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(54) BACKREST ASSEMBLY AND WHEELCHAIR THEREWITH

(57) The invention relates to backrest assembly (1) of a seat of a chair, in particular a wheelchair, comprising: a backrest for supporting the back of a person; two hollow backrest tubes (1.14) connecting the backrest to the seat, in particular seat frame tubes (1.15), on each side of the seat; at least two joints (4.1) for allowing a movement of the backrest tubes (1.14) between at least a first end position and a second end position relative to the seat; two locking means (2.3) for locking and/or unlocking the joints (4.1); and at least one hollow handle tube (1.13) carrying a handle (1.9, 1.10), which is arranged in the middle between the backrest tubes (1.14) and is mechanically connected to the locking means (2.3) via cables (1.3) running substantially inside the hollow tubes (1.14, 1.13). The handle (1.9, 1.10) is providing a twist lock (1.1), with the twist lock (1.1) having only one idle position in which the locking means (2.3) is locked and being adapted to unlock the locking means (2.3) upon rotation of the handle (1.9, 1.10), and is suited to move the backrest tubes (1.14) via the joints (4.1) by pushing or pulling after unlocking, wherein the handle (1.9, 1.10) is adapted to be rotated by a user only in one direction, preferably forwards, towards the front of the chair, for unlocking the locking means (2.3) in any one of the end positions, and the handle (1.9, 1.10) is adapted to automatically re-lock after unlocking the locking means (2.3) and releasing the grip, such that rotating and pushing or pulling of the handle (1.9, 1.10) can be achieved by gripping the handle (1.9, 1.10) by one hand of an user, without releasing the respective grip of the handle (10; 100). The present invention also relates to a wheelchair with such a backrest assembly.

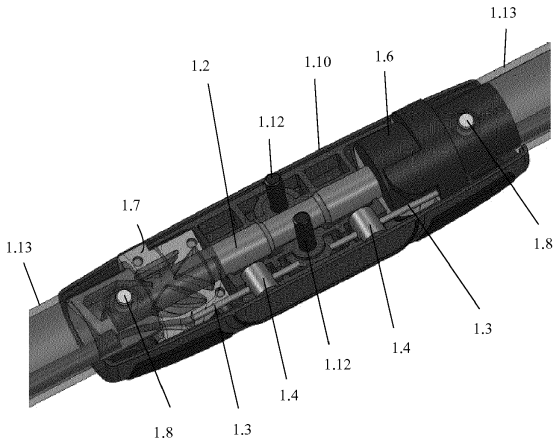

Fig. 3

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Description

[0001] The present invention relates to a backrest assembly for a chair and a wheelchair with such a backrest assembly. In detail, the invention relates to a backrest assembly of a seat of a chair, in particular a wheelchair, comprising: a backrest for supporting the back of a person; two hollow backrest tubes connecting the backrest to the seat, in particular seat frame tubes, on each side of the seat; at least two joints for allowing a movement of the backrest tubes between at least a first end position and a second end position relative to the seat; two locking means for locking and/or unlocking the joints; and at least one hollow handle tube carrying a handle, which is arranged in the middle between the backrest tubes and is mechanically connected to the locking means via cables running substantially inside the hollow tubes.

[0002] A chair typically comprises a frame that supports a seat having a seating surface and a backrest, and a plurality of legs. A wheelchair is a type of chair for allowing the locomotion of a person while this person uses the chair. For this the legs of the chair are typically configured as wheels, with a standard type comprising four wheels, wherein two wheels are typically configured as drive wheels. A chair, in particular a wheelchair, often incorporates folding functions that allow the overall size of the chair frame to be reduced in order to store or transport the unoccupied chair. There are wheelchairs, which have backrests that fold down against the seating surface to reduce the overall size of the frame.

[0003] For the user of a wheelchair, physically impaired people having need of the wheelchair and for people taking care of them, it is of great importance to ease daily struggles, simplify functions and at the same time to increase the safety of the used devices. Especially for people having difficulties in the lower body, the simultaneous usage of two hands for folding the backrest of a chair, in particular a wheelchair, is a challenging task, since they often need to stabilize their upper torso with one hand.

[0004] US 7,100,988 B1 refers to a child's highchair for receiving a child in a seated orientation. Said chair includes a supporting frame, a seat supported by the frame, and a back connected to the frame wherein the back is movable between a substantially vertical orientation and a rearwardly tilted or reclining orientation. A release mechanism is integrated into the highchair and includes a release handle, a pair of cable arrangements and securing pins that are movable between a locked position and a released position by manipulation of the release mechanism. With the securing pins in a locked position, the back is fixed in position in a substantially vertical orientation. With the securing pins retracted, the back is able to be moved manually to a reclining position so as to enlarge the included angle between the back and the seat, making it easier to place a child in the highchair.

[0005] Known backrest assemblies have the difficulty that some users cannot carry out an unlocking and folding of the backrest, even in case of a single-handed operation making usage of a pull cable. In addition, during manufacture tension on the pull cables has to be maintained in order to avoid play.

[0006] Therefore, it is the object of the present invention to further develop the known backrest assemblies to overcome the drawbacks of the prior art. In particular, the backrest assembly is to be provided with an easy and safe one-handed mechanism to unlock and fold or unfold the backrest with a single grip.

[0007] This object is solved in that the handle is providing a twist lock, with the twist lock having only one idle position in which the locking means is locked and being adapted to unlock the locking means upon rotation of the handle, and is suited to move the backrest tubes via the joints by pushing or pulling after unlocking, wherein the handle is adapted to be rotated by a user only in one direction, preferably forwards, towards the front of the chair, for unlocking the locking means in any one of the end positions, and the handle is adapted to automatically re-lock after unlocking the locking means and releasing the grip, such that rotating and pushing or pulling of the handle can be achieved by gripping the handle by one hand of an user, without releasing the respective grip of the handle.

