US 20200003025A1

(19) United States
(12) Patent Application Publication
(10) Pub. No.: US 2020/0003025 A1
(43) Pub. Date: Jan. 2, 2020
Maher

(54) SYSTEMS AND METHODS FOR TETHERING A SUBSEA STRUCTURE

(71) Applicant: **Trendsetter Vulcan Offshore, Inc.**, Houston, TX (US)

(72) Inventor: **James V. Maher**, Houston, TX (US)

(21) Appl. No.: **16/481,731**

(22) PCT Filed: **Feb. 5, 2018**

(86) PCT No.: **PCT/US18/16821**

§ 371 (c)(1),
(2) Date: **Jul. 29, 2019**

Related U.S. Application Data

(60) Provisional application No. 62/454,472, filed on Feb. 3, 2017.

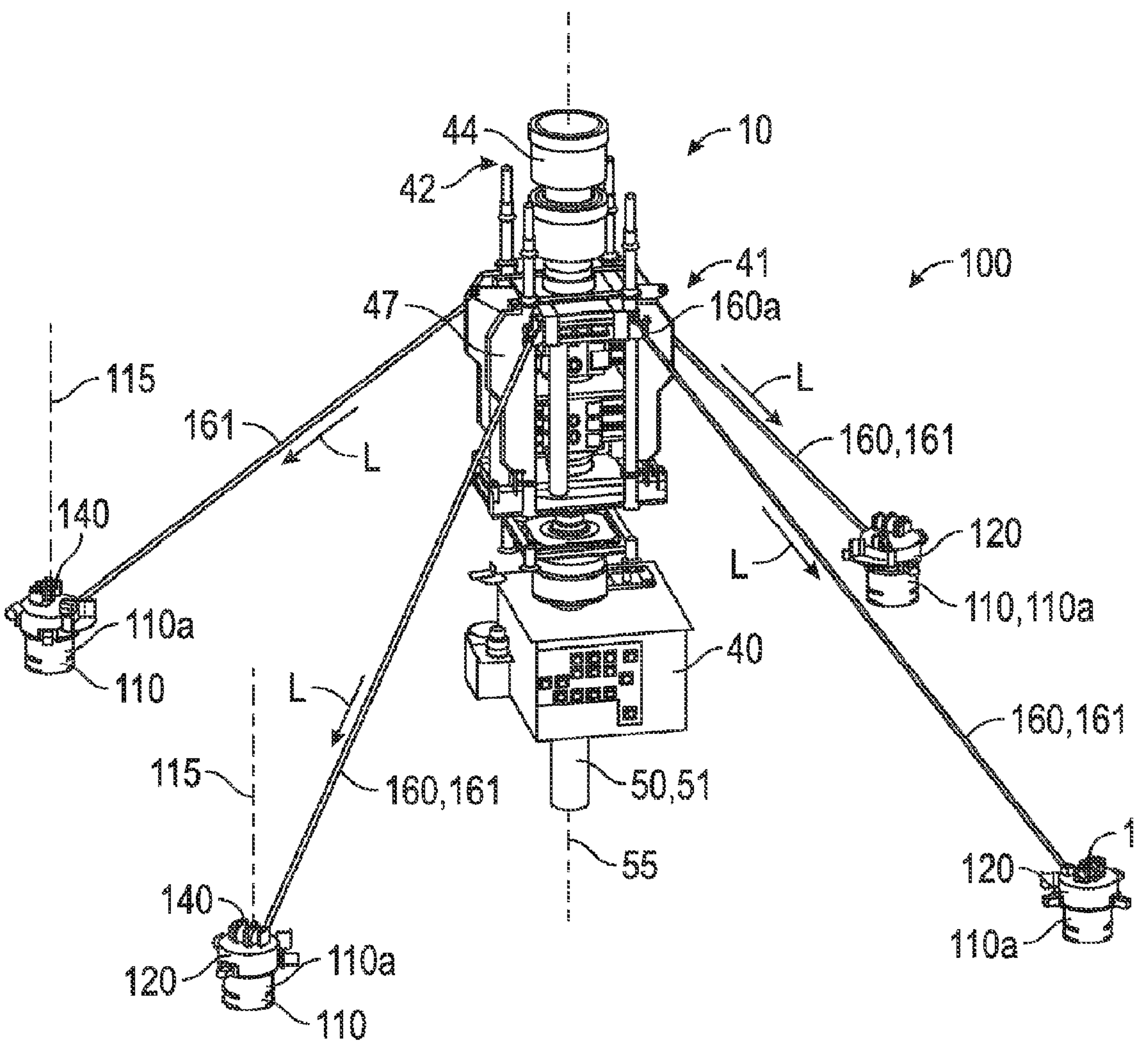
Publication Classification

(51) **Int. Cl.**
E21B 41/00 (2006.01)
E21B 41/04 (2006.01)

(52) **U.S. Cl.**
CPC ***E21B 41/0007*** (2013.01); *E21B 33/064* (2013.01); ***E21B 41/04*** (2013.01)

(57) **ABSTRACT**

A tethering system includes an adapter configured to couple to an upper end of a subsea anchor, a tensioning system, and a flexible tension member having one end coupled to the tensioning system and the other end coupled to the adapter. The tensioning system is operable to pay in and pay out the flexible tension member relative to the tensioning system. The tensioning system can be mounted to the BOP frame, and tension can be applied via a locally or remotely placed winch assembly. Tension can also be applied by gripping the flexible tension member and pulling on the flexible tension member with a hydraulic cylinder.



