

(19)



(11)

EP 2 757 034 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
23.07.2014 Bulletin 2014/30

(51) Int Cl.:
B63B 21/00 (2006.01) **B63B 27/14 (2006.01)**
E01D 15/24 (2006.01)

(21) Application number: **13151682.5**

(22) Date of filing: **17.01.2013**

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

(72) Inventor: **Binney, Steven Mark**
Newcastle upon Tyne
NE6 5QR (GB)

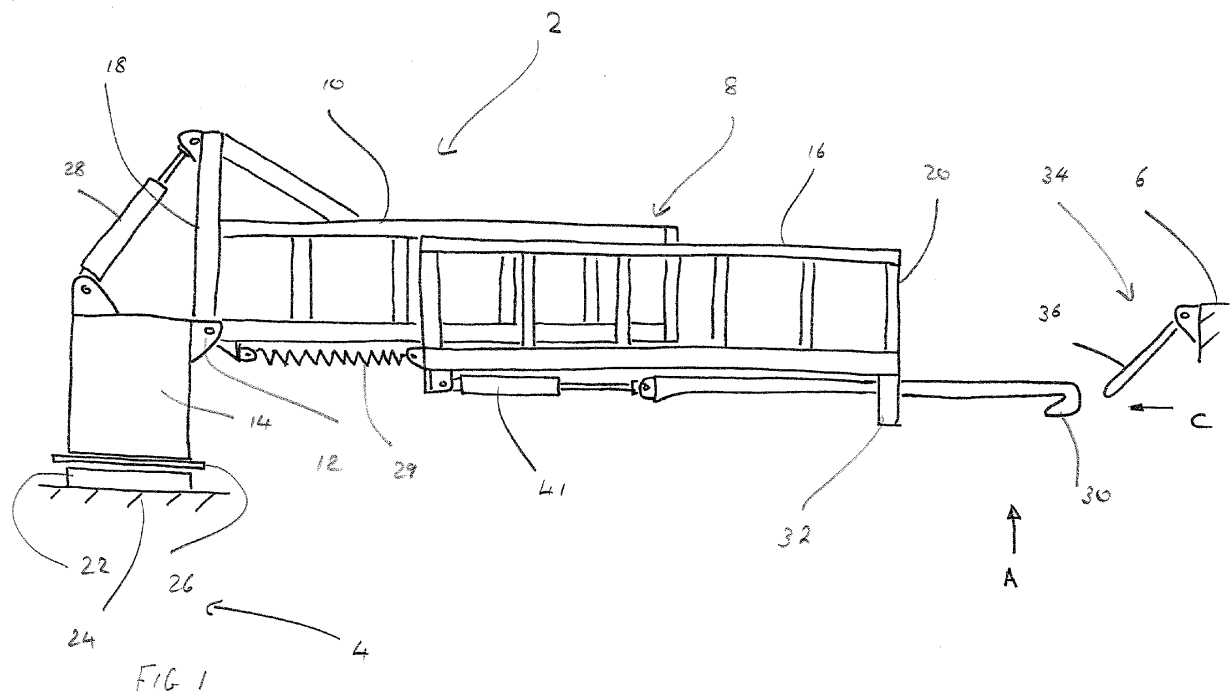
(74) Representative: **Vinsome, Rex Martin**
Urquhart-Dykes & Lord LLP
12th Floor
Cale Cross House
156 Pilgrim Street
Newcastle-upon-Tyne NE1 6SU (GB)

(71) Applicant: **OSBIT Power Limited**
Northumberland NE44 6EG (GB)

(54) Access apparatus for offshore structure

(57) An access apparatus (2) for enabling transfer of personnel between an offshore vessel (4) and an installation (6) moving relative to the vessel is disclosed. The apparatus comprises a platform (14) mounted to the vessel and a gangway (8) mounted to the platform and having a first end (18) and a second end (20), the distance between the first and second ends being adjustable. A

hook (30) extends from the gangway for enabling the second end to be mounted to the installation, and is adapted to engage a wire (36) on the installation. The position of the hook relative to the second end is adjustable, and tensioning means urges the hook towards the first end to place the wire under tension when engaged by the hook.

**EP 2 757 034 A1**

Description

[0001] The present invention relates to access apparatus for enabling transfer of personnel between an offshore vessel and an installation moving relative to the vessel, such as an offshore wind turbine. The invention also relates to a locating apparatus for use with such access apparatus and to a location and access assembly incorporating such apparatus.

[0002] The use of helicopters to gain access to offshore wind turbines is not preferred. As a result, it is generally necessary for personnel to gain access to the wind turbines by transferring from a sea vessel.

[0003] It is known to provide access apparatus mounted to an offshore vessel in which a gangway is supported by a position adjusted platform on the vessel such that compensation is made for the motion of the vessel to control the position of an end of the gangway remote from the vessel. However, such arrangements suffer from the drawback that they are complex and expensive.

[0004] Another access apparatus is known which has a passive mode in which an end of a gangway remote from the vessel is located in a desired position adjacent the installation to which access is to be provided, and a passive mode for use when the end of the gangway has been attached to the installation. However, this arrangement suffers from the drawback that it is difficult to securely attach the end of the gangway to the installation.