[0008] It is proposed that each cable comprises a torsion cable, in particular steel torsion cable, and/or each cable is connected to one locking means via an elastic element, in particular in form of a compression spring, being suited to be compressed or expanded within a predetermined range, in particular determined via at least one spring stop, and/or each cable is guided by a cable guide arranged within the handle, and/or each cable is mounted under tension via a cable clamp, preferably by tightening at least one set screw, and/or the two cables guided from the two hollow backrest tubes, preferably via two handle tubes, into the handle are connected to each other via a connection rod.

[0009] Furthermore it is preferred that each cable is redirected or deflected inside the handle, preferably up to 90°, via its respective cable guide upon rotation of the handle, preferably up to 30°, against the spring force of the respective elastic element for unlocking the locking means and automatically returned into its idle state upon release of the handle due to the release of the spring force such that the handle automatically returns into its idle position.

[0010] With the invention it is also proposed that each cable guide comprises a cable guide top and a cable guide bottom, and/or each cable guide provides a cable deflection slope, with preferably the slope being provided by a recess and/or a projection, in particular a cable guide recess provided by the cable guide bottom and a cable guide projection provided by cable guide top, and/or the connecting rod is attached between the two cable guides. It is proposed that the handle comprises a handle top and a handle bottom, and/or the handle has a non-circular cross section, preferably a flattened or oval cross-sec-

tion, and/or the handle comprises a label, preferably attached to the handle top and the handle bottomand/or facing rearwards, away from the two hollow backrest tubes and the seat and/or for displaying a message, and/or the handle comprises at least one stop element defining the idle position of the handle, with preferably each stop element comprising a projection of the inner wall of the handle bottom and/or the handle top.

[0011] Embodiments of the invention can be characterized in that first connecting means, preferably in form of first screws, connecting the connecting rod and the cable guide to the hollow handle tubes, with preferably at least one first screw attaching one end of the connecting rod to one cable guide as well as to one hollow handle tube and at least one other first screw attaching the other, opposite end of the connecting rod to the other cable guide as well as the other hollow handle tube, and/or with preferably at least one first screw entering into one hollow handle tube and passing through the cable guide bottom, the connection rod and the cable guide top to exit the hollow handle tube.

[0012] It is also proposed that each first screw provides a stop element cooperating with one stop element of the handle to secure the idle position of the handle.

[0013] According to the invention it is preferred that second connecting means, preferably in form of at least one second screw, connecting the handle bottom to the handle top, with preferably two second screws being arranged in the middle of the handle and/or on both sides of the connecting rod, in particular in a region with reduced diameter of the connecting rod.

[0014] With preferred embodiments the handle can only be turned up to 30°, starting from its idle position, and/or the handle can only be turned forwards, starting from its idle position.

[0015] It is also proposed that the handle is adapted to move an additional device, in particular a seating surface of the chair, a seating frame of the chair, at least one leg, at least one rest and/or at least one wheel of the chair.

[0016] It is also preferred that at least an actuator, in particular comprising a battery, a motor, an electric actuator, preferably an electric motor, a hydraulic actuator, preferably a hydraulic motor, a pneumatic actuator, preferably a pneumatic motor, a thermal actuator, a shape memory alloy, preferably a thermal and/or magnetic shape memory alloy, a mechanical actuator and/or a valve for actuating and/or controlling the movement of the backrest and/or the device.

[0017] It is the perception of the invention that unlocking the backrest of a backrest assembly by turning a preferably oval handle and folding down the backrest by pushing the handle forwards or unfolding the backrest by pulling the handle rearwards with one hand only is feasible by a huge part of users. The assembly is then returned to its idle position on the handle, where it locks into place again, automatically.

[0018] With the described embodiments it is ensured that pull cables, which come from the left and the right, respectively, guided in transverse backrest tubes to the handle, can be pulled by turning the handle forwards. It is beneficial that the rotation of the handle does not exceed 30° and that the handle can only turned forwards.

[0019] The accessibility of the handle for unlocking depends on the installation height and can be adapted to the individual needs.

[0020] The handle has a hand friendly contour by being non-circular in cross-section, in particular being oval in cross-section. This oval character can be achieved e.g. by adding a label to the handle with the additional benefit that the label can be used to transport messages like an advertising message or a personalizes message selected by the user of the chair. Still further, the hand-friendly oval contour of the handle results in sufficient installation space inside the handle for guiding and attaching the cables and additional means like stop members and the like.

[0021] The connection from the handle to an unlocking part is achieved by the cables, which are preferably in form of steel cables and can be deflected inside the handle by 90° via cable guides. For determining the direction of rotation and avoiding a backlash screws acting as clamping nipples and stop members are used.

[0022] Other embodiments provide at least two second joints which allow the movement of the backrest tubes between the second end position and a third end position along a second direction, wherein preferably the first and second direction are substantially different. Each first and/or second joint can be configured to be adjustable, in particular to adjust the first, second and/or third end position(s), with each joint preferably comprising a plurality of connecting means, preferably in form of holes for at least one transverse screw, and/or stop means.

[0023] Each locking means can comprise a wedge and/or can provide an, in particular inclined, guiding plane, with preferably at last one transverse screw being guided along the guiding plane during locking and/or unlocking of the locking means.

[0024] A trigger and a locking device can be provided, in particular comprising the elastic means, for locking and/or unlocking the handle. The trigger can be designed as or can comprise at least one of a hull, a lever, a knob, a button, a latch, a strap, a clamp, a key, a switch and/or a sensor, preferably a force sensor, a tactile sensor, an optical sensor, a sound sensor and/or a fingerprint sensor, and/or is engineered to be effected by at least partly sliding, rotating, squeezing, pushing, pulling and/or touching.

