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Remarks:
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(54) A lifting and/or transporting device for humans

(57) A lifting and/or transporting device for humans comprises a frame member (110), a back supporting member (114) for supporting the back of a sitting or standing person, a saddle-like supporting member (113) for supporting the buttocks of a standing or sitting person, and lifting means adapted to lift and lower at least the saddle-like supporting member. The device may further comprising at least one thigh supporting member (115) pivotally mounted on the frame member (110), whereby the at least one thigh supporting member can be swung between a non-supporting position in which it does not interfere with the legs of a standing person and a supporting position in which it together with the saddle-like buttocks supporting member (113) constitutes a substantially continuous supporting surface for a sitting person. The device may further comprise locking means for locking the at least one thigh supporting member (115) in its supporting position.

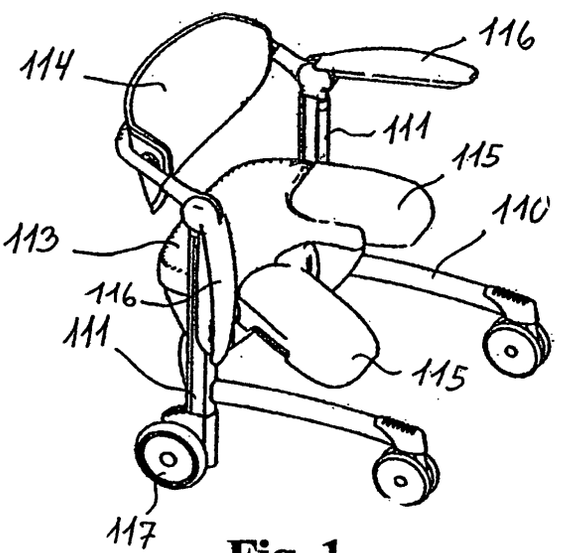

Fig. 1

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Description

Field of the Invention

[0001] The present invention relates to various lifting and transporting devices for disabled persons. One aspect of the invention relates to a device which is built up as a module system, wherein a plurality of different assisting members may be mounted. For example a plurality of different assisting members may be mounted at a time to one single base construction in order to increase the mobility of a disabled person with only one basic transporting device.

Background of the Invention

[0002] It is known that disabled persons have difficulties in raising, sitting, visiting the lavatory, etc. Therefore, they often need a plurality of helping devices in their homes, e.g., one for helping them in raising, a second one for helping them in walking and a third one for helping them when visiting the lavatory etc., so as to be able to live a reasonably normal human life. Transporting devices for disabled persons are often developed to be fitted to an institutional environment which means that they often are relatively large and heavy, and it is presumed that a second person is needed in order to control the devices.

[0003] Different kinds of helping devices for disabled persons are known. EP 0 617 942 A2 discloses a lifting and transporting device for transporting a person from a bed. The device comprises a substantially U-shaped base frame which comprises rollers for rolling across the floor. The base frame comprises a vertically mounted post for lifting the seat in relation to the base frame. The seat is pivotally mounted to the post, so as to swivel the seat around a vertical axis and thereby move the centre of gravity of the person from a lifting position to a transporting position.

[0004] US 4,432,359 discloses a transporting and lifting device which comprises a wheeled chassis and a vertical column. The column comprises a handle for manually lifting three supporting surfaces that supports a sitting person. The device has an H-shaped base frame which comprises wheels for rolling across the floor.

WO 87/01583 discloses a wheel chair that comprises a U-shaped base frame and a post. Three supporting plates for supporting a sitting person are mounted on the top of the post, so that the post may lift or lower the supporting plates in relation to the base frame by use of motors. Furthermore, the supporting plates comprise conveyor belts for loading or unloading the person from the chair to e.g., the lavatory.

[0005] US 4,255,823 describes a transporting device for handling invalids and comprising a base frame having holding means mounted for holding a patient above the base frame. The holding means are further provided with lifting means for lifting and lowering the holding means, and pivot means for pivoting the patient in a horizontal plane.

[0006] DE 196 47 498 describes a device for assisting a person in rising from a sitting position to a standing position and comprising a base frame onto which an upright is mounted. The upright comprises lifting means and a back supporting member which is adapted to be positioned around the back of the person. The person is supported by a foot support and raised by lifting the back supporting member.

[0007] US 4,947,497 describes an apparatus for lifting patients and comprising a U-shaped moving base, and an elevator column mounted to the moving base. The column comprises holes for receiving lateral bars each of which being suitable for receiving horizontal lifting arms. Support means for supporting the person are mounted on the arms.

[0008] NL 9 301 145 discloses an apparatus for assisting a person in rising from a sitting position to a standing position and comprising a rotatable lifting rod, at the free end of which a transversely extending assisting member is provided. Knee supports for the knees of the disabled person are provided.

[0009] WO 96/11658 discloses a posture change system and posture change method. The document describes a method for lifting a person from a sitting to a standing position, the method comprising rotating the person's torso around a pivot point while the person is supported by a chest pad.

Summary of the Invention

[0010] An object of the present invention is to provide one or more devices and/or methods which enable disabled persons to be self-helped and live normal lives in their private homes despite of severe handicaps or diseases. A further object of the present invention is to provide means for assisting disabled persons, the means being designed in such a way that they may be controlled by the disabled person himself. A still further object of the invention is to provide devices which can easily be moved around inside the private home of a disabled person.

[0011] Thus, a first principle of the present invention provides a lifting and transporting device which may comprise one or more assisting members at a time, and thereby provide the disabled persons with one single lifting and transporting device for all needs or at least for a plurality of different needs. The lifting and transporting device for assisting disabled persons may be constructed as a module system having a base frame and an upright onto which a plurality of assisting members may be mounted, the upright comprising mounting means which are adapted to receive one or more assisting members for carrying or otherwise assisting a disabled person. The upright further comprises lifting means for lifting or lowering the assisting members in relation to

the base frame.

