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(54) **Stair lift**

(57) A stair lift comprising a rail (3) which extends obliquely upwards at an angle of inclination along a staircase (2) and a frame (4) which is movable along said rail, on which a chair (10) is mounted, which frame is provided with guide means and drive means that engage the rail, whilst the chair is provided with a seat part (11) and a backrest (12), **characterised in that** the stair lift com-

prises means arranged for moving the upper end of the backrest backwards and/or downwards from a neutral position with respect to the frame (4), whilst the distance between the upper end of the backrest and the rear side of the seat part (11) remains substantially the same, such that the distance between the upper end of the backrest (12) and the inclined plane of the staircase becomes smaller.

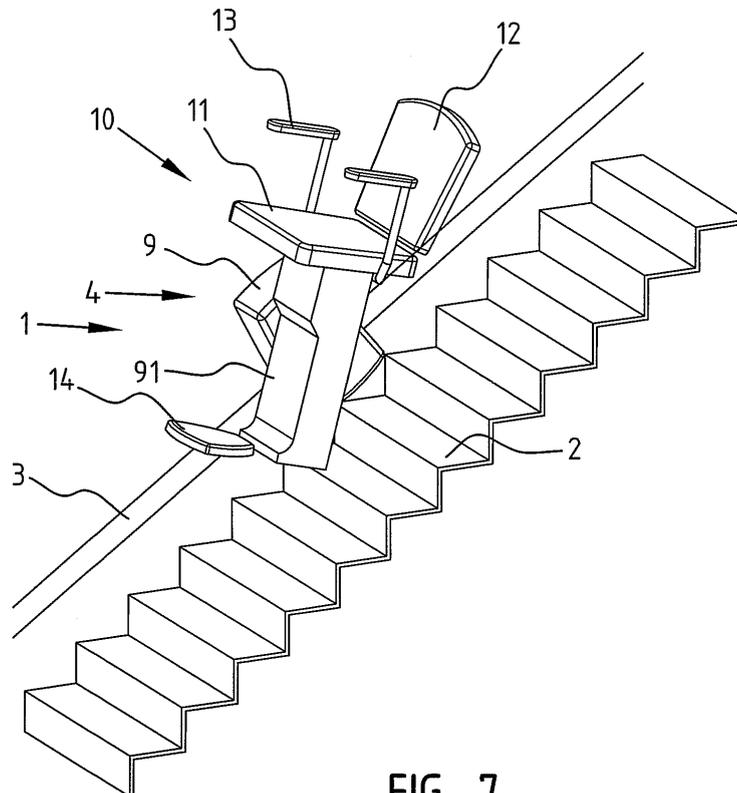


FIG. 7

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Description

[0001] The invention relates to a stair lift comprising a rail which extends obliquely upwards at an angle of inclination along a staircase and a frame which is movable along said rail, on which a chair is mounted, which frame is provided with guide means and drive means that engage the rail, whilst the chair is provided with a seat part and a backrest.

[0002] Such a stair lift is described in EP-A-1449801. The rail of the stair lift is mounted along a staircase, usually in an existing house occupied by people for whom climbing stairs has become difficult. A problem which may occur in that case is the limited amount of space that is available in the stairwell, so that there is not sufficient space for the frame with the chair and a person seated thereon to pass therethrough. The limited amount of space for the passage may be caused by a ceiling which is locally too low, for example halfway the stairs. Because of this, the distance between the ceiling and the steps is too small. In such a case, installing the stair lift is not possible, or it may be necessary to remove part of the ceiling. The object of the invention is to provide an efficient solution to this problem.

[0003] The user group of stair lifts consists mainly of older people, who often are afraid when using a stair lift, in particular along the steep inner side of a staircase. Said fear plays a part in particular when the seat part is oriented transversely to the direction of movement and the occupant thus looks into the wellhole. Accordingly it is another object of the invention to provide a stair lift that gives the user a greater sense of safety.

[0004] In order to accomplish that object, the stair lift comprises means arranged for moving the upper end of the backrest backwards and/or downwards from a neutral position with respect to the frame, whilst the distance between the upper end of the backrest and the rear side of the seat part remains substantially the same, such that the distance between the upper end of the backrest and the inclined plane of the staircase becomes smaller. The inclined plane of the staircase is in this regard defined as the plane that extends through the upper ends of the steps.

[0005] In a first embodiment, said means are arranged for pivoting the backrest backwards with respect to the seat part.

[0006] In another embodiment, said means are arranged for tilting the chair, i.e. including the seat part, backwards.

[0007] In a preferred embodiment, said means are furthermore arranged for moving the seat part forwards with respect to the frame, thereby creating more space for pivoting the backrest backwards, in particular in the case of a chair whose backrest faces a wall.

[0008] In another preferred embodiment, said means are arranged for pivoting the chair from an orientation in which the backrest extends parallel to the rail to an orientation in which the backrest extends transversely to

the rail, with the rear side of the backrest facing the inclined plane of the staircase, before moving the upper end of the backrest from the neutral position with respect to the frame. In another preferred embodiment, the chair is already oriented with the rear side of the backrest facing the inclined plane of the staircase in the starting position.

[0009] In yet another embodiment, said means are arranged for moving the chair, whose backrest faces the staircase in that case, rearwards in the direction of the inclined plane of the staircase with respect to the frame.

[0010] In yet another embodiment, said means are arranged for moving the chair downwards with respect to the frame. A footrest attached to the frame need not be moved downwards in that case, for example if insufficient space is available for that purpose, the effect being that the user's knees will move upwards temporarily with respect to the seat part.

[0011] In one variant, said means are arranged for making the aforesaid movements at the beginning and/or at the end of the rail. In another variant, the stair lift is furthermore provided with a memory, which stores the positions along the rail where said means are to move the upper end of the backrest, and any other chair parts, during said movement along the rail. The stair lift may furthermore be provided with sensors for determining the positions along the rail where said means are to move the upper end of the backrest, and any other chair parts, during said movement along the rail. Said sensors may be electronic sensors or mechanical sensors (switches). In yet another variant, the movement of the backrest is started as soon as the stair lift is activated by the user.

[0012] Preferably, said means are furthermore arranged for maintaining the seat part in a fixed orientation when changes occur in the angle of inclination of the rail relative to the horizontal plane. Because of the use of combined means for "keeping the chair straight" during a change in the angle of inclination of the staircase, and for tilting or shifting the backrest or the chair, the stair lift is very cost-efficient.

[0013] The invention further relates to a frame on which a chair is mounted, which frame is provided with guide means and drive means arranged for engaging a rail extending at an angle of inclination and moving said frame along the rail, which chair is provided with a seat part and a backrest, wherein the stair lift is provided with means arranged for moving the upper end of the backrest backwards and/or downwards from a neutral position with respect to the frame, whilst the distance between the upper end of the backrest and the rear side of the seat part remains substantially the same.

[0014] The invention will now be explained in more detail by means of a description of two examples, in which reference is made to the appended drawing, in which like parts are indicated by the same numerals, and in which:

Figure 1 is a perspective front view of a stair lift installation;

Figure 2 is a partially broken-away perspective rear view of part of the stair lift installation of figure 1;

Figure 3 is a side view according to the arrow III in figure 2;

Figure 4 is a partially broken-away perspective rear view of the stair lift installation of figure 1 in a bend in the rail;

Figure 5 is a perspective front view of the stair lift installation of figures 1-4 provided with a number of sensors for determining the position of the load carrier;

Figure 6 is a block diagram of a system for maintaining the position of the load carrier;

Figure 7 is a perspective front view of a stair lift installation;

Figures 8-13 are respective front views and perspective views of the pivoting and tilting mechanism of the chair of figure 7;

Figure 14 is a perspective view of a stair lift installation;

Figure 15 is a perspective view of part of the stair lift installation of figure 14; and

Figures 16 and 17 are sectional views of part of the stair lift installation of figure 14.

[0015] An installation 1 for conveying a load from a first level to a second level (figure 1), a stair lift installation in the illustrated embodiment, comprises a rail 3 mounted along a staircase 2, which rail includes an angle α with the horizontal H, and a device 4, which is movable along the rail 3, for transporting the load between the various levels, in this case a stair lift, therefore. The rail 3, which has a round cross-section in the illustrated embodiment, is supported by a number of posts 5 disposed in spaced-apart relationship along the staircase 2, which posts are fixed to a projecting part 6, which extends along the rail 3 (figure 2). The function of said projecting part 6 will be explained in more detail yet hereinafter. The rail 3 further comprises a driving part 7, in this case in the form of a gear rack 8, which has a round cross-section.

