

(19)



(11)

EP 4 740 793 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
13.05.2026 Bulletin 2026/20

(21) Application number: **25213836.7**

(22) Date of filing: **06.11.2025**

(51) International Patent Classification (IPC):
A47C 3/20 (2006.01) **A47C 7/00** (2006.01)
A47C 7/50 (2006.01) **A61G 5/10** (2006.01)
A61G 5/14 (2006.01) **A61G 7/10** (2006.01)

(52) Cooperative Patent Classification (CPC):
A47C 3/20; A47C 7/006; A47C 7/5062;
A61G 5/1059; A61G 5/14; A61G 7/1019

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL
NO PL PT RO RS SE SI SK SM TR
 Designated Extension States:
BA
 Designated Validation States:
GE KH LA MA MD TN

(30) Priority: **07.11.2024 BE 202405770**

(71) Applicant: **Moments Furniture**
8770 Ingelmunster (BE)

(72) Inventors:
 • **Thevelin, Benoit**
8300 Knokke-Heist (BE)
 • **De Temmerman, Joren**
9820 Merelbeke (BE)

(74) Representative: **De Clercq & Partners**
Edgard Gevaertdreef 10a
9830 Sint-Martens-Latem (BE)

(54) **A LIFTING MECHANISM FOR RAISING AND LOWERING A SEATING ELEMENT AND A SEATING ELEMENT HAVING SUCH A LIFTING MECHANISM**

(57) A lifting mechanism (1, 100) for raising and/or lowering a seating element (5, 105) comprising a base (10, 110) having a top side (12) and a bottom side (14), optionally a connection frame (16, 116) connected to the bottom side (14) of the base (10, 110), and a link mechanism (18, 118) connected to the connection frame (16, 116) or the bottom side of the base (10, 110). The link mechanism (18, 118) being moveable between a retracted position and an extended position by at least one actuator (20, 120). The at least one actuator (20, 120) is on a first end connected to the connection frame (16, 116) or the bottom side of the base (10, 110), such that the first end is positioned below the base (10, 110), and on a second end to the link mechanism (18, 118) such that the second end is positioned above the base (10, 110).

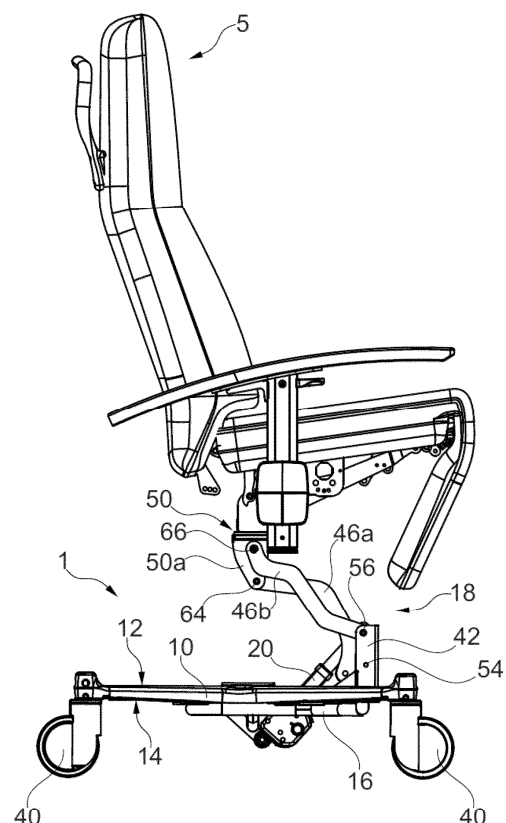


Fig. 2

Description

FIELD OF THE INVENTION

[0001] The invention relates to a lifting mechanism for raising and/or lowering a seating element such as a chair. The invention is further related to a seating element, such as a chair or a convertible chair foreseen with such a lifting mechanism.

BACKGROUND TO THE INVENTION

[0002] Chairs which are often used in hospitals or elderly homes are typically foreseen with large wheels which allow for an increased stability and steerability of the chair. If such a chair is used as a stationary chair, the wheels are often not provided, and the chassis or frame of the chair is placed directly on the ground. Likewise, it is possible to provide the chair with different diameters of wheels, depending on the use of the chair. A smaller diameter of wheels can be foreseen e.g. if these chairs are typically only used in the room of the elderly or patient. The height of the seating surface of the chair is thus typically fixed with relation to the wheels and chassis on which the chair is build and the minimum height of the seating surface above the ground is thus depending on what kind of wheels, chassis or frame is used. Also typically is that these known chairs are built as a robust chair having a heavy looking chassis on which all components are fixed.

[0003] It can therefore be difficult, if not impossible at times, for disabled or elderly people to comfortably sit in a chair when the height of the seating element is not at the right level or height for their build or length. In order to sit and rest comfortably, it is necessary that the feet can rest on the ground or on a foot board or footrest whereby the patient who is sitting in the chair is able to bend his or her knees under an angle up to 130 degrees.

[0004] A number of mechanisms are already available in the market, which provide for the raising and/or lowering of the seating surface. However, these mechanisms are typically complex scissor-like structures build on top of a frame providing an overall look and feel of an over-dimensioned and closed structure which is difficult to clean and maintain mechanism.

[0005] Other types of mechanisms allowing chairs which are typically used in hospitals or elderly homes to facilitate a patient from a sitting position to a standing position or vice versa.

[0006] Typically, such mechanisms will allow the seating element, such as the bottom cushion to be tilted in a forward direction around a pivot point as to help the patient with the upwards and forwards movement, or to help the patient to sit down, by gradually tilting in a backwards and downwards direction around the pivot point. Again, the mechanisms for these types of raising assistance chairs are built on top of the chassis and are typically large and heavy.

[0007] For example, KR20110050115 discloses a protector bed for a hospital is provided to minimize injury of a patient due to a fall from a seat plate during sleep. A protector bed for a hospital comprises a bed main body, an upper supporting device, a lower supporting device, and a height controlling device.

[0008] For example, US2014265497A1 discloses a medical chair includes a seat supported by a base and actuators adapted to both tilt and lift the seat with respect to the base. A controller controls the actuators to both lift and tilt the seat as the seat moves from the sitting position to the standing position.

[0009] There is thus a need for an improved lifting mechanism allowing the seating surface of the seating element to be in minimum position which is lower than the known minimum heights for the seating surfaces, thus being able to compensate for different diameters of wheels and/or frames used for the seating element, while providing for an easily accessible lifting mechanism which can be serviced and cleaned easily.

SUMMARY OF THE INVENTION

[0010] It is the aim of the present invention to solve the problems highlighted above. This aim is achieved by a lifting mechanism for raising and/or lowering a seating element, the lifting mechanism comprising a base having a top side and a bottom side, optionally a connection frame connected to the bottom side of the base and a link mechanism connected to the connection frame or the bottom side of the base whereby the link mechanism being moveable between a retracted position and an extended position. The lifting mechanism further comprising at least one actuator, the at least one actuator configured of being connected on a first end to the connection frame or the bottom side of the base such that the first end is positioned below the base and on a second end to the link mechanism such that the second end is positioned above the base. The at least one actuator is operable to move the link mechanism between the retracted position and the extended position.

[0011] By connecting the link mechanism to a connection frame below the base or directly to the bottom side of the base and by connecting one end of the at least one actuator to the bottom side of the base, will allow for the entire lifting mechanism to be positioned lower, thus lowering the minimum height of the seating element to compensate for the use of a bigger diameter of wheels.

[0012] The link mechanism comprises a first linking element and/or a second linking element, wherein the first linking element and/or the second linking element is shaped such that the first and/or second linking element can be positioned around the base when the link mechanism is in the retracted position.

[0013] Shaping the link mechanism, and more particularly the first and/or second linking elements such that they can be positioned around the base, allows for the seating element to be lowered such that it can rest on or is

in close proximity to the top side of the base when the link mechanism is in the retracted position.

[0014] In a preferred embodiment, the base comprises a fixation frame positioned around the center of the base and at least four arms, wherein one end of each of the at least four arms is connected to the fixation frame and the at least four arms are essentially evenly distributed around the center of the base.

[0015] When using a fixation frame around the center of the base and at least four arms which are evenly distributed and connected to this fixation frame, allows for a more accessible structure, whereby the at least four arms can be connected closer to the center point of the base and brought outwardly from this center point, thus providing an easier access to the different elements of the lifting mechanism.

[0016] In a preferred embodiment, the base further comprises at least four wheels and wherein one of the at least four wheels is connected to the other end of one of the at least four arms such that the base is configured to be moveable on a ground surface.

[0017] In a preferred embodiment, the connection frame comprises a first connection bracket and a second connection bracket, wherein the first and second connection brackets connect the link mechanism to the connection frame or wherein the base comprises a first connection bracket and a second connection bracket, wherein the first and second connection brackets are connected to the base and are configured to connect the link mechanism to the base. Depending on the clearance availability under the connection frame or the base, a connection bracket having a specific length can be added, preferably to the bottom side of the base or to the bottom side of the connection frame, such that the connection point of the link mechanism can be lowered and provide for a lowest possible height of the seating element.

[0018] In a preferred embodiment, the link mechanism comprises a first linking element, a second linking element and a top connecting element, wherein a first end of the first linking element is pivotally connected to the first bracket, a first end of the second linking element is pivotally connected to the second bracket, and the second end of the first bracket and the second end of the second bracket are pivotally connected to the connecting element.

[0019] In a preferred embodiment, the first linking element comprises a first arm and a second arm, a first end of the first arm is configured to be pivotally connected to the first bracket at a first rotation point, a second end of the first arm is configured to be pivotally connected to the top connecting element at a second rotation point, a first end of the second arm is configured to be pivotally connected to the first bracket at a third rotation point, and a second end of the second arm is configured to be pivotally connected to the top connecting element at a fourth rotation point.

[0020] In a preferred embodiment, the second linking

element comprises a first arm and a second arm, a first end of the first arm is configured to be pivotally connected to the second bracket at a fifth rotation point, a second end of the first arm is configured to be pivotally connected to the top connecting element at a sixth rotation point, a first end of the second arm is configured to be pivotally connected to the second bracket at a seventh rotation point, and a second end of the second arm is configured to be pivotally connected to the top connecting element at an eighth rotation point.

[0021] In a preferred embodiment, the first arm of the first linking element and/or the first arm of the second linking element is V-shaped. In an alternative preferred embodiment, the first arm of the first linking element and/or the first arm of the second linking element is shaped as a boomerang.

[0022] In a preferred embodiment, the second arm of the first linking element and/or the second arm of the second linking element is W-shaped.

[0023] Forming the first arms and/or the second arms in a V-shape, a boomerang-shape or a W-shape allows for the arms to be positioned around the base when the link mechanism is in the retracted position.

[0024] In a preferred embodiment, the first and/or second link element is configured such that when the link mechanism is in the retracted position, the rotation points of the second end of the first and second arm of the first link element and/or the rotation points of the second end of the first and second arm of the second link element are positioned below the top side of the base. Such a link mechanism will allow for the seating element to be positioned at a minimum height, while still allowing for a compact and robust lifting mechanism when positioned in its retracted position. Preferably, the height between the ground surface on which the chair is positioned and the top of the seating element when the link mechanism is in its retracted position is between 35 cm and 70 cm, preferably between 40 cm and 50 cm, preferably at 46 cm.

