Method for assembling an apparatus intended for being placed in a body of water

The present invention relates to a method for assembling an apparatus intended to be placed in a body of water, the apparatus including a base and at least one module placed on the base.

The apparatus is for example a Floating Production, Storage and Offloading (FPSO) unit, a Floating Liquefied Natural Gas (FLNG) unit, or more generally an offshore unit such as a semisubmersible platform, which may for example be a Tension Leg Platform (TLP), an unloading buoy, a floating vertical column or a ship. In a variant, the apparatus is a fixed rigid structure of the “gravity-fed" type, for example a "Gravity-Based Structure" (GBS).

Floating units of the aforementioned type generally include a floating hull carrying a large number of pieces of equipment interconnected with one another. These pieces of equipment are for example connected to one another by pipes, functional lines, such as electric lines, hydraulic transfer lines, and/or information transfer lines.

To manufacture such a unit, it is known to assemble the hull, and to deposit different modules prefabricated separately on the hull. Once deposited on the hull, the modules are interconnected to one another so as to produce the different systems of the installation.

The modules are generally deposited on the hull using cranes. In light of the capacity of current cranes, this involves a limitation in terms of size and weight of the modules.

Thus, a complete fluid exploitation system sometimes requires being separated into several modules that must be connected and tested after they are assembled on the hull. Such a solution is therefore not satisfactory, since the access to each module is more complicated than on land, and any flaws on a module can delay the assembly of other systems and/or the commissioning of the apparatus.

Furthermore, it is known in some cases to load modules on a floating base without using cranes. The floating base is ballasted to be flush with the upper surface of a dock on which the module is arranged. Then, the module is transferred onto the base, by sliding it on guides that are installed permanently on the floating base.

When the module rests on the guides, it is secured there to the base, the guides being kept in place.

This last method means that the depth of water opposite the dock is sufficient to allow the aforementioned flushness after ballasting. The latter method is not fully satisfactory including in this scenario. Indeed, the presence of permanent guides on the base makes the apparatus needlessly heavier and takes up significant space on the hull,

limiting the number and/or size of the pieces of equipment that can be placed on board the hull.

One aim of the invention is therefore to have a method for assembling an apparatus including a base and at least one module placed on the base, the method not requiring high-capacity cranes, while being implemented by noninvasive means on the apparatus.

To that end, the invention relates to a method of the aforementioned type, characterized by the following steps:

- providing the base, including an upper surface and mountings projecting above the upper surface;
- assembling guiding rails on the mountings;
- placing the module intended to be installed on the base on an upper surface located next to the base;
- translating the module on the guiding rails in order to bring it onto the base;
- placing the module on the mountings so that the mountings support the weight of the module;
- releasing the guiding rails relative to the mountings;
- removing the guiding rails by horizontal movement opposite the upper surface of the base.

The method according to the invention may comprise one or more of the following features, considered alone or according to any technically possible combination:

- before the translation step, the lifting of the module by its lower surface using a lifting structure positioned bearing between the upper surface and the lower surface of the module, to bring the lower surface to the height of the guiding rails;
- the lifting structure includes lifting beams placed below the lower surface of the module, the method including a step for connecting the lifting beams to the guiding rails by connecting beams when the lower surface is at the height of the guiding rails;
- the step for removing the guiding rails comprises horizontal pulling of each guiding rail from the outside of the base;
- each guiding rail comprises a plurality of successive segments, the removal step comprising the horizontal pulling of at least one segment of each guiding rail outside the base, then the disassembly of the segment located outside the base;
- the removal step includes the horizontal movement of the guiding rails away from the module, while keeping part of the guiding rails across from a region of the upper surface located separated from the module, the translation of an additional module on the guiding

rails to the upper surface region located separated from the module, then the placement of the additional module on the mountings;

- the base bears pieces of equipment on the upper surface, the guiding rails after assembly being positioned above the equipment, the pieces of equipment advantageously including a rack of functional lines and/or pipes, the guiding rails passing above the rack;

- the guiding rails have a U-shaped cross-section opening upward;

- the base has a longitudinal axis, the guiding rails being assembled transversely relative to the longitudinal axis;

- the guiding rails extend over substantially the entire width of the base, the module having a width greater than 90% of the width of the base, considered at the guiding rails;

- the base has a longitudinal axis, the guiding rails being assembled parallel to the longitudinal axis;

