

## Description

### BACKGROUND

The present invention relates to an offshore structure for supporting a production platform above the water for subsea wells, particularly for shallow wells which can be drilled by jackup rig.

US-A-4,087,983 discloses an offshore platform which extends from the subsea location and includes a plurality of knuckle joints which are arranged circumferentially and includes a very large base footprint and has braces extending from the outer portions of the base to the central tubular member.

US-A-3,572,044 discloses an offshore platform which is lowered from a floating rig and after the base is set which includes angular piling under the corner leg guides of the base and around the exterior of the wellhead unit. This structure has a very large footprint and is used only for setting the wellhead unit and then recovered.

US-A-3,482,408 discloses a telescoping caisson which connects from a subsea location to a production deck above the surface of the water and is held in location by a series of guy wires.

US-A-4,222,682 discloses a sea bottom structure for supporting a platform above the water surface and includes a large base including floatation tanks to support the column connecting between the platform and the base during transportation.

US-A-4,558,973 discloses a structure for clamping about a subsea well conductor pipe to support it in an erect position and such structure includes a wide spread base with half shells secured to the base, extending upwardly, is clamped around the conductor pipe and angular supports extending angularly from the corners of the base to the half shells near their upper ends to support them in their erect position.

US-A-3380520 discloses a structure for use in subsea well drilling operations which includes a control column and a base including a plurality of legs. The structure is anchored to the seabed and control means are coupled between various wellheads provided within wellhead protector sleeves and the control column.

GB-A-2136482 discloses an offshore structure comprising a central column and a base including a plurality of legs. The central column extends from the seabed to a platform above the water level.

"Offshore" volume 37, No. 5, May 1977 pages 256,259 discloses a method of erecting a standard offshore platform from a jackup rig.

An object of the present invention is to provide an improved caisson structure for a subsea well which has a footprint smaller than the slot of the jackup rig which is used to set the structure.

Another object is to provide an improved caisson structure for several subsea wells in which the struc-

ture has a foot print smaller than the slot in the jackup rig which is used to set the structure.

According to one aspect of the present invention there is provided a method of setting a caisson structure for a subsea production well comprising the steps of locating a jackup rig in position over a preselected subsea well site with its legs on bottom, delivering a caisson structure to the jackup rig, said caisson structure having a central caisson which is tubular, a base with a plurality of tubular legs spaced around said central caisson, support braces extending between said legs and said central caisson and said central caisson being sufficiently long to extend from the subsea production well on the bottom to a position above the surface of the water and sufficiently large in diameter to allow drilling therethrough and to accommodate at least one production string extending therethrough, picking up said caisson structure with said jackup rig so that it is positioned generally vertically, lowering said caisson structure to the bottom with its central caisson in surrounding relationship to said preselected subsea well site, setting piles through the tubular legs of said caisson structure, and connecting at least one production string extending through said central caisson to production equipment on the production platform of said caisson structure, characterised by the step of filling the interior of said central caisson around the exterior of the production string positioned therein with cement to provide additional support strength to the central caisson, thereby allowing the caisson structure to have a footprint smaller than the slot of said jackup rig.

According to another aspect of the present invention there is provided a caisson structure for connection between a subsea well and the surface of the water comprising:

a central tubular caisson, said central tubular caisson being sufficiently long to extend from the subsea bottom to a position above the water surface;

at least one production string extending from the subsea well through said central tubular caisson to the position above the water surface;

a base including a plurality of legs surrounding the lower end of said caisson and means connecting said legs to said caisson and to each other;

a production platform positioned at the upper end of said caisson; characterised in that cement fills the interior of said caisson around the exterior of the production string extending therethrough to provide additional support strength to the caisson.

One embodiment of the invention provides an improved caisson structure which is adapted to support a production platform above the water and has its base on bottom and has a foot print or base which will pass through the drilling slot of a jackup rig. The caisson structure includes a large diameter caisson supported by a truss structure including at least three base columns through which piling is placed and braced

ing extending between the columns and the caisson, a platform supported at the upper end of the caisson with production tubing and its casing extending upward through the caisson, and where desired, the caisson is filled with concrete surrounding the casing within the caisson. The improved caisson structure can be used to surround and support an existing conductor pipe extending from a subsea wellhead to the surface. The method of setting the caisson structure includes lifting the structure from a barge and lowering to position its base in engagement with the sea bottom in the desired location, piling is placed in the corner columns, the wells are drilled through the caisson, the production strings are set and the wellhead production equipment are installed on the productions strings at the platform. The piling is steel tubular members which can be cut below the sea bottom to recover the caisson structure after the wells are plugged. The caisson structure which is then easily recovered is reusable for other wells in different depths of water.