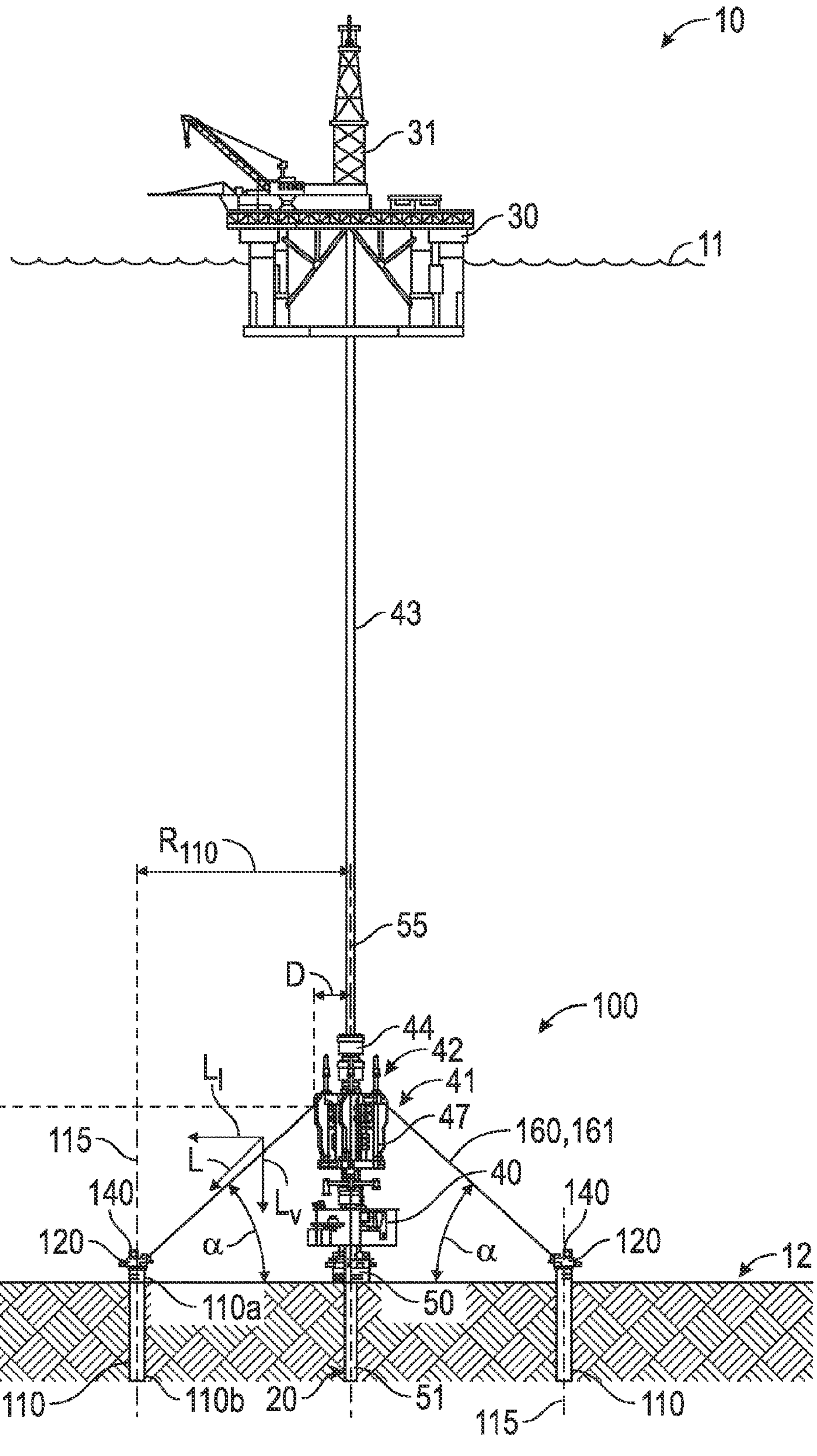

10
31
30
11
43
R_{110}
55
D
100
44
42
41
L_I
47
160,161
115
L
40
H
L_V
140
140
120
α
α
120
12
110a
50
110
110b
20
51
115
110

FIG. 1

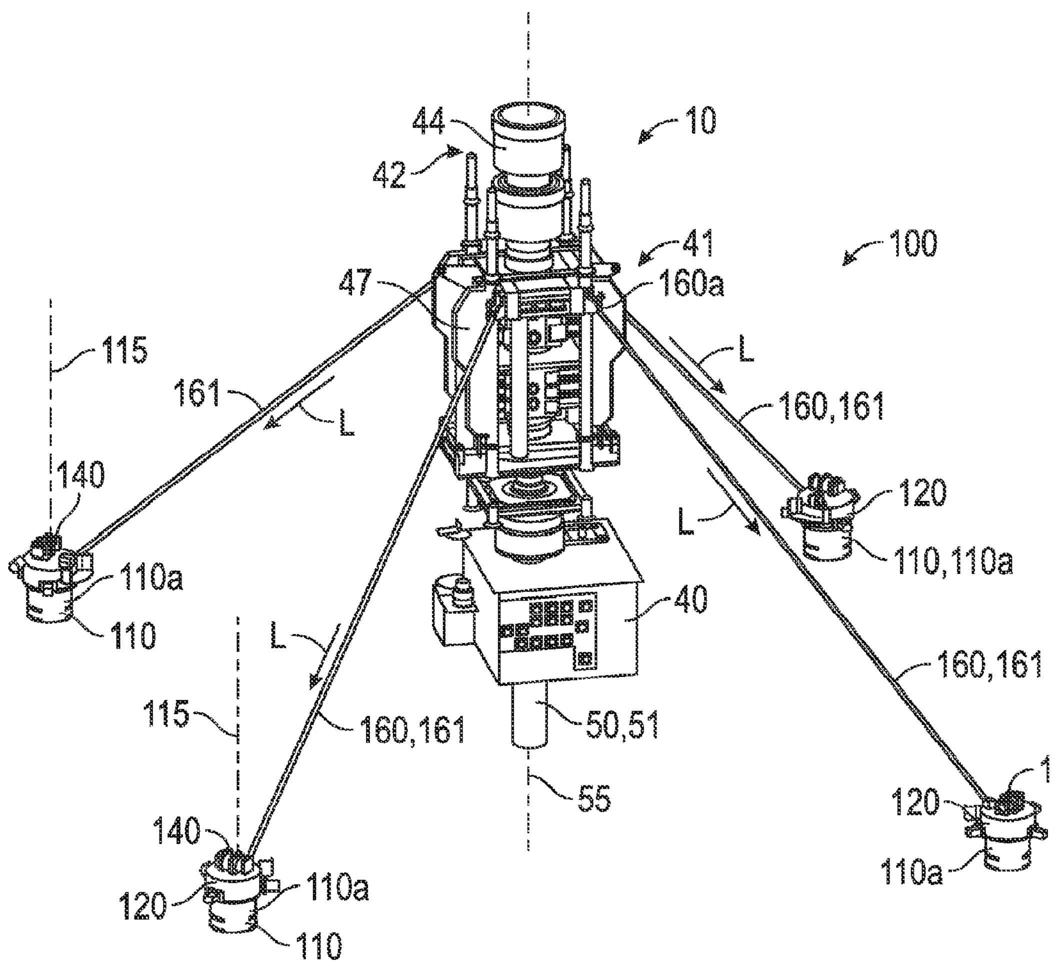

44
42
10
41
100
47
160a
115
L
161
L
160,161
140
120
L
110,110a
110a
110
40
L
160,161
115
160,161
50,51
55
140
120
140
120
110a
110a
110