[0025] The handle can comprise a sensor, preferably a force sensor, a tactile sensor, an optical sensor, a sound sensor and/or a fingerprint sensor.

[0026] The handle backrest tube(s) and/or the handle can comprise an indicator device in addition to the label or in form of the label, for conveying information to the user, wherein preferably the indicator device comprises a display device with at least one light source for emitting

light, in particular a LCD, a sound device with at least one loudspeaker for emitting sound, and/or a tactile device for generating a tactile perception.

[0027] The invention also provides a wheelchair comprising a backrest assembly according to the invention.

[0028] The present invention will be better understood from the following description of preferred embodiments which are described with respect to the accompanying drawings, in which:

Figure 1 is an exploded view of a backrest assembly of an embodiment of the invention;
Figure 2 is an exploded view of a twist lock of the backrest assembly of figure 1;
Figure 3 is a part sectional view of the twist lock of figure 2;
Figure 4a is a perspective view of a cable guide of the twist lock of figure 2;
Figure 4b is a perspective view of a cable guide bottom of the twist lock of figure 2;
Figure 4c is a perspective view of a cable guide top of the twist lock of figure 2;
Figure 5a is a sectional view of the twist lock of figure 2, in its idle position; and
Figure 5b is a sectional view of the twist lock of figure 2, in a rotated position.

[0029] Figure 1 provides an exploded view of a backrest assembly 1 of an embodiment of the invention, with figure 2 providing another exploded view to better show a twist lock 1.1 of the backrest assembly 1. Said twist lock 1.1 comprises a connecting rod 1.2 connected at opposite ends with backrest tubes 1.13 as well as cable guides each having a cable guide top 1.6 and a cable guide bottom 1.7. For that purpose the connecting rod 1.2 has attachment holes 1.21 to be aligned with attachment holes 1.22 of the backrest tubes 1.13 and respective holes extending through the cable guides such that one screw 1.8 can be passed through all three elements, along a screw connection path 1.81 shown in figure 4b, at each end of the connecting rod 1.2. The cable guides guide pull cables 1.3, with one pull cable 1.2 coming from the left backrest tube 1.13 and the other pull cable 1.3 from the right backrest tube 1.13, and each pull cable 1.3 being held under tension with the help of a cable clamp 1.4 via a set screw 1.5. The cable clamps 4 are mounted within the twist lock 1.1 between a center handle top 1.9 and a center handle bottom 1.10, at fixed locations, see figure 3. Thus, the connecting rod 1.2 attached between the two cable guides 1.6, 1.7, which guide the two pull cables 1.3 to the two cable clamps 1.4, is housed between the center handle top 1.9 and the center handle bottom 1.10, which are attached to each other via cap screws 1.12. There are two cap screws 1.12, one on each side of the connecting rod 1.2, extending perpendicularly to the connecting rod 1.2 in the center region of the connecting rod 1.2 having a reduced diameter. A label 1.11 can be attached to the two handle halves 1.9, 1.10 for conveying information for example by carrying an advertisement print, a display device with at least one light source for emitting light, in particular a LCD, a sound device with at least one loudspeaker for emitting sound, and/or a tactile device for generating a tactile perception.

[0030] The backrest assembly 1 comprises said two transverse backrest tubes 1.13 connected to the twist lock 1.1 and each one of the two transverse backrest tubes 1.13 guides one pull cable 1.3 from the twist lock 1.1 into a backrest tube 1.14. The backrest tubes 1.14 are substantially perpendicular to the backrest tubes 1.13 and can be tilted relative to seat frame tubes 1.15, for example from a substantially vertical first position as shown in figure 1 into an inclined second position, via joints comprising a back bracket 4.1 on each side the backrest assembly 1. For enabling such a tilting, or rather a folding and un-folding of the backrest assembly 1 relative to the seat frame tubes 1.15, each pull cable 1.3. is connected to a locking means comprising a back latch 2.3, with a spring 2.2 and a spring stop 2.1 being arranged between the back latch 2.3 and a transverse screw 5.3 carrying rivets 6.2 and secured via a nut 6.3 to the respective backrest tube 1.14. The transverse screw 5.3, 6.1 not only serves as abutment member for the spring stop 2.1, but also for attachment of the respective back bracket 4.1 such that the backrest tube 1.14 extends into the respective back bracket 4.1 between the two rivets 6.2 and the back latch 2.3 can telescope out of the backrest tube 1.14. Each back bracket 4.1 is not only attached to one backrest tube 1.14 but also to one seat frame tube 1.15 via cap screws 4.4 with caps 4.2, 4.3. A further back lock plate 5.1. attached to the back bracket 4.1 via the transverse screw 5.3, 6.1 as well as a further cap screw 4.6 with a cap 4.6 on each side of the backrest assembly 1 provides further adjustment possibilities. Each back latch 2.3 has an inclined surface due to is wedge shape at its free end which is locked by the transversely extending respective screw 4.5, 5.2 in an idle position of the twist lock 1.1 and can be unlocked by rotating the twist lock 1.1 forwards, i.e. into the plane of figure 1 and towards the backrest tubes 1.14 as well as the seat frame tubes 1.15, to slide along the respective screw 4.5, 5.2 against the force of the respective spring 2.2 being compressed against the spring stop 2.1.