[0012] In the present application, the term "lifting means" cover any means suitable for and/or capable of activating a lifting and/or lowering movement of any device or a person. The lifting means may comprise manually driven means, electrically driven means and/or hydraulically driven means in combination with one or more chains, telescopic cylinders, belts, wires and/or suspension bands.

[0013] A second principle of the invention relates to a chair-like transporting device for assisting a person when walking, standing and sitting.

[0014] A third principle of the invention relates to a bed for disabled persons, wherein the supporting parts at the foot end of the bed are removable mounted to the other parts, so as to thereby make it easier for the person to get into/out of the bed.

[0015] The above-mentioned principles and the associated aspects of the invention will be further described below.

[0016] A first aspect of the invention relates to a lifting and/or transporting device for disabled persons, that comprises a base member and an upright extending from the base member and comprising a plurality of mounting means which are adapted to receive one or more assisting members for carrying or otherwise assisting a disabled person. The mounting means may be positioned at different positions along the height of the upright so as to allow one or more assisting members to be mounted at different positions along the height of the upright, and lifting means for lifting and lowering the upright in relation to the base member, and wherein the upright is displaceable along the base frame.

[0017] The base member may comprise a track, and that in case, the track may be integrated in a floor. The base frame may be stationary mounted, e.g., to a floor, or the base frame may comprise wheels and/or rollers for rolling and/or driving the device along a floor or ground surface.

[0018] The assisting members may comprise all kinds of devices or parts for assisting and/or carrying a disabled person. Thus, an assisting member may comprise a seat, optionally provided with a lavatory hole, one or more handgrips, a stretcher, a table surface, means for supporting specific body parts of the disabled person, such as, e.g., the thighs, the calves, the knees, the back, the buttocks, the torso, the arms, the neck and/or head or the feet. An assisting member alternatively may comprise straps for hoisting devices optionally comprised in the device.

[0019] An advantage of the above-mentioned aspect of the invention is that the upright is displaceable mounted to the base frame or track which provides improved flexibility of the device in relation to prior art devices. Thus, the device to a large extent is independent of the layout and design of, e.g., a bathroom, toilet, kitchen, doors etc. of a private home.

[0020] The mounting means which are adapted to receive one or more assisting members at a time provides the disabled person to mount a plurality of different assisting members on the upright, using only one single transporting device. The mounting means may comprise a sheet or plate which extends along the height of the upright and which is provided with mounting holes or other means for receiving the assisting members.

[0021] Preferably, the upright further comprises lifting means for lifting or lowering the assisting members. The lifting means may comprise an electrical power driven chain for lifting or lowering the assisting members or any other suitable means for lifting.

[0022] The base frame may be U-shaped or H-shaped and supported by a plurality of wheels or rollers for rolling the device over or along a ground or floor surface.

[0023] In the present application, the terms "wheels" or "rollers" cover any kind of driving or rolling means. All or some of the wheels or rollers of a device or frame may be driven by driving means, which may, e.g., comprise electrical means. Preferably, the driving means are adapted to drive the device in all and any directions. For some applications of the device, some or all of the driving wheels may be of the type disclosed in WO 99/01298, the disclosure of which document is hereby made part of the present application. For ensuring that the device does not roll when the person supported by the device is not ready for rolling, the wheels may further comprise braking means for stopping movement of the wheels or rollers. The driving and braking means may be electronically controllable, if the device further comprises user control means for controlling braking and/or driving of the wheels.

[0024] As an alternative, the U-shaped base frame may be adapted to be stationary mounted in or to a floor or it may be adapted to be rotationally and/or displaceable mounted in relation to the floor.

[0025] The lifting and transporting device according to the first aspect of the invention has the particular advantage that the upright comprises lifting means for lifting or lowering a plurality of assisting members at a time. Thereby, two assisting members for, e.g., the torso and the back, respectively, of a disabled person may be lifted at a time. Thus, the possibility is provided that the person is being lifted, so that he/she makes a normal human movement, which is a major advantage over the type of prior art devices, which are adapted to pull a belt which is wound around the disabled person's torso.

[0026] In any aspect of the present invention, the upright may be displaceable along the base frame or track, the base frame or track being mounted on or integrated in a floor or they may be mounted on a turntable which is mounted on or integrated in a floor.

[0027] In any aspect of the present invention, the base frame may be U-shaped or H-shaped and have a length being larger than the width.

[0028] A second aspect of the present invention relates to a lifting and/or transporting device that compris-

es an upright which comprises mounting means which are adapted to receive at least a first platform, and lifting means which are adapted to lift and lower the first platform. The device further comprises a second platform which is supported along at least a first and a second supporting line, one of which supporting lines is provided between the second platform and a floor support and another one of which is provided between the second platform and the first platform. The first supporting line provides a pivot for the pivotal movement of the second platform around said pivot, and the support provided by the second supporting line allows relative movement between the second platform and the first platform or between the second platform and a floor support, so that when the first platform is lifted or lowered, the second platform pivots around the pivot and simultaneously slides along the first platform or along the floor support.

[0029] Devices according to this aspect of the present invention provide the possibility that a person who is unable to overcome, e.g. a staircase or another level change may use the platforms. Thus, the disabled person may, e.g., place his/her wheelchair on the first platform, lift the platforms by activating the lifting means, and finally enter a floor on a higher level by rolling the chair over the second platform to the floor.

[0030] As an alternative, the pivot may be placed between the floor support and the second platform, and the slideable support may be placed between the first and second platform. The first and/or second platform may comprise banisters, which may be releasable mounted to the first and/or second platform.

