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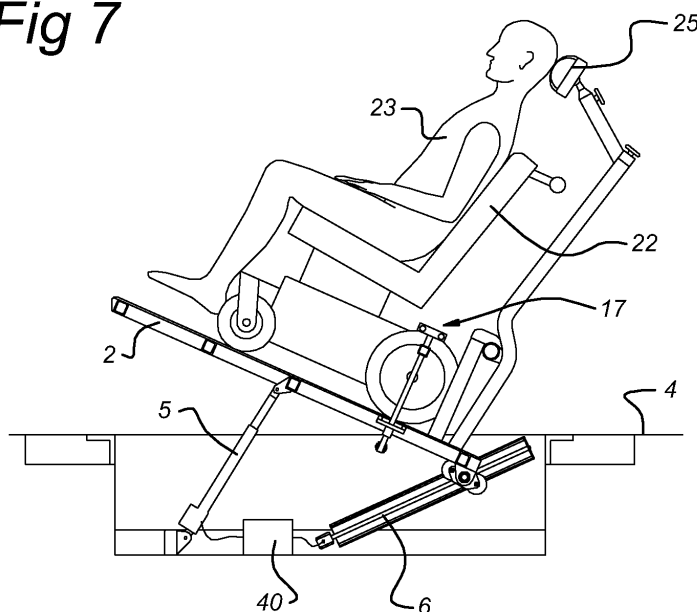
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(54) **Tiltable wheelchair carrier as well as an assembly comprising a wheelchair carrier of this type**

(57) Tiltable wheelchair carrier which may be used for applications where, in the inoperative state, a level floor is desired, such as in combination with dental equipment. The wheelchair carrier comprises a carrier plate which is substantially level with the floor and is accommodated in a tray-like structure which is fitted in the floor of the respective room. First and second jack means are provided in this tray-like structure and operate between the tray-like structure and the carrier plate. By means of

a control unit, a tilting movement is carried out such that, in addition to being tilted, the head end of the wheelchair user is also lifted. Preferably, tilting is carried out in a position which is as close as possible to the centre of gravity of the wheelchair user. If desired, a headrest may be used in order to support the neck of the user. If desired, the support may be embodied such that it can be adjusted (automatically). Locking is effected by means engaging on the wheel which can engage on the tyre as well as inside the wheel.

Fig 7



Description

[0001] The present invention relates to a tiltable wheelchair carrier comprising a structure which is to be accommodated in a floor and comprises lifting means and a carrier plate connected to the lifting means for a wheelchair, said carrier plate comprising a ramp section and an end section, said lifting means being embodied such that the carrier plate, from the drive-on position, carries out a tilting movement combined with a lifting movement of the end section.

[0002] A tiltable wheelchair carrier of this type is generally known in the prior art. Even wheelchair patients have to undergo certain treatments where the head is tilted with respect to the vertical position. Examples are haircuts, dental treatments and the like. In all these cases, it is desirable for the head of the patient to be tilted and supported in order to facilitate the treatment. Although there are specially adapted chairs, such as dentist's chairs, for this purpose, it is not possible or desirable for some (wheelchair) patients to leave their wheelchair and take a seat in a dentist's chair or other treatment chair, without the help of the treating individual and an additional individual.

[0003] The prior art has proposed tiltable wheelchair carriers in order to solve this problem. These are structures which can accommodate a wheelchair and which subsequently carry out a tilting movement. For rooms which are also being used by other people, it is often a requirement that a tiltable carrier of this type should not, or hardly, cause an obstruction when it is not in use. Therefore, the prior art has proposed to position the carrier plate for the wheelchair, in the inoperative position, substantially level with the floor of the room in question. During use as a tiltable wheelchair carrier, such a carrier plate can be displaced with respect to the floor surface in order to achieve the desired tilting movement.

[0004] Structures used in the prior art are particularly suited for conventional manually driven wheelchairs, i.e. wheelchairs with relatively small front wheels and relatively large rear wheels. Such structures are not suitable for wheelchairs with small wheels and batteries, i.e. electrically driven wheelchairs.

[0005] Moreover, it has been found that known tiltable wheelchair carriers are very inconvenient for the users since the tilted position is very uncomfortable for them and gives them a great sense of insecurity.

[0006] In addition, there is the drawback that the treating individual, such as a hairdresser or dentist, cannot position himself or herself in an optimum position with respect to the patient.

[0007] WO 92/08431 discloses a tiltable wheelchair carrier according to the preamble of Claim 1. Therein a structure with carrier plate is embodied in such a manner that it can be arranged to be level with the floor.

[0008] Since dental treatments require an increasingly sophisticated locomotion and increasingly high demands are placed on the operating positions of the dentist, such

a tiltable wheelchair carrier is no satisfactory solution, unless the patient is tilted through a particularly large angle, with his/her legs approaching the vertical position.

[0009] In particular for nursing home patients, this is very uncomfortable and undesirable.