[0025] In a preferred embodiment, the first and/or second link element is configured such that when the link mechanism is in the extended position, the rotation points of the second end of the first and second arm of the first link element and/or the rotation points of the second end of the first and second arm of the second link element are positioned above the top side of the base. Such a link mechanism will allow for the seating element to be positioned at a maximum height, while still allowing for a compact and robust lifting mechanism when positioned in its extended position.

[0026] Preferably, the difference in height of the seating element when the link mechanism is in its extended position and when it is in its retracted position is between 25 and 35 cm, preferably at 30 cm.

[0027] In a preferred embodiment, the link mechanism further comprises a bottom connecting element, wherein a first end of the bottom connecting element is fixedly connected to the first linking element, and/or wherein a

second end of the bottom connecting element is fixedly connected to the second linking element. Using a bottom connecting element between the first linking element and the second linking element allows for a more robust construction due to the connection between the first linking element and the second linking element.

[0028] In a preferred embodiment, the first end of the bottom connecting element is fixedly connected to the first end of the first arm of the first linking element, and/or wherein a second end of the bottom connecting element is fixedly connected to the first end of the first arm of the second linking element.

[0029] In a preferred embodiment, the bottom connecting element further comprises a connecting element, preferably an arm connected at a position approximately halfway the length of the bottom connecting element, and wherein the at least one actuator is connected at its second end to the connecting element such that the at least one actuator is operable to simultaneously rotate the first arm of the first linking element and/or the first arm of the second linking element around their respective rotation points and to move the link mechanism from the retracted position to the extended position or vice versa.

[0030] Alternatively, a first actuator is directly attached to the first linking element, and a second actuator is directly attached to the second linking element such that the link mechanism can be moved from the retracted position to the extended position or vice versa.

[0031] In a preferred embodiment, the top connecting element comprises at least one connecting element, preferably one or more connection opening, wherein the at least one connecting element is configured to connect a seating element with the top connecting element. This way, any type of seating element can be placed on top of the lifting mechanism such that any type of seating element can be positioned anywhere from the minimum possible height to the maximum possible height.

[0032] In a preferred embodiment, the lifting mechanism further comprises a controller, and wherein the controller is configured to control the at least one actuator. In a further preferred embodiment, the controller is a remote controller, preferably connected to the lifting mechanism, an NFC device, preferably a smartphone, a Bowden cable, or a foot pedal.

[0033] In a preferred embodiment, the base is a cross base, wherein the cross base comprises four arms and a fixation frame positioned around the center of the cross base, the four arms being connected to the fixation frame. The fixation frame is preferably a circular fixation frame, a square fixation frame, a rectangular fixation frame or an oval fixation frame.

[0034] In a preferred embodiment, the at least one actuator is an electric actuator, preferably an electric motor, a hydraulic actuator preferably a hydraulic pump, an electromagnetic actuator, a mechanical actuator, and/or a gas spring.

[0035] In a preferred embodiment, the lifting mechanism further comprises a preferably removable footrest slidably connected to the bottom side of the base and positioned underneath the link mechanism and/or the connection frame. Especially when a user of the seating element needs to be moved around when sitting in the seating element such as a wheelchair, it is convenient if the feet of the user can rest on a footrest installed underneath the link mechanism thus preventing the feet of the user from hindering movement of the wheelchair.

[0036] In a preferred embodiment, the lifting mechanism further comprises at least one counterbalance, the at least one counterbalance being connected to the base and/or to the connection frame. In a further preferred embodiment, the at least one counterbalance is configured to be repositioned depending on the position of the link mechanism. Especially when the seating element, additionally of being lifted and/or lowered by the lifting mechanism, is also able to be tilted, a counterbalance may be useful to make sure that, regardless of the position of the lifting mechanism, a safe seating arrangement is maintained. When the seating element is e.g. lifted to its maximum height by the lifting mechanism and the seating element is then tilted backwards, the center of gravity may shift. To prevent tipping over the entire seating arrangement, a counterbalance can be used such that the center of gravity remains in an area where the seating arrangement will not tip over.

[0037] In a further embodiment, a seating element having a lifting mechanism is provided, wherein the seating element is a chair, preferably a relaxing chair, a raising assistance chair or a tilt-in-space relax chair.

[0038] In a preferred embodiment, the seating element is a convertible chair and wherein the convertible chair can be transformed from a chair to a bed or vice versa.

BRIEF DESCRIPTION OF THE DRAWINGS

[0039]

Figure 1 shows a 3D view of chair in an extended position with the seating area at its maximum height according to an embodiment of the invention;

Figure 2 shows a side view of an alternative chair in an extended position with the seating area at its maximum height according to an embodiment of the invention;

Figure 3 shows the rear view of the chair as shown in figure 2;

Figure 4 shows the bottom view of the chair as shown in figures 2 and 3;

Figure 5 shows a side view of the chair of figures 2 to 4 in a retracted position with the seating area at its minimum height;

Figure 6 shows the rear view of the chair as shown in figure 5;

Figure 7 shows the bottom view of the chair as shown in figures 5 and 6;

Figures 8A and 8B show a detailed 3D view of the lifting mechanism according to an embodiment of the invention in the extended position and in the retracted position;

Figures 9A to 9D show an alternative embodiment of a linking mechanism according to the invention, wherein figure 9A shows a side view of a chair in an extended position with the seating area at its maximum height, figure 9B shows a rear view of the chair as shown in figure 9A, figure 9C shows a side view of the chair as shown in figures 9A and 9B in a retracted position with the seating area at its minimum height, and figure 9D shows the rear view of the chair as shown in figure 9C; and

Figures 10A to 10C show alternative embodiments of the base of the lifting mechanism according to an embodiment of the invention.

DETAILED DESCRIPTION OF INVENTION

[0040] Before the present system and method of the invention are described, it is to be understood that this invention is not limited to particular systems and methods or combinations described, since such systems and methods and combinations may, of course, vary. It is also to be understood that the terminology used herein is not intended to be limiting, since the scope of the present invention will be limited only by the appended claims.

[0041] As used herein, the singular forms "a", "an", and "the" include both singular and plural referents unless the context clearly dictates otherwise.

[0042] The terms "comprising", "comprises" and "comprised of" as used herein are synonymous with "including", "includes" or "containing", "contains", and are inclusive or open-ended and do not exclude additional, non-recited members, elements or method steps. It will be appreciated that the terms "comprising", "comprises" and "comprised of" as used herein comprise the terms "consisting of", "consists" and "consists of".

[0043] Whereas the terms "one or more" or "at least one", such as one or more or at least one member(s) of a group of members, is clear *per se*, by means of further exemplification, the term encompasses *inter alia* a reference to any one of said members, or to any two or more of said members, such as, e.g., any ≥ 3 , ≥ 4 , ≥ 5 , ≥ 6 or ≥ 7 etc. of said members, and up to all said members.

[0044] All references cited in the present specification are hereby incorporated by reference in their entirety. In particular, the teachings of all references herein specifically referred to are incorporated by reference.

[0045] Unless otherwise defined, all terms used in disclosing the invention, including technical and scientific terms, have the meaning as commonly understood by one of ordinary skill in the art to which this invention belongs. By means of further guidance, term definitions are included to better appreciate the teaching of the present invention.

[0046] In the following passages, different aspects of

the invention are defined in more detail. Each aspect so defined may be combined with any other aspect or aspects unless clearly indicated to the contrary. In particular, any feature indicated as being preferred or advantageous may be combined with any other feature or features indicated as being preferred or advantageous. Reference throughout this specification to "one embodiment" or "an embodiment" means that a particular feature, structure or characteristic described in connection with the embodiment is included in at least one embodiment of the present invention. Thus, appearances of the phrases "in one embodiment" or "in an embodiment" in various places throughout this specification are not necessarily all referring to the same embodiment, but may. Furthermore, the particular features, structures or characteristics may be combined in any suitable manner, as would be apparent to a person skilled in the art from this disclosure, in one or more embodiments. Furthermore, while some embodiments described herein include some but not other features included in other embodiments, combinations of features of different embodiments are meant to be within the scope of the invention, and form different embodiments, as would be understood by those in the art. For example, in the appended claims, any of the claimed embodiments can be used in any combination.

[0047] In the present description of the invention, reference is made to the accompanying drawings that form a part hereof, and in which are shown by way of illustration only of specific embodiments in which the invention may be practiced. Parenthesized or emboldened reference numerals affixed to respective elements merely exemplify the elements by way of example, with which it is not intended to limit the respective elements. Unless otherwise indicated, all figures and drawings in this document are not to scale and are chosen for the purpose of illustrating different embodiments of the invention. In particular the dimensions of the various components are depicted in illustrative terms only, and no relationship between the dimensions of the various components should be inferred from the drawings, unless so indicated.

[0048] It is to be understood that other embodiments may be utilized, and structural or logical changes may be made without departing from the scope of the present invention. The following detailed description, therefore, is not to be taken in a limiting sense, and the scope of the present invention is defined by the appended claims.

[0049] **Figure 1** shows a 3D view of a seating element 5 such as a chair having a lifting mechanism 1 according to an embodiment of the invention. The lifting mechanism 1 is in the extended position such that the seating area of the chair 5 is at its maximum height above the ground surface. The lifting mechanism 1 is able to lift the chair 5 from a retracted position (see figure 5) to the extended position as shown in figure 1. Vice versa, the lifting mechanism 1 is able to lower the chair 5 from the extended position to the retracted position as shown in figure 1.

[0050] The lifting mechanism 1 comprises a base 10 having a top side 12 and a bottom side 14. The bottom side 14 is facing the ground surface, while the top side 12 is facing the chair 5 which is placed upon a connecting element 50. A connection frame 16 is foreseen which is connected to the bottom side 14 of the base 10 and allows for the positioning of a first 42 and second 44 bracket relative to the base 10. The connection frame 16 provides additional strength and robustness to the lifting mechanism 1. Alternatively, the first 42 and second 44 brackets are connected directly to the bottom side 14 of the base 10.

[0051] The lifting mechanism 1 further comprises a link mechanism 18 connected to the connection frame 16 or to the bottom side 14 of the base 10 preferably via the first 42 and the second 44 bracket. The link mechanism 18 of figure 1 comprises a first linking element 46 and a second linking element 48. The first linking element 46 and second linking element 48 are shaped such that the first 46 and second 48 linking element can be positioned around the base 10 when the link mechanism 18 is in the retracted position. Although a first 46 and second 48 linking element are preferred, the link mechanism 18 can be constructed having only one link element. However, in this case, such a link element needs to be constructed as a heavy-duty element, since the entire lifting mechanism 1 and seating element 5 will be resting on this one link element.

[0052] An actuator 20, such as a hydraulic cylinder is connected at a first end to the connection frame 16 and at its second end to the link mechanism 18 via a connecting element 80, preferably an arm 80, and a bottom connecting element 52. The actuator 20 is able to move the link mechanism 18 and more particular the first linking element 46 and the second linking element 48, between the retracted position and the extended position thus lifting or lowering the chair 5. Alternatively, the actuator 20 is directly connected to the bottom side of the base 10 instead of being connected via the connection frame 16. Connecting the actuator 20 at its first end to the connection frame 16 which is positioned below the base 10, or directly at the bottom side 14 of the base 10, facilitates that the actuator 20 is positioned as low as possible and as close as possible with the ground surface, such that the minimum height of the seating element 5 is lower as currently available in the market.

