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(54) **Handlebar for a powered wheelchair**

(57) Handlebar (1) for motorized wheelchair (100) for a person transportation, of the type comprising a supporting frame (2), at least one couple of wheels (3, 4) each disposed sideways to said supporting frame, and means rotatably operable for changing the direction (5) of said wheelchair and accommodated, at least in part, in said supporting frame, said handlebar comprising at least one idler arm (7), integrally connectable to said means for changing the direction to drive the rotation of said means for changing the direction, and at least one hand grip (8) to drive the rotation of said at least one idler arm, said handlebar being characterized by comprising a mechanism (9) to constrain the displacement of said at least one hand grip with respect to said at least one idler arm, between a first operative position (P1), wherein said at least one hand grip is disposed in front of said supporting frame, and a second operative position (P2), wherein said at least one hand grip is disposed sideways with respect to said supporting frame, and vice versa.

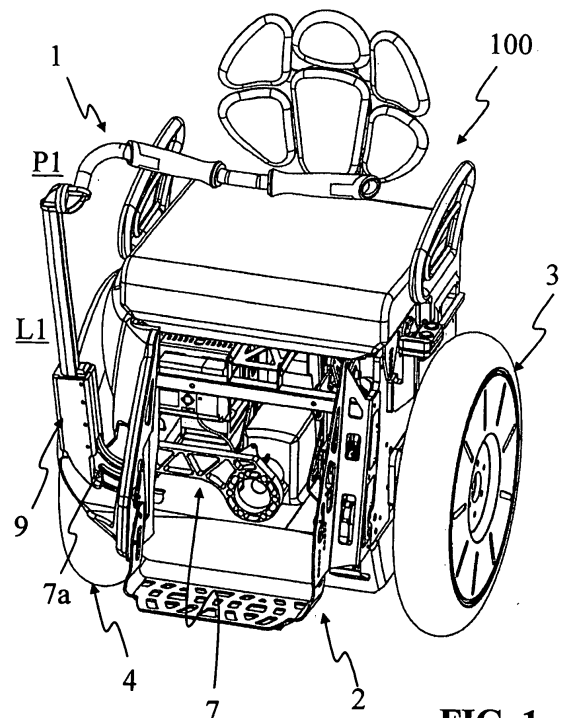


FIG. 1

Description

[0001] The present invention relates to a handlebar for a motorized wheelchair, a motorized wheelchair which employs such a handlebar and a corresponding method for varying the operative arrangement of said motorized wheelchair.

[0002] It is known the existence of motorized wheelchairs which allow a person, in particular, but not exclusively, with reduced, even partially, lower limb mobility, to easily move in environments presenting remarkable obstacles to the free displacement of the wheelchair itself.

[0003] For example a motorized wheelchair is commercially available of the type comprising a supporting frame, over which the seat for the user is provided, only two wheels both disposed sideways to said supporting frame and rotatably operable means accommodated, at least in part, in said supporting frame for changing the direction of said wheelchair. The above described motorized wheelchair, which can be advantageously provided with known means for self-equilibrating the weight thereof in any working condition and also employed in the device having the trade name of SEGWAY®, is provided, as well, with a handlebar to allow the user to rotationally drive, from sitting position yet, said means for changing the direction of said wheelchair. Such a handlebar is disposed in front and in the middle of the frame, between the user two legs, and is rotated by the latter in such a way to control, as said, the change of direction of the device. In this type of wheelchair the forward and/ or backward movement is obtained by means of the front and/ or back unbalancing of the user's body.

[0004] Such a wheelchair, despite able to effectively and comfortably transport people, however is not free from drawbacks. In particular, it will be understood that such a device, due to the handlebar bulk, not only does not allows to easily access closed and narrow places, but also makes it difficult to allow the user to comfortably sit down at the table sitting on its motorized wheelchair. Furthermore, still due to the presence and the bulk given by the handlebar, it will be understood that the user can find difficult to sit or rise on/from the wheelchair seat.

[0005] It is, therefore, object of the present invention to realize a handlebar for said wheelchair which allows to solve the above mentioned problems. In particular, a handlebar which is able to remarkably reduce the motorized wheelchair bulks, at least in some particular use conditions, and which, at the same time, allows to facilitate the user sitting/ raising operation on/from the wheelchair.

[0006] Further object of the present invention id to realize a wheelchair which solves the above mentioned known art problems.

[0007] Finally, object of the present invention is to realize a method which allows to change the use arrangement of the wheelchair in such a way to reduce the handlebar bulks in the various use situations of the wheel-

chair itself.

[0008] Such objects are obtained by the present handlebar for motorized wheelchair for a person transportation, of the type comprising a supporting frame, at least one couple of wheels each disposed sideways to said supporting frame, and means rotatably operable for changing the direction of said wheelchair and accommodated, at least in part, in said supporting frame, said handlebar comprising at least one idler arm, integrally connectable to said means for changing the direction to drive the rotation of said means for changing the direction, and at least one hand grip to drive the rotation of said at least one idler arm, said handlebar being characterized by comprising a mechanism to constrain the displacement of said at least one hand grip with respect to said at least one idler arm, between a first operative position, wherein said at least one hand grip is disposed in front of said supporting frame, and a second operative position, wherein said at least one hand grip is disposed sideways with respect to said supporting frame, and vice versa.