[0005] Preferred embodiments of the present invention seek to overcome one or more of the above disadvantages of the prior art.

[0006] According to an aspect of the present invention, there is provided an access apparatus for enabling transfer of personnel between an offshore vessel and an installation moving relative to the vessel, the apparatus comprising:-

support means adapted to be mounted to an offshore vessel;

access means mounted to said support means and having a first end adjacent said support means and a second end adapted to be mounted to an installation to allow transfer of personnel between the vessel and the installation, wherein the distance between said first and second ends is adjustable;

engaging means extending from said access means for enabling said second end to be mounted to the installation, wherein said engaging means is adapted to engage at least one tensile member on said installation, and wherein the position of said engaging means relative to said second end is adjustable; and

tensioning means for urging said engaging means towards said first end to place said tensile member under tension when engaged by said engaging

means.

[0007] By providing tensioning means for urging the engaging means towards the first end to place the tensile member under tension when engaged by the engaging means, this provides the advantage that only tensile loads are transferred to the platform, which reduces bending moments on the access apparatus and makes the apparatus easier to install. The apparatus can also be constructed such that it is light but strong and flexible, enabling the engaging means to engage the tensile member without high impact loads.

[0008] The apparatus may further comprise guide means for engaging at least one said tensile member to generate a component of tensile force in said tensile member transverse to a line joining said engaging means and said first end.

[0009] This provides the advantage of assisting in restraining movement of the access means relative to the installation.

[0010] The engaging means may be adapted to extend through at least one aperture in said guide means and retract at least one said tensile member through said aperture to cause said guide means to engage said tensile member.

[0011] The access means may comprise a plurality of access portions, wherein said first end is provided on a first access portion, said second end is provided on a second access portion, and said second access portion is moveable relative to said first access portion.

[0012] The engaging means may comprise releasable latching means.

[0013] The latching means may be adapted to release the or each said tensile member engaged thereby when tension in said tensile member exceeds a predetermined level.

[0014] This provides the advantage of improving the safety of operation of the apparatus.

[0015] The engaging means may further comprise release means moveable relative to said latching means between a latching condition and a release condition, wherein the release means is adapted to engage the second access portion and move relative to the latching means from the latching condition to the release condition when tension in a said tensile member engaged by said latching means exceeds a predetermined level.

[0016] The apparatus may further comprise first biasing means for biasing said release means towards said latching condition.

[0017] The tensioning means may comprise second biasing means for urging the engaging means towards the first end.

[0018] The tensioning means may comprise third biasing means for urging the second end towards the first end.

[0019] The engaging means may comprise at least one hook.

[0020] The apparatus may further comprise position-

ing means operable from said vessel for adjusting the position of said engaging means relative to said vessel.

[0021] The positioning means may be adapted to adjust the position of said second end relative to said first end.

[0022] The positioning means may be adapted to cause pivoting of the access means about a first axis relative to the support means.

[0023] The positioning means may be adapted to cause pivoting of the access means about a second axis relative to the vessel.

[0024] The apparatus may further comprise notification means for generating a notification signal of said vessel tending to move out of range of said installation.

[0025] This provides the advantage of enabling an operator to correct the position of the vessel to maintain operability of the access apparatus.

[0026] According to another aspect of the present invention, there is provided a locating apparatus adapted to be engaged by engaging means of an access apparatus as defined above, the locating apparatus comprising:-

at least one tensile member adapted to be mounted to an installation; and

loop forming means for forming a loop from at least one said tensile member.

[0027] By providing loop forming means for forming a loop from at least one said tensile member, this provides the advantage of assisting engagement of the tensile member with the engaging means.

[0028] The loop forming means may comprise fourth biasing means for biasing ends of at least one said tensile member along divergent directions relative to said installation.

[0029] The apparatus may further comprise at least one engaging portion mounted to at least one said tensile member and adapted to be engaged by said engaging means and to preventing the minimum bend radius of said tensile member becoming lower than a predetermined value.

[0030] The apparatus may further comprise at least one support for supporting at least one said tensile member, wherein the support is pivotably mounted to the installation in use.

[0031] According to a further aspect of the present invention, there is provided a location and access assembly comprising an access apparatus as defined above and a location apparatus as defined above.

[0032] Preferred embodiments of the invention will now be described, by way of example only and not in any limitative sense, with reference to the accompanying drawings in which:-

Figure 1 is a schematic side view of a location and access assembly of a first embodiment of the present

invention prior to engagement of an access apparatus with a location apparatus thereof;

Figure 2 is a view in the direction of arrow C in Figure 1;

Figure 3 is a view in the direction of arrow A in Figure 1;

Figure 4 is a view corresponding to Figure 1 of the assembly of Figure 1 after engagement of the access apparatus with the locating apparatus;

Figure 5 is a view in the direction of arrow B in Figure 4; and

Figure 6 is a view corresponding to Figure 1 of an assembly of a second embodiment of the present invention.