[0031] In another embodiment of the second aspect of the present invention, the assisting member may comprise only one lifting platform, which is horizontally mounted to the upright for lifting or lowering objects from one level to another.

[0032] A third aspect of the present invention relates to a lifting and/or transporting device for disabled persons, comprising

- a base member,
- an upright extending from the base member,
- an assisting member for assisting a disabled person, the assisting member being mounted to the upright by means of a supporting arm mounted to and extending transversely from the upright, and comprising a seat with a seating surface rotatably mounted to the supporting arm around an axis of rotation extending through a central part of the seat substantially perpendicularly to the seating surface, and
- lifting means for lifting and lowering the assisting member in relation to the upright.

[0033] Preferably, the rotation axis is substantially coincident with the longitudinal axis of the torso of a person sitting upright in the seat.

[0034] In a preferred embodiment, the seat is mounted to the supporting arm by means of a bearing which comprises:

- a ring-shaped member, the centre of which defines said axis of rotation, and
- bearing members which are displaceable in relation to and along the ring-shaped member, the bearing members and the ring-shaped member constituting a guide for the rotational movement of the seat in relation to the ring-shaped member.

[0035] The bearing members may be mounted to the seat, and the ring-shaped member may be mounted to the supporting arm.

[0036] Alternatively, the seat may be fixed mounted to the ring-shaped member, so that the seat is not rotatably.

[0037] Preferably, the base member is U-shaped and defines an inner area, a substantially horizontal plane and a geometrical centre axis extending perpendicularly to said plane, and wherein the linear distance between the axis of rotation and the geometrical centre axis is at the most 30 cm.

[0038] The linear distance between the axis of rotation and the geometrical centre axis may be at most 28 cm, such as at most 26 cm, such as at most 24 cm, such as at most 22 cm, such as at most 20 cm, such as at most 18 cm, such as at most 16 cm, such as at most 14 cm, such as at most 12 cm or even lower, such as at most 10 cm, such as at most 8 cm, such as at most 6 cm, or such as at most 5 cm, such as at most 4 cm, or even lower, such as at most 3 cm, such as at most 2 cm or at most 1.5 cm, such as at most 1 cm, at most 0.8 cm, at most 0.6 cm, at most 0.5 cm, at most 0.4 cm, 0.3 cm, 0.2 cm, such as 0.1 cm, such as 0.8 mm, such as 0.6 mm, such as 0.4 mm, such as at most 0.3 or at most 0.2 mm, such as at most 0.1 mm, or even closer to 0 mm or even 0 mm.

[0039] In another embodiment according to the third aspect, the present invention relates to a lifting and/or transporting device comprising a base member which defines an inner area, a substantially horizontal plane and a geometrical centre axis extending perpendicularly to said plane, an upright extending from the base member, and the upright comprises mounting means which are adapted to receive one or more assisting members for assisting a disabled person and lifting means for lifting or lowering the assisting member. The assisting member is rotationally mounted around an axis of rotation, and it is carried by an supporting arm which is mounted on the upright and which extends from the upright in a direction towards the inner area of the base member, so that the linear distance between the axis of rotation of the assisting member and the geometrical

centre axis of the base member is at most 20 cm when rotating the assisting member around the axis of rotation within an angular range of at least 45°.

[0040] The lifting and/or transporting device may comprise a substantially U-shaped base frame which defines an inner area, a substantially horizontal plane and a geometrical centre axis extending perpendicularly to said plane, and an upright extending upwardly from the base frame. The upright preferably comprises mounting means which are adapted to receive one or more assisting members for assisting a disabled person, and lifting means for lifting or lowering the assisting member. The assisting member is rotationally mounted around an axis of rotation, and is carried by a supporting arm. The supporting arm is mounted on the upright and extends from the upright in a direction towards the inner area of the base member, so that the linear distance between the centre of gravity of the disabled person being carried by the assisting member and the geometrical centre axis of the base member is at most 20 cm when rotating the assisting member around the axis of rotation within an angular range of at least 45°.

[0041] Preferably, the seat may be rotationally mounted to a supporting arm and be detachably mounted to the upright. Thus, when the seat is oriented such that the disabled person sitting on the seat faces a first direction, the transporting device has a first width which is approximately equal to the width of the base frame, and when the seat is oriented such that the disabled person sitting on the seat faces a second direction, the transporting device has a second width which is approximately equal to the length of the base frame. Thus, the transporting device may be designed so that it may pass through a standard door having a width of approximately 60 cm, while the device may be sufficiently long in order to ensure stability of the device. In comparison to some prior art devices which have dimensions in all directions which makes it impossible to pass such devices through standard doors.

[0042] In the embodiments according to the third aspect, the device may further a locking device for locking the seat in relation to the supporting arm. Preferably, the locking device comprises one or more spring-biased pawls which are adapted to engage corresponding grooves provided in furnishings, and the furnishings may be mounted to the seat, and wherein the locking device may be mounted to the ring-shaped member, or vice versa.

[0043] The pawls may be retracted from the grooves of the furnishings by pulling a release handle, so as to release the seat and allow rotation thereof.

[0044] The seat mentioned above may further comprise a lavatory hole, so as to make it possible for a person to visit the lavatory without leaving the seat, and only rolling the transporting device to the toilet bowl and placing the seat over the lavatory bowl.

[0045] Preferably, the lavatory hole is arranged within the inner periphery of the ring-shaped member when seen in plane projection. The lavatory hole may be covered by a sheet, which may be pivotally mounted to the seat either under or above the seat, so that it is removable between a cover position and a non-cover position.

