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(54) **WHEELCHAIR**

(57) A wheelchair (100) comprises a bearing frame (1), wheels (R1, R2) connected to the bearing frame (1), a seat (2) having a frame (20) hinged to the bearing frame (1), a back (3) having a frame (30) hinged to the frame (20) of the seat, and an actuator (6) connected to the bearing frame (1) and to the frame (30) of the back to move the frame (30) of the back.

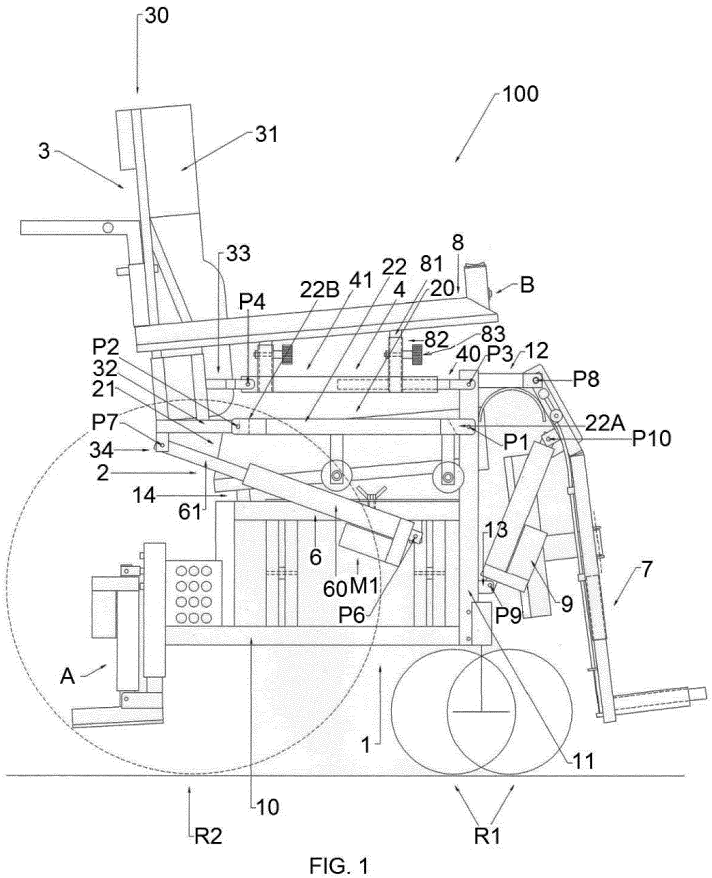


FIG. 1

EP 3 219 299 A1

Description

[0001] The present patent application for industrial invention relates to a wheelchair.

[0002] As it is known, a wheelchair comprises a bearing frame that is moved by wheels. The bearing frame supports a seat, a back and a footrest.

[0003] Generally, the seat is fixed to the bearing frame, whereas the back and the footrest can move with respect to the seat in order to convert the wheelchair into a sort of bed.

[0004] However, similar wheelchairs are impaired by a drawback because they do not help the user when standing up from the wheelchair. In fact, the seat remains fixed to the bearing frame.

[0005] DE3607296 discloses a wheelchair comprising a chassis frame and wheels connected to the chassis frame. A seat comprises a frame pivoted to the chassis frame. A backrest comprises a frame pivoted to the frame of the seat. An actuator is connected to the fixed frame and is pivoted to the frame of the seat. The actuator is composed of a pantograph mechanism moved by a cylinder-piston assembly. By moving the actuator, the frame of the seat is tilted and lifted, helping the user to stand up from the wheelchair. Consequently, also the frame of the backrest, which is pivoted to the frame of the seat, is tilted and lifted. However, the frame of the backrest always remains in a substantially vertical position. Therefore, such a wheelchair cannot be positioned as a sort of bed, with the backrest in a substantially horizontal position.

[0006] GB2380399 discloses a reclining chair comprising a chassis frame. A seat comprises a frame pivoted to the chassis frame. A backrest comprises a frame pivoted to the frame of the seat. An actuator has a first end pivoted to the chassis frame and a second end pivoted to the frame of the back. Such an actuator allows to tilt the frame of the back with respect to the seat in such a way to lift and tilt the seat in order to help the user stand up, so that the frame of the seat and the frame of the back can be in a substantially horizontal position, as a sort of bed.