[0033] Referring to Figures 1 to 5, a location and access assembly embodying the present invention includes an access apparatus 2 of a first embodiment of the present invention and a locating apparatus 34 for enabling transfer of personnel between an offshore vessel 4 and an installation such as an offshore wind turbine 6. The access apparatus 2 has access means comprising a gangway 8 having a first gangway section 10 pivotably mounted about a generally horizontal pivot axis 12 to a platform 14 and a second gangway section 16 slidably mounted to the first gangway section 10 such that the distance between a first end 18 and a second end 20 of the gangway 8 is adjustable. The platform 14 is supported on a plinth 22 on the deck 24 of the offshore vessel 4 and is rotatably mounted to the plinth 22 via a slew ring 26 to enable rotation about a generally vertical axis. The gangway 8 is pivotable about horizontal axis 12 by means of a lift cylinder 28. The first 10 and second 16 gangway sections are mounted to each other such that personnel can walk along the gangway 8 at any relative position of the first 10 and second 16 gangway sections. A spring 29 mounted between the first 10 and second 16 gangway section urges the second end 20 towards the first end 18.

[0034] Engaging means in the form of a hook 30 extends from the second end 20 of the second gangway section 16 and is slidably mounted to the second gangway section 16. The hook 30 passes through a bridle constraint 32 fixed to the second gangway section 16. The bridle restraint 32 has an aperture 33 (Figure 2) having a widened central portion 35 that allows the hook 30 to pass through and tapers to narrowed side portions 37. The second gangway section 16 and hook 30 are interconnected such that the position of the hook 30 can be extended hydraulically and retracted with sufficient force to place a tensile member in the form of a wire 36 of the locating apparatus 34 under tension. The bridle restraint 32 is provided with guides 40 (Figure 5) arranged on opposite sides of the aperture 33 for engaging the wire 36,

the purpose of which is explained in greater detail below.

[0035] Referring in detail to Figure 3, the tensile member in the form of a wire 36 of the locating apparatus 34 is pivotably mounted at its ends 39 to supports 38 which are mounted to the offshore installation 6. The ends 39 of the wire 36 are pivotable relative to the supports 38 and are biased by means of springs 43 towards the condition shown in Figure 3, in which the wire 36 forms a loop and thereby provides a larger target for the hook 30. In the condition shown in Figure 3, the side of the wire 36 remote from the installation 6 is lower than its ends 39 (Figure 1), which assists in locating the hook 30 on the wire 36. The ends of the wire 36 are connected by an engaging member 42 which is engaged by the hook 30 to prevent the bend radius of the wire 36 becoming less than a predetermined minimum value.

[0036] In operation, an operator on the vessel 4 controls the angle, slew position and hook extension position to locate the hook 30 in a desired position relative to the vessel 4. As the vessel 4 moves with the sea, the hook 30 is extended from the aperture 33 of the bridle restraint 32 by means of actuator 41, and the operator operates controls to limit movement of the hook 30 relative to the locating apparatus 34 as the vessel 4 approaches the installation 6. The hook 30 engages the engaging member 42 on the wire 36 and the hook 30 is then retracted into the aperture 33 of the bridle restraint 32 to place the wire 36 under tension as shown in Figures 4 and 5. As a result of the hook 30 placing the wire 36 under tension, the gangway 8 is placed under tension and the second gangway section 16 extends relative to the first gangway section 10. The lift cylinder 28 and slew cylinder (not shown) are then switched to a floating condition in which they can move freely to allow free movement of the gangway sections 10, 16 relative to the plinth 26. As a result, the position of the hook 30 becomes loosely restrained by the wire 36 of the bridle, and as the hook 30 retracts, the gangway 8 extends and the hook 30 passes through the aperture 33 of the bridle restraint 32 which progressively constrains the position of the second end 20 of the gangway. As the bridle restraint 32 is forced towards the mounting points of the bridle on the installation 6, the tension in the wire 36 of the bridle increases until the second end 20 of the gangway 8 is fully supported by the tensioned wire 36. The ends of the wire 36 are then located in the side portions 37 of the aperture 33 in the bridle restraint 32 and engage the guides 40 as shown in Figure 5. This causes the ends 39 of the wire 36 to pivot inwards relative to the supports 38 so that the tension in the ends of the wire 36 has a component transverse to the direction in which tension is applied by the hook 30. The gangway 8 is then free to extend and contract and the bridle acts as a gimbal, providing 6 degrees of freedom between the vessel 4 and the installation 6.

[0037] Notification means (not shown) provides a signal to warn if the vessel 4 is moving out of range of the offshore installation 6, or if wave motions are too great. This can then be used by a dynamic positioning system

of the vessel 4 to correct the position of the vessel 4.

[0038] Referring to Figure 6, in which parts common to the embodiment of Figures 1 to 5 are denoted by like reference numerals but increased by 100, the wire 136 is engaged by a releasable latch 150 which has a first latching member 152 and a second latching member 154 arranged such that the latch 150 only engages the wire 136 if it approaches the latch 150 in the direction of arrow D. This reduces the risk of accidental latching by the latch 150.

[0039] The latch 150 is mounted to a support member 156 which is slidable by means of actuator 141 relative to the second gangway section 116 and extends through the bridle restraint 132. Release means in the form of an inner rod 158 is slidably mounted to the support member 156 and is urged by a gas strut 160 into engagement with an end wall 162 of the support member 156 to urge the latch 150 to its latching condition.