[0016] The chairlift 4 comprises a the frame 9 which is movable along the rail 3, on which the frame a load carrier 10 is mounted, in this case in the form of a chair with a seat part 11, a backrest 12, armrests 13 and a footrest 14. The chair 10 is pivotally connected to the frame 9 about a horizontal shaft 45 (fig. 3), whilst the frame 9 houses a maintaining mechanism 70 (yet to be explained below), which comprises, among other parts, an adjusting motor 71 connected to the shaft 45, so that the posi-

tion of the chair 10 can be kept constant at all times, irrespective of the inclination of the rail 3.

[0017] The frame 9 of the stair lift 4 is further provided with support and guide means 15, which engage round a part of the circumference of the rail 3. The frame 9 is to that end substantially L-shaped, with an upright back 38 and two feet 26 engaging under the rail 3. The support and guide means 15 are adapted to absorb moments directed transversely to the direction of movement of the stair lift 4. To this end the support and guide means 15 comprise a number of guide rollers 17 disposed at intervals in the direction of movement, which rollers engage the rail 3. In the illustrated embodiment, several pairs of guide rollers 17 are even provided, which, in addition, are spread over the circumference of the rail 3. Because a large number of guide rollers 17 are used, each of said guide rollers can be comparatively small, so that a compact construction is obtained. In addition, the loads on the stair lift 4 are thus spread uniformly over the rail 3 and resistance is minimized. The guide rollers 17 are each rotatable about a pin 18 and accommodated in pairs in a recess in a roller carrier 20. The outer recesses are covered with a closing plate 19.

[0018] In the illustrated embodiment, the roller carrier 20 is configured as a ring segment having a spherical outer surface 21, which is open to one side. The open side functions to allow the ring segment to engage round the projecting part 6 of the rail 3. The illustrated embodiment comprises two roller carriers 20, each of which is provided with three pairs of rollers 17, which pairs are spaced 120° apart in circumferential direction. Each roller carrier 20 is mounted at two diametrically opposite points in cup-shaped dishes 24 connected to the frame 9, such that it is in principle movable in all directions. The dishes 24 are fixed to the foot 26 projecting under the rail 3 and to a part 27 of the frame 9 engaging over the rail 3 by means of a number of screws 25. An imaginary line connecting the roller carriers 20 includes a small angle β with the vertical V.

[0019] In order to limit the movability of the roller carrier 20 to two mutually perpendicular directions transversely to the direction of movement of the stair lift, i.e. a tilting movement transversely to the rail 3, two grooves 22 extending substantially in the direction of movement are formed in the outer surface 21, in each of which grooves a pin 23 engages. Said pin 23 projects from the centre of the cup-shaped dish 24. The sliding movement of the pins 23 in the grooves 22 thus allows pivoting of the roller carrier 20 about a substantially horizontal axis, whilst pivoting of the roller carrier 20 about the pins 23 is also possible. On the other hand, the pins 23 prevent tilting movement about the longitudinal axis of the rail 3. In this way it is readily possible to follow bends in the staircase 2, and thus also in the rail 3, which generally involve turns both in the horizontal and in the vertical plane (figure 4).

[0020] The stair lift 4 is also provided with drive means 16, which co-act with the driving part 8 of the rail 3. Said drive means 16 are accommodated in a subframe 28,

which has a reverse L-shape in this embodiment and which is formed between the feet 26 of the frame 9. A roller 29 is mounted for rotation about a shaft 30 in the subframe 28, so that the subframe 28 is supported on the rail 3. The drive means 16 comprise a motor 31 with an output shaft 32, on which a rotatable driving element 33 is mounted, which driving element engages the driving part 8 of the rail 3. In the illustrated embodiment, two batteries 34 are provided at the top of the subframe 28 for supplying power supply to the motor 31.

[0021] As already said before, the driving part 8 is a gear rack in the illustrated embodiment, and the driving element 33 is thus configured as a gear. Since the gear rack 8 is provided on the side of the rail 3 remote from the frame 9, an output shaft 32 driven by the motor 31 extends transversely to the direction of movement under the rail 3.

[0022] In the illustrated embodiment, the output shaft 32 even extends beyond the gear rack 8 and the toothed wheel 33, as far as the projecting part 6 of the rail 3. Mounted on the projecting part of the shaft 32 is a support wheel 35, which engages the projecting part or strip 6 of the rail 3. As a result, a moment directed round the rail 3, which is the result of the weight of the load carrier 10 and the load carried by said load carrier 10, can be absorbed by the drive means 16.

[0023] In order to ensure that the toothed wheel 33 will mesh optimally with the gear rack 8, another closing roller 36 is rotatably mounted on a shaft 37 opposite the support wheel 35. The subframe 28 of reverse L-shape with the closing roller 36 mounted therein and the projecting shaft 32 with the support wheel 35 thus form a unit which encloses the rail 3 practically entirely.

[0024] Because the support and guide means 15 and the drive means 16 are offset, seen in the direction of movement of the stair lift 4, and because the driving part 8 does not coincide with the rail 3, the guide rollers 17 and the gear 33 will not move to the same extent in a bend in the rail 3. Thus there would be a risk of the toothed wheel 30 moving out of engagement with the driving part 8 of the rail 3, so that the stair lift 4 could come to a stop or at least move in jolting manner. Such differences would also interfere with the electronic control of the position maintaining mechanism 70. The invention therefore provides that the drive means 16 are movably accommodated in the frame 9 relative to the support and guide means 15.

[0025] In the illustrated embodiment, the subframe 28 with the drive means 16 accommodated therein is movable substantially transversely to the direction of movement of the stair lift 4 with respect to the frame 9, making it possible to compensate for differences in the distance to the central axis of the rail 3 in inside and outside bends. The subframe 28 is to that end connected to the back 38 of the frame 9 via a member 39, which defines a pivot pin 40, 41, respectively, at its respective ends. The pivot pins 40, 41 are oriented substantially in the direction of movement of the stair lift 4. The use of two parallel pivot

pins 40, 41 achieves that the subframe 28 is movable transversely to the rail 3 in two mutually perpendicular directions.

[0026] In order to enable transmission to the frame 9 of the stair lift 4 of the driving forces generated by the meshing of the toothed wheel 30 with the gear rack 8, force transmitting means 42 are provided between the subframe 28 of the drive means 16 and the frame 9 in the illustrated example. Said force transmitting means 42 must be movable in order to be able to follow the movements between the subframe 28 and the frame 9. In the illustrated embodiment, the force transmitting means 42 to that end comprise two co-acting pressure elements or slide bearings 43, 44, one on the subframe 28 and one on the frame 9, which are freely movable in a direction transversely to the direction of movement of the stair lift 4. During relative movement between the frame 9 and the subframe 28, said pressure elements 43, 44 slide past each other, roughly in the manner of buffer stops on coupled railway carriages. The driving forces can thus be transmitted from the rail 3 to the stair lift 4 at all times, irrespective of the relative positions of the subframe 28 and the frame 9.

[0027] As already indicated before, the stair lift 4 comprises a position maintaining mechanism 70, which consists of an adjusting motor 71, which is drivingly connected to the pivot shaft 45 of the chair 10. The construction and operation of this mechanism 70 will be explained on the basis of the first embodiment of the stair lift 4 and with reference to figures 5 and 6. The operation of adjusting motor 71 is controlled by an electronic control system 72 which receives signals from a number of motion sensors, six in the illustrated embodiment, 73L, 73R, 74L, 74R, 75R. In addition, the control system 72 receives a signal 76 from a sensor which senses the position of chair 10 when stair lift 4 is inoperative, i.e. at the beginning or the end of the rail 3.

The control system 72 may receive a number of secondary signals, such as a signal from an acceleration sensor or electronic level 77 connected to the chair 10, and a signal 78 from sensors which sense a high resistance, which is an indication that something or someone is impeding the operation of stair lift 4. Finally, a signal 79 that indicates the speed of the adjusting motor 71 is fed back to the control system. All these signals are processed in the control system 71, and on the basis thereof a control signal 80 is delivered to the adjusting motor 71. The rotation of said adjusting motor 71 is transmitted to the shaft 45 by a transmission 72, which is preferably self-locking, such as a worm wheel transmission, for example.

[0028] In the illustrated embodiment, the motion sensors 73, 74, 75 are embodied as contactless sensors. Optical sensors, such as CCD elements, or electronic sensors such as inductive elements, may be considered in this connection. In both cases the sensors 73, 74, 75 co-act with target elements 81, 82, 83 disposed opposite said sensors. In the case of optical sensors, said target members are visually discernable, for example being

configured as a pattern of marks, whilst in the case of inductive sensors use can be made of target elements in the form of metal plates. In the illustrated embodiment, the sensors 73, 74 are fixed to the frame 9, whilst the associated target elements 81, 82 are provided on the outer surface of the roller carrier 20. The sensor 75 is likewise fixed to the frame 9 in this embodiment, whilst its associated target element 83 is provided on the sub-frame 28.

