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(54) CONNECTION UNIT FOR A LIFTING ARRANGEMENT AND SUCH A LIFTING ARRANGEMENT

(57) A connection unit (11) in a lifting arrangement for lifting a weak or disabled person is described. The connection unit (11) comprises a housing, having connection means (15) arranged at the top end of the connection unit for connecting to a hoist. The connection unit (11) comprises a housing divided in an upper part and a lower part, which rotate freely in relation to each other about a vertical axis. The connection unit (11) further comprises a through-going horizontal bore (23) in the lower part (14) of the housing. A mounting shaft (24) is mounted in a rotatable manner about the longitudinal axis of the mounting shaft in said through-going bore (23). The mounting shaft is provided for mounting a lifting frame construction (1) to the connection unit (11). Slide bearings (25) provide free rotation of the mounting shaft (24) about a horizontal axis. A ball bearing (22) ensures free rotation about a vertical axis. A lifting arrangement and a method for lifting are also disclosed.

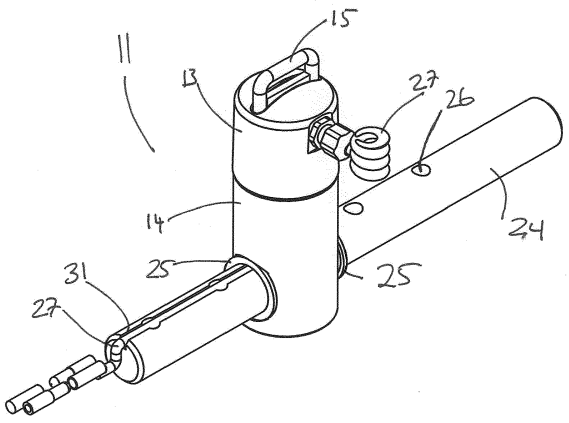

Fig. 2

EP 3 453 373 A1

Description

Field of the Invention

[0001] The present invention relates to a connection unit for a lifting frame for lifting a weak or disabled person, when the person has to be moved from one place to another, said connection unit comprising a housing with a vertical and a horizontal direction and having a through-going horizontal hole and a shaft for mounting a lifting frame construction.

[0002] The invention further relates to a lifting arrangement comprising such a lifting frame with the connection unit and a method for lifting.

Background of the Invention

[0003] Lifting arrangements of the above kind are commonly known and used in hospitals and (nursing) homes when a weak or disabled person needs to be moved from e.g. a sitting position in a chair to a laying position in a bed.

[0004] An apron is arranged under the person to be lifted and the apron is attached to the lifting frame, which is attached to a hoist. The hoist is usually arranged on a stationary or moveable stand or frame. Alternatively the hoist is suspended from wall-mounted or ceiling-mounted rails. A moveable frame is a two-stand frame e.g. with wheels for positioning of the hoist prior to a lifting procedure and/or for removing after a lifting procedure. A stationary frame may be e.g. a four-stand frame with a rail suspended there between.

[0005] During such relocation of a person the lifting frame construction may be rotated back and forth about a vertical axis, and further respective frame parts of the lifting frame construction may be angle rotated relative to each other in order to change the position of the person being lifted from a sitting position to a laying position or vice versa. During such operation the lifting frame construction may due to a rigid connection between the connection unit and the lifting frame construction tilt so that the mass center of the lifting frame construction including the person being lifted is not lying on a straight vertical line below the suspension point under the hoist.

[0006] This may cause some unfortunate forces to occur in the connection unit and furthermore that the person is sitting or lying in an uncomfortable manner.

[0007] Known lifting frame constructions or arrangements are often suspended under a hoist hanging from e.g. a ceiling rail or a stand via a strap or wire, in the following called a lifting strap. The lifting strap may in an unfortunate manner be twisted when the lifting frame construction is rotated about a vertical axis. This may result in the lifting strap getting stuck in the hoist if the lifting strap is rolled up in the hoist when the lifting strap is twisted.

[0008] In some cases the known lifting arrangements comprise electrical components, such as an actuator for moving the individual parts of the lifting frame construction relative to each other. In such cases the electrical cord, which supplies electricity or control signals to the electrical actuator, may be twisted and wrapped around the lifting frame construction in an unfortunate way, and thus preventing any movement of the person, which may become stuck in the hoist because he or she cannot be lowered.

[0009] Thus, there is room for improving the lifting equipment to further reducing such situations during lifting of persons and to further improve easy and smooth moving and/or lifting procedure and less discomfort for the person when lifted.

Object of the Invention

[0010] The object of the present invention is to provide a lifting arrangement and method by which the above mentioned disadvantages are reduced or eliminated.

[0011] A further object is to provide a lifting arrangement and where the lifting frame construction may be freely rotated about a vertical axis without the strap in which the lifting arrangement is twisted.

[0012] A further object is to provide a lifting arrangement and method where the lifting frame construction may be freely rotated about a vertical axis without the strap in which the lifting arrangement is twisted, and freely rotatable about a second horizontal axis to improve comfort for the person who is lifted or lowered.

[0013] A further object is to provide a lifting arrangement and method where the lifting frame construction provides no risk that electrical cords, which supply power and/or control signals to an electrical actuator on the lifting frame, are twisted and wrapped around the lifting frame construction.

Description of the Invention

[0014] The present invention relates to a connection 1. A connection unit in a lifting arrangement for lifting a weak or disabled person, said connection unit comprising a housing, having connection means arranged at the top end of the connection unit for connecting to a hoist and where said housing is divided in an upper part and a lower part, which rotate freely in relation to each other about a longitudinal axis of the housing, and where said connection unit further comprises a through-going horizontal bore in the lower part of the housing, and where a mounting shaft is mounted in a rotatable manner about the longitudinal axis of the mounting shaft in said through-going bore, where said mounting shaft is provided for mounting a lifting frame construction to the connection unit.