[0009] Such a solution allows, therefore, to vary the operative position of the hand grip with respect to the idler arm and thus to avoid that the hand grip, can be bulky in the situations wherein the wheelchair arrangement has to be changed due to the reduced space or in situations wherein the user gets in or out from the wheelchair itself. In such a first and second operative positions the handlebar is in a stable arrangement and allows to easily control the motorized wheelchair.

[0010] According to a particular embodiment of the invention, in said at least one first operative position, said at least one hand grip and said at least one idler arm are disposed in front, that is to say forward, and parallel to said supporting frame so that said handlebar adopts a substantially C-shape. More in detail, still according to a further embodiment of the invention, said at least one idler arm is substantially L-shaped and said at least one hand grip is substantially L-shaped.

[0011] Still according to the invention, said displacement mechanism comprises means for rotating said at least one hand grip with respect to said at least one idler arm between said at least one first and said at least one second operative position. Again, still according to the invention, said rotating means comprise at least one first tubular portion integrally constrained to the free end of said at least one idler arm and at least one second tubular portion integrally constrained to one end of said hand grip and able to be rotationally coupled to said at least one first tubular portion. Note that said first tubular portion and said at least one second tubular portion can also be realized in a single piece with, respectively, said idler arm and said hand grip.

[0012] Deep in detail, said displacement mechanism comprises, as well, means for guiding the translation of said at least one hand grip with respect to said at least one idler arm exclusively when said at least one hand grip is in said at least one first and said at least one second operative position, between a lowered position, wherein

the rotation of said at least one hand grip with respect to said at least one idler arm is prevented, and a raised position, wherein the rotation of said at least one hand grip with respect to said at least one arm is allowed between said first and said second operative position. In practice, therefore, in said first and in said second operative position the rotation between said hand grip and said at least one idler arm is possible only in raised position of said hand grip and is prevented in all of the other positions till said lowered position is reached. In detail, said guiding means can comprise at least two slide longitudinal seats obtained, at least in part, in said at least one first portion, or in said at least one second portion, and at least one countercheck element integral with said at least one second portion, or with said at least one first portion, and sliding in said at least two longitudinal seats at least when said at least one hand grip is, respectively, in said first and said second operative position. Advantageously, said at least one countercheck element comprises at least one polygonal section bar made integrally with said at least one second tubular portion and jutting with respect to said at least one second tubular portion, and said at least two longitudinal seats, realized in said at least one first tubular portion, are couplable by shape to said at least one polygonal section bar.

[0013] Still according to the invention, said at least one first tubular portion comprises one abutment element for said at least one countercheck element to limit the translation downwards of said at least one second tubular element with respect to said at least one second tubular element in said at least one first operative position. Note that in said second operative position such an abutment element is absent and, therefore, the lowered position of the hand grip is lower from the ground than that of the hand grip when it is in lowered position, but in said first operative position. This causes that in said second, lowered, operative position the handlebar is still less bulky and occupies still less space, at least in height, than in said first lowered position.

[0014] According to the invention, furthermore, a motorized wheelchair is provided for the transportation of at least one sitting person, comprising at least one supporting frame, at least one couple of wheels each disposed sideways to said supporting frame, means accommodated, at least in part, in said supporting frame, for changing the direction of said transporting device and a handlebar according to one or more of the claims from 1 to 10.

[0015] Advantageously, said motorized wheelchair comprises two wheels only, each disposed at the two sides of said supporting frame, and means accommodated, at least in part, in said supporting frame, for auto-balancing continuously said wheelchair. Such means for auto-balancing said wheelchair are known and present in the known device named SEGWAY® and, therefore, herein not further described.

[0016] Again, the objects of the invention are obtained by the method for changing the operative arrangement of a wheelchair according to the claim 11 or 12, charac-

terized by comprising the step of displacing said at least one hand grip with respect to said at least one idler arm, between a first operative position, wherein said at least one hand grip is disposed in front of said supporting frame, and a second operative position, wherein said at least one hand grip is disposed sideways with respect to said supporting frame, and vice versa. Advantageously, said step of displacing said hand grip comprises the step of rotating said at least one hand grip with respect to said at least one idler arm between said at least one first and said at least one second operative position. In detail, before the step of rotating said at least one hand grip the step of guiding the translation of said at least one hand grip with respect to said at least one idler arm exclusively when said at least one hand grip is in said at least one first and said at least one second operative position is comprised, between a lowered position, wherein the rotation of said at least one hand grip with respect to said at least one idler arm is prevented, and a raised position, wherein the rotation of said at least one hand grip with respect to said at least one idler arm is allowed between said first and said second operative position. In particular, said at least one operative position, said lowered position of said at least one hand grip is higher from the ground than the lowered position of said at least one hand grip in said at least one second operative position.

[0017] For purposes of illustrations and not limitative, more particular preferred embodiments of the present invention will be now provided with reference to the accompanying figures, in which:

figure 1 is a perspective view of a motorized wheelchair according to the present invention wherein said handlebar is in said first operative position and in lowered position;

figure 2 is a perspective view of a motorized wheelchair according to the present invention wherein said handlebar is in said second operative position and in lowered position;

figure 3 is a perspective view of a motorized wheelchair according to the present invention wherein said handlebar is in said first operative position and in raised position;

figure 4 is a perspective view of a motorized wheelchair according to the present invention wherein said handlebar is in said second operative position and in raised position;

figure 5 is a side view of the handlebar constraining mechanism according to the invention, in said first lowered operative position;

figure 6 is a cross sectional view of the constraining mechanism of figure 5 (section A-A);

figure 7 is a longitudinal sectional view of the constraining mechanism of figure 5 (section D-D);

figure 8 is a side view of the handlebar constraining mechanism according to the invention, in said second lowered operative position;

figure 9 is a cross sectional view of the constraining

mechanism of figure 8 (section C-C);
figure 10 is a longitudinal sectional view of the constraining mechanism of figure 8 (section E-E).