[0007] Such a reclining seat comprises two lateral arms to support the arms of the user. Each lateral arm is connected to the fixed frame by means of a connection rod. Each lateral arm comprises an elongated portion, which acts as arm rest, and a plate portion, which acts as cam. The plate portion of each lateral arm has a slot that slidingly houses a pin joined to the frame of the back. In such a way, the frame of the back is connected to the fixed frame by means of said lateral arms. Moreover, the slot obtained on the plate portion of each lateral arm acts as guide for moving the frame of the back between a substantially vertical position and a substantially horizontal position.

[0008] Although the reclining chair of GB2380399 helps the user to stand up and can be disposed in a substantially horizontal position, as a sort of bed, such a reclining chair is impaired by some drawbacks. In fact, while moving the frame of the back, the elongated portion of each lateral arm, which acts as arm rest, remains always in a substantially horizontal position, being detrimental for the user's comfort. As a matter of fact, when the frame of the seat is in a lifted, tilted position, the arm rests remain in horizontal position, thus impairing the user when standing up from the reclining chair. Moreover, the connection rods-cam plates-pins mechanism is very complicated and articulated, and therefore prone to jamming and failure.

[0009] The purpose of the present invention is to eliminate the drawbacks of the prior art by disclosing a wheelchair that is versatile, functional, comfortable and capable of helping the user when standing up from the wheelchair as well as capable of being positioned in a bed-like configuration.

[0010] These purposes are achieved by the present invention with the characteristics of the independent claim 1.

[0011] The wheelchair of the invention comprises:

- a bearing frame;
- wheels connected to the bearing frame;
- a seat having a frame hinged to the bearing frame,
- a back having a frame hinged to the frame of the seat,
- arm rests to support the arms of a user;
- an actuator connected to the bearing frame in order to lift the seat and the back, in such a way to help the user when standing up from the wheelchair; and
- at least one telescopic rod comprising a first pipe and a second pipe that are telescopically coupled, wherein the second pipe is hinged to the frame of the back in order to support the frame of the back.

[0012] The actuator comprises a cylinder hinged to the bearing frame and a stem hinged to the frame of the back, in such a way to move the seat and the back to a substantially horizontal position, as a sort of bed, and to a substantially vertical position to help the user when standing up from the wheelchair.

[0013] The wheelchair of the invention also comprises two telescopic rods and the first pipe of each telescopic rod is hinged to the bearing support, in such a way that the telescopic rod is disposed in lateral position above the seat. The arm rests are supported by the telescopic rods by means of connection means, in such a way that a movement of the telescopic rods determines a movement of the arm rests.

[0014] The advantages of the wheelchair according to the present invention are evident, wherein the actuator allows for tilting the frame of the back with respect to the seat, in such a way to lift and tilt the seat to help the user when standing up, and in such a way to position the frame of the seat and the frame of the back in a substantially horizontal position, as a sort of bed. Moreover, because of the fact that they are supported by the telescopic rods, the arm rests can follow the inclination of the frame of

the seat and of the frame of the back, thus helping the user when standing up from the wheelchair.

[0015] Advantageous embodiments of the invention will appear from the dependent claims.

[0016] Additional features of the invention will appear manifest from the detailed description below, which refers to a merely illustrative, not limiting embodiment, as illustrated in the attached figures, wherein:

Fig. 1 is a side view of the wheelchair of the invention;
Fig. 2 is a side view of the wheelchair according to the present invention, wherein the back and the seat are shown in lifted position;
Fig. 3 is a side view of the wheelchair according to the present invention, wherein the back is shown in lowered position.

[0017] With reference to the attached figures, a wheelchair according to the present invention is disclosed, which is generally indicated with reference numeral 100.

[0018] The wheelchair (100) of the invention comprises a bearing frame (1). Two front wheels (R1) and two back wheels (R2) are connected to the bearing frame (1).

[0019] A seat (2) is movably connected to the bearing frame (1). A back (3) is movably connected to the seat (2).