FIG. 2

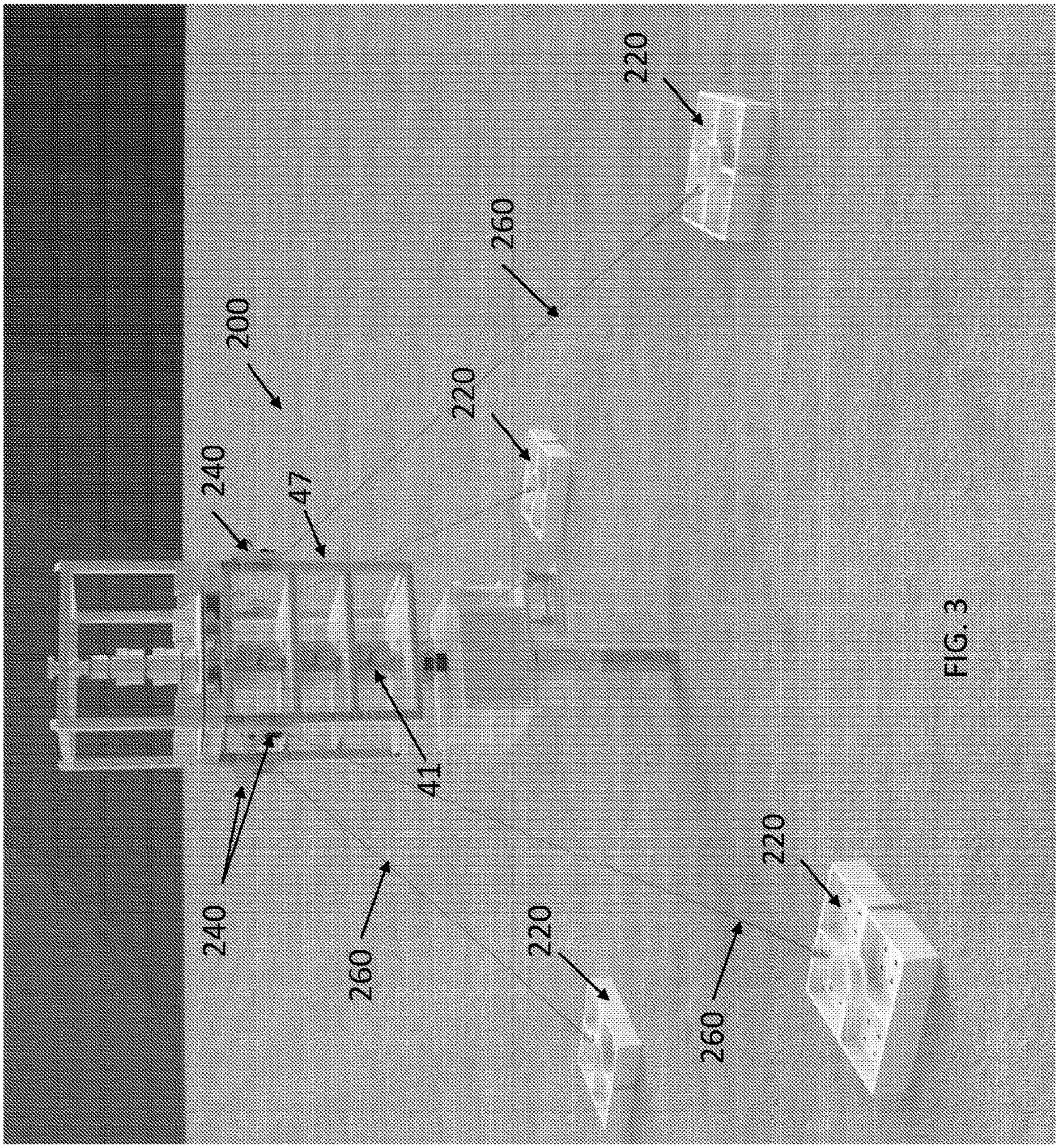


FIG. 3

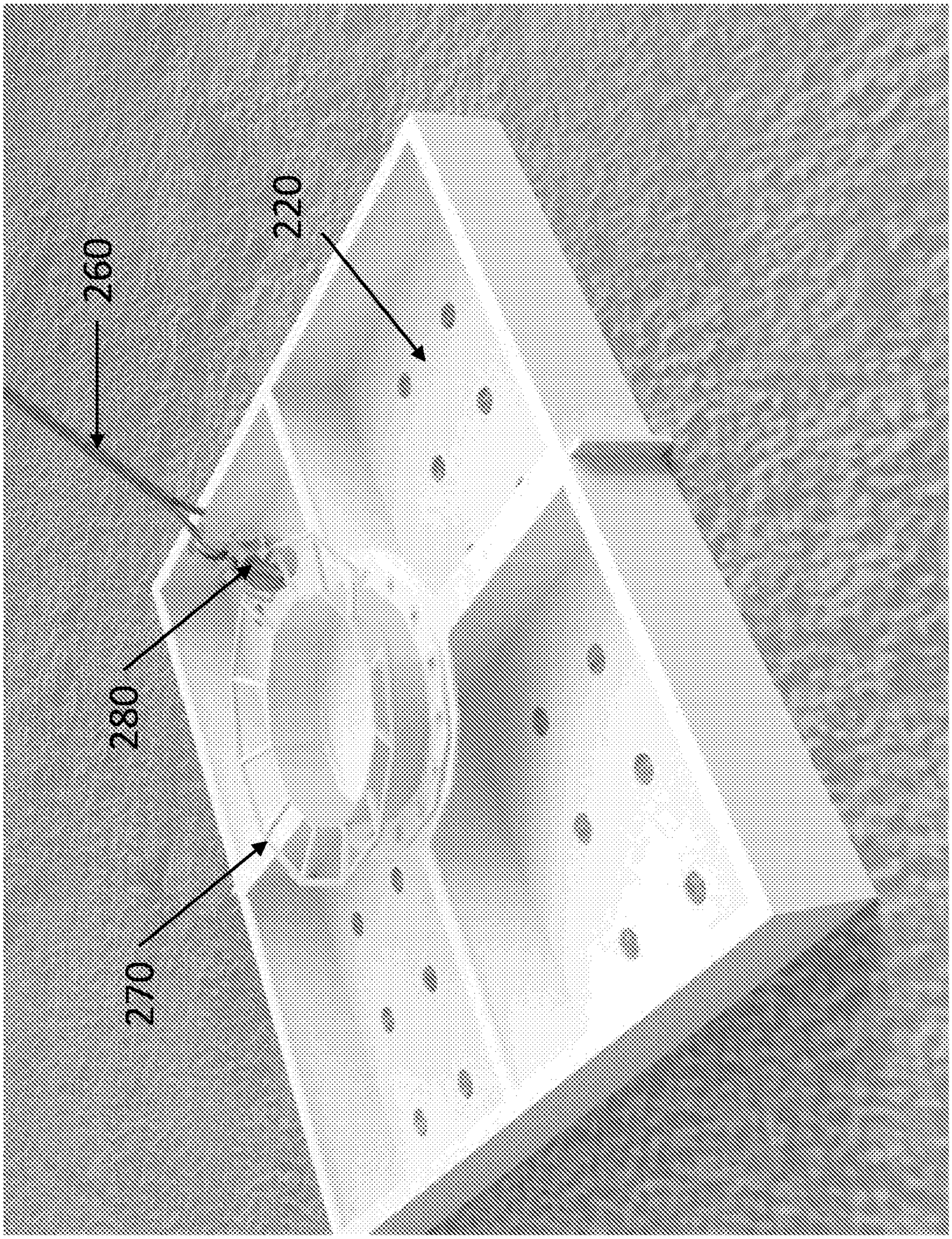


FIG. 4

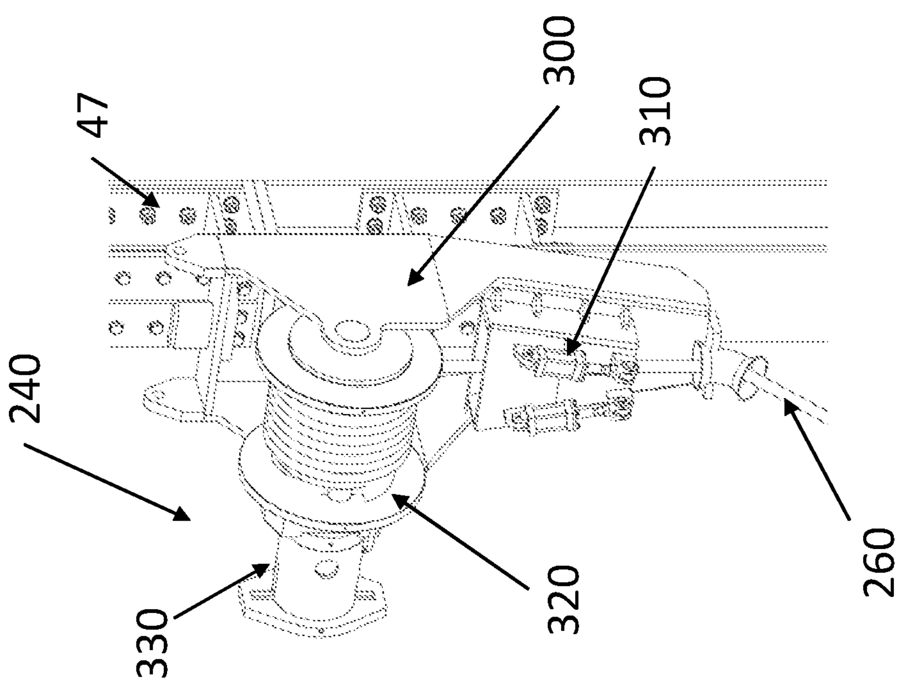


FIG. 5

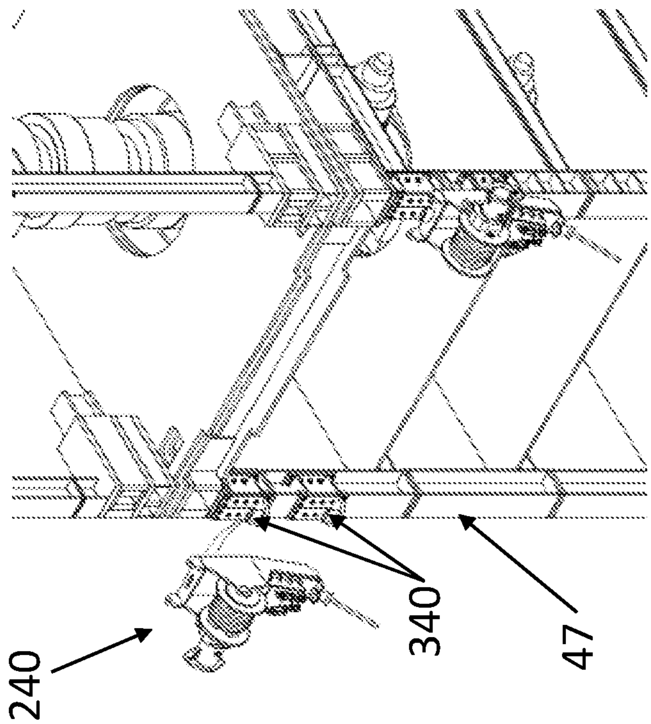


FIG. 6

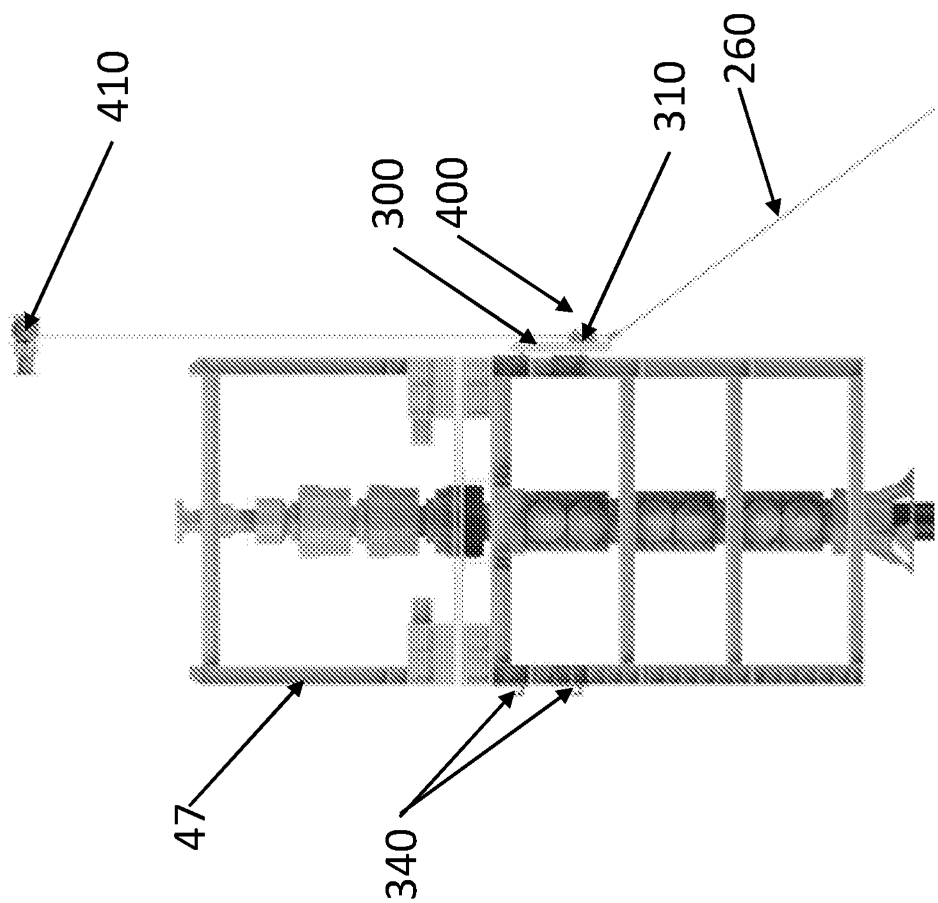


FIG. 7

SYSTEMS AND METHODS FOR TETHERING A SUBSEA STRUCTURE

BACKGROUND

[0001] The disclosure relates generally to systems and methods for tethering subsea structures. More particularly, the disclosure relates to systems and methods for enhancing the strength and fatigue performance of subsea blowout preventers, wellheads, and primary conductors during subsea drilling, completion, production, and workover operations.

[0002] In offshore drilling operations, a large diameter hole is drilled to a selected depth in the sea bed. Then, a primary conductor extending from the lower end of an outer wellhead housing, also referred to as a low pressure housing, is run into the borehole with the outer wellhead housing positioned just above the sea floor/mud line. To secure the primary conductor and outer wellhead housing in position, cement is pumped down the primary conductor and allowed to flow back up the annulus between the primary conductor and the borehole sidewall.

[0003] With the primary conductor cemented in place, a drill bit connected to the lower end of a drillstring suspended from a drilling vessel or rig at the sea surface is lowered through the primary conductor to drill the borehole to a second depth. Next, an inner wellhead housing, also referred to as a high pressure housing, is seated in the upper end of the outer wellhead housing. A string of casing extending downward from the lower end of the inner wellhead housing (or seated in the inner wellhead housing) is positioned within the primary conductor. Cement then is pumped down the casing string, and allowed to flow back up the annulus between the casing string and the primary conductor to secure the casing string in place.

