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(54) **Lifting device for plane elevation**

Hebevorrichtung zum Anheben einer Ebene

Dispositif de levage pour levage plan

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Description

Field of the Invention

[0001] The present invention concerns a lifting device for level lifting, including a canvas suspended in a lifting bracket which establishes a number of separate suspension points which in use are disposed at edge regions of the canvas, so that in use the canvas is supported in a largely horizontal plane.

Background of the Invention

[0002] Lifting devices for level lifting are primarily known from hospitals and institutions. They are, however, also known from ambulances where there may be a need for injured persons.

[0003] The prior art lifting devices for persons are to support the person over largely the entire length of the person, and is at the same time to provide suspension points having mutual spacing so that it is situated approximately at edge areas of the canvas. The distance between these suspension points is to correspond at least to the width of an adult person, in order to keep the canvas distended as much as possible. The supporting points thus aim at keeping the canvas clamped at points situated in a largely horizontal plane, so that a person lying in the canvas will not fall off during lifting and transporting.

[0004] Usually, it will be necessary that the canvas can be released from the support bracket itself, so that it may be placed under a person to be lifted. When the person is placed on the canvas, the canvas is then fastened to the suspension points of the lifting bracket.

[0005] The prior art lifting devices will be very space consuming as they are to provide a construction in which an adult person can be placed. They are thus space demanding when put away and not in use.

[0006] In an attempt to reduce the space requirement for the lifting device when not in use, it has been proposed to provide a lifting bracket with a longitudinal beam and crossbars that may be telescoped. However, this will still be a cumbersome space demanding lifting device, requiring space for storage at least corresponding to the length of the lifting device. Furthermore, these lifters are not advantageous since their straps for the canvas will have a downwards inclining extension so that a person lying supported in a canvas will press the canvas down so that the suspension straps squeeze against the sides of the person. In many situations of use, this is unwanted. Furthermore, the support structure will make it difficult for assisting staff, e.g. doctors and nurses, to get at working with the person, e.g. with oxygen masks, resuscitation equipment and similar, as access to the person is very limited.

[0007] A lifting device of the type disclosed by way of introduction is disclosed in US 5 898 960 A. However this device has a canvas which in use is arranged with downwards inclining parts beneath substantial horizontal arranged arms to which the canvas is connected. This device is foldable however it does not disclose how to place the point of gravity of the person located on the lifting device in order to avoid the risk that the canvas tips over and the person falls out of the lifting device.

[0008] Stiff or firm stretcher-like beds that are suspended in a central lifting bracket are known too. However, such lifting devices will also have a space requirement corresponding to the length of the lifting device when it is to be stored. Furthermore, use of a central bracket will put great demands on correct placing of the point of gravity of the person located on the lifting device in order to avoid the risk that the canvas tips over and the person falls out of the lifting device.

Object of the Invention

[0009] It is the purpose of the present invention to indicate a lifting device for level lifting of the type mentioned in the introduction, wherein the above disadvantages are overcome as the lifting device provides secure support in use, with good access for a person in the lifting device, which lifting device may simultaneously be collapsed for taking up a little space only when not in use.

Description of the Invention

[0010] According to the present invention, this is achieved with a lifting device of the type specified in the introduction which is peculiar in that the lifting bracket is made of a central lifting beam extending in the longitudinal direction of the canvas and supporting two mutually pivotably frame members which at one end are pivotably attached to the central lifting beam, and which may pivot between a first extreme position where the two frame members are close to each other, and a second extreme position where the two frame members are pivoted away from each other, that locking means are provided which may lock the frame members at least in the second extreme position, and that each frame member at its end farthest from the central lifting beam includes a telescoping member to which the canvas is fitted and that the lifting beam is provided with a lifting means, preferably a lifting eyelet, which is displaceable in the longitudinal direction of the lifting beam.

[0011] In the lifting device it is thus possible to collapse the two frame parts so that they occupy considerably less space than the necessary width for a bed, and furthermore it is possible to collapse the telescoping members so that the lifting device is stored in a space which is substantially shorter than the length of the lifting device when in use.

[0012] In practice it has appeared possible to collapse/telescope the lifting device according to the present invention, so that is has a volume corresponding to a large suitcase in a collapsed storing and transport situation.

[0013] In order to further safeguard horizontal trans-

port, the lifting beam is provided with a lifting means, preferably a lifting eyelet, which is displaceable in the longitudinal direction of the lifting beam. Such a lifting means, which may be an eyelet or similar which is fasted to the crane on a fixed or mobile lifting apparatus, will thus enable adjusting the point of gravity. This may e.g. be effected by the lifting eyelet being situated inside the lifting beam, so that the lifting beam is serving as a displaceable guide, and that the lifting eyelet is fastened by screwing on with an operating handle, where friction secures a position. Alternatively, the lifting eyelet may be displaced in a guide in which there are cutouts where the lifting eyelet is disposed during use. Hereby, one does not need to trust a locking of the lifting eyelet with a friction screw.