[0046] A still further assisting member, which is adapted to be mounted to the upright, may be provided in order to pull the disabled person towards the upright and simultaneously pull the disabled person in an upward direction, so as to assist the disabled person in raising from a sitting to a standing position and/or in getting from a standing to a sitting position. This assisting member may in a preferred embodiment comprise a wire which is wound around a power driven reel connected to or integrated in the upright, the pulling movement towards the upright being provided by winding the wire around the reel, and the upward or downward movement is provided by the vertical movement of the upright. The wires may be of nylon wires, fibre reinforced wires, cables, suspension bands, etc.

[0047] This assisting member may be mounted to the upright together with a further assisting member, e.g., a plate that is adapted to assist the legs and feet of the person. An advantage of the mounting of these assisting members at the same time is that they provide a normal human movement of the disabled person when raising and sitting instead of the person being pulled by a torso belt only. The plate may provide a safe support for the feet of a disabled person and may ensure that the person does not slide on the floor when raising or sitting.

[0048] A still further assisting member mounted to the upright may comprise one or more handgrips, so as to assist the disabled person in rising from a sitting to a standing position and/or in getting from a standing to a sitting position when lifting or lowering the upright, respectively.

[0049] A further assisting member mounted to the upright may comprise a seat which is mounted on an arm, which is pivotally mounted around a substantially horizontal axis that may be mounted to the upright, whereby the seat may be swung between a supporting position and a non-supporting position. This assisting member allows the person to put on or take off a pair of trousers or a skirt, e.g., when visiting the lavatory. This is due to the fact that the seat can be displaced from the supporting position between the legs to the non-supporting position which may be on one side of the person. The arm may be spring biased, and furthermore, the arm may be either manually, electrical or hydraulic driven. The arm may further comprise one or more abdomen supporting members for supporting the abdomen of the person.

[0050] A still further assisting member may comprise a table sheet or plate mounted to the upright in mounting means, whereby the table sheet may be lowered or lifted by lifting means.

[0051] Another assisting member comprises at least two supporting plates which are pivotally interconnected along one of there respective edges, so that they in an aligned position define a supporting surface for a lying

person, and so that they in a non-aligned position define supporting surfaces for a sitting person. This assisting member may comprise three supporting plates, wherein an edge of a first supporting plate is pivotally connected to a first edge of a second supporting plate, and an edge of a third supporting plate being pivotally connected to a second edge of the second supporting plate, the second edge of the second supporting plate being opposite to the first edge. Preferably, the assisting member may comprise locking means for interlocking the two or three supporting plates in different mutual positions. The pivotal movement of the supporting plates may be driven by manual means, such as a wire and a hand crank or they may be driven by power driven means. It is a possibility that at least one of the supporting plates is provided with a driving belt for loading or unloading a lying person to or from the supporting surface defined by the supporting plates. Thereby, the person is being cared in a gently way.

[0052] A fourth aspect of the present invention relates to a device for assisting disabled persons that comprises a base frame and an upright extending from the base frame and comprising a plurality of mounting means which are adapted to receive one or more assisting members, and lifting means for lifting or lowering the assisting member. The assisting member is pivotally mounted to the upright and comprises a supporting plate for abutting the chest of a disabled person, so as to assist the disabled person when rising from a sitting to a standing position and/or when getting from a standing to a sitting position. An advantage of this design is that the pivotal mounting of the supporting plate provides the possibility that the disabled person leans forward towards the supporting plate which abuts the torso or parts of the torso while simultaneously being lifted, so that the movement of the torso of the person comprises at least two movements, a linear lifting/lowering movement and a rotational bending forward/leaning backward movement. Thereby, a normal human movement is allowed for. Furthermore, the person may lean towards the supporting plate when taking off or putting on his/her trousers or skirt while simultaneously being supported by the assisting member.

[0053] All of the above-mentioned assisting members according to the first, second, third and fourth aspect of the present invention may be mounted to the upright one, two, three, four, five or all at a time and in any combination, and they may be mounted to an upright that has any of the lifting means that are described above. The upright may be fixed or displaceable mounted to a base frame which may be substantially U-shaped or circular or rectangular and comprises wheels or rollers that are manually or power driven. It should be understood that any combination of frame configurations, lifting means, assisting members, wheels or rollers and other features mentioned above are possible within the scope of the invention.

[0054] As mentioned above, a second principle of the invention relates to a chair-like transporting device for assisting a person when walking, standing and sitting.

[0055] Thus, a further aspect of the present invention relates to a lifting and/or transporting device comprising a frame member, a back supporting member for supporting the back of a sitting or standing person, and a saddle-like supporting member for supporting the buttocks of a standing or sitting person, and lifting means which are adapted to lift and lower at least the saddle-like supporting member. A purpose of this device is to provide a disabled person with a helping device that is a combined supporting device for walking, standing and/or lifting situations. When provided with this lifting and transporting device, the person is able to get out of bed, walk around and be assisted in a standing position. The lifting and transporting device may comprise at least one thigh supporting member pivotally mounted to the frame member, whereby the at least one thigh supporting member can be swung between a non-supporting position in which it does not interfere with the legs of a standing person and a supporting position in which it together with the saddle-like supporting member constitutes a substantially continuous supporting surface for a sitting person. The device may further comprise locking means for locking the at least one thigh supporting member in its supporting position. Preferably, the device may comprise armrests which may be pivotally mounted to the edges of the back support and finally be releasable mounted. It will be appreciated that this device is not only suitable as an aid for disabled persons but also as a highly flexibly chair, e.g., for use in an office or a private home.

[0056] The lifting means are preferably adapted to lift and/or lower either the back supporting member or the saddle-like supporting member or the buttocks supporting member or the thigh supporting member or all of the supporting members at a time or some of them at a time. Furthermore, the back supporting member may be biased towards the back of the person supported by the device, so as to support the back of the person in a standing and in a sitting position. Thereby, the person's back may always be supported, so that the possibility of person falling backwards is minimised.