- the base is partially submerged in a water mass along a dock, the module being carried by the dock during the placement step;

- the base includes a hull, the hull floating on the water mass during the translation step of the module;

- the base is placed on the bottom of the water mass or on the floor of a drydock during the step for translation of the module, the method next including a flotation of the base by the de-ballasting of the base and/or by filling of the drydock in order to float the apparatus including the base and the module placed on the base;

- the mass of at least one module is greater than 3500 tons;

- the lifting step includes the gradual assembly of a removable structure for lifting the module below the lower surface of the module;

- the base includes at least two hulls, at least one module being placed below the two hulls of the base after the step for translation of the module;

- each hull floats on the water mass during the translation step of the module;

- the two hulls extend in two substantially parallel directions;

- the apparatus includes a connecting element positioned between the two hulls.

The invention also relates to a hydrocarbon exploitation apparatus intended to be placed in a body of water, comprising a base and at least one module, the base including an upper surface and mountings projecting above the upper surface, the base including two hulls advantageously extending in substantially parallel directions, characterized in that the module is placed on the two hulls, the mountings supporting the weight of the module.

The invention will be better understood upon reading the following description, provided solely as an example, and in reference to the appended drawings, in which:

- figure 1 is a front view of the base of a first apparatus made using a method according to the invention;

- figure 2 is a top view of the apparatus of figure 1;

- figure 3 is an elevation view of an assembly unit intended to carry out the method according to the invention;

- figure 4 is a top view of the assembly unit of figure 3;

- figures 5 to 9 illustrate successive steps to carry out a first method according to the invention;

- figure 10 is a top view illustrating the position of the guiding rails, before the placement of a module on the base of an apparatus;

- figure 11 is a partial sectional view of the apparatus, before the removal of the guiding rails;

- figure 12 shows a mounting assembled on the base, intended to bear the guiding rails, then the module after placement;

- figures 13 and 14 are top views illustrating the steps for assembling a second apparatus done using a method according to the invention;

- figure 15 is a schematic view of a column of a lifting structure used in the method according to the invention;

- figure 16 is a schematic top view of the column of figure 15;

- figure 17 is a perspective view of a second apparatus made using a method according to the invention;

- figure 18 is a perspective view of the second apparatus of figure 17 comprising modules;

- figure 19 is a front view of the second apparatus of figure 18.

A first apparatus 10, intended to be placed in a body of water 12, is illustrated schematically by figures 1 and 2.

The installation 10 is in particular intended for fluid exploitation, in particular hydrocarbons such as oil and/or natural gas, the fluid being collected at the bottom of the body of water 12 and raised to the surface of the body of water 12.

The apparatus 10 is for example a Floating Production, Storage and Offloading (FPSO) unit, or a Floating Liquefied Natural Gas (FLNG) unit, a semisubmersible platform, which may for example be a Tension Leg Platform (TLP), an unloading buoy, a floating vertical column or a ship. In a variant, the apparatus 10 is a fixed rigid structure of the “gravity-fed" type, for example a "Gravity-Based Structure" (GBS).

The body of water 12 is for example a lake, sea or ocean. The depth of the body of water 12 at the installation 10 is for example between 50 m and 3000 m, or even 4000 m.

In reference to figure 1, the apparatus 10 includes a base 14 partially submerged in the body of water, the base 14 having mountings 16. The apparatus 10 comprises at least one module 18 placed and fixed on the mountings 16 of the base 14.

In the example shown in figures 1 and 2, the base 14 extends along a longitudinal axis A-A' between an upstream edge 13 and a downstream edge 15. It defines a port side edge 17 and a starboard side edge 19.

It includes a hull 20 floating in the body of water 12. The base 14 further has an upper surface 22 here forming a deck, and pieces of equipment 24 carried by the upper surface 22.

The base 14 comprises a selective ballasting system 26, able to adjust the height of the upper surface 22 relative to the surface of the body of water 12, and able to keep the upper surface 22 substantially horizontal, even if the load applied on the upper surface 22 is not homogeneous and irrespective of the tide variation.

The pieces of equipment 24 for example comprise functional systems such as mechanical equipment (pumps, bridge cranes, monorails, trolleys). The pieces of equipment 24 further comprise fluid transport pipes, or functional lines, such as electrical transport lines, hydraulic fluid transport lines, and/or information transport lines.