[0014] It is preferred to make the lifting device so that each frame part is formed by a U-shaped frame, as the bottom of the U-shaped frame consists of a central member section having a telescoping end part as an extendable part at each end of the central member section. Such an embodiment will have a frame part situated at a central part of the lifting device, and the central member part of each member will preferably be the larger member from where the telescoping end parts of the members are extended. The members can be made as tubular members or have other suitable shapes. As the U-shaped frame and thereby also the central lifting beam are located at the centre section of a lifting device, it will be easy to get the point of gravity of the person within the U-shaped frame, so that there is no risk of the canvas tipping. As only the branches of the U-shaped frame and the central lifting beam will be above a person lying on the canvas, it will be easy for assisting staff to access the person lying on the bed. Upper part of the body and legs will thus be outside the U-shaped frame, and one may unhindered come to work with resuscitation equipment, oxygen apparatuses, IV lines and the like. In order to ensure ample space over the user, it is preferred that the branches of the U-shaped frame are bent or curving so that the outermost branch parts farthest from the lifting beam and closest to the bottom of the U-shaped frame under use with the frame parts pivoted to the second extreme position are standing largely vertically. As the outermost branch part has greater or lesser length, spacing between the canvas and the inclining branch parts of the U-shaped frame is thus provided, even at the outermost sides of the canvas. This will ensure that the lifting device can be used for large persons, and that in such situations there will be no risk of squeezing the person.

[0015] According to a preferred embodiment, a lifting device according to the invention is peculiar in that the lifting bracket and the frame parts have a length from 750 to 1000 mm, preferably from 800 to 850 mm, and that the members in the extended state have a length from 1750 to 2100 mm, preferably from 1800 to 1900 mm.

[0016] In a practical example, a lifting bracket will thus have an extended length of 188 mm and a transverse dimension between the two outermost frame parts in the said second extreme position of 975 mm. By making the branches of the U-shaped frame with a curvature, an elevation of about 530 mm may be attained between the level in which the members are disposed and the central lifting beam. In the collapsed/telescoped condition, such a lifting device will have a total length of about 840 mm, a width of about 285 mm and a height of about 755 mm. This provides that the space demand for storage becomes very limited, and furthermore it will be easy to handle the lifting device when not in use. This may be particularly of interest in ambulance applications.

[0017] As mentioned above, the lifting device is to be locked when the frame parts are in the second extreme position or the position of use. Such locking may be effected by means of locking means provided as spring-loaded locking pawls which are displaceable in the branches of the U-shaped frame for engaging drilled holes in the lifting beam. Thus locking pawls or pins may be provided which may be pressed into engagement against a drilled hole or recess in the lifting beam by a spring. Such a locking pawl may in a simple way be provided with a lateral operating handle extending through a slot in the branches of the U-shaped frame. A user may thereby operate the handle for displacing through the slot in order to bring the locking pawl out of engagement with the drilled hole in the lifting beam.

[0018] As the locking pawls are in mutual engagement with the drilled holes while a person lies in the canvas, there will be not possibility or risk of inadvertent unlocking due to the force of gravity.

[0019] It is also preferred that the lifting device can be locked in collapsed condition, and in this situation there will additionally be drilled holes or recesses which the locking pawls may engage in the collapsed condition.

[0020] In order to impart the greatest possible rigidity to the canvas to ensure a largely level bed for the person lying on the canvas, the canvas can be made with a longitudinal duct at each of its longitudinal sides so that a stiff rod can be received in these ducts. Alternatively, the canvas can be made with dual layers so that between the two layers a channel is formed in which a stiff plate can be received. Thus either the stiff rods or the plate may be used when the lifting device is to be used for a task where it is of particular importance that the injured person lies on a plane bed. If there will be lesser requirement to the planeness of the bed, the stiff rods or the stiff plate may be omitted.

[0021] The canvas is mounted on the members with 3-5 connecting straps. These are preferably provided with self-locking buckles so that the canvas can be tightened and form a bed which is as plane as possible. Alternatively, eyelets may be provided along the longitudinal edges of the canvas which interact with hook-shaped means on the members. However, the connecting straps will be a relatively easy and rapid way. When the canvas is not in use, it may easily be dismounted and rolled together. Buckles based on Velcro bands may also be provided.