[0040] When excessive tension is applied to the wire 136 when engaged with the latch 150, for example as a result of the vessel moving out of range of the installation, the latch 150 and support member 156 are urged outwards of the second gangway section 116 until a flange 164 on the inner rod 158 engages a stop 166 on the second gangway section 116, preventing further outward movement of the inner rod 158 relative to the second gangway section 116. As a result, the inner rod 158 is urged against the action of gas strut 160 out of engagement with end wall 162 of support member 156 to move the first 152 and second 154 latching members relative to each other to bring the latch 150 into its release condition to release the wire 136.

[0041] It will be appreciated by persons skilled in the art that the above embodiment has been described by way of example only, and not in any limitative sense, and that various alterations and modifications are possible without departure from the scope of the invention as defined by the appended claims.

Claims

1. An access apparatus for enabling transfer of personnel between an offshore vessel and an installation moving relative to the vessel, the apparatus comprising:-
 - support means adapted to be mounted to an offshore vessel;
 - access means mounted to said support means and having a first end adjacent said support means and a second end adapted to be mounted to an installation to allow transfer of personnel between the vessel and the installation, wherein the distance between said first and second ends is adjustable;
 - engaging means extending from said access means for enabling said second end to be mounted to the installation, wherein said engaging means is adapted to engage at least one tensile member on said

installation, and wherein the position of said engaging means relative to said second end is adjustable; and
 tensioning means for urging said engaging means towards said first end to place said tensile member under tension when engaged by said engaging means.

2. An apparatus according to claim 1, including one or more of the following features:

(i) further comprising guide means for engaging at least one said tensile member to generate a component of tensile force in said tensile member transverse to a line joining said engaging means and said first end;
 (ii) wherein the access means comprises a plurality of access portions, wherein said first end is provided on a first access portion, said second end is provided on a second access portion, and said second access portion is moveable relative to said first access portion;
 (iii) wherein the engaging means comprises releasable latching means;
 (iv) wherein the tensioning means comprises second biasing means for urging the engaging means towards the first end;
 (v) wherein the tensioning means comprises third biasing means for urging the second end towards the first end;
 (vi) wherein the engaging means comprises at least one hook;
 (vii) further comprising positioning means operable from said vessel for adjusting the position of said engaging means relative to said vessel; or
 (viii) further comprising notification means for generating a notification signal of said vessel tending to move out of range of said installation.

3. An apparatus according to claim 2, wherein said engaging means is adapted to extend through at least one aperture in said guide means and retract at least one said tensile member through said aperture to cause said guide means to engage said tensile member.

4. An apparatus according to claim 2 or 3, wherein said latching means is adapted to release the or each said tensile member engaged thereby when tension in said tensile member exceeds a predetermined level.

5. An apparatus according to claims 2 and 4, wherein the engaging means further comprises release means moveable relative to said latching means between a latching condition and a release condition, wherein the release means is adapted to engage the

second access portion and move relative to the latching means from the latching condition to the release condition when tension in a said tensile member engaged by said latching means exceeds a predetermined level.

6. An apparatus according to claim 5, further comprising first biasing means for biasing said release means towards said latching condition.

7. An apparatus according to any one of claims 2 to 6, wherein the positioning means is adapted to adjust the position of said second end relative to said first end.

8. An apparatus according to any one of claims 2 to 7, wherein the positioning means is adapted to cause pivoting of the access means about a first axis relative to the support means.

9. An apparatus according to any one of claims 2 to 8, wherein the positioning means is adapted to cause pivoting of the access means about a second axis relative to the vessel.