[0020] The bearing frame (1) comprises a base (10) from which two front uprights (11) stand up straight. A tooth (14) protrudes on top from the bearing frame (1) towards the seat (2).

[0021] The seat (2) comprises a frame (20) and a cushion (21), or padding, supported by the frame (20) of the seat.

[0022] The back (3) comprises a frame (30) and a cushion (31), or padding, supported by the frame (30) of the back.

[0023] The frame (20) of the seat comprises two lateral rods (22). Each lateral rod (22) of the frame of the seat has a first end (22a) and a second end (22b).

[0024] With reference to Fig. 1, the first end (22a) of each lateral rod (22) of the frame (20) of the seat is hinged to one of the front uprights (11) of the bearing frame, in a pivot point (P1). The second end (22b) of each lateral rod (22) of the frame (20) of the seat is hinged to the frame (30) of the back, in a pivot pin (P2).

[0025] Two telescopic rods (4) are connected to the bearing frame (1) and to the back (3). Each telescopic rod (4) comprises a first pipe (40) that telescopically slides inside a second pipe (41). The first pipe (40) of each telescopic rod (4) has one end hinged to one of the front uprights (11) of the bearing frame, in a pivot point (P3). The second pipe (41) of each telescopic rod (4) has one end hinged to the frame (30) of the back, in a pivot point (P4). In view of the above, each telescopic rod (4) is disposed in lateral position, above the seat.

[0026] Advantageously, the frame (30) of the back has four arms (32, 33), two arms for each side, which protrude towards the seat in such a way to be respectively hinged with the lateral rods (22) of the frame (20) of the seat in the pivot points (P2) and with the telescopic arms (4) in the pivot points (P4).

[0027] The arms (32, 33) of the frame (30) of the back are parallel. The telescopic rods (4) are disposed above the lateral rods (22) of the frame (20) of the seat. The telescopic rods (4) are in substantially parallel position with respect to the lateral rods (22) of the seat.

[0028] In view of the above, the upright (11) of the bearing frame, the lateral rod (22) of the frame (20) of the seat, the two arms (32, 33) of the frame (30) of the back and the telescopic rod (4) form an articulated parallelogram, having four elements hinged in four pivot points (P1, P2, P3, P4).

[0029] An actuator (6) comprises a stem (61) that slides inside a cylinder (60). The cylinder (60) is hinged to the bearing frame (1) in a pivot point (P6). The stem (61) has one end (62) hinged to the back (2), in a pivot point (P7), as shown in Figs. 1 and 2.

[0030] The frame (30) of the back has one arm (34) that protrudes downwards in order to be hinged to the stem (61) of the actuator in the pivot point (P7), as shown in Figs. 1 and 3.

[0031] The actuator (6) comprises a motor (M1) that can be manually operated by a user with a button (B).

[0032] With reference to Fig. 1, the stem (61) of the actuator is disposed in an intermediate position inside the cylinder (60). In such a case, the seat (2) is disposed in a substantially horizontal position, which the frame (20) of the seat stopped against the tooth (14) of the bearing frame (1), and the back (3) is disposed in a substantially orthogonal position with respect to the seat (2).

[0033] With reference to Fig. 2, if the actuator (6) is actuated in such a way that the stem (61) comes out from the cylinder (60), the stem (61) of the actuator pushes the frame (30) of the back upwards and, consequently, also the frame (20) of the seat is lifted upwards, rotating around the pivot axis (P1). The telescopic rods (4) rotate around the pivot axis (P3) remaining substantially parallel to the lateral rods (22) of the frame (20) of the seat.

[0034] In such a situation, wherein the stem (61) of the actuator is completely extracted from the cylinder (60), the back (3) is always disposed along a vertical plane, whereas the seat (2) is disposed along a plane that is tilted by approximately 30°-50° with respect to a horizontal plane.

[0035] With reference to Fig. 3, if the actuator (6) is actuated in such a way that the stem (61) is completely retracted inside the cylinder (60), the stem (61) of the actuator pulls the frame (30) of the back downwards and, consequently, the arm (32) of the frame (30) of the back rotates around the pivot axis (P2) and each arm (33) of the frame (30) of the back rotates around the pivot axis (P4). Therefore, the back (3) moves downwards with respect to the seat (2).