[0004] Prior to continuing drilling operations in greater depths, a blowout preventer (BOP) is mounted to the wellhead and a lower marine riser package (LMRP) is mounted to the BOP. The subsea BOP and LMRP are arranged one-atop-the-other. In addition, a drilling riser extends from a flex joint at the upper end of the LMRP to a drilling vessel or rig at the sea surface. The drill string is suspended from the rig through the drilling riser, LMRP, and BOP into the well bore. Drilling generally continues while successively installing concentric casing strings that line the borehole. Each casing string is cemented in place by pumping cement down the casing and allowing it to flow back up the annulus between the casing string and the borehole sidewall. During drilling operations, drilling fluid, or mud, is delivered through the drill string, and returned up an annulus between the drill string and casing that lines the well bore.

[0005] Following drilling operations, the cased well is completed (i.e., prepared for production). For subsea architectures that employ a horizontal production tree, the horizontal subsea production tree is installed on the wellhead below the BOP and LMRP during completion operations. Thus, the subsea production tree, BOP, and LMRP are arranged one-atop-the-other. Production tubing is run through the casing and suspended by a tubing hanger seated in a mating profile in the inner wellhead housing or production tree. Next, the BOP and LMRP are removed from the production tree, and the tree is connected to the subsea production architecture (e.g., production manifold, pipelines, etc.). From time to time, intervention and/or workover operations may be necessary to repair and/or stimulate the well to restore, prolong, or enhance production.

BRIEF SUMMARY OF THE DISCLOSURE

[0006] In some aspects, a system for tethering a subsea blowout preventer (BOP) may comprise an anchor disposed about the subsea BOP and secured to the sea floor. The system may further comprise a flexible tension member. The flexible tension member may have a first end including a releasable connector engaged to the anchor. The flexible tension member may extend horizontally and vertically from the first end to a second end to impart a lateral preload and a vertical preload to the subsea BOP. The system may further comprise a tensioning system. The tensioning system may include a releasable base removeably connected to the subsea BOP. The tensioning system may further include a gripping system coupled to the releasable base, or part of, or mounted on, the subsea BOP. The gripping system may be configured to selectively engage the flexible tension member to prevent pay out of the flexible tension member.

