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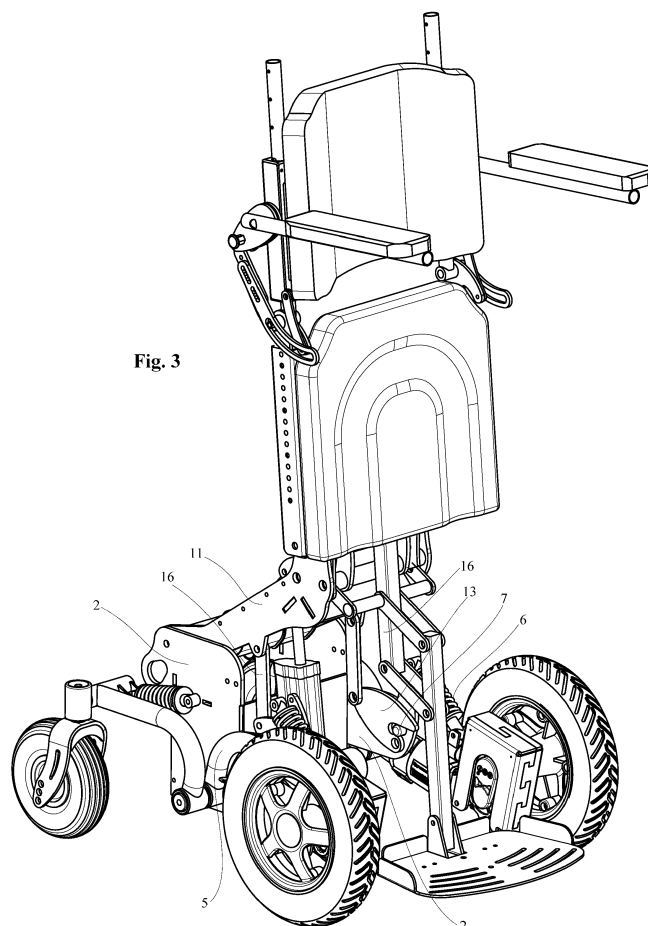
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(54) **STABILISER DEVICE FOR WHEELCHAIRS EQUIPPED WITH SHOCK ABSORBERS**

(57) This deals with a stabiliser device to increase the stability of wheelchairs equipped with shock absorbers that activates automatically restoring stable condi-

tions in the critical wheelchair verticalisation and seat raising phases blocking the involvement of the shock absorbers.



Description

[0001] The object of the present invention relates to a stabilising device for improving the stability of wheelchairs fitted with shock absorbers.

Prior art

[0002] There is a special category of outstanding wheelchairs with numerous features that allow its users to use them at any time of the day, enabling them to move in any situation, even on uneven ground, as long as it is not bump, and at any time of the day, since the seat can be raised up and the wheelchair can be brought into a vertical condition.

[0003] In fact, these types of wheelchairs are remarkably capable of dealing with an uneven floor or ground, using shock absorbers that absorb any ruggedness and making moving always a comfortable experience.

[0004] Therefore, the use of a shock absorber in these wheelchairs has many benefits not only because of its numerous and varied features, but at the same time introduces a critical element.

[0005] In fact, these shock absorbers behave admirably during normal use of the wheelchair, but they also represent an element that could lead to loss of equilibrium if the centre of gravity of the wheelchair rises excessively and exits or moves outwards towards the support perimeter.

[0006] Such situations arise, in particular, if the seat is raised or in the verticalisation phase.

[0007] In both these situations, there is even greater need for stability and in limited terms, also because in these situations, with the seat raised and in a vertical position, the wheelchair is not really suited to moving on a surface that is uneven or has holes, and consequently there is no need for shock absorbers and the consequent effects of having them.

[0008] One solution could consist of intervene on these shock absorbers by modifying their preload or stiffening their reaction, but this would make said shock absorbers less sensitive and ready for daily use and unable to deal with small rugged areas commonly encountered during daily use.

[0009] Even a normal device that would allow you to move, raising or lowering the stabilisers to increase the support perimeter, and only in the presence of the above-mentioned destabilising situations, would prove to be unsafe and impractical, not only because of the increase in weight and the bulk of these devices but also because the relative control, left to the operator's choosing, would not provide a sufficient guarantee of implementation.

Objects of the invention

[0010] The object of the present invention is to make available a stabilising device for improving the stability of wheelchairs equipped with shock absorbers that over-

comes one or more of the drawbacks of the prior art.

[0011] A further object of the present invention is to make available a stabilising device for wheelchairs equipped with shock absorbers that overcomes the above-mentioned drawbacks.

[0012] A different object of the present invention is to make available a stabilising device for wheelchairs equipped with shock absorbers that engage automatically in the critical stages of stability and in particular during the raising of the seat some distance off the ground and in the verticalisation phase.

