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(54) Offshore installation and method for connecting cabling and/or piping thereto

Offshore-Anlage und Verfahren zur Verbindung von Kabeln und/oder Leitungen damit

Installation en pleine mer et procédé de connexion de câblage et/ou de tuyaux avec cette installation

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**EP-A1- 0 518 709 EP-A2- 0 042 540
US-A- 4 227 831 US-A- 4 527 928**

EP 2 365 136 B1

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Description

[0001] The invention relates to an offshore installation for offshore energy resources exploitation.

[0002] Such offshore installations are widely known and used for the exploitation of offshore energy resources. Offshore energy resources exploitation may be understood to comprise the exploitation of oil and/or gas fields, the exploitation of wind energy using offshore wind turbines, the exploitation of wave energy and/or the exploitation of solar energy offshore. The exploitation of wind energy, wave energy and/or solar energy usually comprises the generation of electricity to be transported to a further, usually onshore, location. The exploitation of an oil and/or gas field, usually comprises the winning of oil and/or gas which may have to be transported to a further, usually onshore, location.

[0003] Advantageously a movable self-installing platform may be used for the exploitation of the energy resources offshore. After expiration of the life time of e.g. the exploitation of a wind mill park or an oil and/or gas field, the platform can be removed from the offshore location and can be relocated to a further offshore location.

[0004] Such a platform is known for example known from the Dutch patent NL 1005463. Also several of such platforms are being operated in the North Sea, some known as Mobile Offshore Application Barge (MOAB) and others as Multi Purpose Platform (MPP). These platforms comprise a floating pontoon and four retractable legs, which can be lowered and lifted with respect to the pontoon. The lower end of each leg may be fitted with suction cans, which can penetrate the sea bottom and provide a fixed connection to the bottom. If the legs are lowered in relatively shallow water, at some stage the legs may reach the seabed and the suction cans may penetrate in the sea bottom. As the legs are moved further by force, the pontoon will be elevated out of the water. The purpose of lifting the pontoon out of the water is to obtain a relatively stable fixed structure, which is not subjected to wave loads and which can therefore safely stay in place offshore, also during storm conditions. The pontoon may provide a stable deck on which for example sheltered areas can be provided e.g. for oil and/or gas production facilities and/or for systems of an electrical power network for wind turbines. These pontoons with retractable legs are usually referred to as "Self Installing Platform", which may be abbreviated as "SIP".

[0005] For the installation of an offshore installation of the above mentioned type usually various peripheral equipment needs to be provided. Peripheral equipment such as cabling, e.g. electrical cabling and/or piping may be provided. Cabling, in particular electrical cabling may be important for installations where electricity may be generated, such as electricity generation by wind energy and/or wave energy and/or solar energy. Piping may be provided for installations where oil and/or gas may be exploited. Of course, also for an oil and/or gas installation cabling may be required and/or for an electricity gener-

ating installation piping may be required. The cabling and/or piping is usually provided on the sea bottom.

[0006] A drawback of the cabling and/or piping is that the cabling and/or piping is rather vulnerable and thus may increase installation time of the offshore installation. When first installing the platform and thereafter installing the cabling and/or piping, this is relatively costly due to the time the platform is already on the offshore location but cannot be used yet. The relatively vulnerable cabling and/or piping can however be connected directly to the platform. Alternatively, when first installing the cabling and/or piping and thereafter installing the platform, the cabling and/or piping needs to be stored during a certain period of time on the sea bottom making it vulnerable to damage. In addition, after connection of the cabling and/or piping, the relatively vulnerable equipment may be exposed to environmental influences, and therefore may be prone to damage.

[0007] Publication EP 0 518 709 discloses a method for installing a marine structure having a hollow base which is to be flooded with water, a topside deck and a plurality of hollow telescopic caissons connecting the base to the deck. A J-tube may be casted in one of the caissons for providing horizontal access to the caisson.

[0008] Publication EP 0 042 540 discloses an offshore installation having a base and a top structure that can be floatingly moved to the installation location. After connection of the top structure to the base, pipeline segments can be connected to each other to form a pipeline.

[0009] Publication US 4 227 831 discloses a jack-up platform structure with tubular conductors that serve to guide and support the drill pipe.

[0010] Publication US 4 527 928 discloses a protective sleeve for fitting around legs of an offshore structure.

[0011] The objective of the invention is to provide an offshore installation of the above mentioned type that obviates at least one of the above mentioned drawbacks.

[0012] Thereto, the invention as defined by claim 1, provides for an offshore installation for offshore energy resources exploitation comprising a movable self-installing platform wherein the platform comprises a floatable pontoon with at least one leg that is adjustable between a transport position in which the leg is elevated with respect to the pontoon and an installation position in which the leg is lowered with respect to the pontoon, wherein the platform is arranged for connection of cabling and/or piping from the sea bottom to the pontoon, further comprising a protection pipe arranged to enclose the cabling and/or piping between the sea bottom and the pontoon, wherein the protection pipe comprises a suction anchor at a lower end for anchoring in the sea bottom.

[0013] By providing a protection pipe between the sea bottom and the pontoon, the relatively vulnerable cabling and/or piping can be protected from e.g. the relatively harsh environmental conditions. This may increase the life time of the cabling and/or piping and may reduce maintenance and/or repair costs. The protection pipe may support and guide the cables and/or pipelines, and

also may protect them from impact loads, e.g. collision with a vessel, and/or environmental loads. The protection pipe provides for a relatively cost-effective protection structure for the cabling and/or piping. Of course, the platform may also be provided with two or more protection pipes.

[0014] In particular for the development and exploitation of offshore wind mill parks, the platform may function as a substation comprising electrical equipment such as transformers. The electrical cabling to and from the platform may be extensive and complex. The installation of the electrical cabling may therefore be time consuming. The electrical cabling is also rather vulnerable, mainly due to the relatively small diameters of the electrical cabling. A protection structure as a relatively larger diameter protection pipe that can guide and protect the electrical cabling may provide a reliable and cost effective protection which may increase the life time of the electrical cabling.

[0015] The protection pipe fully encloses the cabling and/or piping between the sea bottom and the pontoon in order to provide optimal protection for the vulnerable cabling and/or piping. The protection pipe comprises a relatively large diameter pipe that can fully enclose the cabling and/or piping and which is usually installed upwardly at a side of the pontoon. The protection pipe may comprise coupling elements for coupling to the platform and/or the pontoon. The coupling elements may comprise brackets or welding or other connection means.

[0016] The platform comprises a floatable pontoon with at least one leg. The leg is adjustable between a transport position and an installation position. In the transport position is the leg elevated with respect to the pontoon, the leg substantially extends above the pontoon, such that during transport, when the pontoon is floating in the water, the draft of the floating platform can remain relatively limited. In the installation position, the leg is lowered with respect to the pontoon, preferably until the leg can be installed with respect to the sea bottom.

