

Description

This invention relates to a subsea riser for multiple bore wells.

Multiple bore wells having multibore tubing hangers and christmas trees often utilize multiple tubing strings or "purpose built" multiple bore completion or workover risers. These multiple tubing strings provide access to each individual bore but in deep water locations the multiple tubing strings are cumbersome. Also, the specially built riser to provide access to each individual bore for wirelining is very expensive.

U. S. Patent Nos. 4,284,142 and 4,474,236 disclose structures of the purpose built type of multiple bore completion/workover risers. These structures provide the multiple bores extending completely through the structure so that access to each bore is available at the water surface.

U. S. Patent No. 4,291,724 discloses a flowline switching apparatus in which access to a plurality of individual flowlines is provided for through flow line (TFL) tools from a single connection at the top of the structure. This disclosure involves the rotation of a cylinder structure with the flowline extending therethrough being curved to register with the individual bores as the cylinder is rotated.

U. S. Patent No. 4,319,637 discloses an orienting system for running a multiple string tubing hanger for remote installation, such as an underwater well.

US-A-3780756 describes a switch which can interconnect a pipeline to one of two or more diverging pipeline sections.

An object of the present invention is to provide an improved, reasonably priced subsea riser which provides communication between a single string at the upper end of the riser with individual strings at the lower end of the riser.

According to the present invention there is provided a subsea riser for connecting a multiple bore subsea wellhead to the surface, the riser comprising a string of single bore tubular elements extending, in use, from the surface to near to the wellhead, and, at the bottom of the string, a riser selector, the riser selector comprising a lower housing member having multiple, substantially vertical bores therethrough spaced around the centre of the lower housing member, means for fixing the lower housing member to the wellhead, a tubular housing fixed at its lower end to the lower housing member, an upper tubular member which is rotatably mounted within the tubular housing and projects upwardly therefrom, the upper tubular member and lowermost tubular element of the string being provided with means for fixing them together with a substantially vertical bore in the upper tubular member in register with a substan-

tially vertical bore in the lowermost tubular element of the string, the upper tubular member having a tubing extension extending downwardly through a gradual transition so as to terminate at its lower end with an offset substantially vertical portion which can be selectively brought into register with different ones of the bores of the lower housing member upon rotation of the upper tubular member relatively thereto, and the upper tubular member also having a tubular skirt which extends downwardly around the tubing extension and within the tubular housing and is in sealing engagement at its lower end with the lower housing member.

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

FIGURE 1 is an elevation view of completion riser of the prior art.

FIGURE 2 is detail partial longitudinal sectional view of the completion riser shown in FIGURE 1.

FIGURE 3 is a sectional view taken along line 3-3 in FIGURE 1.

FIGURE 4 is an elevation view of the improved riser of the present invention.

FIGURE 5 is a detailed longitudinal sectional view of the lower part of the riser shown in FIGURE 4 and includes FIGURES 5A which shows the upper portion of the riser selector, 5B which shows the intermediate or offset portion of the riser selector and 5C which shows the lower portion of the riser selector.

FIGURE 6 is a transverse sectional view taken along line 6-6 in FIGURE 5 to show the rotational stop structure.

FIGURE 7 is another transverse sectional view taken along line 7-7 in FIGURE 5 to illustrate the structure of the position indicating apparatus.

Riser 10 illustrated in FIGURES 1, 2 and 3 discloses the completion riser described above in which riser 10 includes a plurality of sections 12 which are connected end to end to provide connection from the water surface to a subsea wellhead 14. Each of sections 12 includes an outer tubular housing 16 and a plurality of strings 18 which provide the connection from the surface to the subsea wellhead 14. As best seen from FIGURE 3, riser 10 includes two strings 18a and 18b of large diameter one string 18c having a slightly smaller diameter and a plurality of strings or control lines 18d which extend through tubular housings 16 and are interconnected so that each string 18 and control line 18d extends continuously from the upper end to the lower end of riser 10. This structure provides direct access through the two large diameter strings 18a and 18b to the tubing strings (not shown) within the wellhead 14 for wireline and other operations necessary for completion and workover operations. Each of sections 12 is a com-

plete assembly including all of the tubular members therein to form the complete strings 18. Such structure is expensive and cumbersome.

