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(54) MOVING AID FOR THE (FORE)ARM OF A PERSON

HILFE FÜR DIE (UNTER) ARM EINES PERSONS

AIDE À LA MOBILITÉ DU BRAS OU DE L'AVANT-BRAS D'UNE PERSONNE

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Description

[0001] The present invention relates to a moving aid for the (fore)arm of a person. Moving aids as such are known in the art, for example from WO 2009/029693 A1. They serve to assist (partly) disabled persons to perform functions they are not able to perform without help, or which cost them extraordinary much effort.

[0002] In many cases this is done by supporting the (fore)arm in a certain position, or by providing a movable support for the (fore)arm with respect to a (roller)chair or bed. The support is then arranged for moving along with the arm, and may or may not be powered in order to ease the movement for a user.

[0003] In general, these aids provide an improvement in the well-being of the person, but still there are some disadvantages associated with them. In particular, the arrangements on (wheel-) chairs are voluminous, which causes - in the case of a wheelchair - for instance trouble when trying to pass through doors and other small openings. Furthermore, the operation of the existing aids is in many cases still intensive and exhausting for their users.

[0004] For that reason, and in general for providing a useful alternative to the existing moving aids, it is a goal of the present invention to provide a moving aid that at least partly lacks the above disadvantages, and that provides benefits over the prior art.

[0005] The present invention thereto proposes a moving aid for the (fore)arm of a person, comprising an arm-rest for receiving the (fore)arm of a person, a carrier for the arm rest, a support, for movably supporting the carrier with respect to the (wheel)chair, work place, bed or other fixed world, wherein the support comprises a first parallelogram, having a first essentially horizontal extending upper side, connected to the (wheel)chair, work place, bed or other fixed world, and a first lower side, situated below the upper side, coinciding with a second lower side, forming part of a second parallelogram, which second parallelogram comprises a second upper side, situated above the first upper side of the first parallelogram and which holds the carrier; and wherein at least one of the legs of the second parallelogram that connect the second lower side and the second upper side extends beyond the second lower side; and wherein the lower end of the at least one leg that extends beyond the second lower side is beared in a conductor-track, which conductor-track is formed such that a second upper side of the second parallelogram is urged in a desired track, such as an essentially horizontal track.

[0006] The moving aid according to the present invention provides the advantage that an arm rest is provided that is able to follow for instance horizontal movement of the (fore)arm of a person, while being compact and robust. Alternative solutions according to the prior art with sliding constructions have appeared not to be able to resist the weight of an arm and a load for the arm for a long time without wear, and yet other solutions according to the prior art are not able to follow a straight horizontal

or other desired movement of the arm, or are not compact.

[0007] The use of a double parallelogram enables the carrier for the arm rest and thus the arm rest to follow a straight horizontal path. The path is further controlled by the conductor-track through which the lower end of the at least one leg that extends beyond the second lower side is beared. This conductor track may thereto for instance have a V-shape, as will be explained later on with respect to the figures.

[0008] In order to increase the safety of the use of the moving aid, the conductor-track may be arranged under a cover. This also avoids dirt from entering the track and this causing malfunctioning. The cover may further have an aesthetic or ergonomic effect.

[0009] In an embodiment, the carrier comprises at least two mutually hinged parts, which are at least together rotatable about a vertical axis with respect to the support, and wherein the second hinged part is rotatable about a horizontal axis with respect to the first hinged part.

[0010] The at least two mutually hinged parts thus form two "arms" of which the carrier is formed, and together with the axes of rotation mentioned above enable to perfectly follow a user's arm movement.

[0011] In a further embodiment, the rotation about the vertical axis comprises a lock. Such lock prevents undesired and/or uncontrolled rotation and movements of a user's arm, and enables to fix the arm support in a desired position, which may be a preferred setting of a user. The lock may comprise a number of pins, arranged in a circle, and a different number of holes for receiving the pins, arranged in a circle with the same diameter, for enabling a number of locking positions that is equal to the product of the number of pins times the number of holes. Thereto, the greatest common divider of both numbers should be chosen equal to 1. This number of locking positions may be obtained if the number of pins and the number of holes are not a multitude of each other. The pins may be biased to move into a hole when the pin and the hole are outlined, for instance by a spring, and an unlocking mechanism may be present to remove the pin from a hole.

[0012] In yet another embodiment, the rotation of the second hinged part with respect to the first hinged part is restricted by a stop that defines the lowest position of the arm rest. The stop may be movable by means of an actuator, which can be arranged for moving the stop with an armrest resting on it. The actuator and the stop have a double function this way. On one hand, they serve to set the lowest rest position for the arm of the user, on the other hand, they provide lifting power for a user's arm and a load carried by that arm. The stop according to the invention may also be used without the features of the independent claim.