[0013] An important object of the present invention is to make available a stabilising device for wheelchairs equipped with shock absorbers whose effect is proportional and progressive with respect to the critical stages of stability, and in particular during the raising of the seat some distance from the ground and in the verticalisation phase.

[0014] A clear purpose of the present invention is to make available a stabilising device for wheelchairs equipped with shock absorbers whose operation is safe and reliable.

[0015] Another object of the present invention is to make available a stabilising device for wheelchairs equipped with shock absorbers whose activation is automatic.

[0016] A further object of the present invention is to make available a stabilising device for wheelchairs equipped with self-resetting shock absorbers with respect to the play that could be created over time as a result of use.

[0017] A no-less important object of the present invention is to make available a stabilising device for wheelchairs equipped with shock absorbers that maintain the readiness and response sensitivity of the shock absorbers during normal wheelchair use outside the critical stability phases.

[0018] These and other objects are all achieved by the wheelchair of this invention in accordance with the attached claims.

Explanation of the invention

[0019] A stabilising device for wheelchairs equipped with shock absorbers comprising one or more base plates constituting the load-bearing structure of the wheelchair, where hinged on said base plate there is a first end of at least one arm, whose second extremity of said arm supports a wheel of said wheelchair, in an intermediate position between said first end and said second end a protruding pin is fixed that can slide, moving within a slot in the support structure, where the movement of the arm supporting the wheel is countered by an actuator, most likely a shock absorber, and furthermore said pin movement is defined and limited in its travel within the ends of said slot, and finally said movement is limited, since the gap of the slot is narrow, by a plate hinged on said load-bearing structure and made to rotate by seat

raising kinematic mechanisms and/or verticalisation mechanisms of the wheelchair.

Advantageous features of the invention

[0020] Advantageously, said plate is rotated by a linking rod between said plate and the lifting or verticalising kinematic systems.

[0021] A further advantage is that said limitation is achieved by decreasing the gap of the slot, and limiting the travel of the pin in the slot.

[0022] A different advantage is that said limitation is progressive and proportional to the height the seat is lifted or to the degree of verticalisation.

[0023] Another advantage is a total limitation for the maximum degree of raising or verticalisation.

[0024] A no less important advantage is that said limitation is total, since the configuration of the fork and the maximum permissible rotation, the pin is within the mouth of the fork.

[0025] Another advantage lies in the fact that said total limitation of the movement of the pin actuated by the fork, until it locks, brings the wheelchair into the safest condition possible with the pin next to and locked to one end, the most secure one, of the slot.

Brief description of the drawings

[0026] The technical features of the invention, according to the aforesaid aims, can clearly be seen in the content of the claims below, and its advantages will become more readily apparent in the detailed description that follows, made with reference to the accompanying drawings, which illustrate a preferred embodiment, which is purely exemplary and not limiting, in which:

Fig. 1 shows a wheelchair in its normal use configuration.

Fig. 2 shows a wheelchair in a configuration of a first critical stability mode.

Fig. 3 shows a wheelchair in a vertical use mode with precarious equilibrium.

Fig. 4 shows in an exploded and magnified manner only the lower part of the wheelchair, to show in an exemplary manner the elements and their correlation that help form and define the object of the invention.

Fig. 5 shows in an exemplary manner the normal configuration of the various elements during use of the wheelchair in the mode shown in Fig. 1.

Fig. 6 shows in an exemplary manner the configuration of the component units and their interrelationship during use of the wheelchair in the mode shown in fig. 2 and fig. 3.

Detailed description of an example of a preferred embodiment

[0027] A wheelchair in its normal operating configuration is shown in figure 1, while figures 2 and 3 corresponding to figs. 3 and fig. 4, respectively with the seat raised and in a vertical mode show two modes with critical static equilibrium

[0028] The load-bearing structure 1 of the wheelchair can be configured in a number of ways, in this example it is made with a pair of spaced and base plates 2 paired and separated, which have the function of acting as a base and of supporting on the wheels 3 all the parts that support, direct and move the seat 4. In particular, since the structure 1 is symmetrical only one of such base plates 2 is shown in the drawings.

[0029] Joined to each of these base plates 2 is at least the first end of an arm 5, on the second end of which a wheel 3 is applied.

[0030] This first end is hinged onto the base plate 2 and can slightly rotate, compensating for any obstacles or protrusions that might be encountered along the way, absorbing any differences in height, countered in this movement by the damping action of a shock absorber 6.

[0031] In fact, between the structure 1 of the wheelchair and said arm 5 there is a shock absorber 6.

[0032] Protruding from this arm 5 is a pin 7, preferably positioned far away from the hinge end of the arm 5, which moves, following the movement of the arm 5, sliding into a slot 8 in the load-bearing structure 1, or in the base plate 2.

[0033] This pin 7 also defines and limits the oscillation movement of the arm 5 countered and dampened by the shock absorber 6, next to the ends 9, 10 of the gap of the oval slot 8.