[0053] The arm 80 is connected approximately halfway along the length of the bottom connecting element 52. Although it is preferred to connect the arm 80 at approximately halfway the length of the bottom connecting element 52 such that the force which is applied by the actuator 20 to the bottom connecting element 52 is evenly distributed, it is also possible to position the arm 80 at another position along the length of the bottom connecting element 52.

[0054] As a further alternative, instead of foreseeing only one actuator 20, it is likewise possible to foresee two or more actuators 20 to move the link mechanism 18,

whereby two or more arms 80 are connected to the bottom connecting element 52 and the multiple actuators will work together to move the link mechanism 18. In this case, smaller sized actuators can be used while still being able to provide the necessary force to move the link mechanism 18.

[0055] The base 10 comprises a fixation frame 30 positioned around a center X of the base 10 and four arms 32, 34, 36, 38 which are essentially evenly distributed around the center X of the base 10. One end 32a, 34a, 36a, 38a of each of the four arms 32, 34, 36, 38 is connected to the fixation frame 30, while the other end 32b, 34b, 36b, 38b of each of the four arms 32, 34, 36, 38 is foreseen with a wheel 40 to allow the base 10 to move over the ground surface.

[0056] Although not shown, at least one counterbalance can be connected to the base 10 and/or to the connection frame 16. Such a counterbalance can be fixed to the base 10 and/or the connection frame 16 or it can be repositionable depending on the position of the link mechanism 18. Especially when the seating element 5, additionally of being lifted and/or lowered by the lifting mechanism 1, is also able to be tilted, a counterbalance may be useful to make sure that, regardless of the position of the lifting mechanism 1, a safe seating arrangement is maintained. When the chair 5 is e.g. lifted to its maximum height by the lifting mechanism 1 and the chair 5 is then tilted backwards, the center of gravity may shift. To prevent tipping over of the entire seating arrangement, a counterbalance can be used such that the center of gravity remains in an area where the seating arrangement will not tip over. Therefore, the counterbalance can be repositioned with regards to the base 10 and/or the connection frame 16, e.g. gradually extended, when the chair 5 is moved from its lowest position to its highest position by the lifting mechanism 1. Likewise, the counterbalance can gradually slide back inwards when the chair 5 is moved from its highest position to its lowest position by the lifting mechanism 1. Such repositioning of the counterbalance can be done automatically by e.g. a controller when operating the lifting mechanism 1, or can be done manually by a user of the lifting mechanism 1.

[0057] As further can be seen from figure 1, the link mechanism 18 comprises a top connecting element 50 having a first attachment element 50a and a second attachment element 50b. A first end of the first linking element 46 is pivotally connected to the first bracket 42 while the second end of the first linking element 46 is pivotally connected to the first attachment element 50a at a first end of the top connecting element 50. Likewise, a first end of the second linking element 48 is pivotally connected to the first bracket 44 while the second end of the second linking element 48 is pivotally connected to the second attachment element 50b at a second end of the top connecting element 50.

[0058] Connecting the first linking element 46, the second linking element 48, the top connecting element 50 and the bottom connecting element 52 via the brack-

ets 42, 44 with each other will provide for a stable and robust link mechanism 18 which is able to withstand deformation of the elements of the link mechanism 18 when a user is sitting in the seating element or chair 5.

[0059] Further, the lifting mechanism 1 can be foreseen with a removable footrest 90 which is slidably connected to the bottom side 14 of the base 10. The footrest 90 is positioned underneath the link mechanism 18 and the connection frame 16, and will thus shield the elements of the link mechanism 18, the actuator 20 and the connection frame 16 from the ground surface.

[0060] Figure 2 shows a side view of an alternative chair 5, having a leg support element attached to the seating area of the chair 5. The chair 5 as shown is in the extended position with the seating area being at its maximum height above the ground surface. The chair 5 of figure 2 is attached to a similar lifting mechanism 1 as is shown in figure 1.

[0061] In figure 2, the first linking element 46 is shown. The linking element 46 comprises a first arm 46a and a second arm 46b, whereby the first arm 46a is positioned on the inside of the lifting mechanism 1 and the second arm 46b is positioned on the outside of the lifting mechanism 1. A first end of the first arm 46a is pivotally connected to the first bracket 42 at a first rotation point 54, while a second end of the first arm 46a is pivotally connected to the first attachment element 50a of the top connecting element 50 at a second rotation point 64. A first end of the second arm 46b is pivotally connected to the first bracket 42 at a third rotation point 56, while a second end of the second arm 46b is pivotally connected to the first attachment element 50a of the top connecting element 50 at a fourth rotation point 66. The third rotation point 56 is positioned above the first rotation point 54 on the first bracket 42, while the fourth rotation point 66 is positioned above the second rotation point 64 on the first attachment element 50a. As shown in figures 8A and 8B, likewise, the second linking element 48 comprises a first arm 48a and a second arm 48b, whereby the first arm 48a is positioned on the inside of the lifting mechanism 1 and the second arm 48b is positioned on the outside of the lifting mechanism 1. A first end of the first arm 48a is pivotally connected to the second bracket 44 at a fifth rotation point 58, while a second end of the first arm 48a is pivotally connected to the second attachment element 50b of the top connecting element 50 at a sixth rotation point 68. A first end of the second arm 48b is pivotally connected to the second bracket 44 at a seventh rotation point 60, while a second end of the second arm 48b is pivotally connected to the second attachment element 50b of the top connecting element 50 at an eighth rotation point 70. The seventh rotation point 60 is positioned above the fifth rotation point 58 on the second bracket 44, while the eighth rotation point 70 is positioned above the sixth rotation point 68 on the second attachment element 50b.

[0062] The bottom connecting element 52 is at one end fixedly connected to the first end of the first arm 46a of the

first linking element 46, and on the one end fixedly connected to the first end of the first arm 48a of the second linking element 48 and thus indirectly connected to the first 42 and second 44 bracket. When the lifting mechanism 1 is in its fully retracted position (see figure 8B), the actuator or hydraulic cylinder 20 may extend or push out such that the lifting mechanism 1 is moving from its fully retracted position to its fully extended position (see figure 8A). Therefore, the hydraulic cylinder 20 will push the arm 80 forward, which at its turn will cause the bottom connecting element 52 to rotate in a counterclockwise direction around the first rotation point 54 and the fifth rotation point 58. Due to the fact that the bottom connecting element 52 is preferably fixedly connected to both the first arm 46a of the first linking element 46 and the first arm 48a of the second linking element 48, rotation of the bottom connecting element 52 will cause the first arm 46a of the first linking element 46 and the first arm 48a of the second linking element 48 to move together with the rotating bottom connecting element 52. Since the first arm 46a of the first linking element 46, the second arm 46b of the first linking element 46, the first arm 48a of the second linking element 48, and the second arm 48b of the second linking element 48 are all connected with the top connecting element 50 and thus with each other, all arms 46a, 46b, 48a, 48b will rotate together by the movement of the hydraulic cylinder 20, thus pushing the top connecting element 50 upwards or downwards if the hydraulic cylinder 20 is retracting.

[0063] As can be seen from figure 2, one end of the hydraulic cylinder 20 is connected to the bottom connecting element 52, while the other end of the hydraulic cylinder 20 is connected to the bottom side 14 of the base 10. By doing so, a part of the hydraulic cylinder 20 can be positioned below the base 10, thus being able to position the lifting mechanism 1 as low as possible to the ground surface. Additionally, by positioning at least a part of the actuator 20 under the base 10, a larger, more powerful actuator 20 can be used without the need to settle for a higher minimum height of the seating area of the seating element 5 above the ground surface.

[0064] Figure 3 shows the rear view of the chair 5 as shown in figure 2 with the lifting mechanism 1 in its fully extended position. The chair 5 is connected to the top connecting element 50 via connection openings 51 and bolts and nuts (not shown). Other ways or means to attach the chair 5 to the top connecting element 50 are likewise possible, such as rivets, welding, gluing, snap or press fits, etc.

[0065] Preferably, spacers 53, 55 are foreseen at the rotation points 66, 70 between the second arms 46b and 48b and the first 50a and second 50b attachment elements respectively.

[0066] The first arm 46a of the first linking element 46 is connected to the first bracket 42 on the side of the first bracket 42 facing inwardly, while the second arm 46b of the first linking element 46 is connected to the first bracket 42 on the side of the first bracket 42 facing outwardly.

Likewise, the first arm 48a of the second linking element 48 is connected to the second bracket 44 on the side of the second bracket 44 facing inwardly, while the second arm 48b of the second linking element 48 is connected to the second bracket 44 on the side of the second bracket 44 facing outwardly. The first 42 and second 44 bracket are typically formed as a U-shaped bracket, thus creating a space between the first leg and the second leg of each U-shaped bracket. The first 50a and second 50b attachment elements are typically a plate having a specific thickness to provide robustness to the top connecting element 50 without adding additional and unnecessary weight to the top connecting element 50. The spacers 53, 55 are thus used to compensate for the distance between the legs of the U-shaped brackets 42, 44 and make it possible to assemble the first 46a and second 46b arms of the first linking element 46, the first bracket 42 and the first attachment element 50a as a first parallelogram, while assembling the first 48a and second 48b arms of the second linking element 58, the second bracket 44 and the second attachment element 50b as a second parallelogram.

[0067] Further, figure 3 shows that the wheels 40 are attached to the base 10, more particularly, each wheel 40 is attached to an arm 32, 34, 36, 38 of the base 10. As is clearly visible from figure 3, the size of the wheels 40 will determine the height between the ground surface and the bottom 14 of the base 10. In order to compensate the height difference which may arise from using different sizes of wheels 40, the first 42 and second 44 brackets, the first 50a and second 50b attachment element and the arms 46a, 46b, 48a, 48b of the linking elements 46, 48 can be formed in such a way that when bigger sized wheels 40 are used, the link mechanism 18 can be positioned further below the bottom side 14 of the base 10.

[0068] The arms 32, 34, 36, 38 of the base 10 of the preferred embodiment as shown in the figures 1 to 8B are positioned around the central fixation frame 30 and form a cross base. In order for the arms 46a, 46b, 48a, 48b of the linking elements 46, 48 to be able to be positioned around the cross base 10 when the link mechanism 18 is in its retracted position, the first arm 46a of the first linking element 46 and the first arm 48a of the second linking element 48 is formed as a V-shape. Likewise, the second arm 46b of the first linking element 46 and the second arm 48b of the second linking element 48 is formed as a W-shape. Alternatively, the arms 46a, 46b, 48a, 48b of the linking elements 46, 48 can be formed in any other shape such as a boomerang, a sinus wave or any free flowing shape necessary to allow the first ends of the arms 46a, 46b, 48a, 48b to be connected to the first 42 or second 44 brackets, while the second ends of the arms 46a, 46b, 48a, 48b to be connected to the first 50a or second 50b attachment element, regardless of the position or form of the first 42 and second 44 bracket and the position or form of the base 10.

