

[0035] An underarm support surface 13 is provided on each side of the main support surface. The underarm support surfaces 13 extend from the main support surface towards the handles 12.

[0036] The knee support 15 is provided with a substantially vertically extending abutment surface and is adjustable in height. The knee 15 support is also adjustable forward and rearward to adjust for variations in the length of the thighbone of the persons to be assisted. The knee abutment surface can be contoured to prevent and side-ward moment of the knees.

[0037] With reference to Figs. 3a through 3c the move-

ment of the torso support 10 is illustrated. During the raising procedure the torso support 10 and the knee support 15 are arranged substantially transversely to the frame 5.

[0038] Fig. 3a illustrates the position of the torso support 10 when the person to be assisted is in a seated position. The torso support 10 is positioned well behind the knee support and in a relatively low position. This position of the torso support 10 is hereinafter referred to as the first position.

[0039] During the first portion of the raising procedure the torso support moves forward and to a lesser extent upwards, as illustrated by Figs. 3b and 3c. During the last portion of the raising procedure the torso support moves predominantly upwards. The forward and raised position of the torso support 10 shown in Fig. 3c is the hereinafter referred to as the second position.

[0040] As indicated by the arrow Z The torso support 10 can by a force applied by the person to be supported tilt slightly forward to a limited extent about the horizontal part of the support arm 14 against the force of a spring (not shown).

[0041] The path of the torso support from the first position (indicated as A in the graph) to the second position (indicated as D in the graph) is illustrated diagrammatically in the graph of Fig. 3d. This graph clearly illustrates that the forward moment dominates from the start of the movement in the first position and only when the torso support has almost reached the second position at about the position indicated as C in the graph the upward movement starts to dominate.

[0042] Figs. 3e through 3h illustrate two different versions of the actuating mechanism that is used to move the torso support. According to the embodiment illustrated in Fig. 3e and 3f the arm 14 that carries the torso support 10 is vertically slidably suspended from an upright bar 21 and the lower end of the arm 14 is connected to a horizontal bar 26. Bar 21 is provided with a wheeled trolley 22 at its upper end and with a wheeled trolley 23 at its lower end. These oppositely disposed and oriented trolleys run on support surfaces at the top and bottom of the frame, respectively.

[0043] The horizontal bar 26 is provided with a wheeled trolley 27 at its left end and with a wheeled trolley 28 at its right end. These oppositely disposed and oriented trolleys run on a support face at the left end and the right end of the frame, respectively. The upright bar 21 is connected to a tooth belt 24 that runs around two horizontally spaced pulleys, one at the left side of the frame 5 and one at the right side of the frame. One of the pulleys is connected to an electric drive motor 25, which can be a stepper motor. Activation of the drive motor 25 moves the upright bar 21 in either the right- or left direction.

[0044] The horizontal bar 26 is supported by an linear actuator 29 including an electric motor. The upper extremity of the linear actuator 29 can slide sideways relative to the horizontal bar 26. Activation of the liner drive actuator results in the horizontal bar 26 moving upwards

or downwards. The vertical and horizontal movement of the torso support 10 are independent from one another and the electric motors can be controlled to achieve any desired path of movement and/or first and second positions for the torso support 10.

[0045] According to the embodiment illustrated in Fig. 3g and 3g the arm 14 that supports the torso support 10 is connected to a wheeled trolley 33 that the runs on a sloping and curved guide Rail 28. The trolley is provided with rollers two opposite sides of the guide rail 28. The rail 28 controls the vertical movement of the torso support. The movement of the torso support in the horizontal direction is controlled by a tooth belt 24 running on two horizontally spaced pulleys, one of the pulleys being connected to an electric drive motor 25, such as a stepper motor.

[0046] The electric motor or motors are in both versions of the actuating mechanism controlled by a programmable control unit (not shown). The control unit receives a position signal from a sensor in the electric actuator 29 (not in the embodiment shown in Fig. 3g and 3h) and from the drive motor 25. The control unit 99 is programmable and can contain the individually adjusted first and second positions or complete path of the torso support 10 for the various persons to be supported.

[0047] Also the speed, acceleration/deceleration and the path of the movement between the first position and the second position of the torso support 10 can be individually stored for the various persons that use the device. Thus the path could be steeper or less steep, in accordance with individual user needs.

[0048] In an alternative embodiment (not shown) the arm 14 is pivoted about a horizontally extending pivot axis near the front bottom corner of the frame 5 and actuated by electric actuator means, which are such well-known in the art and therefore not described in detail here.

[0049] In all the embodiments the actuating means is associated with programmable control unit described above and a user interface, preferably in the form of a control panel (not shown).

[0050] The Figs. 4a through 4d illustrate the procedure of raising a person from a seated position on a toilet 30 to a substantially standing and slightly leaning forward position on the device 1 by means of side views. In Fig. 4a the person to be assisted sits on a toilet 30 in a relaxed position. The torso support 10 is in a forward position to allow easy access to the toilet.

[0051] The feet of the person to be assisted are supported by the floor in front of the toilet 30. In Fig. 4b the torso support 10 has been moved to the first position with the torso support 10 in a low position just in front of the middle part of the torso of the person to be assisted. The knee support 15 is close to (or in contact with) the knees or shins of the person to be assisted. The person to be assisted has leaned his/her torso slightly bended forward and rests with the lower to middle part of his/her torso on the torso support 10. The underarms of the person to be

assisted rest on the underarm supports 13 and the hands of the person to be assisted hold the handles 12. The upper arms of the person to be assisted are in a substantially downward position. The hands of the person to be assisted have gripped the handlebars 12 and the person to be assisted is now able to rest with a large part of his/her upper body weight on the torso support 10. The shins of the patient abut with the knee support and the feet of the patient are resting on the floor. From this position the torso bar 10 is simultaneously moved forward and upward by the actuating means, with a focus on the forward movement during the first part of the raising procedure. Therefore, as also illustrated more diagrammatically in Fig. 10, the first portion of the raising procedure leads to an increased forward tilt of the upper body and only a small upward movement of the hips of the person to be assisted. Only in the last part of the raising procedure the hips start to move more significantly upwards with the rotation of the thighs about the knees. Thus, during this raising that is illustrated by Fig. 4c and 4d (and diagrammatically by Fig. 10) the person to be assisted to remains with the weight of his/her upper body leaning on the torso support, and due to the forward and upward movement of the torso support 10 the person to be assisted moves from the seated position to a substantially standing position and slightly leaning forward position. During this movement the knee support prevents legs the person to be assisted from collapsing. In Fig. 4d the person to be assisted has reached a position in which he/she is substantially standing whilst leaning forward over the torso support 10. The torso support 10 makes a slight forwardly tilting movement during the last part of the raising procedure to allow the torso of the person to be supported to lean slightly more forward in the raised position.

[0052] The positions of Figs. 4b and 4d are shown as perspective views in Figs. 4e and 4f, respectively.

[0053] According to another preferred embodiment shown in Figs. 4g and 4h, the seat 19 of the toilet or of a mobile toilet seat 18 is provided with a gas spring or other resilient member that urges the seat to pivot upwards about a horizontal pivot axis disposed in the region of the front end of the seat 19. This forward tilting movement of the toilet seat 19 helps the person to perform the required to upwardly pivoting movement of his/her thighs. The forwardly tilting toilet seat may be part of the device 1 and supported by the frame 5 (this embodiment is not shown). In Fig. 4g the person to be assisted has reached an intermediate position between the first and second position and has been helped by the tilting seat 19 up to this point in the raising procedure. During the remainder of the raising procedure the tilting seat 19 cannot be of further assistance, but this is normally not required since it is usually the first part of the raising movement of the thighs that creates most problems. In Fig. 4h the person to be assisted has reached a position in which he/she is substantially standing and leaning slightly forward on the torso support 10. In this position it is relatively easy for a

carer to access the abdominal region for cleaning and to dress the lower garments, i.e. to put the person's pants up. The abdominal region is well accessible whilst the position of the person to be assisted is less humiliating than the conventional rearwardly tilted position. Dressing and undressing the lower garments is substantially easier than in rearwardly inclining toilet seats since the person to be assisted does not have any contact with the lower body to a seat or the like.

[0054] The need for the assistance of a forwardly tilting toilet seat depends on the level of impairment of the person to be assisted. For less impaired persons it will not be necessary to use the forwardly tilting toilet seat.

[0055] For more severely impaired or weak persons it can be necessary to provide a sling around the back of the person to be assisted, as shown in Figs 5a and 5b in two stages of the raising procedure, in order to assure that the person to be assisted remains in contact with the main support surface of the torso support 10 and to remain in a slightly leaning forward position. Hereto, the torso support 10 is provided with two transversely spaced sling attachment points at opposite ends thereof. The sling 37 is placed around the lower part of the back of the patient and provides mainly support in a forward direction in order to keep the torso of the person to be assisted in abutment with the torso support 10, i.e. the sling 37 does not carry the weight of the person to be assisted.

[0056] Figs. 6a to 6c illustrate another embodiment of the invention that differs from the embodiments described above mainly by further including a foot plate 17. In this embodiment the feet of the person to be assisted rest on the footplate 17 as opposed to on the floor like in the embodiments described above. The torso support 10, the knee support 15 and the foot plate 17 are pivotally suspended from the frame 5 and can pivot about a - preferably common - vertical axis Y. The torso support 10, the knee support 15 and the foot plate 17 are interconnected such in that they swing in unison. The torso support 10, the knee support 15 and the foot plate 17 can be locked in the transverse position by a not-shown locking means so that they locked during the raising or lowering procedure. As shown in Figs. 6b and 6c, the person to be assisted can be swung sideward. With the person to be assisted swung sideward access for a carer for hygiene and/or dressing reasons is significantly improved. When the carer has finished in the dressing and/or hygienic activities or the like the person to be assisted can be lowered into the wheelchair and can be transported or vice versa.

[0057] Fig. 7 illustrates another preferred embodiment of the invention in which the torso support and the knee support are two-parted into a torso support part 10 and a torso support part 10' and a knee support part 15 and knee support part 15' with each part being arranged at an opposing side of the seat. The device thus comprises two frames 5 and 5' (although these two frames can be arranged on one wheeled carriage) with each their torso

support member and their knee support member. If a foot plate is included it will in this embodiment also be two-parted. The respective parts of the torso support, the knee support and the footplate move in unison to a position swung away for access to the seat (not shown) and a transverse position (Fig. 7) for the raising/lowering procedure.

[0058] Figs. 8a to 8c illustrate an embodiment of the invention in which the frame 5 is mounted on a wheeled carriage 50 to turn the device into a mobile standing/raising aid. Thus, the device 1 can be used for transporting persons to and from various places, such as between a bed and a toilet. The wheeled carriage 50 has a U-shaped sub-frame that allows the device to be positioned over a toilet or other seat. The frame 5 is mounted on the sub-frame with the footplate 17 fastened to the bar that connects the two legs of the U-shaped sub-frame. The frame 5 is provided with the torso support 10 and the knee support 15 in the same way as described for the embodiment according to Fig. 1. The free extremity of one of the legs of the sub-frame serves as a support for a detachable seat 45. The seat 45 could be a toileting seat as shown, or a regular seat (not shown). As shown in Fig. 8b, the seat 45 is pivotally suspended from the sub-frame so that it can be swung aside when required, e.g. when a person is to be transferred from a wheelchair to the device 1. After the person is raised from the wheelchair, the wheelchair is removed and the seat 45 is swung back into the position of Fig. 8A whereafter the person to be assisted is lowered onto the seat 45. As shown in Fig. 8c, the seat 45 can be detached when it is not needed.

[0059] Fig. 9 illustrates another embodiment of the invention with a differently shaped torso support 10. This embodiment is substantially identical to the embodiment of Fig. 6a, except that in this embodiment the torso support 10 does not have a upwardly sloping main support surface, but is formed by a transversely extending rod like member. The rod like member can have a round (not shown) or oval cross sectional shape and is upholstered in order to provide a comfortable support surface for the torso and the underarms/elbows. The operation of this embodiment and the other details thereof correspond to the embodiments described above.

[0060] Fig. 10 illustrates in four steps the raising procedure according to the invention in a more schematic fashion. The sequence of positions clearly shows the focus of the forwardly bending movement of the upper body of the person to be assisted during the first portion of the raising procedure, which causes the center of gravity to come close to or above the footplate and the knee support before the predominantly upward movement commences. Once the centre of gravity is substantially above the footplate/knee support the upward movement of the torso support begins to dominate. With the center of gravity almost or completely above the knees of the person to be assisted, the actual upward movement of the upper body of the person to be assisted is carried out. Thus,

the raising procedure is ergonomically optimal with the low loads and strains on the joints limbs and back of the person to be assisted.

[0061] In the above described embodiments the knee support, the torso support and the footplate are carried/suspended from one frame 5. It is however clear that each of these supports could be carried by a separate frame or other suitable construction for keeping these supports in the correct position relative to a seat, toilet or bed.

[0062] Thus, while the preferred embodiments of the devices and methods have been described in reference to the environment in which they were developed, they are merely illustrative of the principles of the invention. Other embodiments and configurations may be devised without departing from the scope of the appended claims.

Claims

1. A device for assisting a person to move from a seated position on a seat to a substantially standing and at least slightly leaning forward position and vice versa, said device comprising:

- a frame;
- a knee or shin support carried by said frame;
- a torso support movably suspended from said frame;
- at least a part of the torso support having a preferably substantially transversely extending support surface that is disposed in front of the torso of the person to be assisted;
- the torso support is operably connected to actuating means for moving said torso support from a first position in which the lower to middle part of the torso and eventually also the underarms of the person to be assisted can rest thereon whilst the person to be assisted is in a seated position with his/her torso at least slightly bended forward to a second position in which the torso and eventually the arms of the person to be assisted can rest thereon whilst the person to be assisted is in a standing and at least slightly leaning forward position.

2. A device according to claim 1, wherein the torso support comprises a transversely extending and forwardly inclined main support surface disposed substantially right in front of the torso of the person to be assisted.
3. A device according to claim 1 or 2, wherein the torso support comprises underarm support surfaces, one on each opposite side of said main support surface.
4. A device according to claim any of claims 1 to 3, wherein said torso support comprises two handles

that move in unison with the torso support, said handles preferably being disposed in front of the main support surface for holding by the hands of the person to be assisted, and the distance between the main support surface and the handles preferably being adjustable.