In the example shown in figures 1, 2 and 11, the pieces of equipment 24 comprise at least one longitudinal rack 27, extending along the base 14 and passing below each module 18.

The rack 27 contains a plurality of fluid transport pipes and/or functional lines intended to connect the modules 18 to one another, or a module 18 with pieces of equipment located on the base 14.

The mountings 16 project on the upper surface 22. They have a height, considered relative to the upper surface 22, greater than that of the pieces of equipment 24 present on the surface 22.

In reference to figure 12, each mounting 16 includes a base 30, and a head 32 for assembling the module 18 able to support the module 18. In the example shown in figure 12, each mounting 16 further includes arms 34 intended to carry rails 36 for guiding the module 18, during its placement.

The base 30 here has a polyhedral or frustoconical shape converging upward.

The head 32 has an upper bearing platen 38 for the module 18, and advantageously, an insertion passage 40 for a bearing apparatus 41 of the module 18 placed on the platen 38.

Each arm 34 protrudes laterally relative to the base 30. In the example shown in figure 12, the mounting 16 is provided with two side arms 34 extending on either side of the base 30.

Each arm 34 is for example removable relative to the base 30, in order to minimize the bulk on the apparatus 10, once the module 18 is installed.

In the example shown in figure 2, the apparatus 10 includes a plurality of modules 18 arranged in an adjacent manner along the axis A-A'.

In this example, at least one module 18 extends over substantially the entire width of the base 14, for example over more than 90% of the base 14, considered between the port side edge 17 and the starboard side edge 19.

Each module 18 includes a plurality of pieces of equipment preassembled before the installation of the module 18 on the base 14. The pieces of equipment are for example tanks, reactors, compressors, turbines, columns on top of the systems similar to those defined above. The modules 18 are each able to perform at least one function in the assembly 10, for example separating gas, water, oil and liquefying natural gas.

At least one module 18 has a mass greater than 3500 tons, preventing the module 18 from being placed by a crane of normal capacity for the industry relevant to the invention.

As illustrated by figure 11, each module 18 has a lower surface 50 intended to be placed opposite the upper surface 22 of the base 14, bearing on the mountings 16. Each module 18 further includes a plurality of padding blocks 52 projecting downward relative to the lower surface 50 resting on the bearing apparatus 41 placed on the platen 38. Each padding block 52 is advantageously horizontal.

The assembly method according to the invention is implemented using a placement unit 60, illustrated schematically in figure 3.

The placement unit 60 comprises a worksite 62 for assembling the module 18, and a loading dock 64 located between the worksite 62 and a water mass 66 receiving the base 14. The water mass 66 is connected to the body of water 12, to allow the apparatus 10 to be conveyed by flotation to the body of water 12.

The placement unit 60 further includes a removable lifting structure 68 for lifting the module 18 by its lower surface 50, the guiding rails 36 intended to be placed above the base 14 and connecting beams 70 between the lifting structure 68 and the guiding rails 36.

In reference to figures 7 to 9, the placement unit 60 further includes a plurality of pads 72 for horizontal movement of the module 18 on the lifting beams 76, on the connecting beams 70 and on the rails 36, as well as a pulling system 74 for pulling the guiding rails 36 away from the base 14.

As illustrated by figure 3, the removable lifting structure 68 is a vehicle lift able to lift the lower surface 50 of the module 18 between a low position located at an upper surface 75 of the dock 64, and high positions in which the module 18 is positioned above and separated from the edge of the dock 64, without using a crane above the module 18.

The removable lifting structure 68 comprises lifting beams 76 bearing the module 18, if deployable columns 78, of gradually increasing height during their assembly, the columns 78 bearing the lifting beams 76, and jacks 79 and 81 for gradual lifting of each column 78 (visible in figures 15 and 16).

In one exemplary embodiment, illustrated by figure 15, each column 78 is formed by a series of pairs of bars 80 and pairs of crosspieces 82, each pair of bars 80 being positioned perpendicular to a pair of crosspieces 82 and bearing the pair of crosspieces 82.

The jacks 79, 81 are positioned at the base of the column 78. At least two jacks 79 are able to lift the bars 80 to make it possible to insert crosspieces 82 below the bars 80.

At least two jacks 81 are able to lift the crosspieces 82 to make it possible to insert bars 80 below the crosspieces 82. Thus, each column 78 is assembled gradually in stages to gradually lift the lifting beams 76 and the module 18.