[0010] It is an object of the present invention to overcome these drawbacks and to provide an improved tiltable wheelchair carrier.

[0011] This object is achieved with the above-described wheelchair having the features of claim 1.

[0012] According to the present invention, the tilting movement of the wheelchair carrier is combined with a lifting movement.

[0013] As a result of the vertical displacement, the head of the patient or another part of the patient which has to undergo treatment can be brought into an optimal position with respect to the treating individual. That is to say that the tilting movement according to the present invention no longer is a simple pivoting movement, but a complicated composite movement and, accordingly, no longer involves just a tilting point, but rather a tilting region.

[0014] According to the present invention, it is not only possible to tilt the wheelchair, but also to lower it. As a result, it is easier for the dentist to reach the patient without this requiring an extremely tilted position.

[0015] According to a particular embodiment of the invention, the first and second lifting means are controlled in such a manner by means of control means that this tilting region is located at a distance which is as far removed from the carrier plate as possible and as close as possible to the centre of gravity of the body of the individual in the wheelchair. An optimum value is at least 30 cm above the carrier plate. This results in the individual in the wheelchair having a much more natural sensation and feeling much more comfortable during tilting.

[0016] According to a further advantageous embodiment of the invention, the lifting means comprise first and second lifting means which, viewed in the drive-on direction of the wheelchair onto the carrier plate, are arranged one behind the other on the carrier plate, with a first lifting means being connected to the ramp section and the second lifting means being connected to the end section against which the wheelchair is placed. Possibly, the first lifting means and/or second lifting means can be double in the direction at right angles to the driving direction of the wheelchair which imparts stability to the structure.

[0017] In the prior art, there are problems with respect to securing / locking a wheelchair against displacement on, for example, a tilting plate. With certain structures, many operations are required in order to achieve the correct setting. With more simple structures, it is not always possible to guarantee that the lock is adequate, or there is significant discomfort for the patient.

[0018] According to a further advantageous embodiment of the invention, wheel-locking means are present in order to retain the wheelchair in a fixed position with respect to the carrier plate during tilting and in the tilted

position. These may comprise wheel-engagement means which are vertically displaceable with respect to the carrier plate. In particular, such wheel-engagement means comprise reversible engagement pins, with the tyre of the wheels of the wheelchair being engaged (preferably from above) in a first position and the wheel itself (for example internally) being engaged in the second position. Thus, any kind of wheelchair can be fixed in a secure manner with respect to the carrier plate. These wheel-engagement means can operate horizontally, vertically and axially (wheel and wheelchair).

[0019] According to a further advantageous embodiment of the invention, the end section, i.e. the part against which the wheelchair eventually abuts, is provided with a headrest recess. With the latter, the head of the user can be supported if there is no headrest present on the wheelchair and/or if the headrest is not satisfactory. Since the patient, during tilting, may move with respect to the wheelchair, more particularly with respect to the backrest thereof, which will mainly occur with relatively soft backrests, a variant of the invention proposes for the headrest for the head of the patient to be adjustable during tilting.

[0020] The present invention also relates to an assembly comprising a headrest of this type and a wheelchair carrier and treatment equipment, such as dental equipment, hairdressing equipment, pedicure equipment or other equipment.

[0021] The present invention also relates to an assembly comprising the above-described wheelchair carrier and dental equipment or hairdressing equipment.

[0022] The structure of the tiltable wheelchair carrier is such that there is always as little play as possible, so that the user always has the greatest sense of stability possible.

[0023] Preferably, the structure of the wheelchair carrier is such that in the inoperative position, there is a flat front surface area which can be stepped on without there being any obstacle with respect to the environment.

[0024] The invention will be described in more detail below with reference to an exemplary embodiment illustrated in the drawing, in which:

Fig. 1 shows the tiltable wheelchair carrier according to the invention partly in section in an inoperative position;

Fig. 2 shows the tiltable wheelchair carrier as illustrated in Fig. 1 in the maximum tilted position;

Fig. 3 shows the headrest to be used with the tiltable wheelchair carrier according to the present invention;

Fig. 4 shows a detail of the guide of the carrier plate;

Fig. 5 shows the clamping device for the wheelchair, and

Figs. 6-8 show the use of the tiltable wheelchair carrier in combination with a wheelchair.

[0025] In the figures, reference numeral 1 denotes a

tiltable wheelchair carrier according to the present invention. It comprises a tray-like structure 3 in which two linear actuators or jacks 5, 6 are arranged by means of joints 8 and 9. These actuators engage on a carrier plate 2. With a simple pivot point 10, jack 5 engages on carrier plate 2 and more particularly on the ramp section 37 thereof. Jack 5 comprises two parts which are telescopic with respect to one another. The latter can be effected by means of a threaded spindle by electrical or hydraulic means or in another way. The operation of jacks 5 and 6 is controlled by control unit 40. The jack 6 comprises a screwed rod with a nut-like structure 11 therein.