[0031] Returning to the twist lock 1.1, the result of rotating the twist lock 1.1 forwards will be described in further detail with respect to figures 3 to 5b. As can be seen in figure 3, each pull cable 1.3 is mounted under tension via the respective cable clamp 1.4. On its way to its cable clamp 1.4 each pull cable 1.3 passes its respective cable guide or rather is forced to run within a recess 1.71 provided by the cable guide bottom 1.7 and along a projection 1.6.1 provided by the cable guide top 1.6, see figures 4a to 4c. Thus, rotating the twist lock 1.1 results in rotating the connecting rod 1.2 together with the two cable guides 1.6, 1.7 such that the pull cables 1.3 are redirected or rather deflected inside the handle 1.9, 1.10. up to 90° as best shown in figure 4a, when rotating the handle 1.9,

1.10 up to 30°. This cable deflection leads to a contraction of the springs 2.2 and, thus, an upward movement of the back laches 2.3, along the screws 4.5, 5.2 resulting in an unlocking. But as soon as no force is acting on the twist lock 1.1, i.e. as soon as the grip of the hand of a user is released from the handle 1.9, 1.10, the handle 1.9, 1.10 will return into its idle position.

[0032] Figure 5a shows the twist lock 1.1 in its idle position with the stop screw 1.8 securing the two cable guide halves 1.6, 1.7 together within the backrest tube 1.13 and resting against a projection 1.101 provided on the inner wall of the handle bottom 1.10. When gripping the handle 1.9, 1.10 and turning the same forwards, the stop screw 1.8 disengages from the projection 1.101 as shown in figure 5b, and as soon as said grip is released, the stop screw 1.8 will automatically be rotated back against the projection 1.101 defining the idle position. Thus, the twist lock 1.1 will always be in its idle position when the backrest assembly 1 is locked, either in the first or the second position, and can only be rotated in one direction for disengaging the stop screw 1.8 and the projection 1.101 as well as unlocking the back brackets 4.1 for allowing a change of position, either from the first position into the second position or vice versa.

[0033] The handle 1.9, 1.10, providing a grip of the twist lock 1.1, has a hand friendly contour by being non-circular in cross-section, in particular being oval in cross-section. This oval character can be seen in figures 5a and 5b, with both the handle bottom 1.10 and the handle top 1.9 having an u-shaped, flattened cross-section. This shape is made even more ergonomically by the label 1.11 against which the palm of the hand can be applied for gripping the handle 1.9, 1.10.

[0034] With respect to further details on the unlocking and folding/un-folding mechanism, reference is made to EP 19 176813, not being pre-published.

[0035] The twist lock handle of the invention is described with respect to unlocking and folding/unfolding a backrest assembly in particular of a wheelchair, but can also be used for moving other parts relative to each other.

[0036] The features disclosed in this specification, the claims and the figures maybe important for the claimed invention, taken separately or in any combination, for the respective different embodiments.

Reference Signs

[0037]

1	backrest assembly
1.1	twist lock
1.2	connecting rod
1.3	pull cable
1.4	cable clamp
1.5	set screw
1.6	cable guide top
1.7	cable guide bottom
1.8	stop screw
1.9	center handle top
1.10	center handle bottom
1.101	projection
1.11	label
1.12	cap screw
1.13	backrest tube
1.14	backrest tube
1.15	seat frame tube
1.21	attachment hole
1.22	attachment hole
1.61	cable guide projection
1.71	cable guide recess
1.81	screw connection path
2.1	spring stop
2.2	spring
2.3	back latch
4.1	back bracket
4.2	cap
4.3	cap
4.4	cap screw
4.5	cap screw
4.6	cap
5.1	back lock plate
5.2	cap screw
5.3	transverse screw
5.2	cap screw
6.1	transverse screw
6.2	rivet
6.3	nut

Claims

1. A backrest assembly (1) of a seat of a chair, in particular a wheelchair, comprising:

a backrest for supporting the back of a person;
two hollow backrest tubes (1.14) connecting the backrest to the seat, in particular seat frame tubes (1.15), on each side of the seat;
at least two joints (4.1) for allowing a movement of the backrest tubes (1.14) between at least a first end position and a second end position relative to the seat;
two locking means (2.3) for locking and/or unlocking the joints (4.1); and
at least one hollow handle tube (1.13) carrying a handle (1.9, 1.10), which is arranged in the middle between the backrest tubes (1.14) and is mechanically connected to the locking means (2.3) via cables (1.3) running substantially inside the hollow tubes (1.14, 1.13),
characterized in that
the handle (1.9, 1.10)

• is providing a twist lock (1.1), with the twist lock (1.1) having only one idle position in which the locking means (2.3) is locked and

being adapted to unlock the locking means (2.3) upon rotation of the handle (1.9, 1.10), and

• is suited to move the backrest tubes (1.14) via the joints (4.1) by pushing or pulling after unlocking,

wherein the handle (1.9, 1.10) is adapted to be rotated by a user only in one direction, preferably forwards, towards the front of the chair, for unlocking the locking means (2.3) in any one of the end positions, and the handle (1.9, 1.10) is adapted to automatically re-lock after unlocking the locking means (2.3) and releasing the grip, such that rotating and pushing or pulling of the handle (1.9, 1.10) can be achieved by gripping the handle (1.9, 1.10) by one hand of an user, without releasing the respective grip of the handle (10; 100).

2. The backrest assembly according to claim 1, **characterized in that**

• each cable (1.3) comprises a torsion cable, in particular steel torsion cable, and/or
• each cable (1.3) is connected to one locking means (2.3) via an elastic element, in particular in form of a compression spring (2.2), being suited to be compressed or expanded within a predetermined range, in particular determined via at least one spring stop (2.1), and/or
• each cable (1.3) is guided by a cable guide (1.6, 1.7) arranged within the handle (1.9, 1.10), and/or
• each cable (1.3) is mounted under tension via a cable clamp (1.4), preferably by tightening at least one set screw (1.5), and/or
• the two cables (1.3) guided from the two hollow backrest tubes (1.14), preferably via two handle tubes (1.13), into the handle (1.9, 1.10) are connected to each other via a connection rod (1.2).