Crossed diagonals 83 (visible in figure 3) connect the columns 78 to one another in order to avoid the lateral instability of the assembly under the weight of the module 18 and to stiffen it.

In the example shown in figures 3 to 10, the guiding rails 36 are able to extend transversely over the entire width of the base 14. Each guiding rail 36 here is made in one piece. As illustrated by figure 10, the placement unit 60 includes a plurality of parallel guiding rails 36, here a pair of rails 36, then a triplet of rails 36, then another pair of rails 36.

Each rail 36 is carried by side arms 34 of successive mountings 16. Each rail 36 here is hollow and has a U shape that is upwardly open. It defines a central groove 84 for sliding of the pads 72. The groove 84 reduces the bulk of the rail 36 heightwise and does not alter the presence of the pieces of equipment 24 and the rack 27.

Furthermore, the groove 84 defines two vertical walls that stiffen the bottom of the guiding rail 36. This limits the bending of the rail 36 between two mountings 16, in particular when the distance separating the mountings 16 is greater than 10 m. This allows the rail 36 to be relatively thin, to reduce its bulk.

The central groove 84 is advantageously provided with a slippery coating, for example made from polytetrafluoroethylene and inner stops (not shown) spaced longitudinally apart to allow the catching and the pushing or pulling of the pads 72.

In figures 7 and 8, each pad 72 includes a soleplate 86, a jack 88 for lifting the module 18, carried by the soleplate 86 and a deployable arm 90 for pushing/pulling the soleplate 86, able to grasp an inner stop in the guiding rail 36 in order to push/pull the soleplate 86 and longitudinally move the jack 88 and the module 18.

Each guiding rail 36 is removably fixed on the successive mountings 16. When the guiding rail 36 is released from the mountings 16, it is able to be pulled substantially horizontally, parallel to the upper surface 22 in order to be removed from the apparatus 10.

In reference to figure 9, the pulling system 74 is able to pull each rail 36 horizontally in order to separate it laterally from the base 14 and the module 18, to free the intermediate space between the module 18 and the upper surface 22. The pulling system 74 is for example fixed on the lifting structure 68, after transferring the module 18 onto the base 14. It for example comprises at least one winch.

A first assembly method of the apparatus 10 according to the invention will now be described.

Initially, each module 18 is assembled on a worksite 62 independently of the base 14. The base 14 is brought into a water mass 66 in the vicinity of the dock 64, and is moored to the dock 64, as illustrated in figure 4.

The guiding rails 36 are installed on the mountings 16 using a crane. They are placed on the arms 34 of the successive mountings 16.

In this example, they extend transversely over the entire width of the base 14, between the port side edge 17 and the starboard side edge 19.

The lifting structure 68 occupies a low position in which the deployable columns 78 are disassembled and in which the lifting beams 76 are positioned at the upper surface 75 of the dock 64.

The movement pads 72 are installed below the lower surface 50 of the module 18. The jacks 88 of the movement pads 72 are then deployed to release the module 18 from its construction struts. Then, the movement pads 72 are activated, using the arms 90, to translate the module 18, in order to bring it onto the lifting beams 76.

When the module 18 is placed on the lifting beams 76, the lifting structure 68 is transitioned to its high position, to bring the lifting beams 76 to the same horizontal level as the guiding rails 36.

In this example, the deployable columns 78 are gradually assembled from the upper surface 75 in order to lift the lifting beams 76 and the module 18 away from the upper surface 75.

In the example shown in figures 15 and 16, the jacks 81 are first activated in order to lift two crosspieces 82 located below the lifting beams 76 by a height substantially equal to that of a bar 80. The bars 80 are placed perpendicular to the crosspieces 82, above the jacks 79 of the rigid bearings 83B. The rigid bearings 83B located just below the bars 80 make it possible to place the unit back on the bars 80, if needed.

The jacks 81 are then retracted, the crosspieces 82 bearing on the bars 80, and the jacks 79 are deployed by a height substantially equal to that of a crosspiece 82.

The crosspieces 82 are then placed above the jacks 81 and the rigid bearings 83A perpendicular to the bars 80. The rigid bearings 83A located just below the crosspieces 82 make it possible to place the unit back on the crosspieces 82, if needed.

These operations are repeated until the lifting beams 76 reach a height equal to that of the guiding rails 36 on the base 14.