[0026] Via the nut-like structure 11, jack 6 engages on the end section 38 of the carrier plate 2. In order to prevent play as much as possible, a structure is provided having wheels 12 which are moved along a guide 7, the details of which structure can be seen in Fig. 4.

[0027] Reference numeral 39 denotes a stop arm. If desired, this stop arm 39 can be embodied so as to be removable in a simple manner or folded away, as a result of which carrier plate 2 forms a structure which is completely level with the floor 4 in the inoperative position.

[0028] In particular Fig. 3 shows that a headrest is present which may optionally be applied. Stop arm 39 is provided at its top with a recess for accommodating projections 27 which are fixedly connected to a beam 26 of the headrest 25 to which the arm 30 is pivotably attached via joint 29. Arm 30 can move to and fro in the direction of arrow 34. Reference numerals 31 and 32 denote adjusting screws and the part supporting the head is denoted by reference numeral 35.

[0029] As can be seen in Fig. 5, a clamping structure 17 is provided for locking the wheels of a wheelchair positioned on the carrier plate. This comprises an electrically driven jack 13 engaging on the carrier plate 2, which engages on an arm 14 of a clamp 17 on the other hand. By moving the arm 14 up and down, tube 15 will also move up and down and arm 16 will follow this movement. At the free end of the arm 16, first clamping pins 18 and second clamping pins 19 are provided. By rotation about joint 20, either the clamping pins 18 or the clamping pins 19 become active. In the exemplary embodiment illustrated, the clamping pins 18 are active in order to engage on the tyre of a wheel from above. Clamping pin 19 will be used when engaging a wheel on the inside, for example on the rim, for example between the bottom side of the rim and the carrier plate 2.

[0030] Figs. 6-8 show a wheelchair 22 with an individual 23 seated therein. Fig. 6 shows the drive-on position, i.e. that position in which the carrier plate 2 is positioned level with the floor. A headrest 25 is present. In this position, the rearmost wheel is secured by means of the clamp 17. Clamp 17 can be used to secure both large and small wheels against displacement.

[0031] Starting from the position shown in Fig. 6, the carrier plate 2 is tilted. In contrast to known structures, this is a composite movement which is controlled by control unit 40, since it does not involve just tilting about a

fixed pivot point but comprises a combination of tilting and lifting. Therein, it will be mainly jack 6 which is responsible for the tilting movement, while jack 5 is mainly responsible for the lifting movement. As is indicated in Fig. 8, there is no longer just a tilting point, but rather a tilting region K and this is at a height H above the carrier plate. This height H is preferably at least 30 cm. Fig. 8 shows how an optimum end position can be reached in which dental equipment 50 can be positioned in front of the patient and the dentist 51 is able to be in an optimum position next to the patient. It will be understood that for other treatments, a different tilting position may be chosen, it being possible to adjust the desired end position in a very accurate manner by means of the present invention due to the presence of two jacks, both as regards the degree of tilt and the height of the head of the user. If desired, a number of programs may be provided so that the user is not responsible for the detailed operation of the movement of the jacks 5 and 6 which differ with respect to one another.

[0032] It has been found that the structure according to the present invention is extremely stable. That is to say that the patient is moved into the desired position in a stable and accurate manner without any insecure movements. In addition, the structure is designed such that the installation depth of tray 3 is relatively limited, as a result of which it is possible to retrofit the latter into all kinds of buildings and floors in a simple manner.

[0033] After reading the above, those skilled in the art will immediately be able to think of variants which are obvious in the light of this description. Thus, it is possible to embody the jack means in a different way. In addition, it is possible to achieve the above-described characteristic movement in another manner while achieving the same result.

Claims

1. Tiltable wheelchair carrier (1) comprising a structure (3) which is to be accommodated in a floor (4) and comprises lifting means (5, 6) and a carrier plate (2) connected to the lifting means for a wheelchair (22), said carrier plate comprising a ramp section (37) and an end section (38), said lifting means being embodied such that the carrier plate, from the drive-on position, carries out a tilting movement combined with a lifting movement of the end section. **characterized in that** said structure (3) comprises a tray-like structure, with said lifting means, carrier plate and tray-like structure being designed such that a wheelchair which is present on said carrier plate can be moved into said tray-like structure.
2. Wheelchair carrier according to Claim 1, wherein said tilting movement is executed about a virtual tilting region (K) which is located in a region at least 30 cm above said carrier plate.
3. Wheelchair carrier according to one of the preceding claims, comprising first and second lifting means as well as control means therefor, said first lifting means (5) being connected to the ramp section (37) and the second lifting means (6) being connected to the end section (38) and the other end of the first and second lifting means (8, 9) being connected to said tray-like structure (3).
4. Wheelchair carrier according to one of the preceding claims, wherein said lifting means comprise linear electrical actuators.
5. Wheelchair carrier according to one of the preceding claims, comprising wheel-locking means (17) which are attached to said carrier plate (2) and comprise vertically displaceable wheel-engagement means (18, 19).
6. Wheelchair carrier according to Claim 5, wherein said wheel-engagement means comprise wheel-engagement pins (18; 19).
7. Wheelchair carrier according to Claim 5 or 6, wherein said wheel-locking means are provided with first (18) and second (19) wheel-engagement means, said first wheel-engagement means being embodied to engage on the tyre (44) and said second engagement means being designed to engage inside the wheel (43).
8. Wheelchair carrier according to one of the preceding claims, wherein said end section (38) is provided with a headrest recess (28).
9. Wheelchair carrier according to Claim 8, in which said headrest recess (28) comprises two attachment points which are spaced apart in the horizontal direction and comprises, located between the latter, an adjustable headrest carrier (34).
10. Wheelchair carrier according to one of the preceding claims, in which, in the inoperative state, the top side of the carrier plate is arranged so as to be level with the surrounding area.
11. Assembly comprising a wheelchair carrier according to one of Claims 8-10 as well as a headrest (25), wherein said headrest is arranged so as to be displaceable (34) with respect to said carrier.
12. Assembly comprising a wheelchair carrier according to one of Claims 1-10, as well as treatment equipment (50).