[0017] By providing a tie-in tube at a lower end of the protection pipe, the cabling and/or piping can be relatively smoothly tied in from the sea bottom into the protection pipe. Preferably, the tie-in tube is of a tube of the J-type such that the cabling and/or piping can relatively easily be pulled through the J-tube into the protection pipe. Alternatively, the cabling and/or piping may be arranged in the protection pipe and may be pulled through the tie-in tube towards the sea bottom for further installation on the sea bottom. Preferably, the tie-in tube is provided at a lower end of the protection pipe, such that when the protection pipe is installed on the sea bottom, the tie-in tube is located near the sea bottom to accommodate a relatively smooth transition of the cabling and/or piping between the sea bottom and the protection pipe. An alternative connection for, in particular pipelines, can be a flange connection to pre-installed piping inside the protection pipe. Preferably, the protection pipe extends over

approximately the whole height of the platform, from a lower side where the piping and/or cabling is entering the protection pipe to an upper side where the piping and/or cabling is connecting to the pontoon and/or to the platform. The lower side may be at, near or in the sea bottom.

[0018] By providing the protection pipe with a suction anchor at a lower end, as claimed in claim 1, the protection pipe can be independently anchored to the sea bottom. The protection pipe can thus be installed independently of the platform. The protection pipe can be connected to the sea bed e.g. by one or more suction cans which are fitted to the protection pipe.

[0019] Providing the protection pipe with one or more suction anchors leaves the opportunity to install the protection pipe before the installation of the platform. This offers the option that pipeline and/or cables are also installed before the platform is installed, such that the connections to the platform can be made faster and operation can start earlier. This may reduce installation time and thus costs. Also, by pre-installing the protection pipe the cabling and/or piping installed on the sea bottom may be stored dry, i.e. in the protection pipe, until the platform arrives for connection to the platform. For example, for an offshore wind mill park with its complex and expensive, mainly electrical, cabling, this offers the opportunity to pre-install approximately all electrical cabling, which may be advantageous due to the relatively long installation time involved. By pre-installing the protection pipe, the already installed electrical cabling can be stored dry in or at a dry end of the protection pipe, which may give a significant cost advantage. Also, the platform can be installed later and connecting the electrical cabling to the platform may become relatively easy due to the dry storage of the electrical cabling, thus reducing the installation and/or hook-up time for the platform.

[0020] When pre-installing the protection pipe, the pontoon may be provided with an adapted corner element for receiving the pre-installed protection pipe as leg of the pontoon. Instead of a guide element arranged in the corner for guiding the leg, the corner may be provided as an open corner to relatively easily receive the already installed protection pipe. The corner may then be closed to connect the protection pipe to the pontoon, e.g. by using a clamping element. Also, the pontoon may be provided with two or more open corners allowing installation of the normal legs outside a dry dock, e.g. when the pontoon is floating in a harbour. With the clamping elements, the legs can be connected to the pontoon. The open corner elements with the clamping elements may also provide a guide through which the leg can be lowered and/or the pontoon can be lifted for installation at the offshore location. The clamping element can be removed from the pontoon e.g. by the use of removable fastening means such as bolts. Providing an open corner with a clamping element allows installation of the legs to the platform without the use of a dry dock or an additional barge. The pontoon can be kept floating in the water, e.g. in a harbour and a crane on the shore, can hang the leg in the open

corner and can lower the leg a bit in the open corner. Then the leg can be positioned in the open corner and the clamping element may close the open corner and fasten the leg for transport. Also, by providing an open corner, the suction may be assembled to the leg onshore and the leg with suction can may be installed at once in the open corner to the pontoon of the platform.

[0021] Alternatively, the protection pipe can also be installed after the platform is installed. In this case the advantage is that the protection pipe can be transported to location on the platform and the installation can also be done from the platform. This may avoid for example hiring of equipment e.g. a crane vessel for separately installing the protection pipe, since the protection pipe can then be installed from the platform.

[0022] Advantageously, the protection pipe is provided as a leg of the platform, thus reducing installation and/or manufacturing costs. A platform is usually fitted with four legs at corners of the pontoon. By providing one leg as the protection pipe, the other legs may remain conventional legs.

[0023] By providing at least two strand jacks working in opposite directions on the same pre-tensioned strand bundle to the legs and/or the protection pipe, a relatively cost-effective and re-usable system may be obtained to move the legs with respect to the pontoon. A double set of strand jacks working in opposite directions is used to move the legs up or down, such that forces can be generated both upward, to lift the pontoon upward and downward, to lower the legs. The two or more strand jacks for lifting and lowering work in line on a single wire bundle. The advantage of this arrangement is that the wire bundles can be pre-tensioned by a separate system such that no slack wire occurs during lifting or lowering of the legs. A relatively simple control of the wire tension may thus be possible.

[0024] By providing a base frame that can be installed on the sea bed, the platform may be installed in larger water depths. A movable self-installing platform can usually be installed up to water depths of around 30 m. It is known in the art to provide a base frame when installing a movable self-installing platform in larger water depths, e.g. in water depths of 80 m up to 100 m. In publication NL 1003439 is the use of such a base frame described. The base frame may also provide extra strength. The base frame can be installed on the sea bed and the legs of the platform are lowered in the corner legs on top of the base frame. The base frame can be pre-installed on the sea bed prior the installation of the platform.

[0025] In an advantageous embodiment is the protection pipe part of the base frame. The protection pipe can be mounted on a side of the base frame or the protection pipe can replace a leg of the base frame. When the protection pipe is provided at a side of the base frame, the protection pipe can be fitted with or without a suction can for anchoring the protection pipe to the sea bottom. When connecting the protection pipe to the base frame, anchoring of the protection pipe to the sea bottom may be left

away. The protection pipe may then be sufficiently anchored to the base frame.

[0026] Preferably, the legs of the base frame are fitted with suction anchors for easy and reliable anchoring of the base frame to the sea bed. In case the protection pipe replaces a leg of the base frame, the protection pipe may also be fitted with a suction anchor for anchoring the protection pipe to the sea bottom. The legs of the base frame are usually approximately as high as the base frame itself. The protection pipe however extends from approximately the sea bottom to approximately the height of the pontoon in installed position and thus extends above the base frame. If the platform, and therefore the base frame, has four corners each arranged to fit with a leg, than three 'normal' legs remain while the fourth leg may be replaced by the protection pipe.

[0027] By pre-installing the base frame with the protection pipe, the platform can be completed, equipped and commissioned onshore and can then be towed to the offshore location where the base frame is already waiting. The completed platform can then be installed on the base frame relatively fast and easy, without expensive crane vessels etc. Also, the piping and/or cabling that is, preferably, pre-installed through the protection pipe, can be easily connected to the platform. After connection of the piping and/or cabling, the platform can become operational. Thus, in a relatively efficient and cost effective way, a self-installing platform can be installed in larger water depths using pre-installed facilities, such as a base frame and a protection pipe. Such a platform can for example be used as a base station or a transformer station for offshore energy parks, comprising electrical equipment. The electrical equipment may then be fully tested and commissioned onshore, while being connected offshore to the piping and/or cabling. The self-installing platform may also be a satellite platform for an oil and/or gas well, for example comprising processing equipment that may be tested and commissioned onshore and connected to the well and/or pipeline offshore. The piping and/or cabling may advantageously be pre-installed through the protection pipe.