[0015] In this way the mounting shaft for mounting the lifting frame construction and thus also the lifting frame construction itself will rotate about the central axis of said mounting shaft. This ensures that the mass center of the lifting frame construction including the person being lifted is lying on a straight vertical line below the suspension

point. Hence, the connection unit is always suspended vertically under the hoist and thus in a straight line under the strap or wire in which the lifting frame is suspended. Thus, any unfortunate force occurring in the connection unit is kept at a minimum and the person is sitting or lying in the lifting arrangement in a more comfortable manner. In addition, in order to avoid that the hoist strap or wire, in which the lifting arrangement is suspended, becomes twisted it is preferred that the connection unit is divided in an upper part and a lower part, which parts are rotatable relative to each other about a vertical axis via a rotational joint. In this way the lifting frame construction may be freely rotated about the vertical axis without twisting the strap or wire, in which the lifting arrangement is suspended. This also ensures that the hoist does not stop because the twisted strap or wire is rolled up into the hoist body and gets stuck inside the hoist body.

[0016] The housing of the connection unit comprises an upper part and a lower part. The upper part of the connection unit comprises a vertical central shaft (when seen as in suspension under the hoist). The upper end of the central shaft comprises connection means for attaching the connection unit to the strap or wire of the hoist.

[0017] The connection means are e.g. an eye or ring for attaching a hook member on the hoist's strap or wire. Alternatively, the connection means comprise a hook that engages a ring member on the hoist strap or wore.

[0018] A flange is provided at the lower end of the central shaft. The flange preferably extends perpendicularly from the outer surface of the central shaft. The flange connects the central shaft to the lower part of the housing via a rotational joint.

[0019] The rotational joint is preferably a bearing, and in particular a ball bearing or any corresponding type of bearing that allows free rotation of the upper and lower part of the housing while also being able to carry the load suspended in the lifting arrangement. This is necessary as this rotational joint carries the load because the lower part of the connection unit is also attached to the rotational joint and thus carries the entire load of the person being lifted.

[0020] The rotational joint is attached to the upper surface of the flange on the central shaft.

[0021] The lower part of the housing is attached to the other part of the rotational joint/ball bearing. The lower part comprises a hollow cylindrical housing having an inwardly extending flange at the upper end of the lower housing part's body.

[0022] The central shaft is arranged centrally inside the lower cylindrical part from below and with the rotational joint between the flanges.

[0023] Thus, the inwardly extending flange on the lower housing part is attached to the rotational joint at the opposite side in relation to the central shaft to allow the central shaft and the lower part of the housing to rotate freely in relation to each other.

[0024] The lower end of the lower part of the housing is provided as an end plate or an end cap that is attached in the opening in the lower end of the cylindrical housing. The end cap may be attached to the cylindrical housing e.g. by a threaded connection, snap action locking mechanism or a male-female connection. A male-female connection may e.g. comprise a circumferential shoulder on the outer surface of the end cap that engages a corresponding groove on the internal surface of the cylindrical housing or vice versa.

[0025] The upper part of the central shaft extends upwardly from the top end of the cylindrical lower part of the housing. The central shaft may be surrounded by a housing top cap. This housing top cap is attached to the central shaft. This central shaft provides protection for the rotational joint.

[0026] The lower part of the housing comprises a through-going bore. The through-going bore is provided perpendicularly to the longitudinal axis of the lower housing part, i.e. horizontally when seen in suspension vertically under a hoist. Since the lower part of the housing is preferably hollow, the through-going bore is preferably made of two diametrically opposed holes in the lower part of the housing.

[0027] A mounting shaft is mounted in said through-going bore in a rotatable manner. The mounting shaft is longer than the diameter of the connection unit and thus extends through the connection unit and thus horizontally outwards from the connection unit housing (when seen in suspension under a hoist).

[0028] The mounting shaft is provided for mounting a lifting frame construction to the connection unit as described in further details below. The mounting shaft is rotatable about the longitudinal axis of the mounting shaft, i.e. about an axis that is perpendicular to the central shaft. This allows the lifting frame construction to be tilted in relation to the connection unit.

[0029] In order to allow the mounting shaft to rotate freely in the connection unit, the mounting shaft may be arranged in said bore in one or two linings or slide bearings. The linings or slide bearings are preferably made of low friction resin material. The low friction material may e.g. be as nylon, ABS, or polyamide, optionally with one or more low friction additives, such as glass beads, Teflon and/or MoS_2.

[0030] An adjustment screw may engage a threaded bore in the mounting shaft. The length at which the adjustment screw extends from the threaded bore may be adjusted to adjust and/or restrict the free rotation of the mounting shaft to each side. This ensures that that the mounting shaft cannot be rotated more than once around its own axis when the adjustment screw is engaged in the circumferential groove.

[0031] The restriction of the rotation of the mounting shaft may e.g. be up to $\pm$ 90 degrees in relation to a vertical plane, or preferably up to $\pm$ 75 degrees or more preferred or pref erably up to $\pm$ 60 degrees.

[0032] The mounting shaft is for mounting of the lifting frame arrangement to the connection unit. The lifting frames of hoists are usually made of hollow pipes, e.g.

aluminium or steel pipes or pipes made of suitable composite materials. Thus, the lifting frame is easily mounted by inserting the mounting shaft into the void. The lifting frame may then be secured to the mounting shaft by conventional attachment means, e.g. screws or rivets arranged in bores through the lifting frame pipes and corresponding bores provided in the mounting shaft. If screws are used, the bores in at least the mounting shaft are preferably threaded. Optionally, the corresponding bores in the lifting frame construction are threaded to engage with corresponding screws. Alternatively, the screws may be secured by nuts.

[0033] The lifting frame according to the present invention preferably further comprises at least two frame parts. These frame parts are connected via links that allow the two frame parts to be moveable in relation to each other, in particular by rotation.

[0034] Such lifting frame with moveable frame parts may be moved manually in relation to each other or by means of an electrical actuator. This allows to adjust the position of the person in the apron to sitting or lying position to adjust to the place or item, such as bed, chair, wheelchair etc. to and/or from which they are lifted. This improves the comfort of the person that is suspended in the apron.