Fig 1

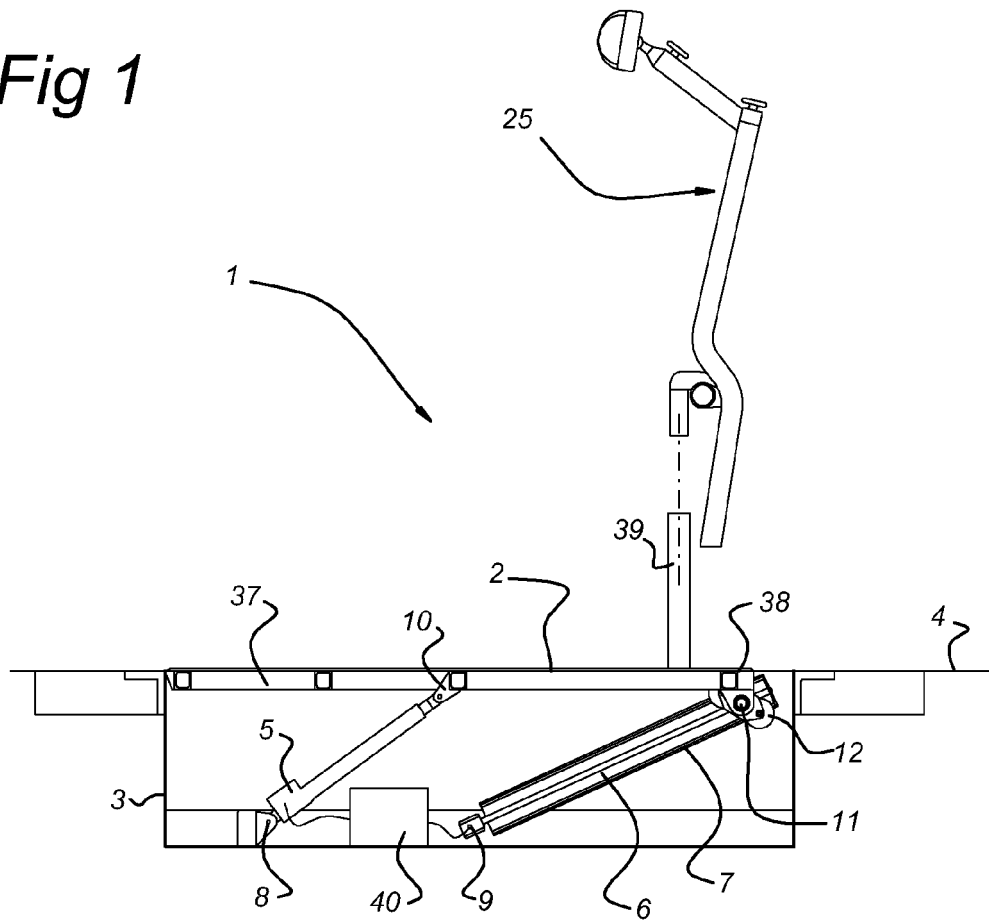


Fig 2