[0069] Figure 4 shows the bottom view of the chair 5 as

shown in figures 2 and 3. The connection frame 16 is attached to the arms 32, 34, 36, 38 of the cross base 10 at eight connection points 16a-16h to secure the connection frame 16 to the bottom side 14 of the cross base 10.

[0070] The actuator 20 is connected to the connection frame 16 such that this side of the actuator 20 is positioned below the bottom side 14 of the cross base 10, while the other side of the actuator 20 can be positioned above the top side 12 of the cross base 10 and attached to the arm 80 to move the arm 80 and thus the link mechanism 18 when extending or retracting. Alternatively, the actuator 20 can be connected directly to the bottom side 14 of the cross base 10.

[0071] Also clear from figure 4 is that the arms 46a, 46b and 48a, 48b of the first linking element 46 and second linking element 48 are space apart from each other by the spacers 53, 55 to form a parallelogram.

[0072] Figure 5 shows a side view of the chair 5 of figures 2 to 4, the chair 5 being in the retracted position such that the seating area of the chair 5 is at its minimum height and as close as possible to the ground surface. As can be seen from figure 5, the lifting mechanism 1 is retracted and the first attachment element 50a is now at least partially below the bottom side 14 of the cross base 10. The arms 46a and 46b of the first linking element 46 are shaped in such a way that these arms 46a, 46b can be positioned around the arms 32, 34 of the cross base 10 when the link mechanism 18 is lowered to its fully retracted position. Likewise, the arms 48a, 48b of the second linking element 48 are shaped such that these arms 48a, 48b can be positioned around the arms 36, 38 of the cross base 10 when the link mechanism 18 is lowered to its fully retracted position (see figure 8B). Due to the shape of the arms 46a, 46b, 48a, 48b of the first 46 and second 48 linking element, the movement of the link mechanism 18 from a fully extended to a fully retracted position is not hindered.

[0073] Figure 6 shows the rear view of the chair 5 as shown in figure 5, while figure 7 shows the bottom view of the chair 5 as shown in figure 5. In particular in figure 7, it is shown that the bottom connecting element 52 is rotated by the movement of the hydraulic cylinder 20 and the arm 80, such that the bottom connecting element 52 is now positioned at least partially behind the front of the connection frame 16.

[0074] Further, when comparing figure 3 with figure 6 it is clear that the distance between the lowest parts of the lifting mechanism 1 and the ground surface does not change regardless of the link mechanism 18 being in the retracted position as shown in figure 6, the extended position as shown in figure 3, or anywhere between these two positions.

[0075] Figures 8A and 8B show a detailed 3D view of the lifting mechanism 1 of the preferred embodiment, in which the lifting mechanism 1 is shown in its extended position in figure 8A, while being in its retracted position in figure 8B. When comparing the lifting mechanism 1 in its extended position with its retracted position it is clear that

the second 64 and fourth 66 rotation points of the second end of the first 46a and second 46b arm of the first link element 46 and the sixth 68 and eighth 70 rotation points of the second end of the first 48a and second 48b arm of the second link element 48 are repositioned compared to the cross base 10 and will move from being positioned above the top side 12 of the cross base to drop below the top side 12 of the cross base 10 when moving from the extended position as shown in figure 8A to the retracted position as shown in figure 8B.

[0076] Further shown in figure 8A and 8B is the removable footrest 90 which is slidably connected to the bottom side 14 of the cross base 10. The footrest 90 is positioned underneath the link mechanism 18 and the connection frame 16, and will thus shield the elements of the link mechanism 18, the actuator 20 and the connection frame 16 from the ground surface. Since the distance between the lowest parts of the lifting mechanism 1 and the ground surface does not change regardless of the position of the link mechanism 18, such a footrest 90 can be installed between the lowest part of the lifting mechanism 1 and the ground surface. Although such a foot rest 90 is not necessary for the good functioning and operation of the lifting mechanism 1, it has besides allowing a user of the chair 5 to place his feet on the foot rest 90, the additional function that it may protect the components of the lifting mechanism 1 from objects laying on the floor or ground surface. Since the front end of the footrest 90 is positioned before the front of the connection frame 16, an object which is high enough to come into contact with a component or element of the lifting mechanism 1 will be pushed forward by the front end of the footrest 90. An object which is small enough to pass under the footrest 90 will not be able to contact any of the elements of the lifting mechanism 1 and in any way is shielded by the presence of the footrest 90.

[0077] Figures 9A to 9D show an alternative embodiment of a linking mechanism 100 according to the present invention. In particular, the first 146 and second 148 linking element are designed to form a more compact unit. Therefore, the second arm 146b, 148b is positioned on the outside of the linking element 146, 148 and constructed such that it shields the majority of the first arm 146a, 148a of the linking element 146, 148. The remaining elements as described in relation to the previous figures, are the same or similar elements, having the same functionality.

[0078] In figure 9A, a side view of the chair is shown, where the chair 105 is in its extended position with the seating area at its maximum height. Similar to the chair as shown in figure 2, the chair 105 is foreseen with a leg support element attached to the seating area of the chair 105. In figure 9A, only the first linking element 146 is shown. The linking element 146 comprises a first arm 146a and a second arm 146b. The first arm 146a is positioned on the inside of the lifting mechanism 100 and the second arm 146b is positioned on the outside of the lifting mechanism 100, whereby the second arm

146b obstructed the majority of the first arm 146a. Similar to the embodiment as shown in figure 2, a first end of the first arm 146a is pivotally connected to a first bracket 142 at a first rotation point 154, while a second end of the first arm 146a is pivotally connected to a first attachment element 150a of the top connecting element 150 at a second rotation point 164. A first end of the second arm 146b is pivotally connected to the first bracket 142 at a third rotation point 156, while a second end of the second arm 146b is pivotally connected to the first attachment element 150a of the top connecting element 150 at a fourth rotation point 166. The third rotation point 156 is positioned above the first rotation point 154 on the first bracket 142, while the fourth rotation point 166 is positioned above the second rotation point 164 on the first attachment element 150a.

[0079] In figure 9B, the rear view of the chair as shown in figure 9A is shown with the lifting mechanism 100 in its fully extended position. As can be seen in figure 9B, the first arm 146a of the first linking element 146 is connected to the first bracket 142 on the side of the first bracket 142 facing inwardly, while the second arm 146b of the first linking element 146 is connected to the first bracket 142 on the side of the first bracket 142 facing outwardly. Likewise, the first arm 148a of the second linking element 148 is connected to the second bracket 144 on the side of the second bracket 144 facing inwardly, while the second arm 148b of the second linking element 148 is connected to the second bracket 144 on the side of the second bracket 144 facing outwardly. The first 142 and second 144 bracket are typically formed as a U-shaped bracket, thus creating a space between the first leg and the second leg of each U-shaped bracket.

[0080] The chair 105 is connected to a top connecting element 150, thus effectively connecting the seat of the chair 105 with the lifting mechanism 100. A connection frame 116 is foreseen to which the first 142 and second 144 bracket are connected, relative to a base 110 of the lifting mechanism 100. An actuator 120 is connected at its first end to the connection frame 116 and at its second end to a connecting element 152. When comparing figure 9B with figure 3, the connecting element 152 is positioned higher above the base 110 compared to the connecting element 52 and the base 10. Such a higher positioning may be beneficial for the stability of the chair 105 when moving up or down.

[0081] The connecting element 152 is connected at one end to the first linking element 146, and at its other end to the second linking element 148. A spring element 195 is likewise connected at its first end to the connection frame 116 and at its second end to the connecting element 152. The spring element 195, preferably a gas spring 195 cooperates with the hydraulic cylinder 120 during movement of the lifting mechanism 100. Although the example of figure 9B shows a hydraulic cylinder 120, likewise an electric actuator, preferably an electric motor, a hydraulic actuator preferably a hydraulic pump or an electromagnetic actuator can be used instead of the

hydraulic cylinder. The spring element 195 is provided to take up vibrations or reduce abrupt movements when operating the hydraulic cylinder 120 allowing a smoother operation of the up and downward movement of the chair 105. Additionally, a spring element, such as gas spring 195, helps reduce the force that would otherwise need to be provided by the actuator - whether it's a hydraulic cylinder 120, electric motor, or hydraulic pump. This results in a more compact actuator that requires less force to move the chair 105 up or down. In figure 9C, a side view is shown of the chair as shown in figure 9A and 9B, the chair 105 is in its retracted position with the seating area at its minimum height. As can be seen, the lifting mechanism 100 is retracted and the first attachment elements 150a, 150b are now at least partially below the bottom side of the base 110. The arms 146a and 146b of the first linking element 146 are shaped in such a way that these arms 146a, 146b can be positioned around the base 110 when the link mechanism 118 is lowered to its fully retracted position. Likewise, the arms 148a, 148b of the second linking element 148 are shaped such that these arms 148a, 148b can be positioned around the base 110 when the link mechanism 118 is lowered to its fully retracted position. Due to the shape of the arms 146a, 146b, 148a, 148b of the first 146 and second 148 linking element, the movement of the link mechanism 118 from a fully extended to a fully retracted position is not hindered.

[0082] In figure 9D, a rear view of the chair as shown in figure 9C is shown. As is the case with the first embodiment described in relation to figures 1 to 7, it is clear that again the distance between the lowest parts of the lifting mechanism 100 and the ground surface does not change regardless of the link mechanism 118 being in the retracted position as shown in figure 9C and 9D, the extended position as shown in figures 9A and 9B, or anywhere between these two positions.

[0083] When the lifting mechanism 100 is in its fully retracted position (see figures 9C and 9D), the actuator or hydraulic cylinder 120 may extend or push out such that the lifting mechanism 100 is moving from its fully retracted position to its fully extended position (see figures 9A and 9B). Therefore, the hydraulic cylinder 120 will rotate the connecting element 152 in a counterclockwise direction around the first rotation point 154 and the fifth rotation point 158. Due to the fact that the bottom connecting element 152 is preferably fixedly connected to both the first arm 146a of the first linking element 146 and the first arm 148a of the second linking element 148, rotation of the bottom connecting element 152 will cause the first arm 146a of the first linking element 146 and the first arm 148a of the second linking element 148 to move together with the rotating bottom connecting element 152. Since the first arm 146a of the first linking element 146, the second arm 146b of the first linking element 146, the first arm 148a of the second linking element 148, and the second arm 148b of the second linking element 148 are all connected with the top connecting element 150

and thus with each other, all arms 146a, 146b, 148a, 148b will rotate together by the movement of the hydraulic cylinder 120, thus pushing the top connecting element 150 upwards or downwards if the hydraulic cylinder 120 is retracting. The spring element 195 cooperates and assists with the hydraulic cylinder 120 during movement of the lifting mechanism 100.

[0084] Figures 10A to 10C show alternative embodiments of the base 10 of the lifting mechanism 1 according to an embodiment of the invention. The base 10 as shown in figure 9A is comparable to the cross base 10 as shown in figures 1 to 8B.

[0085] The arms 32, 34, 36, 38 of the base 10 as shown in the figure 9A are positioned around the central fixation frame 30 and form a cross base. One end 32a, 34a, 36a, 38a of each of the at least four arms 32, 34, 36, 38 is each time connected to the fixation frame 30 and are essentially evenly distributed around the center X of the cross base 10.