[0029] In order to limit the control activities, the position of the chair 10 is correctly set on the basis of the inoperative position signal 76 before transport takes place, i.e. at the upper or the lower end of the rail 3. After that, said position is changed only when the stair lift 4 reaches a bend in the rail 3. After all, the position of the stair lift 4 will only change at that location. The reaching of a bend is sensed by the motion sensors 73, 74, 75 on either side of the stair lift 4. The sensors 73, 74 are adapted to sense movements of the support and guide means 15, more particularly the roller carriers 20, with respect to the frame 9 in the direction of the rail 3 and in a direction transversely thereto, respectively. The sensor 75 is arranged for sensing movements of the drive means 16, in this case the subframe 28, therefore, with respect to the support and guide means 15, in this case the roller carriers 20, therefore. Using the movements in the construction of the stair lift 4 itself for determining the course of the rail 3 obviates the need to use separate sensors guided along the rail 3, as for example described in the present applicant's prior patent application EP 1 119 513. The structure of the position maintaining means 70 is thus significantly simplified.

[0030] According to figures 7-17, the stair lift 1 has been extended with a mechanism for moving, tilting and/or pivoting the seat part 11 and/or the backrest 12 with respect to the frame 9 to enable transport of the stair lift 4 with the user seated thereon between a low ceiling and the staircase 2, for example.

[0031] Figure 7 shows a situation in which the chair 10, in an orientation with the backrest 12 facing the staircase 2, has been tilted backwards in its entirety with the support 91, the seat part 11, the backrest 12, the armrests 13 and the footrest 14. The distance between the upper side of the backrest 12 and the staircase 2 has thus been reduced in comparison with the situation in which the chair 10 is maintained upright. Also the upper side of the head of the user seated on the chair is thus moved closer to the staircase 2, so that a smaller distance between the ceiling and the staircase 2 will suffice.

[0032] Figures 8-13 showed the frame 9 with a position maintaining mechanism 70 as described before, to which a pivoting and translation device has been added, by means of which the chair 10 can be pivoted about a substantially vertical axis with respect to the frame from the position in which the backrest 12 faces the wall on which the rail 3 is mounted, as shown in figure 1, to a position in which the backrest 12 faces the staircase 2. The chair 10 can then be tilted backwards about the horizontal shaft

45 by the adjusting motor 71, as shown in figure 7. The position maintaining mechanism 70 is to that end arranged for having the adjusting motor 71 rotate the shaft 45 through a desired angle via control signals. The chair 10 can also be moved downwards and upwards with respect to the frame.

[0033] Said pivoting, tilting and moving in vertical direction can take place at both ends of the rail 3, i.e. from the neutral position to the tilted and/or moved position before the stair lift 1 starts its movement at the beginning of the rail, and back from the tilted and/or moved position to the neutral position after the stair lift 1 has come to a standstill at the end of the rail. In an alternative embodiment, said pivoting, tilting and/or moving can take place while the chair moves along the rail 3. The locations along the rail 3 where said pivoting, tilting and/or moving are to take place, and/or the respective angles through which the chair 10 is to pivot and tilt, may be stored in an electronic memory. Furthermore, mechanical or electronic marks may be provided along the rail 3, and the stair lift 1 is provided with mechanical or electronic sensors, in the manner described before, for initiating said tilting, pivoting and/or moving. The marks may also comprise the information about the respective angles through which the chair 10 is to pivot and tilt, and transfer said information to the stair lift 1. A combination of marks along the rail 3 and a memory in the stair lift 1 is also possible. Other ways of indicating the location of the stair lift 1 along the rail 3 where said pivoting, tilting and/or moving are to take place and providing information to the chairlift 1 about the respective angles through which the chair 10 is to pivot and tilt are also possible.

[0034] The pivoting and translation mechanism that has been added to the control system 72 and the position maintaining mechanism 70 comprises a substantially vertical shaft 92, which is fixed to a circular disc 93, which disc 93 is mounted on the end face of the shaft 45 by means of bolts and nuts 103. The disc 93 is provided with slots 94 in the form of a segment of a circle, making it possible to adjust the position of the disc 93 relative to the shaft 45 upon installation of the stair lift 1.

[0035] The shaft 92 is provided with two identical gears 95, 96, which are spaced apart by a distance equal to the distance over which the chair 10 can be moved upwards and downwards. In an alternative embodiment, the shaft 92 is provided with a continuous gear having a length equal to the maximum distance over which the chair 10 can be moved upwards and downwards. The chair 10 can also be moved in vertical direction to a position between the two outermost positions.

[0036] The support 91 is provided with a motor 97 having a vertical shaft with a gear 98. An intermediate gear 99 is furthermore mounted on the support 91, which gear engages the gear 98. The intermediate gear 99 engages one of the gears 95, 96 on the shaft 92.

[0037] On the shaft 92, a hinge element 100 is mounted for rotation about the shaft 92. In the hinged-closed position as shown in figures 8 and 9, the hinge element 100

is secured in vertical direction by two stops 104. The hinge element 100 supports the support 91 by means of a pneumatic or hydraulic piston 101 extending parallel to the shaft 92, which piston is attached to the hinge element 100 at one end, and which is attached to the support 91 at the other end. A rod 102 extending along the piston 101, spaced therefrom by some distance in lateral direction, which is rigidly connected to the support 91 at one end and which is mounted for axial movement in the hinge element 100 at the other end, prevents the support 91 from pivoting about the piston 101 with respect to the hinge element 100.

[0038] Figures 14-17 show an alternative to the above-described tilting of the entire chair, in which the seat part 11 of the chair 10 can be moved forwards and back again, so that the backrest 12 will simultaneously tilt backwards. The seat part 11 is to that end movably (on wheels 112) connected to a fixed seat support 111. A pneumatic or hydraulic piston 113, which extends substantially horizontally between the seat part 11 and the seat support 111, is controlled to telescope in and out by the control system 71. Because the backrest 12 is pivotally connected to the seat part 11 at the bottom side, and the part of the backrest 12 located thereabove is movably (in vertical direction) connected to the support 91, the backrest will tilt backwards when said movement takes place.

[0039] The handles 114 provided on the left-hand side and the right-hand side of the seat part can be used for releasing the locking engagement of the chair 10, so that it can be pivoted about the horizontal shaft. In this way the user can manually pivot the chair 10 to a suitable position, for example at the top of the stairs, to get off without difficulty in a safe manner.

Claims

1. A stair lift comprising a rail which extends obliquely upwards at an angle of inclination along a staircase and a frame which is movable along said rail, on which a chair is mounted, which frame is provided with guide means and drive means that engage the rail, whilst the chair is provided with a seat part and a backrest, **characterised in that** the stair lift comprises means arranged for moving the upper end of the backrest backwards and/or downwards from a neutral position with respect to the frame, whilst the distance between the upper end of the backrest and the rear side of the seat part remains substantially the same, such that the distance between the upper end of the backrest and the inclined plane of the staircase becomes smaller.
2. A stair lift according to claim 1, wherein said means are arranged for pivoting the backrest backwards with respect to the seat part.
3. A stair lift according to claim 2, wherein said means

are furthermore arranged for sliding the seat part forwards with respect to the frame.

4. A stair lift according to claim 1, wherein said means are arranged for tilting the chair backwards.
5. A stair lift according to claim 1 or 2, wherein said means are arranged for moving the chair rearwards in the direction of the inclined plane of the staircase with respect to the frame.
6. A stair lift according to any one of the preceding claims 1 - 5, wherein said means are arranged for moving the chair downwards with respect to the frame.
7. A stair lift according to any one of the preceding claims 1 - 6, wherein said means are arranged for pivoting the chair from an orientation in which the backrest extends parallel to the rail to an orientation in which the backrest extends transversely to the rail, with the rear side of the backrest facing the inclined plane of the staircase, before moving the upper end of the backrest from the neutral position with respect to the frame.
8. A stair lift according to any one of the preceding claims 1 - 7, wherein said means are arranged for making the aforesaid movements at the beginning and/or at the end of the rail.
9. A stair lift according to any one of the preceding claims 1 - 7, wherein the stair lift is furthermore provided with a memory, which stores the positions along the rail where said means are to move the upper end of the backrest during said movement along the rail.
10. A stair lift according to any one of the preceding claims 1 - 9, wherein stair lift may furthermore be provided with sensors for determining the positions along the rail where said means are to move the upper end of the backrest during said movement along the rail.
11. A stair lift according to any one of the preceding claims 1 - 10, wherein said means are furthermore arranged for maintaining the seat part in a fixed orientation when changes occur in the angle of inclination of the rail relative to the horizontal plane.
12. A frame on which a chair is mounted, which frame is provided with guide means and drive means arranged for engaging a rail extending at an angle of inclination and moving said frame along the rail, which chair is provided with a seat part and a backrest, **characterised in that** the stair lift is provided with means arranged for moving the upper end of

the backrest backwards and/or downwards from a neutral position with respect to the frame, whilst the distance between the upper end of the backrest and the rear side of the seat part remains substantially the same.