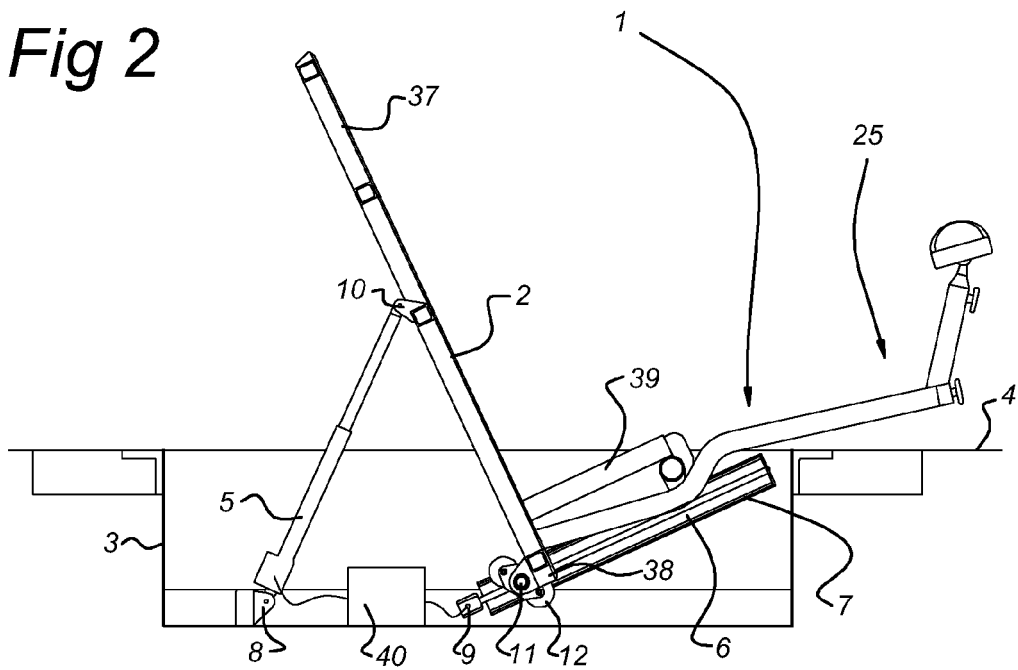


Fig 3