5. A device according to claim 4, wherein said under-arm support extends substantially horizontally from the torso support towards the handles. 5
6. A device according to claim 1, wherein the torso support can tilt forward about a transversely extending axis disposed within the torso support, preferably against the force of a resilient member. 10
7. A device according to any of claims 1 to 6, wherein the first position is substantially above the seat and the second position is substantially above or in front of the knee or shin support, with the second position preferably being higher than the first position. 15
8. A device according to any of claims 1 to 7, wherein the upper arms of the person to be assisted are directed substantially downwards when the under-arms and the torso of the person to be assisted rest on the torso support. 20
9. A device according to any of claims 1 to 8, wherein the first and second positions are adjustable within a range of positions in order to adapt the device to the characteristics of the person to be assisted. 25
10. A device according to any of claims 1 to 9, wherein the torso support is pivotally supported at one end so as to allow the torso support to pivot about a substantially vertical axis between a position with torso support extends substantially transversely in front of the torso of the person to be assisted and a position in which the torso support extends in a non-transverse direction. 30
11. A device according to any of claims 1 to 10, wherein the preferably height adjustable knee or shin support comprises an abutment surface that extends in a transverse and substantially horizontal direction and is disposed in front of the shins or knees of the person to be assisted. 35
12. A device according to claim 11, wherein the knee or shin support is pivotally supported at one end so as to allow the at knee or shin support to pivot about a substantially vertical axis between a position with the knee or shin support extends substantially transversely in front of shins or knees of the person to be assisted and a position in which the knee or shin support extends in a non-transverse direction thereby allowing a person to be assisted to pass the at 40

least one knee or shin support substantially unhindered.

13. A device according to any of claims 1 to 12 wherein said frame also supports a seat with a front end and a rear end, said seat being operably connected to actuating means for tilting the seat between a substantially horizontal position and a forwardly inclined position in which the rear end is higher than the front end, and said actuating means preferably comprising a resilient member. 45
14. A device according to any of claims 1 to 13, further comprising a footplate carried by said frame, said footplate preferably being disposed substantially directly below the knee and shin support and being pivotally suspended from the frame so as to allow it to pivot between a transverse position in front of the person to be support and a non-transverse position not in front of the person to be assisted. 50
15. A device according to any of claims 1 to 14, further comprising a sling attached to the torso support at transversely spaced attachment position for placing around the torso of the patient to be supported. 55
16. A method for assisting a handicapped or invalid person in moving from a seated position to a substantially standing and slightly leaning forward position employing a device with a knee support and a movable torso support, comprising a procedure in which:

the feet of the patient are positioned on the floor or on a footplate of said device, with the legs below the knees substantially vertical or slightly leaning forward against the knee or shin support, the movable torso support is placed in front of lower to middle part of the torso with the torso at least slightly leaning forward and resting on said torso support, optionally also the under-arms of the person to be assisted resting on the torso support with the upper arms of the person to be assisted in a substantially downward direction, and moving said torso support forward and upward until the person to be assisted reaches a substantially standing and slightly leaning forward position.

17. A method according to claim 16, wherein the forward movement of the torso support dominates the upward movement until the centre of gravity of the person to be assisted is close to or above the knee support, whereafter the upward movement dominates the forward movement of the torso support. 55