The invention will be described now by way of example only, with particular reference to the accompanying drawings. In the drawings:

Figure 1 is a schematic view of a subsea location with a jackup rig located thereabove and a barge on which the improved caisson structure is positioned.

Figure 2 is a similar schematic view of the jackup rig picking up the caisson structure from the barge.

Figure 3 is another similar view of the jackup rig lowering the caisson structure to the sea bottom.

Figure 4 is another similar view of the setting of the piles in the base of the caisson structure.

Figure 5 is another similar view of the drilling of wells through the caisson structure. Figure 6 is an isometric view of the production of wells through the caisson structure to the production equipment on the caisson structure platform.

Figure 7 is another schematic view of the positioning of an improved caisson structure into surrounding and supporting relationship to a conductor pipe on an existing subsea well.

FIGURE 8 is a sectional view taken along lines 8-8 in FIGURE 6 to illustrate the strings extending through the caisson and the distribution of cement within the caisson and around the strings.

#### DESCRIPTION OF THE PREFERRED EMBODIMENTS

When improved caisson structure 10 of the present invention is to be used it is carried to the subsea well location on barge 12 and jackup rig 14 is positioned over the desired subsea well location and is jacked up on its legs 16 which have their lower ends in engagement with the bottom 18 of the water 20. In FIGURE 1, barge 12 with caisson structure 10 positioned thereon has been moved under the drilling slot so that the travelling block of derrick 22 can be con-

nected thereto and lift caisson structure free of barge 12. Barge 12 has been moved under rig 14 and travelling block of derrick 22 connected to caisson structure 10. By use of the jacks on its legs 16, rig 14 is elevated to raise structure 10 from barge 12.

Caisson structure 10 when lifted above barge 12 as best shown in FIGURE 2 is in position to be lowered directly downward in water until its truss base 24 is positioned on the bottom 18 with its central caisson 26 positioned over the preselected location of the well bore to be drilled therethrough by rig 14. The lowering of caisson structure 10 is done either by lowering travelling block of derrick 22 or by lowering rig 14 on its legs 16 or by a combination of both so that rig 14 is lowered to its preferred drilling position and any further lowering of caisson structure 10 is accomplished by the travelling block. FIGURE 3 illustrates the position of caisson structure 10 on bottom 18.

With caisson structure 10 on bottom 18, piles 28, which consist of two stage steel piles are installed through the corner upright tubular members or skirt legs 30 of truss base 24. The first stage pile is driven or allowed to sink to a shallower depth and is used as a conductor for a second insert pile which is drilled and installed by rig 14 to the desired depth. As shown in FIGURE 4, one of two stage piles 28 have been installed through skirt tubular member 30 which is hidden by central caisson 26 and the other two first stage piles are positioned in the other two skirt tubular members 30 awaiting to be driven into sea bottom 18. After the three two stage piles 28 have been installed, the caisson structure 10 is secured in its position on bottom 18. At this stage production deck 40 is installed on top of caisson structure 10 and secured in place as by welding.

FIGURE 5 illustrates the next step in the sequence of installation steps for placing caisson structure 10 in use. With caisson structure 10 secured by piles 28, drill string 32 is used to drill one or more well bores 34 beneath the central caisson 26 into the producing formations. With well bores 34 completed, production strings 36 extend from the producing formation (not shown) to production equipment 38 on the platform 40 located above the surface of the water 20 at the top of caisson structure 10, as shown in FIGURE 6. Additionally, if desired, helicopter pad 42 may be provided above production platform 40.

In addition to the use of improved caisson structure 10 of the present invention as previously described, structure 10 can be installed over existing subsea production strings 44 which extend from a subsea wellhead to the water surface as shown in FIGURE 7 or over a surface wellhead of a subsea well substantially as described previously herein except that caisson structure 10 is positioned with the upper end of strings 44 within central caisson 26 and it lowered to the sea bottom 18 with strings 44 extending through central caisson 26.