3. The backrest assembly according to claim 2, **characterized in that** each cable (1.3) is redirected or deflected inside the handle (1.9, 1.10), preferably up to 90°, via its respective cable guide (1.6, 1.7) upon rotation of the handle (1.9, 1.10), preferably up to 30°, against the spring force of the respective elastic element for unlocking the locking means (2.3) and automatically returned into its idle state upon release of the handle (1.9, 1.10) due to the release of the spring force such that the handle (1.9, 1.10) automatically returns into its idle position.

4. The backrest assembly according to claim 3, **characterized in that**

• each cable guide comprises a cable guide top (1.6) and a cable guide bottom (1.7), and/or
• each cable guide provides a cable deflection slope, with preferably the slope being provided by a recess and/or a projection, in particular a cable guide recess (1.71) provided by the cable guide bottom (1.7) and a cable guide projection (1.61) provided by cable guide top (1.6), and/or
• the connecting rod (1.2) is attached between the two cable guides.

5. The backrest assembly according to any one of the preceding claims, **characterized in that**

• the handle comprises a handle top (1.9) and a handle bottom (1.10), and/or
• the handle has a non-circular cross section, preferably a flattened or oval cross-section, and/or
• the handle comprises a label (1.11), preferably attached to the handle top (1.9) and the handle bottom (1.10) and/or facing rearwards, away from the two hollow backrest tubes (1.14) and the seat and/or for displaying a message, and/or
• the handle comprises at least one stop element (1.101) defining the idle position of the handle, with preferably each stop element (1.101) comprising a projection of the inner wall of the handle bottom (1.10) and/or the handle top (1.9).

6. The backrest assembly according to any one of the claims 2 to 5, **characterized by** first connecting means, preferably in form of first screws (1.8), connecting the connecting rod (1.2) and the cable guides (1.6, 1.7) to the hollow handle tubes (1.13),

• with preferably at least one first screw (1.8) attaching one end of the connecting rod (1.2) to one cable guide (1.6, 1.7) as well as to one hollow handle tube (1.13) and at least one other first screw (1.8) attaching the other, opposite end of the connecting rod (1.2) to the other cable guide (1.6, 1.7) as well as the other hollow handle tube (1.13), and/or
• with preferably at least one first screw (1.8) entering into one hollow handle tube (1.13) and passing through the cable guide bottom (1.7), the connection rod (1.2) and the cable guide top (1.6) to exit the hollow handle tube (1.13).

7. The backrest assembly according to claims 5 and 6, **characterized in that** each first screw (1.8) provides a stop element cooperating with one stop element (1.101) of the handle (1.9, 1.10) to secure the idle position of the handle (1.9, 1.10).

8. The backrest assembly according to any one of the claims 2 to 7, **characterized by** second connecting means, preferably in form of at least one second

screw (1.12), connecting the handle bottom (1.10) to the handle top (1.9),

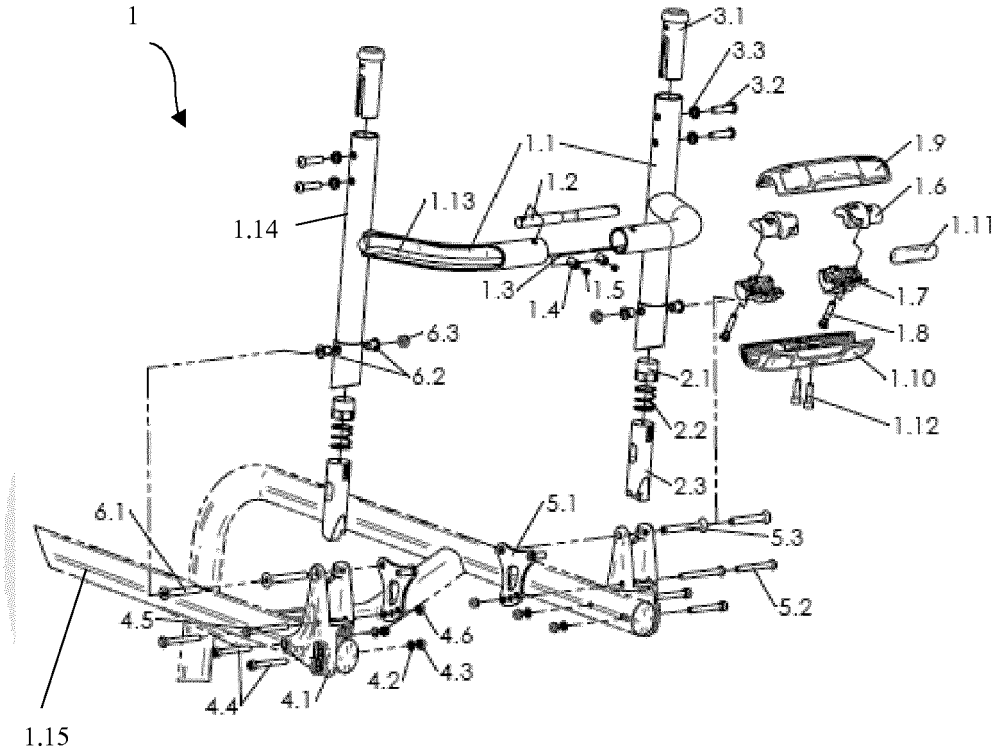
- with preferably two second screws (1.12) being arranged in the middle of the handle (1.9, 1.10) and/or on both sides of the connecting rod (1.2), in particular in a region with reduced diameter of the connecting rod (1.9).

9. The backrest assembly according to any one of the preceding claims, **characterized in that**
the handle (1.9, 1.10) can only be turned up to 30°, starting from its idle position, and/or
the handle (1.9, 1.10) can only be turned forwards, starting from its idle position.

