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Description

The invention relates to a wheeled walker according to the preamble of claim 1. Walkers of this type serve to facilitate movement of a person injured at a leg or foot without placing load on the injured leg or foot so as to avoid impairment of the healing process due to such placing of load. Locomotion with such a walker is similar to using a scooter, wherein the injured leg or the leg, the foot of which is injured, lies on an approximately horizontal elongated rest at an angle with the lower limb to relieve the injury so that the walker absorbs the body weight instead of the injured leg or foot when the injured leg or the leg with the injured foot is placed under load. It is known in such walkers to design not only the height of the rest for the lower limb to be adjustable, but also the inclination of the rest in longitudinal direction of the rest, that is, in the direction of movement of the walker, for individual adaptation to the anatomy of a user.

FR 3 002 436 A1 thus provides a rotary mounting of the rest on the end of a vertically upwardly projecting support tube in a pivot joint with a horizontal axle. Two semi-circular discs parallel to one another with bores distributed respectively along their periphery project from the underside of the rest. After flush alignment of a pair of bores of the discs to be selected according to the required inclination of the rest with a pair of bores in the support tube below the axle, the rest may be fixed in the selected inclination by passing a bolt through the bores and securing the bolt. The disadvantage is thus that the pivot joint is placed under load at times by the entire body weight of the user of the walker and therefore has to be executed solidly from a material with high strength and therefore is expensive and that adjustment of the inclination is possible only in relatively coarse stages.

A comparable solution is known from US 2007/0216122 A1. In order to facilitate gradual adjustment of the angle of inclination, here instead of individual bores, guide slots are provided along the circumference of the discs projecting downwards from the rest. To fix the rest in a selected inclination, the discs are clamped against the support tube by means of a wing nut projecting through the guide slots and through bores in the support tube. It is thus a non-positive connection, for the production of which a relatively high application of force is necessary, which also requires here a solid construction and a material with high strength. With too low

clamping force, the connection may additionally be loosened with time when placed under load.

WO 00/74625 A1 and US 7 303 537 B1 show respectively a walker which has no wheels and thus cannot be moved. Locomotion with this walker is similar to normal walking of a human being, wherein the walker takes over the function of the leg from the knee downwards and the foot to be cared for is thus relieved.

US 2007/0216122 A1 shows a wheeled walker with a supporting member for movable mounting of a rest for a leg of a person, wherein the supporting member is a disc with a guide slot which extends semi-circularly about an axle about which the rest can be rotated. The disc on a support part in the form of a rectangular tube can be firmly clamped gradually in any angular position by means of a manually tightenable screw.

GB 108 777 shows a wheeled walker with a rod mounted rotatably about a horizontal axle on a base plate, on the upper end of which rod is attached a rest for a leg of a person. The angular position of the rod and hence also of the rest can be set by displacement of the position of a clamping sleeve likewise connected to the base plate by a lever along the rod. The lever is thus connected both to the clamping sleeve and to the base plate respectively likewise by a hinge.

WO 2015/118192 A1 discloses a further wheeled walker with a rest for a leg of a user. This walker, from which the preamble of claim 1 starts, has a scissor frame with 4 legs, on the lower ends of which are arranged wheels which may be lowered onto the floor or raised from the floor by adjusting the scissor angle of the legs. Adjustment of the scissor angle is effected by rotating a plate which is mounted rotatably on the underside of the rest at one of its ends transversely to the longitudinal direction of the rest, and on the other end of which two of the four legs of the scissor frame are rotatably mounted, by means of a lever about 180°. To adjust the height of the rest with respect to the scissor frame, respectively a telescopic tube connection with several bores and a locking pin is provided between each leg of the scissor frame and the rest or the rotatable plate. By setting different heights of these telescopic tube connections, the inclination of the rest may also be adjusted, for which respectively the locking pins have to be removed at least at two of the telescopic tube connections, the positions of the telescopic tubes have to be displaced and the locking pins inserted again. This type of inclination adjustment is awkward and susceptible to error with regard to the necessary fixing of the locking pins.

Starting from this state of the art, the object of the invention is to provide a wheeled walker with adjustment of the inclination of the rest, in which the rest is held stably and securely in any set inclination position and adjustment may be realised by a simple movement.

This object is achieved according to the invention by a wheeled walker having the features of claim 1. Advantageous designs and developments of the invention are the object of the sub-claims.

A wheeled walker with a carriage, a frame and a rest for a leg of a person, the inclination of which is adjustable with respect to a horizontal plane in the direction of the longitudinal axis of the rest, is characterised according to the invention in that the rest is mounted on a support part connected to the frame firmly, preferably releasably, via a first hinge with a first axle lying horizontally and transversely to the longitudinal axis of the rest and via a supporting member spaced from the first axle in the direction of the longitudinal axis of the rest, which supporting member is connected to the support part via a manually adjustable mechanical actuator, by means of which the vertical position of the supporting member can be changed with respect to the support part, in that the supporting member is a second axle which is rotatably mounted on the rest as part of a second hinge parallel to the first axle, and in that the second axle is connected to a third axle, which is rotatably mounted on the support part in a fixed position vertically below the second axle as part of a third hinge parallel to the first axle and the second axle, by a rod which is a constituent of the actuator and the position of which can be adjusted with respect to the third axle.