[0035] Preferably the lifting frame according to the invention comprises an electrical actuator for changing the position of at least one frame part relative to another frame part, and wherein the actuator is connected to one or more cords being mounted inside the lifting frame construction and the connection unit. The electrical actuator is at its one end mounted to one of the frame parts and at its other end to the other frame part. The electrical actuator thus can change the position of the at least two frame parts relative to each other.

[0036] This enables the assisting person to adjust the position of the person to the place where the person is to be moved by adjusting the position during lifting without the need for manual labour. Further by arranging the cords inside the lifting frame, there is no risk that the lifting frame becomes entangled in the electrical cords for the electrical actuator. Similarly the risk of crushing the electrical cords between moving parts of the lifting frame is elegantly eliminated. In addition, by arranging the electrical cords inside the lifting frame, it becomes easier to clean and maintain clean and hygienic.

[0037] Preferably, the lifting frame construction comprises counterweights that are arranged inside the pipes of the lifting frame construction for ensuring balance of the construction, especially when an electrical actuator is arranged at one side of the lifting frame. This further assists to prevent that the lifting frame is suspended askew.

[0038] The connection unit according to the present invention thus preferably also comprise one or more electrical connections, usually cords that are arranged to pass through the housing and the mounting shaft. Hereby the electrical cords are completely removed from the exterior surface of the lifting frame construction. Thus, the electrical cord(s) enters the connection unit at the upper end, e.g. through the top cap and into an interior space of the vertical shaft of the connection unit. The central vertical shaft may comprise a radial and a central, vertical boring for insertion of the electrical cord(s).

[0039] In order to ensure that the electrical cords do not twist when the parts of the connection unit rotate in relation to each other, the connection unit preferably comprises a rotatable electrical connector with two parts that rotate with the upper and the lower part of the housing, respectively, to which parts a first and a second part of the electrical cord are attached. This type of sliding contact is sometimes called a slip ring connection. This eliminates the risk of the cords being twisted and potentially torn.

[0040] One part of the slip ring connector is connected to the vertical shaft and another part is connected to the cylindrical housing, e.g. via an internal flange. Thus, when the housing is rotated in relation to the vertical central shaft the slip ring ensures that the electrical cords are not twisted inside the connection unit.

[0041] The electrical cord(s) further extend into the interior of the lifting frame construction, i.e. inside the pipes. This may be accomplished by providing the mounting shaft in the connection unit which comprises a longitudinal groove for mounting of the one or more electrical cords. The longitudinal groove preferably extends in axial direction from near the middle of the mounting shaft and towards at least one of the ends of the mounting shafts, preferably in a straight or slightly helical manner.

[0042] Thus, when the lifting arrangement is assembled, the electrical cord may extend from the outside through first the radial boring, then the central boring and then the longitudinal groove in the frame part. In this way, the lifting frame construction may be rotated relative to the stationary portion, being the central vertical shaft, without the electrical cord being twisted and/or without being wrapped around the lifting frame construction.

[0043] The present invention also provides a lifting arrangement for lifting and/or moving weak or disabled persons, comprising a hoist such as a hoist arranged on a movable frame or a ceiling or wall mounted rail, and where said lifting arrangement further comprises a lifting frame arrangement as described above and with a connection unit as described above which is attached to a cable, wire or strap of the hoist.

[0044] The present invention also provides a method for lifting and/or moving weak or disabled persons. The method comprises arranging a lifting frame with a connection unit as described above on a hoist, and arranging a person in a lifting apron and attaching the apron to the lifting frame. The method further comprises the step of activating the hoist for lifting and/or lowering the person and /or moving the person suspended under the hoist while being lifted.

Description of the Drawing

[0045] The present invention will in the following be described in more detail with reference to the figures in which

Fig. 1 shows a lifting frame construction,
Fig. 2 shows a connection unit and part of the lifting frame construction,
Figs. 3a-3b show a cross section of the connection unit and part of the lifting frame construction, and a top view of the connection unit respectively,
Fig. 4 shows an exploded view of the connection unit and part of the lifting frame construction, and
Fig. 5 shows a lifting frame suspended in a rail mounted hoist.

Detailed Description of the Invention

[0046] Fig. 1 shows a lifting frame construction 1 and fig. 5 shows a lifting frame 1 suspended in a hoist 2. The hoist 2 is in fig. 5 arranged in moveable manner in rails 3, which are typically mounted in a ceiling in a room or a number of rooms. The hoist 2 may alternatively be arranged in a stationary or moveable frame (not shown) as discussed above. The lifting frame 1 is suspended in a strap 4 and can be lowered or raised by the hoist 2 by lowering or raising the strap 4.

[0047] The lifting frame 1 shown in fig. 1 comprises a first frame part 5 and a second frame part 6, which are connected via links 8 allowing the two parts to be rotated in relation to each other. This provides a sitting position or a lying position for the person to be lifted. The rotation of the two frame parts 5, 6 relative to each other are performed manually (not shown) in a per se known manner or preferably by means of an electrical actuator 7. The electrical actuator 7 is at its one end mounted to the first frame part 5 and at its other end to the second frame part 6.

[0048] The lifting frame construction 1 further comprises a number of arms 9, which are connected to one of the frame parts via links 10. The arms comprise projections 11 for mounting of an apron (not shown) to support the person to be lifted.

[0049] As shown in fig. 1 the lifting frame construction 1 is connected to a connection unit 11, from which an attachment means 15 projects at the top end for allowing it to be attached to the strap 4 of the hoist 3. In the figures the attachment means are shown as a ring-like member to which a hook member attached to the hoist strap 4 may be attached. The attachment means 15 attached to the top of the connection unit may also be a hook member if the hoist strap 4 comprises a ring member for attachment of the lifting frame construction.