[0013] Preferably, the arm rest is balanced about its axis of rotation. That is, a counter-force is provided for the weight of the arm, or the arm and a load, so that a user minimally needs to exert a force for moving. Such balance may be obtained by a using a zero free length

spring for the balanced support of the arm rest, which zero free length spring may have an adjustable bias. In a specific embodiment, the zero free length spring comprises a compression-spring.

[0014] The invention will now be elucidated into more detail with reference to the following figures. Herein:

- Figure 1 shows a perspective view of a mock-up of a general principle of a first aspect of the present invention;
- Figure 2 shows a perspective view of a mock-up of a general principle of the present invention, mounted on a (wheel)chair;
- Figure 3 shows an overview and details of further aspects of the present invention.

[0015] Figure 1 shows a perspective view of a mock-up of a general principle of a first aspect of the present invention. The mock up comprises a moving aid 1 for the (fore)arm of a person, comprising an armrest 2 for receiving the (fore)arm of a person, a carrier 3 for the arm rest, a support 4, for movably supporting the carrier 3 with respect to a (wheel)chair (see figure 2) wherein the support 4 comprises a first parallelogram A-B-C-D having a first essentially horizontal extending upper side D, connected to the (wheel)chair, and a first lower side B, situated below the upper side, coinciding with a second lower side E, forming part of a second parallelogram E-F-G-H, which second parallelogram comprises a second upper side G, situated above the first upper side D of the first parallelogram and which holds the carrier 3; and wherein at least one of the legs H of the second parallelogram E-F-G-H that connect the second lower side and the second upper side extends beyond the second lower side E; and wherein the lower end H' of the at least one leg that extends beyond the second lower side E is beared in a conductor-track 5, which conductor-track is formed such that a second upper side G of the second parallelogram is urged in an essentially horizontal track I.

[0016] Figure 2 shows a perspective view of a mock up 6 of a general principle of the present invention, mounted on a (wheel)chair 7. As visible in the figure, the conductor-track is arranged under a cover 8.

[0017] Figure 3 shows an overview and details of further aspects of the present invention. The figure shows an embodiment of carrier 3, which comprises two mutually hinged parts 9, 10, which are at least together rotatable about a vertical axis J with respect to the support 2, and wherein the second hinged part 10 is rotatable about a horizontal axis L with respect to the first hinged part. This construction enables to follow the movement of a person's arm.

[0018] In the embodiment shown, the rotation about the vertical axis J comprises a lock 11, comprising a number of pins 12, arranged in a circle, and a different number of holes 13 for receiving the pins, arranged in a circle with the same diameter, for enabling a number of locking positions that is equal to the product of the

number of pins 12 times the number of holes 13. In order to obtain that effect, these numbers should not be a multitude of each other wherein the greatest common divider is one.

[0019] The figure further shows in detail 16 how the rotation of the second hinged part 10 with respect to the first hinged part 9 is restricted by a stop 17 that defines the lowest position of the arm rest. The stop 17 cooperates with a protrusion 18 provided on lever 19 which determines the relative movement of hinged parts 9 and 10. The stop 17 is movable by means of an actuator 20 which drives a spindle 21. In a practical embodiment, the actuator 20 is arranged for moving the stop 17 with an arm resting on arm rest 2.

[0020] The arm rest is balanced about its axis of rotation L, that is, a vertical movement can be performed without the need of exerting a force. Thereto, the lever 19 may be provided with a zero free length spring construction for the balanced support of the arm rest. As detail 14 shows, the zero free length spring may - in order to create a very compact configuration - comprise a compression-spring 22. Detail 15 finally shows a lock for the rotations about two horizontal axes. The embodiments shown are for illustrative purposes only and do not limit the scope of the patent, which is defined in the following claims.