Mounting of the rest on the frame is thus produced which has high mechanical stability due to the two supports spaced from one another in the direction of the longitudinal axis of the rest and due to the actuator facilitates for the user adjustment of the inclination via the vertical position of one of the two supports. By executing the supporting member as a second axle, which is rotatably mounted on the rest as part of a second hinge parallel to the first axle, a degree of freedom of movement is provided which already noticeably simplifies realisation of the actuator. By connecting the second axle to a third axle, which is rotatably mounted as part of a third hinge parallel to the first axle and the second axle on the support part in a fixed position vertically below the second axle, by a rod which is a constituent of the actuator and the position of which can be adjusted with respect to the third axle, further simplification is

produced in that a purely linear movement of the rod with respect to one of the two axles which connects them already suffices to realise the inclination adjustment of the rest.

The actuator is expediently a self-locking actuating drive. This ensures automatic and stable fixing of the set inclination without additional effort. Such a self-locking actuating drive may be realised in particularly simple manner in that the second axle is connected to the third axle by the rod with a thread so that rotation of the rod about its longitudinal axis effects a change in the distance between the second axle and the third axle via the thread. The rod thus does not need to be provided with a thread along its entire length, but it may also suffice if one section with a thread is present.

A rotary movement of the rod is initially converted by the thread into a linear movement and this is further converted into pivoting of the rest about the first axle. The thread translates rotation of the rod according to its pitch into a relatively short linear movement and in this manner facilitates a very sensitive setting of the inclination of the rest. In addition, it offers the property of self-locking which permits dispensing with an additional element to fix a set inclination. However, such a fixing element may nevertheless be provided for safety reasons, for example in the form of a fixing pin or fixing bolt or a splint.

The rod is preferably rotatably mounted on the second axle in a radial bore and on the third axle in a thread of a radial threaded bore. The position of the rod relative to the second axle thus remains unchanged during adjustment of the inclination of the rest so that the rod requires no clearance for linear displacement in this region, whereby a compact construction of the mounting of the second axle on the rest is facilitated.

The rod preferably extends through the third axle and an end section of the rod extending beyond the third axle is provided with a knob by means of which the rod can be rotated manually. This arrangement of an actuating knob for manual adjustment of the inclination of the rest is particularly advantageous from ergonomic points of view and rules out unintentional adjustment as far as possible.

A particularly simple and expedient connection of the rod with the second axle consists in the rod having a shoulder, on which the second axle rests, wherein an end section of the rod extends

in or through the bore of the second axle and is secured there against release from the bore by a securing means.

Alternatively to a threaded rod, the rod may also be a rod bent like a segment of a circle. A rod bent like a segment of a circle without thread preferably also engages in a radial bore in a second axle and/or in a radial bore in a third axle, because the use of at least one rotatable axle within the actuator provides an additional degree of freedom, by means of which the movement of the rod when adjusting the inclination of the rest is facilitated and the risk of becoming stuck reduced. In this embodiment, the rod can be displaced expediently through the radial bore on the third axle and one end of the rod is hinged to the second axle so that displacement of the rod through the radial bore on the third axle effects a change in the distance between the second axle and the third axle, wherein the position of the rod with reference to the third axle can be fixed by means of a fixing element.

In that the support part is expediently releasably connected to the frame, the possibility is produced of pre-mounting the adjusting mechanism for the inclination of the rest separately from the remaining components of the walker and of attaching the rest together with adjusting mechanism as a finished module to the frame.

From medical points of view it is useful if the setting range of the angle of inclination of the longitudinal axis of the rest with respect to the horizontal plane in direction of travel of the walker lies between -10° and +25°, preferably between -3° and +15°.

It is advantageous if the rest has a shell and a cushion attached releasably to the upper side of the shell. The possibility is thus produced of exchanging as required the cushion, on which the leg of a person rests directly when using the walker. Such a need for exchange may be produced in the course of the healing process of a leg injury or foot injury, or also in that the walker is to be used by different people one after another with different anatomy of the leg to be supported, for example different lower limb diameters. A particularly expedient form of releasable attachment of the cushion to the shell consists in using at least one Velcro closure as an attachment element.

An exemplary embodiment of the invention is described below using the drawings. In the latter

Figure 1 shows a side view of a walker of the invention,

Figure 2 shows a perspective view of a part of the walker from Figure 1 with an inclination adjusting mechanism for the rest,

Figure 3 shows a longitudinal sectional view of the part of a walker from Figure 2 in the maximum inclined position,

Figure 4 shows a side view of the part of a walker from Figure 2 in approximately horizontal position and

Figure 5 shows an exploded representation of the part of a walker from Figure 2.