[0036] In such a situation, wherein the stem (61) of the actuator is completely retracted inside the cylinder (60), the seat (2) is always disposed in a substantially horizontal position, the frame (20) of the seat being stopped

against the tooth (14) of the bearing frame (1), whereas the back (3) is disposed along to a plane that is tilted by 20°-40° with respect to a horizontal plane.

[0037] Advantageously the bearing frame (1) comprises two arms (12) that protrude frontally from the front uprights (11).

[0038] The wheelchair (100) comprises two footrests (7) hinged to the arms (12) of the bearing frame (1) in a pivot point (P8).

[0039] The bearing frame (1) comprises two arms (13) that protrude frontally from the uprights (11) of the bearing frame. Each bracket (13) is disposed under the arms (12) of the bearing frame.

[0040] Two actuators (9), one for each side of the wheelchair (100), are connected to the bearing frame (1) and to the footrests (7). In particular, each actuator (9) comprises a stem (91) that slides inside a cylinder (90).

[0041] With reference to Fig. 3, the cylinder (90) of each actuator is hinged to one of the two brackets (13) of the bearing frame (1) in a pivot point (P9) and the stem (91) of each actuator has one end (92) hinged to one of the two footrests (7), in a pivot point (P10).

[0042] Each actuator (9) comprises an electrical motor (M2) that can be manually operated by a user with a button (B).

[0043] With reference to Figs. 1 and 2, the stem (91) of the actuator (9) is disposed in a completely retracted position inside the cylinder (90). In such a case, the footrest (7) is disposed in a substantially vertical position.

[0044] With reference to Fig. 3, if the actuator (9) is actuated in such a way that the stem (91) comes out from the cylinder (90), the stem (91) of the actuator pushes the footrest (7) upwards; consequently, the footrest (7) is lifted upwards, rotating around the pivot axis (P8).

[0045] In such a situation, wherein the stem (91) of the actuator is completely extracted from the cylinder (90), the footrest (7) is disposed along a plane that is tilted upwards by approximately 10°-30° with respect to a horizontal plane, as shown in Fig. 3.

[0046] Advantageously, the electrical motors (M1, M2) that actuate the actuators (6, 9) are electrical step motors in such manner to precisely adjust the position of the back (3) and of the footrest (7).

[0047] The wheelchair (100) comprises two armrests (8) supported by the telescopic rods (4) by means of connection means (80). In such a way, the armrests (8) are disposed above the telescopic rods (4).

[0048] Because of the connection of the armrests (8) with the telescopic rods (4), it is easier for the user to stand up from the wheelchair. In fact, when the actuator (6) is actuated in such a way that the stem (61) comes out from the cylinder (60), the frame (20) of the seat is lifted upwards, rotating around the pivot axis (P1), and the telescopic rods (4) rotate around the pivot axis (P3), remaining substantially parallel to the lateral rods (22) of the frame (20) of the seat. In such a situation, when the first pipe (40) of each telescopic rod is completely retracted inside the second pipe (41), one end of the second pipe (41) is stopped against one of the uprights (11) of the bearing frame, thus determining a rotation of the telescopic rod (4) with respect to the frame (30) of the back around the pivot point (P3). In such a way, the telescopic rod (4) and the armrest (8) integral to the telescopic rod (4) are additionally tilted upwards, thus helping the user when standing up from the wheelchair.

[0049] The length of the connection means (80) used to connect the two armrests (8) to the telescopic arms (4) can be adjusted, in such a way to adjust the position of the armrests (8). For example, the connection means (80) can be provided with two telescopically siding sleeves (81, 82). A fixing screw (83) is used to fix the two sleeves (81, 82) in position.

[0050] The back wheels (R2) are supported by actuators (A) connected to the bearing frame (1). Each actuator (A) can move the back wheel (R2) between a parking position, wherein one side of the back wheel (R2) rests on the ground (Figs. 2 and 3), i.e. the axis of the back wheel (R2) is orthogonal to the ground, and a transportation position, wherein the tread of the back wheel (R2) rests on the ground (Fig. 4), i.e. the axis of the back wheel (R2) is parallel to the ground.