Claims

1. Moving aid (1) for the (fore)arm of a person, comprising:

- an armrest (2) for receiving the (fore)arm of a person;
- a carrier (3) for the arm rest;
- a support (4), for movably supporting the carrier (3) with respect to a (wheel)chair, work place, bed or other fixed world; wherein the support (4) comprises:

- a first parallelogram (A, B, C, D) having

- a first essentially horizontal extending upper side (D), connected to the (wheel)chair, work place, bed or other fixed world, and
- a first lower side (B), situated below the upper side (D), coinciding with:

- a second lower side (E), forming part of a second parallelogram (E, F, G, H), which second parallelogram comprises a second upper side (G), situated above the first upper side (D) of the first parallelogram and which holds the carrier (3); and wherein

- at least one of the legs (H) of the second parallelogram that connect the second lower side (E) and the second upper side (G) extends beyond the second lower side (E); and
- wherein a lower end (H') of the at least one leg (H) that extends beyond the second lower side (E) is beared in a conductor-track (5), which conductor-track (5) is formed such that a second upper side (G) of the second parallelogram is urged in an essentially horizontal track (I).
2. Moving aid (1) according to claim 1, wherein the conductor-track (5) is arranged under a cover (8).
3. Moving aid (1) according to claim 1, wherein the carrier (3) comprises two mutually hinged parts (9, 10), which are at least together rotatable about a vertical axis with respect to the support (4), and wherein the second hinged part (10) is rotatable about a horizontal axis with respect to the first hinged part (9).
4. Moving aid (1) according to claim 3, wherein the rotation about the vertical axis comprises a lock (11).
5. Moving aid (1) according to claim 4, wherein the lock (11) comprises a number of pins (12), arranged in a circle, and a different number of holes (13) for receiving the pins (12), arranged in a circle with the same diameter, for enabling a number of locking positions that is equal to the product of the number of pins (12) times the number of holes (13) wherein the greatest common divisor of both numbers is 1.
6. Moving aid (1) according to claim 3, 4 or 5, wherein the rotation of the second hinged part (10) with respect to the first hinged part (9) is restricted by a stop (17) that defines the lowest position of the arm rest (2).
7. Moving aid (1) according to claim 6, wherein the stop (17) is movable by means of an actuator (20).
8. Moving aid (1) according to claim 7, wherein the actuator (20) is arranged for moving the stop (17) with an arm resting on the armrest (2).
9. Moving aid (1) according to one of the previous claims 5-8, wherein the armrest (2) is balanced about its axis of rotation.
10. Moving aid (1) according to claim 9, comprising a zero free length spring (22) for the balanced support of the armrest (2).
11. Moving aid (1) according to claim 10, wherein the zero free length spring (22) comprises a compression-spring (22).
- ### Patentansprüche
1. Bewegungshilfe (1) für den (Unter-) Arm einer Person, umfassend:
- eine Armauflage (2) für den (Unter-) Arm einer Person;
 - einen Träger (3) für die Armauflage;
 - eine Stütze (4) zum beweglichen Stützen des Trägers (3) in Bezug auf einen (Roll-) Stuhl, einen Arbeitsplatz, ein Bett oder ein anderes fixiertes Objekt;
- wobei die Stütze (4) Folgendes umfasst:
- ein erstes Parallelogramm (A, B, C, D) mit
 - einer ersten, sich im Wesentlichen horizontal erstreckenden oberen Seite (D), die mit dem (Roll-) Stuhl, Arbeitsplatz, Bett oder einem anderen fixierten Objekt verbunden ist, und
 - einer ersten unteren Seite (B), die unter der oberen Seite (D) gelegen ist, übereinstimmend mit:
 - einer zweiten unteren Seite (E), die Teil eines zweiten Parallelogramms (E, F, G, H) bildet,
- wobei das zweite Parallelogramm eine zweite obere Seite (G) umfasst, die über der ersten oberen Seite (D) des ersten Parallelogramms liegt und die den Träger (3) hält, und wobei
- mindestens einer der Schenkel (H) des zweiten Parallelogramms, der die zweite untere Seite (E) und die zweite obere Seite (G) verbindet, sich über die zweite untere Seite (E) hinaus erstreckt; und
 - wobei ein unteres Ende (H') des mindestens einen Schenkels (H), der sich über die zweite untere Seite (E) hinaus erstreckt, in einer Leiterbahn (5) gehalten wird, wobei die Leiterbahn (5) so gebildet ist, dass eine zweite obere Seite (G) des zweiten Parallelogramms in eine im Wesentlichen horizontale Bahn (I) gedrängt wird.
2. Bewegungshilfe (1) nach Anspruch 1, wobei die Leiterbahn (5) unter einer Abdeckung (8) angeordnet ist.
3. Bewegungshilfe (1) nach Anspruch 1, wobei der Trä-