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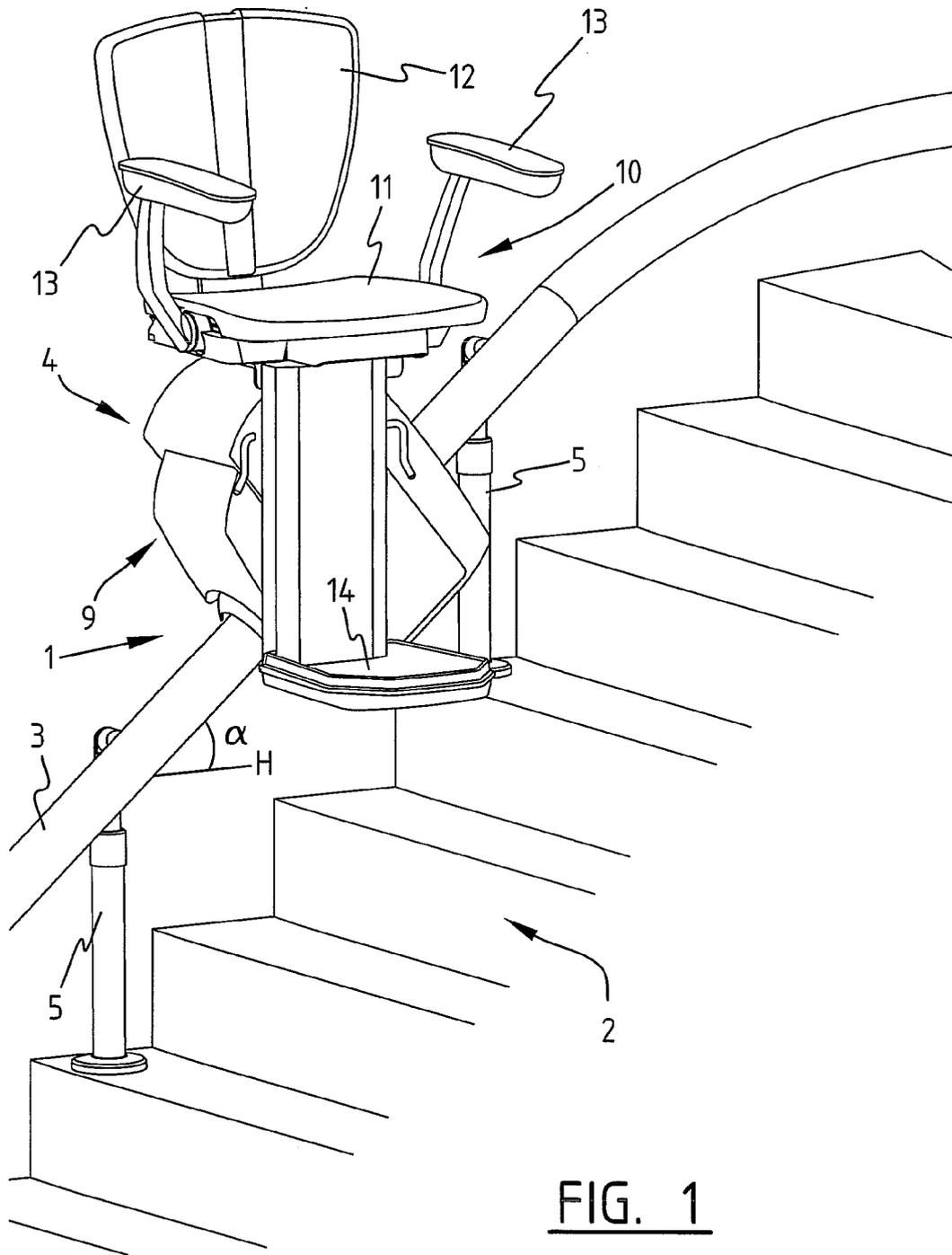
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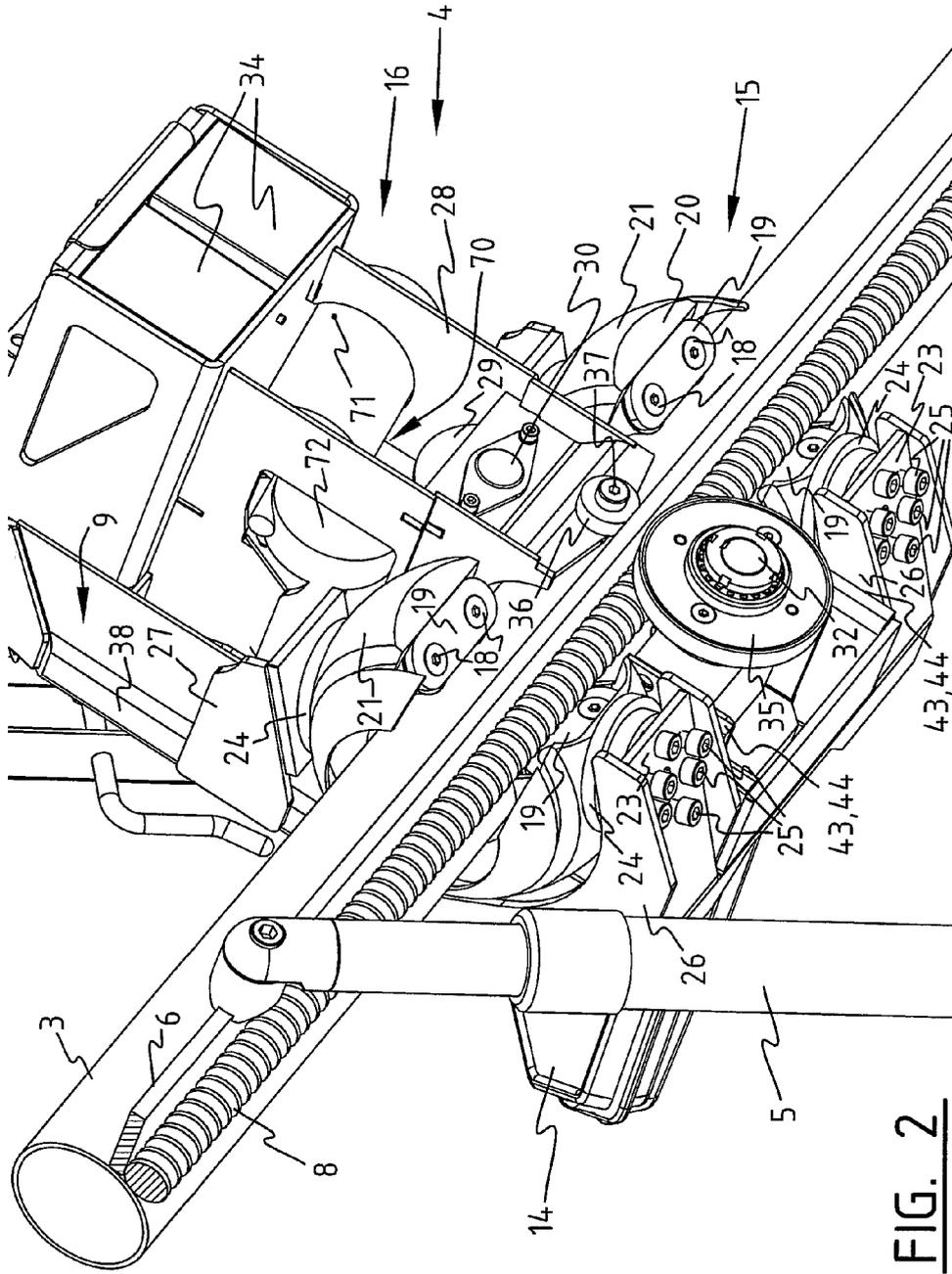