[0051] Numerous variations and modifications can be made to the present embodiments of the invention, which are within the reach of an expert of the field, while falling in any case within the scope of the invention.

Claims

1. Wheelchair (100) comprising:

- a bearing frame (1);
- wheels (R1, R2) connected to the bearing frame (1);
- a seat (2) having a frame (20) hinged to the bearing frame (1) in a pivot point (P1);
- a back (3) having a frame (30) hinged to the frame (20) of the seat in a pivot point (P2);
- armrests (8) to support the arms of a user;
- an actuator (6) connected to the bearing frame (1) in order to lift the seat (2) and the back in a way to help the user when standing up from the wheelchair; and
- at least one telescopic rod (4) comprising a first pipe (40) and a second pipe (41) that are telescopically coupled, wherein the second pipe (41) is hinged to the frame (30) of the back in a pivot point (P4) to support the frame of the back,

characterized in that

said actuator (6) comprises a cylinder (60) hinged to the bearing frame (1) in a pivot point (P6) and a stem (61) hinged to the frame (30) of the back in a pivot point (P7), in such a way to move said seat (2) and said back (3) to a substantially horizontal position, as a sort of bed, and to a substantially vertical posi-

tion, to help the user when standing up from the wheelchair;
wherein said wheelchair (100) comprises two telescopic rods (4) and said first pipe (40) of each telescopic rod is hinged to the bearing support (1) in a pivot point (P3), in such a way that the telescopic rod (4) is disposed in lateral position above the seat (2), wherein said armrests (8) are supported by said telescopic rods (4) by means of connection means (80), in such a way that a movement of the telescopic rods (4) determines a movement of the armrests (8).

2. The wheelchair (100) of claim 1, wherein the frame (20) of the seat comprises at least one lateral rod (22) comprising a first end (22a) and a second end (22b); said first end (22a) of said at least one lateral rod (22) of the frame (20) of the seat being hinged to the bearing frame (1) in a pivot point (P1); said second end (22b) of said at least one lateral rod (22) of the frame (20) of the seat being hinged to the frame (30) of the back in a pivot point (P2).

3. The wheelchair (100) of claim 2, wherein the frame (30) of the back comprises at least two arms (32, 33) that protrude towards the seat (2) in such manner to be respectively hinged with said at least one lateral rod (22) of the frame (20) of the seat in the pivot point (P2) and with one of said telescopic rods (4) in the pivot point (P4).

4. The wheelchair (100) of any one of the preceding claims, wherein said frame (30) of the back is provided with an arm (34) that protrudes downwards in order to be hinged to the stem (61) of the actuator (6) in the pivot point (P7).