A walker of the invention, as can be seen in Figure 1 in a side view, comprises as main components a carriage 22, which can be steered by means of a steering rod 23, a frame 24 and a rest 1 for a leg or a lower limb of a patient, whose mobility is to be facilitated by the walker.

The rest 1 shown enlarged in Figure 2 is arranged on the upper end of a tube 2 which projects upwards starting from the frame 24 of the walker with a slight inclination with respect to the vertical direction. The intended direction of travel of the wheeled walker is marked in Figure 2 by the arrow 3. The rest 1 has substantially the shape of a channel approximately semi-circular in cross-section with a longitudinal axis 4 and with open longitudinal ends and is provided with a cushion 5 on its upper side. The inclination of the rest 1 can be adjusted as regards its longitudinal direction, which corresponds to the direction of travel 3, that is, the angle of the longitudinal axis 4 with respect to the horizontal plane may be varied in a predetermined range. Realisation of this inclination adjustment of the rest 1 according to the invention is illustrated below using Figures 3 to 5.

The rest 1 consists of an elongated shell 6 and a mounting adapter 7 extending along its underside which is firmly connected to the shell 6 or is formed to be integral with the latter. In particular the shell 6 together with the mounting adapter 7 may be produced from plastic as an integral injection-moulded part. The mounting adapter 7 is movably connected to a support part 8 which is firmly connected to the tube 2 and likewise may be an injection-moulded part. A first hinge is formed by a first axle 9 in the form of a bolt inserted in bores of the mounting adapter 7 and of the support part 8 flush with one another and secured there. The axle 9 lies horizontally and transversely to the longitudinal axis 4 of the rest 1. A second hinge is formed by a second axle 10 in the form of a further bolt inserted in two bores of the mounting adapter 7 flush with one another. The first axle 9 and the second axle 10 lie parallel to one another and

one behind another in the direction of the longitudinal axis 4 of the rest 1 at a distance which accounts for a significant part, in the exemplary embodiment shown about one third, of the length of the shell 6.

The second axle 10 is connected to a third axle 11 in the form of a further bolt inserted in two bores of the support part 8 flush with one another by a rod 12. The third axle 11 is located on the support part 8 vertically below the second axle 10 and lies parallel to the latter and hence also parallel to the first axle 9. The rod 12 passes through both axles 10 and 11 respectively in a radial direction. For connection with the third axle 11, the rod 12 has a thread 13 which is screwed through a radial threaded bore 14 in the axle 11, as can be seen from the exploded representation of Figure 5. Its viewing direction is one different than that from Figure 2, which can be seen using the arrow 3 indicating respectively the direction of travel of the walker. For connection with the second axle 10, the rod 12 has a shoulder 15, on which the second axle 10 rests. At the end of an end section of the rod 12 extending through a radial bore 16 in the second axle 10, an annular groove 17 is provided into which a securing ring 18 engages which secures the end section of the rod 12 in the bore 16. The end section of the rod 12 is rotatably mounted in the bore 16.

The third axle 11 is mounted in its longitudinal direction on the support part 8 in that the latter has a cut-out 19 for passage of the rod 12 through the third axle 11. The cut-out 19 limits the movability of the rod 12 with respect to the support part 8 in the longitudinal direction of the third axle 11 and thus also fixes the third axle 11 in its longitudinal direction positively on the support part 8. Analogously thereto, the mounting adapter 7 of the rest 1 has a cut-out open at the bottom which is not visible in the figures in which the rod 12 projects through the second axle 10. This cut-out limits the movability of the rod 12 with respect to the mounting adapter 7 in the longitudinal direction of the second axle 10 and thus also fixes the second axle 10 in its longitudinal direction positively on the mounting adapter 7. Fixing of the first axle 9 in its longitudinal direction on the support part 8 takes place by means of screws 20 which are screwed axially into both ends of the axle 9 and form respectively a positive connection with the support part 8.

The rod 12 provides a movable connection between the second axle 10 and the third axle 11 in that the distance between the second axle 10 and the third axle 11 may be varied via the threaded connection of the rod 12 with the third axle 11 by rotation of the rod 12 about its

longitudinal axis. A control knob 21, which facilitates manual rotation of the rod 12 about its longitudinal axis, is thus arranged on the end of the rod 12 below the third axle 11. Due to the fixed positions of the first axle 9 and of the third axle 11 on the support part 8, a change in the distance between the second axle 10 and the third axle 11 due to rotation of the rod 12 effects a movement of the second axle 10 about the first axle 9 on a circular path. This means at the same time rotation of the entire rest 1 about the first axle 9, whereby the angle of the longitudinal axis 4 of the rest 1 changes with respect to the horizontal plane.