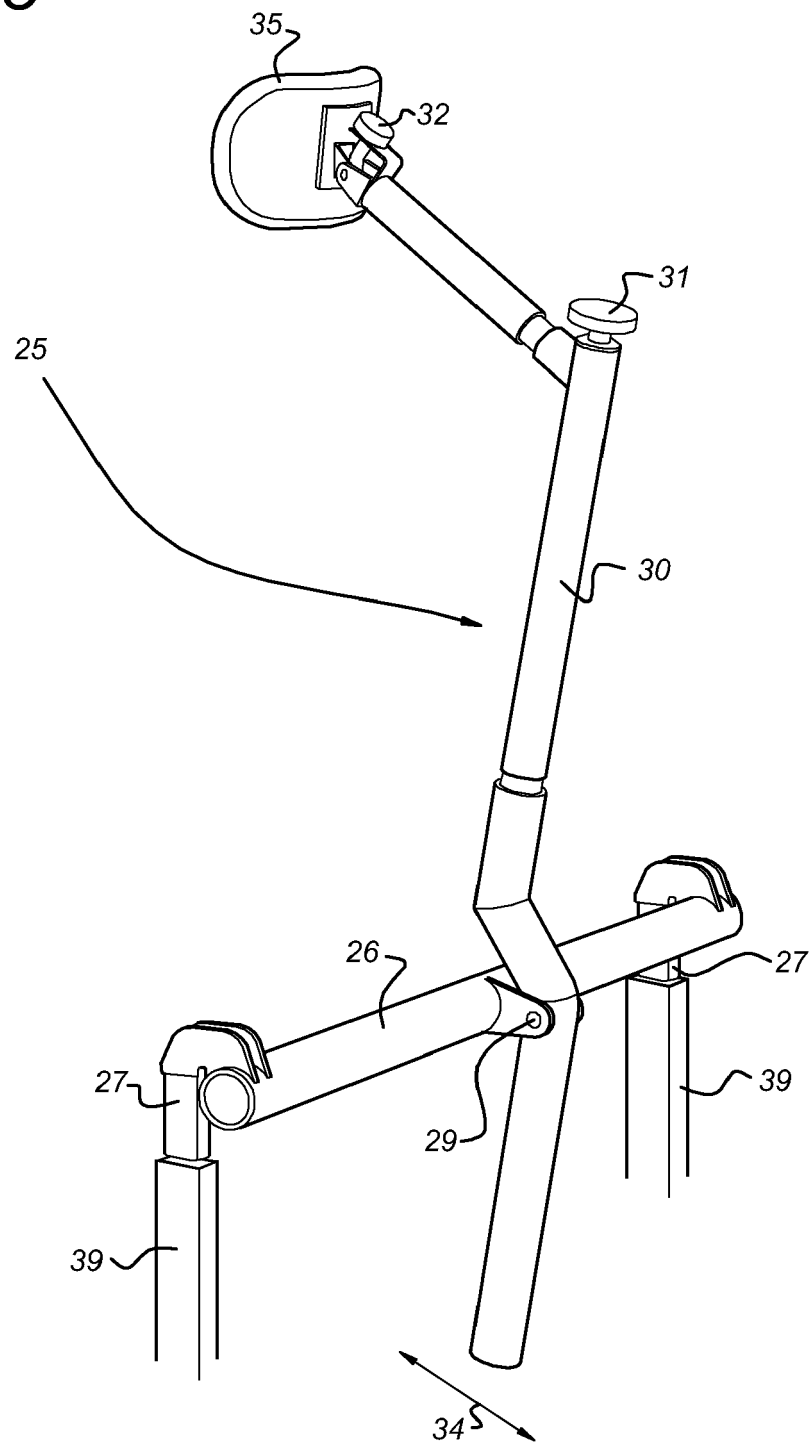
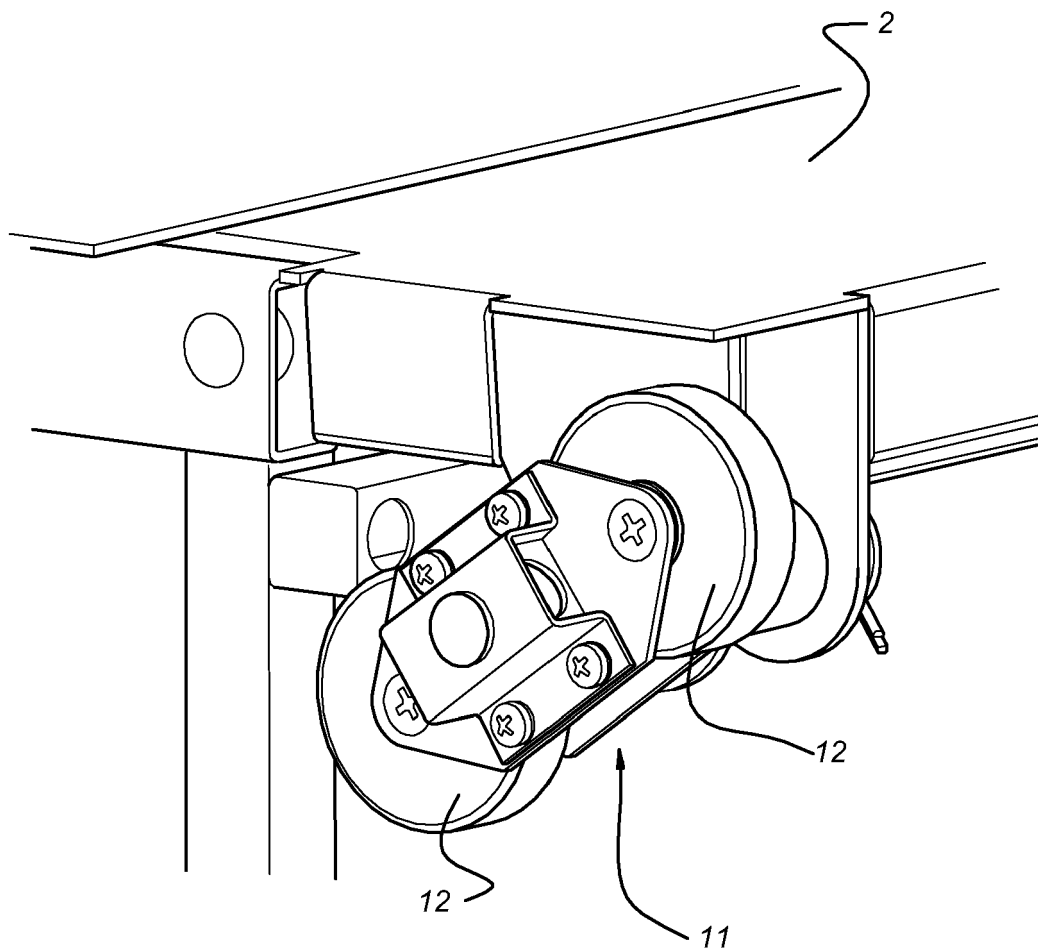