[0034] As already pointed out, joined to this base plate 2 there are various kinematic mechanisms for supporting and moving the seat 4, and after their movement for raising the height of the seat 4 or for the verticalisation of the wheelchair, at least one trellis 11, hinged on the base plate 2, is rotated around its fulcrum 12.

[0035] With the verticalisation of the wheelchair or the raising of the height of the seat 5, the sliding of the pin 7 within the slot 8 is restricted or blocked by a clamping plate 13, also hinged on said base plate 2 which progressively limits the travel of the pin 7 with a catch 14, limiting the gap of the slot 8 to travel less than the original extension of the slot at its ends 9, 10, until it completely blocks the movement of the pin 7 within the slot 8 and as a result completely blocking the movement of the arm 5 on one end of which a wheel 3 is applied.

[0036] In this extreme condition, the destabilising effect of the shock absorber 6 in the two situations that are critical for the stability of the wheelchair is completely cancelled.

[0037] If necessary, said clamping plate 13 is configured with a fork 15 that engages the pin 7 over several parts blocking its movement. The shifting of this clamping

plate 13 is due to the connection of the trellis 11 that supports the seat 4 by means of a tie rod 16, which makes the limitation of the travel of the arm 5 with respect to the raising or degree of verticalisation progressive and proportional.

[0038] Also, with such a configuration of the clamping plate 13 with a fork 15, it is always possible without any malfunction and hesitation in restoring a condition of stability due to the emergence of critical conditions.

[0039] In fact, assuming that the user seated in the chair 4 has already preloaded the shock absorber 6, because of his weight, shifting, then, the relative pins 7 joined to the arms of the wheels in a situation at about half of the possible travel in the slot 8, during the verticalisation phase of the fork 15 of the clamping plate 13, in any event, in any previous position the pins 7 are along the extension of the slot 8, embraces the pin 7 and comes up against it, locking it near the lower end 9 of the slot 8, improving the safety conditions with regard to stability, both to prevent further oscillation of the arm 5 of the wheel and also to raise the arm 5 itself at the unstressed end, and therefore favouring the movement of the loads within safety margins with respect to the stability perimeter.

Claims

1. Stabiliser device for wheelchairs equipped with shock absorbers including one or more base plates (2) constituting the load-bearing structure (1) of the wheelchair, on said base plate (2) is hinged a first end of at least one arm (5), whose second end of this arm supports a wheel (3) of this wheelchair, in an intermediate position between said first end and said second end of the arm (5) is there a protruding pin (7) that can slide, moving within a slot (8) in the load-bearing structure (1) or in the base plate (2), where the movement of the arm (5) that supports the wheel (3) countered by an actuator, probably a shock absorber (6), and also said movement of the pin (7) is defined and delimited in its travel within the ends (9, 10) of said slot (8), finally said movement is limited since the gap of the slot (8) is restricted by a latch (14) of a locking plate (13) hinged on said load-bearing structure (1) or on a base plate (2) and made to rotate by the kinematics for lifting the position of the seat (4) and/or by the kinematics for verticalising the wheelchair.
2. Stabiliser device for wheelchairs equipped with shock absorbers according to claim 1 **characterised by** the fact that said locking plate (13) is made to rotate by a tie rod (16) between said locking plate (13) and the lifting or verticalisation mechanisms.
3. Stabiliser device for wheelchairs equipped with shock absorbers according to claim 1 **characterised by** the fact that said limitation is created by decreas-

ing the gap of the slot (8), and limiting the travel of the pin (7) within the slot (8).

4. Stabiliser device for wheelchairs equipped with shock absorbers according to the previous claim **characterised by** the fact that said limitation is progressive and proportional to the lifting height of the seat (4) or rise in the verticalisation position.
5. Stabiliser device for wheelchairs equipped with shock absorbers according to claims 3 or 4 **characterised by** the fact that said limitation is total for the maximum degree of raising or verticalisation.
6. Stabilizer device for wheelchair equipped with shock absorbers according to claim 1 **characterised by** the fact that said limitation is total since the locking plate (13) configured as a fork (15) and at the maximum allowable rotation the pin (7) is held within the mouth of the fork (15).
7. Stabiliser device for wheelchairs equipped with shock absorbers according to one or more of the preceding claims, **characterised by** the fact that the said locking plate (13) configured with a catch (14) or fork (15) in the critical stability conditions, brings back the pin (7), in whatever position it is located along the extension of the slot (8), pushing up against it and locking it at the end (9) of the slot (8), restoring and increasing the safety margins for the stabilisation of the wheelchair.