[0050] In figs. 2-4 the connection unit 11 is shown. Fig. 3a and 4 show the connection unit in a cross section and exploded view. The connection unit 11 comprises an upper part and a lower part. The upper and lower parts can rotate freely in relation to each other about a vertical axis (when seen suspended under a hoist). The upper part comprises a vertical central shaft 12 surrounded by a top cap 13. The attachment means 15 for attachment to the hoist strap 4 is attached to the upper end of the central shaft 12 with attachment means e.g. screws/bolts and nuts 16.

[0051] The central shaft 12 is arranged from below and inside the lower part and extends upwards from the upper end of the lower part. The lower part comprises a hollow cylindrical housing 14. A locking ring may secure the vertical position of the central shaft 12 and the cylindrical housing 14. An end cap 19 closes the lower end of the cylindrical housing 14.

[0052] A horizontal flange 20 extends outwardly from the lower end of the central shaft 12 in perpendicular manner from the outer surface of the central shaft 12.

[0053] Similarly, a horizontal flange 21 extends inwardly and perpendicularly from the inner surface of the cylindrical housing 14.

[0054] A ball bearing 22, is arranged between the flanges 20, 21. Each side flange part of the ball bearing 22 is attached to each of the flanges 20, 21 on the central shaft and the cylindrical housing, respectively, and thus provides free rotation around the vertical axis of the connection unit 11. The ball bearing 22 is dimensioned to be able to carry the entire load of the lifting frame 1 including the person in the apron during a lifting procedure. Tests have shown that the rotational joint must be a ball bearing 22 in order to be able to carry the load and to provide low enough friction to allow for top and bottom parts to rotate freely in relation to each other.

[0055] A mounting shaft 24 and a portion of the frame part 5 are connected to the connection unit 11. The connection unit 11 comprises an upper part portion 12, 13 and a lower part 14 of the connection unit 11. The lifting frame part 5 is attached to the lower frame part 5 of the lifting frame construction 1 by being connected to the mounting shaft 24. The mounting shaft 24 comprises a longitudinal groove 31 in which the cord 27 is mounted. Thus, the cord 27 is mounted at and introduced into the upper portion of the connection unit 11, extends axially down through the connection unit 11, more detailed shown in fig. 3a, and then further in the longitudinal groove 31 to the electrical actuator (not shown in figs. 2-4).

[0056] Fig. 3a is a cross section of the connection unit 11 and the mounting shaft 24 for mounting of a portion of the frame part 5, and shows in greater details these parts of the lifting arrangement. Thus, the connection unit 11 comprises a central vertical shaft 12. The central vertical shaft 12 may comprise a radial bore 29 and a central, vertical bore 30 for insertion of the electrical cord 27. At its lower end the central vertical shaft 12 comprises a horizontally outwardly extending annular bearing surface 20 or flange. The cylindrical housing 14 comprises an

upper inwardly directed horizontal annular bearing surface 21 or flange to cooperate with the bearing surface 20 of the central shaft 12. Between the annular bearing surfaces 20, 21 a ball bearing 22 is provided to assure free rotation of cylindrical housing 14, in relation to the central shaft 12. The cylindrical housing 14 further comprises holes 23 in its side walls for mounting of the mounting shaft 24. The mounting shaft 24 is intended for the mounting of the lifting frame construction 1. Slide bearings 25 are shown to be mounted in the holes 23 to allow rotation of the lifting frame construction 1.

[0057] In fig. 4 is shown an exploded view of the connection unit 11 and a portion of the frame part 5.

[0058] The cylindrical housing 14 comprises a through-going bore 23. The through-going bore 23 is provided perpendicularly to the longitudinal (vertical) axis of the lower housing part, i.e. horizontally when the connection unit 11 is seen in suspension vertically under a hoist. Since the cylindrical housing 14 is hollow, the through going bore 23 is preferably made of two diametrically opposed holes 23.

[0059] A mounting shaft 24 is mounted in said through-going bore 23 in rotatable manner. The mounting shaft 24 is longer than the diameter of the connection unit 11 and thus extends through the connection unit and thus horizontally outwards from the connection unit housing (when seen in suspension under a hoist).

[0060] The mounting shaft 24 is provided for mounting the lifting frame construction 1 to the connection unit 11. The mounting shaft 24 is rotatable about its longitudinal axis.

[0061] In order to allow the mounting shaft 24 to rotate freely in the connection unit 11, the mounting shaft may be arranged in said bore in one or two linings or slide bearings 25. The linings or slide bearings 25 are preferably made of low friction resin material as discussed above, in particular low friction slide bearings.

[0062] An adjustment screw 26 may engage a threaded bore in the mounting shaft 24. This adjustment screw restricts the free rotation of the mounting shaft 24 to at least one of the sides and thus avoid that the mounting shaft 24 can be rotated more than once around its own axis when the adjustment screw 26 is engaged in the circumferential groove.

[0063] The restriction of the rotation of the mounting shaft may e.g. be up to $\pm$ 90 degrees in relation to a vertical plane, or preferably up to $\pm$ 75 degrees or more preferred or preferably up to $\pm$ 60 degrees.

[0064] The mounting shaft 24 is for mounting of the lifting frame arrangement 1 to the hoist strap 4 via the connection unit 11. Lifting frames 1 of hoists are usually made of hollow pipes, e.g. steel or aluminium pipes. Thus, the lifting frame part 5 is easily mounted on the connection unit 11 by inserting the mounting shaft 24 into the void of the pipes 5. The lifting frame may then be secured to the mounting shaft by conventional attachment means, e.g. screws or rivets arranged in bores through the lifting frame pipes and corresponding bores through the mounting shaft. If screws/bolts are used, the bores in at least the mounting shaft are preferably threaded. Optionally, the corresponding bores in the lifting frame construction are threaded to engage with the screw. Alternatively, the screws may be secured by nuts (not shown).

[0065] Further, a cord connection 27 for supplying electricity and/or control signals to the electrical actuator 7 is attached to the connection unit 11, in particular through the top cap 13.

[0066] When the lifting frame 1 comprises an electrical actuator 7, the electrical actuator is at its one end mounted to one of the frame parts 5 and at its other end to the other frame part 6. The electrical actuator thus can change the position of the at least two frame parts relative to each other.