By rotation of the control knob 21, the user of the wheeled walker, the constituents of which are the elements described here, may thus adjust the inclination of the rest 1 in the direction of travel 3. The threaded connection between the rod 12 and the third axle 11 thus facilitates gradual setting of a required inclination with high precision and low application of force. Due to self-locking of the threaded connection and the arrangement of the control knob 21 below the rest 1, which practically rules out unintentional adjustment, no securing element for fixing a set inclination is necessary. However, it would nevertheless be possible to provide on the rod 12 a securing element, for example in the form of a counter-nut which can be tightened against the second axle 11, which could be executed as a knurled nut.

The first axle 9 fundamentally needs to be rotatably mounted only with respect to the mounting adapter 7 or with respect to the support part 8, but not necessarily with respect to both, even though the latter is preferred in terms of mounting technology. Furthermore, the rod 12 must not absolutely have an approximately vertical position. Instead, the bearing of the second axle 10 could also be arranged on a section of the mounting adapter 7 extending vertically somewhat further downwards and thus could be offset vertically downwards with respect to the first axle 9 and the bearing of the third axle 11 could be offset in horizontal direction at the support part 8 with respect to second axle 10 so that the rod 12 in Figures 3 and 4 would have a greater inclined position from bottom left to the top right. The function of the invention would also be provided in such an arrangement, wherein the change in angle of inclination of the rest 1 per rotation of the rod 12 in this case would be lower than in the exemplary embodiment shown.

Instead of a rod 12 provided with a thread 13, the actuator may also comprise a thread-free rod, which then however must be bent like a segment of a circle and engages through the third axle 11, for example through a radial bore 14 in the third axle 11. The one end of the thread-free rod bent like a segment of a circle may be hinged either on the underside of the mounting

adapter 7. On the other end of the rod is arranged expediently a holding button, with which the position of the rod may be set with reference to the third axle 11 by displacing the rod. During displacement of the rod with reference to the third axle 11, the inclination of the rest is changed, as in the above exemplary embodiment of the invention. The selected position of the rod with regard to the support part 8 may be fixed by fixing means, for example fixing bolts or splints.

For releasable attachment of the cushion 5 to the shell 6, several Velcro closure tapes 25 are provided, of which as Figure 5 shows, one on the shell 6 runs centrally in the direction of the longitudinal axis 4 and respectively one perpendicularly thereto on the front and on the rear section of the shell. Counter-pieces matching thereto are located at corresponding points on the underside of the cushion 5. The Velcro closure tapes 25 are firmly connected to the shell or the cushion 5, for example by adhesion. Alternatively to Velcro closure tapes, other types of releasable connections, such as snap fasteners, snap fits or magnetic strips and combinations of different types of releasable connections, could also be provided.

PATENTKRAV

1. Mobilt ganghjælpemiddel med et chassis (22), en ramme 24 og en støtte (1) for et ben på en person, og hvilken støttes hældning kan indstilles i forhold til et horisontalt plan i retningen for støttens (1) længdeakse (4), hvorved støtten (1) er monteret på en støttedel (8), som fast er forbundet til rammen (24, fortrinsvis løsbart, via et første hængsel med en første aksel (9), liggende horisontalt og på tværs af længdeaksen (4) for støtten (1) og via et støtteelement (4), som har en afstand til den første aksel (9) i retningen for støttens (1) længdeakse (4), hvilket støtteelement er forbundet til støttedelen (8) via en manuelt justerbar mekanisk aktuator, ved hjælp af hvilken den vertikale position for støtteelementet kan ændres i forhold til støttedelen (8),
kendetegnet ved, at støtteelementet er en anden aksel (10), som roterbart er monteret på støtten (1) som del af et andet hængsel, parallelt med den første aksel (9), og **ved, at** den anden aksel (10) er forbundet til en tredje aksel (11), der roterbart er monteret på støttedelen (8) i en fast position vertikalt neden under den anden aksel (10) som del af et tredje hængsel parallelt med den første aksel (9) og den anden aksel (10), ved hjælp af en stang, der er en bestanddel af aktuatoren, og hvis position kan justeret i forhold til den tredje aksel (11).

2. Mobilt ganghjælpemiddel ifølge krav 1, **kendetegnet ved,** at aktuatoren er et selvlåsende styredrev.

3. Mobilt ganghjælpemiddel ifølge krav 1 eller 2, **kendetegnet ved, at** den anden aksel (10) er forbundet til den tredje aksel (11) ved hjælp af stangen (12) med et gevind (13), således at rotation af stangen (12) omkring dens længdeakse bevirker en ændring af afstanden mellem den anden aksel (10) og den tredje aksel (11) via gevindet (13).

4. Mobilt ganghjælpemiddel ifølge krav 3, **kendetegnet ved, at** stangen (12) er roterbart monteret på den anden aksel (10) i en radial boring (16) og på den tredje aksel (11) i et gevind for en radial gevindboring (14).

5. Mobilt ganghjælpemiddel ifølge krav 3 eller 4, **kendetegnet ved, at** stangen (12) strækker sig gennem den tredje aksel (11), og **ved, at** et endeafsnit af stangen (12), som strækker sig ud over den tredje aksel 11, er udrustet med et greb (21), ved hjælp af hvilket stangen (12) manuelt kan drejes.