[0057] For the rolling of the device e.g., inside a building, the device may be provided with wheels or rollers which may be mounted to the base frame. The wheels may be manually driven by pushing the device along the surface of the floor or they may comprise driving means for driving the wheels or rollers as outlined above.

In the lifting and transporting device, the frame member may comprise a substantially U-shaped base frame, which has at least two substantially vertical columns extending from the frame member. The columns are preferably adapted to carry two inner columns which are mounted within each of the columns, so that each column comprises an outer and an inner column. The inner columns are adapted to receive one or more assisting members, the inner columns being displaceable in rela-

tion to the outer columns. Movement of the inner columns may be provided by lifting means.

[0058] Preferably, the lifting means comprise at least one wire and at least one shaft, which is mounted in a fixed vertical position, and around which the wire may be wound. The wire may be fastened to the inner column and connected to the shaft, so that the inner columns may be lifted or lowered in relation to the column when the shaft is rotated. When rotating the shaft in the opposite way of lifting, lowering is provided by the gravitation acting on the inner columns and the assisting members mounted to them. Lowering may be controlled by breaking means for counter-acting the action of gravity.

[0059] More preferably, the lifting means comprise two wires, a first one for lifting the inner columns and a second one for lowering them. By the use of two wires, the clearance between the column and the inner column is reduced when lifting and lowering. As described further below, the wires have their fastening point in the upper part and lower part of the columns, respectively, but they may, alternatively, have their fastening points in the lower end of the inner columns. Preferably, the two wires are wound around the same shaft, but they may, alternatively, be wound around two shafts, one on each, and the wires may be chains, steel wires, nylon wires, fibre reinforced wires, cables, suspension bands, etc. The device is preferably provided with driving means for rotating the shaft. The driving means may either be magnetic electrical driven, hydraulic driven or manual driven.

[0060] As mentioned above, a third principle of the invention relates to a bed for disabled persons, wherein the supporting parts at the foot end of the bed are removable mounted to the other parts, so as to thereby make it easier for the person to get into/out of the bed. Accordingly, a further aspect of the present invention relates to a bed which comprises two or more frame parts and a mattress. The mattress is divided into at least a first mattress sub-part and one or more further mattress sub-parts, each mattress part being supported by an associated frame part. The first mattress sub-part and the associated frame part are adapted to support the calves of a lying person, and the one or more further mattress sub-parts and the associated frame part(s) are adapted to support the thighs, the buttocks, the back and the head of the lying person. The first mattress sub-part and the associated frame part are displaceable between a supporting position wherein they support the calves of the lying person and a non-supporting position under the other frame parts wherein they do not support the calves of a lying person.

[0061] Preferably, the bed comprises at least three frame parts, wherein the mattress is divided into a first mattress sub-part and two further mattress sub-parts. One of the two further mattress sub-parts and the associated frame part is adapted to support at least the thighs of the person. The other one of the two further mattress sub-parts and the associated frame part is adapted to support at least the back of the person. The two further mattress sub-parts and the associated frame parts are pivotally interconnected along one of their respective edges, so that they in an aligned position define a substantially planar supporting surface for a lying person, and so that they in a non-aligned position define supporting surfaces for a sitting person. The bed may comprise four or five mattress sub-parts and four or five associated frame parts, a first one for supporting the head, a second one for supporting the back, a third one for supporting the thighs and a fourth one for supporting the calves, and the fifth one is adapted for making it possible to bend the mattress in an angle of 90° by bending it into two angles of 45°. The bed may further comprise moving means for moving the calves' supporting parts from the supporting position to the non-supporting position below the one or more further mattress sub-parts and the associated frame parts. The moving means may be manually driven, e.g., by wires and shafts or by hinges, or they may comprise electrical driven by chains, cables, suspension bands or other suitable means.

[0062] Some or all of the frame parts may be pivotally interconnected along one of their respective edges, so as to make it possible to pivot the bed into any preferred supporting position. The bed may further comprises pivoting means for the pivotal movement of the mattress sub-parts and the associated frame parts in relation to each other, so as to assist a lying or sitting person in raising. The pivoting means may be power driven or manually driven, e.g., by a wire and a shaft or hydraulically driven cylinders or gas cylinders or electrical driven means comprising chains wires or other kind of suspension bands. The parts may be independently pivotable, and they may be locked in their preferred positions by locking means, such as spring load locking means or locking dowels.

[0063] The frame parts may be mounted to a base frame which is mounted to the floor or to tilting means for tilting the bed within an angular range of 0° - 90° from a horizontal position wherein the mattress sub-parts define a common supporting surface for a lying person to a vertical position wherein the mattress sub-parts define a common supporting surface for a standing person. The tilting mechanism may further comprise locking means for locking the bed in any angle within the angular range. Additionally, the base frame may be provided with lifting means for lifting or lowering the frame parts in relation to the floor. The tilting mechanism may be either manually driven by wires, cables or chains or it may be electrical driven or hydraulic driven.

[0064] The invention further relates to a method for assisting a person in rising from a sitting position to a standing position. The method comprises placing a torso supporting member substantially parallel to the torso of the person in the person's sitting position, the torso supporting member being pivotally mounted to a support around a substantially horizontal axis. The method further comprises that the person sitting and leaning for-

ward towards the torso supporting member and grabbing around one or more handgrips is lifted as the lifting means are activated, so that the movement of the torso of the person comprises at least two movements, a linear lifting movement and a rotational leaning forward movement.