In many cases it is desirable to provide some additional stiffening to central caisson 26, particularly in deeper water depths in which central caisson 26 is made out of composite material to provide more strength and is joined together in a suitable manner to the steel truss base 24. Such composite tubular members have greater strength characteristics than the metal tubular members so that both types may be provided with the stiffening of the cement described above. The additional stiffness is provided, as shown in FIGURE 8, by the filling of the interior of central caisson 26 with cement 46 in surrounding relationship to casing strings 48 which surround production tubing 36. The cement 46 acts to tie strings 48 to central caisson 26 and add to its stiffness so that the cemented structure acts as a unit rather than only caisson 26 carrying all of the loading. For severe weather conditions and deeper water depths, the strength of the central caisson 26 can be increased even more by adding a buoyancy tank which will decrease the unsupported length of the caisson and therefore increase its buckling strength.

Caisson structure 10 includes central caisson 26, base 24, production platform 40 and piles 28 as shown in FIGURE 6. Central caisson 26 is a tubular member which in case of shallow wells may be entirely of steel or in deeper water depths may be composite material such as a filament wound tubular structure with suitable joints. Such structures using filaments of fiberglass or of a carbon material such as graphite or other carbon fibers in a suitable matrix are preferred to be used to form such composite structures. The diameter of central caisson 26 is sufficient for its desired stiffness and to accommodate the number of production strings 36 which are to extend through central caisson 26. Base 24 includes tubular members 30, preferably three in number and arranged in triangular relationship with suitable horizontal braces 50 extending between adjacent tubular members 30 and between tubular members 30 and central caisson 26 near the upper and lower ends of tubular members 30. Mud mat brackets 52 are provided between the lower braces 50 adjacent tubular members 30 as shown to provide a larger surface for engagement with bottom 18. Angular braces 51 extend from the junction of braces 50 with tubular member 30 angularly to a position on central caisson 26. The height of base 24 is determined by the height of caisson structure 10 and the loading which it is to support, both axial loading from weight of production equipment and side loading from current, tides, waves and surface winds. Boat landing platform 56 is secured around central caisson 26 at a position to allow the landing and docking of watercraft on the water surface. Additionally as previously mentioned, helicopter pad 42 may be provided above production equipment 38 on production platform 40. A suitable ladder 58 is provided on the exterior of central caisson 26 from a

position immediately above boat landing platform 56 to production platform 40. When helicopter pad 42 is included access is provided between pad 42 and production platform 40 by ladder 60.

It is suggested that piles 28 be tubular in shape so that if it is desired to retrieve caisson structure 10 following the closing and severing of the wells below the bottom 18, that a suitable cutter can be lowered through each of the legs 30 and the piles 28 and be cut at a position sufficiently below bottom 18 to comply with all regulations regarding closing and abandoning wells while allowing retrieval of caisson structure 10. Such structure 10 can be reused at another location by the addition or removal of sections of the tubular member forming the caisson 26 whether caisson is metal or composite material. This is easily, quickly and simply done.

## Claims

1. A method of setting a caisson structure (10) for a subsea production well comprising the steps of locating a jackup rig (14) in position over a preselected subsea well site with its legs (16) on the subsea bottom, delivering a caisson structure (10) to the jackup rig (14), said caisson structure (10) having a central caisson (26) which is tubular, a base (24) with a plurality of tubular legs (30) spaced around said central caisson (26), support braces (54) extending between said legs (30) and said central caisson (26) and said central caisson (26) being sufficiently long to extend from the subsea production well on the subsea bottom to a position above the surface of the water and sufficiently large in diameter to allow drilling therethrough and to accommodate at least one production string (48) extending therethrough, picking up said caisson structure (10) with said jackup rig (14) so that it is positioned generally vertically, lowering said caisson structure (10) to the bottom (18) with its central caisson (26) in surrounding relationship to said preselected subsea well site, setting piles (28) through the tubular legs (30) of said caisson structure, and connecting at least one production string (48) extending through said central caisson (26) to production equipment on the production platform (40) of said caisson structure (10), characterised by the step of filling the interior of said central caisson (26) around the exterior of the production string (48) positioned therein with cement (46) to provide additional support strength to the central caisson (26), thereby allowing the caisson structure (10) to have a footprint smaller than the slot of said jackup rig (14).