[0067] By arranging the cords 27 to pass through the connection unit 11 and into the lifting frame 1, there is no risk that the lifting frame 1 becomes entangled in the electrical cords 27 for the electrical actuator 7, e.g. during a lifting procedure. Similarly the risk of crushing the electrical cords between moving parts of the lifting frame is elegantly eliminated.

[0068] The connection unit 11 thus preferably also comprises one or more electrical connections 27 that are arranged to pass through the housing and the mounting shaft 24. Hereby the electrical cords 27 are completely removed from the exterior surface of the lifting frame construction. Thus, the electrical cord(s) enters the connection unit 11 at the upper end, e.g. through the top cap and into an interior space 28 of the central vertical shaft 12 of the connection unit 11. The central vertical shaft 12 may comprise a radial 29 and a central, vertical bore 28 for insertion of the electrical cord(s) 27.

[0069] In order to ensure that the electrical cords do not twist when the parts of the connection unit rotate in relation to each other, the connection unit preferably comprises a rotatable electrical connector 30 with two parts that rotate with the upper and the lower part of the housing, respectively, to which parts a first and a second part of the electrical cord are attached. This type of sliding contact 30 is sometimes called a slip ring connection 30. This eliminates the risk of the cords being twisted and potentially torn.

[0070] One part of the slip ring connector 30 is connected to the vertical central shaft 12, e.g. the flange 20 thereof. Another part can rotate freely in relation to the attached part of the slip ring connector 30. Thus, when the cylindrical housing 14 is rotated in relation to the vertical central shaft, the slip ring connector 30 ensures that the electrical cords 27 are not twisted inside the connection unit 11.

[0071] The electrical cord(s) 27 further extends into the interior of the lifting frame construction 1, i.e. inside the pipes. This may be accomplished by providing a longitudinal groove 31 in the mounting shaft 24 for mounting of the one or more electrical cords. The longitudinal groove 31 extends in axial direction from near the middle of the

mounting shaft and towards at least one of the ends of the mounting shafts, preferably in a straight or slightly helical manner to provide room for the electrical cords 27 to extend interior the lifting frame construction.

Reference numbers

[0072]

1. Lifting frame construction
2. Hoist
3. Rail
4. Strap
5. First frame part
6. Second frame part
7. Electrical actuator
8. Link
9. Arm
10. Link
11. Connection unit
12. Central shaft, upper part
13. Top cap upper part
14. Cylindrical housing, lower part
15. Attachment means, eye
16. Screw/bolt
17. Nut
18. Locking ring
19. End cap
20. Horizontal bearing surface/flange on central shaft
21. Horizontal bearing surface/flange on cylindrical lower part
22. Ball bearing
23. Bore for mounting shaft
24. Mounting shaft for lifting frame
25. Slide bearings
26. Adjustment screw
27. Cord
28. Central, vertical bore
29. Radial bore
30. Slide ring connection
31. Longitudinal groove

Claims

1. A connection unit in a lifting arrangement for lifting a weak or disabled person, said connection unit comprising a housing, having connection means arranged at the top end of the connection unit for connecting to a hoist and where said connection unit comprises a housing divided in an upper part and a lower part, which rotate freely in relation to each other about a longitudinal axis of the housing, and where said connection unit further comprises a through-going horizontal bore in the lower part of the housing, and where a mounting shaft is mounted in rotatable manner about the longitudinal axis of the mounting shaft in said through-going bore, where said mounting shaft is provided for mounting a lifting frame construction to the connection unit.

2. A connection unit according to claim 1, **characterized in that** the mounting shaft is arranged in said bore in one or two linings or slide bearings.

3. A connection unit according to claim 1 or 2, **characterized in that** rotation of the upper and lower part in relation to each other is provided by arranging a bearing, such as a ball bearing between the upper and the lower part of the housing.

4. A connection unit according to any of the previous claims 1-3, **characterized in that** one or more electrical cords are arranged to pass through the housing and the mounting shaft.

5. A connection unit according to claim 4, **characterized in that** the connection unit comprises a rotatable electrical connector with two parts that rotate with the upper and the lower part of the housing, respectively, to which parts a first and a second part of the electrical cord are attached.

6. A connection unit according to claim 4 or 5, **characterized in that** the shaft comprises a longitudinal groove for mounting of the one or more electrical cords.

7. A lifting frame comprising a connection unit according to any of claims 1 to 6, and a lifting frame construction, which is mounted on the mounting shaft of the connection unit.

8. A lifting frame according to claim 7, **characterized in that** the lifting frame construction comprises at least two frame parts, which are connected via links allowing the two frame parts to be moveable in relation to each other, in particular by rotation.

9. A lifting frame according to claim 8, **characterized in that** the lifting frame further comprises an electrical actuator for changing the position of at least one frame part relative to another frame part, and wherein the actuator is connected to one or more cords being mounted inside the lifting frame construction and the connection unit.

10. A lifting frame according to claim 8 or 9, **characterized in that** the lifting frame construction comprises counterweights.

11. A lifting arrangement for lifting and/or moving weak or disabled persons, comprising a hoist such as a hoist arranged on a moveable frame or a ceiling or wall mounted rail, and where said lifting arrangement

further comprises a lifting frame arrangement according to any of claims 7-10 with a connection unit according to any of claims 1-6, which connection unit is attached to a cable, wire or strap of the hoist.

12. A method for lifting and/or moving weak or disabled persons comprising arranging a lifting frame with a connection unit according to any of claims 1-6 on a hoist,
arranging a person in a lifting apron and attaching the apron to the lifting frame, and activating the hoist for lifting and/or lowering the person and /or moving the person suspended under the hoist while being lifted.