Next, as illustrated in figure 4, connecting beams 70 are inserted in the intermediate space between the lifting structure 68 and the base 14 placed in a water mass 66. Each connecting beam 70 connects a lifting beams 76 to a guiding rail 36.

Once this is done, the pads 72 are activated to translate the module 18 horizontally on the rails 36 from the lifting structure 68 toward the base 14.

In the example shown in the figures, the arms 90 of each pad 72 are deployed away from the soleplate 86 in the direction going from the dock 64 toward the base 14, to hold onto a stop. Then, the arms 90 are retracted into the soleplate 86, causing the sliding of the soleplate 86 toward the stop, and the movement of the module 18 along the axis defined by each guiding rail 36.

The selective ballasting system 26 is activated to keep the base 14 at a constant level relative to the dock 64 during the progression of the module 18 and thus to keep each guiding rail 36 aligned with the connecting beam 70 and the lifting beam 76. This must be ensured irrespective of the level of the tide that causes the base 14 to rise or lower, and the position of the module 18 during its transfer onto the base 14.

The jacks 88 being active, the lower surface 50 of the module 18 remains above all of the pieces of equipment 24 present on the upper surface 22. Furthermore, the padding blocks 52 pass above the mountings 30, without abutting on the mountings 30.

When the module 18 reaches the desired position, for example extending over the width of the base 14 from the port side edge 17 toward the starboard side edge 19, and the

blocks 52 are positioned opposite the mountings 16, the jacks 88 are deactivated to approach the lower surface 52 of the upper platform 38 of the mountings 16, via a bearing apparatus 41 if applicable.

During this movement, the mountings 16 gradually support the weight of the module 18.

The pulling system 74 of the guiding rails 36 is then activated from the outside of the base 14 to cause the rails 36 to slide horizontally, containing the pads 72, below the lower surface 50, and to move them away from the base 14, advantageously over the lifting structure 68. Beforehand, the connecting beam 70 is removed and the ballast 26 of the hull 20 is activated to level the bottom of the guiding rail 36 with respect to the top of the lifting beam 76.

The intermediate space between the module 18 and the upper surface 22 of the base 14 is released from the guiding rails 36, which eliminates an unnecessary weight from the apparatus 10 and increases the available space in the apparatus 10.

The assembly of the module 18 using the method according to the invention is therefore particularly simple and versatile, since it does not require high-capacity cranes. It is thus possible to assemble, on a base 14, modules 18 that are prefabricated and pretested on the worksite 62, positioned in a water mass 66, even if the worksite 62 does not have cranes of sufficient capacity to lift a module 18 having an excessive weight.

Owing to the arrangement of the guiding rails 36 above the pieces of equipment 24 present on the base 14, the module 18 is able to sweep the entire width of the base 14 during its installation, which makes it possible, if applicable, to build very wide modules 18, and to limit the installation time.

Since the guiding rails 36 are removable, they do not contribute to the weight of the apparatus 10 once the assembly is completed, and they can be used again to place another module 18, or to assemble another apparatus 10.

In the variant illustrated in figures 13 and 14, each guiding rail 36 is made up of several successive segments 100 assembled end to end. Each segment 100 advantageously has a length greater than or equal to the length of a module 18.

In this example, the guiding rails 36 are placed parallel to the longitudinal axis of the base 14. The upstream edge 13 of the base 14 is positioned opposite the dock 64.

During the assembly of the apparatus 10, a first module 18 is translated on the guiding rails 36, as previously described, up to its placement position. Then, the module 18 is placed on the mountings 16 by lowering the jacks 88.

Next, the segments 100 of guiding rails 36 positioned below the module 18 are removed by horizontal translation below the module 18 using the pulling system 74. The segments 100 of the guiding rails 36 that have been removed away from the base 14 are separated from the segments 100 remaining on the base 14, as illustrated in figure 14.

At least one segment 102 of each guiding rail 36 remains across from a region of the upper surface 22 adjacent to the module 18. Then, an additional module 18 is translated on the guiding rails 36 up to the region of the upper surface 22 located away from the module 18. The additional module 18 is placed on the mountings 16.

The rail segments 102 located below the additional module 18 are then removed horizontally, as previously described.

In a variant, the base 14 is placed on the bottom of the water mass 66, or in a drydock 67 during the step for translating the module 18 (see figure 13). The method next includes a step for floating the base 14 by de-ballasting and/or filling the drydock 67.