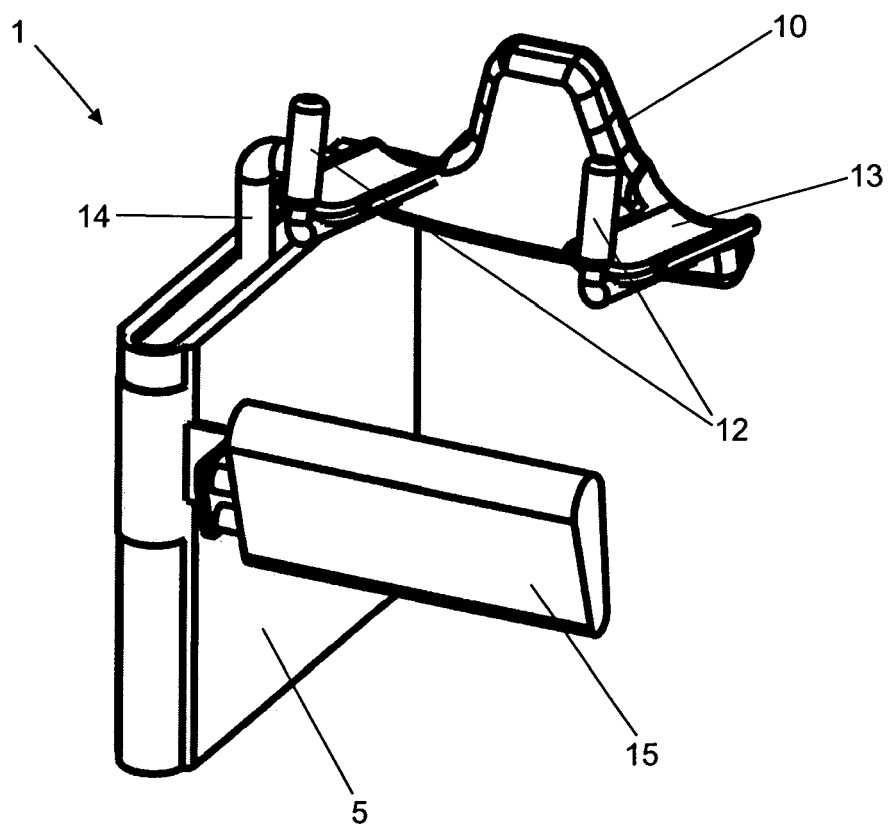


Fig. 1

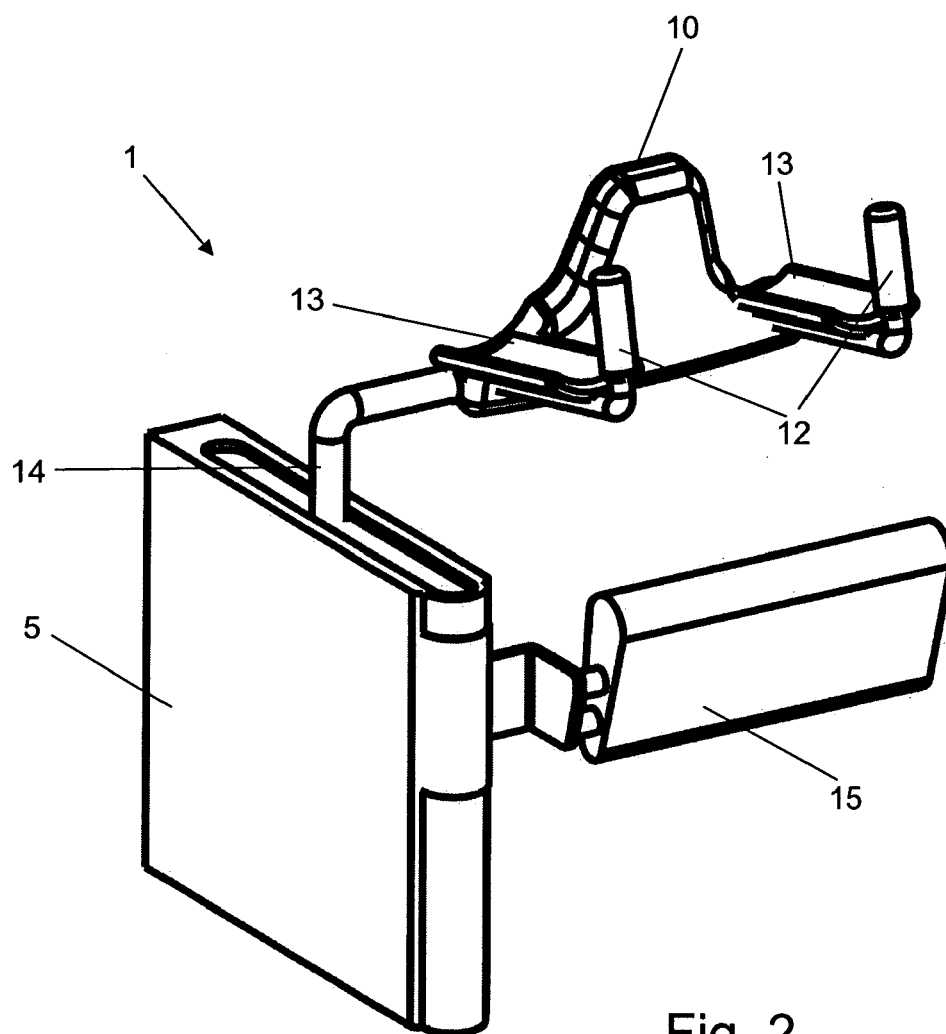


Fig. 2

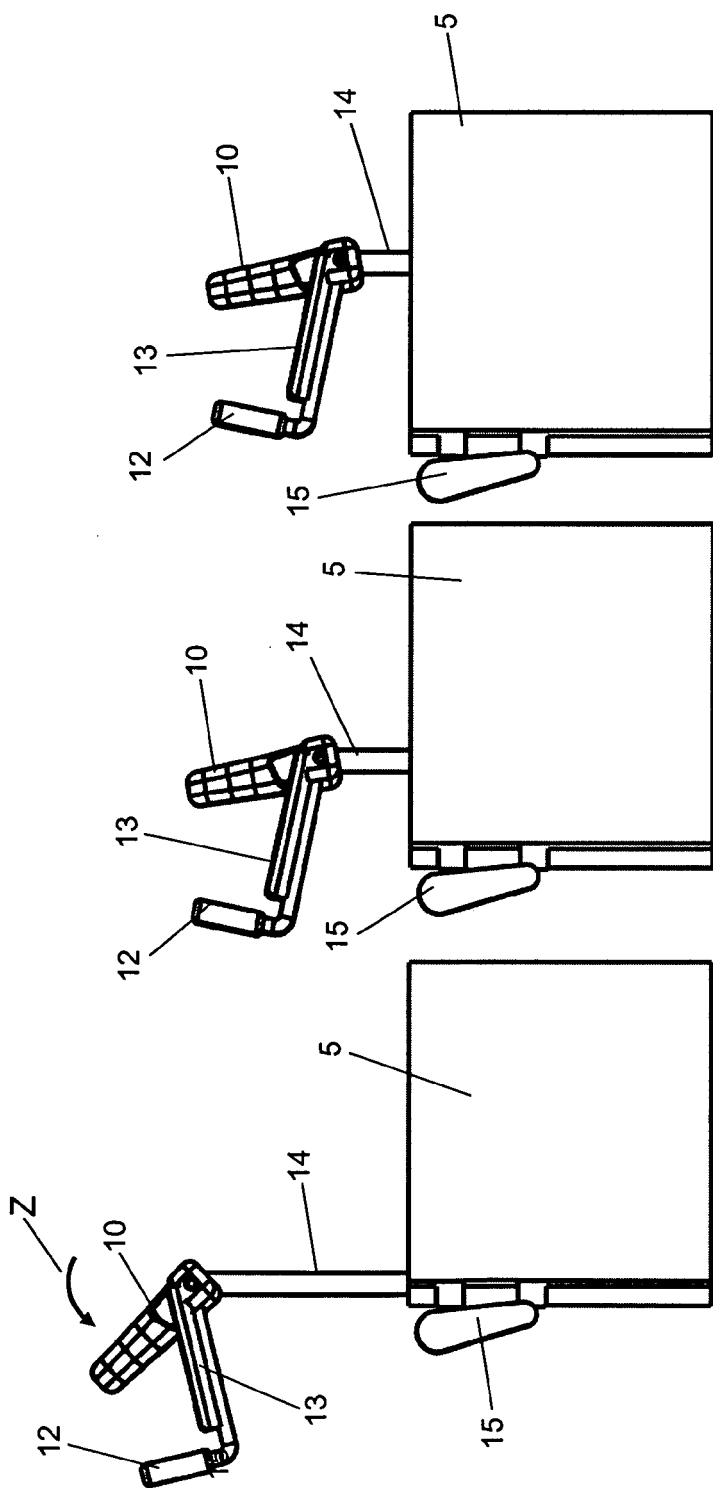


Fig. 3a

Fig. 3b

Fig. 3c

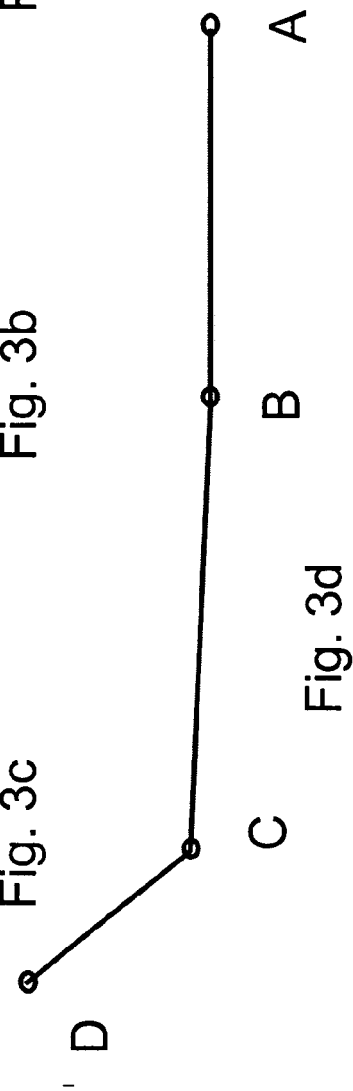


Fig. 3d