[0065] In a further aspect, the invention relates to a method for assisting a person in rising from a sitting position to a standing position, comprising drawing a suspension band around the back of the sitting person. The method further comprising that the person, in the sitting position, grabs around one or more handgrips, whereby the person is assisted in raising when the suspension band is pulled and the hand grips are lifted simultaneously. The suspension band may be wound around a power driven reel connected to or integrated in a support, the pulling movement towards the column being provided by winding the wire around the reel.

[0066] Thus, at least some the above-mentioned lifting and transporting devices are adapted to carry out at least some embodiments of at least some of the methods according to the invention.

[0067] In a further aspect, the invention relates to a locking device for locking interlocking a first and a second part, the first part having a body portion, a neck portion and a head portion, the second part having:

- a body defining two free end surfaces,
- a bore into which the first part may be inserted, the bore extending between said two end surfaces,
- a pawl member pivotally mounted around a pivot and extending in a first direction from the pivot along a distal one of said end surfaces,
- a grip member pivotally mounted around said pivot and connected to the pawl member, the grip member extending in a second direction from the pivot, the second direction being opposite to the first direction, so that lifting of the grip portion results in lowering of the pawl member,

[0068] whereby when the first part extends through the bore, the pawl member engages the neck portion of the first part and thereby interlocks the first and second parts, the pawl member being biased towards the position in which it engages said neck portion.

[0069] The first part may, e.g., be connected to or integrated in a connecting member of an armrest of a chair, and the second part may, e.g., be a frame part of a chair. In that case the above-mentioned locking device may be used for releasably locking/connecting an armrest to a chair.

[0070] The head portion preferably has a conical shape, so as to facilitate mounting of the first part in the bore of the second part. The pawl member may be spring-biased or gravity-biased towards the position in which it engages the neck portion. In case the pawl member is gravity-biased toward the aforementioned position, the gravity-biasing is preferably achieved by the weight of the grip portion.

[0071] A delimiter for the pivoting movement of the locking pawl and the grip portion, respectively, may be provided. The delimiter may comprise a member for abutting a surface of one of the two parts, such as, e.g., a plate member.

[0072] In a further aspect, the invention relates to a method for transferring a seated disabled person to or from a chair having detachably mounted armrests extending along side edges of the chair, the method comprising:

a) removing one of the armrests from the chair,
b) transferring the disabled person over the side edge along which the removed armrest extended prior to being removed at step a),
c) remounting the armrest to the chair.

[0073] The locking device described in general above and in detail in connection with Fig. 3e is suitable for detachably mounting the armrests to the chair. Preferably, the chair may be lifted and lowered. The chair may be comprised in a lifting/transporting device according to the above-mentioned aspects of the present invention.

[0074] This method is useful, e.g., in connecting with x-raying of a person, in particular when the person suffers from a lingering disease. The method is in particular applicable when the disabled person is capable of self-assisting in getting into or out of the chair and/or a bed, e.g. when the person is capable of getting from a lying position in a bed to a sitting position in the bed. When the method is to be applied for transferring a person into the chair, the chair is preferably arranged at a height lower than the supporting surface from which the person is to be transferred. In that case, gravity may assist the person in sliding from the other supporting surface to the chair. Likewise, when the person is to be transferred out of the chair to another supporting surface, the chair is lifted to a position higher than the other supporting surface.

[0075] The above method has the particular advantage of making sails superfluous, such sails often submitting the humiliating circumstances. Moreover, only one or none assistant person(s) are required.

[0076] An embodiment of the method further comprises removing a back rest of the chair and placing only a seat part of the chair under the buttocks of a person supported by another supporting surface, e.g., a person lying in a bed. Next, the person is raised to a sitting position. Subsequently, the person is turned, so that the person's legs hang over the edge of, e.g., the bed. Subsequently, the back rest is mounted to the seat/the chair, and the chair may be mounted on a transporting/lifting device.

Brief Description of the Drawings

[0077]

Figs. 1 and 2 show a device, which may assist a sitting, standing or walking person, and

Fig. 3 shows a lifting mechanism for the device shown in Figs. 1 and 2.

Description of Preferred Embodiments

[0078] Figs. 1 and 2 show a lifting and transporting device that comprises an assisting member for assisting a standing or sitting person. The transporting device comprises a substantially U-shaped base frame 110 and two vertically extending uprights 111. The uprights each comprises an inner upright 112, and each inner upright comprises lifting means, such as the ones shown in Fig. 3, for telescopically extending or shortening the uprights in order to lift or lower the assisting member. The assisting member comprises a saddle-like seat 113, a back support 114, buttock supports 115, and armrests 116. The buttock supports 115 are pivotally mounted, so that they are pivotable between a horizontal supporting position and a vertical non-supporting position. Thus, a person is able to walk while simultaneously being assisted by the saddle-like seat support 113, without having his/her legs interfering with the buttock supports 115. The base frame further comprises wheels 117 for rolling the device. The armrests 116 are pivotally mounted on a hinge which is connected to the top of each inner upright 112.

[0079] Fig. 3 shows a lifting mechanism which is suitable for being integrated in the device shown in Figs. 1 and 2. However, the lifting mechanism shown in Fig. 3 is not restricted to the device of Figs. 1 or 2 or to any device covered by the present invention, and, accordingly, the lifting mechanism described below and in the appended claims as well as above constitutes an independent aspect of the present invention. The lifting mechanism of Fig. 3 comprises a first wire 120, a second wire 121 and a shaft 122. The shaft is provided between the two uprights 123, so that the wires 120, 121 are being wound around the shaft 122, when the shaft is rotated around its axis of rotation. When rotating the shaft 122 in the direction 124, the first wire 120 is wounded around the shaft 122 and thereby causes lifting of the inner uprights 125. Simultaneously, the second wire 121 is wound off the shaft 122. When rotating the shaft 122 in the opposite direction, the second wire 121 is wound around the shaft 122, thereby causing lowering of the two inner uprights 125 while the first wire 120 is wound off the shaft 122.