6. Mobilt ganghjælpemiddel ifølge et af kravene 1 til 5, **kendetegnet ved, at** stangen (12) omfatter en skulder (15), på hvilken den anden aksel (10) hviler, og **ved, at** et endeafsnit af stangen (12) strækker sig ind i eller gennem boringen (16) i den anden aksel (10) og der er fastgjort mod løsgøring fra boringen (16) ved hjælp af et fastgørelsesmiddel (18).

7. Mobilt ganghjælpemiddel ifølge krav 1 eller 2, **kendetegnet ved, at** stangen er bøjet som et cirkelsegment.

8. Mobilt ganghjælpemiddel ifølge krav 7,
kendetegnet ved, at stangen griber ind i en radial boring (16) i den anden aksel (10) og/eller i en radial boring (14) i den tredje aksel (11).

9. Mobilt ganghjælpemiddel ifølge krav 8,
kendetegnet ved, at stangen kan forskydes gennem den radiale boring (14) i den tredje aksel (11), og **ved, at** stangens ene ende er hængslet til den anden aksel (10), således at forskydning af stangen gennem den radiale boring (14) for den tredje aksel (11) bevirker en ændring i afstanden mellem den anden aksel (10) og den tredje aksel (11).

10. Mobilt ganghjælpemiddel ifølge et af kravene 7 til 9,
kendetegnet ved, at stangens position i forhold til den tredje aksel (11) kan fikseres ved hjælp af et fikseringselement.

11. Mobilt ganghjælpemiddel ifølge et af kravene 1 til 10,
kendetegnet ved, at indstillingsintervallet for hældningsvinklen af støttens (1) længdeakse (4) i forhold til det horisontale plan i bevægelsesretningen (3) for hjælpemidlet ligger mellem -10° og +25°, fortrinsvis mellem -3° og +15°.

12. Mobilt ganghjælpemiddel ifølge et af kravene 1 til 11, **kendetegnet ved, at** støtten (1) omfatter en skal (6) og en pude (5), som løsbart er fastgjort til skallens overside.

13. Mobilt ganghjælpemiddel ifølge krav 12, **kendetegnet ved, at** puden (5) er fastgjort til skallen (6) ved hjælp af mindst et Velcro-lukke (25).