10. The backrest assembly according to any of the preceding claims, **characterized in that** the handle (1.9, 1.10) is adapted to move an additional device, in particular a seating surface of the chair, a seating frame of the chair, at least one leg, at least one rest and/or at least one wheel of the chair.

11. The backrest assembly according to any of the preceding claims, further comprising at least an actuator, in particular comprising a battery, a motor, an electric actuator, preferably an electric motor, a hydraulic actuator, preferably a hydraulic motor, a pneumatic actuator, preferably a pneumatic motor, a thermal actuator, a shape memory alloy, preferably a thermal and/or magnetic shape memory alloy, a mechanical actuator and/or a valve for actuating and/or controlling the movement of the backrest and/or the device.

12. A wheelchair, comprising a backrest assembly of any one of the preceding claims.


1
3.1
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3.2
1.1
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1.14
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1.6
1.11
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1.12
6.3
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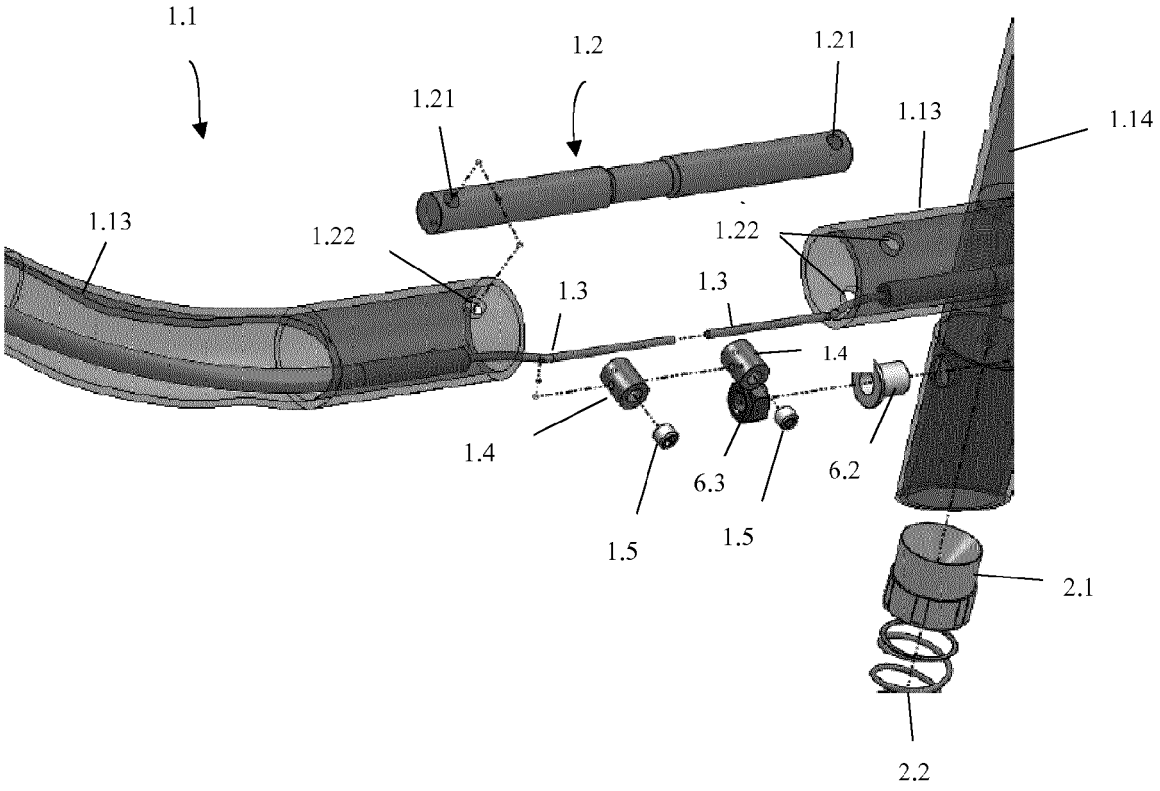
2.3
5.1
5.3
5.2
6.1
4.5
4.6
4.3
4.2
4.4
4.1
1.15

Fig. 1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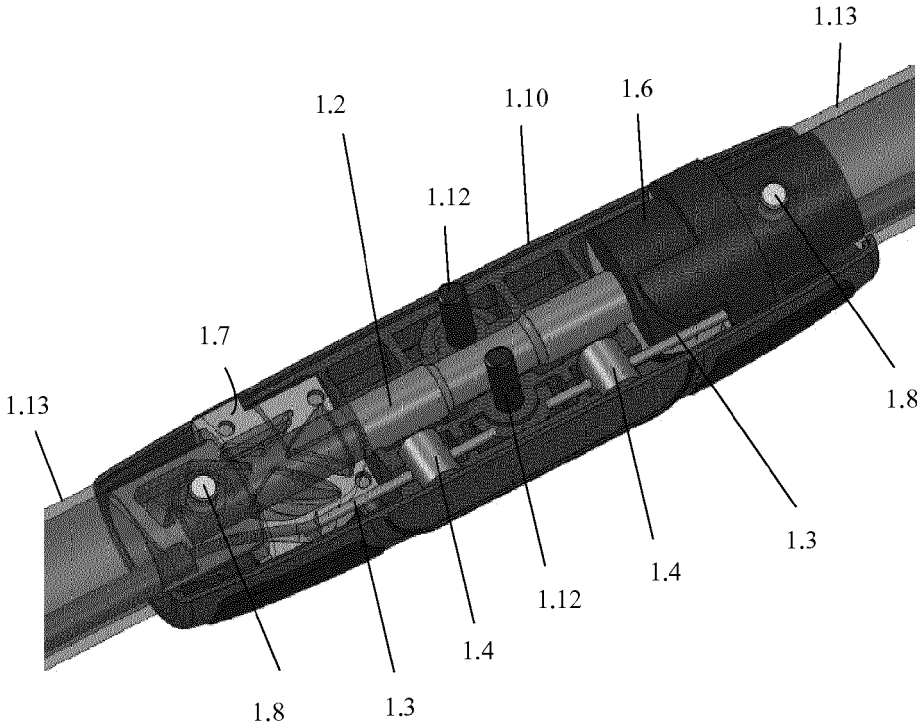
1.5
1.5
2.1
2.2