[0007] In some embodiments, the system may further comprise a winch reel coupled to the second end of the flexible tension member, and an interface configured for coupling to a remotely operated vehicle (ROV), wherein rotation of the interface causes rotation of the winch reel and paying in or out the flexible tension member.

[0008] In some embodiments, the system may further comprise a spool coupled to the second end of the flexible tension member, and a hydraulic cylinder coupled to the gripping system, wherein actuation of the hydraulic cylinder causes paying in or out the flexible tension member.

[0009] In some embodiments, the system may further comprise a winch reel coupled to the second end of the flexible tension member, wherein the winch reel is located on a vessel.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] For a detailed description of the preferred embodiments of the invention, reference will now be made to the accompanying drawings in which:

[0011] FIG. **1** is a schematic partial cross-sectional side view of an offshore system for completing a subsea well including an embodiment of a subsea tethering system in accordance with the principles described herein;

[0012] FIG. **2** is an enlarged partial isometric view of the offshore system of FIG. **1** illustrating the tethering system;

[0013] FIG. **3** is a partial isometric view of an offshore system;

[0014] FIG. **4** is an enlarged partial isometric view of the offshore system of FIG. **3** illustrating the anchors;

[0015] FIGS. **5** and **6** are enlarged isometric views of one of the tensioning systems of FIG. **3**; and

[0016] FIG. **7** is a side view of an alternate tensioning system.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0017] The following discussion is directed to various exemplary embodiments. However, one skilled in the art will understand that the examples disclosed herein have broad application, and that the discussion of any embodiment is meant only to be exemplary of that embodiment, and not intended to suggest that the scope of the disclosure, including the claims, is limited to that embodiment.