[0086] Wheels 40 are connected to the other end 32b, 34b, 36b, 38b of the arms 32, 34, 36, 38 such that the cross base 10 is configured to be moveable on the ground surface. The central fixation frame 30 of figure 9A is essentially of a circular form, while the central fixation frame 30' of figure 9B is essentially of a square form. The central fixation frame 30" as shown in figure 9C is of a rectangular form. Other forms for the central fixation frame 30 are equally possible such as an oval form, an 8-shaped form, etc.

[0087] In order to have a stable base 10 on which the chair 5 is to be mounted, it is preferred that the arms 32, 34, 36, 38 are evenly distributed around the center X of the base 10 and attached to the central fixation frame 30. Preferably, the actuator 20 is positioned in front of the center X of the base 10 and preferably offset to the center X, such that the movement of the actuator 20 is not hindered by any of the arms 32, 34, 36, 38 of the base 10.

[0088] Although the figures 9A to 9C show four arms 32, 34, 36, 38, it is also possible to use more than four arms to construct the base 10.

[0089] The shape of the base 10 may be in accordance with known designs, and the shapes shown in the drawings are not limiting the scope of the present invention.

[0090] Although not shown on any of the drawings, the lifting mechanism 1 may comprise a controller which is able to control the operation of the actuator 20. Such controller can be a remote controller whereby the controller is attached to the lifting mechanism 1 via a cable. Likewise, the controller may be a wireless device, such as an RFC device or a smartphone to operate and control the lifting mechanism 1. Further alternatives for the controller can be a Bowden cable or a foot pedal to operate and control the lifting mechanism 1.

[0091] Although not shown in the figures, an additional safety feature may be added to the lifting mechanism 1. When the seating arrangement is equipped with a braking system it is possible to allow the controller to operate the lifting mechanism 1 only when the brakes are acti-

vated and actively brake the wheels 40 of the seating arrangement thus preventing the wheels from moving of the ground surface when the lifting mechanism is lifting or lowering the chair 5 in relation to the ground surface.

[0092] The figures 1 to 8B show a hydraulic cylinder 20 as the actuator used to lift or lower the lifting mechanism 1. However, it is also possible to use an electric motor, a hydraulic pump, an electromagnetic actuator, a mechanical actuator or a gas spring to move the arm 80 and to operate the lifting mechanism 1.

[0093] The seating element 5 shown in figures 1 to 7 is a relax chair 5. However, the seating element 5 can be any type of chair, such as a raising assisting chair, a tilt-in-space relax chair, a convertible chair where the chair can be transformed into a bed, or a combination thereof. Not all the details described above are required in every embodiment according to the invention.

Claims

1. A lifting mechanism (1, 100) for raising and/or lowering a seating element (5, 105), the lifting mechanism (1, 100) comprising:

- a base (10, 110) having a top side (12) and a bottom side (14);
- optionally, a connection frame (16, 116) connected to the bottom side (14) of the base (10, 110);
- a link mechanism (18, 118) connected to the connection frame (16, 116) or the bottom side of the base (10, 110), the link mechanism (18, 118) being moveable between a retracted position and an extended position;
- at least one actuator (20, 120), the at least one actuator (20, 120) being configured to connect, at a first end, to the connection frame (16, 116) or the bottom side of the base (10, 110), such that the first end is positioned below the base (10, 110), and, at a second end, to the link mechanism (18, 118), such that the second end is positioned above the base (10, 110); wherein the at least one actuator (20, 120) is operable to move the link mechanism (18, 118) between the retracted position and the extended position; and,
- wherein the link mechanism (18, 118) comprises a first linking element (46, 146) and/or a second linking element (48, 148), wherein the first linking element (46, 146) and/or the second linking element (48, 148) are shaped such that the first linking element (46, 146) and/or the second linking element (48, 148) can be positioned around the base (10, 110) when the link mechanism (18, 118) is in the retracted position.

2. The lifting mechanism (1, 100) according to claim 1, wherein the base (10, 110) comprises a fixation

frame (30) positioned around the center (X) of the base (10, 110) and at least four arms (32, 34, 36, 38), wherein one end (32a, 34a, 36a, 38a) of each of the at least four arms (32, 34, 36, 38) is connected to the fixation frame (30) and the at least four arms (32, 34, 36, 38) are essentially evenly distributed around the center (X) of the base (10, 110).

3. The lifting mechanism (1, 100) according to claim 2, wherein the base (10, 110) further comprises at least four wheels (40) and wherein one of the at least four wheels (40) is connected to the other end (32b, 34b, 36b, 38b) of one of the at least four arms (32, 34, 36, 38) such that the base (10, 110) is configured to be moveable on a ground surface.
4. The lifting mechanism (1, 100) according to any one of the preceding claims, wherein the connection frame (16, 116) comprises a first connection bracket (42, 142) and a second connection bracket (44, 144), wherein the first and second connection brackets (42, 44; 142, 144) connect the link mechanism (18, 118) to the connection frame (16, 116), or wherein the base (10, 110) comprises a first connection bracket (42, 142) and a second connection bracket (44, 144), wherein the first and second connection brackets (42, 44; 142, 144) are connected to the base (10, 110) and are configured to connect the link mechanism (18, 118) to the base (10, 110).
5. The lifting mechanism (1, 100) according to claim 4, wherein the link mechanism (18, 118) comprises a first linking element (46, 146), a second linking element (48, 148) and a top connecting element (50, 150), wherein a first end of the first linking element (46, 146) is pivotally connected to the first connection bracket (42, 142), a first end of the second linking element (48, 148) is pivotally connected to the second connection bracket (44, 144), and the second end of the first bracket (46, 146) and the second end of the second connection bracket (44, 144) are pivotally connected to the connecting element (50, 150), and optionally wherein the first linking element (46, 146) comprises a first arm (46a, 146a) and a second arm (46b, 146b), a first end of the first arm (46a, 146a) is configured to be pivotally connected to the first connection bracket (42, 142) at a first rotation point (54, 154), a second end of the first arm (46a, 146a) is configured to be pivotally connected to the top connecting element (50, 150) at a second rotation point (64, 164), a first end of the second arm (46b, 146b) is configured to be pivotally connected to the first connection bracket (42, 142) at a third rotation point (56, 156), and a second end of the second arm (46b, 146b) is configured to be pivotally connected to the top connecting element (50, 150) at a fourth rotation point (66, 166).

6. The lifting mechanism (1, 100) according to claim 5, wherein the second linking element (48, 148) comprises a first arm (48a, 148a) and a second arm (48b, 148b), a first end of the first arm (48a, 148a) is configured to be pivotally connected to the second connection bracket (44, 144) at a fifth rotation point (58), a second end of the first arm (48a, 148a) is configured to be pivotally connected to the top connecting element (50, 150) at a sixth rotation point (68), a first end of the second arm (48b, 148b) is configured to be pivotally connected to the second connection bracket (44, 144) at a seventh rotation point (60), and a second end of the second arm (48b, 148b) is configured to be pivotally connected to the top connecting element (50, 150) at an eighth rotation point (70).
7. The lifting mechanism (1) according to claim 5 or 6, wherein the first arm (46a) of the first linking element (46) and/or the first arm (48a) of the second linking element (48) is V-shaped, or wherein the first arm (46a) of the first linking element (46) and/or the first arm (48a) of the second linking element (48) is shaped as a boomerang, and/or optionally wherein the second arm (46b) of the first linking element (46) and/or the second arm (48b) of the second linking element (48) is W-shaped.
8. The lifting mechanism (1, 100) according to any one of claim 5 to 7, wherein the first (46, 146) and/or second (48, 148) link element is configured such that when the link mechanism (18, 118) is in the retracted position, the rotation points (64, 66; 164, 166) of the second end of the first (46a, 146a) and second (46b, 146b) arm of the first link element (46, 146) and/or the rotation points (68, 70) of the second end of the first (48a, 148a) and second (48b, 148b) arm of the second link element (48, 148) are positioned below the top side (12) of the base (10, 110), and/or wherein the first (46, 146) and/or second (48, 148) link element is configured such that when the link mechanism (18, 118) is in the extended position, the rotation points (64, 66; 164, 166) of the second end of the first (46a, 146a) and second (46b, 146b) arm of the first link element (46, 146) and/or the rotation points (68, 70) of the second end of the first (48a, 148a) and second (48b, 148b) arm of the second link element (48, 148a) are positioned above the top side (12) of the base (10, 110), and/or wherein the link mechanism (18, 118) further comprises a bottom connecting element (52, 152), wherein a first end of the bottom connecting element (52, 152) is fixedly connected to the first linking element (46, 146), and/or wherein a second end of the bottom connecting element (52, 152) is fixedly connected to the second linking element (48, 148).
9. The lifting mechanism (1, 100) according to claim 8, when depending on claim 5, wherein the first end of the bottom connecting element (52, 152) is fixedly connected to the first end of the first arm (46a, 146a) of the first linking element (46, 146), and/or wherein a second end of the bottom connecting element (52, 152) is fixedly connected to the first end of the first arm (48a, 148a) of the second linking element (48, 148).
10. The lifting mechanism (1, 100) according to claim 8 or 9, wherein the bottom connecting element (52, 152) further comprises a connecting element, preferably an arm (80, 180) connected at approximately halfway the length of the bottom connecting element (52, 152), and wherein the at least one actuator (20, 120) is connected at its second end to the connecting element (80, 180) such that the at least one actuator (20, 120) is operable to simultaneously rotate the first arm (46a, 146a) of the first linking element (46, 146) and/or the first arm (48a, 148a) of the second linking element (48, 148) around their respective rotation points (54, 58; 154, 158) and to move the link mechanism (18, 118) from the retracted position to the extended position or vice versa.
11. The lifting mechanism (1, 100) according to any of claims 5 to 10, wherein the top connecting element (50, 150) comprises at least one connecting element (51), preferably one or more connection openings (51), wherein the at least one connecting element (51) is configured to connect a seating element (5, 105) with the top connecting element (50, 150).
12. The lifting mechanism (1, 100) according to any one of the preceding claims, wherein the lifting mechanism (1, 100) further comprises a controller, and wherein the controller is configured to control the at least one actuator (20, 120), and optionally wherein the controller is a remote controller, preferably connected to the lifting mechanism (1, 100), an NFC device, preferably a smartphone, a Bowden cable, or a foot pedal.
13. The lifting mechanism (1, 100) according to any one of the preceding claims, wherein the base is a cross base (10, 110), and wherein the cross base (10, 110) comprises four arms (32, 34, 36, 38) and a fixation frame (30) positioned around the center (X) of the cross base (10, 110), the four arms being connected to the fixation frame (30), and/or wherein the at least one actuator (20, 120) is an electric actuator, preferably an electric motor, a hydraulic actuator preferably a hydraulic pump, an electromagnetic actuator, a mechanical actuator, and/or a gas spring.
14. The lifting mechanism (1, 100) according to any one of the preceding claims, wherein the lifting mechanism (1, 100) further comprises a preferably removable

ble footrest (90) slidably connected to the bottom side (14) of the base (10, 110) and positioned underneath the link mechanism (18, 118) and/or the connection frame (16, 116), and/or wherein the lifting mechanism (1, 100) further comprises at least one counterbalance, the at least one counterbalance being connected to the base (10, 110) and/or to the connection frame (16, 116), and optionally wherein the at least one counterbalance is configured to be repositioned depending on the position of the link mechanism (18, 118).