2. A method according to claim 1, wherein said central caisson (26) is made of a composite material.

3. A method according to claim 1 or claim 2, including the step of drilling at least one well through said central caisson (26) prior to said cement filling



In many cases it is desirable to provide some additional stiffening to central caisson 26, particularly in deeper water depths in which central caisson 26 is made out of composite material to provide more strength and is joined together in a suitable manner to the steel truss base 24. Such composite tubular members have greater strength characteristics than the metal tubular members so that both types may be provided with the stiffening of the cement described above. The additional stiffness is provided, as shown in FIGURE 8, by the filling of the interior of central caisson 26 with cement 46 in surrounding relationship to casing strings 48 which surround production tubing 36. The cement 46 acts to tie strings 48 to central caisson 26 and add to its stiffness so that the cemented structure acts as a unit rather than only caisson 26 carrying all of the loading. For severe weather conditions and deeper water depths, the strength of the central caisson 26 can be increased even more by adding a buoyancy tank which will decrease the unsupported length of the caisson and therefore increase its buckling strength.

Caisson structure 10 includes central caisson 26, base 24, production platform 40 and piles 28 as shown in FIGURE 6. Central caisson 26 is a tubular member which in case of shallow wells may be entirely of steel or in deeper water depths may be composite material such as a filament wound tubular structures with suitable joints. Such structures using filaments of fiberglass or of a carbon material such as graphite or other carbon fibers in a suitable matrix are preferred to be used to form such composite structures. The diameter of central caisson 26 is sufficient for its desired stiffness and to accommodate the number of production strings 36 which are to extend through central caisson 26. Base 24 includes tubular members 30, preferably three in number and arranged in triangular relationship with suitable horizontal braces 50 extending between adjacent tubular members 30 and between tubular members 30 and central caisson 26 near the upper and lower ends of tubular members 30. Mud mat brackets 52 are provided between the lower braces 50 adjacent tubular members 30 as shown to provide a larger surface for engagement with bottom 18. Angular braces 51 extend from the junction of braces 50 with tubular member 30 angularly to a position on central caisson 26. The height of base 24 is determined by the height of caisson structure 10 and the loading which it is to support, both axial loading from weight of production equipment and side loading from current, tides, waves and surface winds. Boat landing platform 56 is secured around central caisson 26 at a position to allow the landing and docking of watercraft on the water surface. Additionally as previously mentioned, helicopter pad 42 may be provided above production equipment 38 on production platform 40. A suitable ladder 58 is provided on the exterior of central caisson 26 from a

position immediately above boat landing platform 56 to production platform 40. When helicopter pad 42 is included access is provided between pad 42 and production platform 40 by ladder 60.

It is suggested that piles 28 be tubular in shape so that if it is desired to retrieve caisson structure 10 following the closing and severing of the wells below the bottom 18, that a suitable cutter can be lowered through each of the legs 30 and the piles 28 and be cut at a position sufficiently below bottom 18 to comply with all regulations regarding closing and abandoning wells while allowing retrieval of caisson structure 10. Such structure 10 can be reused at another location by the addition or removal of sections of the tubular member forming the caisson 26 whether caisson is metal or composite material. This is easily, quickly and simply done.

## Claims

1. A method of setting a caisson structure (10) for a subsea production well comprising the steps of locating a jackup rig (14) in position over a preselected subsea well site with its legs (16) on the subsea bottom, delivering a caisson structure (10) to the jackup rig (14), said caisson structure (10) having a central caisson (26) which is tubular, a base (24) with a plurality of tubular legs (30) spaced around said central caisson (26), support braces (54) extending between said legs (30) and said central caisson (26) and said central caisson (26) being sufficiently long to extend from the subsea production well on the subsea bottom to a position above the surface of the water and sufficiently large in diameter to allow drilling therethrough and to accommodate at least one production string (48) extending therethrough, picking up said caisson structure (10) with said jackup rig (14) so that it is positioned generally vertically, lowering said caisson structure (10) to the bottom (18) with its central caisson (26) in surrounding relationship to said preselected subsea well site, setting piles (28) through the tubular legs (30) of said caisson structure, and connecting at least one production string (48) extending through said central caisson (26) to production equipment on the production platform (40) of said caisson structure (10), characterised by the step of filling the interior of said central caisson (26) around the exterior of the production string (48) positioned therein with cement (46) to provide additional support strength to the central caisson (26), thereby allowing the caisson structure (10) to have a footprint smaller than the slot of said jackup rig (14).

2. A method according to claim 1, wherein said central caisson (26) is made of a composite material.

3. A method according to claim 1 or claim 2, including the step of drilling at least one well through said central caisson (26) prior to said cement filling



step.