Description of the Drawing

[0022] In the following, the invention will be disclosed more closely with reference to the accompanying drawing, wherein:

Fig. 1	shows a lifting device according to the present invention in a situation where it is ready for use;
Fig. 2	shows a lifting device according to the invention with dismounted canvas and in collapsed/telescoped state for storage and transport;
Figs. 3 and 4	show a schematic side view and end view, respectively, of the lifting device without canvas in a situation ready for use;
Figs. 5 and 6	show views corresponding to Figs. 3 and 4 of the lifting device in collapsed and telescoped condition; and
Fig. 7	shows a detail of the central lifting beam in the lifting device according to the invention.

Detailed description of the invention

[0023] In the following, identical and corresponding elements will be described with the same reference numerals. No detailed explanation will be given in connection with all Figures.

[0024] In Fig. 1 is shown a lifting device 1 with a canvas 2 which is suspended in a lifting bracket 3. The lifting bracket 3 establishes suspension points 4 located at edge areas of the canvas 2. The support consists of straps 6 which at their ends are provided with a buckle 7 for mounting on members 8. The members 8 are telescoping as they consist of a central member part 9 and two telescoping end parts 10. The members constitute part of two mutually pivotable U-shaped frame parts 11 that are pivotably suspended on a central lifting beam 12. In addition to the central member part 9, the U-shaped frame parts include two bent pipes 13 which at their end parts 14 closest to the central member part 9 are oriented largely vertical when the lifting device is in use. In Fig. 1, the lifting device thus appears in a situation of use where the two frame parts 11 are pivoted to an extreme position, where the two frame parts are pivoted away from each other and locked, as a spring-loaded locking pawl engages a recess in the central lifting beam 12. The spring-loaded locking pawl is located inside the pipe 13 and may be operated via an operating handle 15 (see also Fig. 7) extending out through a slot 16 in the pipe 13. The operating handle 15 may thus be displaced in direction of the arrow 17 to release the locking pawl.

[0025] Fig. 2 shows the lifting device in a condition where the frame parts 11 are pivoted to a second extreme position where they are disposed close to each other and with the telescoping end parts 10 telescoped into the central member part 9. In this situation, the locking pawl will also engage a drilled hole in the central lifting beam 12 so that the frame parts 11 of the lifting device is locked in the collapsed condition.

[0026] Fig. 3 shows a schematic side view of the lifting device 1 with the members in extended position. In this situation, the total length 18 of the members in the shown embodiment will be 1800 mm.

[0027] In Fig. 4 is shown an end view of the lifting device of Fig. 3, where it appears that the frame parts 11 are pivoted to their locked extreme position away from each other. In this situation the width is 19 975 mm. Furthermore, between a plane 20 in which the members 8 are disposed and the central lifting beam 12 there will be a difference of height 21, which will be 532 mm.

[0028] Fig. 5 shows a schematic view corresponding to Fig. 3, but with the lifting device in collapsed and telescoped condition. In this situation, the central member part 9 will have a length 22 of 837 mm.

[0029] Fig. 6 shows an end view of the collapsed and telescoped lifting device shown in Fig. 5. The collapsed lifting device will have a total width 23 of 285 mm and a height 24 of 755 mm.

[0030] As it appears, the collapsed/telescoped lifting device will thus have a dimension substantially corresponding to a large suitcase. The canvas 1, which is dismounted at the collapsing, may be placed in the interspace 25 formed between the two frame parts 11.

[0031] The lifting device may be provided with a transport handle 26, as illustrated in Figs. 2 and 5.

[0032] As it most clearly appears from Fig. 7, the lifting device is provided with a lifting eyelet 27. The lifting eyelet 27 is provided displaceable in the central lifting beam 12, as the lifting eyelet 27, which extends out of slots 28, is connected with an internal slide (not shown). The internal slide is provided with a thread that engages an operating handle 29 which may be turned according to arrows 30, so that the slide is pressed against the inner side of the central lifting beam 12 and so that frictional engagement secures the lifting eyelet at a certain position. By turning the operating handle 29 in the opposite direction, a release will occur so that it becomes possible to adjust the position of the lifting eyelet with regard to the point of gravity for the person situated in the lifting device.

[0033] Besides the frictional engagement, a safety pin 31 extending into drilled holes in the slide may be provided so that the lifting eyelet 27 is locked in a position in relation to the central lifting beam 12.

[0034] As it appears from the detailed view in Fig. 1, the strap 6 is provided at one end with a buckle 7 comprising a hook-shaped part which may be passed in over the strap 6. The hook-shaped part may tighten around the strap 6 and thus function as a self-tightening buckle. Alternatively, other self-tightening buckles can be used which enable performing suspension of the canvas 1 so that it will be in the plane 20 formed by the members 8. This enables tightening the straps after a person has been placed in the lifting device. Alternatively, the length

of the straps may be adapted so that the canvas 1 will be tightly suspended when the two frame parts 11 are pivoted into and locked in the extreme position, which is illustrated in Fig. 1.