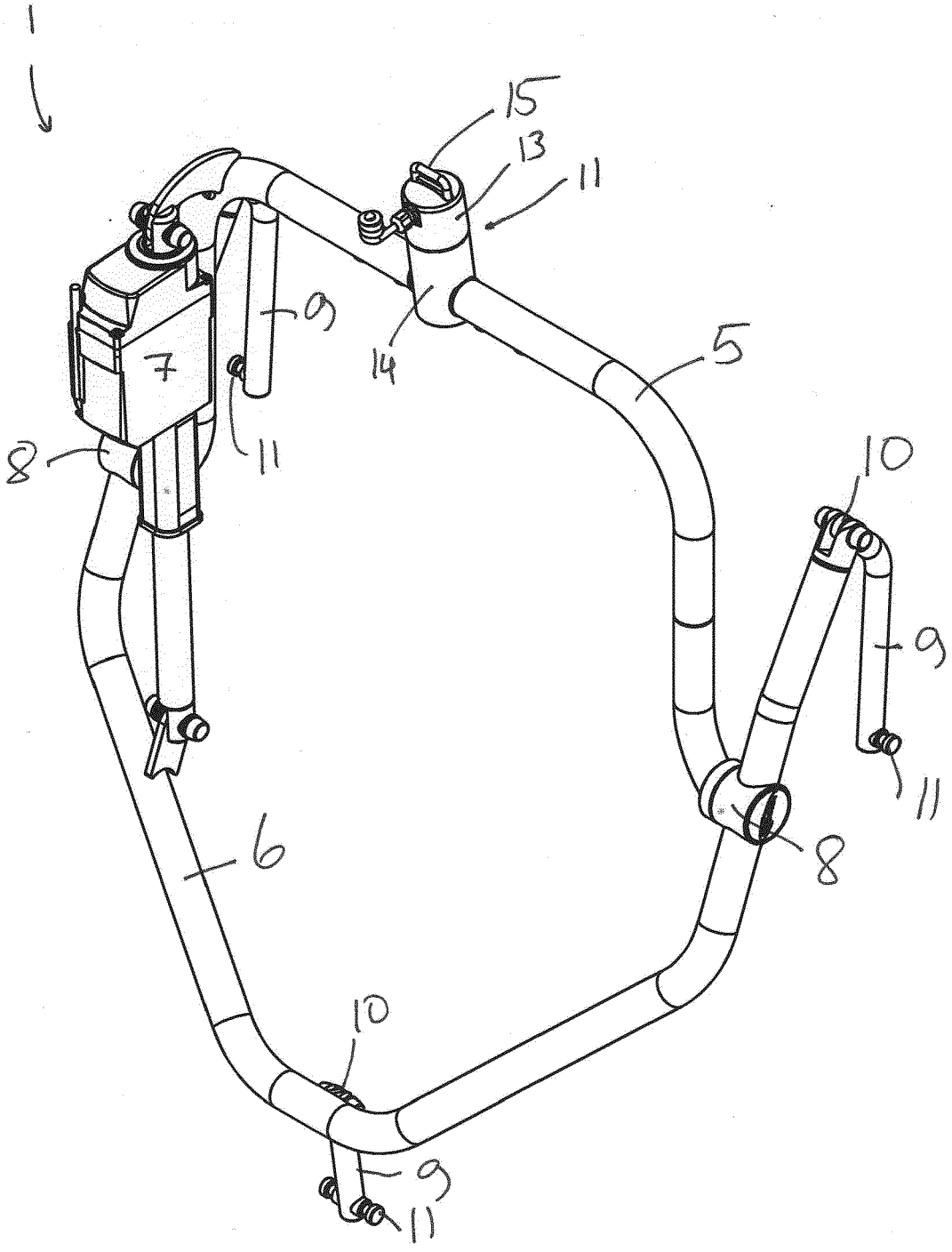

Fig. 1

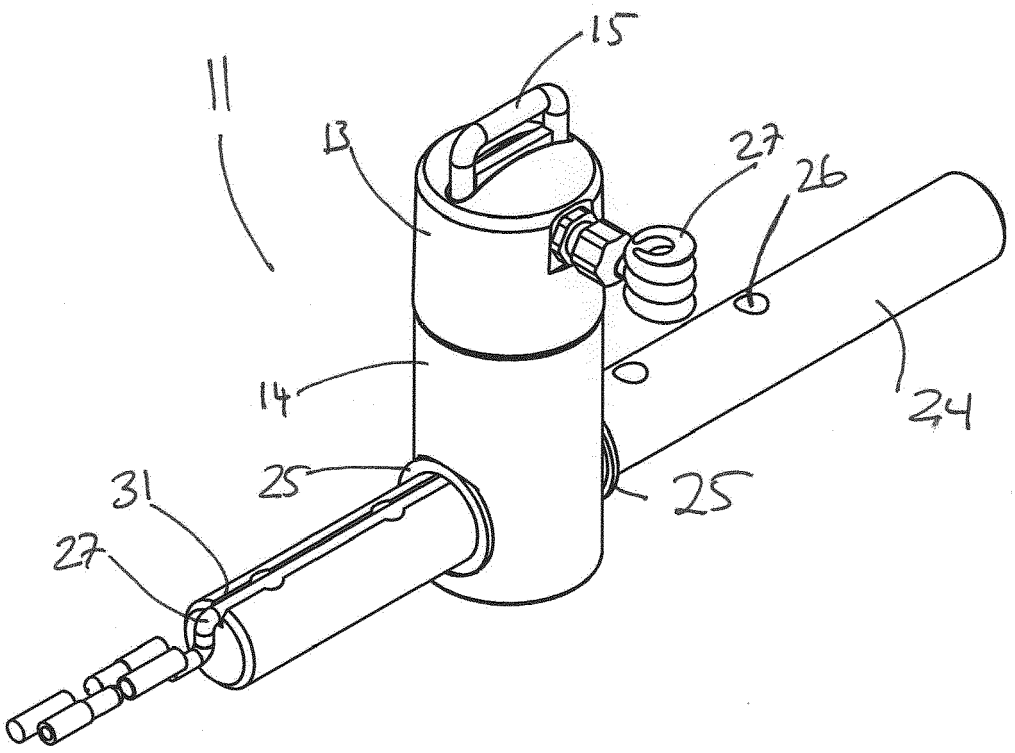

Fig. 2

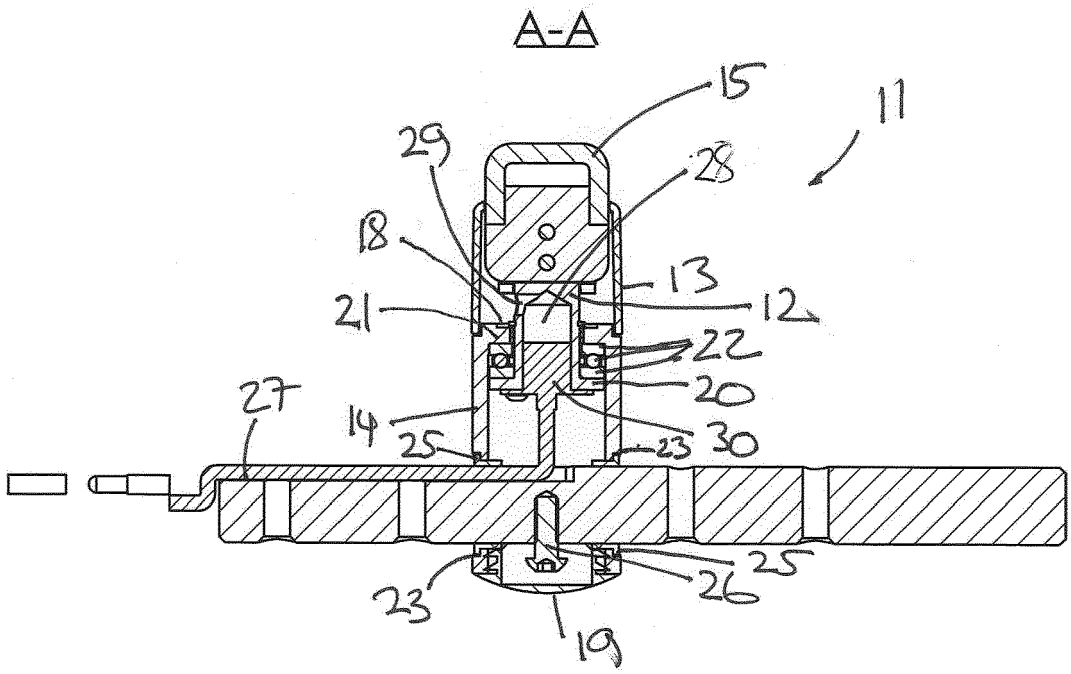