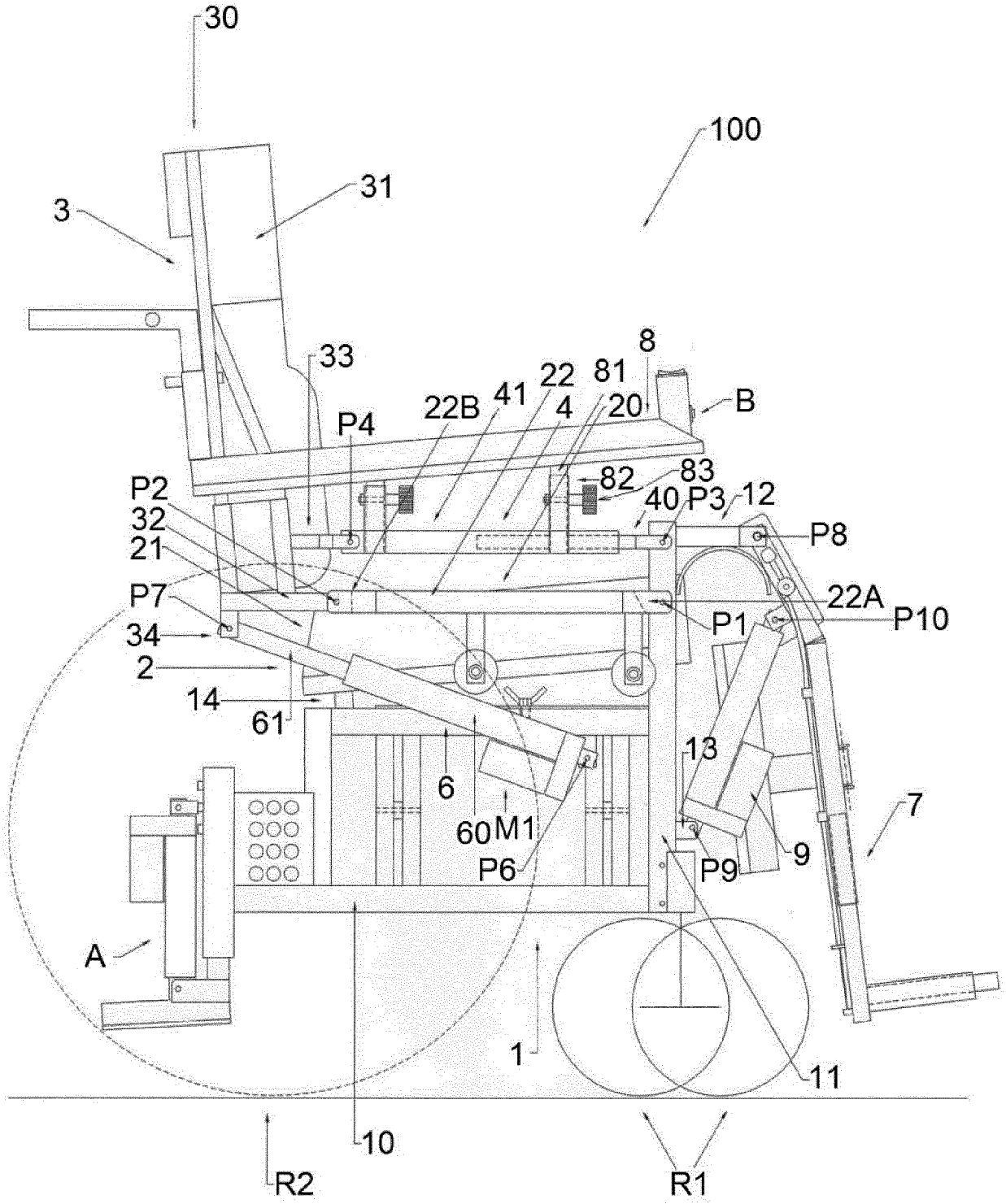
5. The wheelchair (100) of any one of the preceding claims, wherein said connection means (80) comprise two telescopically sliding sleeves (81, 82) and one fixing screw (83) to fix said two sleeves (81, 82) in position.

6. The wheelchair (100) of any one of the preceding claims, comprising:

- at least one footrest (7) hinged to the bearing frame (1) in a pivot point (P8);
- at least one actuator (8) connected to the bearing frame (1) and to the footrest (7) to move the footrest (7).

7. The wheelchair (100) of claim 6, wherein said actuators (6, 8) comprise electrical motors (M1, M2) that can be operated by a user with a button (B); wherein said electrical motors (M1, M2) are electrical step motors in such manner to precisely adjust the position of the back (3) and of said at least one footrest (7).