[0028] The invention further relates to a method, as defined by claim 13, for connecting cabling and/or piping to an offshore installation comprising a movable self-installing platform wherein the platform comprises a floatable pontoon with at least one leg that is adjustable between a transport position in which the leg is elevated with respect to the pontoon and an installation position in which the leg is lowered with respect to the pontoon, comprising installing the cabling and/or piping on the sea bottom to the platform location, providing a protection pipe for enclosing the cabling and/or piping between the sea bottom and the pontoon, installing the protection pipe on the sea bottom, tying in the cabling and/or piping in the protection pipe, wherein the protection pipe is anchored in the sea bottom with a suction anchor at a lower end thereof.

[0029] By installing the protection pipe prior to instal-

lation of the platform, tying-in the cabling and/or piping into the installed protection pipe prior to installation of the platform, a further reduction in installation time and costs can be achieved. A platform can then be completed, equipped and commissioned onshore, while once at the offshore location, can be installed and connected to the pre-installed cabling and/or piping. After connection to the cabling and/or piping, the platform can become operational.

[0030] Further advantageous embodiments are represented in the subclaims.

[0031] Further, the invention relates to the following aspects. According to an aspect of the invention, the legs and/or the protection pipe are fitted with at least two strand jacks working in opposite directions on the same pre-tensioned strand bundle for lifting and/or lowering the legs with respect to the pontoon.

[0032] According to an aspect of the invention, the offshore installation further comprises a base frame comprising interconnected legs at corners of the base frame, wherein the base frame is arranged for installation on the sea bottom and wherein the base frame legs are arranged to receive the legs of the platform.

[0033] According to an aspect of the invention, the base frame is pre-installed on the sea bottom prior to installation of the platform.

[0034] According to an aspect of the invention, the protection pipe is part of the base frame.

[0035] According to an aspect of the invention, the protection pipe is provided as a leg of the base frame.

[0036] The invention will further be elucidated on the basis of exemplary embodiments which are represented in a drawing. The exemplary embodiments are given by way of non-limitative illustration of the invention.

[0037] In the drawing:

Fig. 1 shows a schematic view of a platform with protection pipe;

Fig. 2 shows a schematic view of a platform with a base frame and a protection pipe;

Fig. 3 shows a schematic view tie-in tube for a protection pipe;

Fig. 4 shows a schematic perspective view of protection pipe with tie-in tubes;

Fig. 5 shows a schematic view of a strand jack arrangement;

Fig. 6 shows a schematic view of an installation of a leg of a platform with an open corner piece;

Fig. 7 shows the embodiment of Fig. 6 with a clamping element; and

Fig. 8 shows a platform in floating position.

[0038] It is noted that the figures are only schematic representations of embodiments of the invention that are given by way of non-limiting example. In the figures, the same or corresponding parts are designated with the same reference numerals.

[0039] Fig. 1 shows an offshore installation 1 comprising

ing a platform 2. The platform 2 is a movable self-installing platform comprising a floatable pontoon 3 and legs 4. The pontoon 3 may comprise one or more decks.

[0040] The platform 2 is adjustable between a transport position, as shown for example in Fig. 8 and an installed position, as shown in Fig. 1. In the transport position, the pontoon 3 is floating on the water and the legs are in elevated with respect to the pontoon 3. The legs 4 extend substantially above the pontoon 3. In the installed position, the legs 4 are lowered with respect to the pontoon 3. The legs 4 extend substantially below the pontoon 3. In a final installed position is the pontoon 3 elevated with respect to the water level at the offshore location. The platform 2 is considered to be a self-installing platform since the platform can be installed at the offshore location without the requirement of a crane vessel for example. Also, the platform can be transported to the offshore location without the use of a barge, since the pontoon is self floating. The legs can move upward and downward with respect to the pontoon along the longitudinal guides 7.

[0041] In this embodiment, the legs 4 are provided with suction anchors 5 for anchoring to the sea bottom 6. The suction anchors usually are provided as suction cans 5. Upon installing a platform 2, the leg 4 is lowered to the sea bottom 6, whereby the suction cans 5 penetrate the sea bottom 6. The leg 4 is moved further down by which the pontoon 3 is lifted out of the water. Finally, the legs 4 and the pontoon 3 are connected to each other such that the platform 2 becomes a stable platform. When disconnecting the legs 4 and the pontoon 3 and removing the suction cans 5 from the sea bottom 6, the platform 2 can be removed from the offshore location and can be moved further, for example to another offshore location or to a harbour. The platform 2 is thus movable.

[0042] The platform 2 usually is arranged for the connection of cabling and/or piping 8 from the sea bottom 6 to the pontoon 3. In particular when the platform 2 serves as an offshore substation for a wind mill park, extensive cabling may go to and from the platform. This cabling 8, mainly electric cabling, is laid on the sea bottom and may connect for example wind mills with the substation, or may connect for example the substation with an onshore location. The cabling 8 may be connected to the pontoon 3 of the platform 2 from the sea bottom 6. The pontoon 3 may comprise internal closed compartments that can be utilized for the installation of equipment, such as transformers. In case of equipment which is sensitive to temperature, moisture and/or saltiness of the environment, such as electrical and/or electronic equipment, the closed compartments can be fitted with an air conditioning system. Access of large components of the equipment into and out of the compartments can be created by hatches in the main deck of the pontoon.

[0043] The cabling 8 is relatively vulnerable for example for impact damage or environmental loads. Thereto, a protection pipe 9 is provided at the side of the platform 2. The protection pipe 9 is a relatively large diameter

pipe, e.g. a diameter between approximately 2 m and approximately 6 m, that fully encloses the cabling 8 between the sea bottom 6 and the pontoon 3. As the cables or pipelines 8 are inside the protection pipe 9, they are protected against external loads. By protecting the cabling 8 the life time of the cabling may be increased and/or installation and/or connection of the cabling may be facilitated, thus reducing costs such as installation and/or maintenance costs.

[0044] The protection pipe 9 is here further provided with J-tubes 10 for accommodating tying in of the cabling 8 to the protection pipe. Fig. 3 and Fig. 4 give a more detailed overview of the J-tube 10 at the lower end of the protection pipe 9. The J-tube 10 is a tie-in tube arranged at the lower end of the protection pipe 9 such that, when the protection pipe 9 is installed the J-tube 10 is positioned near the sea bottom 6.

[0045] In this embodiment, the protection pipe 9 is provided with a suction can 5 at its lower end for anchoring to the sea bottom 6. By providing the suction can 5, the protection pipe 9 can be installed independently of the platform 2, such that the protection pipe 9 may be installed prior to the installation of the platform 2 or after the installation of the platform 2.

[0046] In Fig. 2, the installation 1 is provided with a base frame 11 which can be pre-installed, e.g. by a crane vessel, and connected to the sea bottom 6, e.g. by suction cans 5 or by piles driven vertically in the soil. The base frame may be used as a stable support for the platform 2 and may enable the installation of the platform 2 in deeper water, e.g. above x meter water depth.