- ger (3) zwei wechselseitig angelenkte Teile (9, 10) umfasst, die mindestens gemeinsam um eine vertikale Achse in Bezug auf die Stütze (4) drehbar sind, und wobei das zweite angelenkte Teil (10) um eine horizontale Achse in Bezug auf das erste angelenkte Teil (9) drehbar ist. 5
4. Bewegungshilfe (1) nach Anspruch 3, wobei die Drehung um die vertikale Achse eine Verriegelung (11) umfasst. 10
5. Bewegungshilfe (1) nach Anspruch 4, wobei die Verriegelung (11) eine Anzahl von Stiften (12), die in einem Kreis angeordnet sind, und eine unterschiedliche Anzahl von Löchern (13) zum Aufnehmen der Stifte (12) umfasst, die in einem Kreis mit demselben Durchmesser angeordnet sind, sodass eine Reihe von Verriegelungspositionen, die gleich dem Produkt der Anzahl von Stiften (12) mal der Anzahl von Löchern (13) ist, möglich ist, wobei der größte gemeinsame Teiler beider Zahlen 1 ist. 15 20
6. Bewegungshilfe (1) nach Anspruch 3, 4 oder 5, wobei die Drehung des zweiten angelenkten Teils (10) in Bezug auf das erste angelenkte Teil (9) durch einen Anschlag (17) begrenzt ist, der die niedrigste Position der Armauflage (2) definiert. 25
7. Bewegungshilfe (1) nach Anspruch 6, wobei der Anschlag (17) durch ein Stellglied (20) bewegbar ist. 30
8. Bewegungshilfe (1) nach Anspruch 7, wobei das Stellglied (20) zum Bewegen des Anschlags (17), während der Arm auf der Armauflage (2) liegt, angeordnet ist. 35
9. Bewegungshilfe (1) nach einem der vorangehenden Ansprüche 5-8, wobei die Armauflage (2) um ihre Drehachse ausbalanciert ist. 40
10. Bewegungshilfe (1) nach Anspruch 9, umfassend eine Feder (22) mit einer freien Länge von null für die ausbalancierte Stütze der Armauflage (2). 45
11. Bewegungshilfe (1) nach Anspruch 10, wobei die Feder (22) mit einer freien Länge von null eine Druckfeder (22) umfasst. 50
- Revendications** 50
1. Dispositif d'aide à la mobilité (1) pour le bras ou l'avant-bras d'une personne, comprenant :
- un élément de soutien de bras (2) destiné à recevoir le bras ou l'avant-bras d'une personne ;
 - un dispositif porteur (3) pour l'élément de soutien de bras ;
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- un support (4) destiné à supporter de manière mobile le dispositif porteur (3) par rapport à une chaise ou un fauteuil roulant, un poste de travail, un lit ou autre environnement fixe ;
 - dans lequel le support (4) comprend :
- un premier parallélogramme (A, B, C, D) comportant :
 - un premier côté supérieur (D) s'étendant de manière essentiellement horizontale, raccordé à la chaise ou au fauteuil roulant, au poste de travail au lit ou autre environnement fixe, et
 - un premier côté inférieur (B), situé sous le côté supérieur (D), coïncidant avec :
- un second côté inférieur (E), faisant partie d'un second parallélogramme (E, F, G, H), ledit second parallélogramme comprenant un second côté supérieur (G), situé au-dessus du premier côté supérieur (D) du premier parallélogramme et soutenant le dispositif porteur (3) ; et dans lequel
 - au moins une des branches (H) du second parallélogramme qui relie le second côté inférieur (E) et le second côté supérieur (G) s'étend au-delà du second côté inférieur (E) ; et
 - dans lequel une extrémité inférieure (H') de la ou des branches (H) qui s'étend au-delà du second côté inférieur (E) est supportée dans une rainure de guidage (5), ladite rainure de guidage (5) étant formée de telle sorte qu'un second côté supérieur (G) du second parallélogramme soit entraîné sur une trajectoire (I) essentiellement horizontale.
2. Dispositif d'aide à la mobilité (1) selon la revendication 1, dans lequel la rainure de guidage (5) est disposée sous un élément de couverture (8).
3. Dispositif d'aide à la mobilité (1) selon la revendication 1, dans lequel le dispositif porteur (3) comprend deux parties (9, 10) mutuellement articulées, qui sont au moins rotatives ensemble autour d'un axe vertical par rapport au support (4), et dans lequel la seconde partie articulée (10) est rotative autour d'un axe horizontal par rapport à la première partie articulée (9).
4. Dispositif d'aide à la mobilité (1) selon la revendication 3, dans lequel la rotation autour de l'axe vertical comprend un dispositif de blocage (11).
5. Dispositif d'aide à la mobilité (1) selon la revendication 4, dans lequel le dispositif de blocage (11) com-

prend un certain nombre de goupilles (12), agencées en cercle, et un certain nombre, différent, de trous (13) destinés à recevoir les goupilles (12), agencés en cercle avec le même diamètre, destinés à créer un certain nombre de positions de blocage qui est égal au produit du nombre de goupilles (12) par le nombre de trous (13), dans lequel le plus grand diviseur commun des deux nombres est 1.