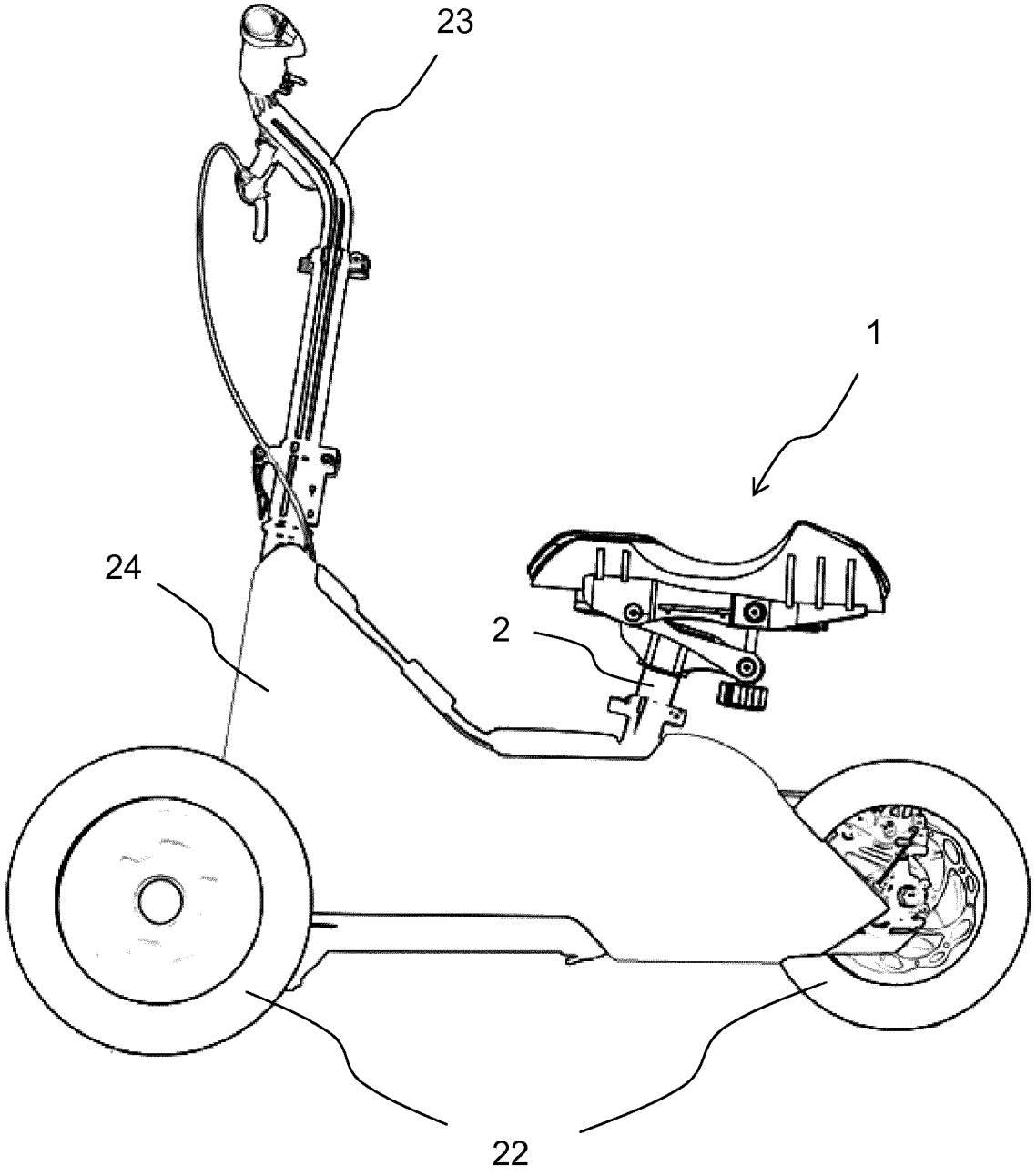

Fig. 1

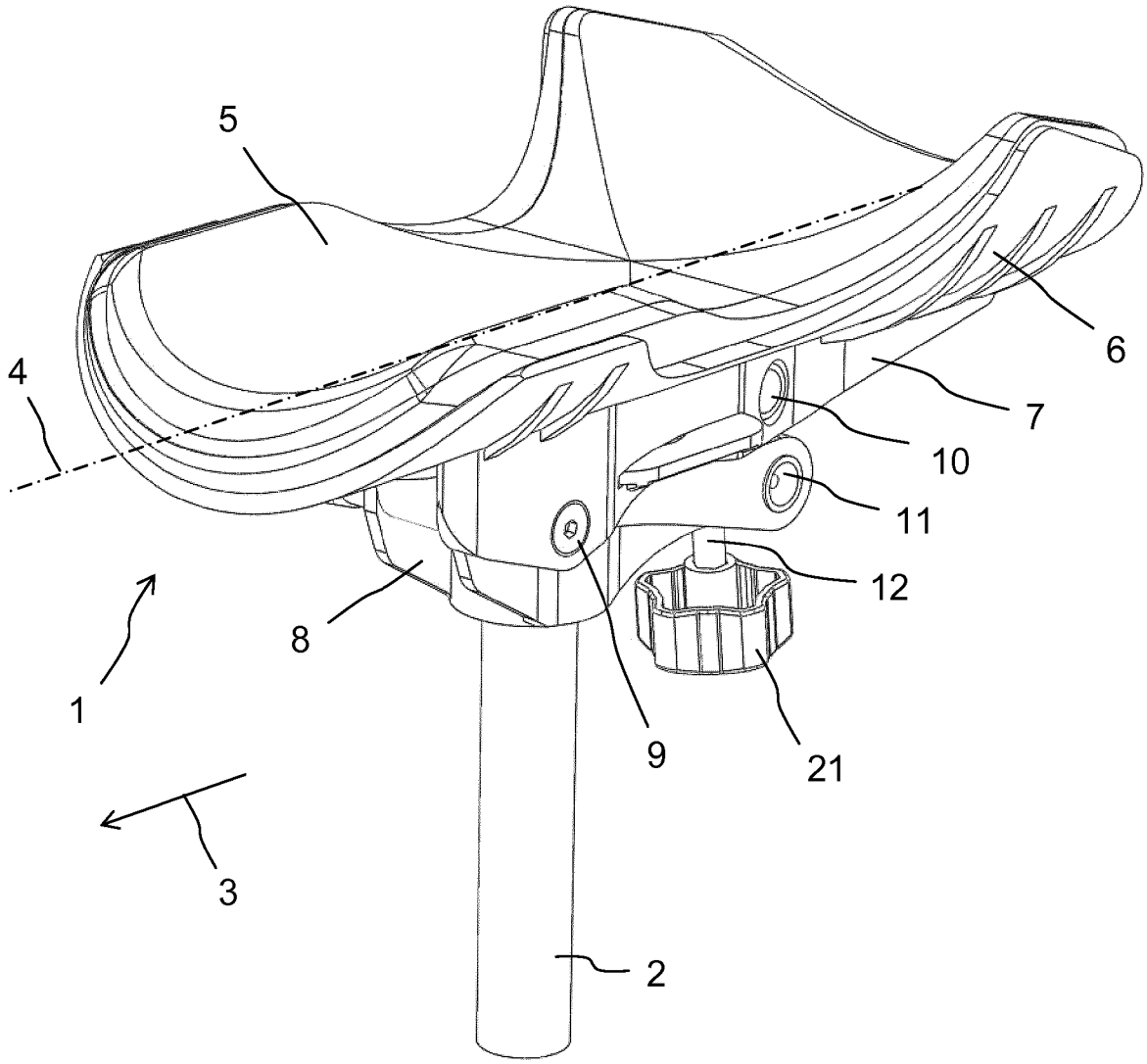