[0018] Referring particularly to such figures a handlebar for a motorized wheelchair 100 according to the invention has been denoted with numeral 1.

[0019] In figure 1 a motorized wheelchair 100 for a person transportation is depicted comprising a supporting frame 2, two wheels 3, 4 disposed at the two sides 2a, 2b of said supporting frame 2, and means for changing the direction 5 of said wheelchair 100 that are rotationally operable and accommodated, at least in part, in said supporting frame 2. Furthermore, said wheelchair 100 comprises a handlebar 1 provided with an idler arm 7, integrally connectable to said means for changing the direction 5 to drive the rotation of said means for changing the direction, and a hand grip 8 to drive the rotation of said idler arm 7. According to the invention, said handlebar 1 comprises a mechanism 9 for constraining the displacement of said hand grip 8 with respect to said idler arm 7, between a first operative position P1, wherein said hand grip 8 is disposed in front of said supporting frame 2, that is on the front side 2c of said supporting frame 2, and a second operative position P2, wherein said hand grip 8 is disposed sideways with respect to said supporting frame 2, that is on the side 2a of said supporting frame 2, and vice versa. Obviously, a solution wherein said hand grip, in said second operative position P2, would be disposed on the side 2b would still fall within the protection scope of the present invention.

[0020] It is clear, therefore, that such a solution allows to change the operative arrangement of the wheelchair 100 by the displacement of the operative position of the hand grip 8 with respect to the idler bar 7, so to avoid that the hand grip 8 can be bulky due to the reduced space of the place wherein it is or when the user gets in or out from the wheelchair itself. In such a first and second operative positions P1, P2, the handlebar 1 is in a stable arrangement and allows to easily control the motorized wheelchair 100. Advantageously, in said at least one first operative position P1, said hand grip 8 and said idler arm 7 are disposed in front and parallel to said supporting frame 2 in such a way that such a handlebar adopts a substantially C-shape. Such an arrangement allows to further facilitate the getting in/out to/from the motorized wheelchair 100, since it eliminates, at least in said second operative position P2, any front bulk.

[0021] In detail, said idler arm 7 is substantially L-shaped as well as said hand grip 8 is substantially L-shaped.

[0022] According to the invention, said displacement mechanism 9 comprises means 10 for rotating said hand grip 8 with respect to said idler arm 7 between said first and said second operative position P1 and P2, and vice versa. In particular, said rotating means 10 comprise a first tubular portion 11 integrally constrained, even though indirectly, to the free end 7a of said idler arm 7

and a second tubular portion 12 integrally constrained to an end 8a of said hand grip 8 and rotationally couplable with said first tubular portion 11. Furthermore, said displacement mechanism 9 comprises, as well, means 13 for guiding the translation of said hand grip 8 with respect to said idler arm 7 exclusively when said hand grip 8 is in said first operative position P1 or in said second position P2, between a lowered position, respectively, L1 and L2, wherein the rotation of said hand grip 8 with respect to said idler arm 7 is prevented, and a raised position, respectively, H1 and H2, wherein the rotation of said hand grip 8 with respect to said idler arm 7 is allowed between said first and said second operative position P1 and P2. Substantially, therefore, in said first and said second operative positions P1 and P2 the rotation between said hand grip 8 and said idler arm 7 is possible only in said raised position H1, H2, in all other positions any reciprocal rotation between said hand grip 8 and said idler arm 7 is prevented.

[0023] In particular, said guiding means 13 comprise two polygonal slide longitudinal seats 14, 16 obtained on at least part of said tubular portion 11, and a countercheck element 15, polygonal too, integral with said second tubular portion 12, and sliding in said longitudinal seats 14, 16 at least when said hand grip 8 is in said first and said second operative position P1, P2. In the embodiment herein described said countercheck element 15 comprises a polygonal section bar integrally obtained with said at least one second tubular portion 12 and jutting with respect to said second tubular portion 12, while said longitudinal seats 14 and 16 are couplable by shape with said polygonal section bar. Note also that said polygonal section bar 15 comprises two sides 70, 71 disposed at 90° one from another such that said second tubular portion 12 on the whole adopts a drop shape. Similarly, also said longitudinal seats comprise two sides 72, 73 are positioned at 90° one from another and adapted to receive said polygonal section bar 15.

[0024] According to a particular aspect of the invention, said first tubular portion 11 comprises an abutment element 20 for said countercheck element 15 to limit the translation of said second tubular element 12 with respect to said first tubular element 11 in said first lowered operative position L1. Such a solution, as mentioned, allows to place the hand grip 8 at different heights from the ground between said first P1 and said second P2 operative positions. In particular, in said second operative position P2 said hand grip 8, when in lowered position L2, is lower from the ground than when it is in the lowered position L1, in said first operative position P1.

[0025] Note that the invention also relates to a motorized wheelchair 100 for the transportation of a sitting person, and comprising a supporting frame 2, a couple of wheels 3, 4 each disposed sideways of said supporting frame 2, means for changing the direction 5 of said motorized wheelchair 100, accommodated, at least in part, in said supporting frame 2, and a handlebar 1 according to what above described and, anyway, according to one

or more of the claims from 1 to 10. According to the particular embodiment herein described, said wheelchair 100 comprises only two wheels 3 and 4, each disposed at the two sides 2a, 2b of the said supporting frame 2 and means (herein not shown) for auto-balancing continuously and in any operative condition said wheelchair 100, which are accommodated, at least in part, in said supporting frame 2.