6. Dispositif d'aide à la mobilité (1) selon la revendication 3, 4 ou 5, dans lequel la rotation de la seconde partie articulée (10) par rapport à la première partie articulée (9) est limitée par une butée (17) qui définit la position la plus basse de l'élément de soutien de bras (2). 5
7. Dispositif d'aide à la mobilité (1) selon la revendication 6, dans lequel la butée (17) peut être déplacée au moyen d'un dispositif d'actionnement (20). 10
8. Dispositif d'aide à la mobilité (1) selon la revendication 7, dans lequel le dispositif d'actionnement (20) est conçu pour déplacer la butée (17) tandis qu'un bras est soutenu sur l'élément de soutien de bras (2). 15
9. Dispositif d'aide à la mobilité (1) selon l'une des revendications précédentes 5 à 8, dans lequel l'élément de soutien de bras (2) est équilibré autour de son axe de rotation. 20
10. Dispositif d'aide à la mobilité (1) selon la revendication 9, comprenant un ressort de longueur à vide nulle (22) pour le support équilibré de l'élément de soutien de bras (2). 25
11. Dispositif d'aide à la mobilité (1) selon la revendication 10, dans lequel le ressort de longueur à vide nulle (22) est un ressort de compression (22). 30

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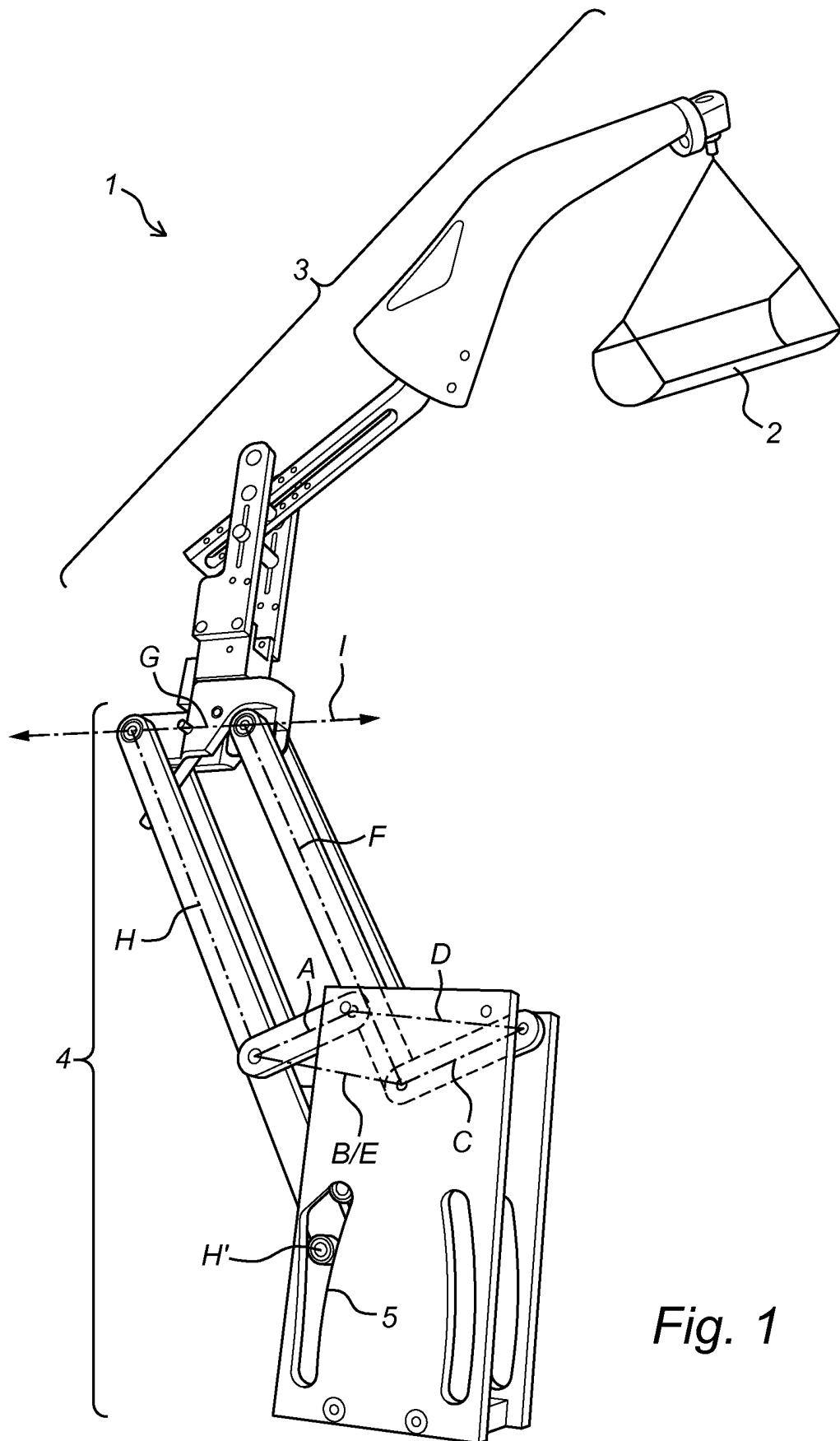