[0018] Certain terms are used throughout the following description and claims to refer to particular features or components. As one skilled in the art will appreciate, different persons may refer to the same feature or component by different names. This document does not intend to distinguish between components or features that differ in name but not function. The drawing figures are not necessarily to scale. Certain features and components herein may be shown exaggerated in scale or in somewhat schematic form and some details of conventional elements may not be shown in interest of clarity and conciseness.

[0019] In the following discussion and in the claims, the terms "including" and "comprising" are used in an open-ended fashion, and thus should be interpreted to mean "including, but not limited to . . . ." Also, the term "couple" or "couples" is intended to mean either an indirect or direct connection. Thus, if a first device couples to a second device, that connection may be through a direct connection, or through an indirect connection via other devices, components, and connections. In addition, as used herein, the terms "axial" and "axially" generally mean along or parallel to a central axis (e.g., central axis of a body or a port), while the terms "radial" and "radially" generally mean perpendicular to the central axis. For instance, an axial distance refers to a distance measured along or parallel to the central axis, and a radial distance means a distance measured perpendicular to the central axis.

[0020] U.S. Pat. No. 9,359,852 ("'852 patent"), which is incorporated herein by reference for all purposes, describes, in reference to FIGS. **1** and **2**, an embodiment of an offshore system **10** for interfacing with a wellbore **20**. In this embodiment, system **10** includes a floating offshore vessel **30** at the sea surface **11**, a horizontal production tree **40** releasably connected to a wellhead **50** disposed at an upper end of a primary conductor **51** extending into the wellbore **20**, a subsea blowout preventer (BOP) **41** releasably connected to production tree **40**, and a lower marine riser package (LMRP) **42** releasably connected to BOP **41**. Tree **40**, BOP **41**, and LMRP **42** are vertically arranged or stacked one-above-the-other, and are generally coaxially aligned with wellhead **50**. Wellhead **50** has a central axis **55** and extends vertically upward from wellbore **20** above the sea floor **12**. In FIG. 1 of the '852 patent, system **10** is shown configured for completion operations, and thus, includes tree **40**, however, for drilling operations, tree **40** may not be included.

[0021] As best shown in FIG. 1 of the '852 patent, vessel **30** is equipped with a derrick **31** that supports a hoist (not shown). In this embodiment, vessel **30** is a semi-submersible offshore platform, however, in general, the vessel (e.g., vessel **30**) can be any type of floating offshore drilling vessel including, without limitation, a moored structure (e.g., a semi-submersible platform), a dynamically positioned vessel (e.g., a drill ship), a tension leg platform, etc. A drilling riser **43** (not shown in FIG. 2 of the '852 patent) extends subsea from vessel **30** to LMRP **42**. During drilling operations, riser **43** takes mud returns to vessel **30**. Downhole operations are carried out by a tool connected to the lower end of the tubular string (e.g., drillstring) that is supported by derrick **31** and extends from vessel **30** through riser **43**, LMRP **42**, and BOP **41**, and tree **40** into wellbore **20**. In this embodiment of the '852 patent, BOP **41** includes an outer rectangular prismatic frame **47**.

[0022] Still referring to the '852 patent, BOP **41** and LMRP **42** are configured to controllably seal wellbore **20** and contain hydrocarbon fluids therein. Specifically, BOP **41** includes a plurality of axially stacked sets of opposed rams disposed within frame **47**. In general, BOP **41** can include any number and type of rams including, without limitation, opposed double blind shear rams or blades for severing the tubular string and sealing off wellbore **20** from riser **43**, opposed blind rams for sealing off wellbore **20** when no string/tubular extends through BOP **41**, opposed pipe rams for engaging the string/tubular and sealing the annulus around string/tubular, or combinations thereof. LMRP **42** includes an annular blowout preventer comprising an annular elastomeric sealing element that is mechanically squeezed radially inward to seal on a string/tubular extending through LMRP **42** or seal off wellbore when no string/tubular extends through LMRP **42**. The upper end of LMRP **42** includes a riser flex joint **44** that allows riser **43** to deflect and pivot angularly relative to tree **40**, BOP **41**, and LMRP **42** while fluids flow therethrough.

[0023] During drilling, completion, production, and workover operations, cyclical loads due to riser vibrations (e.g., from surface vessel motions, wave actions, current-induced VIV, or combinations thereof) are applied to BOP **41**, wellhead **50**, and primary conductor **51** extending from wellhead **50** into the sea floor **12**. Such cyclical loads can induce fatigue. This may be of particular concern with subsea horizontal production tree architectures (e.g., system **10**) due to the relatively large height and weight of the hardware secured to the wellhead proximal the mud line (i.e., tree, BOP, and LMRP). For example, in this embodiment, the hardware mounted to wellhead **50** proximal the sea floor **12**, production tree **40** and BOP **41** in particular, is relatively tall, and thus, presents a relatively large surface area for interacting with environmental loads such as subsea currents. These environmental loads can also contribute to the fatigue of BOP **41**, wellhead **50**, and primary conductor **51**. If the wellhead **50** and primary conductor **51** do not have sufficient fatigue resistance, the integrity of the subsea well may be compromised. Still further, an uncontrolled lateral movement of vessel **30** (e.g., an uncontrolled drive off or drift off of vessel **30**) from the desired operating location generally over wellhead **50** can pull LMRP **42** laterally with riser **43**, thereby inducing bending moments and associated stresses in BOP **41**, wellhead **50**, and conductor **51**. Such induced bending moments and stresses can be increased further when the relatively tall and heavy combination of tree **40** and BOP **41** is in a slight angle relative to vertical. Accordingly, in this embodiment, a tethering system **100** is provided to reinforce BOP **41**, wellhead **50**, and primary conductor **51** by resisting lateral loads and bending moments applied thereto. As a result, system **100** offers the potential to enhance the strength and fatigue resistance of BOP **41**, wellhead **50**, and conductor **51**.