[0047] As can be seen in Fig. 2 comprises the base frame interconnected legs 12. The legs 12 are here interconnected by a truss-structure. In this embodiment is one leg 12 replaced by the protection pipe 9, also provided with a J-tube 10. The protection pipe 9 reaches from the sea bottom 6 to the pontoon 3, whereas the legs 12 of the base frame 11 are approximately as high as the base frame itself. The legs 12 are arranged to couple with the legs 4 of the platform 2. This coupling may be for example a stabbing connection. Of course, other connections, such as welding, bolting, etc. are also possible.

[0048] The protection pipe 9 as part of the base frame 11 is installed together with the base frame 11 prior to the installation of the platform. If the platform 2 is arranged for receiving four legs at the corners, then the protection pipe serves as one leg. The platform 2 comprising the pontoon 3 and three legs 4 is then transported to the offshore location where the base frame 11 is installed. One corner of the pontoon 3 is arranged for receiving the already installed protection pipe 9. For example, the corner can be provided as an open corner in which the protection pipe 9 can be accommodated. To connect the protection pipe 9 to the pontoon 3 the corner can be closed with a closing piece 13. The closing piece 13 can for example be a clamping element for removable clamping the protection pipe 9 to the pontoon.

[0049] Also, the pontoon 3 can be fitted with an open

corner for facilitating installation of the legs to the pontoon without the requirement of a relative expensive dry dock. The legs 4 can then be installed when the pontoon 3 is floating, e.g. in a harbour as illustrated in Fig. 6 and Fig. 7. Fig. 6 shows that a leg 4 is positioned into the open corner using a crane 14. In this way, the dry dock or a second barge are not required as the connections which are to be made between the leg 4 and the pontoon 3 and the closing piece 13 are above the water. The leg 4 is positioned and kept in place at the mounting location e.g. by slings or temporary hooks. As a next step in the assembly procedure of assembling the leg 4 to the pontoon 3, the closing piece 13 is aligned and connected to the pontoon 3, e.g. by bolts or by welding. The weight of the closing piece 13 is relatively small, which makes it relatively easy to handle.

[0050] Fig. 2 further shows a strand jack arrangement 15 for lowering and lifting the legs with respect to the pontoon. Fig. 5 shows two strand-jacks 16a, 16b acting in line in opposite directions on a single strand bundle 17. The strand jack 16a is mounted such that it is capable of pulling a bundle of strands 17 upward, indicated by arrow A. The strand-jack 16b is mounted such that it is capable of pulling the same bundle of strands 17 downward, indicated by arrow B. The bundle of strands 17 is pre-tensioned by a pulling device 18 between the top and bottom of the leg 4 in order to prevent the strands to become slack if a vertical load is acting on the support 19 which is rigidly connected to the pontoon 3. Slack strands are to be avoided for proper functioning of the strands and also to avoid impact loads when the slack strands are tensioned after reversal of the load. Here, an upward force at the pontoon 3 is achieved by the action of strand jack 16a, while the strand jack 16b is not active. A downward force of the pontoon is achieved by the action of strand jack 16b, while the strand jack 16a is not active. Therefore, only one strand jack 16a, 16b has to be controlled at the time, depending on the direction of the load acting on the pontoon 3, thereby allowing less complex control mechanisms.

[0051] Suction cans 5 fitted to the underside of the legs 4 can be placed centred, as shown in the previous embodiments, but can also be placed eccentrically, as shown in Fig. 8. In order to reduce the draft of the platform 2 in transport position, when the pontoon 3 is floating and the legs 4 are elevated, leg guides 20 for guiding the legs during lowering and/or lifting, can be moved upward and sideward of the pontoon. In the embodiment of Fig. 1 for example, is a corner of the pontoon 3 provided with a passage for the leg 4, thereby functioning as leg guide embodied in the pontoon 3. An advantage of the arrangement of Fig. 8 is that the suction can 5 can be lifted higher, such that the draft of the floating platform may be smaller. The leg guide 20 can be closed with a closing piece 13 for relatively easy assembly of the leg 4 to the pontoon 3.

[0052] Many variants will be apparent to the person skilled in the art. For example, a platform may be provided with more than one protection pipe and/or one or more

legs of the platform may be arranged as protection pipe.

Claims

1. Offshore installation for offshore energy resources exploitation comprising a movable self-installing platform (2) wherein the platform comprises a floatable pontoon (3) with at least one leg (4) that is adjustable between a transport position in which the leg (4) is elevated with respect to the pontoon (3) and an installation position in which the leg (4) is lowered with respect to the pontoon (3), whereby the platform (2) is arranged for connection of cabling and/or piping (8) from the sea bottom to the pontoon (3), further comprising a protection pipe (9) arranged to enclose the cabling and/or piping between the sea bottom and the pontoon (3), wherein the protection pipe (9) comprises a suction anchor (5) at a lower end for anchoring in the sea bottom. 5
2. Offshore installation according to claim 1, wherein the protection pipe (9) comprises a tie-in tube (10) at a lower end for tying in the cabling and/or piping (8) from the sea bottom into the protection pipe. 10
3. Offshore installation according to claim 2, wherein the tie-in tube is a J-type tube (10). 15
4. Offshore installation according to any of the preceding claims, wherein the protection pipe (9) is pre-installed before installation of the platform. 20
5. Offshore installation according to any of the preceding claims, wherein the protection pipe (9) is installed after installation of the platform. 25
6. Offshore installation according to any one of the preceding claims, wherein the protection pipe is provided as a leg of the platform. 30
7. Offshore installation according to any one of the preceding claims, wherein the floatable pontoon (3) comprises at least one deck. 35
8. Offshore installation according to any one of the preceding claims, wherein the legs and/or the protection pipe are fitted with at least two strand jacks (16a, 16b) working in opposite directions on the same pretensioned strand bundle (17) for lifting and/or lowering the legs with respect to the pontoon. 40
9. Offshore installation according to any one of the preceding claims, wherein the offshore installation further comprises a base frame (11) comprising interconnected legs (12) at corners of the base frame, wherein the base frame (11) is arranged for installation on the sea bottom and wherein the base frame 45

legs (12) are arranged to receive the legs (4) of the platform.