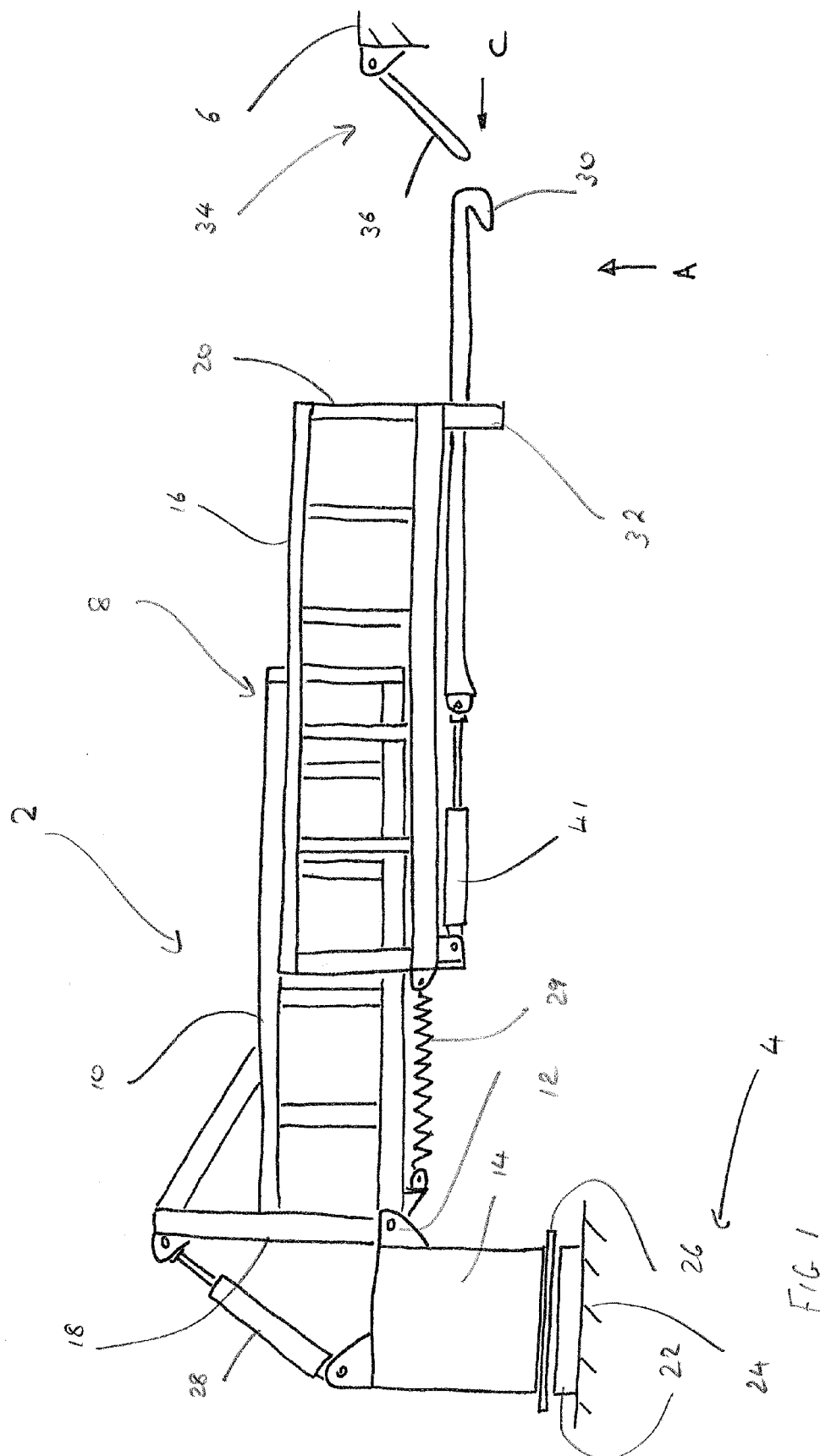
10. A locating apparatus adapted to be engaged by engaging means of an access apparatus according to any one of the preceding claims, the locating apparatus comprising:-
 at least one tensile member adapted to be mounted to an installation; and
 loop forming means for forming a loop from at least one said tensile member.

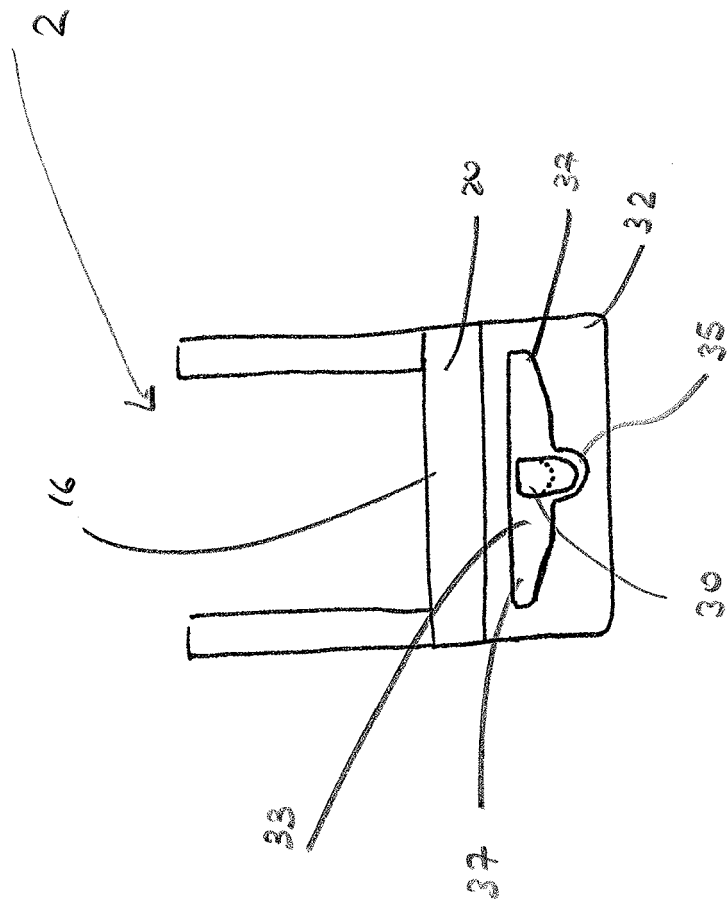
11. An apparatus according to claim 10, wherein said loop forming means comprises fourth biasing means for biasing ends of at least one said tensile member along divergent directions relative to said installation.