Fig. 2

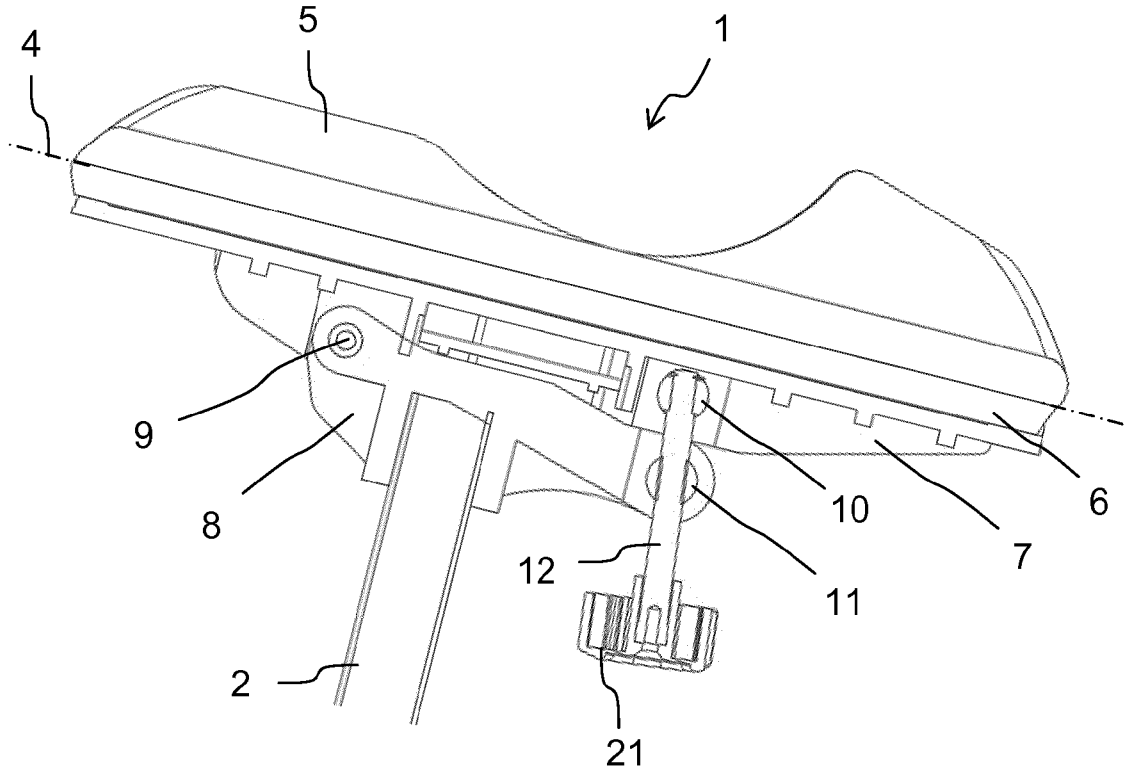

Fig. 3