Fig. 1

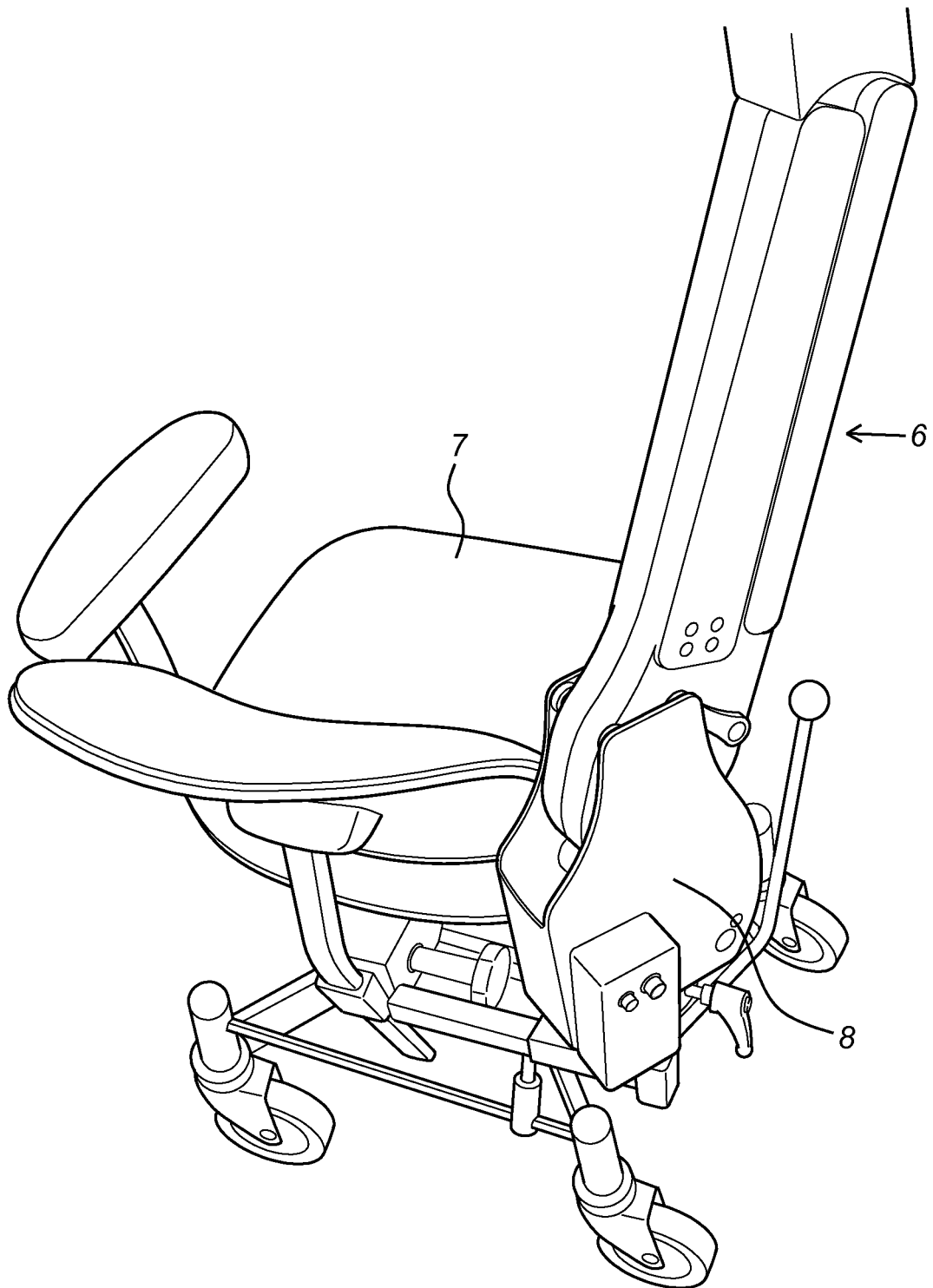
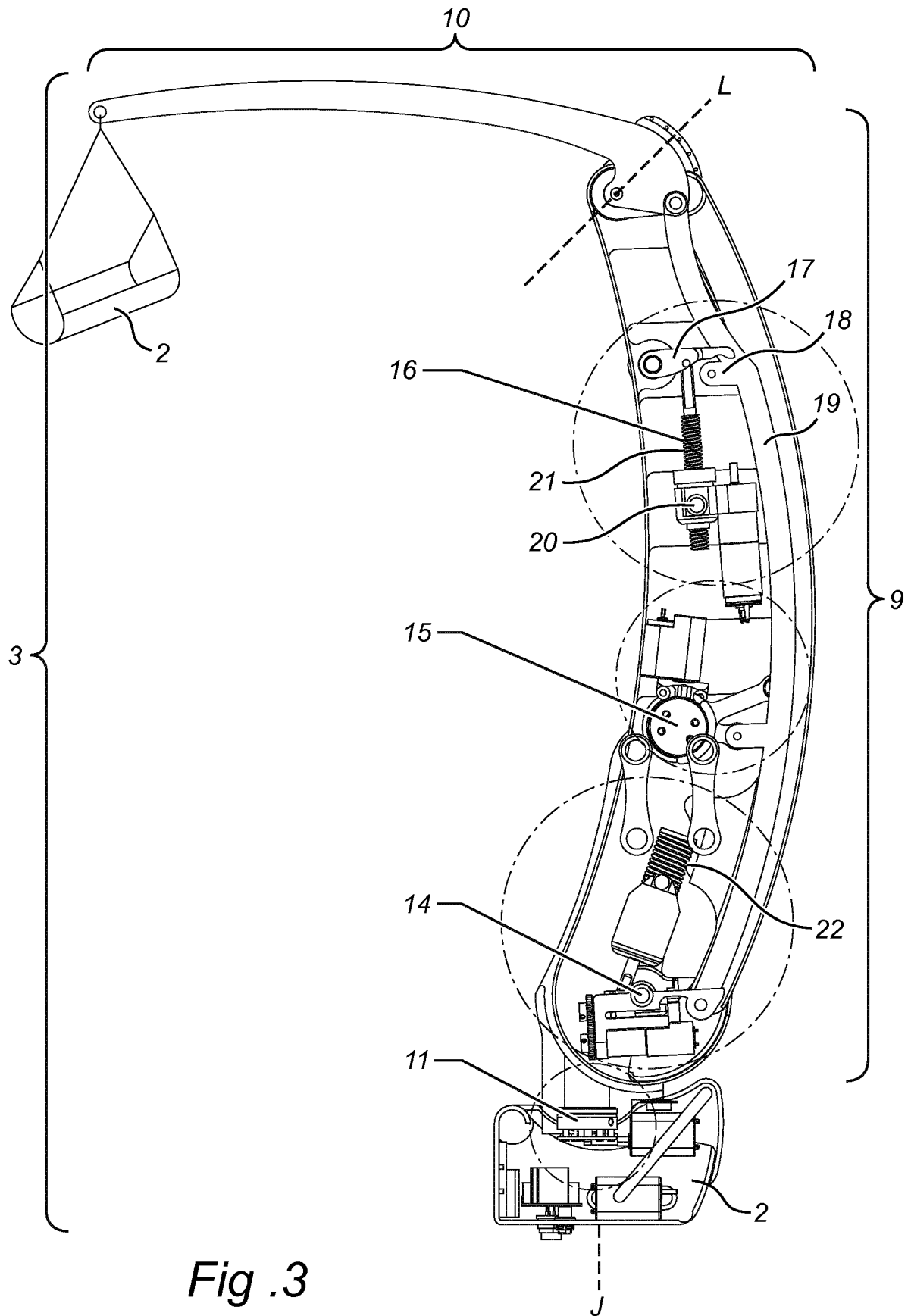