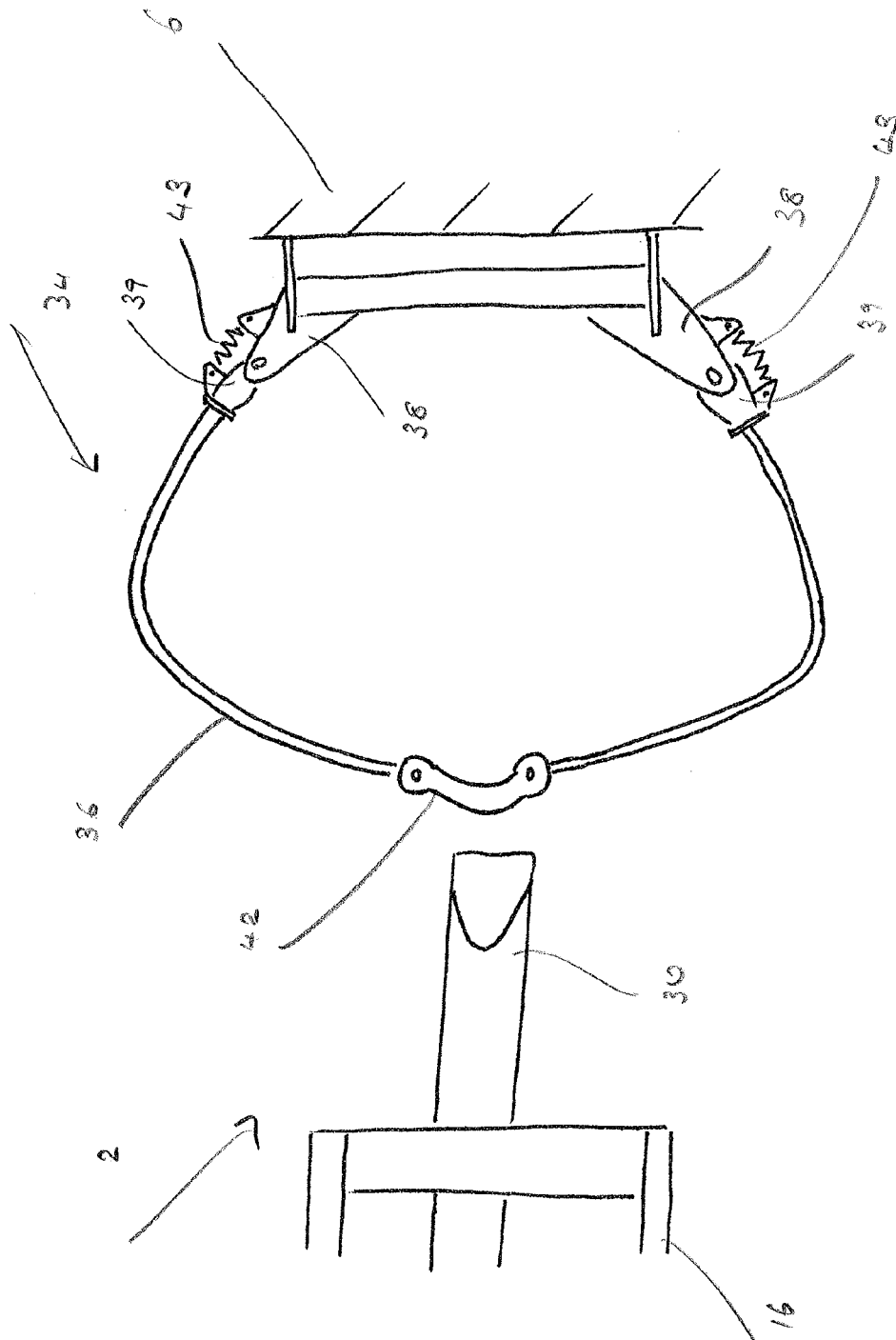
12. An apparatus according to claim 10 or 11, further comprising at least one engaging portion mounted to at least one said tensile member and adapted to be engaged by said engaging means and to prevent the minimum bend radius of said tensile member becoming lower than a predetermined value.

13. An apparatus according to any one of claims 10 to 12, further comprising at least one support for supporting at least one said tensile member, wherein the support is pivotably mounted to the installation in use.

14. A location and access assembly comprising an access apparatus according to any one of claims 1 to 9 and a location apparatus according to any one of claims 10 to 13.