8. The wheelchair (100) of any one of the preceding claims, wherein the back wheels (R2) are supported by actuators (9) connected to the bearing frame (1); each actuator (9) being intended to move the back wheel (R2) between a parking position, wherein the axis of the back wheel (R2) is orthogonal to the ground, and a transport position, wherein the axis of the back wheel (R2) is parallel to the ground.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P8
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P10
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M1
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R2
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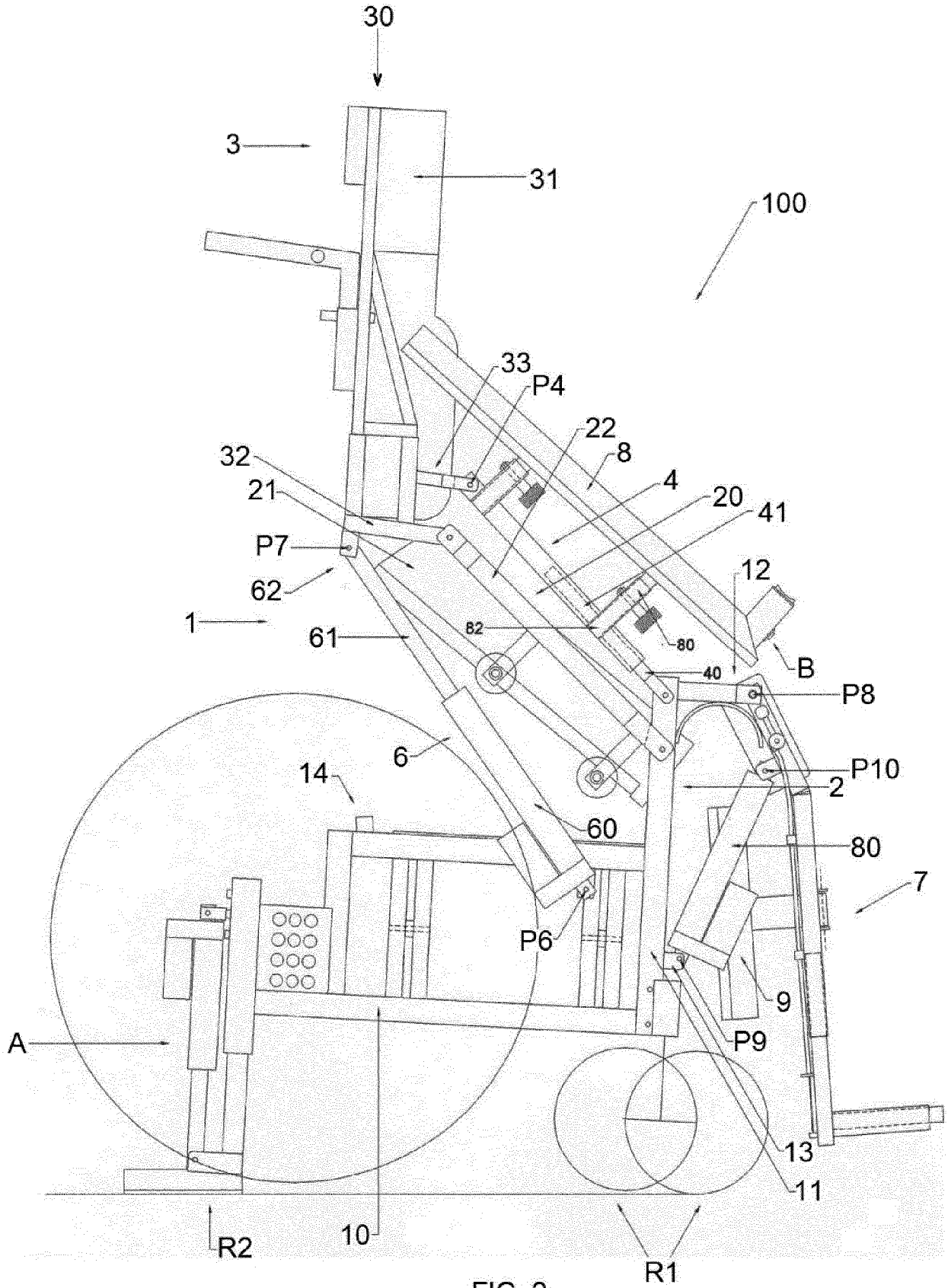
FIG. 1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P6
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P9
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11
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R2
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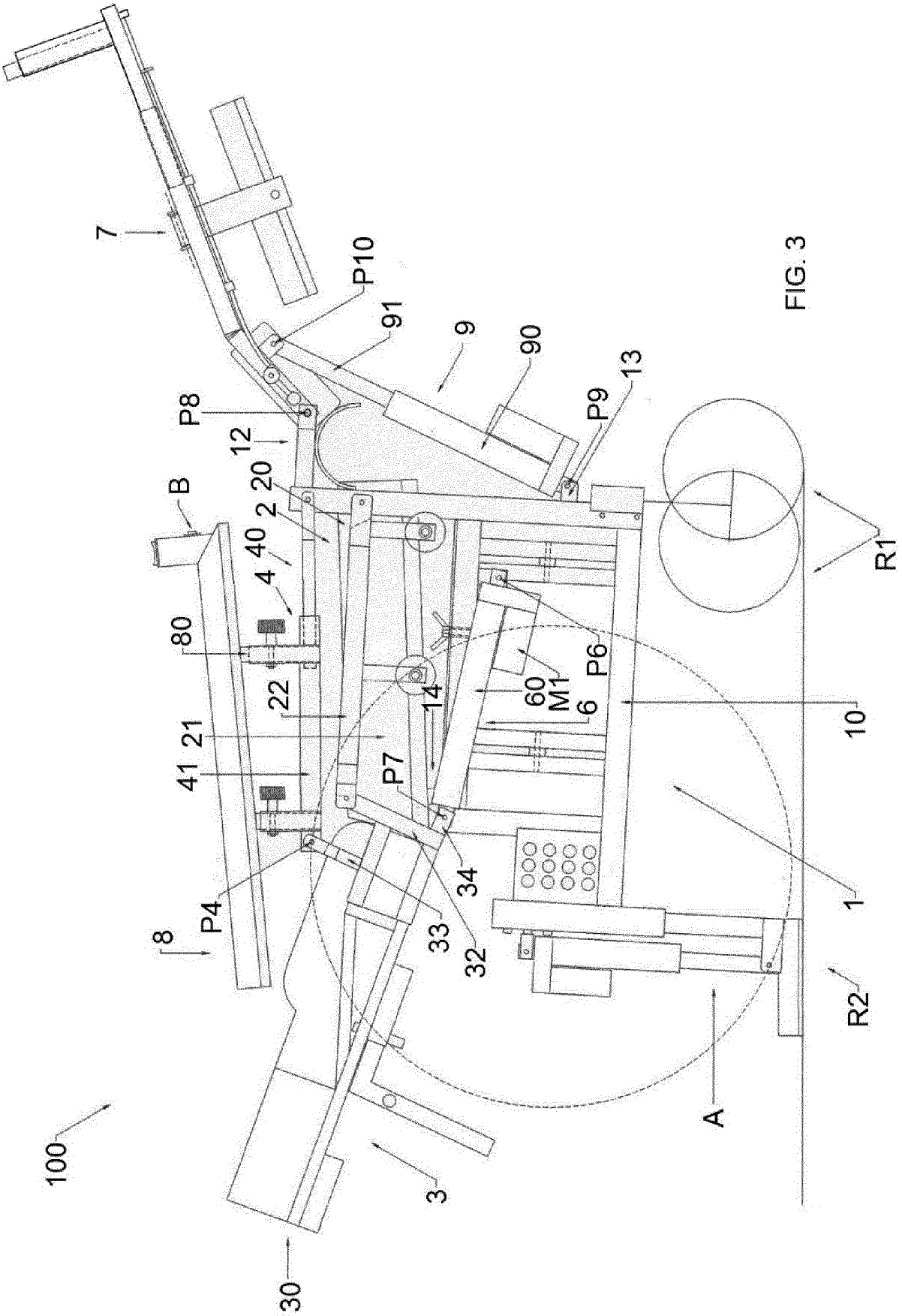
FIG. 2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34
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3
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R2

FIG. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 17 16 1314

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	DE 36 07 296 C1 (DIMASTROGIOVANNI SALVATORE) 5 November 1987 (1987-11-05) * the whole document * -----	1-8	INV. A61G5/14 A61G5/00 A61G5/10 A61G5/12
A	GB 2 380 399 A (TAYLOR GRAHAM [GB]) 9 April 2003 (2003-04-09) * the whole document * -----	1-8	

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	28 July 2017	Edlauer, Martin

CATEGORY OF CITED DOCUMENTS

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EPO FORM 1503 03.82 (P04C01)

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28-07-2017

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 3607296 C1	05-11-1987	NONE	
GB 2380399 A	09-04-2003	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- DE 3607296 **[0005]**
- GB 2380399 A **[0006] [0008]**