Fig. 1

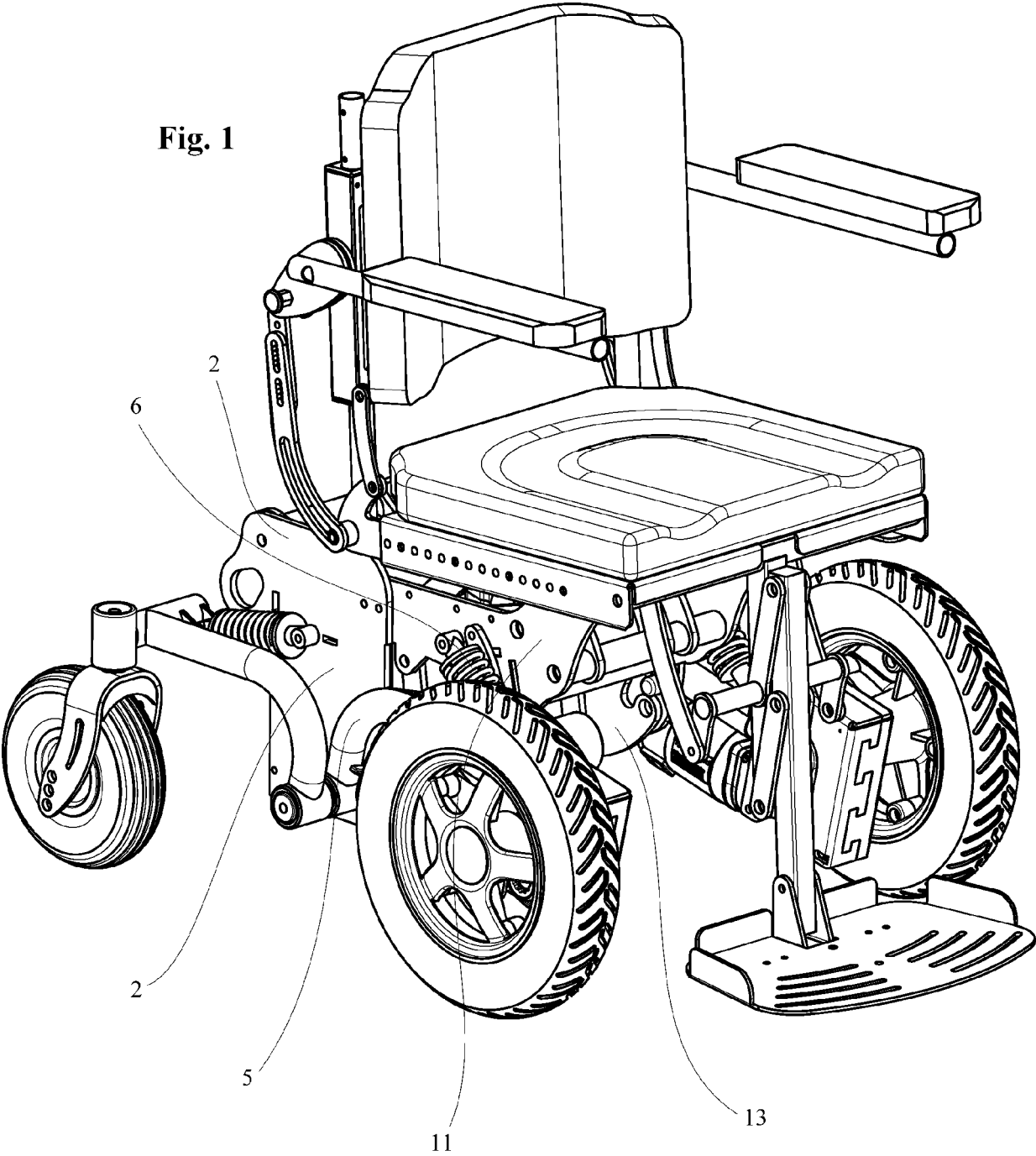