10. Offshore installation according to claim 9, wherein the base frame (11) is pre-installed on the sea bottom prior to installation of the platform. 5
11. Offshore installation according to claim 9 or 10, wherein the protection pipe (9) is part of the base frame (11). 10
12. Offshore installation according to claim 11, wherein the protection pipe (9) is provided as a leg of the base frame (11). 15
13. Method for connecting cabling and/or piping to an offshore installation comprising a movable self-installing platform (2) wherein the platform comprises a floatable pontoon (3) with at least one leg (4) that is adjustable between a transport position in which the leg (4) is elevated with respect to the pontoon (3) and an installation position in which the leg (4) is lowered with respect to the pontoon (3), further comprising installing the cabling and/or piping (8) on the sea bottom to the platform location, providing a protection pipe (9) for enclosing the cabling and/or piping between the sea bottom and the pontoon (3), installing the protection pipe (9) on the sea bottom, tying in the cabling and/or piping in the protection pipe (9), wherein the protection pipe (9) is anchored in the sea bottom with a suction anchor (5) at a lower end thereof. 20
14. Method according to claim 13, further comprising installing the protection pipe (9) prior to installation of the platform, tying-in the cabling and/or piping (8) into the installed protection pipe prior to installation of the platform. 25

Patentansprüche

1. Offshore-Anlage zur Nutzung von Offshore-Energie-ressourcen, umfassend eine bewegliche selbstinstallierende Plattform (2), wobei die Plattform einen schwimmfähigen Ponton (3) mit mindestens einem Bein (4), das zwischen einer Transportposition, in der das Bein (4) in Bezug auf den Ponton (3) angehoben ist, und einer Installationsposition, in der das Bein (4) in Bezug auf den Ponton (3) abgesenkt ist, einstellbar ist, umfasst, wobei die Plattform (2) angeordnet ist für die Verbindung von Kabeln und/oder Leitungen (8) vom Meeresboden zum Ponton (3), ferner umfassend ein Schutzrohr (9), angeordnet zum Einschließen der Kabel und/oder Leitungen zwischen dem Meeresboden und dem Ponton (3), wobei das Schutzrohr (9) einen Sauganker (5) an einem unteren Ende zum Verankern im Meeres- 45

boden umfasst.

2. Offshore-Anlage nach Anspruch 1, wobei das Schutzrohr (9) eine Einbinderöhre (10) an einem unteren Ende umfasst, um die Kabel und/oder Leitungen (8) vom Meeresboden in das Schutzrohr einzubinden. 5
3. Offshore-Anlage nach Anspruch 2, wobei die Einbinderöhre eine J-Typ-Röhre (10) ist. 10
4. Offshore-Anlage nach einem der vorhergehenden Ansprüche, wobei das Schutzrohr (9) vor der Installation der Plattform vorinstalliert wird. 15
5. Offshore-Installation nach einem der vorhergehenden Ansprüche, wobei das Schutzrohr (9) nach der Installation der Plattform installiert wird.
6. Offshore-Anlage nach einem der vorhergehenden Ansprüche, wobei das Schutzrohr als ein Bein der Plattform bereitgestellt wird. 20
7. Offshore-Anlage nach einem der vorhergehenden Ansprüche, wobei der schwimmfähige Ponton (3) mindestens ein Deck umfasst. 25
8. Offshore-Anlage nach einem der vorhergehenden Ansprüche, wobei die Beine und/oder das Schutzrohr mit mindestens zwei Litzenhubvorrichtungen (16a, 16b) ausgestattet ist/sind, die in entgegengesetzten Richtungen an demselben vorgespannten Litzenbündel (17) arbeiten, um die Beine in Bezug auf den Ponton anzuheben und/oder abzusenken. 30
9. Offshore-Anlage nach einem der vorhergehenden Ansprüche, wobei die Offshore-Anlage ferner einen Basisrahmen (11) mit miteinander verbundenen Beinen (12) an den Ecken des Basisrahmens umfasst, wobei der Basisrahmen (11) zur Installation auf dem Meeresboden angeordnet ist und wobei die Basisrahmenbeine (12) zum Aufnehmen der Beine (4) der Plattform angeordnet sind. 35 40
10. Offshore-Anlage nach Anspruch 9, wobei der Basisrahmen (11) vor der Installation der Plattform auf dem Meeresboden vorinstalliert ist. 45
11. Offshore-Anlage nach Anspruch 9 oder 10, wobei das Schutzrohr (9) ein Teil des Basisrahmens (11) ist. 50
12. Offshore-Anlage nach Anspruch 11, wobei das Schutzrohr (9) als ein Bein des Basisrahmens (11) bereitgestellt ist. 55
13. Verfahren zur Verbindung von Kabeln und/oder Leitungen an einer Offshore-Anlage, umfassend eine

bewegliche selbstinstallierende Plattform (2), wobei die Plattform einen schwimmfähigen Ponton (3) mit mindestens einem Bein (4), das zwischen einer Transportposition, in der das Bein (4) in Bezug auf den Ponton (3) angehoben ist, und einer Installationsposition, in der das Bein (4) in Bezug auf den Ponton (3) abgesenkt ist, einstellbar ist, ferner umfassend die Installation der Kabel und/oder Leitungen (8) auf dem Meeresboden am Plattformstandort, die Bereitstellung eines Schutzrohres (9) zum Einschließen der Kabel und/oder Leitungen zwischen dem Meeresboden und dem Ponton (3), die Installation des Schutzrohres (9) auf dem Meeresboden, das Einbinden der Kabel und/oder Leitungen in das Schutzrohr (9), wobei das Schutzrohr (9) im Meeresboden mit einem Sauganker (5) an einem unteren Ende davon verankert ist.

14. Verfahren nach Anspruch 13, ferner umfassend die Installation des Schutzrohres (9) vor der Installation der Plattform, das Einbinden der Kabel und/oder Leitungen (8) in das installierte Schutzrohr vor der Installation der Plattform.

Revendications

1. Installation offshore pour l'exploitation de ressources énergétiques offshore comprenant une plateforme mobile auto-installante (2), dans laquelle la plateforme comprend un ponton flottant (3) avec au moins un montant (4) ajustable entre une position de transport dans laquelle le montant (4) est soulevé par rapport au ponton (3) et une position d'installation dans laquelle le montant (4) est abaissé par rapport au ponton (3), la plateforme (2) étant conçue pour la connexion d'un câblage et/ou d'une tuyauterie (8) du fond de la mer vers le ponton (3), comprenant en outre une conduite de protection (9) conçue pour entourer le câblage et/ou la tuyauterie entre le fond de la mer et le ponton (3), dans laquelle la conduite de protection (9) comprend une ancre d'aspiration (5) à une extrémité inférieure pour l'ancrage dans le fond de la mer.
2. Installation offshore selon la revendication 1, dans laquelle la conduite de protection (9) comprend un tube de raccordement (10) au niveau d'une extrémité inférieure pour un raccordement du câblage et/ou de la tuyauterie (8) du fond de la mer vers la conduite de protection.
3. Installation offshore selon la revendication 2, dans laquelle le tube de raccordement est un tube de type J (10).
4. Installation offshore selon l'une des revendications précédentes, dans laquelle la conduite de protection