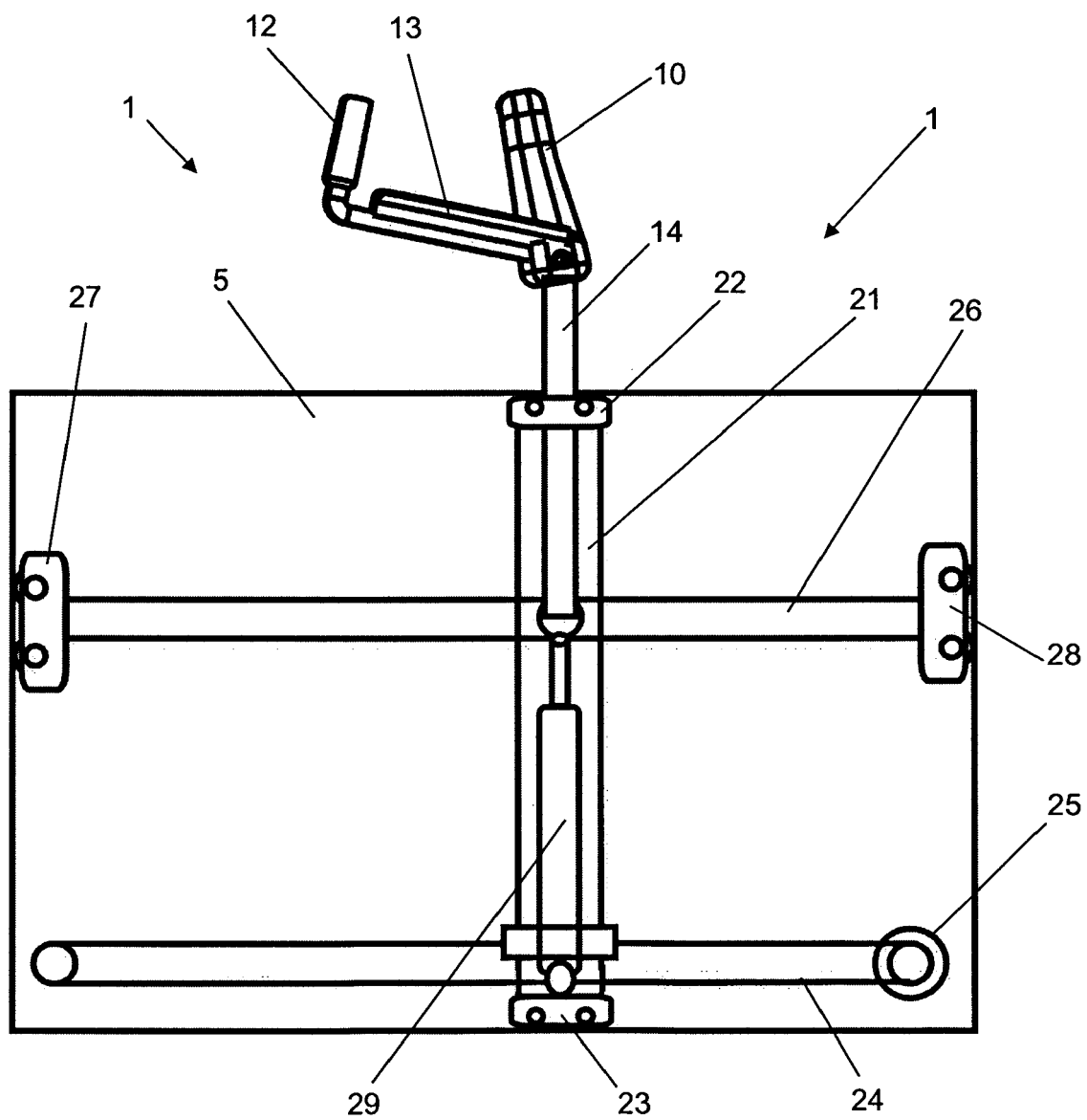


Fig. 3e

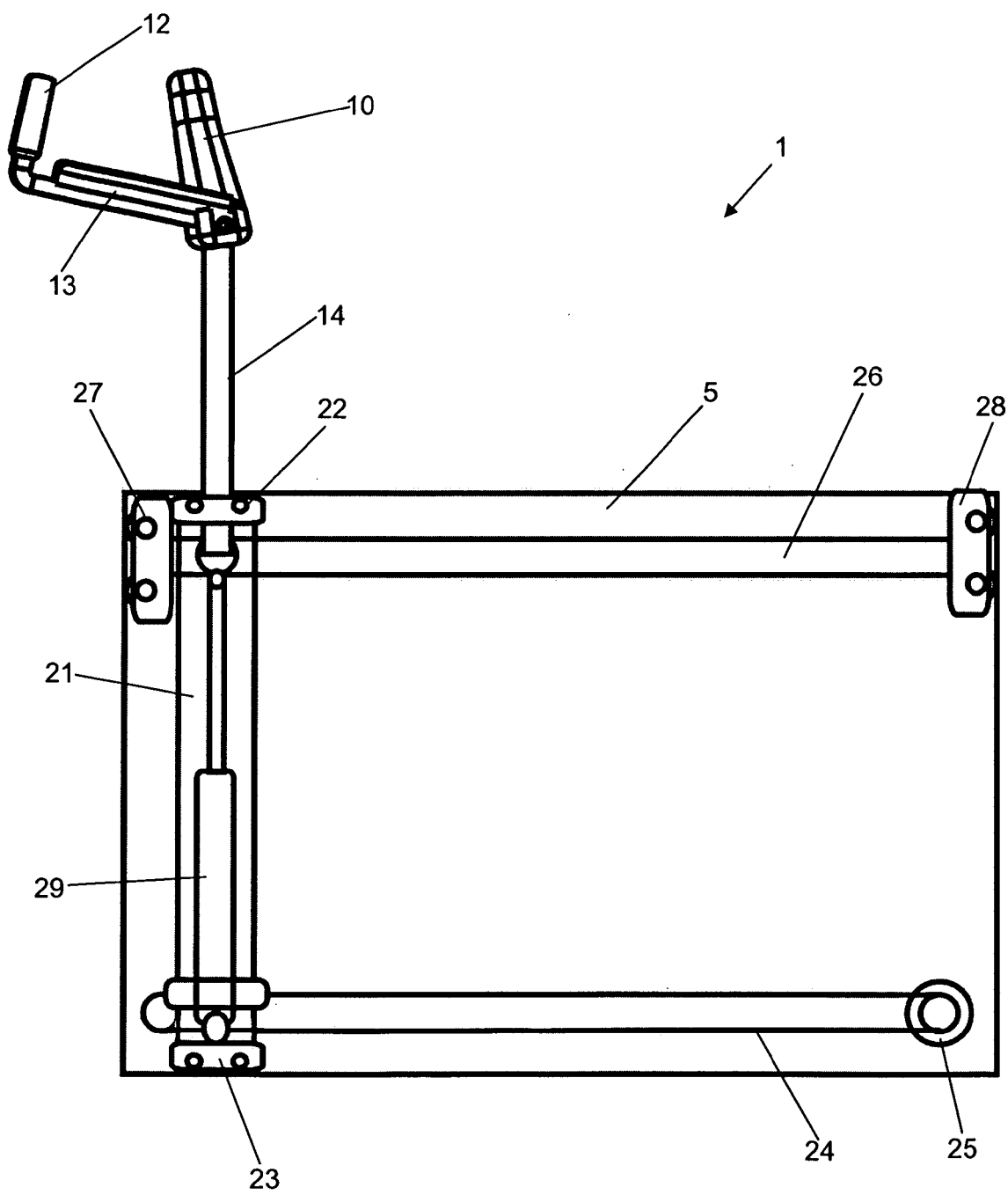


Fig. 3f

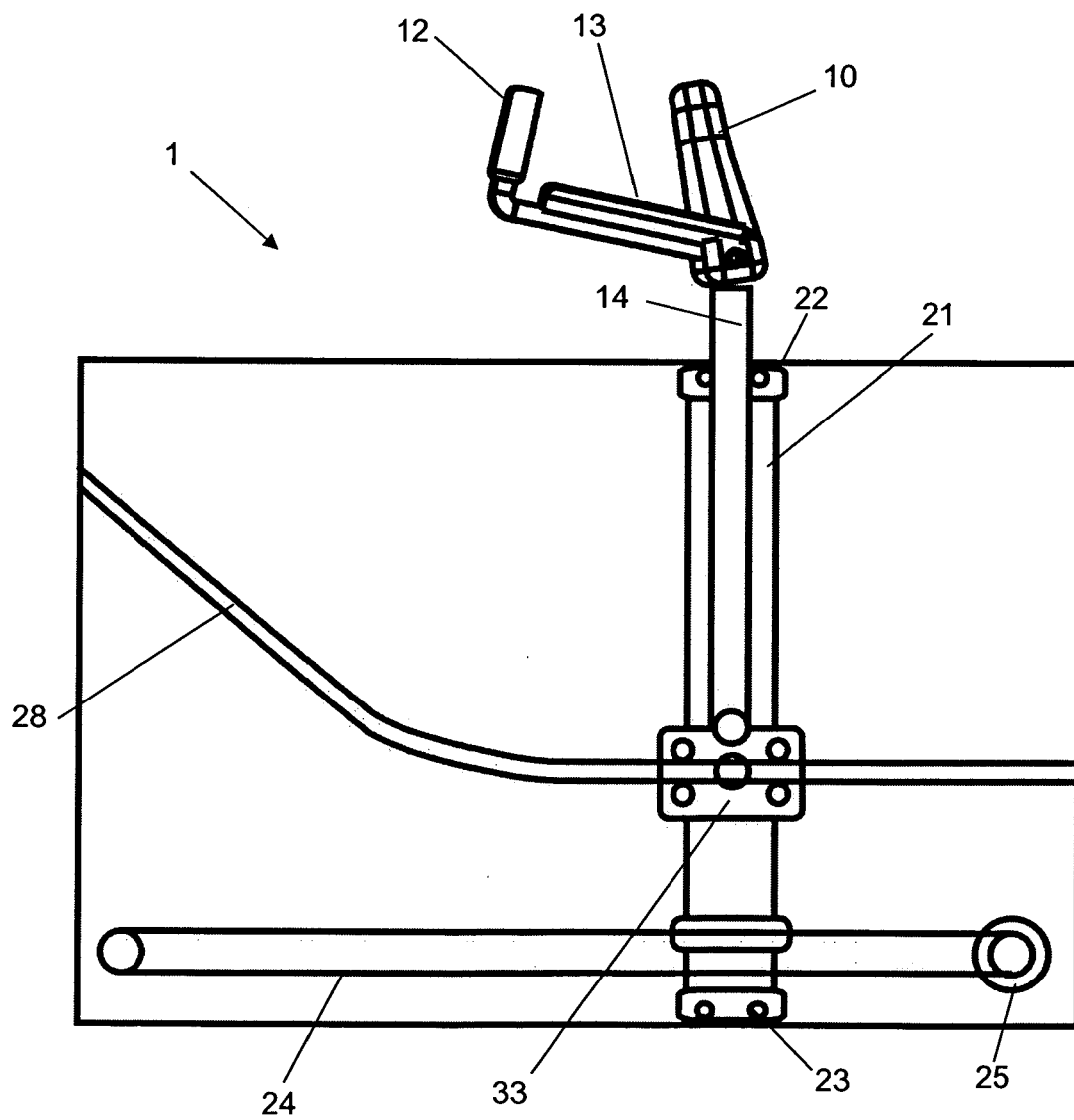


Fig. 3g

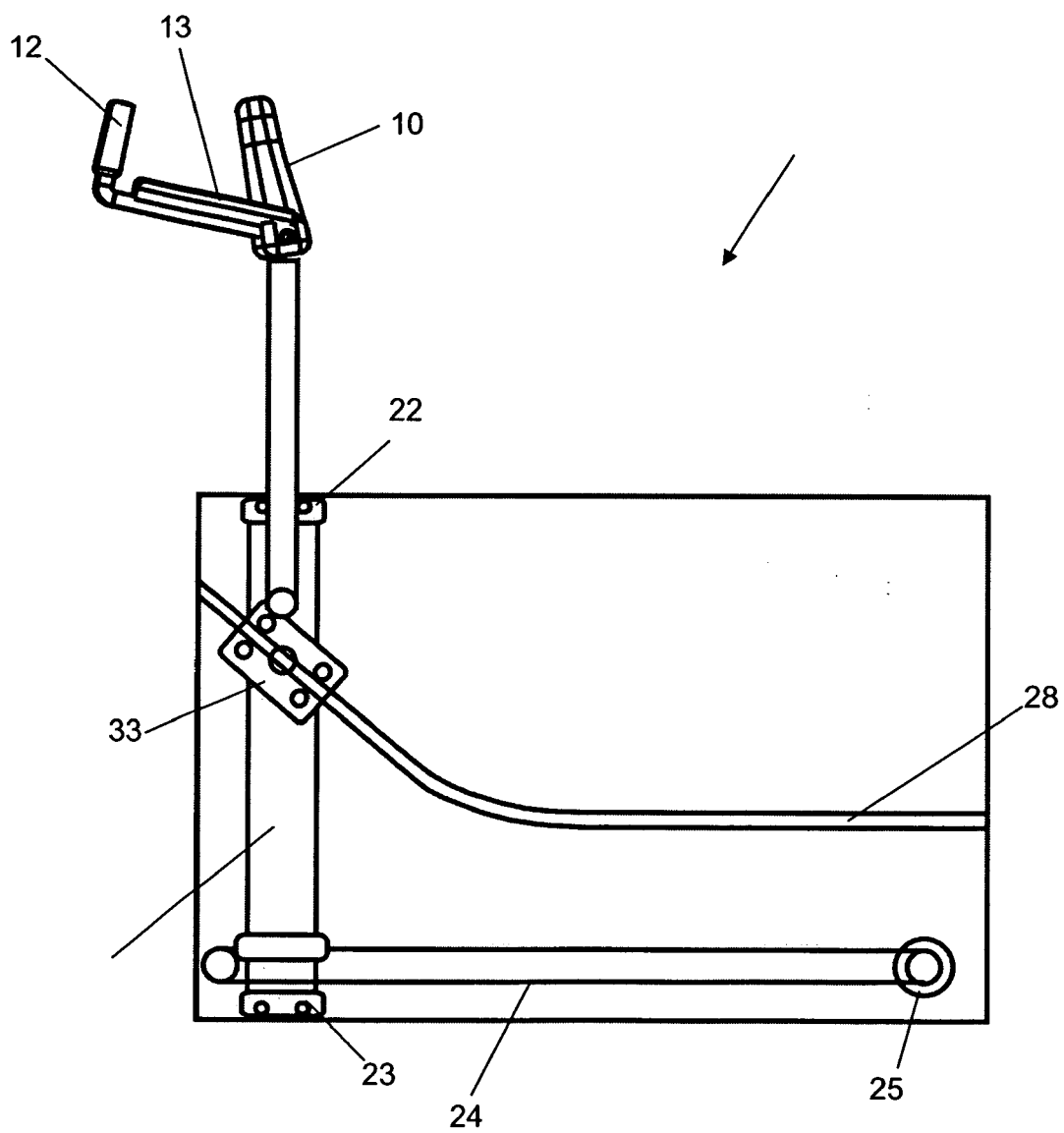


Fig. 3h