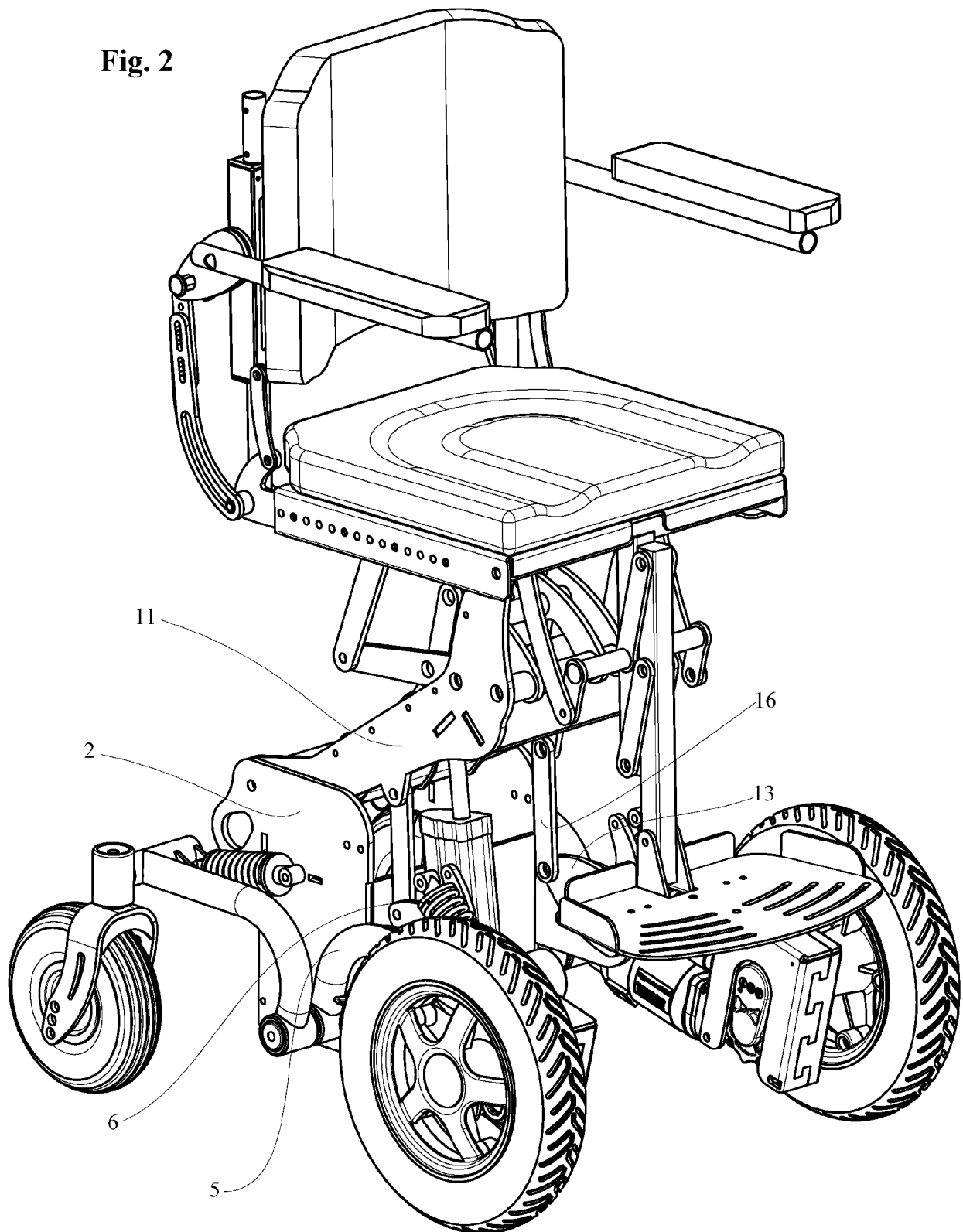
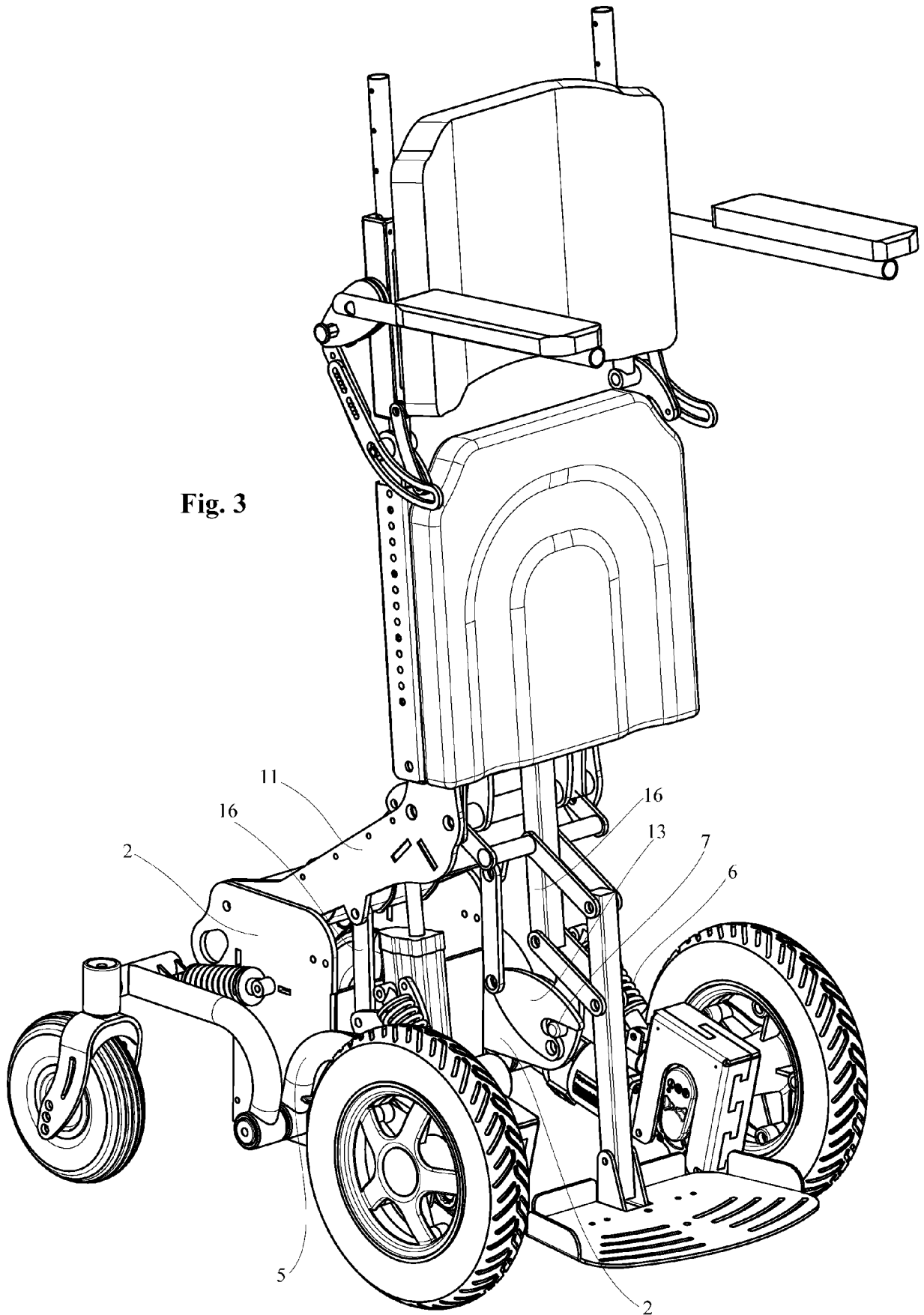