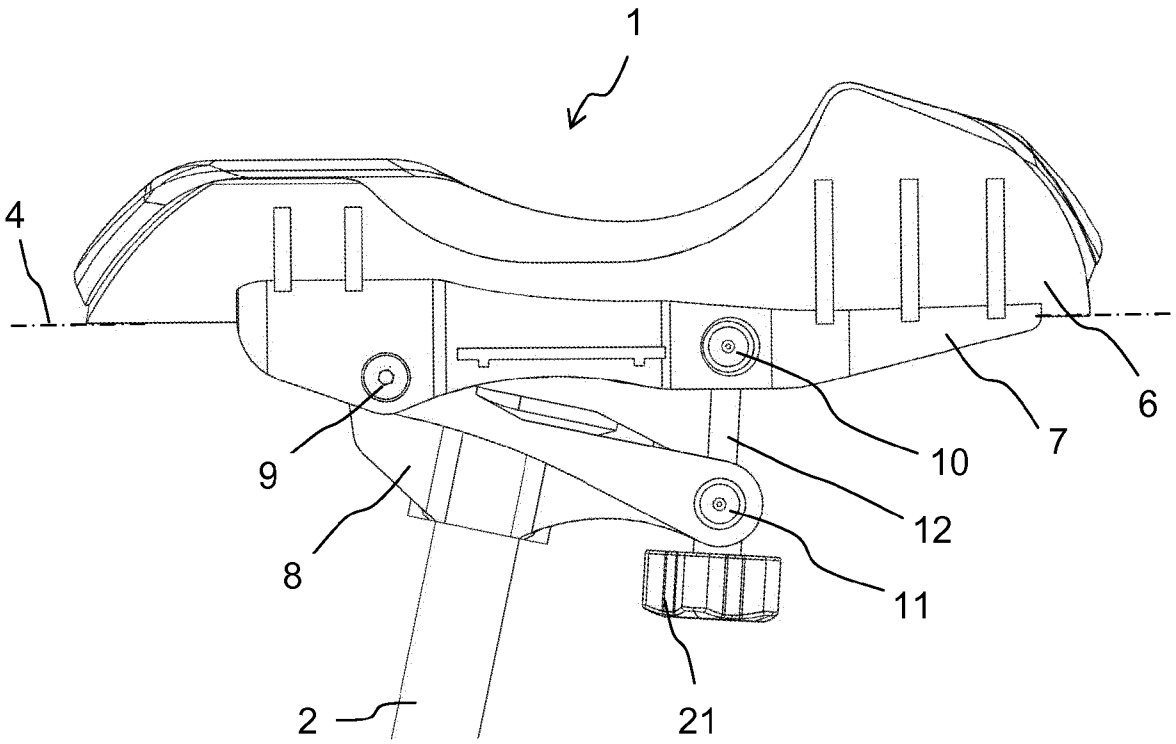

Fig. 4

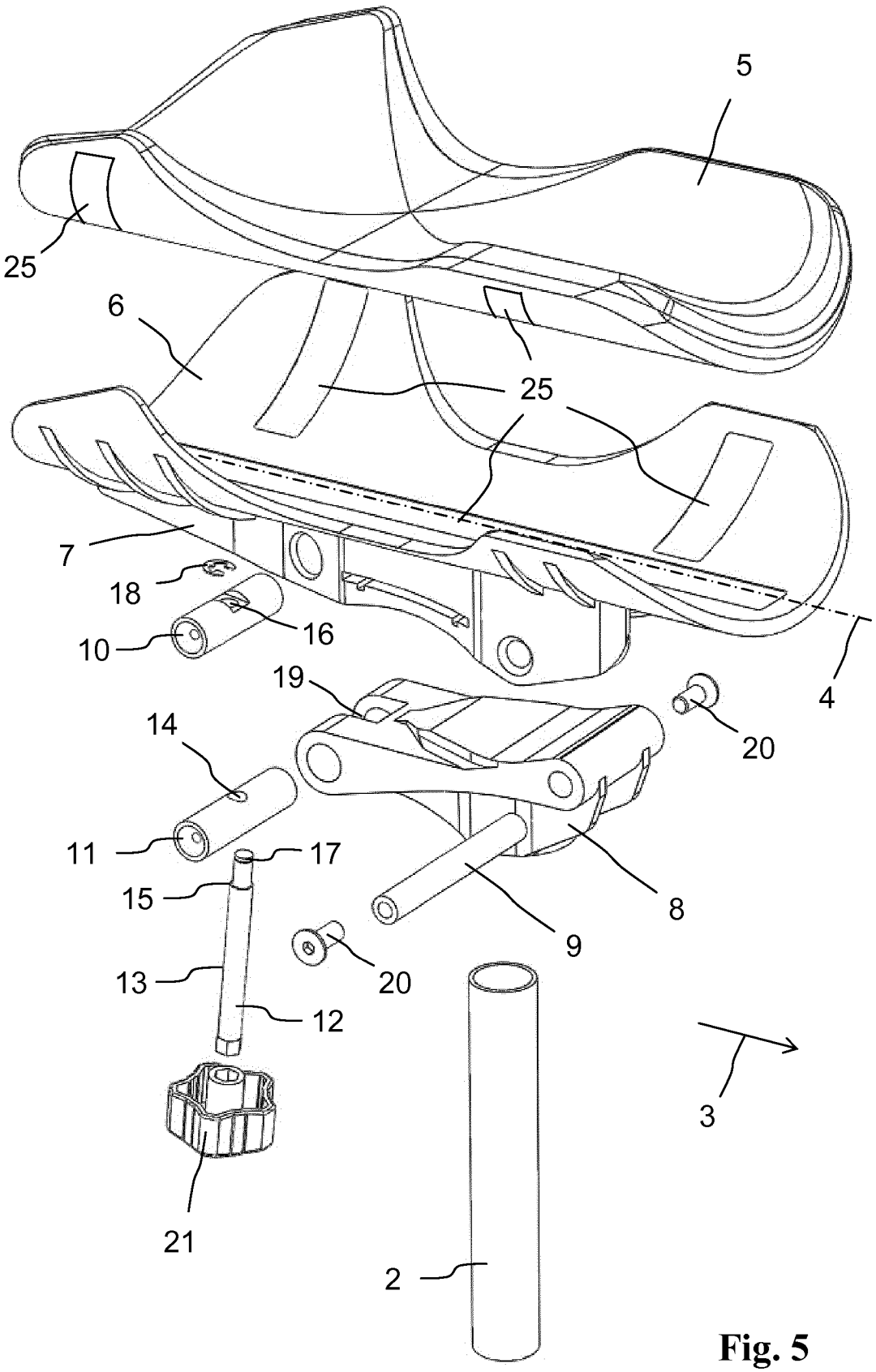

Fig. 5