4. A method according to any preceding claim, wherein said lowering step includes the step of lowering said caisson structure (10) over an existing production conduit of a subsea well into position so that the lower end of said central caisson (26) surrounds the subsea wellhead on the bottom (18).

5. A method according to any preceding claim, including the step of securing a production platform (40) at the upper end of said central caisson (26).

6. A caisson structure for connection between a subsea well and the surface of the water comprising:  
a central tubular caisson (26), said central tubular caisson (26) being sufficiently long to extend from the subsea bottom (18) to a position above the water surface;

at least one production string (48) extending from the subsea well through said central tubular caisson (26) to the position above the water surface;

a base (24) including a plurality of legs (30) surrounding the lower end of said caisson (26) and means (50, 54) connecting said legs (30) to said caisson (26) and to each other;

a production platform (40) positioned at the upper end of said caisson (26); characterised in that cement fills the interior of said caisson (26) around the exterior of the production string (48) extending there-through to provide additional support strength to the caisson (26).

7. A caisson structure according to claim 6, wherein said central tubular caisson (26) is steel.

8. A caisson structure according to claim 6, wherein said central tubular caisson (26) is composite material.

9. A caisson structure according to claim 8, wherein said composite material is a filament wound material.

10. A caisson structure according to claim 9, wherein said filament wound material is suitable fiber wound is a suitable matrix.

11. A caisson structure according to claim 10, wherein the fiber of said filament wound material is selected from the group consisting of fiberglass, graphite fibers and other carbon fibers.

12. A caisson structure according to claim 6, wherein said base legs (30) are tubular in shape and including pilings (28) sized to extend through the interior of said base legs (30), each of said pilings being tubular in shape to allow it to be cut from its interior to allow retrieval of said caisson structure (10).

## Patentansprüche

1. Ein Verfahren zum Aufstellen einer Caissonanordnung (10) für ein Unterseeproduktionsbohrloch, mit den Verfahrensschritten: Anordnen einer Hubinsel-Bohrausrüstung (14) in Position über einer vor-

ausgewählten Unterseebohrlochstelle mit ihren, Beinen (16) auf dem Meeresgrund, Zuführen einer Caissonanordnung (10) zu der Hubinsel-Bohrausrüstung (14), wobei die Caissonanordnung (10) einen zentralen Caisson (26), welcher rohrförmig ist, eine Basis (24) mit einer Vielzahl von rohrförmigen Beinen (30), die um den zentralen Caisson (26) herum beabstandet angeordnet sind, Trägerstreben (54), die sich zwischen den Beinen (30) und dem zentralen Caisson (26) erstrecken, aufweist und wobei der zentrale Caisson (26) genügend lang ist, um sich von dem Unterwasserproduktionsbohrloch auf dem Meeresgrund in eine Position oberhalb der Oberfläche des Wasser zu erstrecken, und genügend groß im Durchmesser ist, um ein Bohren durch ihn hindurch zu ermöglichen und um wenigstens eine sich durch ihn hindurch erstreckende Produktionsbohrereinrichtung (48) aufzunehmen, Aufstellen der Caissonanordnung (10) mit der Hubinsel-Bohrausrüstung (14), so daß sie im wesentlichen vertikal angeordnet ist, Absenken der Caissonanordnung (10) auf den Grund (18), wobei ihr zentraler Caisson (26) die vorausgewählte Unterseebohrlochstelle umgibt, Setzen von Pfahlrammen (28) durch die rohrförmigen Beine (30) der Caissonanordnung hindurch, und Verbinden von wenigstens einer sich durch den zentralen Caisson (26) erstreckenden Produktionsbohrereinrichtung (48) mit der Produktionsausrüstung auf der Produktionsplattform (40) der Caissonanordnung (10), gekennzeichnet durch den Verfahrensschritt: Füllen des Innenraums des zentralen Caissons (26) um die Außenwand der Produktionsbohrereinrichtung (48), die darin angeordnet ist, herum mit Zement (46), und für eine zusätzliche Trägerfestigkeit des zentralen Caissons (26) zu sorgen, wodurch es möglich ist, daß die Caissonanordnung (10) eine Aufstandsfläche kleiner als der Schlitz der Hubinsel-Bohrausrüstung (14) aufweist.

2. Ein Verfahren nach Anspruch 1, wobei der zentrale Caisson (26) aus einem Kompositmaterial hergestellt ist.

3. Ein Verfahren nach Anspruch 1 oder 2, mit dem Verfahrensschritt: Bohren von wenigstens einem Bohrloch durch den zentralen Caisson (26) vor dem Zementfüllungsschritt.