A second apparatus 110 according to the invention is illustrated in figures 17 to 19.

The second apparatus 110 differs from the first apparatus 10 in that the base 14 includes two hulls 20.

In this example, the second apparatus 110 further comprises a turret mounting 92, a turret 93, and a connecting element 94.

The two hulls 20 extend in substantially parallel directions, parallel to the axis A-A' of the base 14.

Advantageously, the two hulls 20 are substantially equal sizes.

The two hulls 20 advantageously contain preassembled pieces of equipment 24 as defined above.

Advantageously, each hull 20 comprises preassembled pieces of equipment 24 as defined above having a function different from the pieces of equipment 24 comprised in the other hull 20.

For example, the equipment of a first hull 20 is intended to store liquid gas and the equipment of a second hull 20 is intended to store condensates from the gas (light oil) or any liquid or solid related to the process.

At least one module 18 is configured to be placed on the two hulls 20 of the base 14 in order to connect the two hulls 20 transversely, as illustrated by figures 18 and 19.

In particular, at least one module 18 is placed on the two hulls 20 orthogonally relative to the axis A-A'.

The connection between the two hulls 20 to form the base 14 is therefore provided by at least one module 18. It is not necessary to use closed boxes or connecting beams between the hulls 20, thus avoiding a complex installation inside or outside the drydock.

The turret mounting 92 is connected to the two hulls 20. In particular, the turret mounting 92 is connected to an end along the axis A-A' of each hull 20, for example to the bow.

The turret mounting 92 is assembled rotating around the turret 93. The turret 93 is fixed on the bottom of the body of water by anchoring lines to allow the anchoring of the apparatus 110.

As illustrated in figures 18 and 19, the connecting element 94 is positioned between the two hulls 20.

The connecting element 94 advantageously extends along the axis A-A' and is connected to an upper edge of each hull 20.

The connecting element 94 strengthens the horizontal rigidity of the apparatus 110.

The connecting element 94 provides access to the pieces of equipment 24 by the staff of the apparatus 110 between the decks of the two hulls 20.

A second assembly method of the second apparatus 110 will now be described.

The second assembly method is similar to the first assembly method.

The second assembly method differs from the first assembly device in that the two hulls 20 are formed separately, then are sent to a same assembly worksite 62. The two hulls 20 are placed side by side, floating.

The hulls 20 are provided with mountings 16 positioned projecting on the upper surface of each hull 20.

The connecting element 94 is installed between the two hulls 20, making it possible to keep each of the hulls 20 at a fixed horizontal distance from one another. In a variant, the connecting element 94 is installed in a drydock.

Guiding rails 36 are then assembled transversely on the mountings 16, the rails 36 overlapping the intermediate space between the hulls 20 kept constant by the horizontal connecting element 94. In a variant, the guiding rails 36 serve as a temporary connection between the two hulls 20, the horizontal connecting element 94 not being required.

Next, a module 18 is placed on an upper surface 75 and is translated on the rails 36, until at least a first region of the module 18 extends across from the mountings 16 of a first hull 20, a second region of the module 18 extending across from the mountings 16 of the second hull 20. An intermediate region of the module 18 then extends across from the intermediate space between the hulls 20. Then, the module 18 is placed on the mountings

16 of each hull 20. The guiding rails 36 are then released and removed, as described above. The mountings 16 then support the weight of the module 18 and the connecting forces of the two hulls 20.

During the step for translation of the module 18 and placement on the mountings 16, each hull 20 floats on the water mass 66.

In a variant, both modules 18 are installation in a drydock by the same method as before.

The second apparatus 110 therefore allows a reduction in construction time and costs because it allows the separate construction of the two hulls 20 by builders not having large drydocks of sufficient size to accommodate two hulls positioned in parallel, or heavy lifting cranes.

The assembly of the base 14 is done easily on a worksite 62 or on the water mass 66. Furthermore, the stability of the base 14 and its seaworthiness are improved owing to the two modules 18 placed parallel to one another.

CLAIMS

1.- A method for assembling an apparatus (10) intended to be placed in a body of water (12), the apparatus (10) including a base (14) and at least one module (18) placed on the base (14), the method being characterized by the following steps:

- providing the base (14), including an upper surface (22) and mountings (16) projecting above the upper surface (22);

- assembling guiding rails (36) on the mountings (16);

- placing the module (18) intended to be installed on the base (14) on an upper surface (75) located next to the base (14);

- translating the module (18) on the guiding rails (36) in order to bring it onto the base (14);

- placing the module (18) on the mountings (16) so that the mountings (16) support the weight of the module (18);

- releasing the guiding rails (36) relative to the mountings (16);

- removing the guiding rails (36) by horizontal movement opposite the upper surface (22) of the base (14).