[0026] According to the invention, a method is provided as well for changing the operative arrangement of a motorized wheelchair 100 according to the herein provided description and, anyway, according to the claim 11 or 12. Such a method comprises the step of displacing said hand grip 8 with respect to said idler arm 7, between a first operative position P1, wherein said hand grip 8 is disposed in front of said supporting frame 2, and a second operative position P2, wherein said hand grip 8 is disposed sideways with respect to said supporting frame 2, and vice versa. Still according to the method, said step of displacing said hand grip 8 comprises the step of rotating said hand grip 8 with respect to said idler arm 7 between said first P1 and said second P2 operative positions. Advantageously, said rotation is of 270° outwards of said supporting frame 2 in such a way that during such a rotation the hand grip can not move into abutment against the user, when sitting on the wheelchair 100.

[0027] According to a particular embodiment of the invention, said step of rotating said hand grip 8 is preceded by the step of guiding the translation of said hand grip 8 with respect to said idler arm 7 exclusively when said hand grip 8 is in said first and said second operative position P1, P2, between a lowered position L1, L2 (figures 1 and 2), wherein the rotation of said hand grip 8 with respect to said idler arm 7 is prevented, and a raised position H1, H2 (figures 3 and 4), wherein the rotation of said hand grip 8 with respect to said idler arm 7 is allowed between said first and said second operative position P1 and P2. Advantageously, in said first operative position P1, the said lowered position L1 of said hand grip 8 is higher from the ground than the lowered position L2 of said at least one hand grip in said at least one second operative position P2. In this way, the hand grip 8 is hidden sideways with respect to the supporting frame 2, being in a position lower than the position adopted by the hand grip 8 in said first operative position P1, lowered L1. However, such a hand grip 8, in said lowered positions L1 and L2 as well, is able to be activated by the user to drive the rotation of said idler arm 7 and, thus, the rotation of said means for changing the direction 5 of said wheelchair 100.

Claims

1. Handlebar (1) for motorized wheelchair (100) for a person transportation, of the type comprising a supporting frame (2), at least one couple of wheels (3, 4) each disposed sideways to said supporting frame,

and means rotatably operable for changing the direction (5) of said wheelchair and accommodated, at least in part, in said supporting frame, said handlebar comprising at least one idler arm (7), integrally connectable to said means for changing the direction to drive the rotation of said means for changing the direction, and at least one hand grip (8) to drive the rotation of said at least one idler arm, said handlebar being **characterized by** comprising a mechanism (9) to constrain the displacement of said at least one hand grip with respect to said at least one idler arm, between a first operative position (P1), wherein said at least one hand grip is disposed in front of said supporting frame, and a second operative position (P2), wherein said at least one hand grip is disposed sideways with respect to said supporting frame, and vice versa.