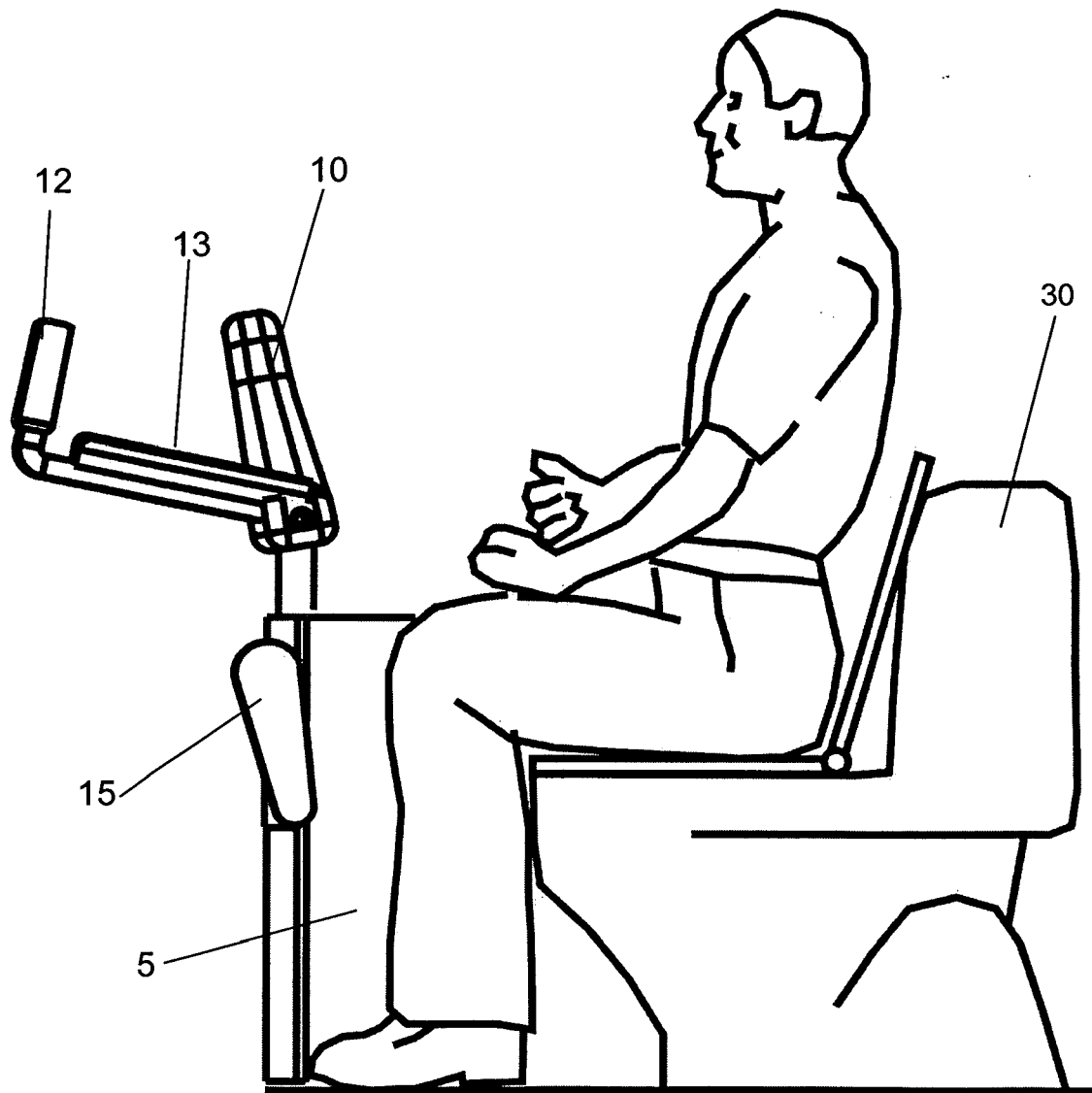


Fig. 4a

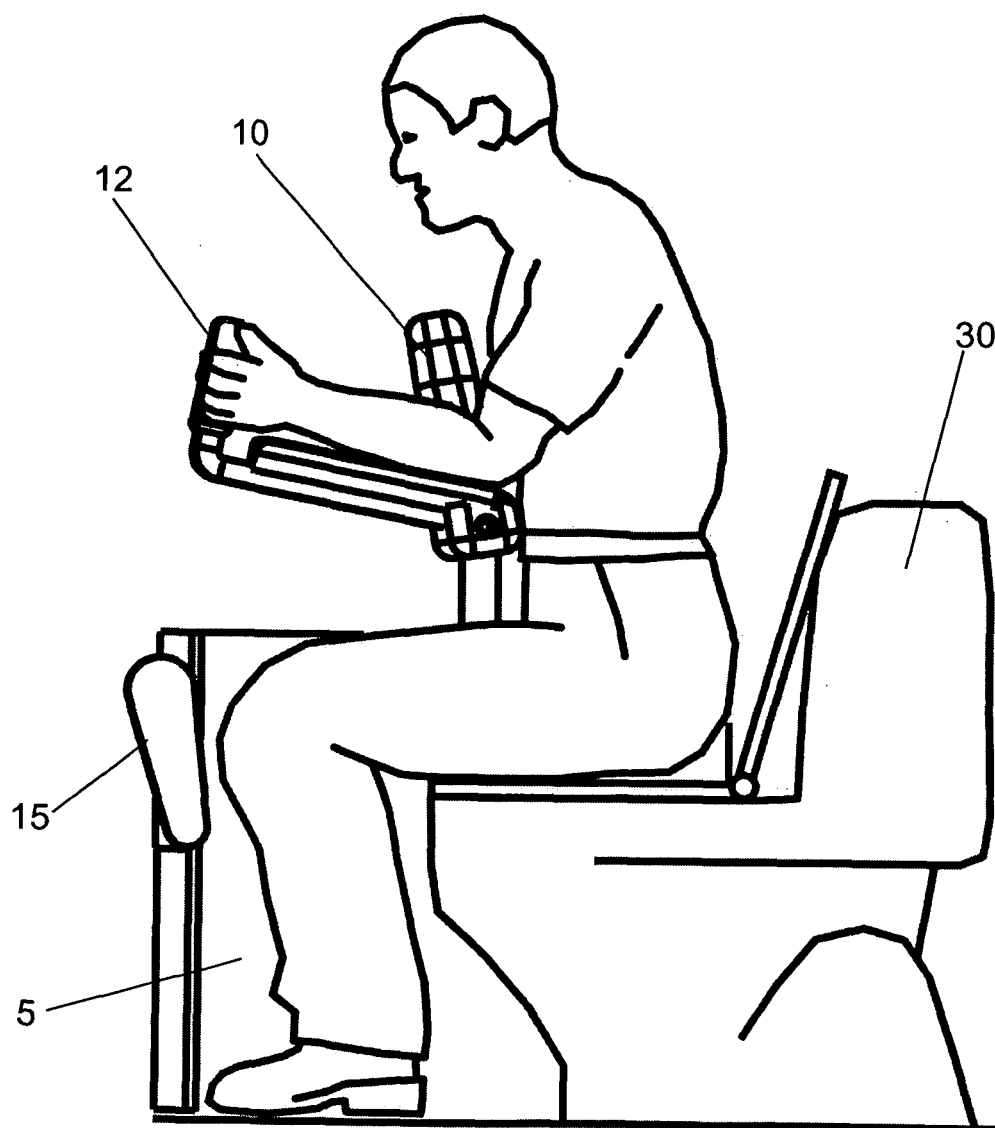


Fig. 4b

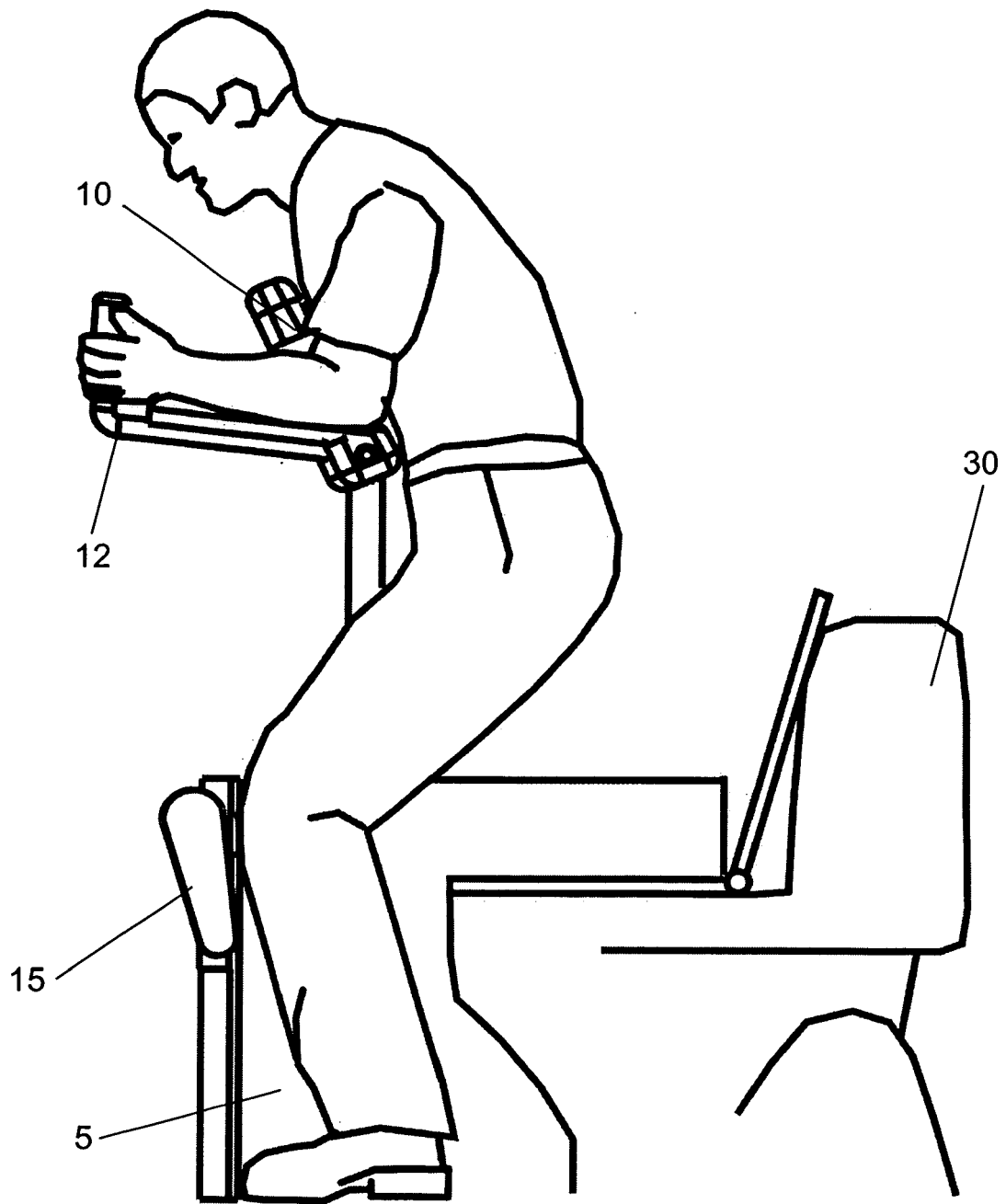


Fig. 4c

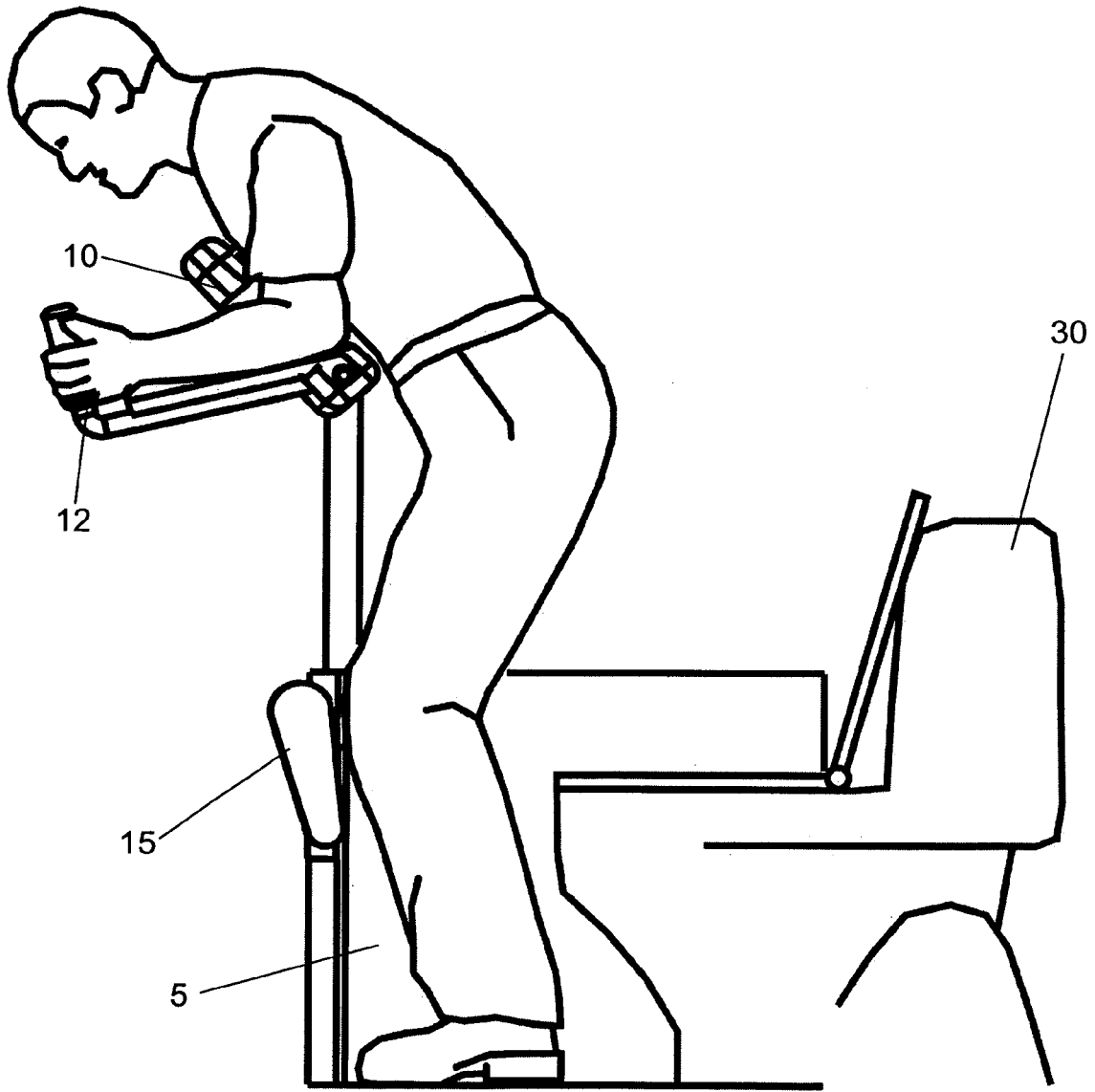
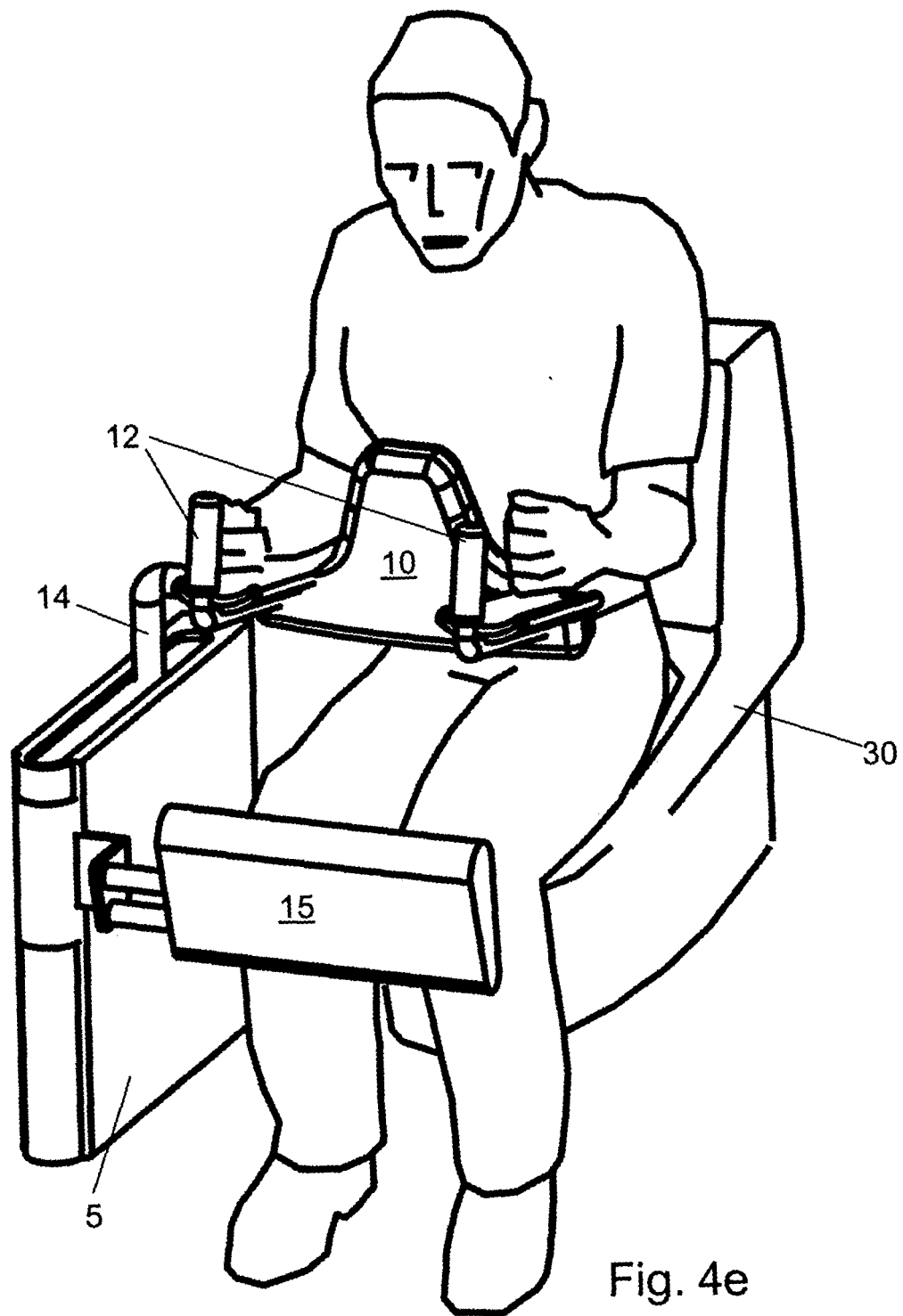