FIG. 2

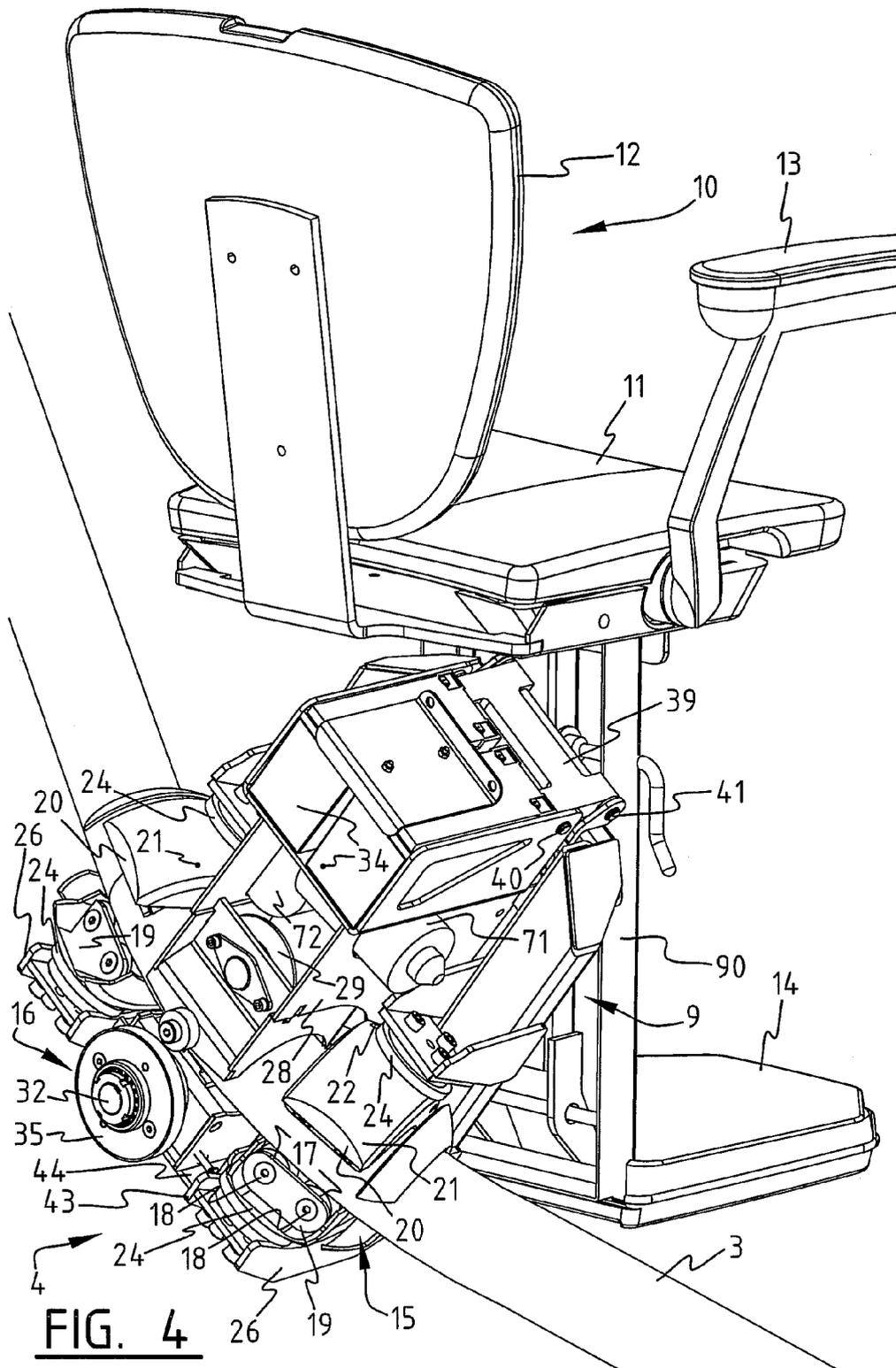


FIG. 4

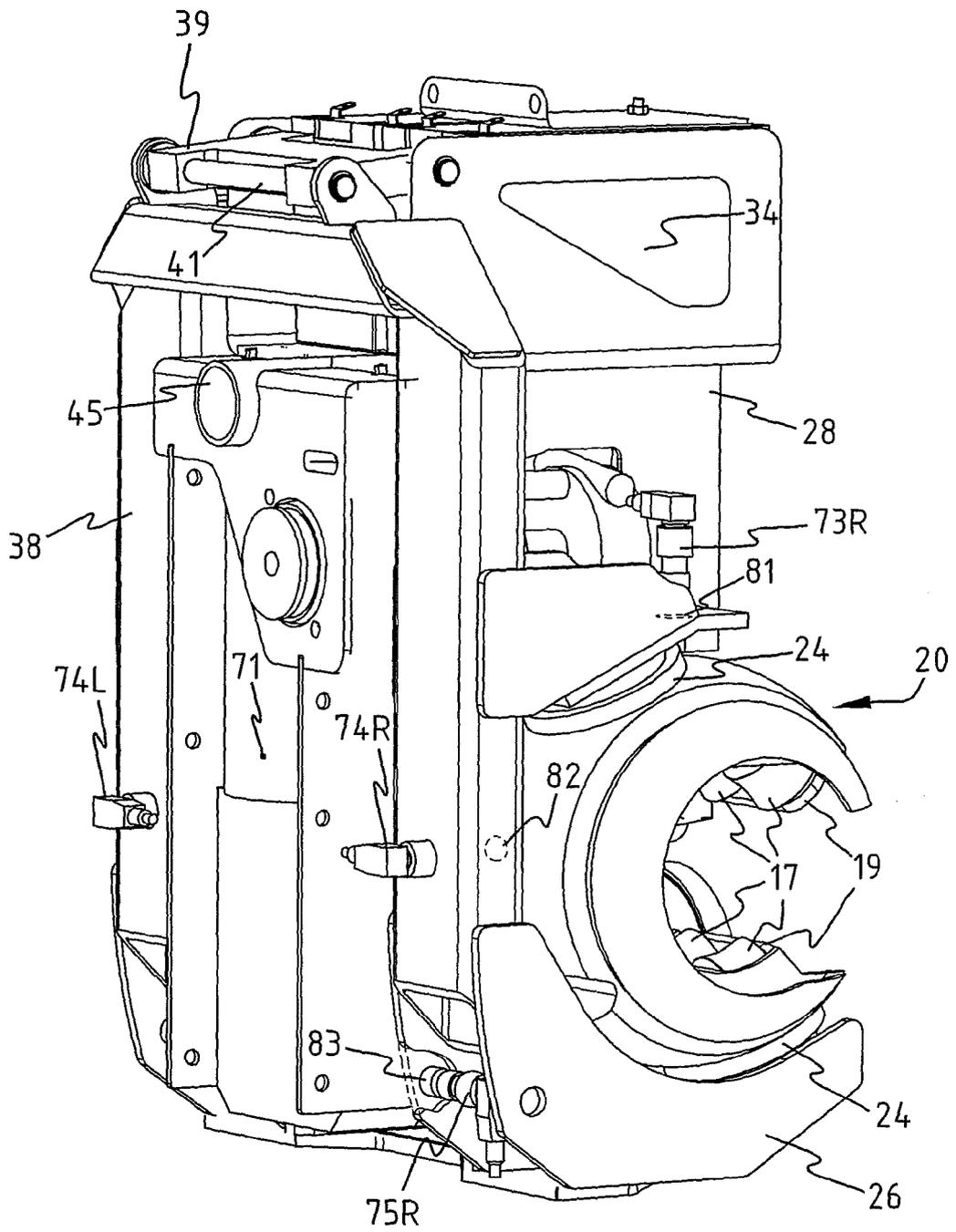


FIG. 5