[0024] Referring again to FIGS. **1** and **2**, in this embodiment, tethering system **100** includes a plurality of anchors **110**, a plurality of pile top assemblies **120**, and a plurality of flexible tension members **160**. One pile top assembly **120** is mounted to the upper end of each anchor **110**, and one tension member **160** extends from each pile top assembly **120** to frame **47** of BOP **41**. As will be described in more detail below, each pile top assembly **120** includes a tensioning system **140** that can apply tensile loads to the corresponding tension member **160**. In this embodiment, each tensioning system **140** is a winch, and thus, may also be referred to as winch **140**. Each winch **140** can pay in and pay out the corresponding tensioning member **160**.

[0025] Each tension member **160** includes a first or distal end **160***a* coupled to frame **47** of BOP **41**, and a tensioned span or portion **161** extending from the corresponding winch **140** to end **160***a*. As best shown in FIG. **1**, each distal end **160***a* is coupled to frame **47** of BOP **41** at a height H measured vertically from the sea floor **12** and at a lateral distance D measured radially and horizontally from central axis **55**. In this embodiment, four uniformly circumferentially-spaced anchors **110** and associated tension members **160** are provided. In addition, in this embodiment, height H of each end **160***a* is the same, lateral distances D to each end **160***a* is the same. For most subsea applications, lateral distance D is preferably between 5.0 and 15.0 feet, and more preferably about 10.0 ft. However, it should be appreciated that lateral distance D may depend, at least in part, on the available connection points to the frame **47** of BOP **41**. As will be described in more detail below, each height H is preferably as high as possible but below LMRP **42**, and may depend on the available connection points along frame **47** of BOP **41**.

[0026] As best shown in FIG. **1**, a tensile preload L is applied to each tensioned span **161**. With no external loads or moments applied to BOP **41**, the actual tension in each span **161** is the same or substantially the same as the corresponding tensile preload L. However, it should be appreciated that when external loads and/or bending moments are applied to BOP **41**, the actual tension in each span **161** can be greater than or less than the corresponding tensile preload L.

[0027] Winches **140** are positioned proximal to the sea floor **12**, and ends **160***a* are coupled to frame **47** of BOP **41** above winches **140**. Thus, each span **161** is oriented at an acute angle α measured upward from horizontal. Since portions **161** are in tension and oriented at acute angles α, the tensile preload L applied to frame **47** of BOP **41** by each span **161** includes an outwardly oriented horizontal or lateral preload L_1 and a downwardly oriented vertical preload L_v. Without being limited by this or any particular theory, the lateral preload L_1 and the vertical preload L_v applied to BOP **41** by each tension member **160** are a function of the corresponding tensile load L and the angle α. For a given angle α, the lateral preload L_1 and the vertical preload L_v increase as the tensile load L increases, and decrease as the tensile load L decreases. For a given tensile load L, the lateral preload L_1 decreases and the vertical preload L_v increases as angle α increases, and the lateral preload L_1 increases and the vertical preload L_v decreases as angle α decreases. For example, at an angle α of 45°, the lateral preload L_1 and the vertical preload L_v are substantially the same; at an angle α above 45°, the lateral preload L_1 is less than the vertical preload L_v; and at an angle α below 45°, the lateral preload L_1 is greater than the vertical preload L. In embodiments described herein, angle α of each span **161** is preferably between 10° and 60°, and more preferably between 30° and 45°.

[0028] The lateral preloads L_1 applied to frame **47** of BOP **41** resist external lateral loads and bending moments applied to BOP **41** (e.g., from subsea currents, riser **43**, etc.). To reinforce and stabilize BOP **41**, wellhead **50**, and primary conductor **51** without interfering with an emergency disconnection of LMRP **42**, each height H is preferably as high as possible but below LMRP **42**, and may depend on the available connection points along frame **47** of BOP **41**. In this embodiment, ends **160***a* are coupled to frame **47** proximal the upper end of BOP **41** and just below LMRP **42**. By tethering frame **47** of BOP **41** at this location, system **100** restricts and/or prevents BOP **41**, tree **40**, wellhead **50**, and primary conductor **51** from moving and bending laterally, thereby stabilizing such components, while simultaneously allowing LMRP **42** to be disconnected from BOP **41** (e.g., via emergency disconnect package) without any interference from system **100**.

[0029] Referring again to FIGS. **1** and **2**, the tensile preload L in each span **161** is preferably as low as possible but sufficient to pull out any slack, curve, and catenary in the corresponding span **161**. In other words, the tensile preload in L in each span **161** is preferably the lowest tension that results in that span **161** extending linearly from the corresponding winch **140** to its end **160***a*. It should be appreciated that such tensile loads L in tension members **160** restrict and/or prevent the initial movement and flexing of BOP **41** at the onset of the application of an external loads and/or bending moments, while minimizing the tension in each span **161** before and after the application of the external loads and/or bending moments. The latter consequence minimizes the potential risk of inadvertent damage to BOP **41**, tree **40**, and LMRP **42** in the event one or more tension members **160** uncontrollably break.

[0030] In general, each tension member **160** can include any elongate flexible member suitable for subsea use and capable of withstanding the anticipated tensile loads (i.e., the tensile preload L as well as the tensile loads induced in spans **161** via the application of external loads to BOP **41**) without deforming or elongating. Examples of suitable devices for tension members **160** can include, without limitation, chain(s), wire rope, and Dyneema® rope available from DSM Dyneema LLC of Stanley, N.C. USA. In this embodiment, each tension member **160** comprises Dyneema® rope, which is suitable for subsea use, requires the lowest tensile preload L to pull out any slack, curve, and catenary (~1.0 ton of tension), and is sufficiently strong to withstand the anticipated tensions.

[0031] Referring now to FIGS. **3-6**, an alternate tethering system **200** includes a plurality of anchors **220**, a plurality of tensioning systems **240**, a plurality of flexible tension members **260**. A tension member **260** is connected to the top of each of the plurality of anchors **220** and extends from each anchor **220** to a tensioning system **240** mounted on frame **47** of BOP **41**. In this embodiment, each tensioning system **240** includes a winch or spool **242** that can pay in and pay out the corresponding tension member **260** and a gripping mechanism **244** to engage the tension member **260**. A winch refers to a reel having sufficient tensioning capacity to apply to the tension member **260** a tensile preload L as discussed in the description of FIG. **1**. A spool refers to a reel having a tensioning capacity to apply at least a tension sufficient to avoid sagging of the tension member **260**, but the tension member **260** may remain slack. A spool may, however, have a tensioning capacity larger than the tension required to prevent sagging and may have as much tensioning capacity as a winch.