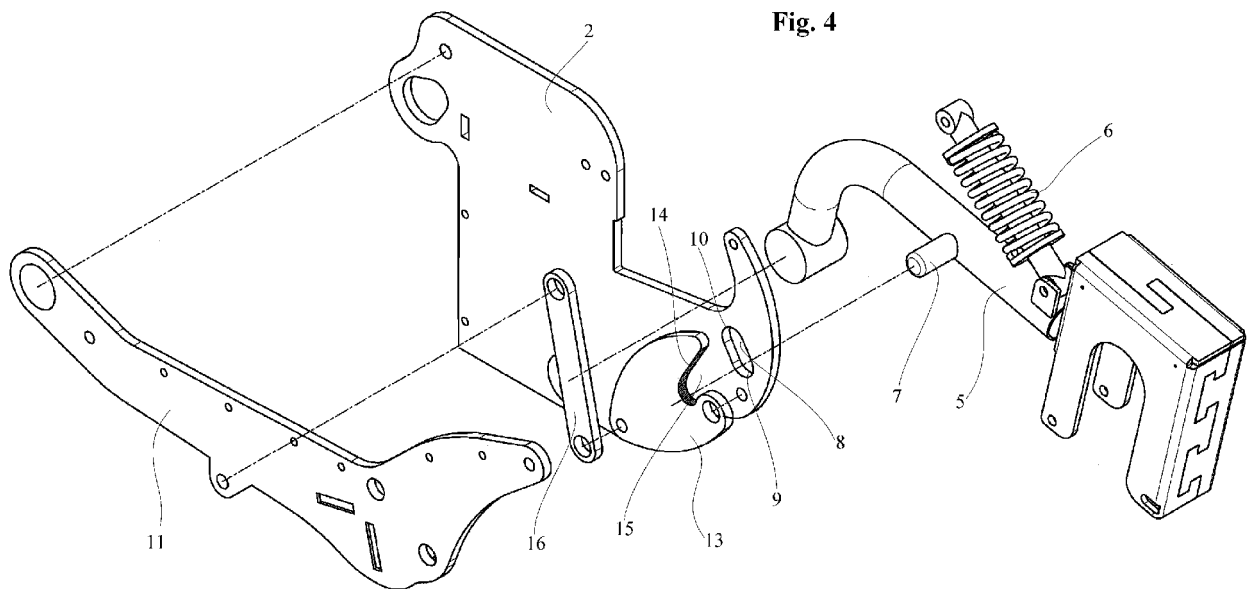