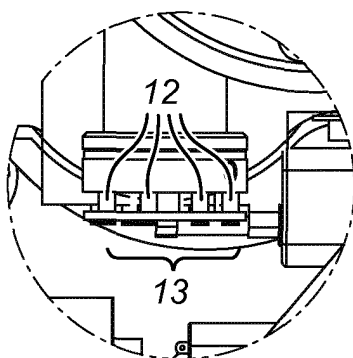
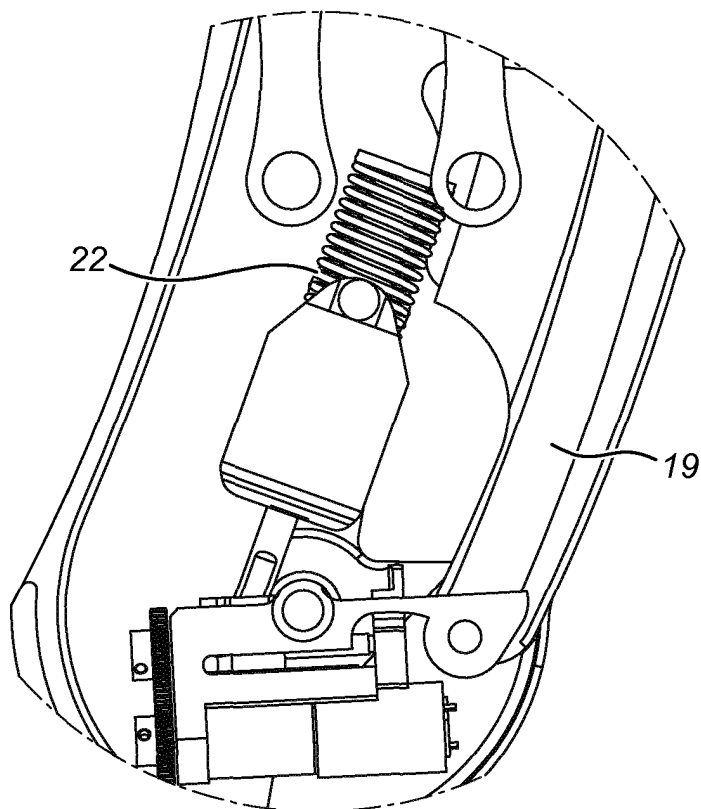