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Fig. 3a

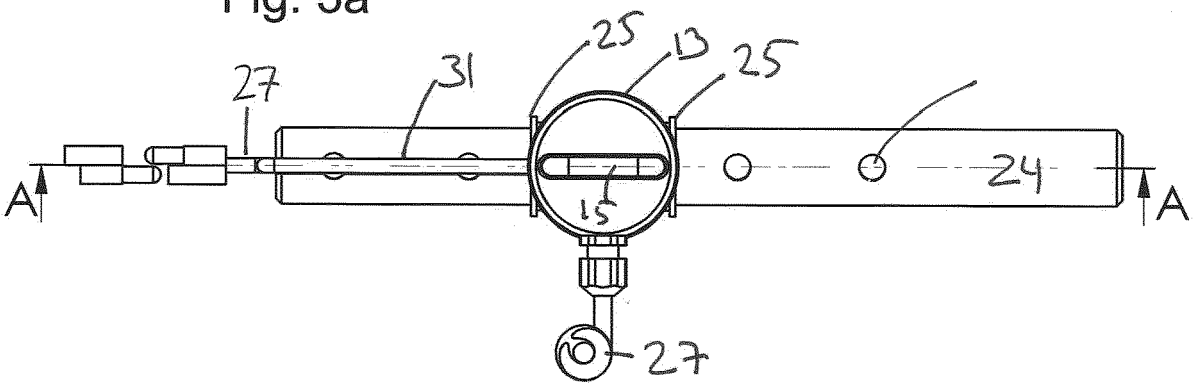
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Fig. 3b