Fig. 2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1.3

Fig. 3

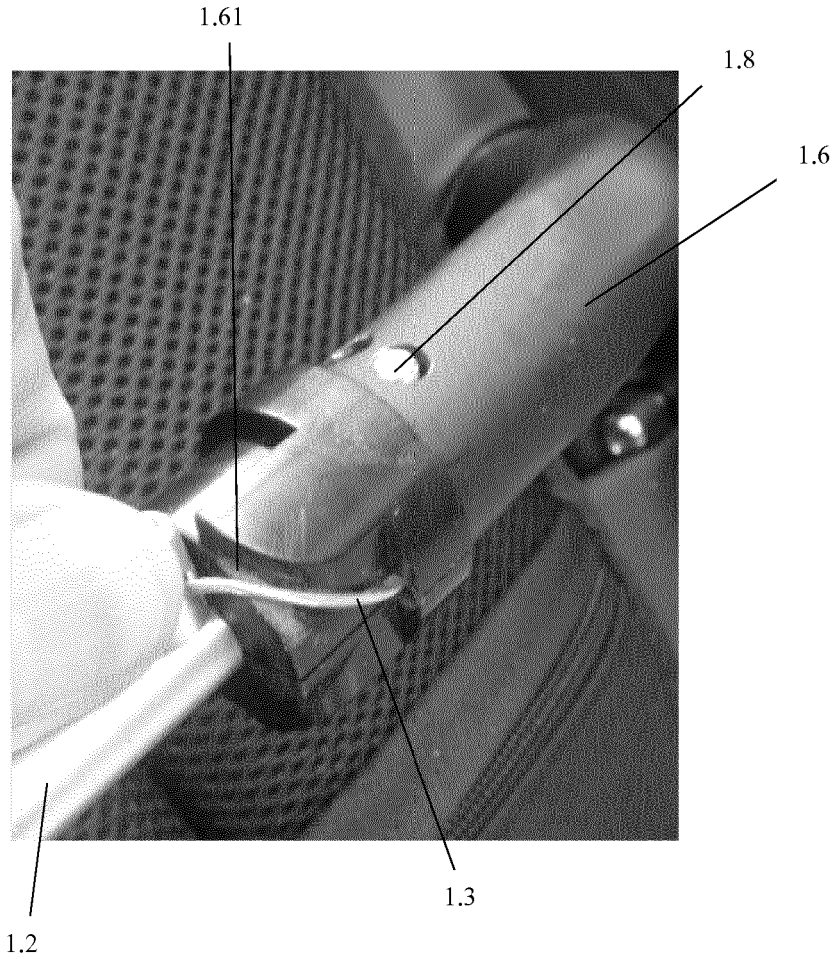

Fig. 4a

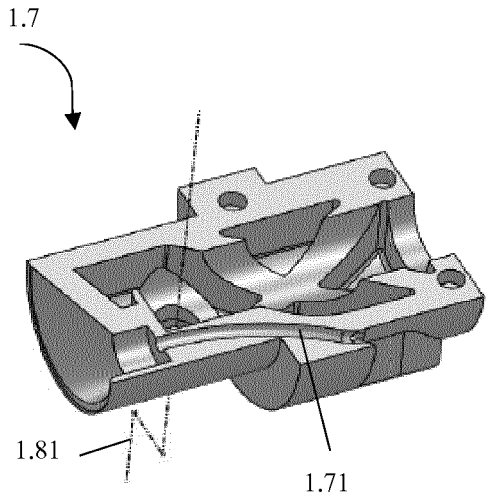

Fig. 4b

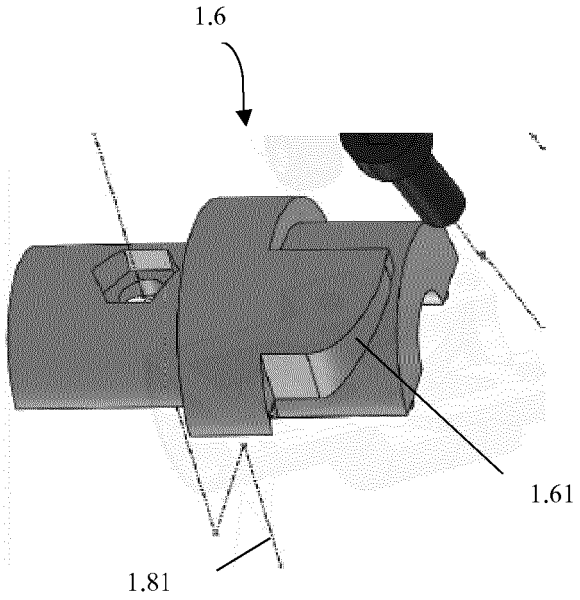

Fig. 4c

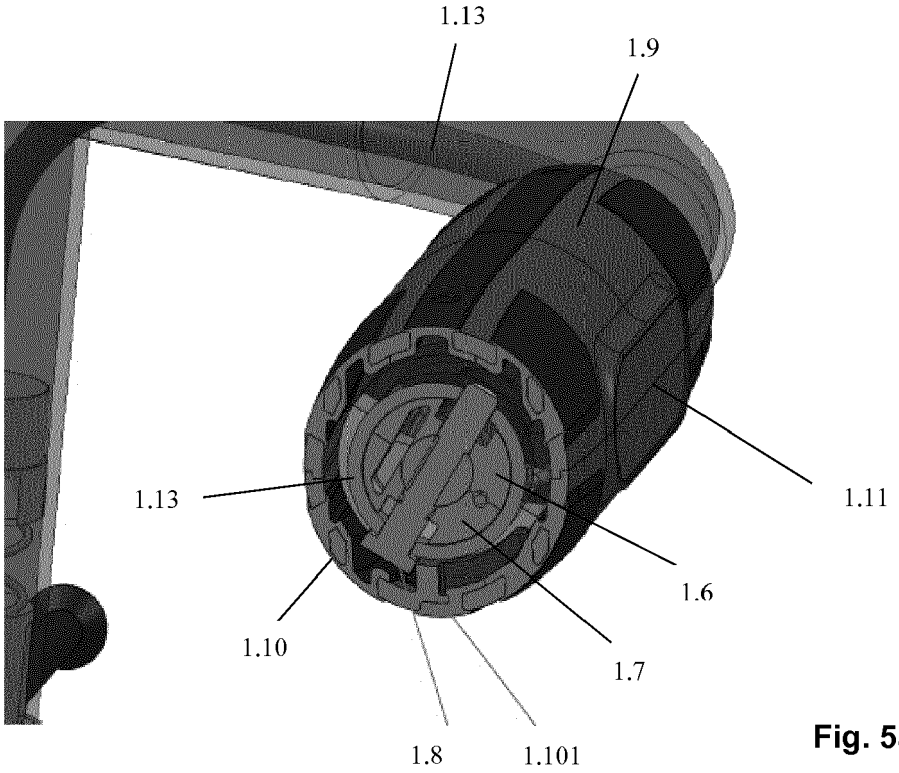

Fig. 5a

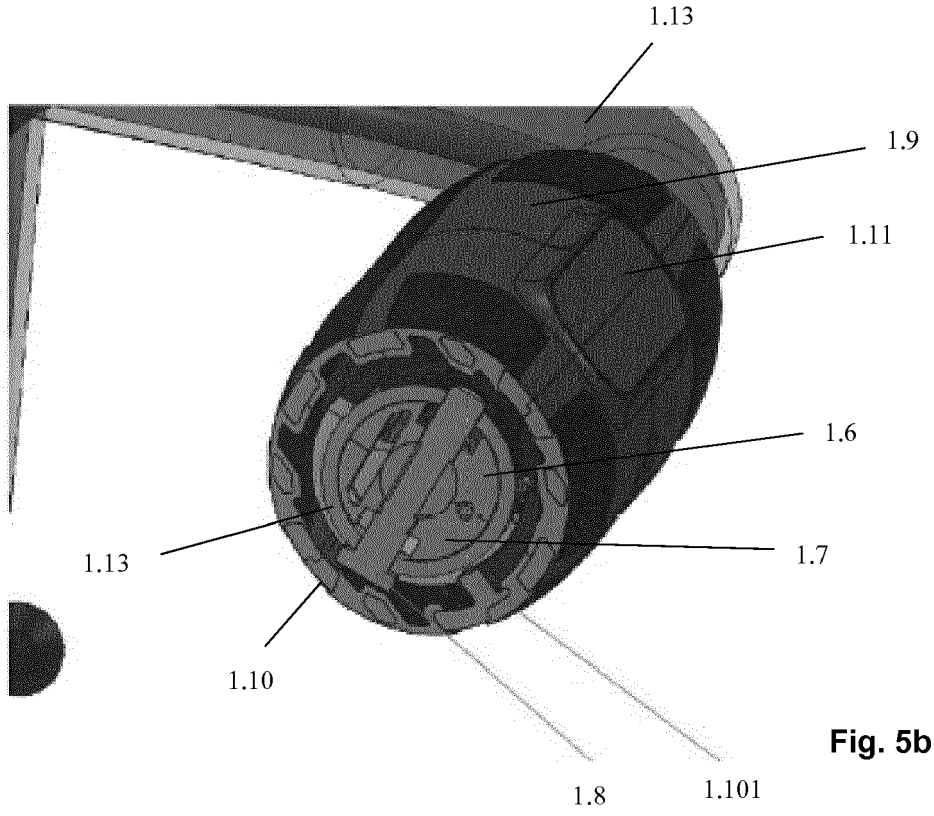

Fig. 5b

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EUROPEAN SEARCH REPORT

Application Number
EP 19 21 3638

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	FR 2 845 893 A1 (INVACARE POIRIER SA [FR]) 23 April 2004 (2004-04-23) * pages 4-6; figures 1-7 *	1-12	INV. A61G5/10
Y	EP 1 319 381 A2 (BRUSTMANN HERBERT [DE]) 18 June 2003 (2003-06-18) * paragraphs [0012], [0014], [0017]; figures 1-5 *	1-12	
E	EP 3 578 151 A1 (SUNRISE MEDICAL GMBH [DE]) 11 December 2019 (2019-12-11) * the whole document *	1-12	

TECHNICAL FIELDS SEARCHED (IPC)

A61G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	27 May 2020	Birlanga Pérez, J

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27-05-2020

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
FR 2845893 A1	23-04-2004	NONE	
EP 1319381 A2	18-06-2003	AT 336980 T	15-09-2006
		DE 10161624 C1	28-11-2002
		EP 1319381 A2	18-06-2003
EP 3578151 A1	11-12-2019	DE 102018113346 A1	05-12-2019
		EP 3578151 A1	11-12-2019
		US 2019365584 A1	05-12-2019

EPO FORM P0459

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Patent documents cited in the description

- US 7100988 B1 **[0004]**
- EP 19176813 A **[0034]**