[0080] The first wire 120 extends from a first fastening point 126 in the upper part of a left one of the uprights 123 and downwards along the inner surface of the left upright 123 to a pulley wheel 127 in the lower end of the left inner upright 125, the left inner upright 125 being received in the left upright 123. The first wire 120 further extends upwards along the opposite inner surface of the left upright 123 to a further pulley wheel 128 and then sideways from the left upright 123 around the shaft 122 to a pulley wheel 129 in the upper part of a right upright 123. Further, the first wire 120 extends downwards along the inner surface of the right upright 123 to a pulley wheel 130 at the lower end of the right inner upright 125 integrated in the right upright 125. Further, the first wire 120 extends upwards along the opposite inner surface of the right upright 125 to a second fastening point 131 in the upper part of the right upright 125.

[0081] The second wire 121 extends from a lower fastening point 132 in the left upright 125 to the pulley wheel 127 and then to a pulley wheel 133 in the tower part of the left upright 125 and then upwards to the pulley wheel 128, around the shaft 122 to the pulley wheel 129 and downwards to a further pulley wheel 134 in the lower part of the right upright 125 and then upwards to a pulley wheel 130. The second wire 121 is fastened to a further fastening point 135.

Claims

1. A lifting and/or transporting device for humans, comprising

   a frame member (110),
   a back supporting member (114) for supporting the back of a sitting or standing person,
   a saddle-like supporting member (113) for supporting the buttocks of a standing or sitting person, and
   lifting means adapted to lift and lower at least the saddle-like supporting member.

2. A device according to claim 1, further comprising at least one thigh supporting member (115) pivotally mounted to the frame member (110), whereby the at least one thigh supporting member can be swung between a non-supporting position in which it does not interfere with the legs of a standing person and a supporting position in which it together with the saddle-like buttocks supporting member (113) constitutes a substantially continuous supporting surface for a sitting person, the device further comprising locking means for locking the at least one thigh supporting member (115) in its supporting position.

3. A device according to claim 1 or 2, further comprising arm rests (116).

4. A device according to any of claims 1-3, wherein the lifting means are further adapted to lift and lower the back supporting member (114).

5. A device according to any of claims 1-4, wherein the lifting means are further adapted to lift and lower the saddle-like buttocks supporting member (113).

6. A device according to any of claims 1-5, wherein the lifting means are further adapted to lift and lower the thigh supporting member (115).

7. A device according to any of claims 1-6, wherein the back supporting member is biased toward the back of a person supported by the device, so as to support the back of the person in a standing and in a sitting position.

8. A device according to any of claims 1-7, further comprising wheels or rollers (117) for rolling the device along a floor surface.

9. A device according to claim 8, further comprising driving means for driving the wheels or rollers (117).

10. A device according to claim 9, further comprising braking means for stopping movement of the wheels or rollers.

11. A device according to claim 9 or 10, wherein the driving means and/or braking means are electrical controllable, the device further comprising user control means for controlling braking and/or driving of the wheels.

12. A device according to any of claims 1-11, wherein the frame member comprises a substantially U-shaped base frame (110).

13. A device according to any of claims 1-12, wherein the frame member comprises at least two uprights (111) extending from the base frame (110), the uprights each comprising telescopic means for lifting and lowering at least part of the uprights.

14. A device according to claim 13, wherein each upright (111) comprises an outer and an inner upright, the inner uprights (112) being adapted to receive one or more assisting members, the inner uprights being displaceable in relation to the outer uprights, movement of the inner uprights being provided by lifting means.

15. A device according to claim 14, wherein the lifting means comprise at least one wire (120, 121) and at least one shaft (122), which is mounted in a fixed vertical position, and around which the wire may be wound, the wire being fastened to the inner upright and connected to the shaft, so that the inner uprights may be lifted or lowered when the shaft is rotated.

16. A device according to claim 15, wherein the lifting means comprise two wires (120, 121), a first one for lifting the inner uprights and a second one for lowering the inner uprights.

17. A device according to claim 15 or 16, further comprising magnetic electrical driving means for driving the shaft.

18. A device according to claim 15 or 16, wherein the shaft is manually driven.

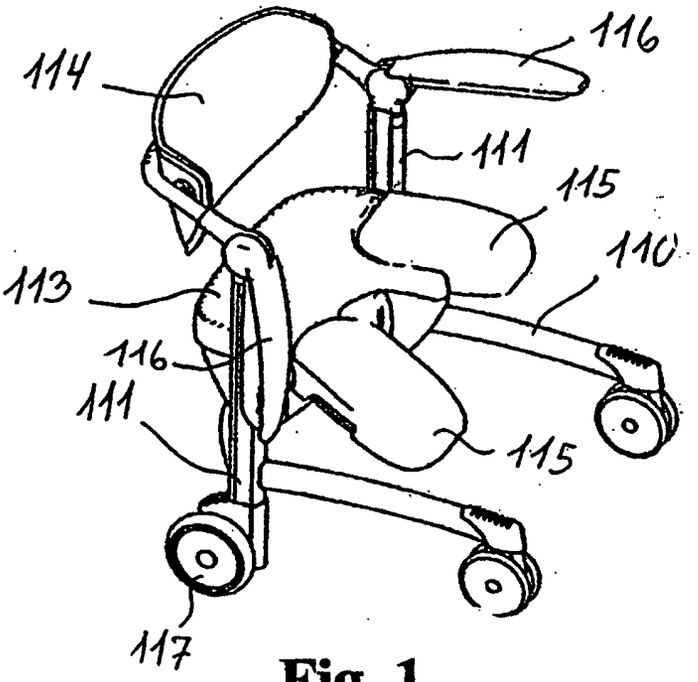
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Fig. 1