- (9) est préinstallée avant l'installation de la plateforme.
5. Installation offshore selon l'une des revendications précédentes, dans laquelle la conduite de protection (9) est installée après l'installation de la plateforme. 5
 6. Installation offshore selon l'une des revendications précédentes, dans laquelle la conduite de protection est conçue comme un montant de la plate-forme. 10
 7. Installation offshore selon l'une des revendications précédentes, dans laquelle le ponton flottant (3) comprend au moins un pont. 15
 8. Installation offshore selon l'une des revendications précédentes, dans laquelle les montants et/ou la conduite de protection sont munis d'au moins deux vérins à traction de câbles (16a, 16b) agissant dans des directions opposées sur le même faisceau de câbles précontraints (17) pour le levage et/ou l'abaissement des montants par rapport au ponton. 20
 9. Installation offshore selon l'une des revendications précédentes, dans laquelle l'installation offshore comprend en outre un châssis de base (11) comprenant des montants interconnectés (12) au niveau des angles du châssis de base, dans laquelle le châssis de base (11) est conçu pour une installation sur le fond de la mer et dans laquelle les montants du châssis de base (12) sont conçus pour recevoir les montants (4) de la plateforme. 25
30
 10. Installation offshore selon la revendication 9, dans laquelle le châssis de base (11) est préinstallé sur le fond de la mer avant l'installation de la plateforme. 35
 11. Installation offshore selon la revendication 9 ou 10, dans laquelle la conduite de protection (9) fait partie du châssis de base (11). 40
 12. Installation offshore selon la revendication 11, dans laquelle la conduite de protection (9) est conçue comme un montant du châssis de base (11). 45
 13. Procédé de connexion de câblage et/ou de tuyauterie à une installation offshore comprenant une plateforme mobile auto-installante (2), dans lequel la plateforme comprend un ponton flottant (3) avec au moins un montant (4) ajustable entre une position de transport dans laquelle le montant (4) est soulevé par rapport au ponton (3) et une position d'installation dans laquelle le montant (4) est abaissé par rapport au ponton (3), comprenant en outre l'installation du câblage et/ou de la tuyauterie (8) sur le fond de la mer sur le site de la plate-forme, fournissant une conduite de protection (9) permettant d'entourer le câblage et/ou la tuyauterie entre le fond de la mer

et le ponton (3), l'installation de la conduite de protection (9) sur le fond de la mer, le raccordement du câblage et/ou la tuyauterie dans la conduite de protection (9), la conduite de protection (9) étant ancrée sur le fond de la mer avec une ancre d'aspiration (5) au niveau d'une extrémité inférieure de celle-ci.

14. Procédé selon la revendication 13, comprenant en outre l'installation de la conduite de protection (9) avant l'installation de la plateforme, le raccordement du câblage et/ou de la tuyauterie (8) dans la conduite de protection installée avant l'installation de la plateforme.