[0035] The invention is described above with reference to a specific embodiment; however, the invention is not limited to this. Within the scope of the invention as defined in the subsequent claims, the lifting device can be made in other ways. Thus it will be possible e.g. to change shapes and the bend on the frame parts 11, and it will also be possible to change the profiles used for constructing the lifting beam, the frame parts and the members.

Claims

1. A lifting device (1) for level lifting, including a canvas (2) suspended in a lifting bracket (3) which establishes a number of separate suspension points (4) which in use are disposed at edge regions of the canvas, so that in use the canvas is supported in a largely horizontal plane (20), **characterised in that** the lifting bracket (3) is made of a central lifting beam (12) extending in the longitudinal direction of the canvas and supporting two mutually pivotably frame members (11) which at one end are pivotably attached to the central lifting beam (12), and which may pivot between a first extreme position where the two frame members (11) are close to each other, and a second extreme position where the two frame members (11) are pivoted away from each other, that locking means are provided which may lock the frame members at least in the second extreme position, and that each frame member (11) at its end farthest from the central lifting beam (12) includes a telescoping member (8) to which the canvas is fitted and that the lifting beam (12) is provided with a lifting means, preferably a lifting eyelet (27), which is displaceable in the longitudinal direction of the lifting beam (12).

2. Lifting device according to claim 1, **characterised in that** each frame part (11) is formed by a U-shaped frame, as the bottom of the U-shaped frame consists of a central member section (9) having a telescoping end part (10) as an extendable part at each end of the central member section (9).

3. Lifting device according to claim 2, **characterised in that** the branches (13) of the U-shaped frame are bent or curving so that the outermost branch parts (14) farthest from the lifting beam (12) and closest to the bottom of the U-shaped frame under use with the frame parts (11) pivoted to the second extreme position are standing largely vertically.

4. Lifting device according to any preceding claim, **characterised in that** the locking means are provided as spring-loaded locking pawls which are displaceable in the branches (13) of the U-shaped frame for engaging drilled holes in the lifting beam (12).

5. Lifting device according to any preceding claim, **characterised in that** at each of its longitudinal sides, the canvas (2) has a longitudinal duct in which a stiff rod can be received.

6. Lifting device according to any of claims 1 - 4, **characterised in that** the canvas (2) has dual layers, and that between the two layers a channel is formed in which a stiff plate can be received.

7. Lifting device according to any preceding claim, **characterised in that** the canvas (2) is mounted on the members (8) with three to five connecting straps (6).

8. Lifting device according to claim 7, **characterised in that** the connecting straps (6) are provided with self-locking buckles (7) in order for the canvas (2) to form a bed which is as plane as possible.

9. Lifting device according to any preceding claim, **characterised in that** the lifting bracket (3) and the frame parts (11) have a length from 750 to 1000 mm, preferably from 800 to 850 mm, and that the members (8) in the extended state have a length from 1750 to 2100 mm, preferably from 1800 to 1900 mm.

Patentansprüche

1. Hebevorrichtung (1) zum höhenausgeglichenen Heben, die eine Plane (2) enthält, die in einer Hebeklammer (3) aufgehängt ist, was eine Anzahl von getrennten Aufhängungspunkten (4) schafft, die im Gebrauch in Kantenbereichen der Plane angeordnet sind, so dass die Plane im Gebrauch in einer größtenteils horizontalen Ebene (20) getragen wird, **dadurch gekennzeichnet, dass** die Hebeklammer (3) aus einem zentralen Hebeträger (12) hergestellt ist, der sich in der Längsrichtung der Plane erstreckt und zwei gegenseitig schwenkbare Rahmenelemente (11) trägt, die an einem Ende schwenkbar an dem zentralen Hebeträger (12) befestigt sind und die zwischen einer ersten äußersten Position, in der die beiden Rahmenelemente (11) nahe beieinander sind, und einer zweiten äußersten Position, in der die beiden Rahmenelemente (11) voneinander weggeschwenkt sind, schwenken können, dass Verriegelungsmittel vorgesehen sind, die die Rahmenelemente zumindest in der zweiten äußersten Position verriegeln können, und dass jedes Rahmenelement (11) an seinem von dem zentralen Hebeträger (12) am weitesten entfernten Ende ein ineinander schieb-

bares Element (8) enthält, in das die Plane eingebaut ist, und dass der Hebeträger (12) mit einem Hebemittel versehen ist, vorzugsweise mit einer Hebeöse (27), die in der Längsrichtung des Hebeträgers (12) verstellbar ist.

2. Hebevorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** jeder Rahmenteil (11) durch einen U-förmigen Rahmen gebildet ist, wobei der Boden des U-förmigen Rahmens aus einem zentralen Elementabschnitt (9) besteht, der ein ineinander schiebbares Teil (10) als einen ausfahrbaren Teil an jedem Ende des zentralen Elementabschnitts (9) besitzt.

3. Hebevorrichtung nach Anspruch 2, **dadurch gekennzeichnet, dass** die Verzweigungen (13) des U-förmigen Rahmens gebogen oder gekrümmt sind, so dass die äußersten Verzweigungsteile (14), die im Gebrauch am weitesten von dem Hebeträger (12) entfernt und am nächsten am Boden des U-förmigen Rahmens sind, wobei die Rahmenteile (11) in die zweite äußerste Position geschwenkt sind, größtenteils vertikal stehen.

4. Hebevorrichtung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Verriegelungsmittel als gefederte Sperrkegel vorgesehen sind, die in den Verzweigungen (13) des U-förmigen Rahmens verstellbar sind, um mit gebohrten Löchern in dem Hebeträger (12) in Eingriff zu gelangen.

5. Hebevorrichtung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Plane (2) an jeder ihrer Längsseiten einen Längsdurchgang besitzt, in dem ein steifer Stab aufgenommen werden kann.

6. Hebevorrichtung nach einem der Ansprüche 1-4, **dadurch gekennzeichnet, dass** die Plane (2) Doppelschichten besitzt und dass zwischen den beiden Schichten ein Kanal gebildet ist, in dem eine steife Platte aufgenommen werden kann.

7. Hebevorrichtung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Plane (2) mit drei bis fünf Verbindungsstreifen (6) auf den Elementen (8) befestigt ist.

8. Hebevorrichtung nach Anspruch 7, **dadurch gekennzeichnet, dass** die Verbindungsstreifen (6) mit selbstverriegelnden Schnallen (7) versehen sind, damit die Plane (2) ein Bett bildet, das so eben wie möglich ist.

9. Hebevorrichtung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Hebeklammer (3) und die Rahmenteile (11) eine Länge von 750 bis 1000 mm, vorzugsweise von 800 bis 850 mm, besitzen und dass die Elemente (8) in dem ausgefahrenen Zustand eine Länge von 1750 bis 2100 mm, vorzugsweise von 1800 bis 1900 mm, aufweisen.

Revendications

1. Dispositif de levage (1) pour levage plan, comprenant une toile (2) suspendue dans une console de levage (3) qui établit un nombre de points de suspension séparés (4) qui en utilisation sont disposés dans les sections de bord de la toile de sorte qu'en utilisation la toile est supportée dans un plan sensiblement horizontal (20), **caractérisé en ce que** la console de levage (3) est fabriquée d'un palonnier central (12) s'étendant dans la direction longitudinale de la toile et supportant deux segments de cadre réciproquement pivotables (11) qui à l'une extrémité sont liés au palonnier central (12) de facon pivotable, et qui peuvent pivoter entre une première position extrême dans laquelle les deux segments de cadres (11) sont à proximité l'un de l'autre, et une seconde position extrême dans laquelle les deux segments de cadre (11) sont pivotés l'un loin de l'autre, que des moyens de verrouillage sont prévus qui peuvent verrouiller les segments de cadre au moins dans la seconde position extrême et que chaque segment de cadre (11) au niveau de son extrémité la plus éloignée du palonnier central (2) comporte un element télescopique (8) auquel la toile est fixée et que le palonnier (12) est pourvu de moyens de levage, de preference un oeillet de levage (27) qui est déplaçable dans la direction longitudinale du palonnier (12).

2. Dispositif de levage selon la revendication 1, **caractérisé en ce que** chaque partie de cadre (11) est formée par un cadre en forme de U, vu que le fond du cadre en forme de U consiste en une section d'élément centrale (9) comportant une partie extrême télescopique (10) comme une partie extensible au niveau de chaque extrémité de la section d'élément central (9).

3. Dispositif de levage selon la revendication 2, **caractérisé en ce que** les branches (13) du cadre en forme de U sont pliées ou incurvées de sorte que les parties de branches extrêmes (14) les plus éloignées du palonnier (12) et la plus proche du fond de cadre en forme de U lors de l'utilisation avec les parties de cadres (11) pivotées vers une seconde position extrême se trouvent sensiblement verticalement.

4. Dispositif de levage selon l'une quelconque des revendications précédentes, **caractérisé en ce que**

des moyens de verrouillage sont prévus comme verrous à resort qui sont déplaçables dans les branches (13) du cadre en forme de U pour engagement dans des trous percés dans le palonnier (12).