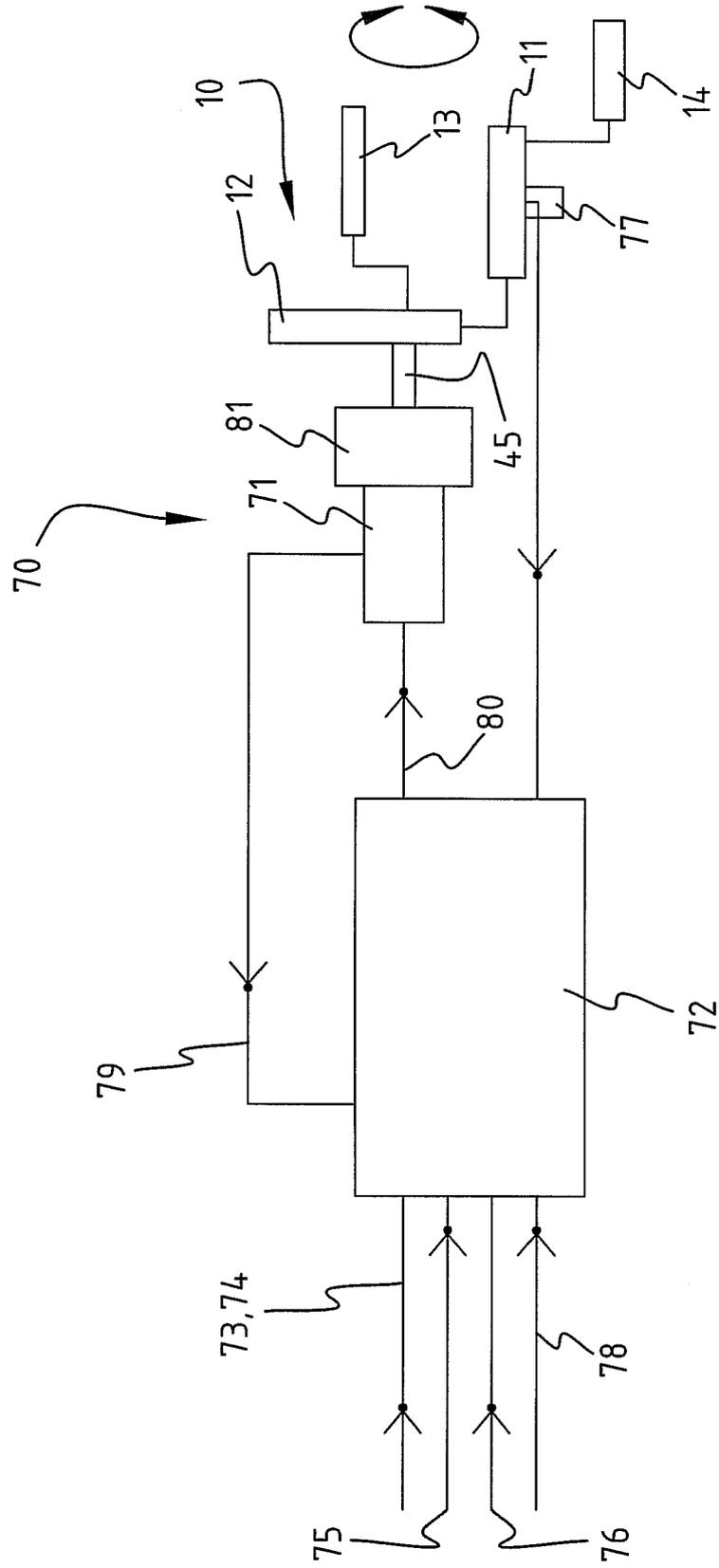


FIG. 6

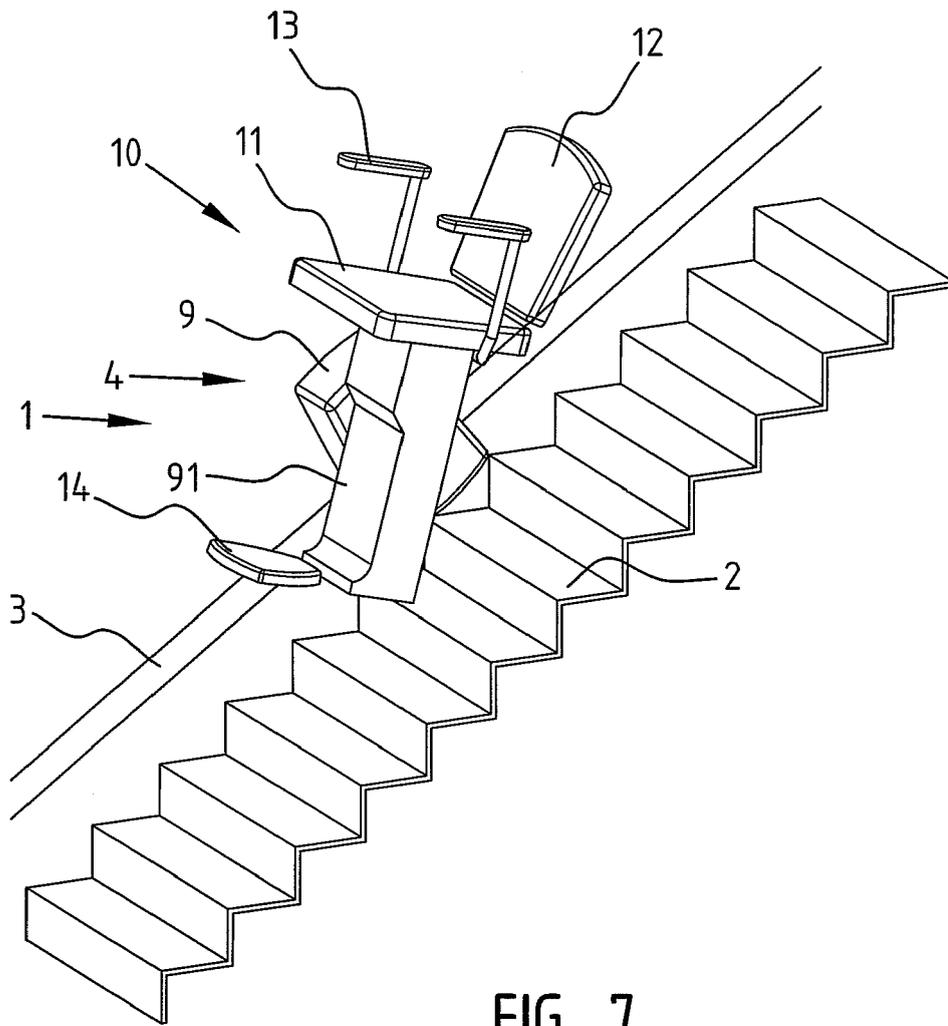
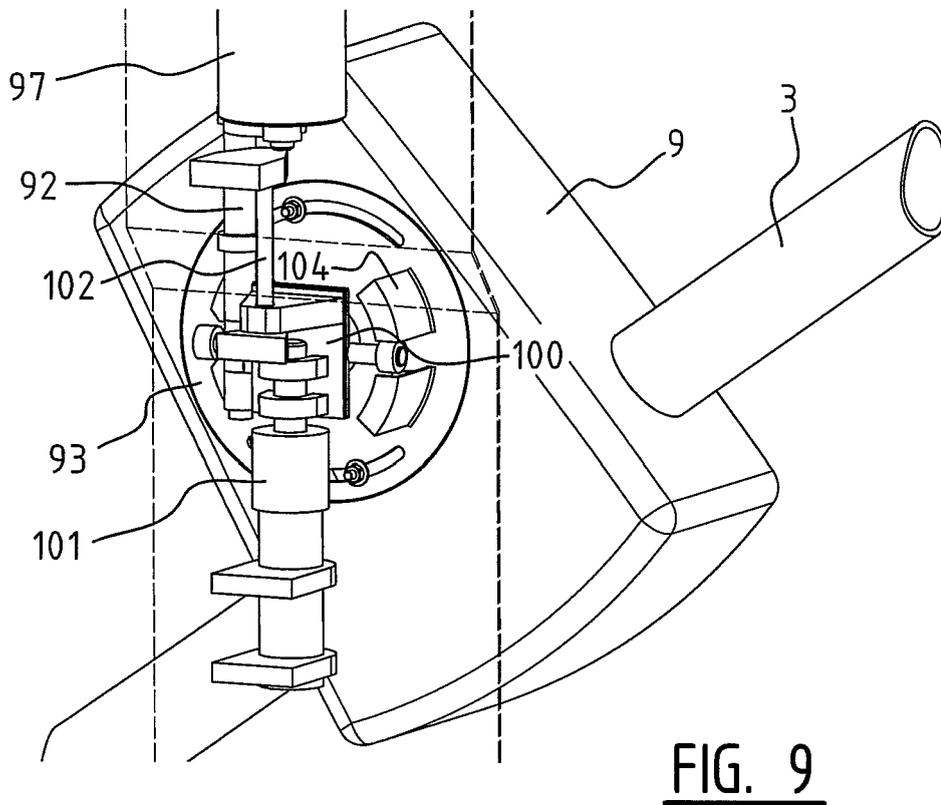