Fig 4



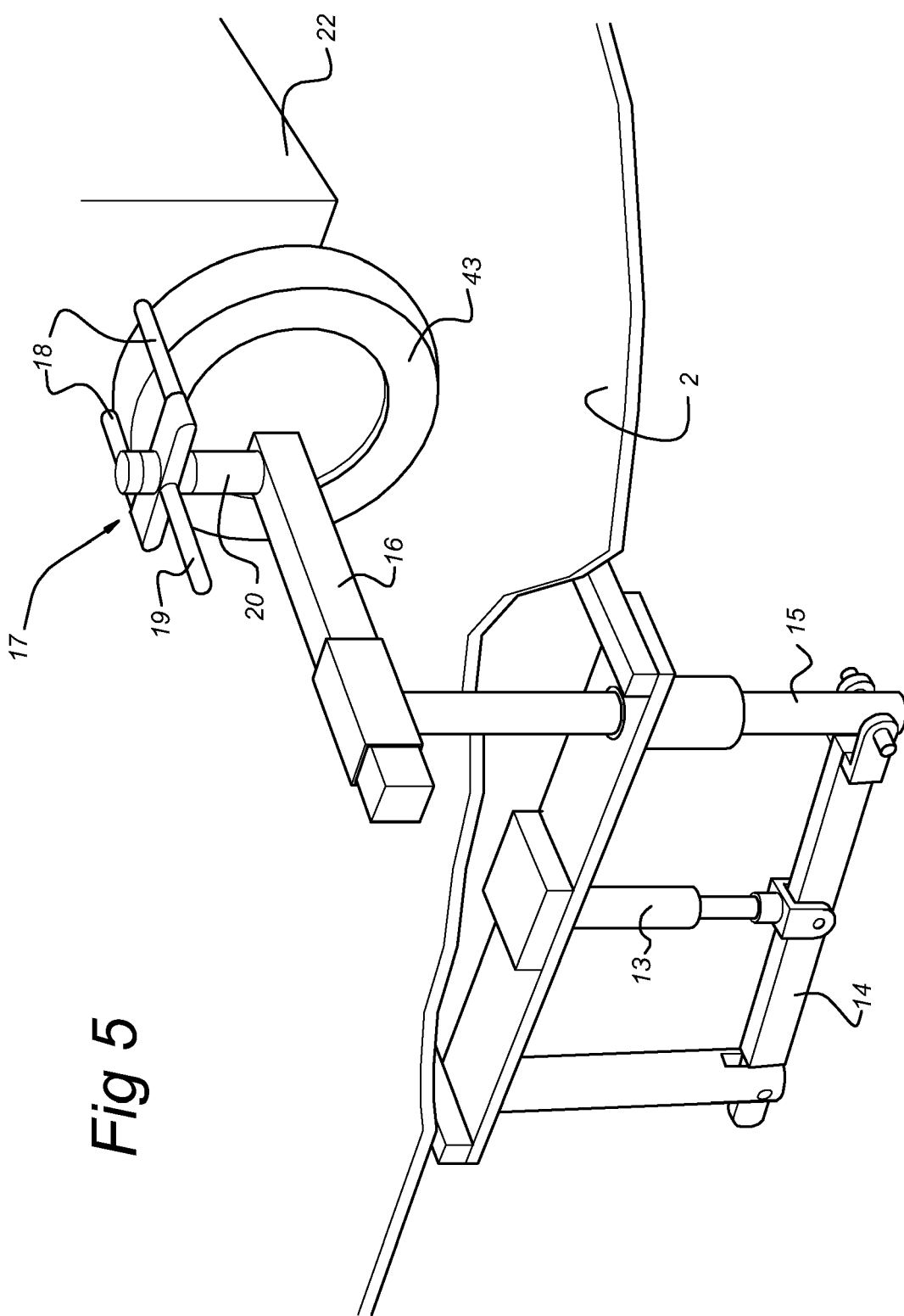


Fig 5

Fig 6

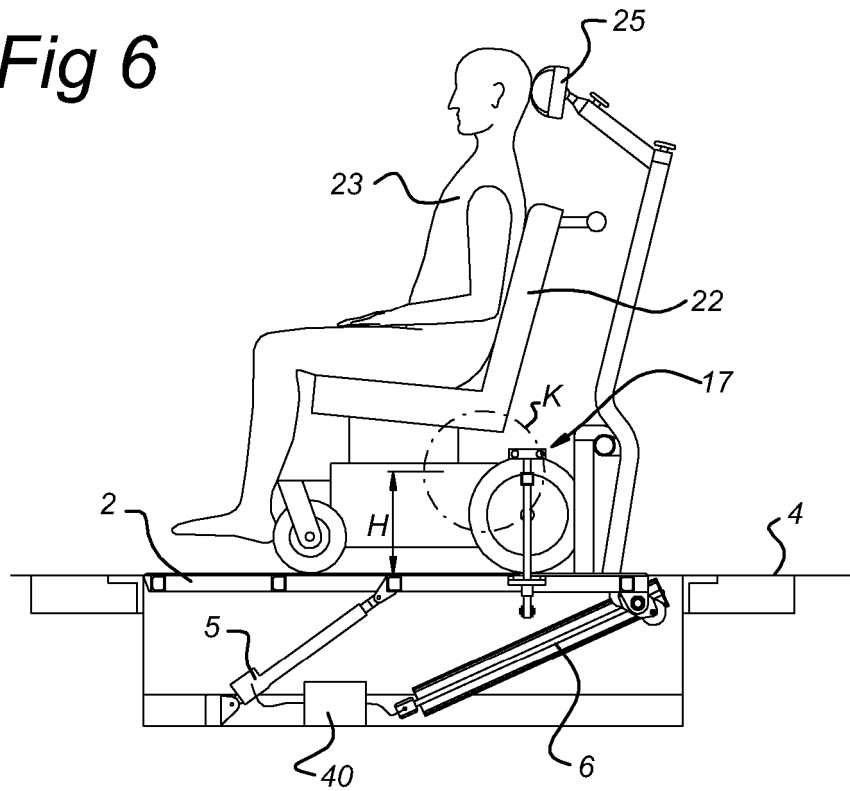


Fig 7

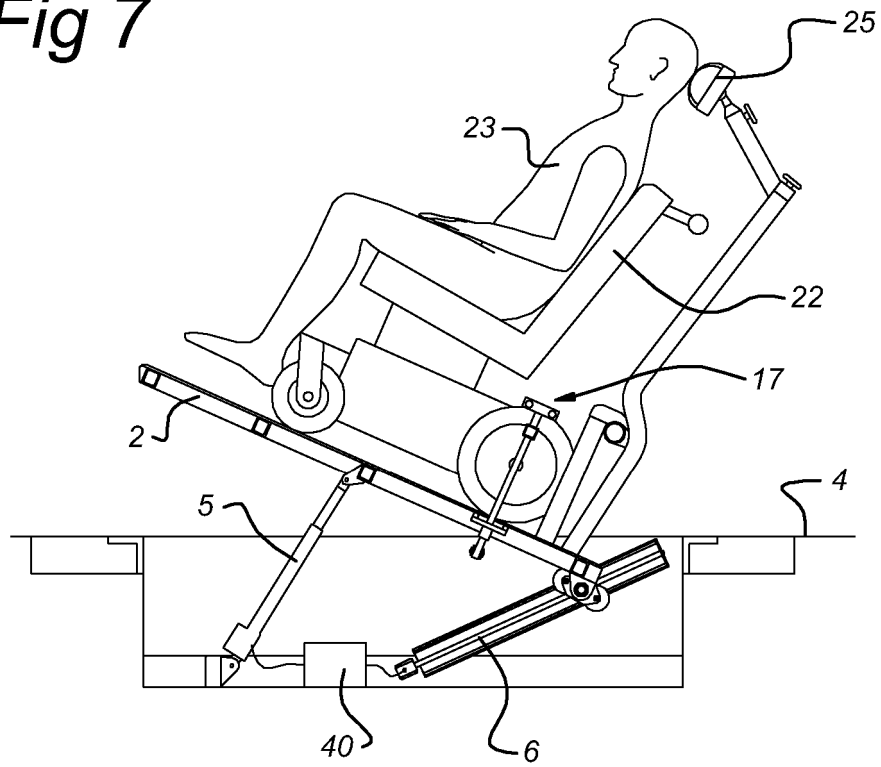