Fig. 4d



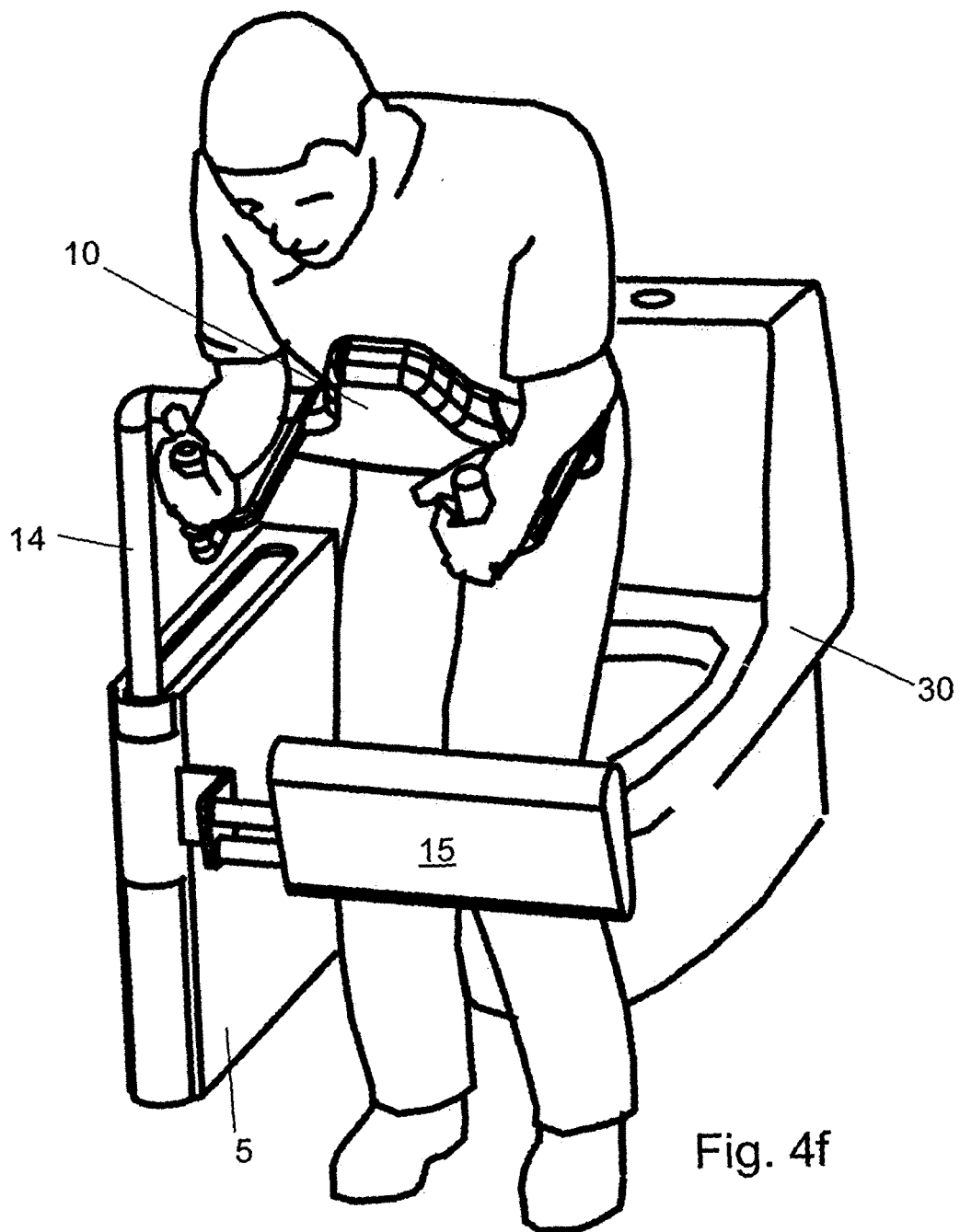


Fig. 4f

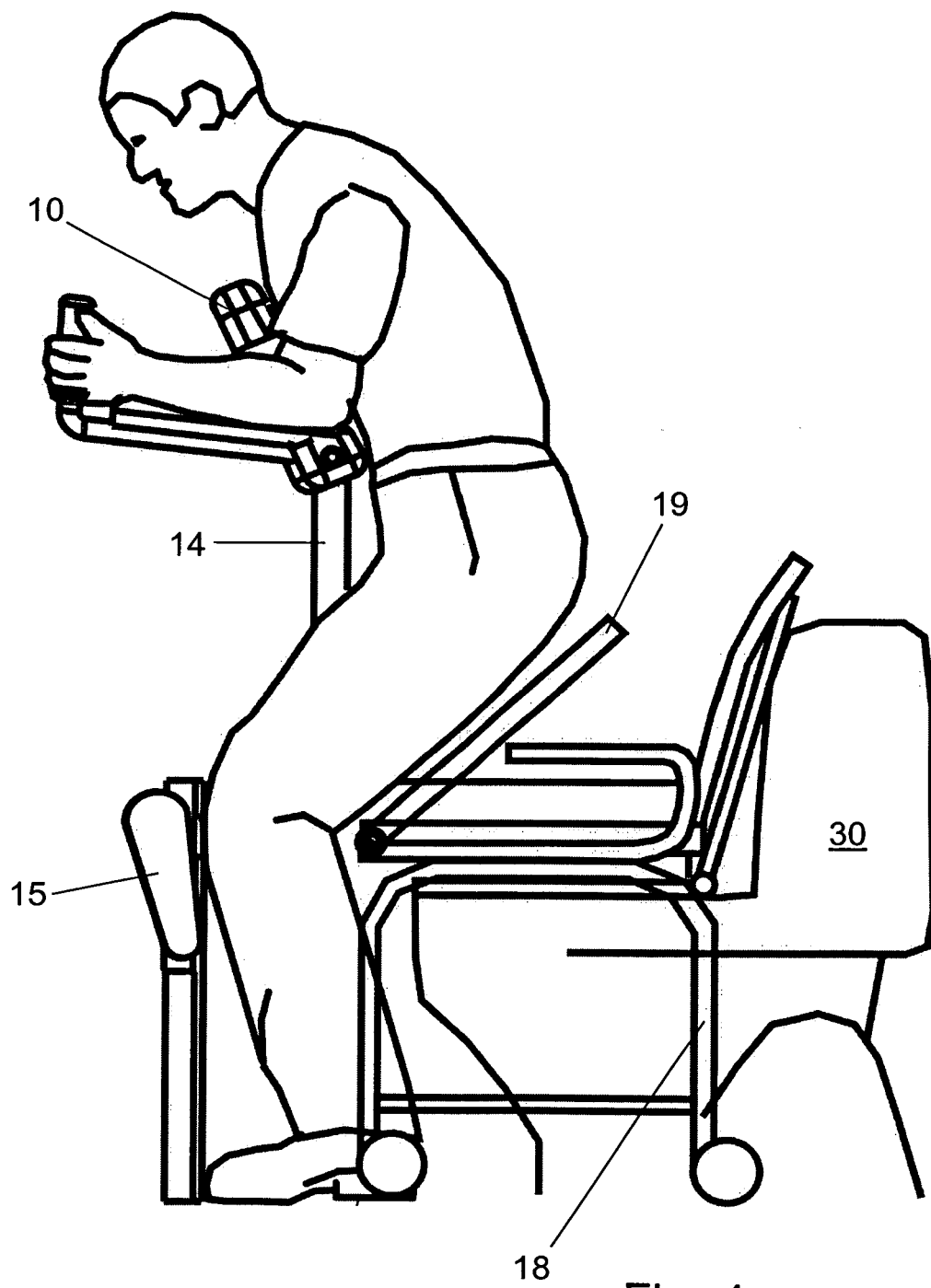


Fig. 4g

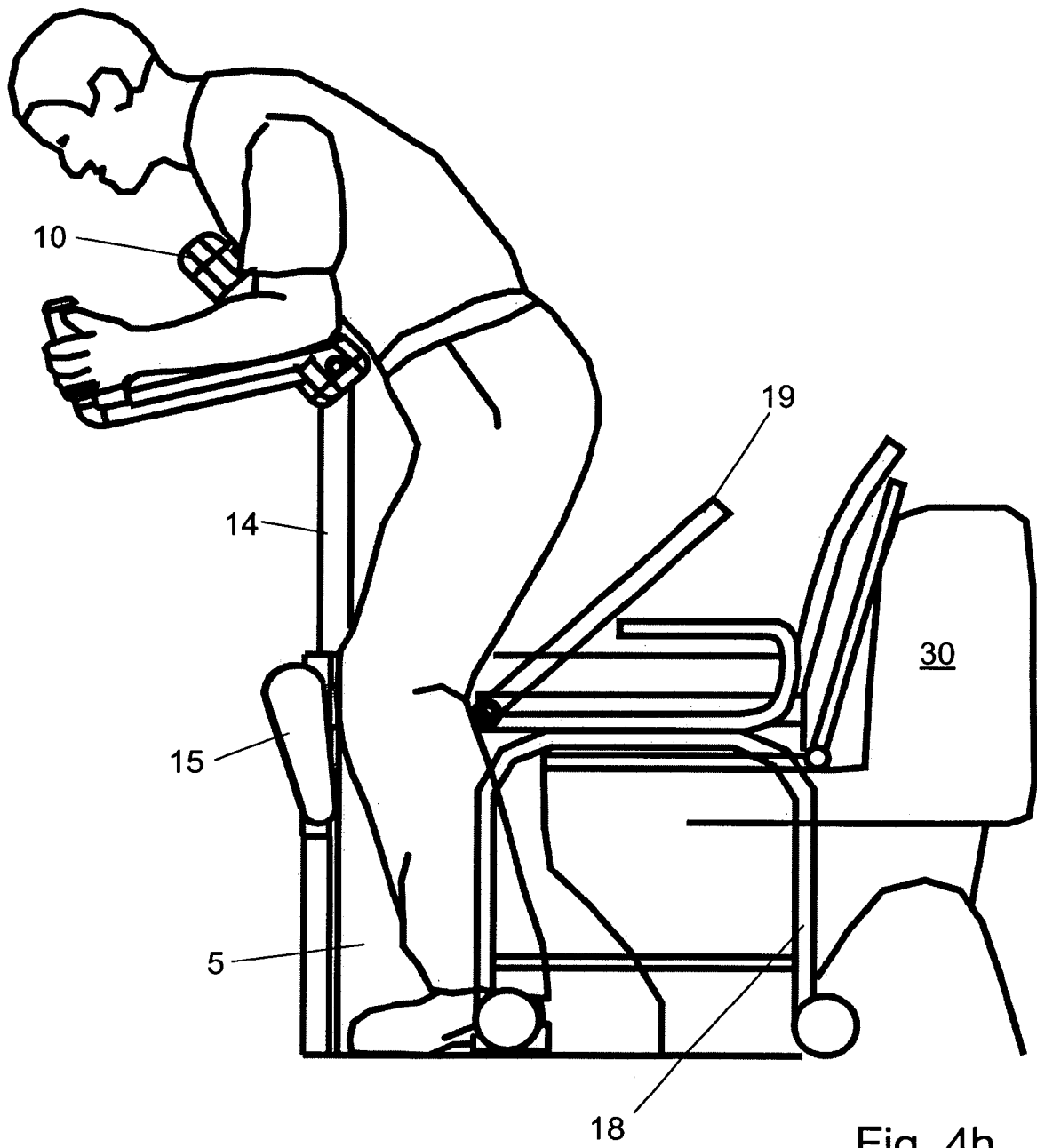


Fig. 4h

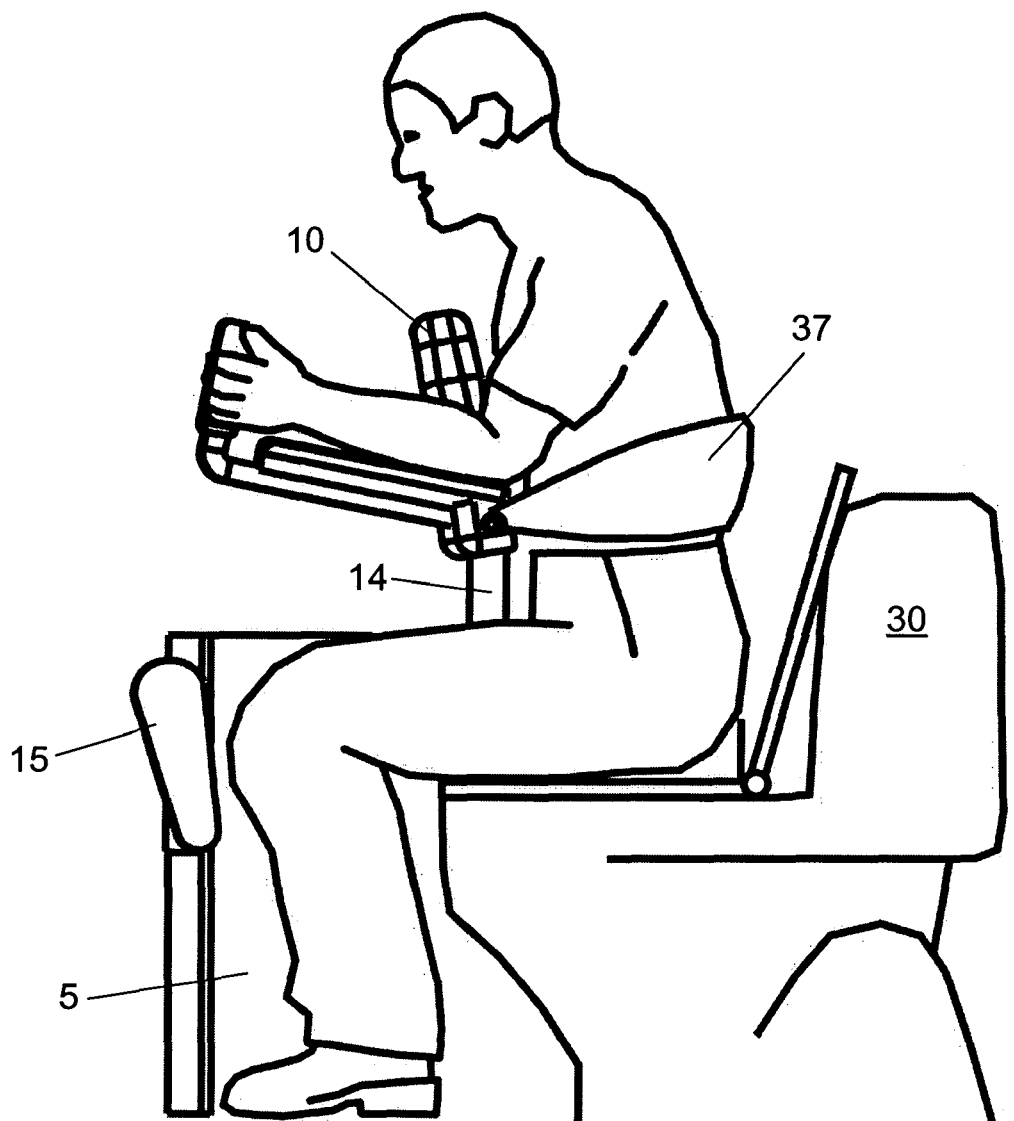


Fig. 5a

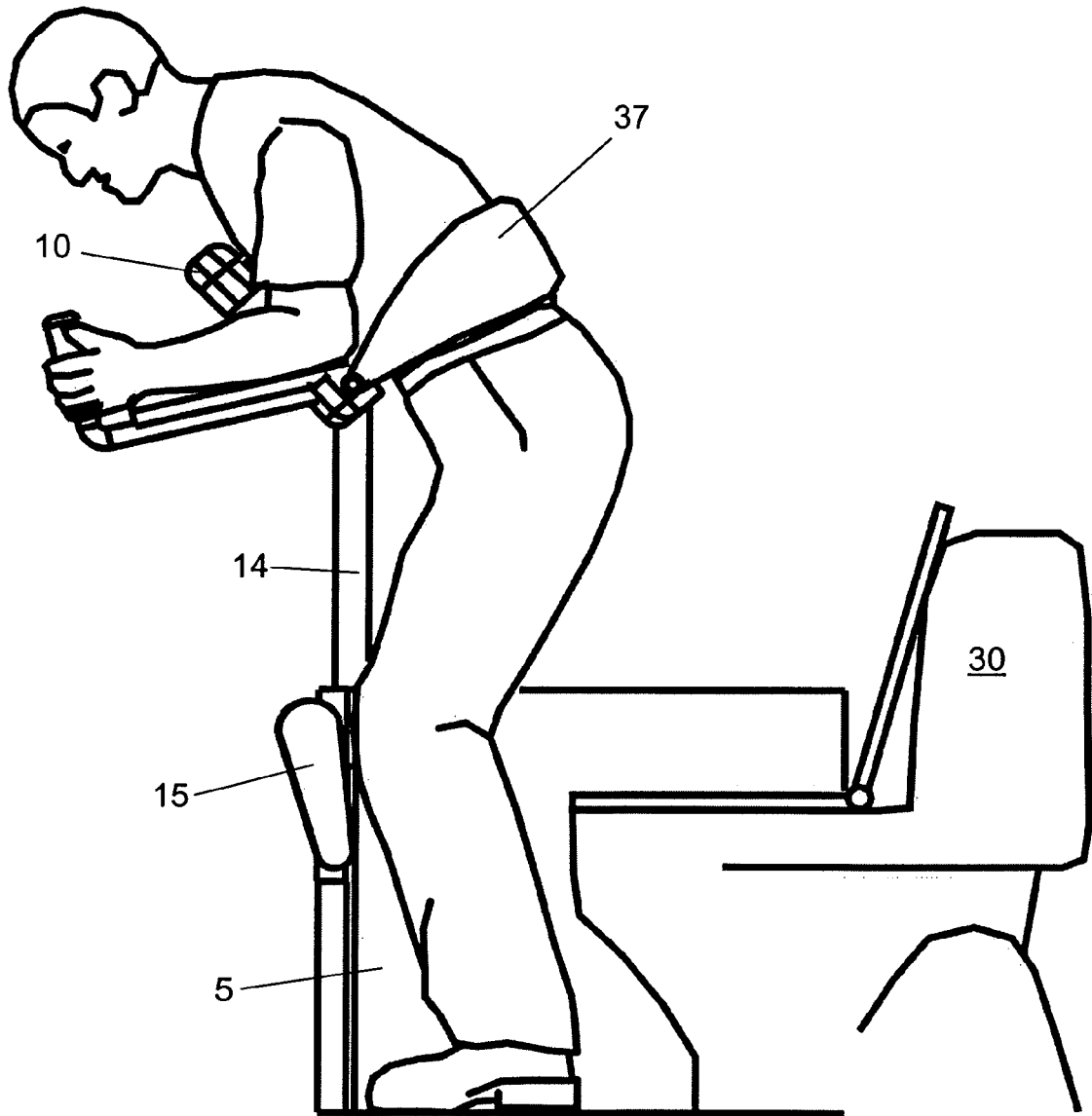


Fig. 5b

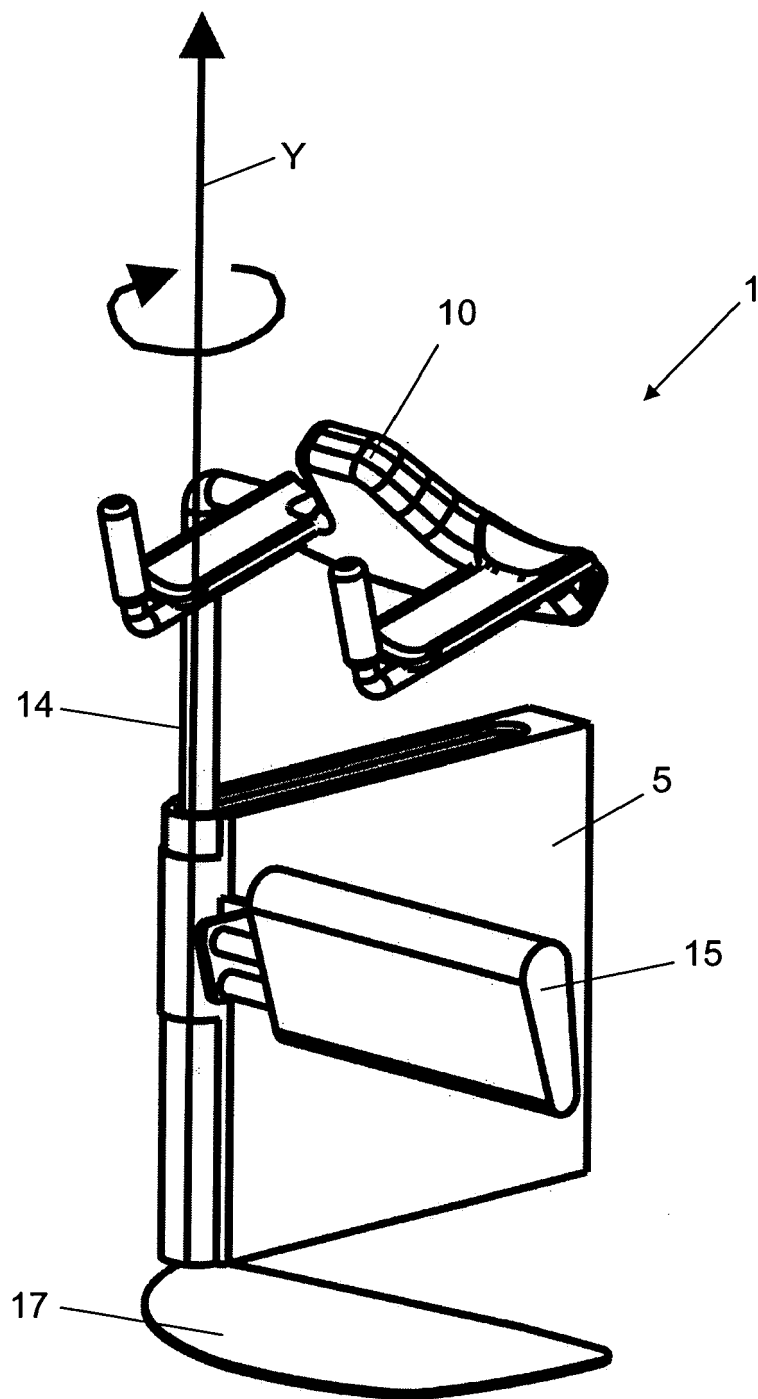
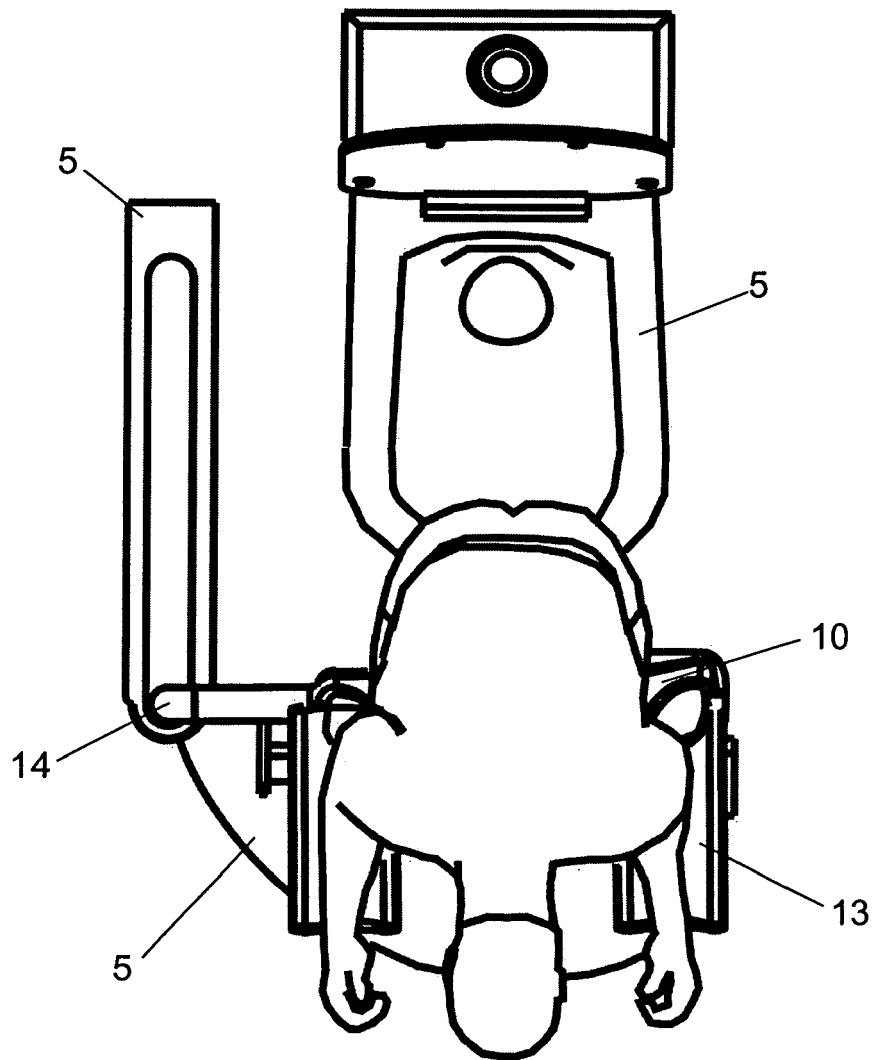