15. A seating element (5, 105) having a lifting mechanism (1, 100) according to any one of the previous claims, wherein the seating element (5, 105) is a chair, preferably a relaxing chair, a raising assisting chair or a tilt-in-space relax chair, or wherein the seating element is a convertible chair (5, 105) that can be transformed from a chair to a bed, or vice versa.

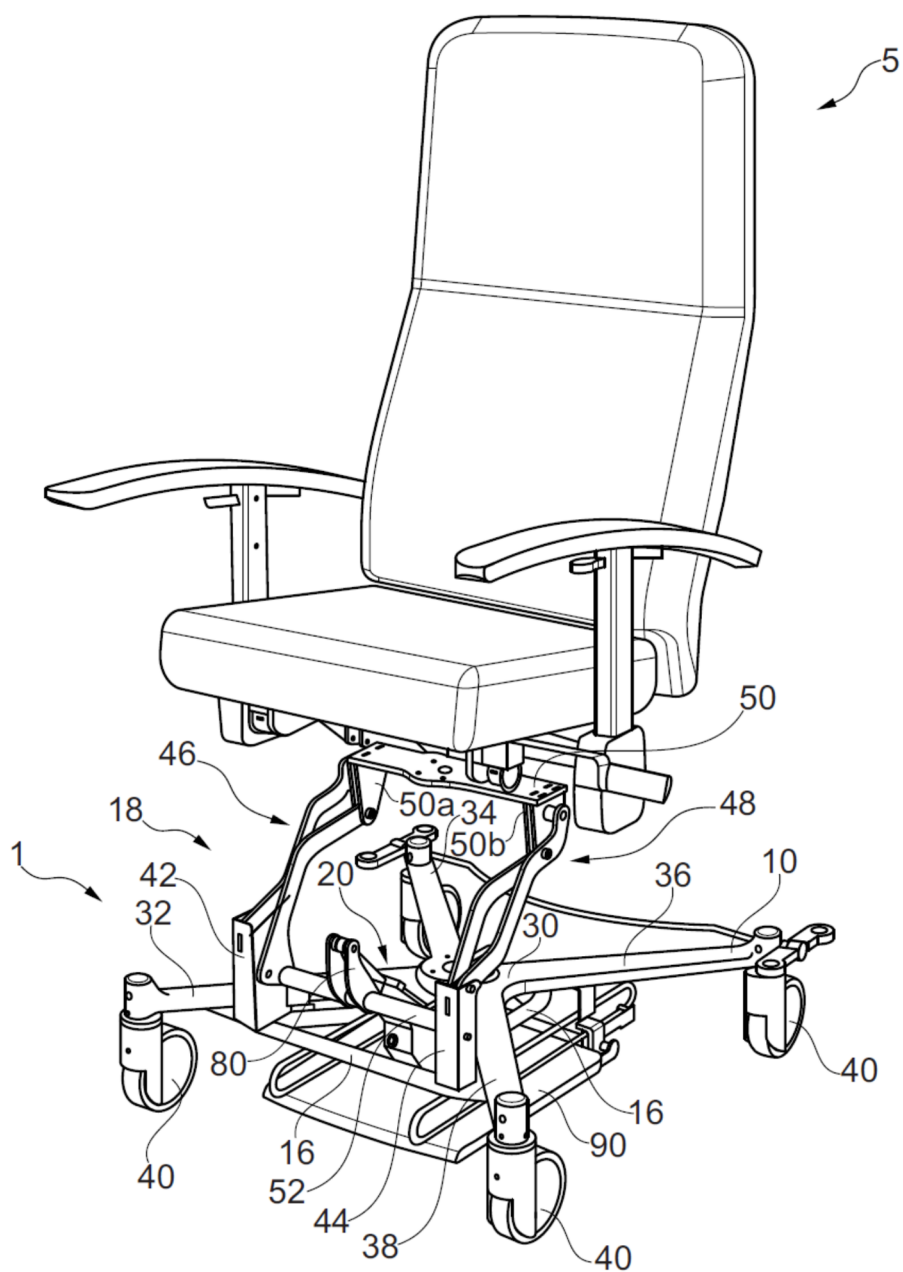


Fig. 1

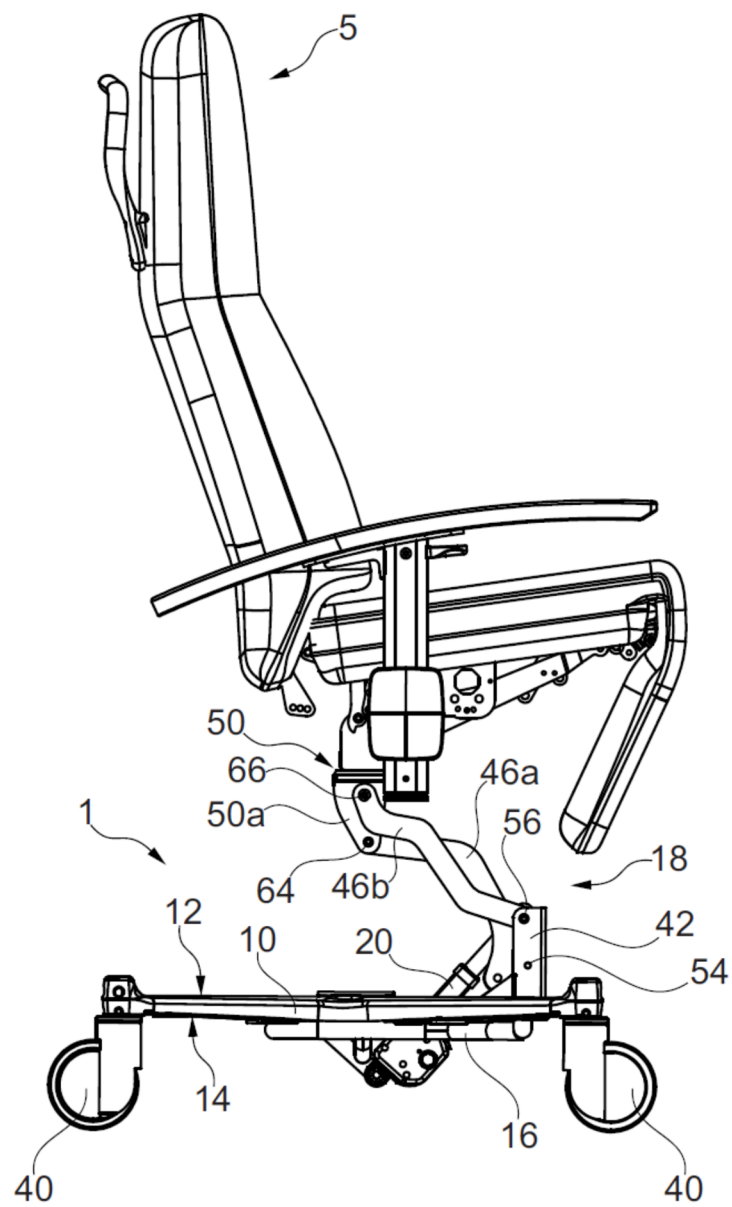


Fig. 2

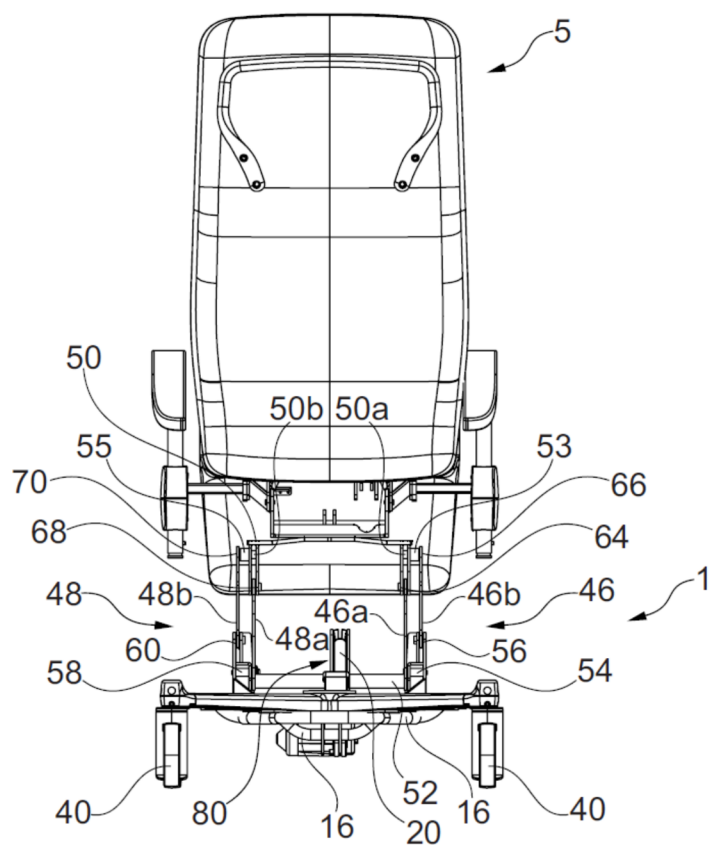


Fig. 3

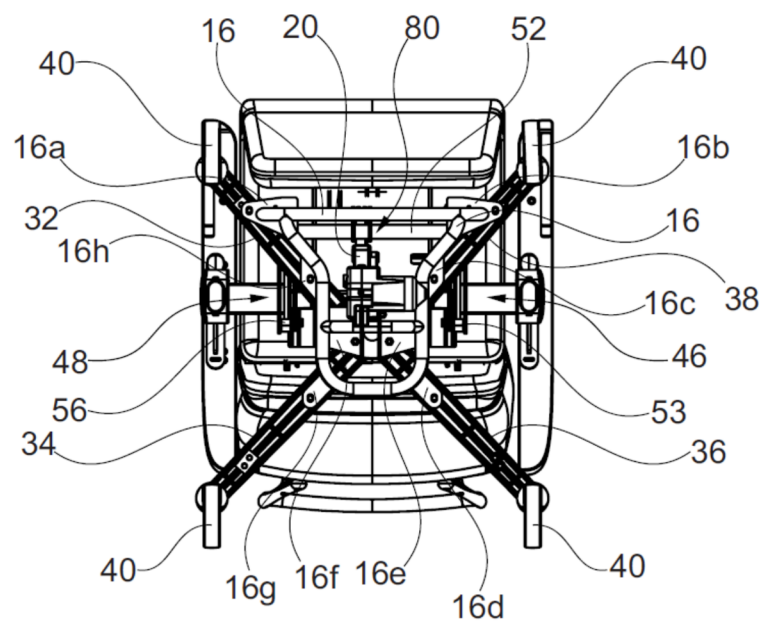


Fig. 4

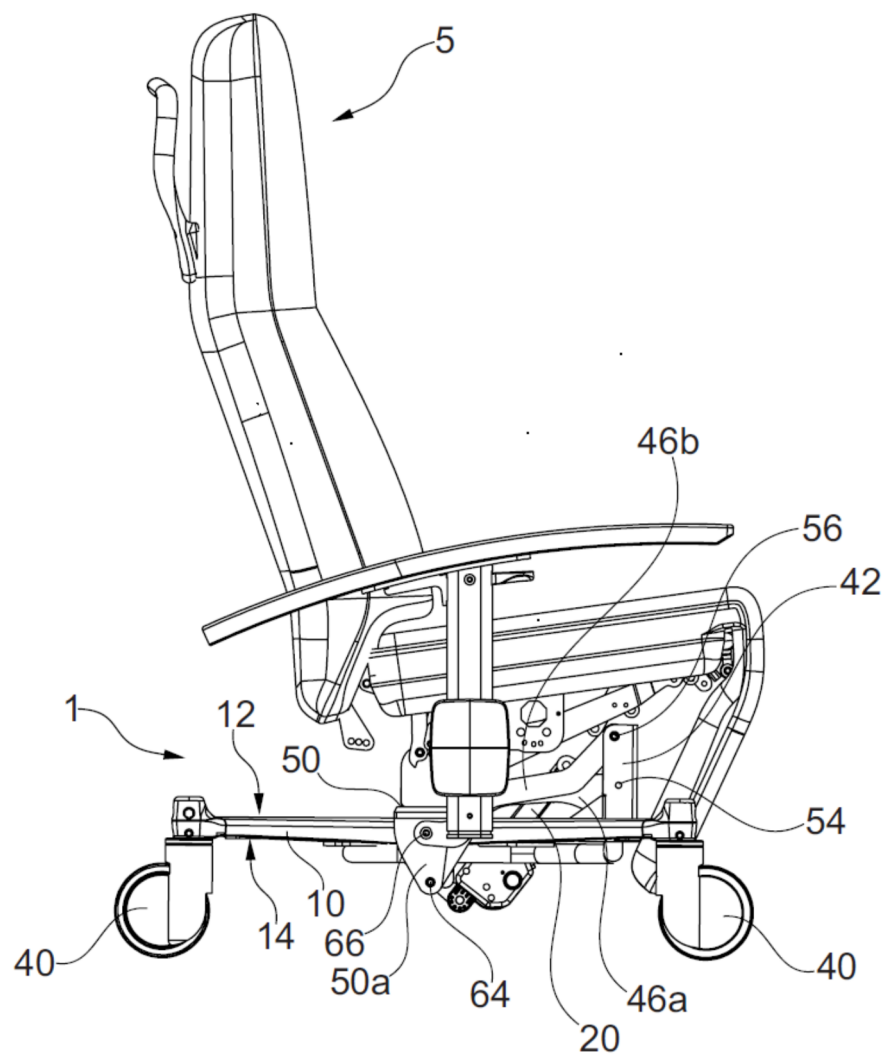


Fig. 5

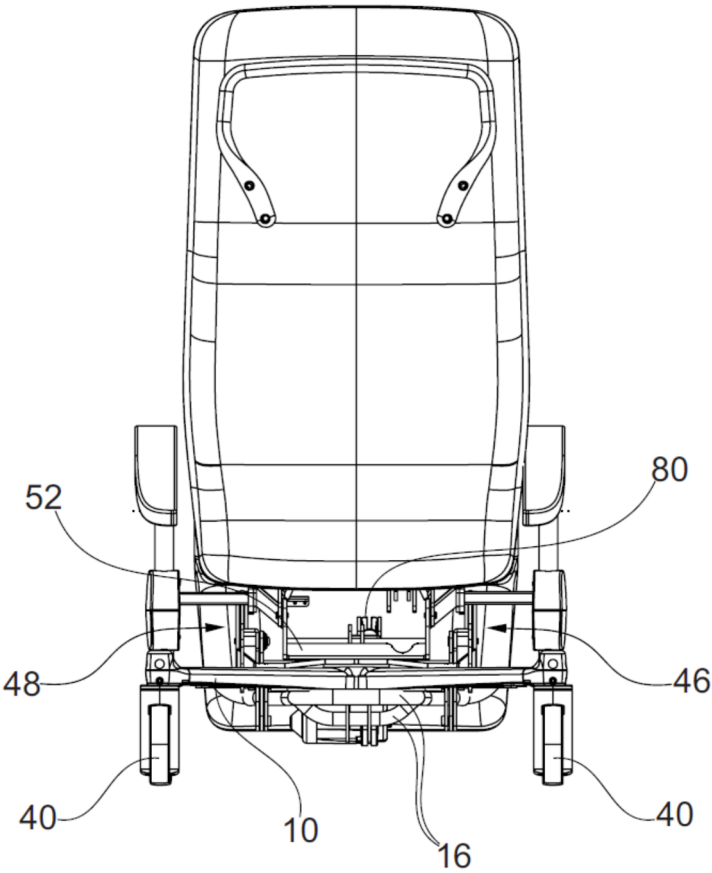


Fig. 6

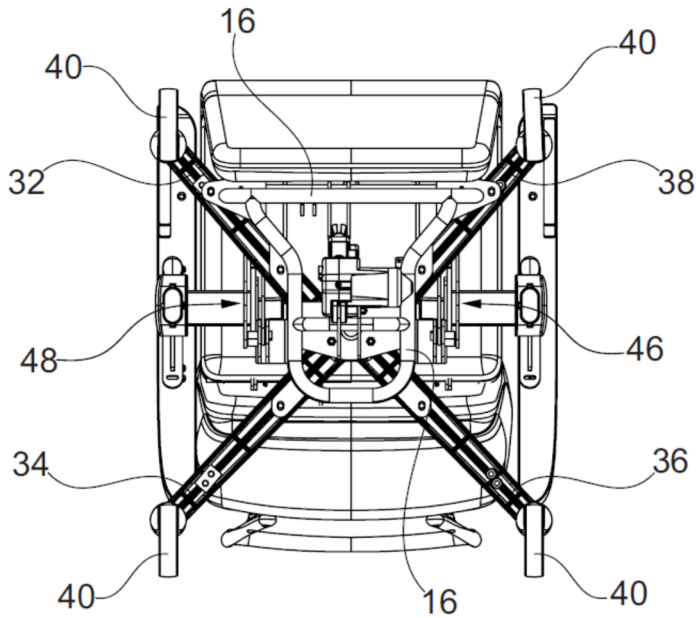


Fig. 7

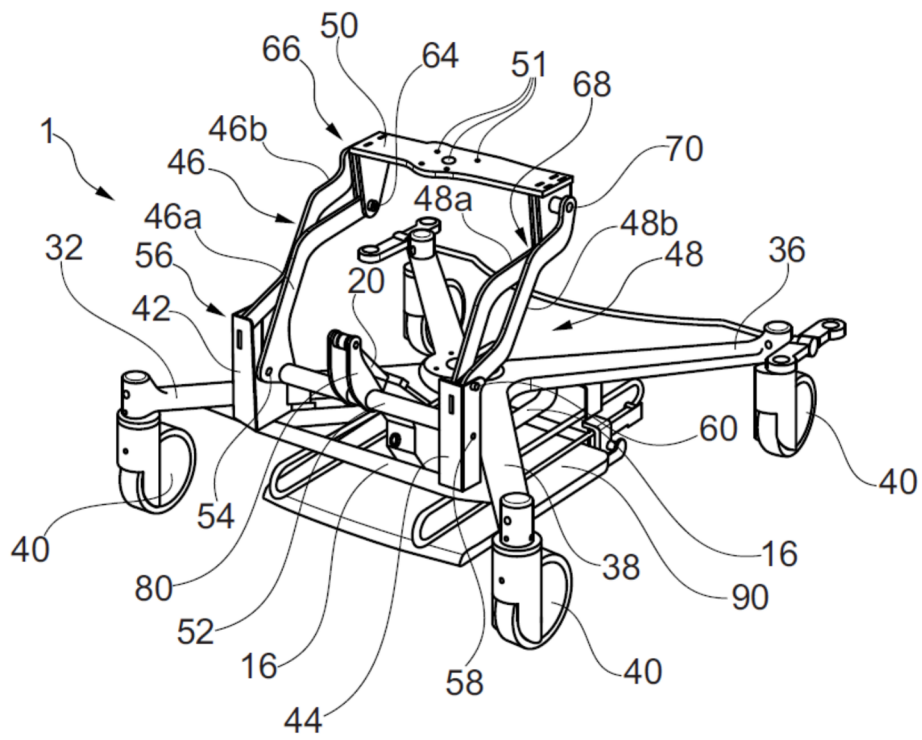


Fig. 8A

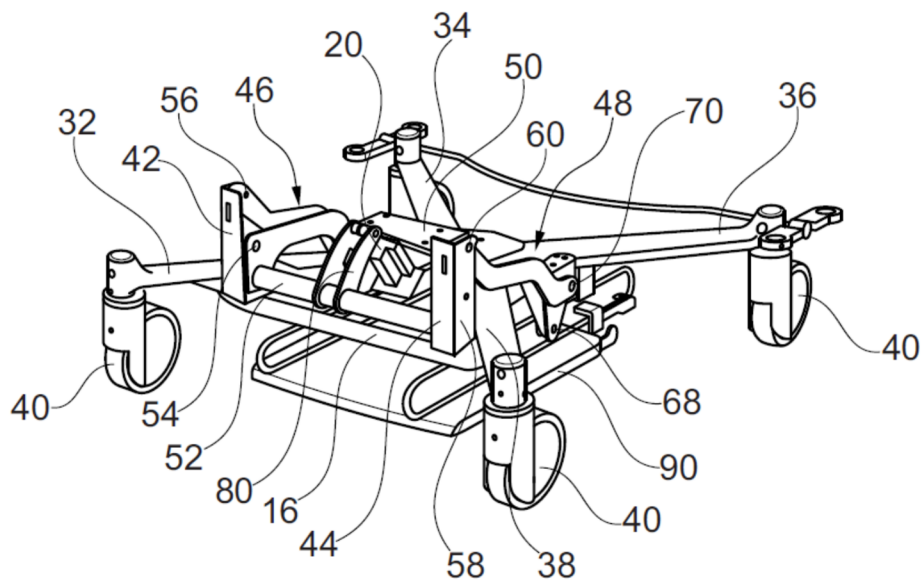


Fig. 8B

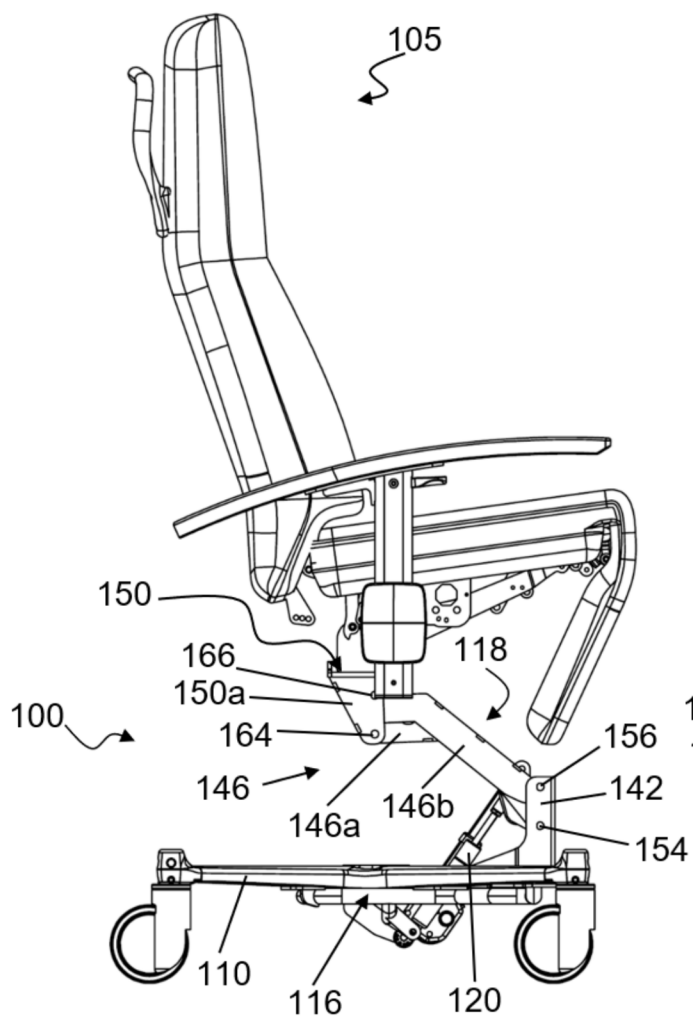


Fig. 9A

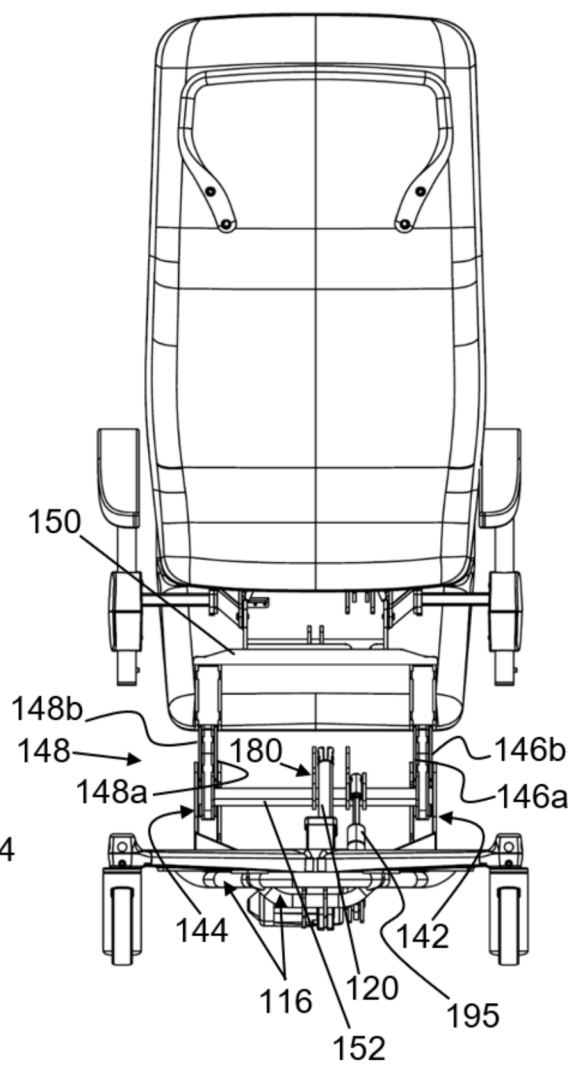


Fig. 9B