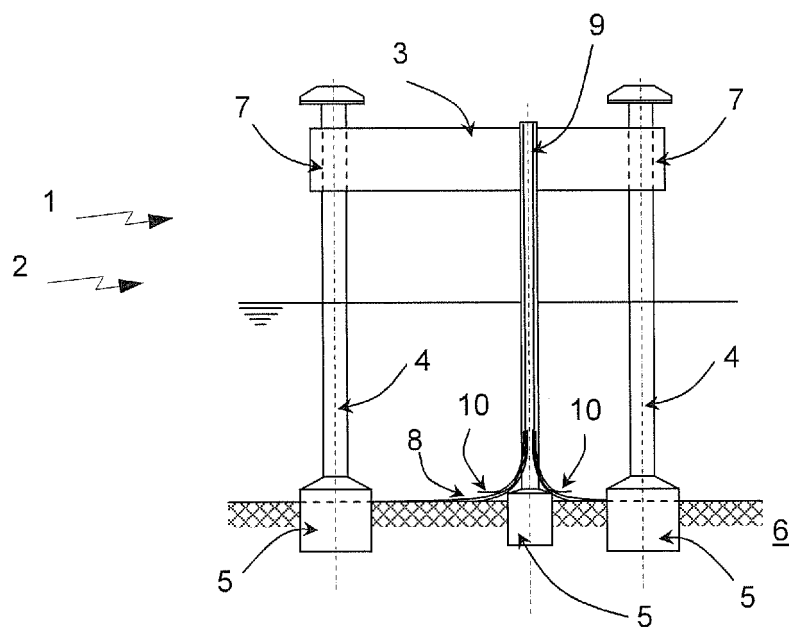


FIG. 1

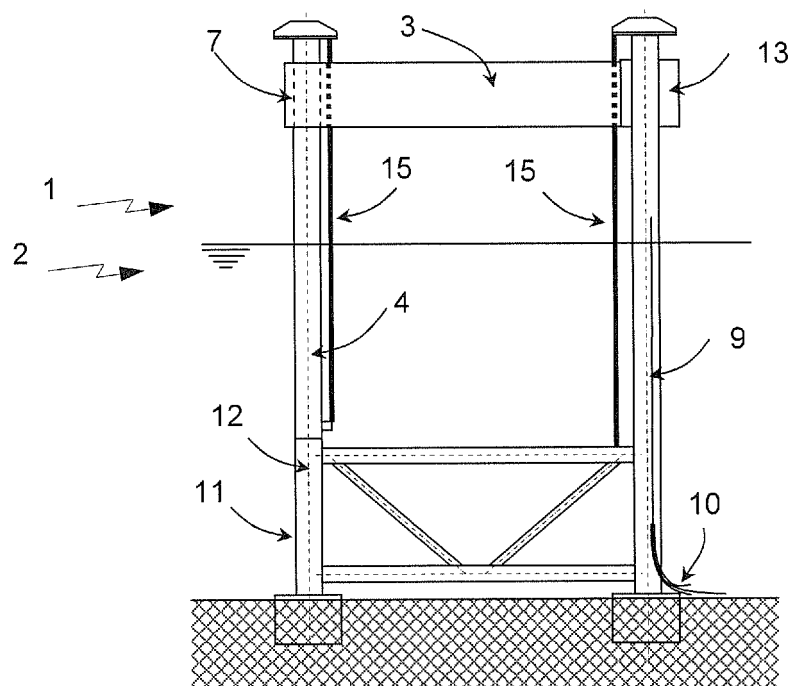


FIG. 2

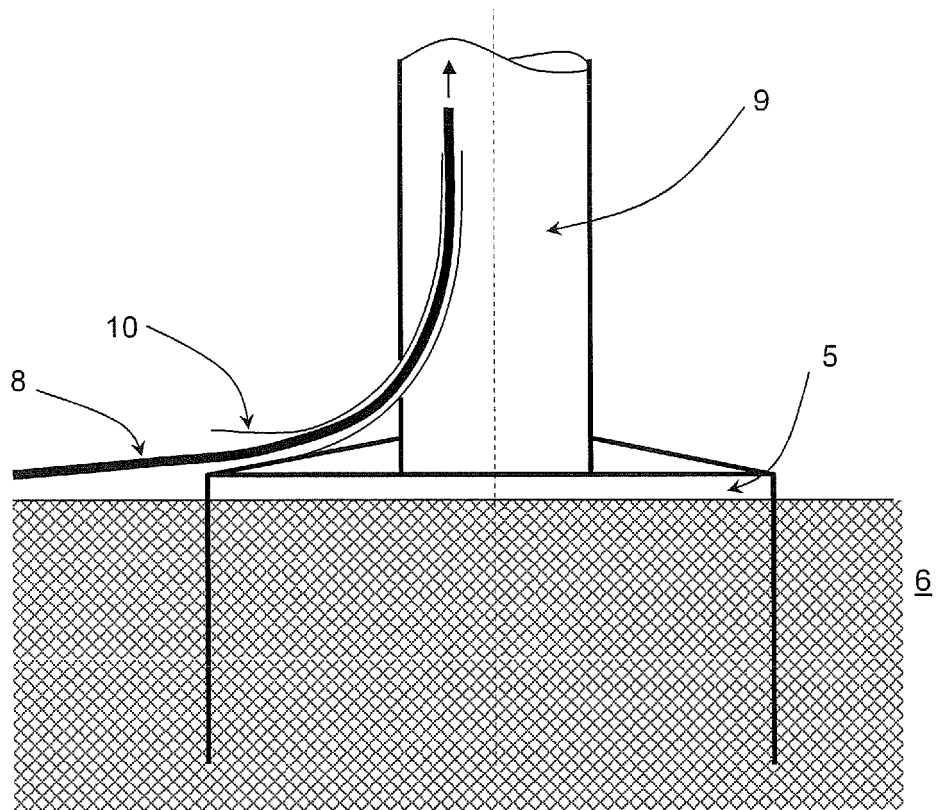


FIG. 3

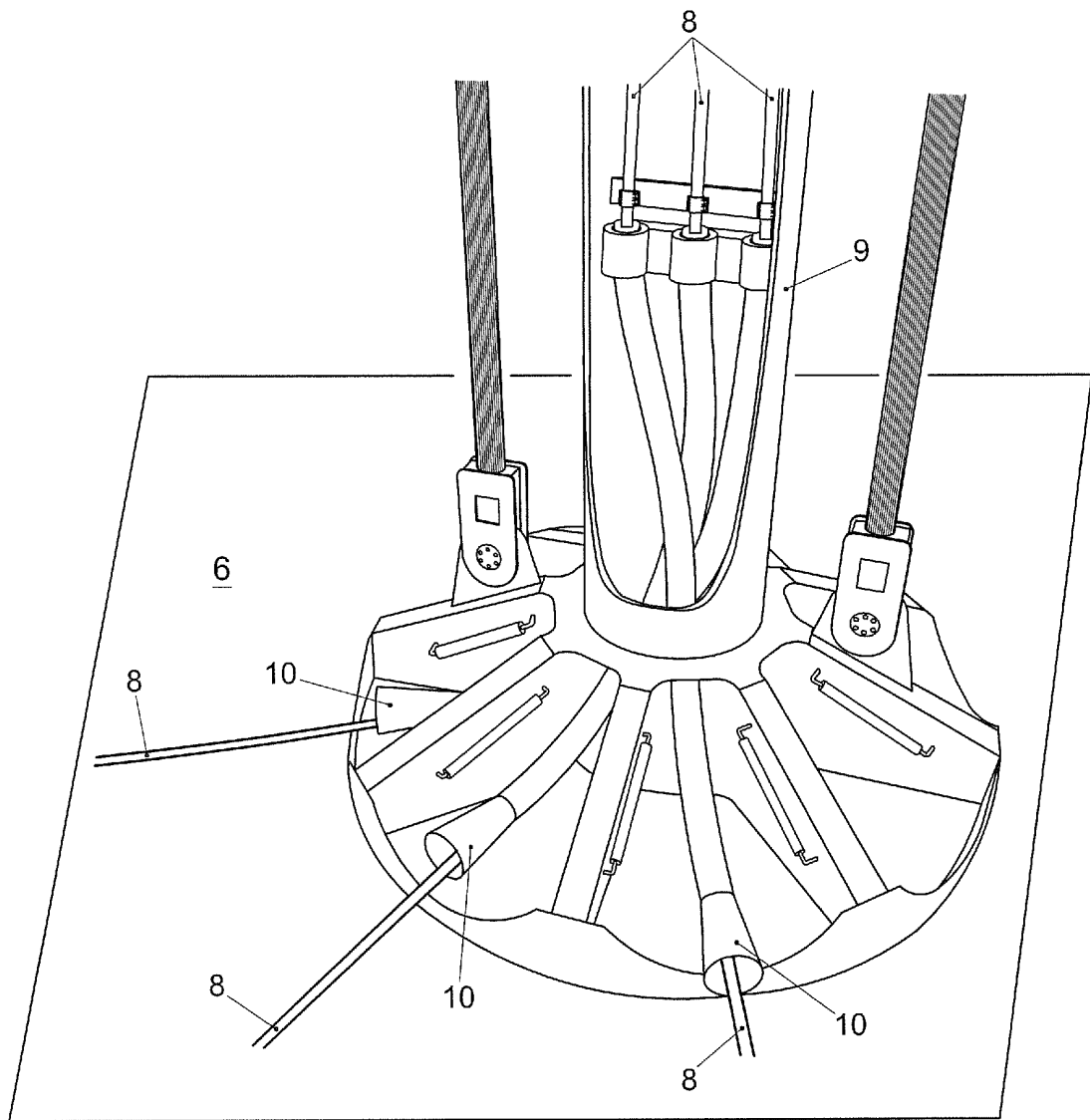


FIG. 4

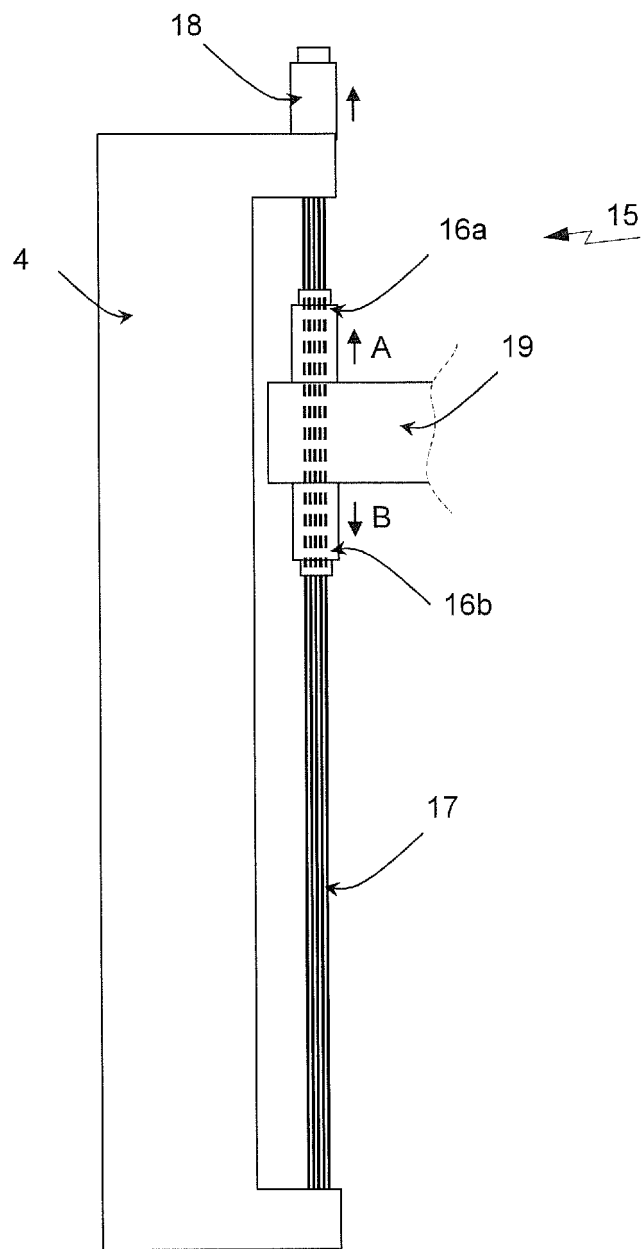