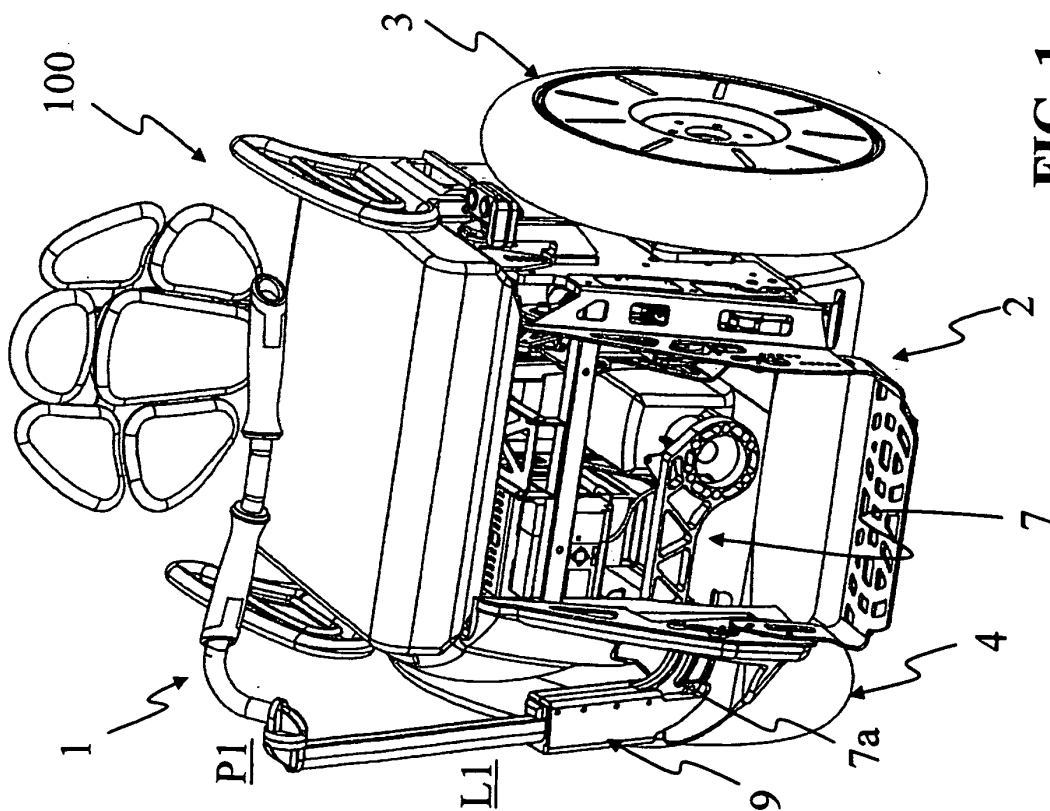
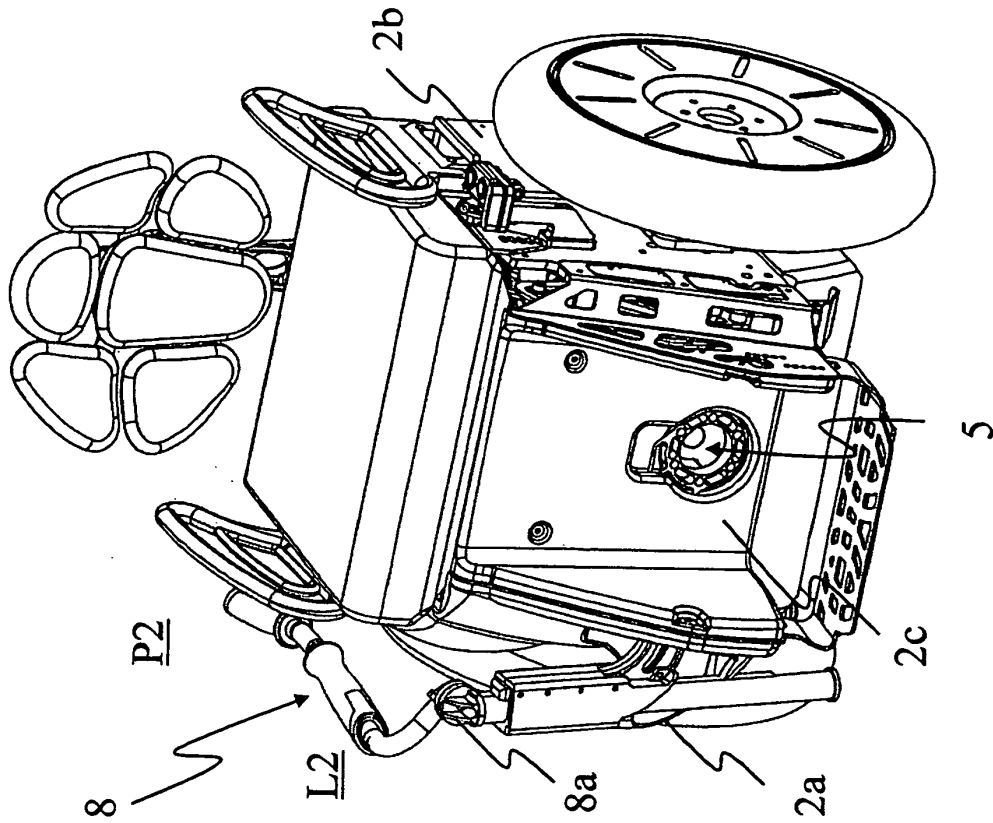
2. Handlebar (1) according to claim 1, **characterized in that**, in said at least one first position (P1), said at least one hand grip and said at least one idler arm are disposed in front of and in parallel with said supporting frame so that said handlebar would adopt a substantially C-shape.
3. Handlebar according to claim 2, **characterized in that** said at least one idler arm is substantially L-shaped.
4. Handlebar according to claim 2 or 3, **characterized in that** said at least one hand grip is substantially L-shaped.
5. Handlebar according to one or more of the claims 1 to 4, **characterized in that** said displacing mechanism comprises means (10) for rotating said at least one hand grip with respect to said at least one idler arm between said at least one first and said at least one second position.
6. Handlebar according to claim 5, **characterized in that** said rotating means comprise at least one first tubular portion (11) integrally constrained to the free end (7a) of said at least one idler arm and at least one second tubular portion (12) integrally constrained to one end (8a) of said at least one hand grip and able to be rotationally coupled to said at least one first tubular portion.
7. Handlebar according to one or more of the claims 5 to 6, **characterized in that** said displacing mechanism (9) comprises as well means (13) for guiding the translation of said at least one hand grip with respect to said at least one idler arm exclusively when said at least one hand grip is in said at least one first and said at least one second operative position (P1, P2), between a lowered position (L1, L2), wherein the rotation of said at least one hand grip

with respect to said at least one idler arm is prevented, and a raised position (H1, H2), wherein the rotation of said at least one hand grip with respect to said at least one idler arm is allowed between said first and said second operative position.

8. Handlebar according to claim 7, **characterized in that** said guide means (13) comprise at least two slide longitudinal seats (14) obtained, at least in part, in said at least one first portion, or in said at least one second portion, and at least one countercheck element (15) integral with said at least one second portion, or said at least one first portion, and sliding in said at least two longitudinal seats at least when said at least one hand grip is in said first and said second position.
9. Handlebar according to claim 8, **characterized in that** said at least one countercheck element comprises at least one polygonal section bar made integrally with said at least one second tubular portion and jutting at least in part with respect to said at least one second tubular portion, and said at least two longitudinal seats are couplable by shape to said at least one polygonal section bar.
10. Handlebar according to one or more of the claims 7 to 9, **characterized in that** said at least one first tubular portion comprises at least one abutment element (20) for said at least one countercheck element to limit the translation of said at least one second tubular element with respect to said at least one first tubular element at least in said at least one first position.
11. Motorized wheelchair (100) for the transportation of at least one sitting person, comprising at least one supporting frame (2), at least one couple of wheels (3, 4) both disposed sideways to said supporting frame, means accommodated, at least in part, in said supporting frame, for changing the direction (5) of said transportation device, and a handlebar according to one or more of the claims 1 to 10.
12. Wheelchair (100) according to claim 11, **characterized by** comprising two wheels only, both disposed at the two sides of said supporting frame, and means accommodated, at least in part, in said supporting frame, for auto-balancing continuously said wheelchair.
13. Method for changing the working arrangement of a motorized wheelchair (100) according to claim 11 or 12, **characterized by** comprising the step of displacing said at least one hand grip (8) with respect to said at least one idler arm (7), between a first operative position (P1), wherein said at least one hand grip (8) is disposed in front of said supporting frame