Fig. 2







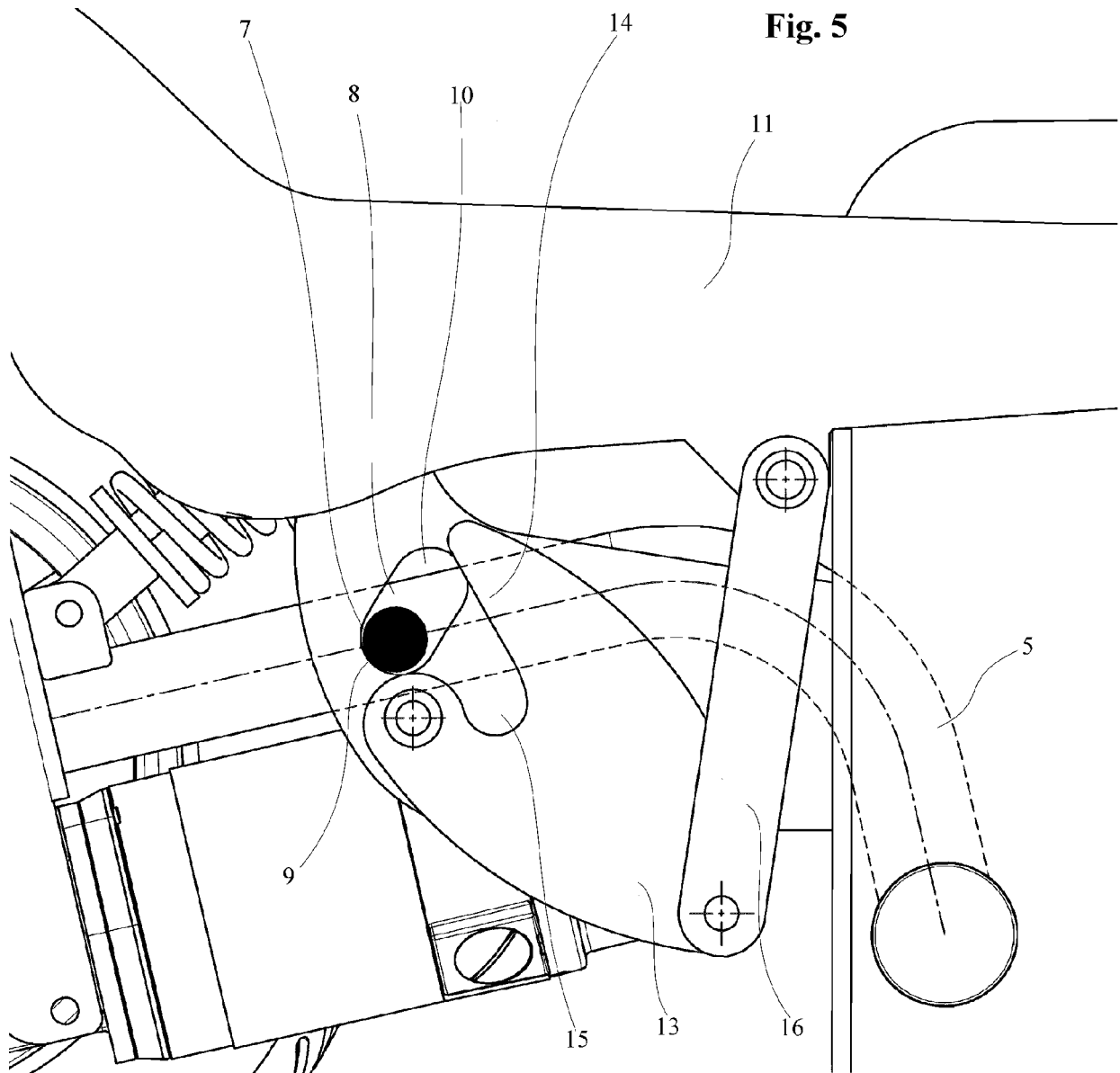
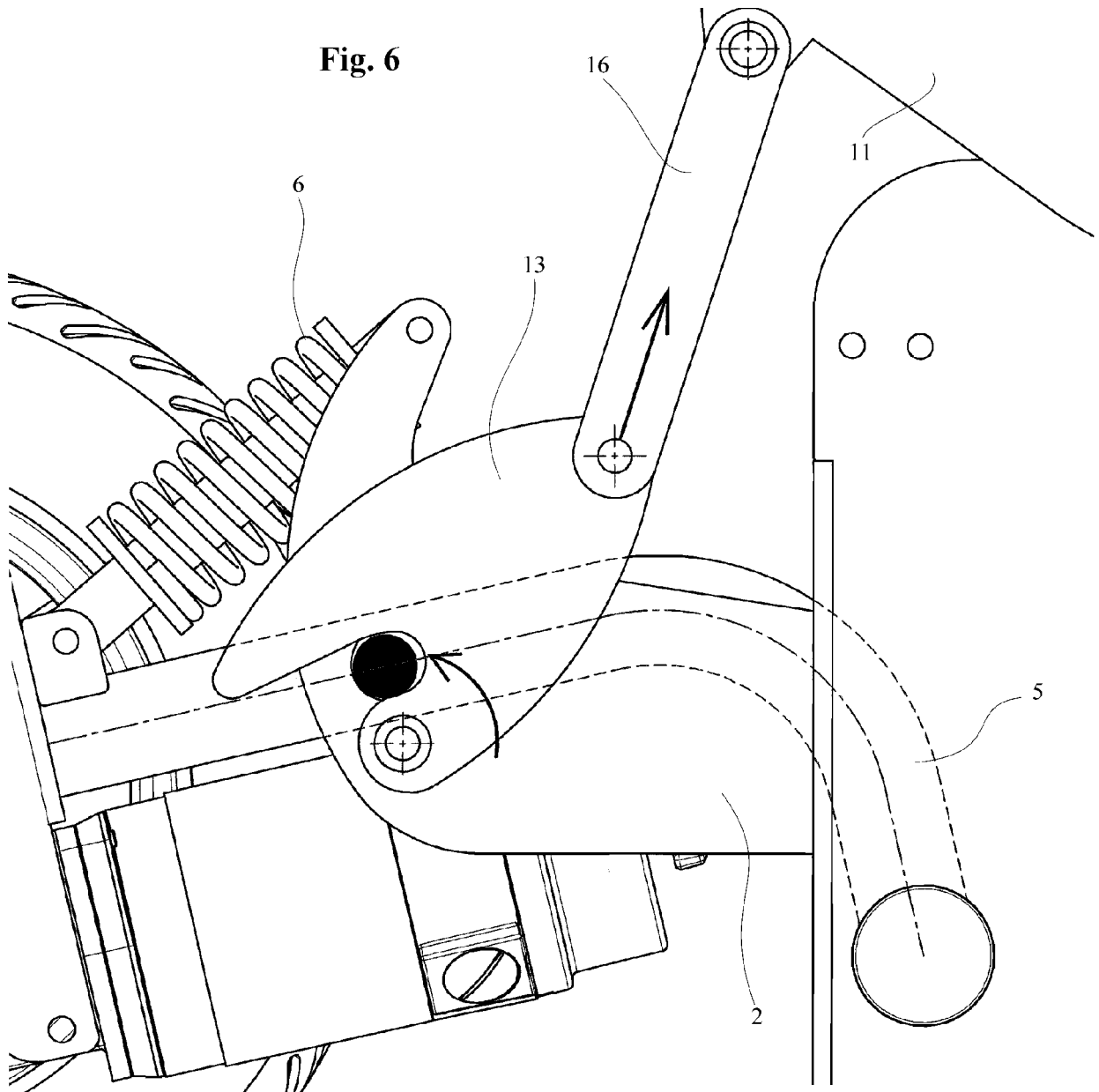