4. Ein Verfahren nach wenigstens einem der vorhergehenden Ansprüche, wobei der Absenkungsschritt den Schritt der Absenkung der Caissonanordnung (10) über einer vorhandenen Produktionsleitung eines Unterseebohrlochs in eine Position derart enthält, daß das untere Ende des zentralen Caissons (26) das Unterseebohrloch auf dem Meeresgrund (18) umgibt.

5. Ein Verfahren nach wenigstens einem der vorhergehenden Ansprüche, welches den Schritt der Befestigung einer Produktionsplattform (40) am oberen Ende des zentralen Caissons (26) enthält.

6. Eine Caissonanordnung zum Herstellen einer



Verbindung zwischen einem Unterseebohrloch und der Wasseroberfläche, mit: einem zentralen röhrenförmigen Caisson (26), wobei der zentrale röhrenförmige Caisson (26) genügend lang ist, um sich vom Meeresgrund (18) zu einer Position oberhalb der Wasseroberfläche zu erstrecken;

wenigstens einer Produktionsbohrereinrichtung (48), die sich von dem Unterseebohrloch durch den zentralen röhrenförmigen Caisson (26) in die Position oberhalb der Wasseroberfläche erstreckt;

einem Basisteil (24), welches eine Vielzahl von Beinen (30), die das untere Ende des Caissons (26) umgeben, und eine Einrichtung (50, 54), die die Beine (30) und den Caisson (26) miteinander verbinden, enthält;

einer Produktionsplattform (40), die am oberen Ende des Caissons (26) angeordnet ist; dadurch gekennzeichnet,

daß Zement den Innenraum des Caissons (26) um die Außenwand der sich hindurch erstreckenden Produktionsbohrereinrichtung (48) ausfüllt, um für eine zusätzliche Trägerfestigkeit des Caissons (26) zu sorgen.

7. Eine Caissonanordnung nach Anspruch 6, wobei der zentrale röhrenförmige Caisson (26) aus Stahl besteht.

8. Eine Caissonanordnung nach Anspruch 6, wobei der zentrale röhrenförmige Caisson (26) aus einem Kompositmaterial besteht.

9. Eine Caissonanordnung nach Anspruch 8, wobei das Kompositmaterial ein in einer Wickeltechnik hergestelltes Material ist.

10. Eine Caissonanordnung nach Anspruch 9, wobei das in einer Wickeltechnik hergestellte Material geeignete gewundene Fasern in einer geeigneten Matrix enthält.

11. Eine Caissonanordnung nach Anspruch 10, wobei die Faser des in Wickeltechnik hergestellten Materials aus der aus Fiberglas, Graphitfasern und anderen Kohlenstofffasern bestehenden Gruppe ausgewählt ist.

12. Eine Caissonanordnung nach Anspruch 6, wobei die Basisbeine (30) röhrenförmig sind und Pfähle (28) enthalten, welche sich durch das Innere der Basisbeine (30) hindurch erstrecken, wobei jeder der Pfähle röhrenförmig ist, um zu ermöglichen, daß er von innen her zerschnitten werden kann, um die Bergung bzw. Wiedergewinnung der Caissonanordnung (10) zu ermöglichen.

## Revendications

1. Procédé de mise en place d'une structure à caisson (10) destinée à un puits sous-marin d'exploitation pétrolière comportant les opérations consistant à mettre une installation (14) de levage par vérins en position au-dessus d'un site choisi à l'avance de puits