(2), and a second operative position (P2), wherein said at least one hand grip (8) is disposed sideways with respect to said supporting frame (2), and vice versa.

14. Method according to claim 13, **characterized in that** said step of displacing at least one hand grip (8) comprises the step of rotating said at least one hand grip (8) with respect to said at least one idler arm (7) between said at least one first and said at least one second operative position.
15. Method according to claim 14, **characterized in that** said rotation is 270° outwards of said supporting frame (2).
16. Method according to claim 14 or 15, **characterized in that** before the step of rotating said at least one hand grip the step of guiding the translation of said at least one hand grip with respect to said at least one idler arm exclusively when said at least one hand grip is in said at least one first and said at least one second operative position (P1, P2) is comprised, between a lowered position (L1, L2), wherein the rotation of said at least one hand grip with respect to said at least one idler arm is prevented, and a raised position (H1, H2), wherein the rotation of said at least one hand grip with respect to said at least one idler arm is allowed between said first and said second operative position.
17. Method according to claim 16, **characterized in that**, in said at least one operative position, said lowered position (L1) of said at least one hand grip is higher from the ground than the lowered position (L2) of said at least one hand grip in said at least one second operative position (P2).



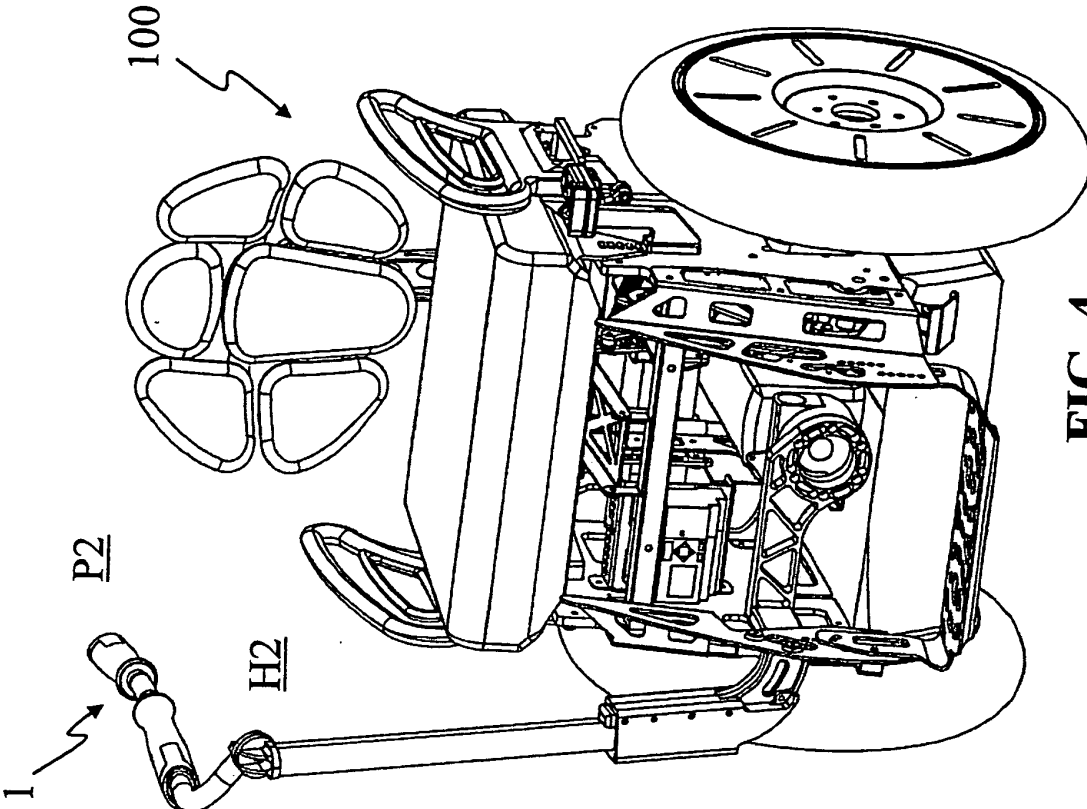


FIG. 4

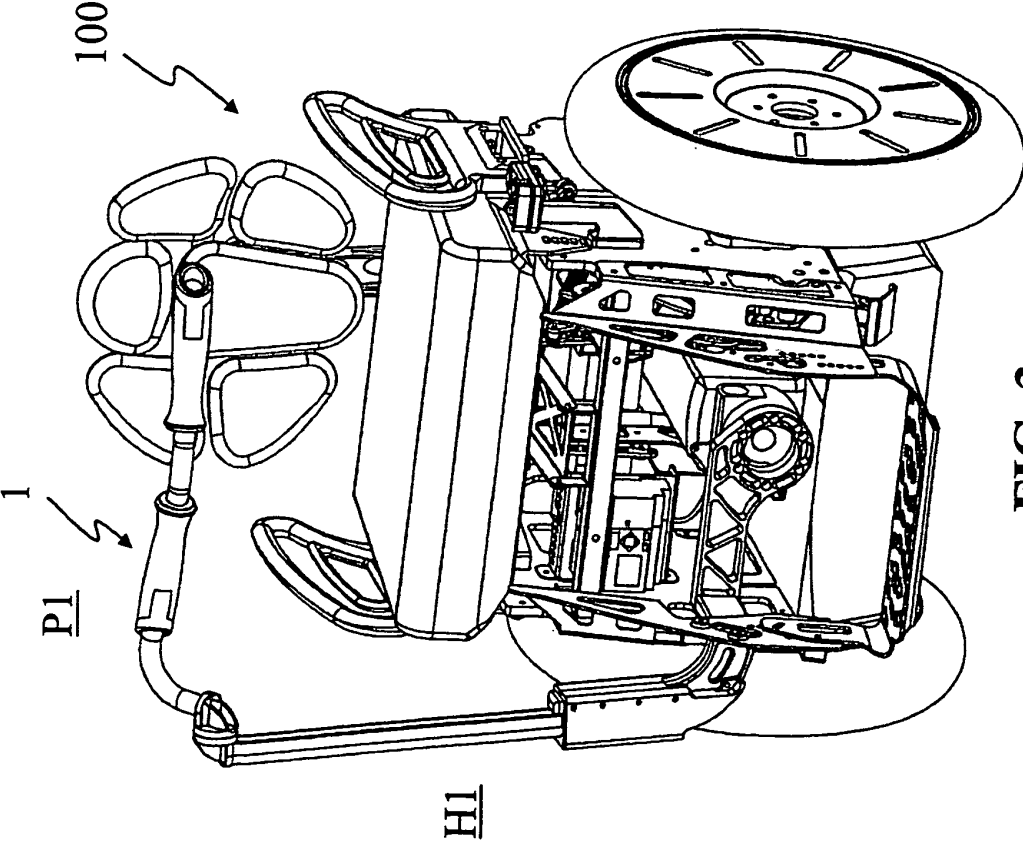


FIG. 3

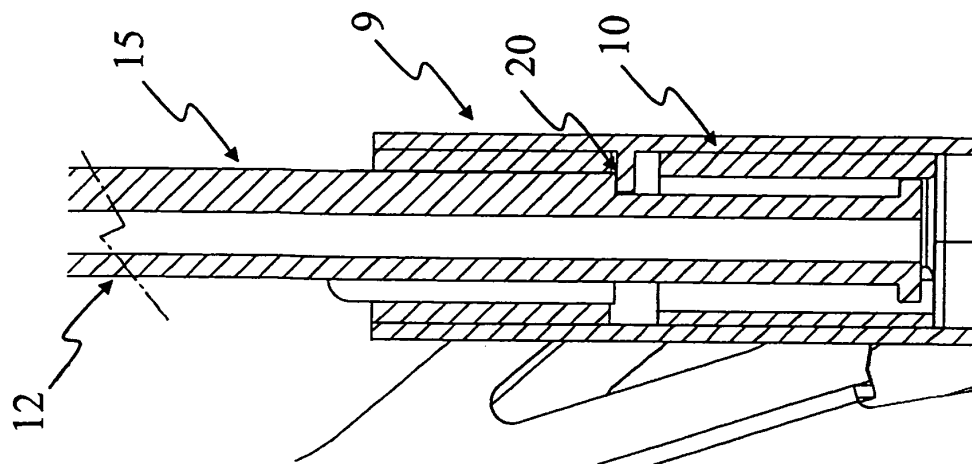


FIG. 7

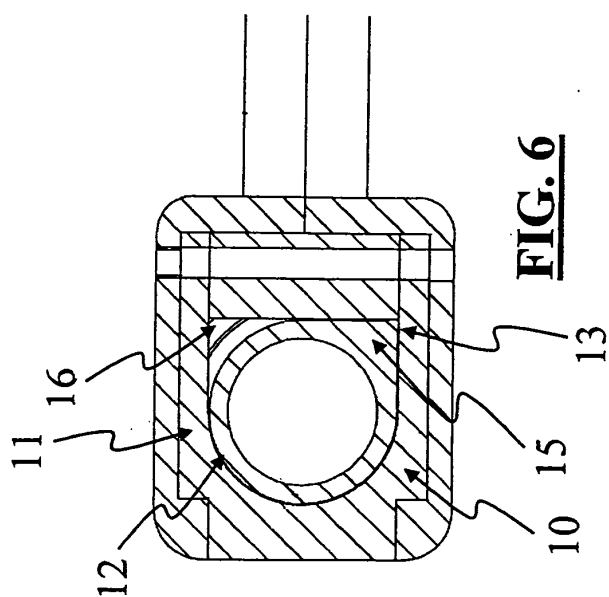


FIG. 6

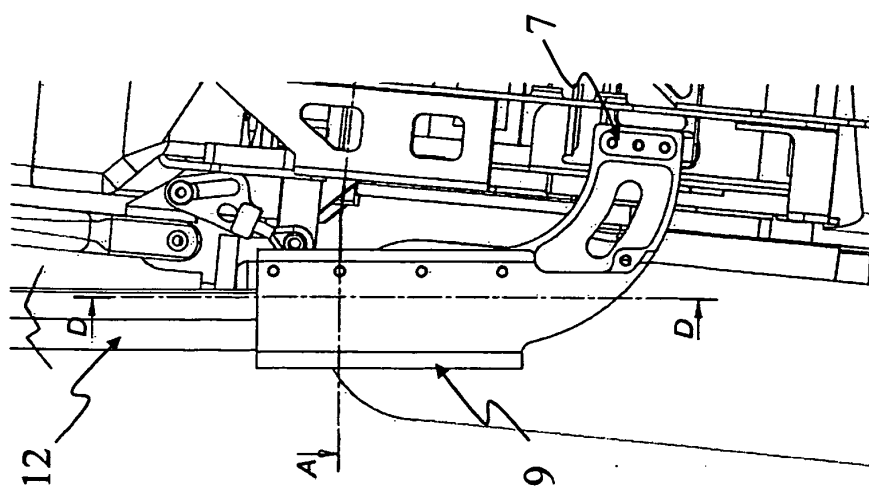


FIG. 5

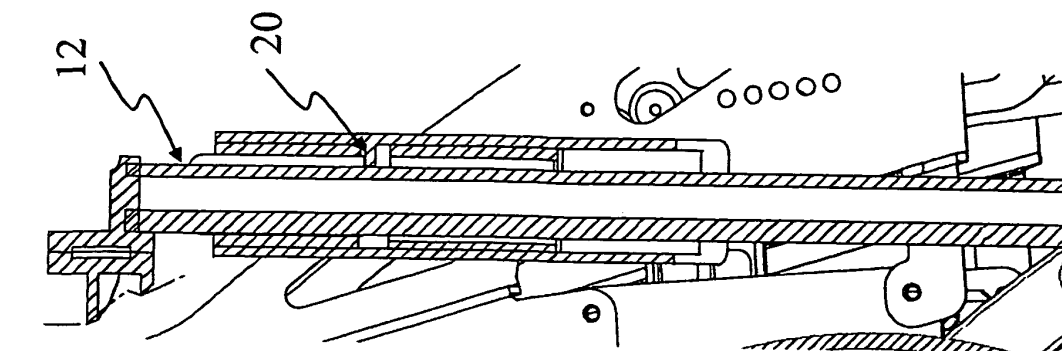


FIG. 10