Fig. 2

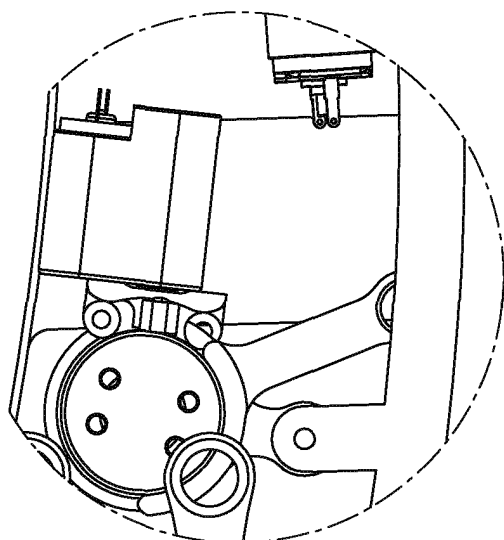




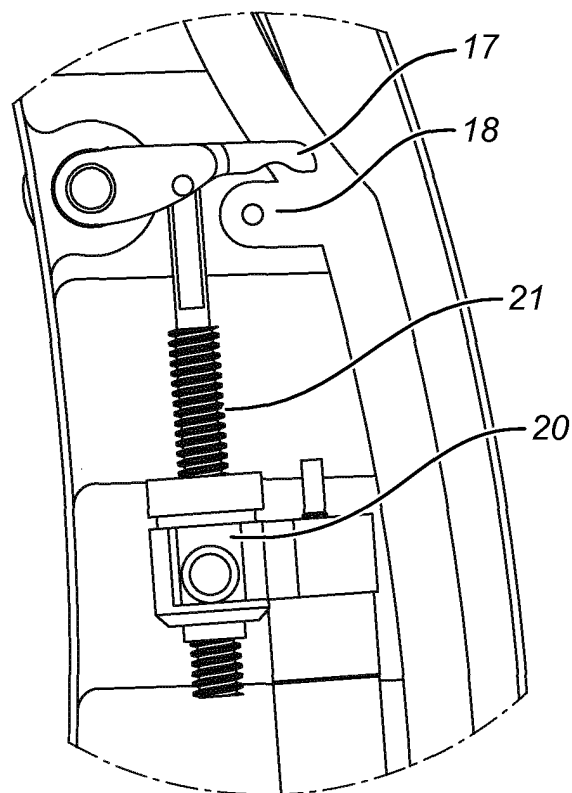
Detail 11



Detail 14



Detail 15



Detail 16

Fig .3 (continue)

REFERENCES CITED IN THE DESCRIPTION

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