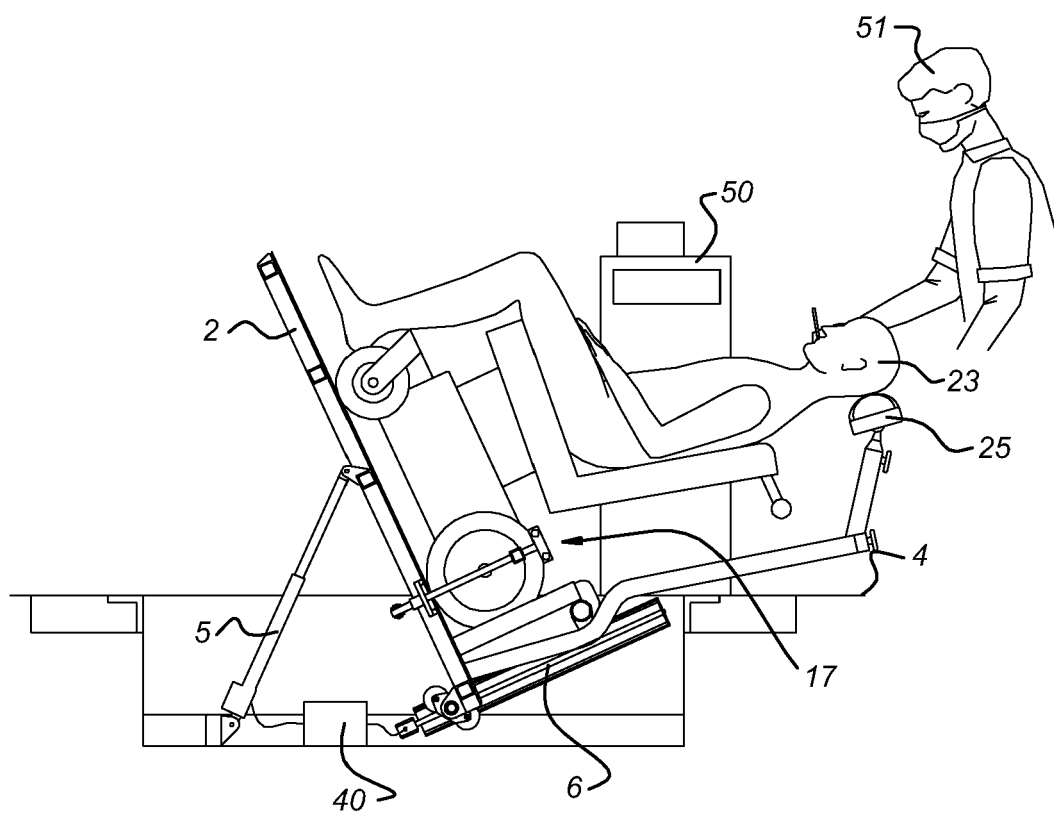


Fig 8



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REFERENCES CITED IN THE DESCRIPTION

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