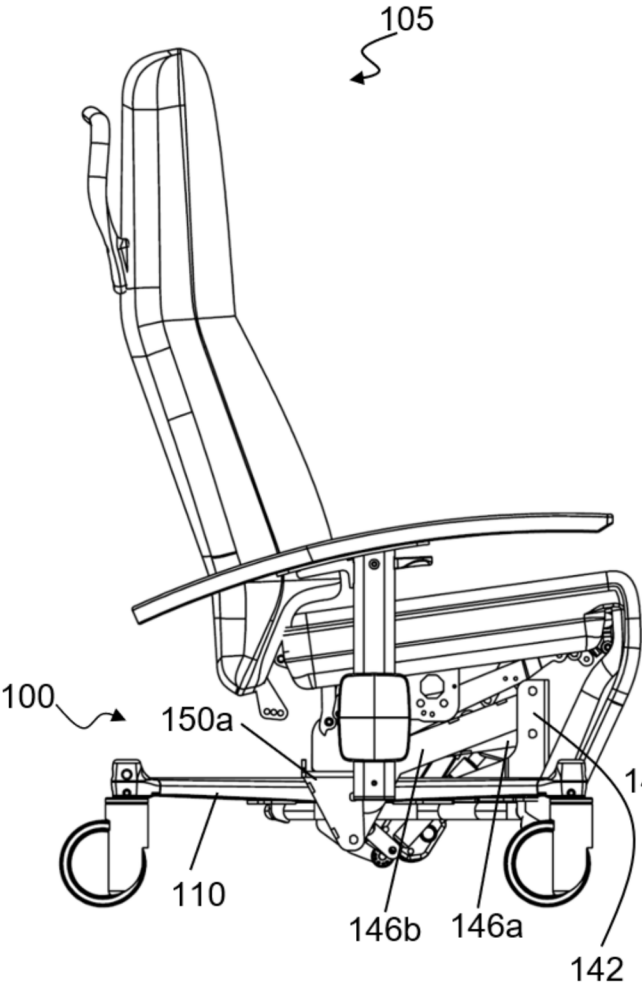


Fig. 9C

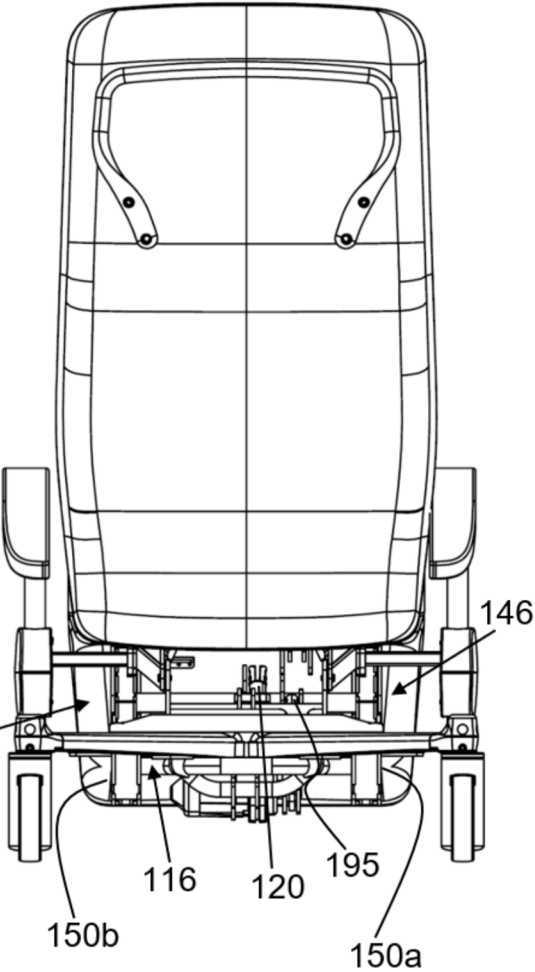


Fig. 9D

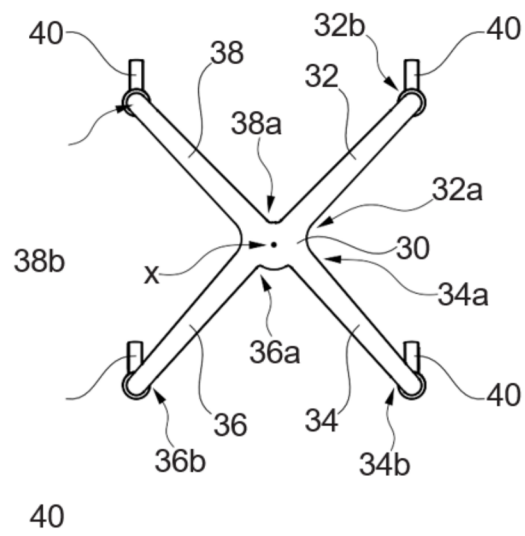


Fig. 10A

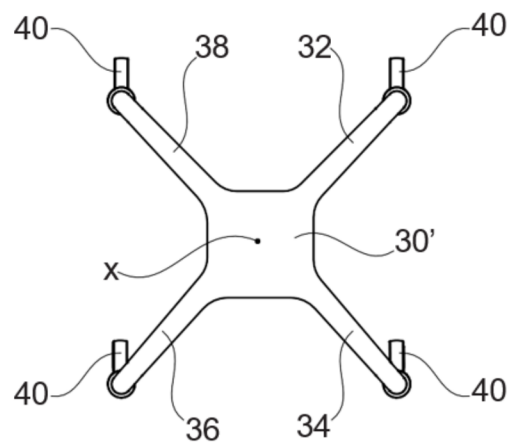


Fig. 10B

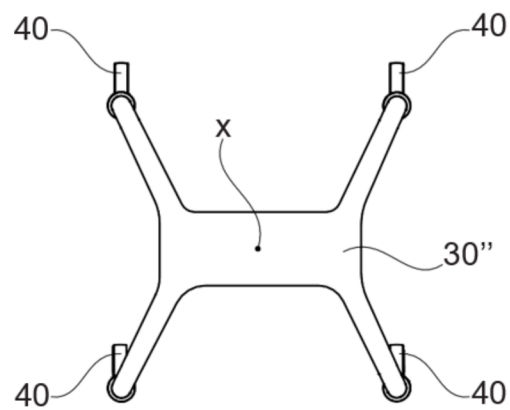


Fig. 10C



EUROPEAN SEARCH REPORT

Application Number

EP 25 21 3836

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	US 2023/048323 A1 (BRITTINGHAM ERIC [US] ET AL) 16 February 2023 (2023-02-16)	1,12-15	INV.
A	* paragraphs [0019] - [0023]; figures * -----	2-11	A47C3/20 A47C7/00 A47C7/50
A	KR 2011 0050115 A (SANGKEON MEDICAL TECHNOLOGY INC [KR]) 13 May 2011 (2011-05-13) * pages 7,8; figures * -----	1-15	A61G5/10 A61G5/14 A61G7/10
A	US 2014/265497 A1 (HOUGH CHRISTOPHER S [US] ET AL) 18 September 2014 (2014-09-18) * paragraph [0214]; claim 1; figures 10-20 * -----	1-15	
			TECHNICAL FIELDS SEARCHED (IPC)
			A47C A61G
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		19 February 2026	Kis, Pál
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 (P34C01)

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

EP 25 21 3836

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

19-02-2026

10

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2023048323 A1	16-02-2023	US 2023048323 A1	16-02-2023
		WO 2023019113 A2	16-02-2023

KR 20110050115 A	13-05-2011	NONE	

US 2014265497 A1	18-09-2014	AU 2014239599 A1	15-10-2015
		CA 2903552 A1	25-09-2014
		CA 3123791 A1	25-09-2014
		EP 2968039 A2	20-01-2016
		US 2014265497 A1	18-09-2014
		US 2014265500 A1	18-09-2014
		US 2014265502 A1	18-09-2014
		US 2014291950 A1	02-10-2014
		US 2018042799 A1	15-02-2018
		US 2019343699 A1	14-11-2019
		US 2021236357 A1	05-08-2021
		WO 2014152550 A2	25-09-2014

15

20

25

30

35

40

45

50

55

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

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- KR 20110050115 [0007]
- US 2014265497 A1 [0008]