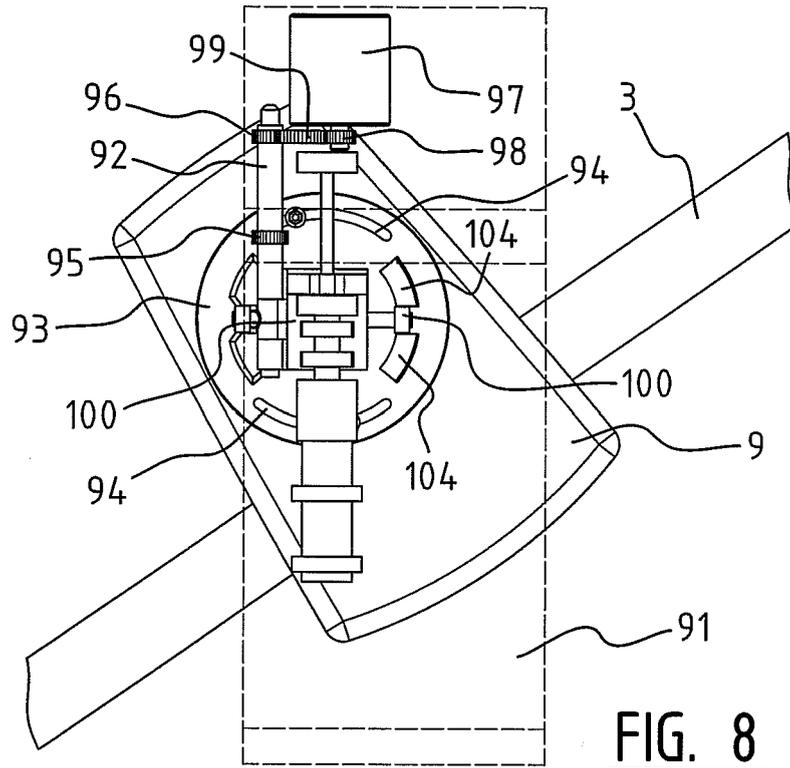
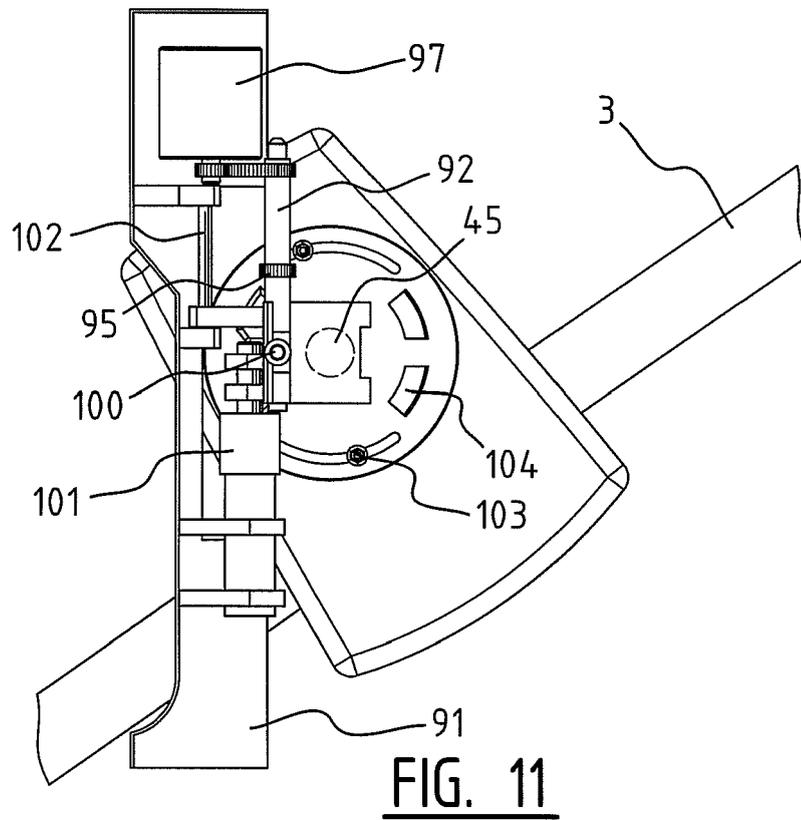
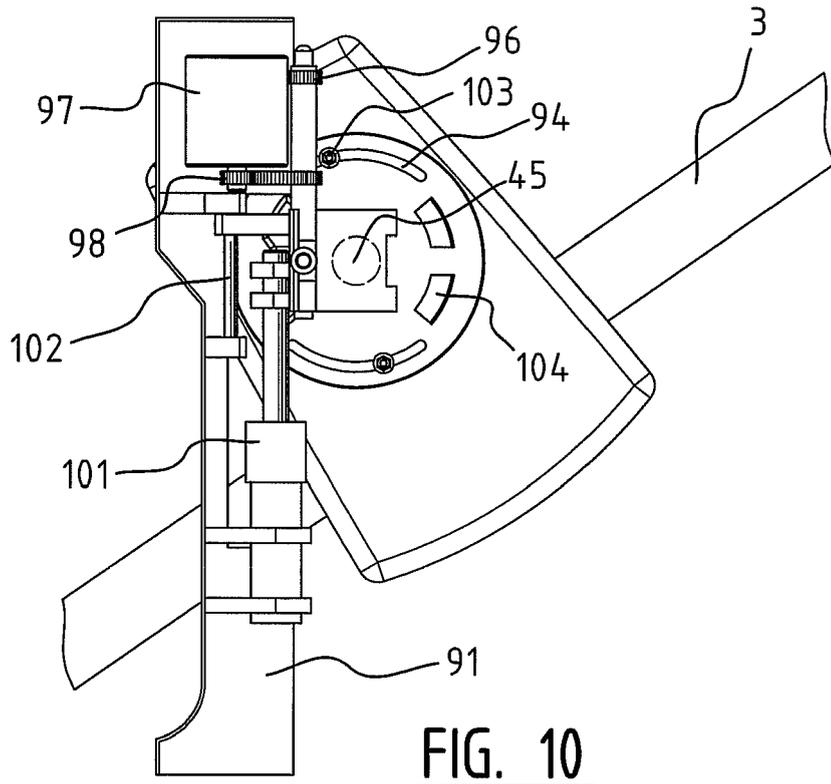