5. Dispositif de levage selon l'une quelconque des revendications précédentes, **caractérisé en ce qu'à** chaque côté longitudinal, la toile (2) a un conduit longitudinal dans lequel une tige rigide peut être reçue.

6. Dispositif de levage selon l'une quelconque des revendications 1-4, **caractérisé en ce que** la toile (2) a deux couches, et **en ce que**, entre les deux couches, un canal est formé dans lequel une plaque rigide peut être reçue.

7. Dispositif de levage selon l'une quelconque des revendications précédentes, **caractérisé en ce que** la toile (2) est montée sur les éléments (8) avec trois à cinq bandes de connexion (6).

8. Dispositif de levage selon la revendication 7, **caractérisé en ce que** les bandes de liaison (6) sont prévus avec des boucles à verrouillage automatique (7) pour que la toile (2) forme un lit qui est aussi plan que possible.

9. Dispositif de levage selon l'une quelconque des revendications précédentes, **caractérisé en ce que** la console de levage (3) et les segments de cadre (11) ont une longueur allant de 750 à 1000 mm, de préférence de 800 à 850 mm, et **en ce que** les éléments (8) dans l'état élargi ont une longueur de 1750 à 2100 mm, de préférence de 1800 à 1900 mm.

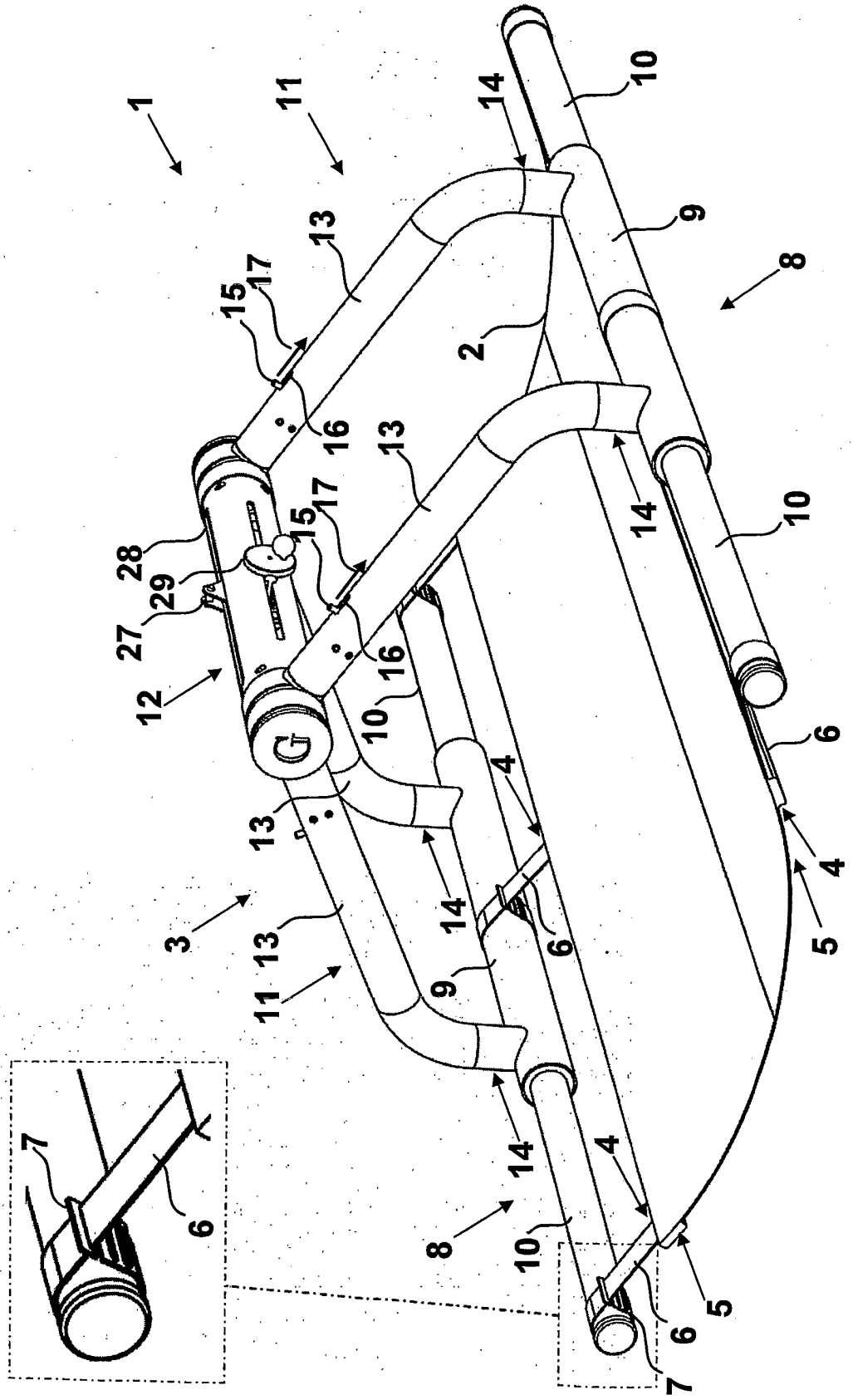

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Fig. 1

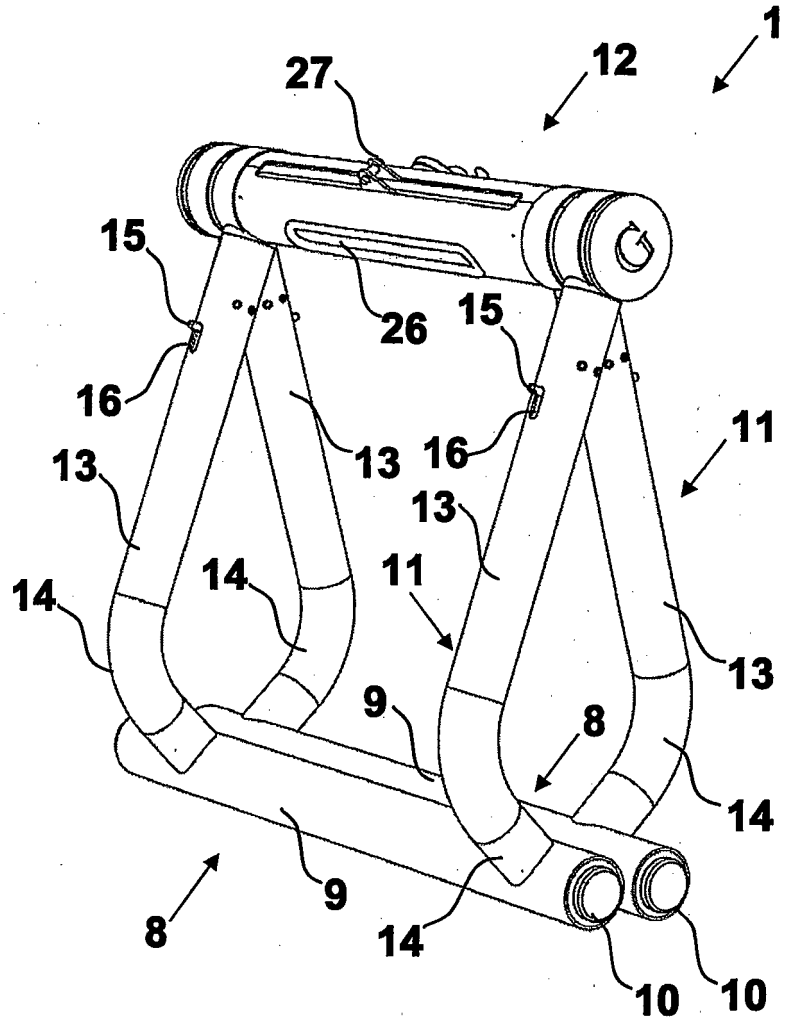


Fig. 2

Fig. 3

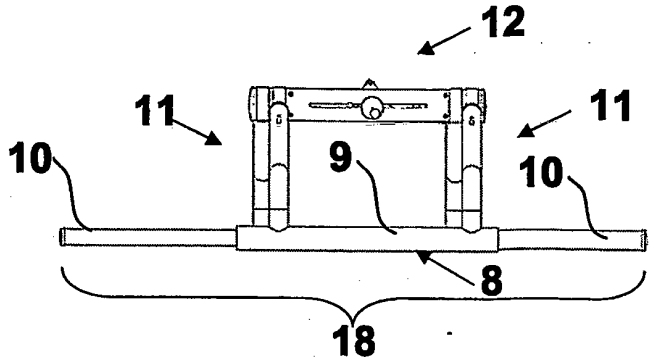


Fig. 4

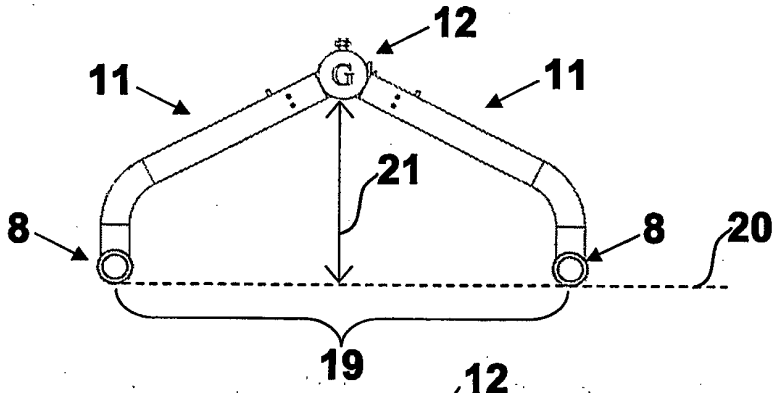


Fig. 5

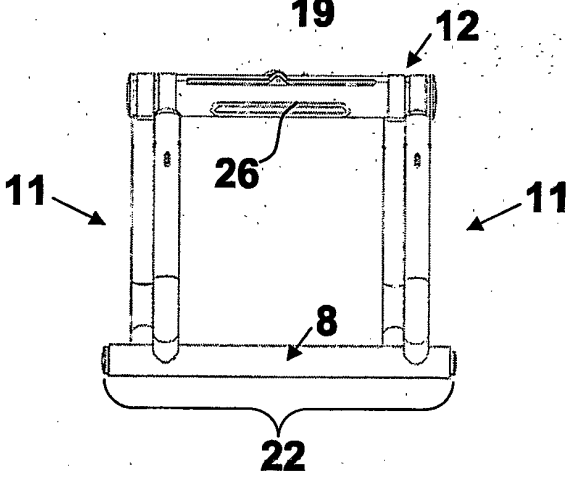
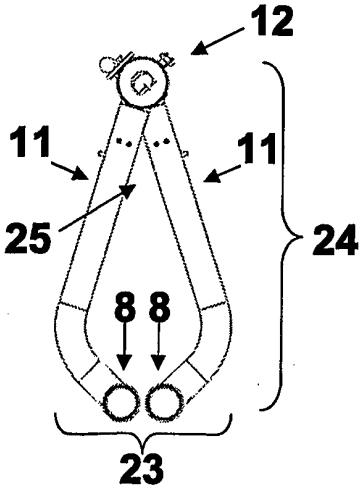


Fig. 6



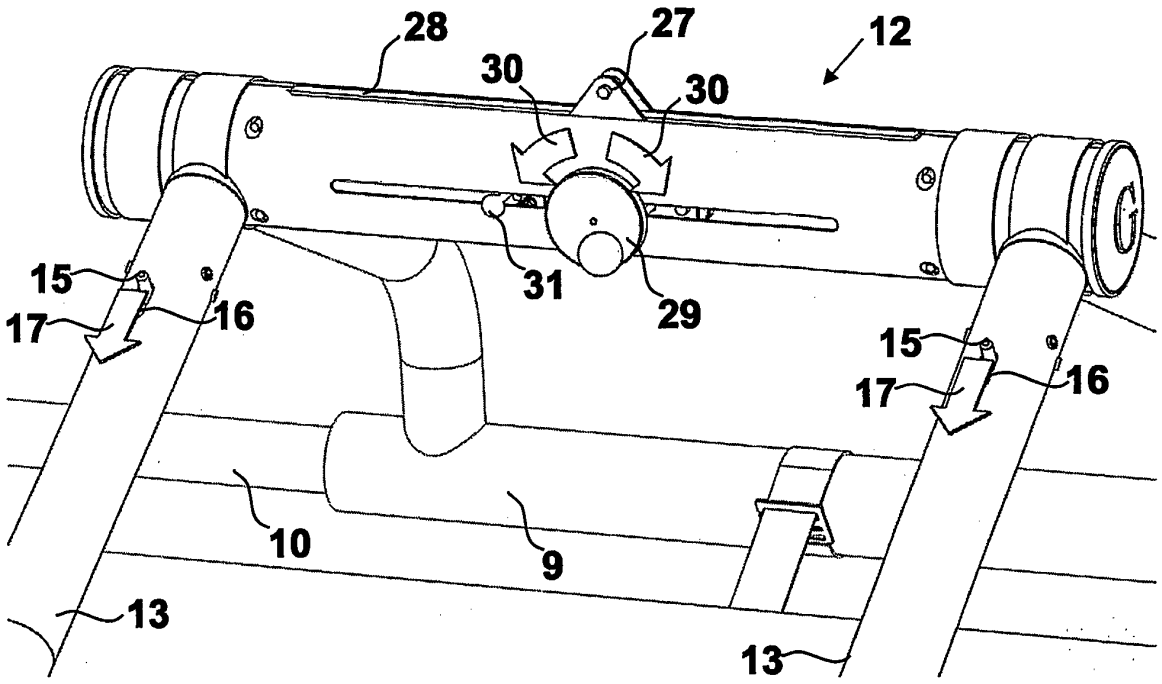


Fig. 7

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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