2. - The method according to claim 1, comprising, before the translation step, a step of lifting the module (18) by its lower surface (50) using a lifting structure (68) positioned bearing between the upper surface (75) located next to the base and the lower surface (50) of the module (18), to bring the lower surface (50) to the height of the guiding rails (36).

3.- The method according to claim 2, wherein the lifting structure (68) includes lifting beams (76) placed below the lower surface (50) of the module (18), the method including a step for connecting the lifting beams (76) to the guiding rails (36) by connecting beams (70) when the lower surface (50) is at the height of the guiding rails (36).

4. - The method according to any one of the preceding claims, wherein the step for removing the guiding rails (36) comprises horizontal pulling of each guiding rail (36) from the outside of the base (14).

5. - The method according to claim 4, wherein each guiding rail (36) comprises a plurality of successive segments (100), the removal step comprising the horizontal pulling

of at least one segment (100) of each guiding rail (36) outside the base (14), then the disassembly of the segment (100) located outside the base (14).

6. - The method according to any one of the preceding claims, wherein the removal step includes the horizontal movement of the guiding rails (36) away from the module (18), while keeping part of the guiding rails (36) across from a region of the upper surface (22) located separated from the module (18), the translation of an additional module (18) on the guiding rails (36) to the upper surface region (22) located separated from the module (18), then the placement of the additional module (18) on the mountings (16).

7.- The method according to any one of the preceding claims, wherein the base (14) bears pieces of equipment (24) on the upper surface (22), the guiding rails (36) after assembly being positioned above the equipment (24), the pieces of equipment (24) advantageously including a rack (27) of functional lines and/or pipes, the guiding rails (36) passing above the rack (27).

8.- The method according to claim 7, wherein the guiding rails (36) have a U-shaped cross-section opening upward.

9. - The method according to any one of the preceding claims, wherein the base (14) has a longitudinal axis (A-A'), the guiding rails (36) being assembled transversely relative to the longitudinal axis (A-A').

10. - The method according to claim 9, wherein the guiding rails (36) extend over substantially the entire width of the base (14), the module (18) having a width greater than 90% of the width of the base (14), considered at the guiding rails (36).

11.- The method according to any one of claims 1 to 8, wherein the base (14) has a longitudinal axis (A-A'), the guiding rails (36) being assembled parallel to the longitudinal axis (A-A').

12. - The method according to any one of the preceding claims, wherein the base (14) is partially submerged in a water mass (66) along a dock (64), the module (18) being carried by the dock (64) during the placement step.

13.- The method according to claim 12, wherein the base (14) includes a hull (20), the hull (20) floating on the water mass (66) during the translation step of the module (18).

14.- The method according to any one of claims 12 or 13, wherein the base (14) is placed on the bottom of the water mass (66) or on the floor of a drydock (67) during the step for translation of the module (18), the method next including a flotation of the base (14) by the de-ballasting of the base (14) and/or by filling of the drydock (67) in order to float the apparatus (10) including the base (14) and the module (18) placed on the base (14).

15.- The method according to any one of the preceding claims, wherein the base (14) includes at least two hulls (20), at least one module (18) being placed below the two hulls (20) of the base (14) after the step for translation of the module (18).

16.- The method according to claim 15, wherein each hull (20) floats on the water mass (66) during the translation step of the module (18).

17.- The method according to any one of claims 15 or 16, wherein the two hulls (20) extend in two substantially parallel directions.

18.- The method according to any one of claims 15 to 17, wherein the apparatus (110) includes a connecting element (94) positioned between the two hulls (20).

19.- A hydrocarbon exploitation apparatus (110) intended to be placed in a body of water (12), comprising a base (14) and at least one module (18), the base (14) including an upper surface (22) and mountings (16) projecting above the upper surface (22), the base (14) including two hulls (20) advantageously extending in substantially parallel directions, characterized in that the module (18) is placed on the two hulls (20), the mountings (16) supporting the weight of the module (18) and the connecting forces of the two hulls (20), wherein there is no closed boxes or connecting beams between the two hulls.