FIG. 7





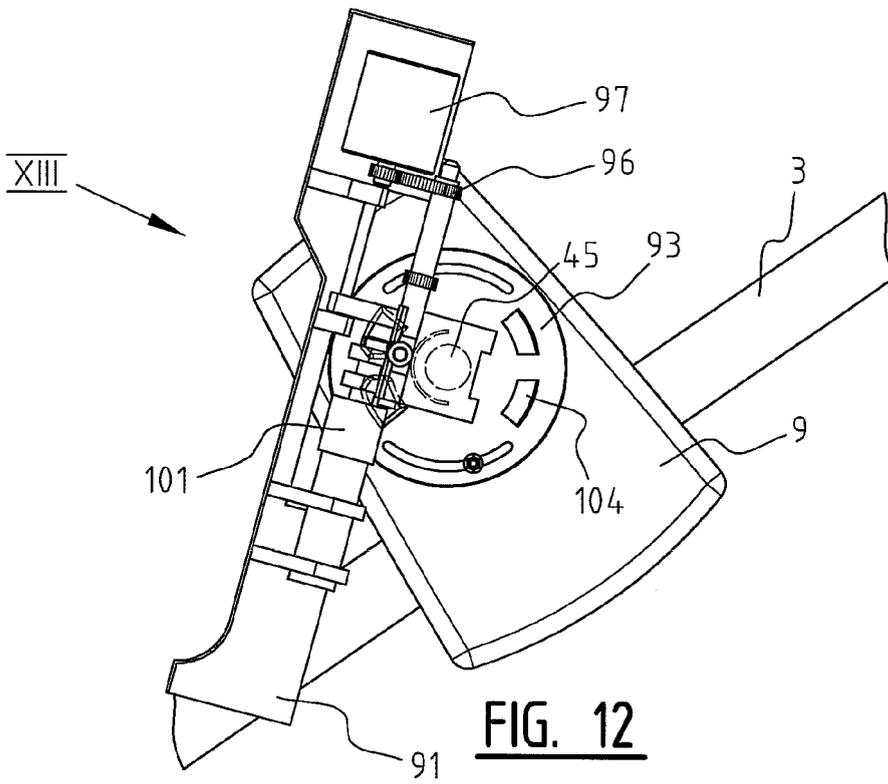


FIG. 12

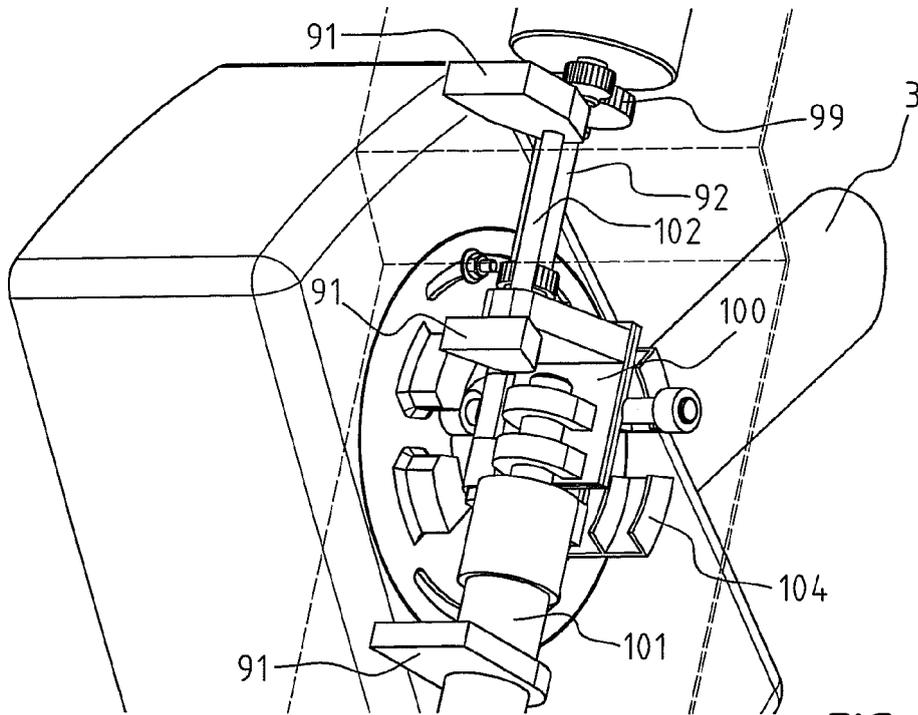


FIG. 13

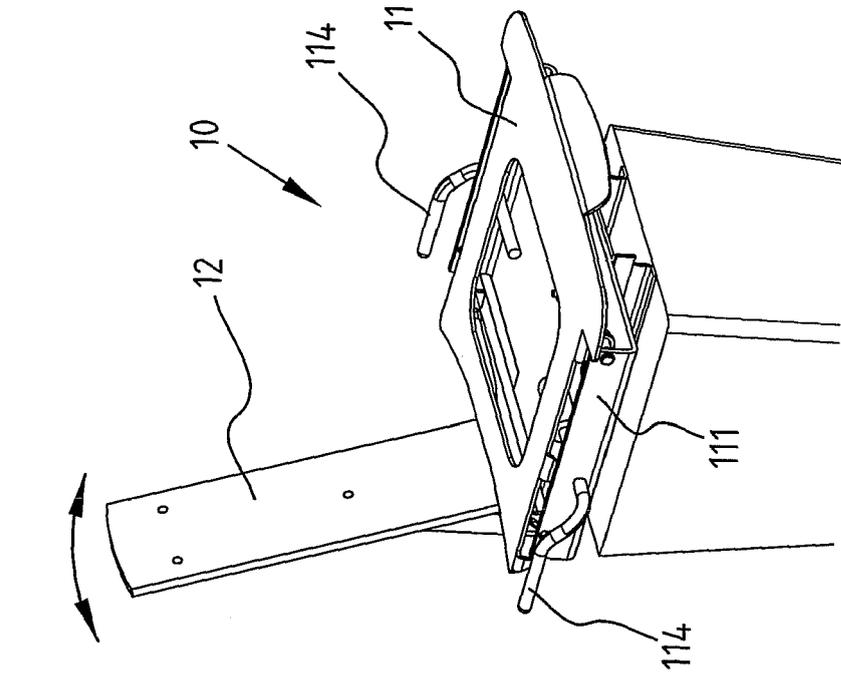


FIG. 14

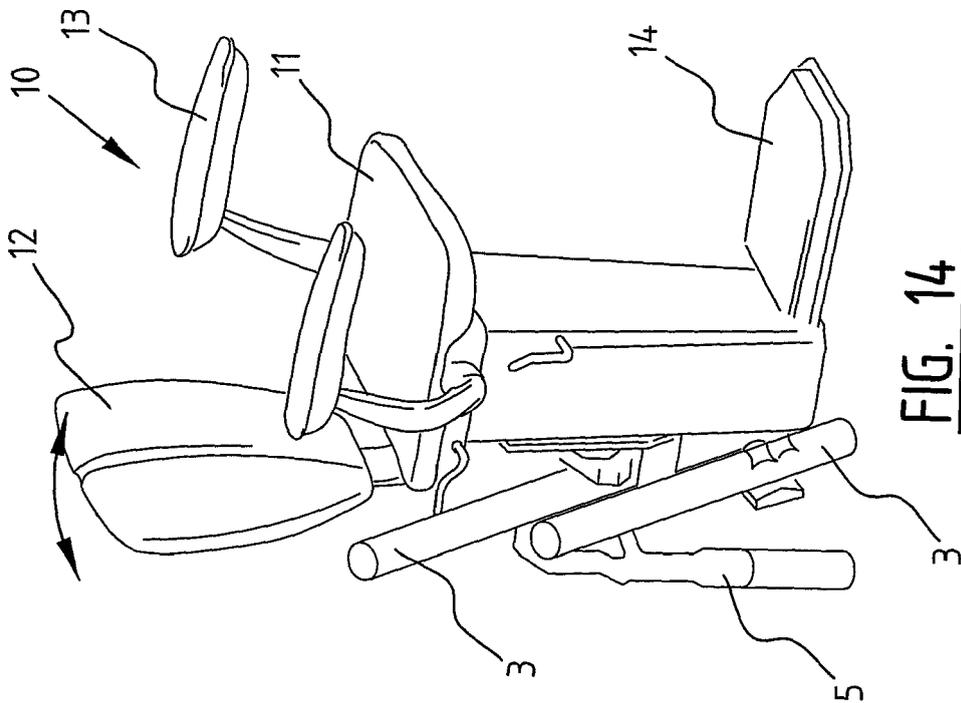


FIG. 15

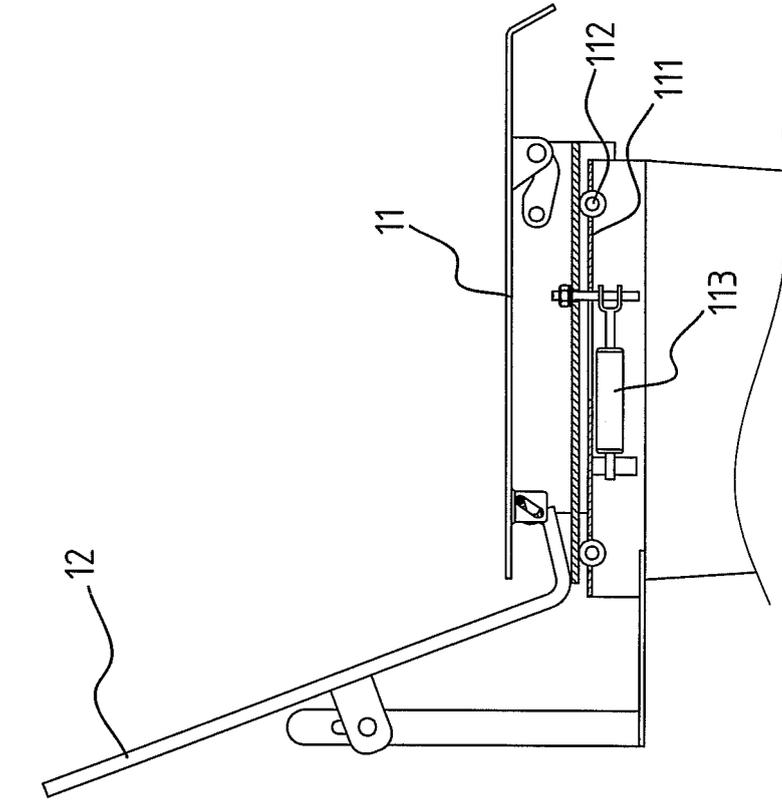


FIG. 16

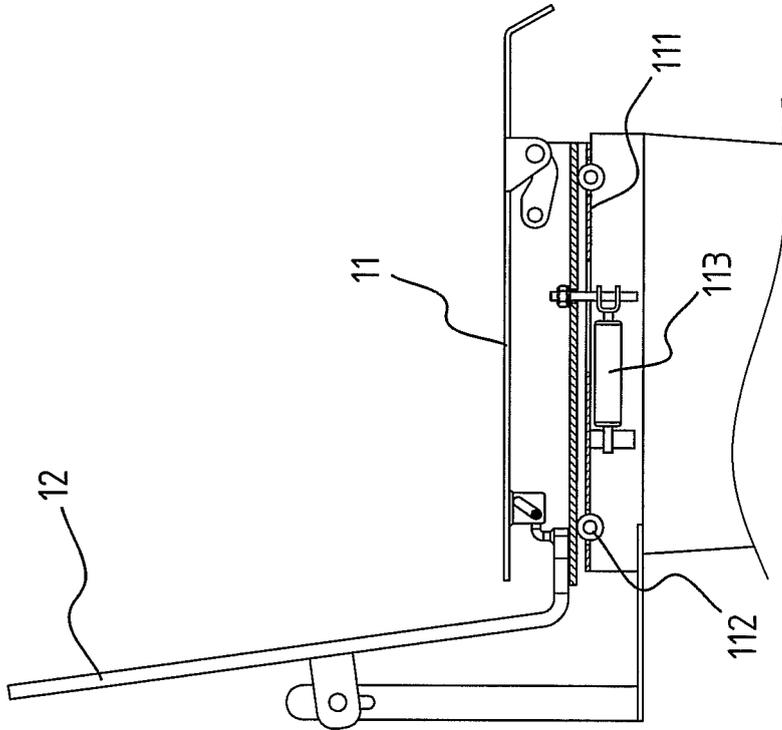


FIG. 17



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Application Number
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Place of search The Hague		Date of completion of the search 19 August 2009	Examiner Janssens, Gerd
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