FIG. 5

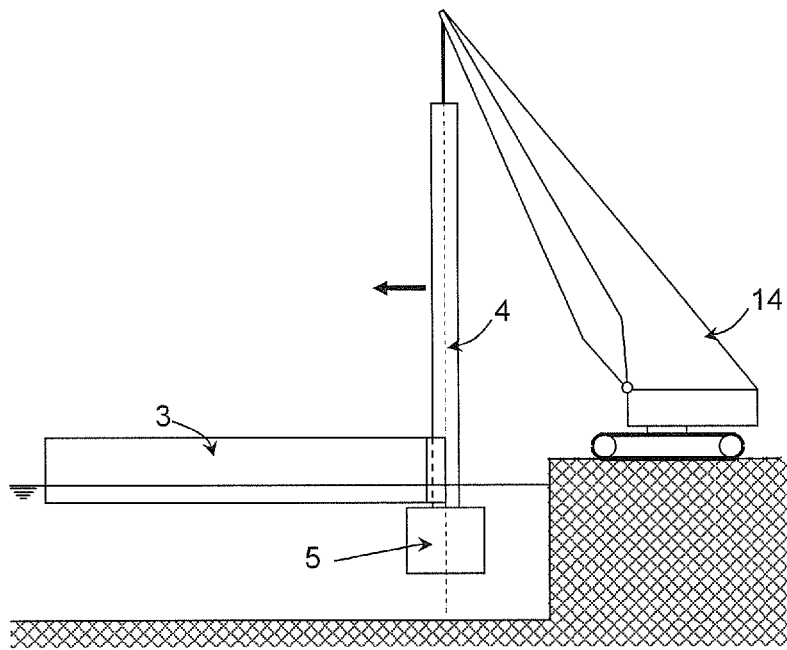


FIG. 6

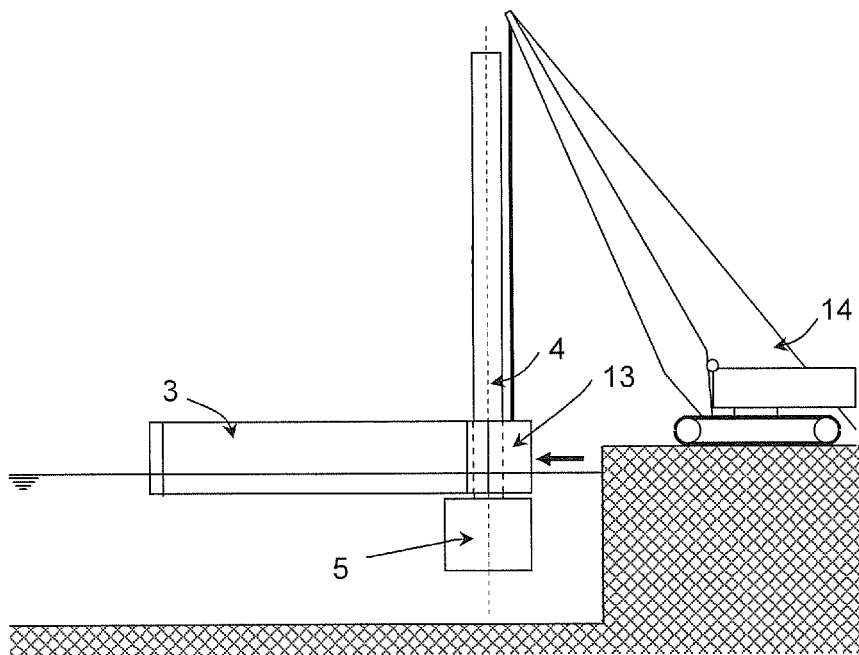


FIG. 7

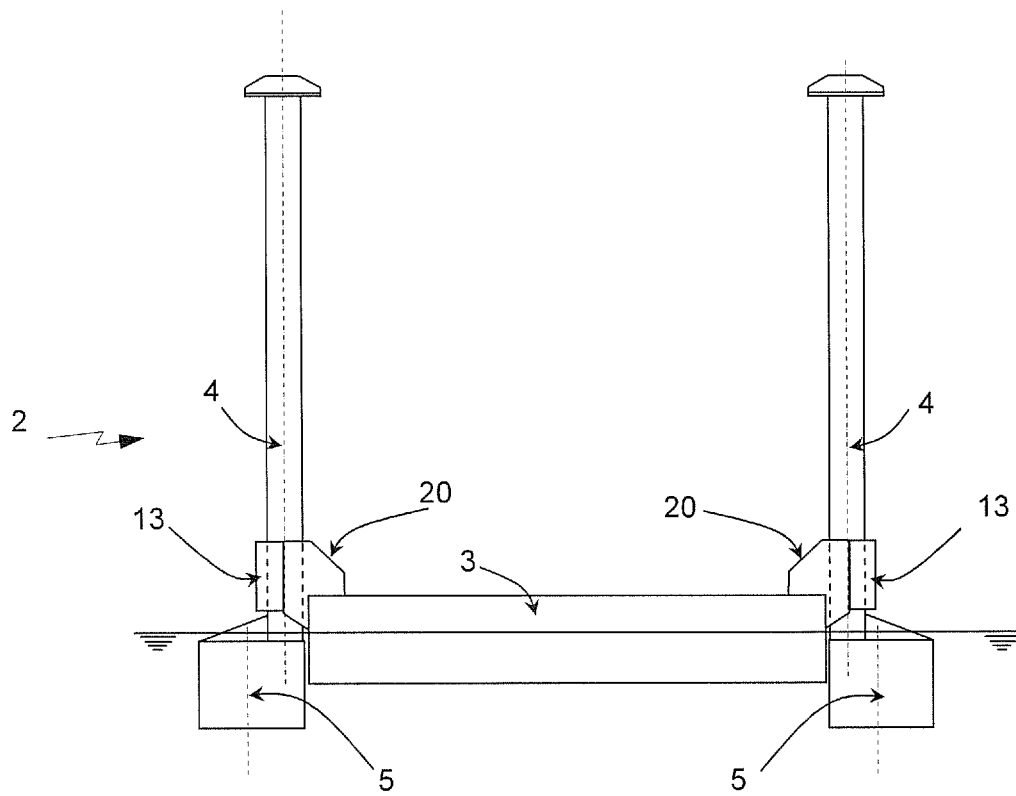


FIG. 8

REFERENCES CITED IN THE DESCRIPTION

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