Fig. 6a



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Fig. 6b

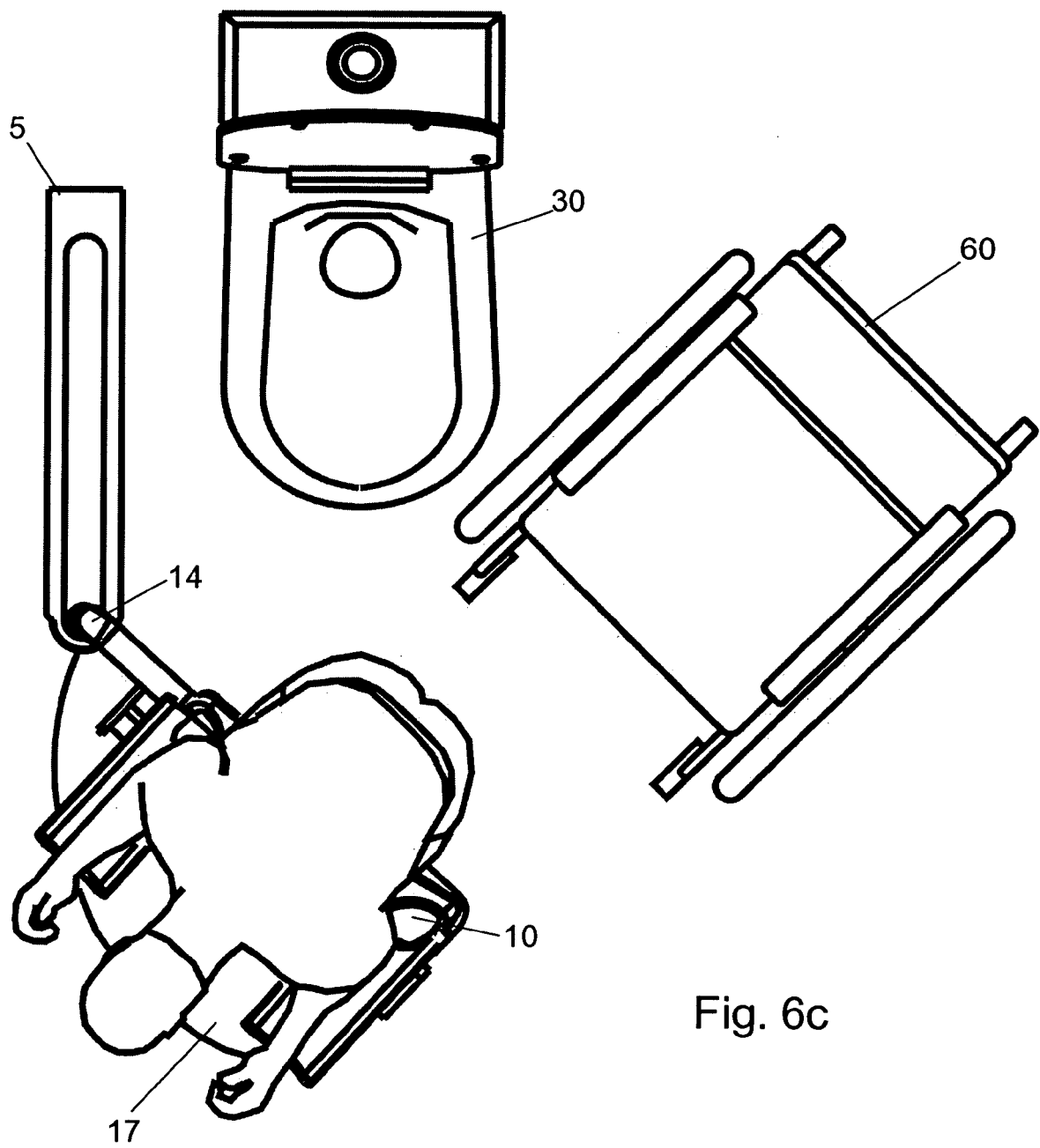


Fig. 6c

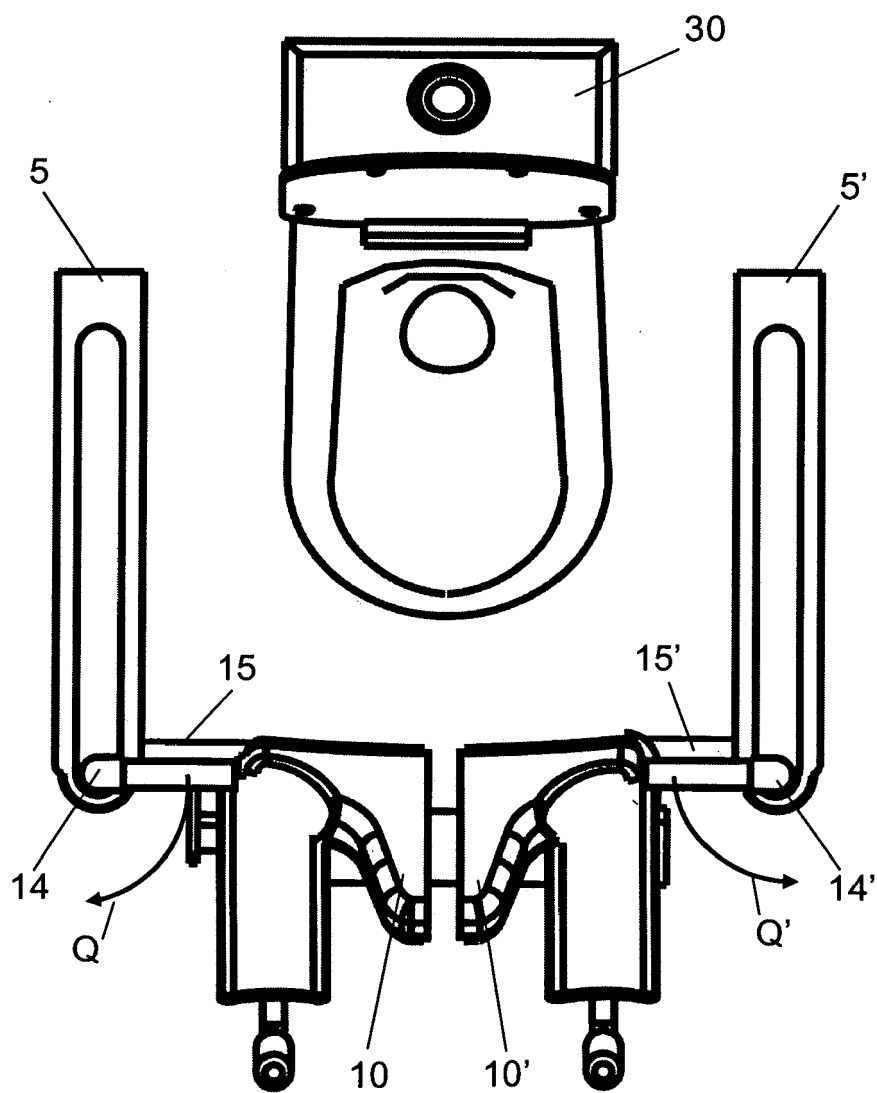


Fig. 7

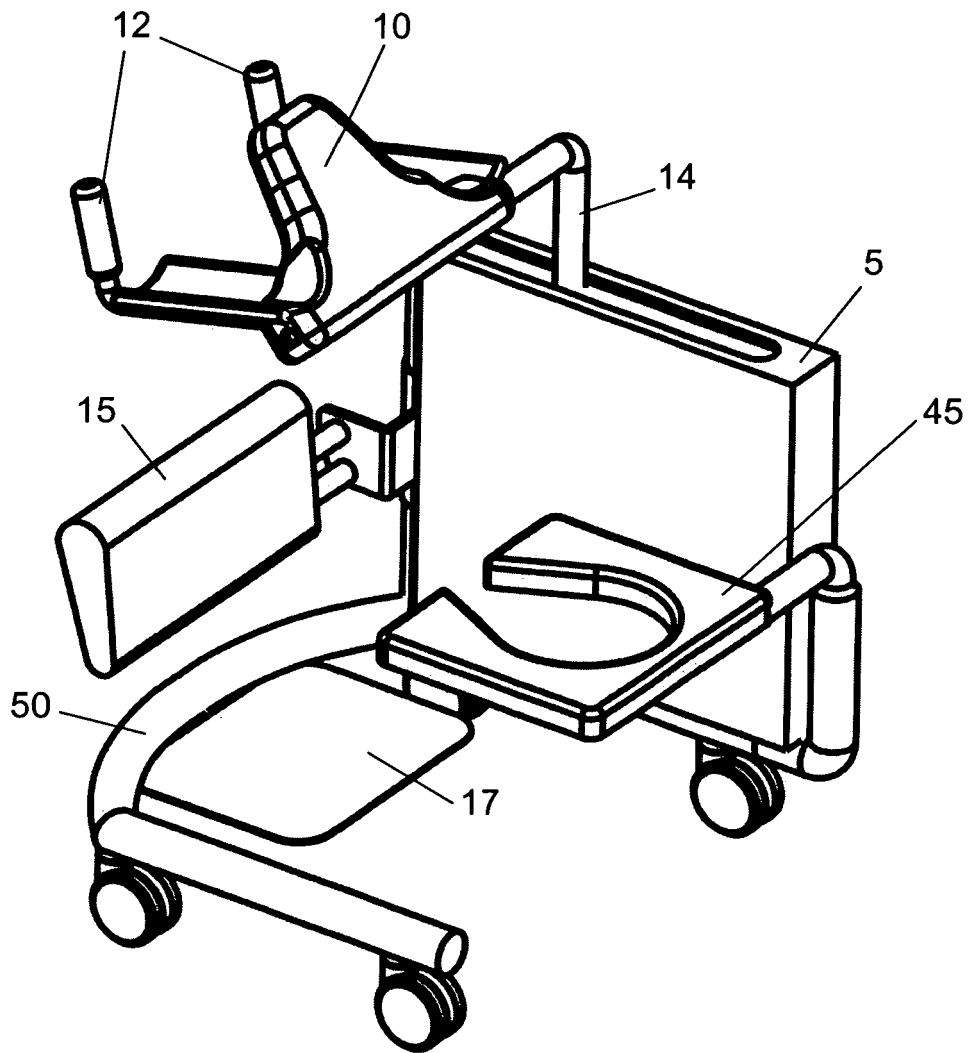


Fig. 8a

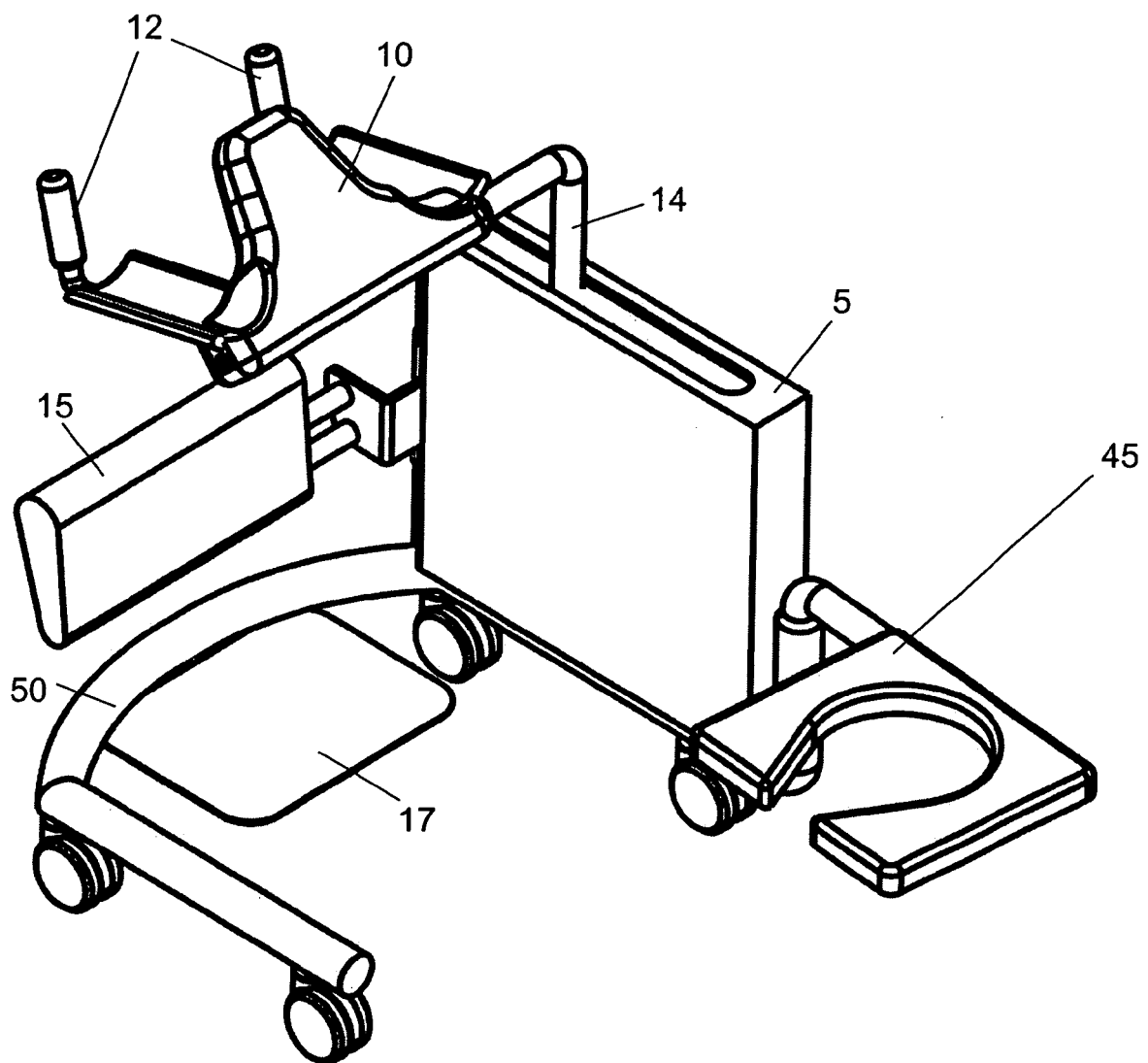
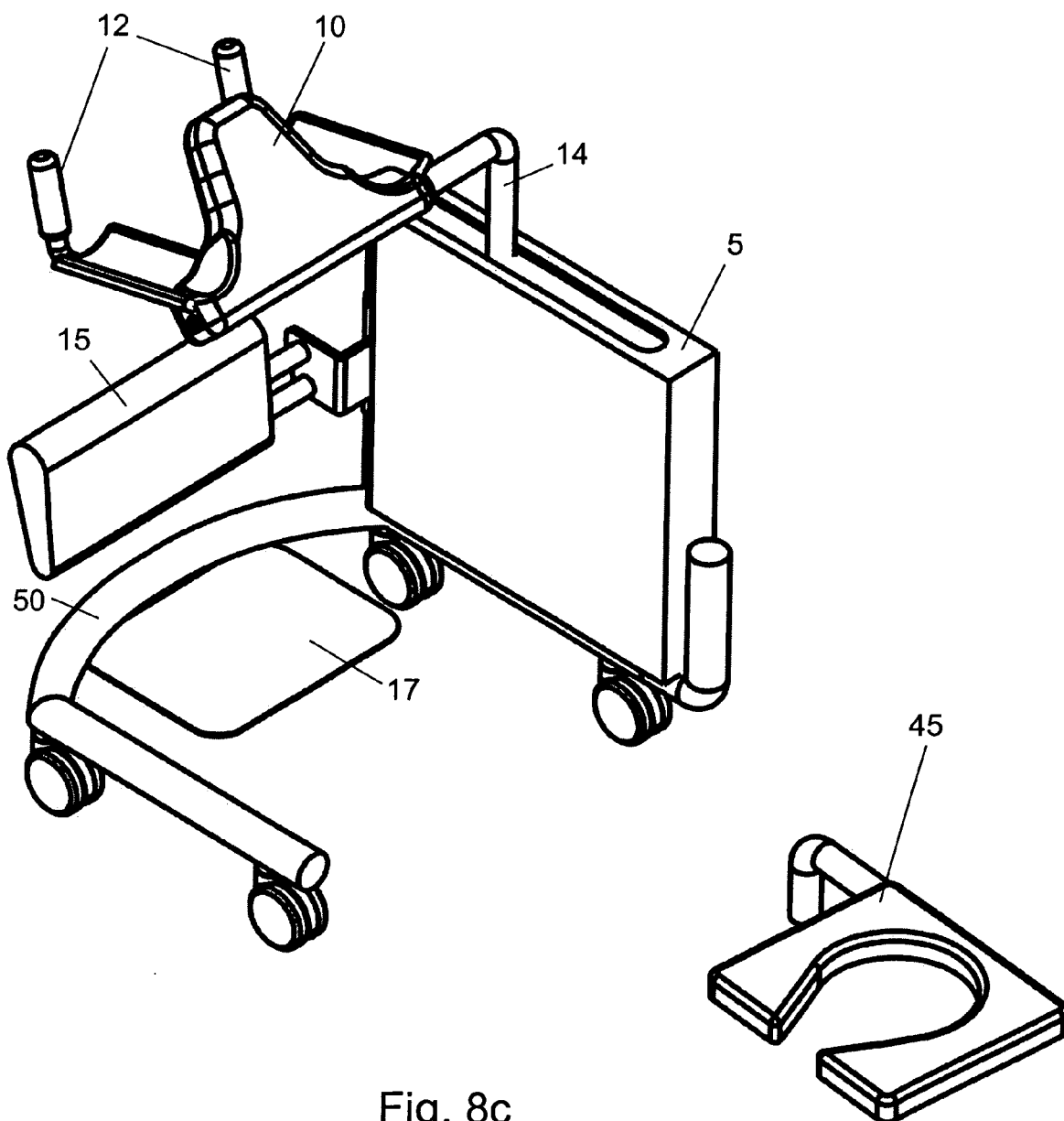


Fig. 8b



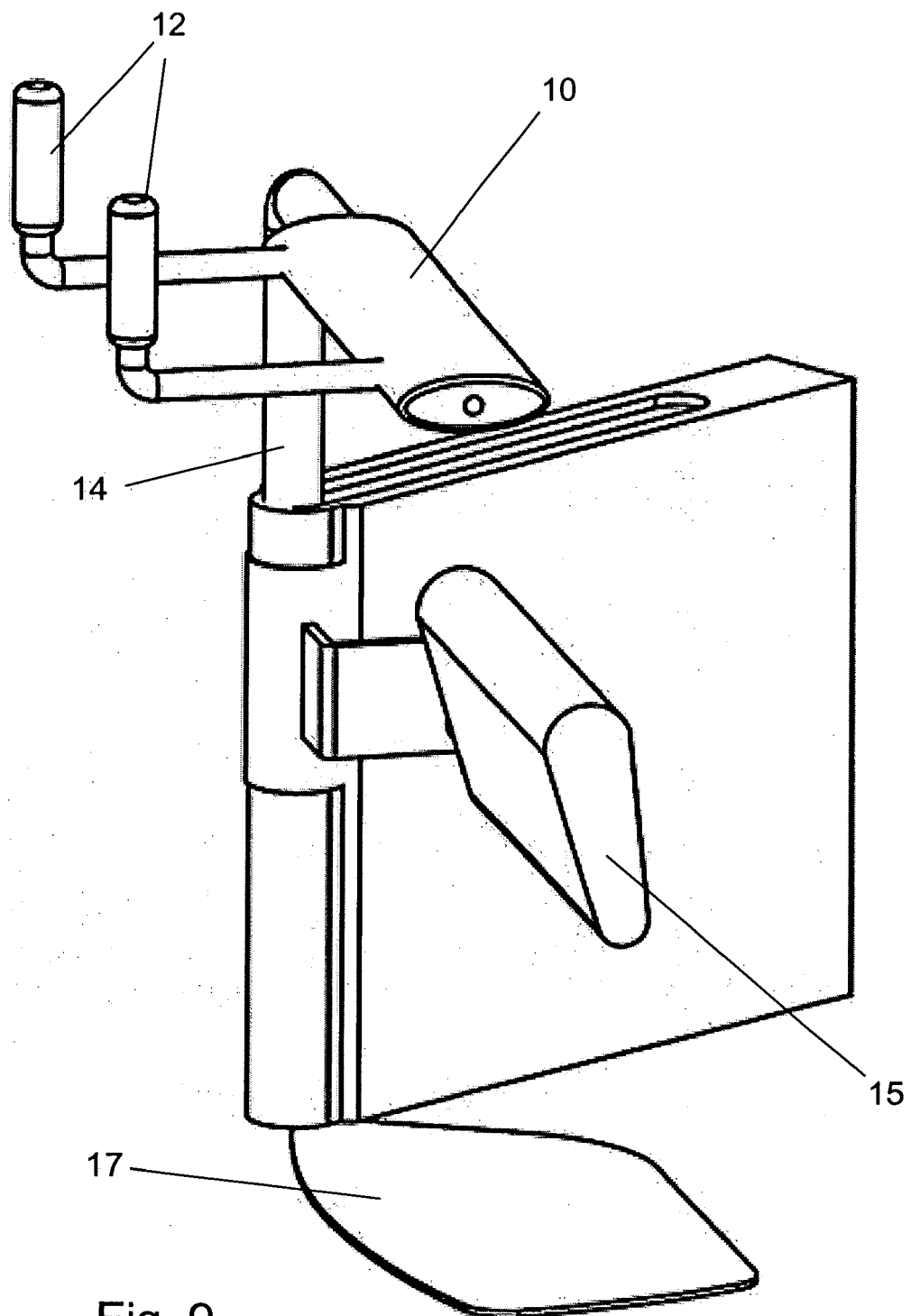


Fig. 9

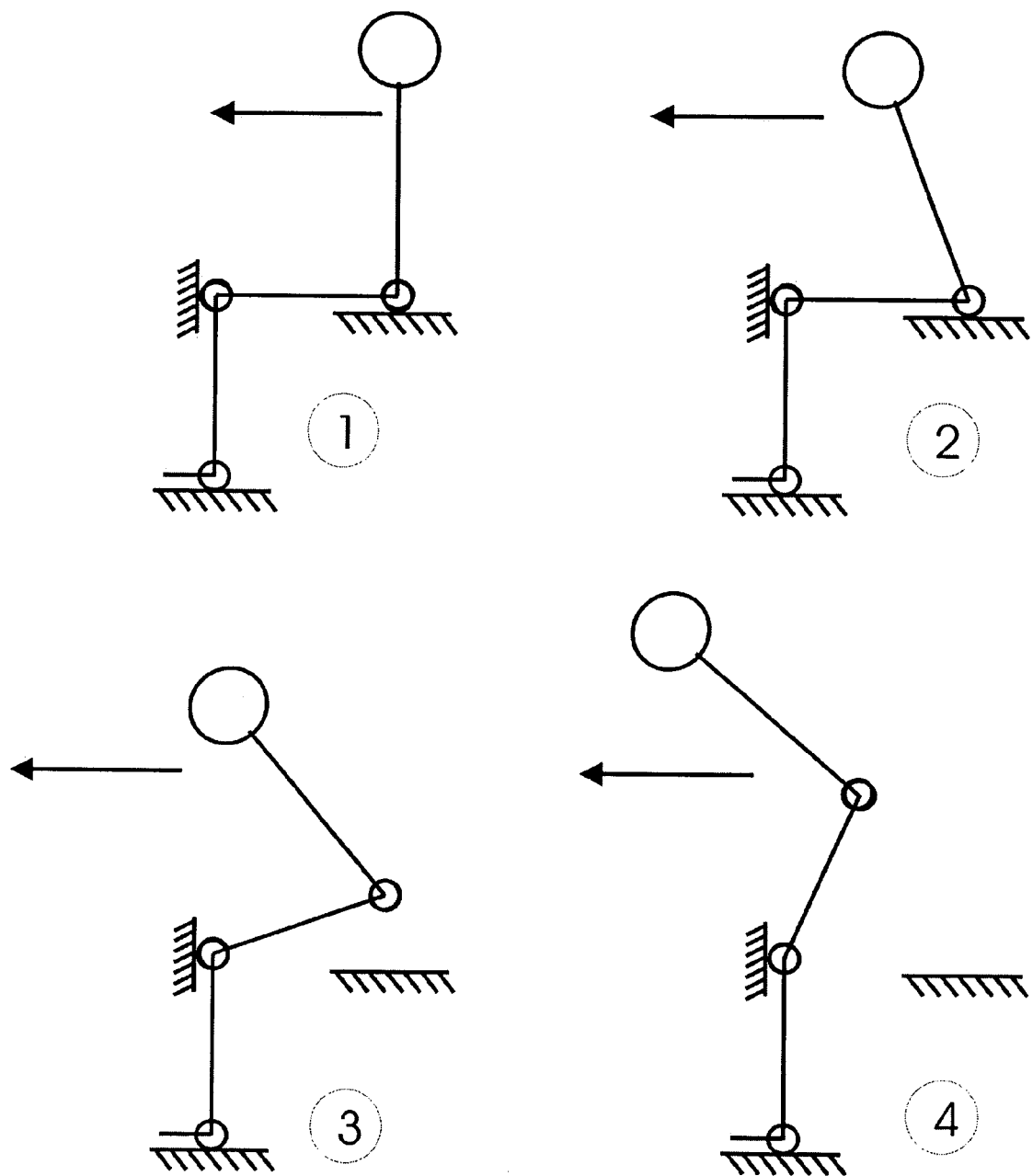


Fig. 10



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EUROPEAN SEARCH REPORT

Application Number
EP 05 02 2034

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Place of search The Hague		Date of completion of the search 16 March 2006	Examiner Girard, O
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16-03-2006

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