[0032] FIG. **4** illustrates one embodiment of an anchor **220** to which a tension member **260** is connected. Anchor **220** may be a driven piling, a clump weight, a suction piling, plate anchor, or any other structure used to affix a base to the sea floor. The top of the anchor **220** includes a connecting ring **270**, or other feature that provides a location for affixing an end of a tension member **260**. In certain embodiments, tension member **260** includes a releasable connector **280** that allows an ROV to selectively engage and disengage the tension member **260** from the anchor **220**.

[0033] In some embodiments, the gripping system **310** may be coupled to the BOP frame **47** or be part of or mounted on the BOP **41**. FIGS. **5** and **6** illustrate one embodiment of a tensioning system **240** including a frame **300**, gripping system **310**, winch reel **320**, and ROV interface **330**. In certain embodiments, the tensioning system **240** is removeably connected to the BOP frame **47** at connection points **340**. An ROV, or other equipment, can be used to install each tensioning system **240** onto the BOP frame **47** subsea by flying the tensioning system **240** into place and connecting it to the connection points **340**. The ROV can then be used to rotate winch reel **320** paying in or out tensioning member **260** as needed. Once the tensioning member **260** is properly installed, gripping system **310** can be activated to grip the tensioning member **260** and maintain any tension in the tension member **260**. Gripping system **310** can be any type of gripping system that can apply a fixing force to the tensioning member **260**, such as a hydraulic slip system, a locking ring, or a brake mechanism. In some embodiments, the hydraulic slip may be used for paying in or out tension member **260**. The hydraulic slip includes one or more hydraulic cylinders and a slip or gripper that may have a first configuration for paying in the tension member **260**, applying to the tension member **260** a tensile preload L as discussed in the description of FIG. **1**, preventing pay out of the flexible tension member **260**, and/or maintaining any tension in the tension member **260**. The one or more hydraulic cylinders and the slip or gripper may have a second configuration for paying out the tension member **260**.

[0034] Referring now to FIG. **7**, an alternative tensioning system **400** is shown that includes a frame **300** and gripping system **310** connected to a BOP frame **47** at connection points **340**. The winch assembly **410** is located remote from the tensioning system **400**, such as at the surface on the drilling or service vessel. Winch assembly **410** is used to apply pay in or out to tension member **260** as needed to achieve the desired tension. Once the tension member **260** is properly tensioned, gripping system **310** can be activated to grip the tension member **260** and maintain any tension in the tension member **260**.

[0035] While preferred embodiments have been shown and described, modifications thereof can be made by one skilled in the art without departing from the scope or teachings herein. The embodiments described herein are exemplary only and are not limiting. Many variations and modifications of the systems, apparatus, and processes described herein are possible and are within the scope of the invention. For example, the relative dimensions of various parts, the materials from which the various parts are made, and other parameters can be varied. Accordingly, the scope of protection is not limited to the embodiments described herein, but is only limited by the claims that follow, the scope of which shall include all equivalents of the subject matter of the claims. Unless expressly stated otherwise, the steps in a method claim may be performed in any order. The recitation of identifiers such as (a), (b), (c) or (1), (2), (3) before steps in a method claim are not intended to and do not specify a particular order to the steps, but rather are used to simplify subsequent reference to such steps.

1. A system for tethering a subsea blowout preventer (BOP), the system comprising:

an anchor disposed about the subsea BOP and secured to the sea floor;

a flexible tension member, wherein the flexible tension member has a first end including a releasable connector engaged to the anchor, wherein the flexible tension member extends horizontally and vertically from the first end to a second end to impart a lateral preload and a vertical preload to the subsea BOP; and

a gripping system mounted on the subsea BOP, wherein the gripping system is configured to selectively engage the flexible tension member to prevent pay out of the flexible tension member.

2. The system of claim **1** further comprising:

a winch reel coupled to the second end of the flexible tension member; and

an interface configured for coupling to a remotely operated vehicle (ROV), wherein rotation of the interface causes rotation of the winch reel and paying in or out the flexible tension member.

3. The system of claim **2** wherein the winch reel is located remotely from the subsea BOP.

4. The system of claim **2** wherein the winch reel is mounted to a releasable base connected to a connection point on the subsea BOP.

5. The system of claim **2** wherein the gripping system includes a slip.

6. The system of claim **2** wherein the gripping system includes a locking ring or a brake mechanism.

7. The system of claim **1** further comprising:

a spool coupled to the second end of the flexible tension member; and

a hydraulic cylinder coupled to the gripping system, wherein actuation of the hydraulic cylinder causes paying in or out the flexible tension member.

8. The system of claim **7** wherein the spool is located remotely from the subsea BOP.

9. The system of claim **7** wherein the spool is mounted to a releasable base connected to a connection point on the subsea BOP.

10. The system of claim **7** wherein the gripping system includes a slip.

11. The system of claim **1** further comprising a winch reel coupled to the second end of the flexible tension member, wherein the winch reel is located on a vessel.

12. A method for tethering a subsea blowout preventer (BOP) coupled to a subsea wellhead, the subsea BOP including a gripping system connected to a frame of the subsea BOP, the method comprising:

securing an anchor to the sea floor about the subsea BOP;

extending a first end of a flexible tension member horizontally and vertically;

applying tension to the flexible tension member to impart a lateral preload and a vertical preload to the subsea BOP; and

engaging the flexible tension member with the gripping system to maintain tension in the flexible tension member.

13. The method of claim **12**, wherein a second end of the flexible tension member is coupled to a winch reel, and wherein applying tension to the flexible tension member comprises:

coupling a remotely operated vehicle (ROV) to an interface, and

rotating the winch reel via the interface to cause paying in or out the flexible tension member.

14. The method of claim **13** wherein the winch reel is located remotely from the subsea BOP.

15. The method of claim **13** wherein the winch reel is mounted to a releasable base connected to a connection point on the frame of the subsea BOP.

16. The method of claim **13** comprising engaging the flexible tension member with a slip.

17. The method of claim **13** comprising preventing pay out of the flexible tension member using a locking ring or a brake mechanism.

18. The method of claim **12** wherein applying tension to the flexible tension member comprises actuating a hydraulic cylinder coupled to the gripping system to cause paying in or out the flexible tension member.

19. The method of claim **12**, wherein a second end of the flexible tension member is coupled to a winch reel located on a vessel, and wherein applying tension to the flexible tension member comprises rotating the winch reel to cause paying in or out the flexible tension member.

* * * * *