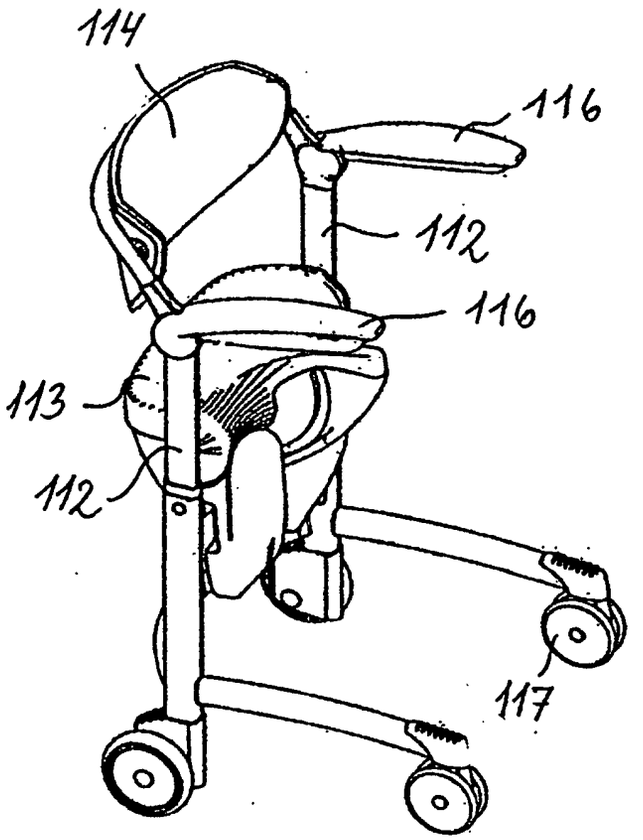
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Fig. 2

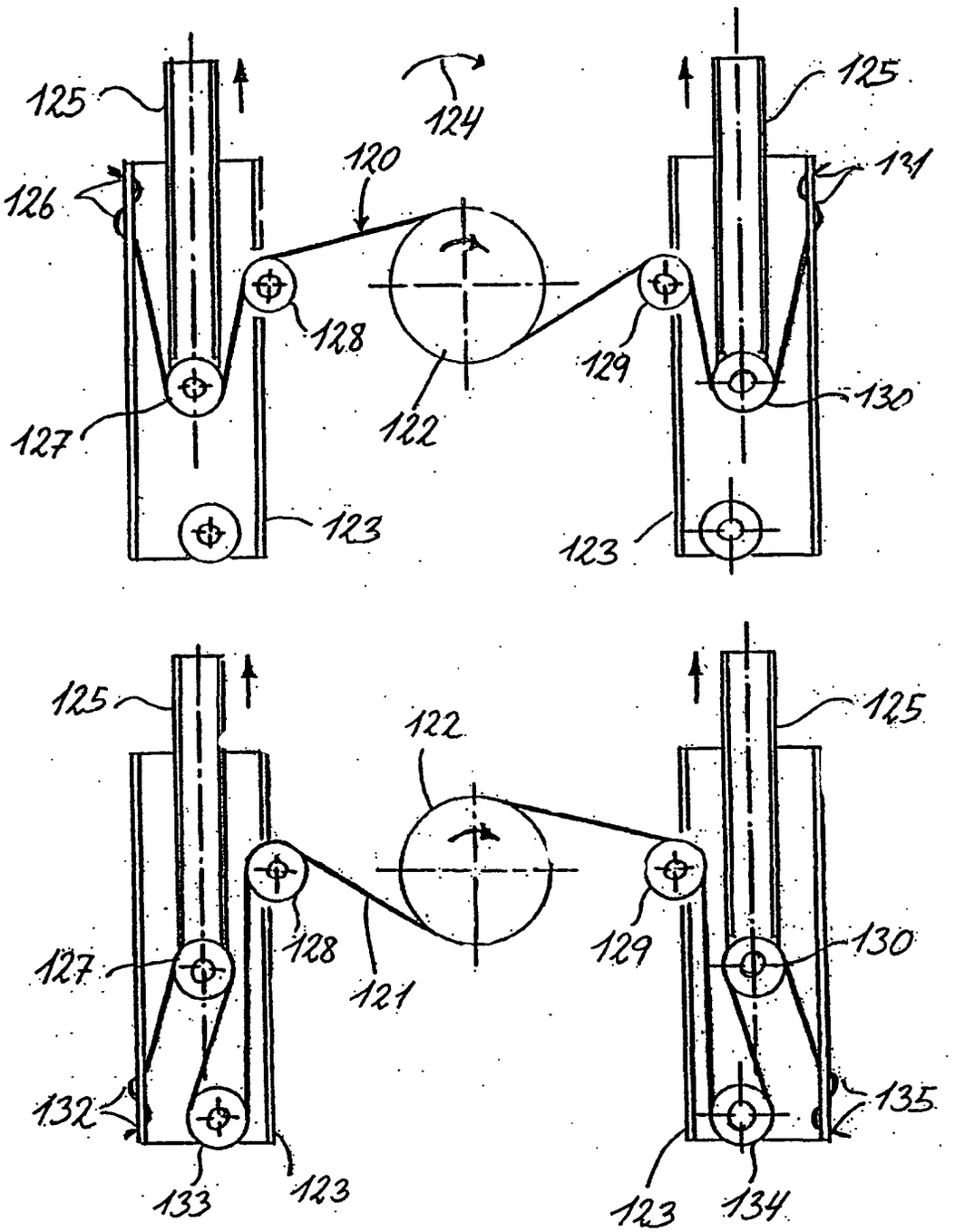
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Fig. 3