VIEW ON A

FIG 3

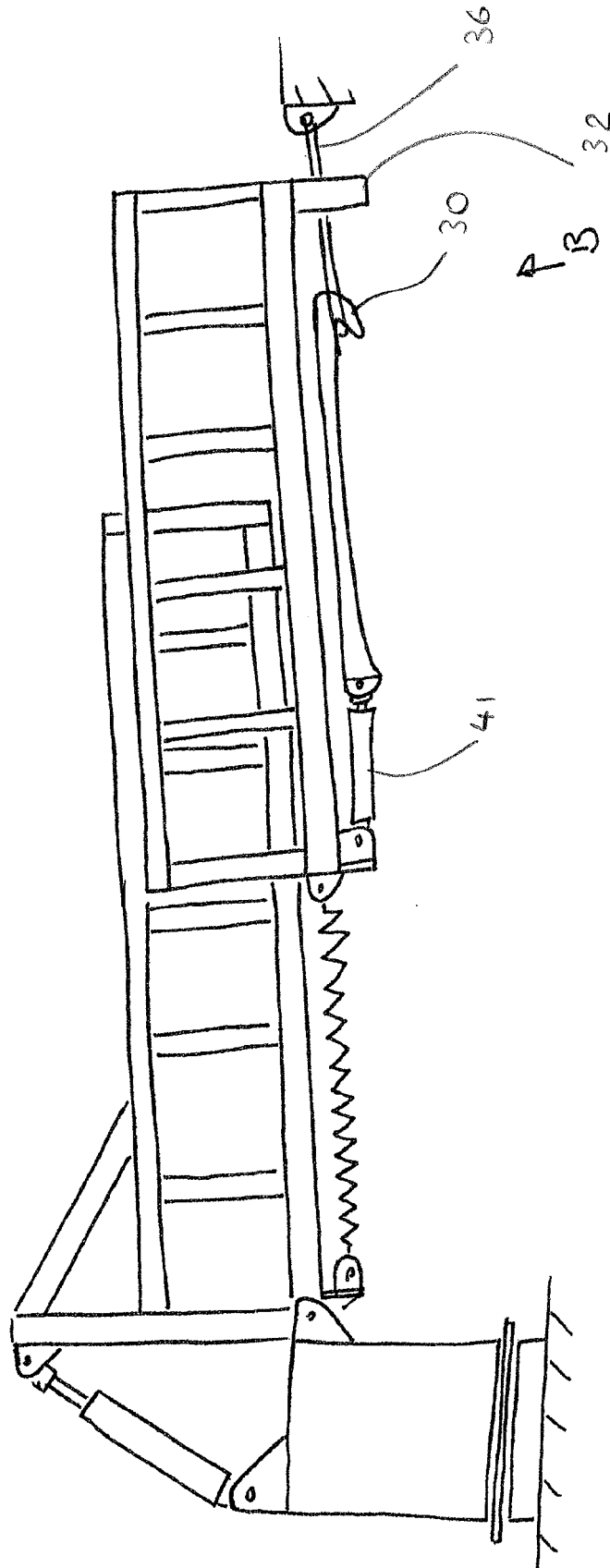


FIG. 4

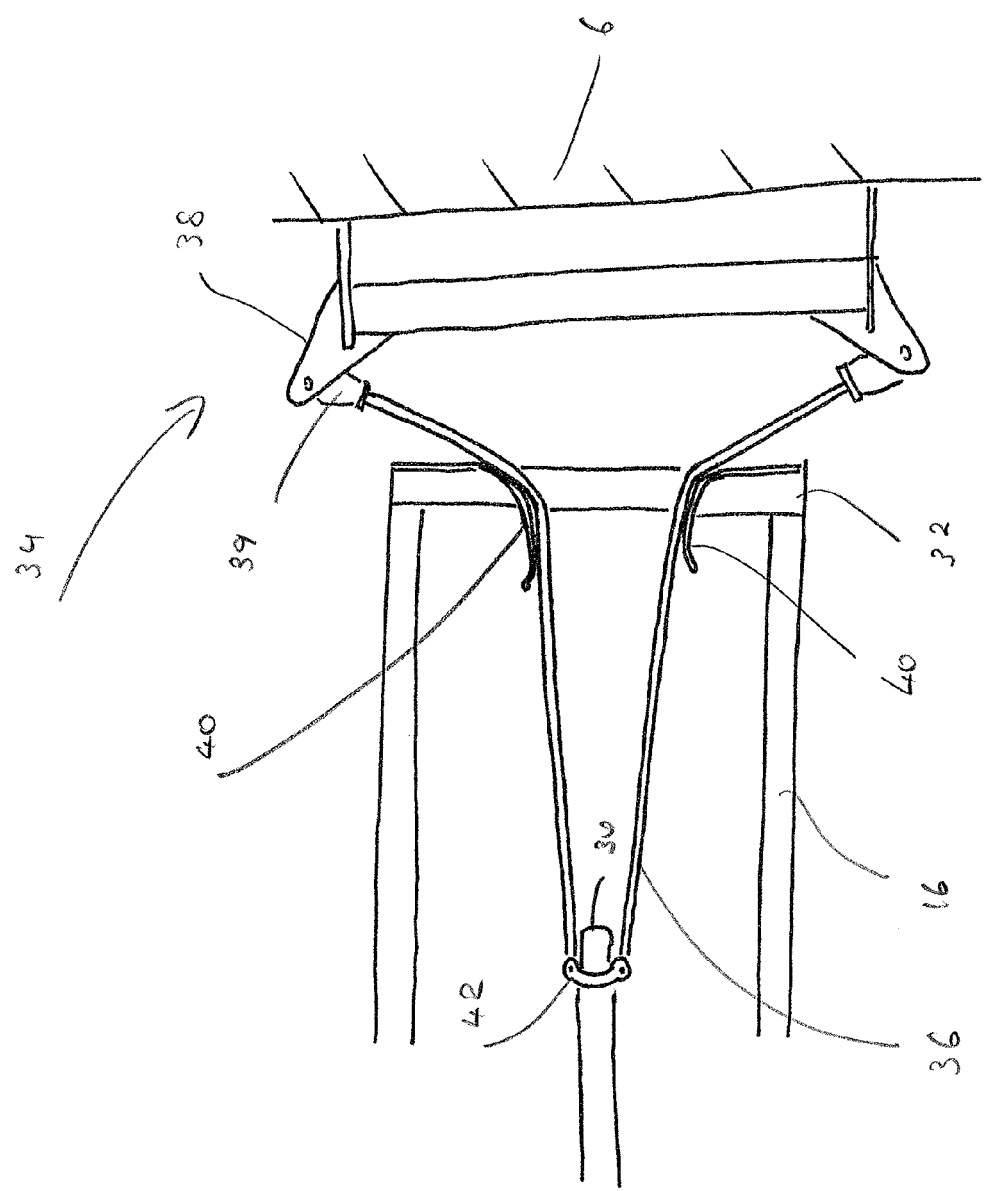


FIG 5

View on B

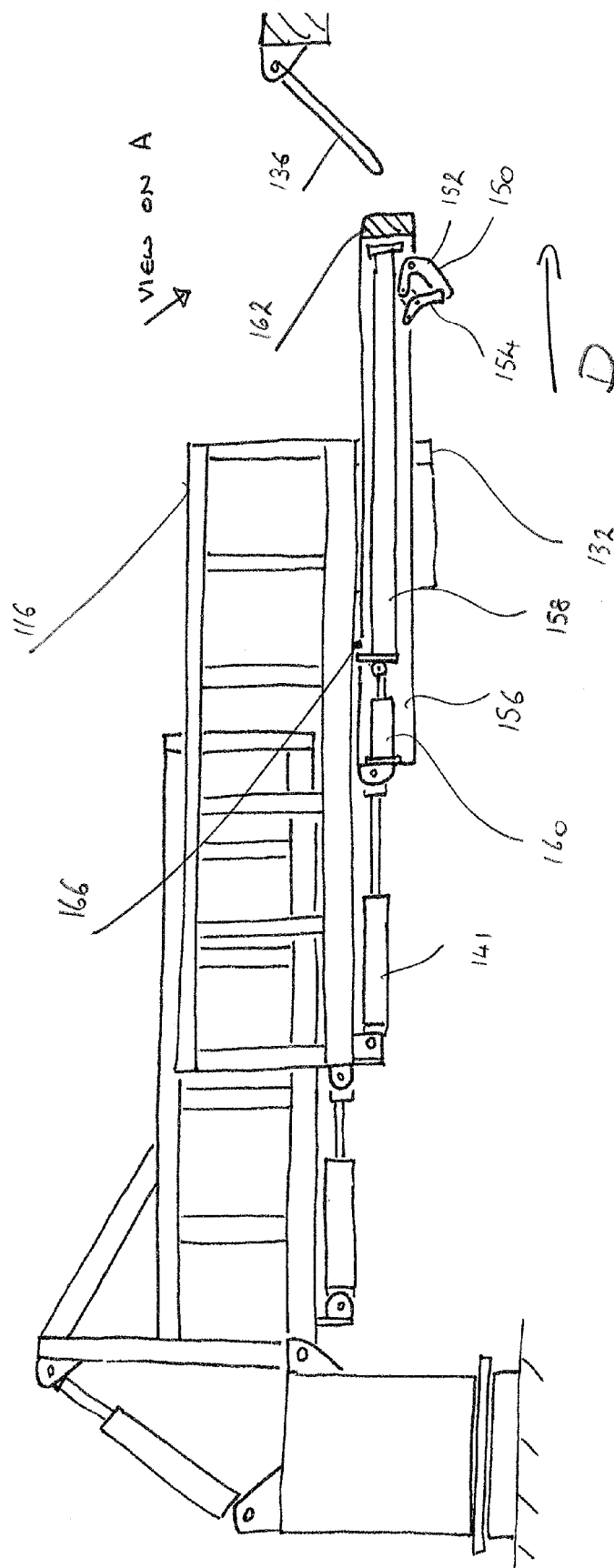


FIG 6



EUROPEAN SEARCH REPORT

Application Number
EP 13 15 1682

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 4 473 916 A (CONNOLD KENNETH [GB]) 2 October 1984 (1984-10-02) * column 4, line 58 - column 5, line 41; claim 1; figures 1,4 *	1-14	INV. B63B21/00 B63B27/14 E01D15/24
X	US 8 308 517 B1 (SHIVERS III ROBERT MAGEE [US] ET AL) 13 November 2012 (2012-11-13) * column 6, line 33 - column 11, line 44; figures 1, 2 *	1-14	
A	WO 2012/047096 A1 (PRAXIS B V [NL]; PRINS WILLEM FREDERIK [NL]) 12 April 2012 (2012-04-12) * page 11, lines 7-29; figure 1 *	1,10,14	
			TECHNICAL FIELDS SEARCHED (IPC)
			B63B E01D
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 10 June 2013	Examiner Brumer, Alexandre
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			
T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (P04C01)

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

EP 13 15 1682

5

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

10-06-2013

10

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4473916 A	02-10-1984	NO 830442 A US 4473916 A	25-08-1983 02-10-1984
US 8308517 B1	13-11-2012	NONE	
WO 2012047096 A1	12-04-2012	AU 2011312963 A1 WO 2012047096 A1	18-04-2013 12-04-2012

15

20

25

30

35

40

45

50

55

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82