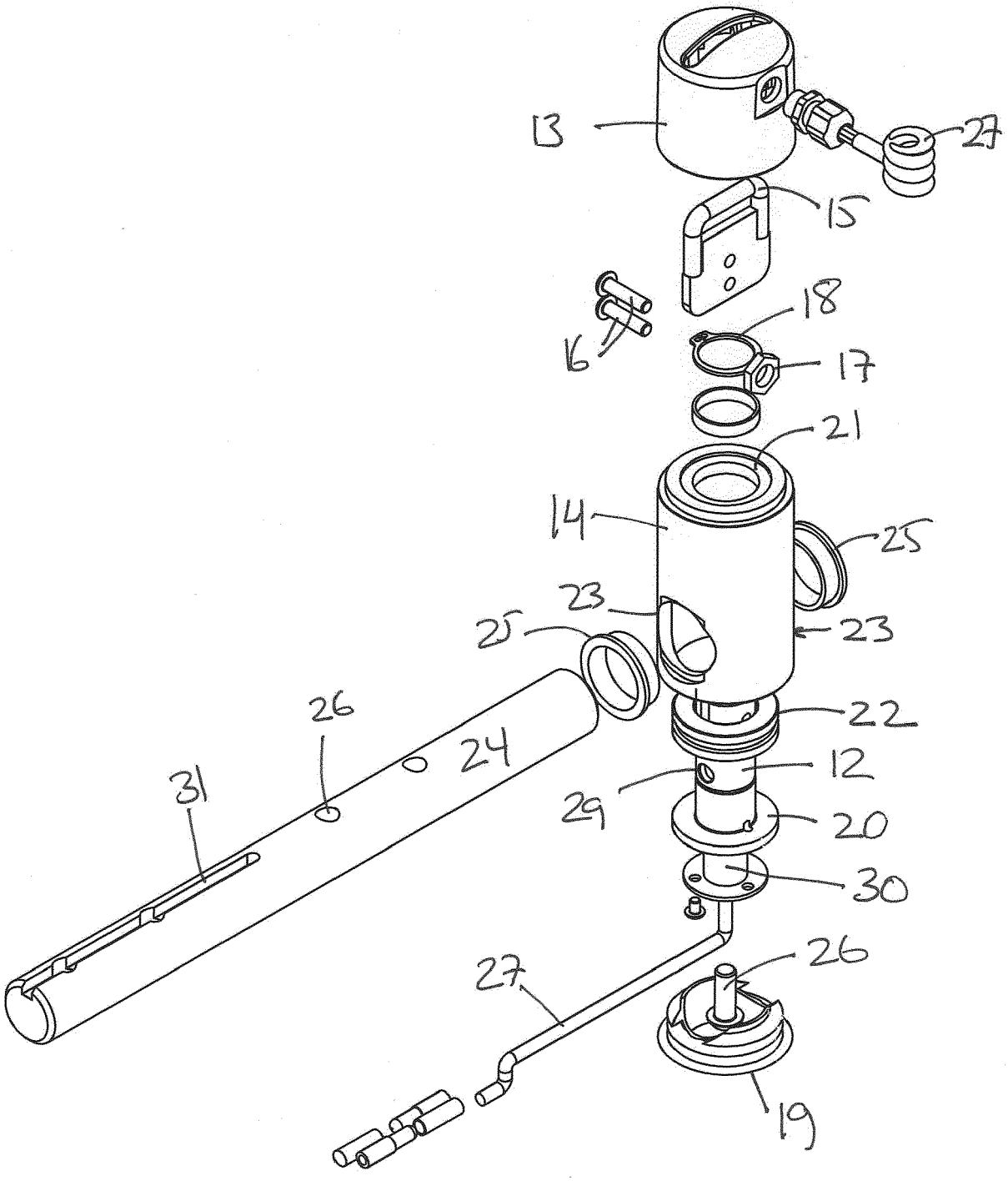

Fig. 4

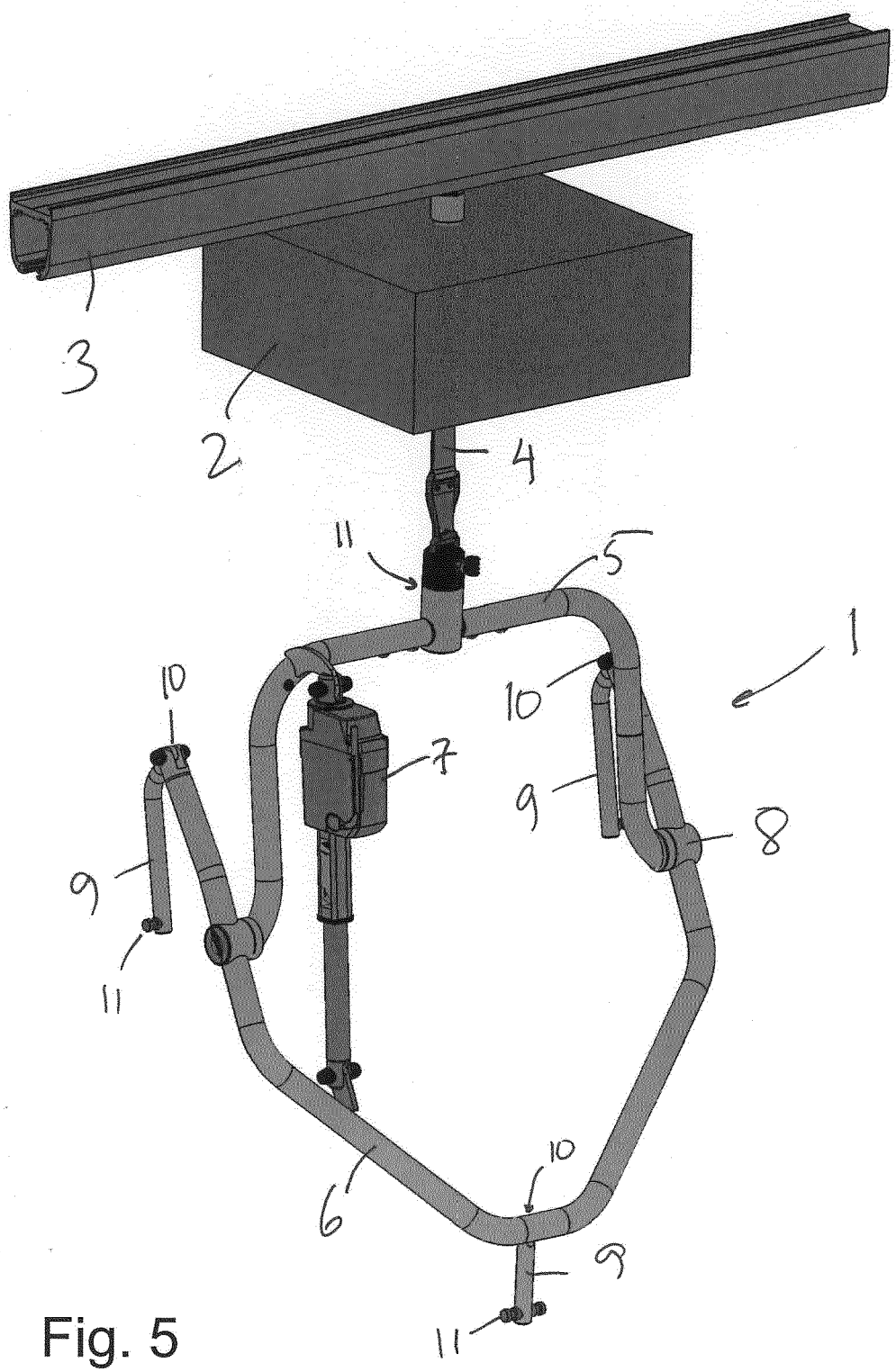

Fig. 5

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	5 March 2018	Edlauer, Martin

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