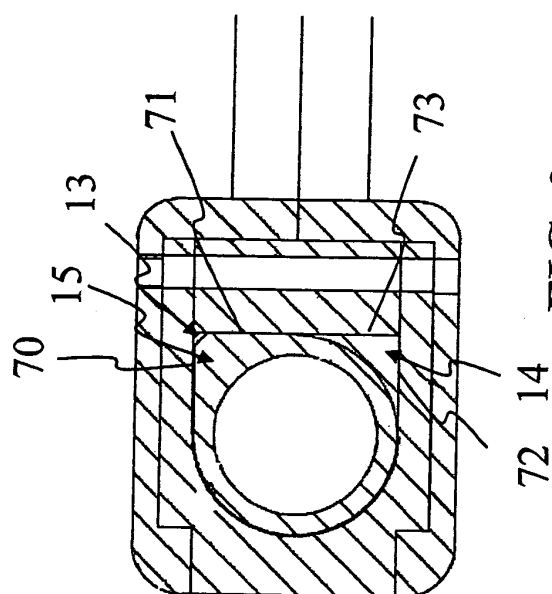


FIG. 9

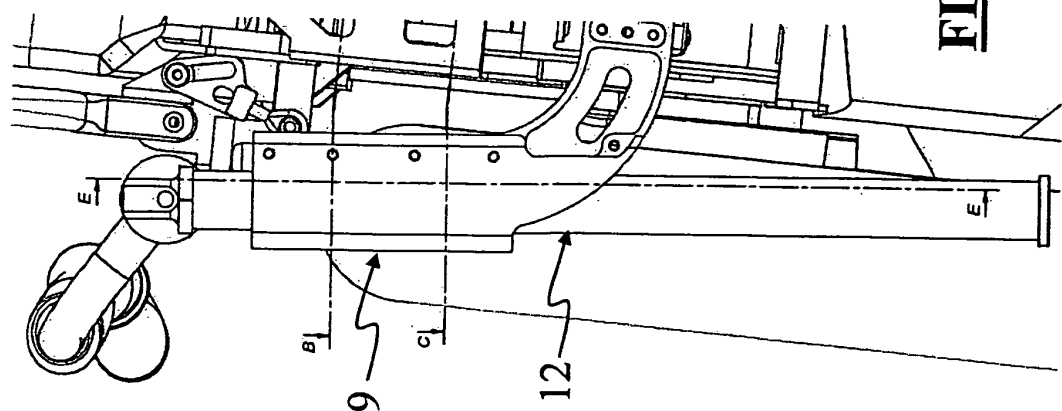


FIG. 8



EUROPEAN SEARCH REPORT

Application Number
EP 12 00 8407

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	DE 102 12 623 A1 (KARMA MEDICAL PRODUCTS CO [TW]) 16 October 2003 (2003-10-16)	1-6,11, 13-15	INV. A61G5/10
A	* paragraph [0019] - paragraph [0031] * * figures 1-7 *	7-10,16, 17	A61G5/04

A	WO 92/07538 A1 (IURA TADASHI [JP]) 14 May 1992 (1992-05-14) * figures 1-11 *	1,13	

			TECHNICAL FIELDS SEARCHED (IPC)
			A61G
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 22 March 2013	Examiner Ong, Hong Djien
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			

 1
EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 12 00 8407

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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22-03-2013

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
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