Fig. 6





EUROPEAN SEARCH REPORT

Application Number
EP 17 17 1357

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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	US 7 150 463 B1 (LIAO FENG-HUEI [TW]) 19 December 2006 (2006-12-19) * column 2, line 40 - column 4, line 22; figures 3-5 *	1	INV. A61G5/10 A61G5/14
A	US 2007/039766 A1 (JACKSON MARK A [US] ET AL) 22 February 2007 (2007-02-22) * paragraphs [0049], [0056] - [0059]; figures 7-9, 21-24 *	1	
A	EP 1 523 971 A2 (INVACARE DEUTSCHLAND GMBH [DE]) 20 April 2005 (2005-04-20) * paragraphs [0026] - [0036]; figures 1-7 *	1	
A	US 2015/196441 A1 (MULHERN JAMES P [US] ET AL) 16 July 2015 (2015-07-16) * paragraphs [0067] - [0116], [0126] - [0133], [0144] - [0151], [0198] - [0207]; figures 1-6, 10A-10C, 30-39 *	1	
			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 4 October 2017	Examiner Petzold, Jan
CATEGORY OF CITED DOCUMENTS 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 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			

EPO FORM 1503 03/82 (P04C01)

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

EP 17 17 1357

5 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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04-10-2017

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 7150463	B1	19-12-2006	NONE
US 2007039766	A1	22-02-2007	AT 465931 T 15-05-2010 EP 1924488 A2 28-05-2008 US 2007039766 A1 22-02-2007 US 2012138376 A1 07-06-2012 US 2012273283 A1 01-11-2012 WO 2007022387 A2 22-02-2007
EP 1523971	A2	20-04-2005	DE 10349019 B3 23-06-2005 EP 1523971 A2 20-04-2005
US 2015196441	A1	16-07-2015	AU 2014364921 A1 14-07-2016 AU 2014365851 A1 14-07-2016 CA 2933695 A1 25-06-2015 CA 2933851 A1 25-06-2015 EP 3082705 A1 26-10-2016 EP 3082706 A2 26-10-2016 US 2015196438 A1 16-07-2015 US 2015196441 A1 16-07-2015 US 2016228311 A1 11-08-2016 US 2017156952 A1 08-06-2017 WO 2015095156 A1 25-06-2015 WO 2015095221 A2 25-06-2015