sous-marin, ses jambes (16) reposant sur le fond de la mer, à fournir une structure à caisson (10) à l'installation (14) de levage par vérins, ladite structure (10) à caisson possédant une tour centrale (26) en caisson qui est tubulaire, une base (24) munie d'une pluralité de jambages tubulaires (30) espacés autour de ladite tour centrale (26) en caisson, des bracons (54) d'entretoisement s'étendant entre lesdits jambages (30) et ladite tour centrale (26) en caisson et ladite tour centrale (26) en caisson étant suffisamment longue pour s'étendre depuis le puits sous-marin d'exploitation pétrolière situé sur le fond de la mer jusqu'à une position située au-dessus de la surface de l'eau et ayant un diamètre suffisamment grand pour permettre un forage à travers cette tour et pour loger au moins un train d'exploitation (48) s'étendant à travers cette tour, à relever ladite structure (10) à caisson à l'aide de ladite installation (14) de levage par vérins de manière qu'elle soit positionnée de façon globalement verticale, à abaisser ladite structure (10) à caisson jusqu'au fond (18) sa tour centrale (26) en caisson ayant une situation entourant ledit site choisi à l'avance de puits sous-marin, à mettre en place des pieux (28) par l'intermédiaire des jambages tubulaires (30) de ladite structure à caisson, et à raccorder au moins un train (48) d'exploitation s'étendant à travers ladite tour centrale (26) en caisson à du matériel de production situé sur la plate-forme de production (40) de ladite structure (10) à caisson, caractérisé par l'opération consistant à remplir l'intérieur de ladite tour centrale (26) en caisson autour de l'extérieur du train d'exploitation (48) qui y est mis en place/au moyen de ciment (46) de façon à procurer une résistance supplémentaire de soutien à la tour centrale (26) en caisson, en permettant de ce fait à la structure (10) à caisson d'avoir une assise plus petite que la trappe de forage de ladite installation (14) de levage par vérins.

2. Procédé conforme à la revendication 1, dans lequel ladite tour centrale (26) en caisson est faite d'un matériau composite.

3. Procédé conforme à la revendication 1 ou à la revendication 2, comprenant l'opération qui consiste à forer au moins un puits à travers ladite tour centrale (26) en caisson préalablement à ladite opération de remplissage à l'aide de ciment.

4. Procédé conforme à l'une quelconque des revendications précédentes, dans lequel ladite opération d'abaissement comprend l'opération consistant à abaisser ladite structure (10) à caisson au-dessus d'un tuyau existant de production d'un puits sous-marin en position telle que l'extrémité inférieure de ladite tour centrale (26) en caisson entoure la tête de puits sous-marine située sur le fond (18).

5. Procédé conforme à l'une quelconque des revendications précédentes, comprenant l'opération consistant à assujettir une plate-forme (40) de production sur l'extrémité supérieure de ladite tour cen-



trale (26) en caisson.

6. Structure à caisson destinée au raccordement entre un puits sous-marin et la surface de l'eau comportant:

une tour centrale tubulaire (26) en caisson, ladite tour centrale tubulaire en caisson (26) étant suffisamment longue pour s'étendre depuis le fond (18) de la mer jusqu'à une position située au-dessus de la surface de l'eau;

au moins un train (48) d'exploitation s'étendant depuis le puits sous-marin à travers ladite tour centrale tubulaire (26) en caisson jusqu'à la position située au-dessus de la surface de l'eau;

une base (24) comprenant une pluralité de jambages (30) qui entourent l'extrémité inférieure de ladite tour (26) en caisson et des moyens (54, 50) qui relient lesdits jambages (30) à ladite tour (26) en caisson et les uns aux autres;

une plate-forme (40) de production mise en place à l'extrémité supérieure de ladite tour (26) en caisson; caractérisée en ce que du ciment remplit l'intérieur de ladite tour (26) en caisson autour de l'extérieur du train (48) d'exploitation qui s'étend à travers cette tour de manière à procurer une résistance supplémentaire de soutien à la tour (26) en caisson.

7. Structure à caisson conforme à la revendication 6, dans laquelle ladite tour centrale tubulaire (26) en caisson est en acier.

8. Structure à caisson conforme à la revendication 6, dans laquelle ladite tour centrale tubulaire (26) est en matériau composite.

9. Structure à caisson conforme à la revendication 8, dans laquelle ledit matériau composite est un matériau à filaments enroulés.

10. Structure à caisson conforme à la revendication 9, dans laquelle ledit matériau à filaments enroulés est une fibre appropriée enroulée dans une matrice appropriée.

11. Structure à caisson conforme à la revendication 10, dans laquelle la fibre dudit matériau à filaments enroulés est choisie à partir du groupe constitué par la laine de verre, les fibres de graphite et d'autres fibres de carbone.

12. Structure à caisson conforme à la revendication 6, dans laquelle lesdits jambages (30) de la base ont une forme tubulaire et contiennent des pieux (28) dimensionnés de façon à s'étendre à l'intérieur desdits jambages (30) de la base, chacun desdits pieux ayant une forme tubulaire pour lui permettre d'être coupé à partir de l'intérieur de ce pieu de manière à permettre la récupération de ladite structure (10) à caisson.