Improved riser 20 of the present invention is shown in FIGURES 4 through 7. Riser 20 includes a plurality of sections 22 so that it extends from the surface to the subsea wellhead 24. Riser 20 is different from the risers of the prior art in that the upper of sections 22 include single tubular members 26 extending from the water surface to a point near subsea wellhead 24 with control lines 72 being on the exterior of tubular member 26 and preferably suitably attached or secured to member 26 in a well known manner so that they are not damaged by the currents. The lowest section 22 of tubular member 26 is connected to the upper end of riser selector 28. The function of riser selector 28 is to provide ready access to the interior of each of the well tubing strings within wellhead 24 from tubular member 26 for completion and workover operations.

Riser selector 28 includes upper tubular member 30 having suitable means (threaded box) for connecting to the lower end of the lower tubular member 26, housing 32 surrounding all but the upper portion of upper tubular member 30, bearing means 34 between the upper end of housing 32 and tubular member 26, means 36 secured to the lower end of housing 32 and having means 38 for connecting to the subsea wellhead 24, means 40 for limiting the amount of relative rotation of tubular member 30 with respect to housing 32 and means 42 for providing an indication of the relative position of tubular member 30 with respect to housing 32 and connecting means 38. It should be noted that the improved riser 20 can be run with a christmas tree or a tubing hanger running tool on its lower end.

Upper tubular member 30 includes upper external partial groove 44 which is positioned within flange 46 forming the upper end of housing 32, lower groove 48 in which split ring 50 is positioned to support flange 46 at the preselected level on tubular member 30, upwardly facing bearing shoulder 52, tubing extension 54 and skirt 56 both of which extend from the lower portion of annular ring 58 which forms shoulder 52. Flange 46 is secured to bearing ring 60 having inner lip 62 and with upper thrust bearing 64 positioned between upper shoulder 66 on lip 62 and the lower surface of split ring 50 and lower thrust bearing 68 positioned between lower shoulder 70 on lip 62 and bearing shoulder 52. Tubing extension 54 at its upper end is centered with respect to housing 32 and includes offset portion 54a in which tubing extension is gradually bent outward and then returned to a vertical position. This offset portion 54a of tubing extension 54 should be at least ten feet (3.0

metres) long and is preferred to be thirty feet (9.1 metres) long so that the bends therein are smooth transitions and allow TFL tools to pass therethrough. Control lines 72 connect through flange 46 into bearing ring 60 in positions communicating with passages 74 therethrough and lanes 76 connect into the opposite end of passages 74 and extending downwardly within housing 32 in surrounding relation to skirt 56 to connect into housing ring or lower housing member 78 to communicate with passages 80 which extend through housing ring 78 and communicate with their mating passages (not shown) in the wellhead equipment connected to the lower end of riser selector 20.

Housing 32 is threaded onto the exterior of bearing ring 60 at its upper end and is sealed around the upper end of housing ring 78 at its lower end. Snap ring 82 by being in engagement with internal groove 84 in housing 32 and external groove 86 in housing ring 78 retains housing 32 secured to housing ring 78. O rings 88 positioned within grooves on the interior of housing 32 above groove 84 provide sealing between the interior of housing 32 and the exterior of housing ring 68. Bores 90 and 92 extend through housing ring 78 and communicate with the bore of tubing hangers in the wellhead at their lower ends and terminate at the upper end of housing ring 78 as shown in FIGURE 5C. Bore 94 also extends through housing ring 78 and provides communication with the annulus around tubing strings within the wellhead. Plug 96 is positioned with its smaller lower end within bore 94a and has its upper end which is of a larger diameter within bore 94b. Suitable sealing is provided between the exterior of plug 96 and the interior of bores 94a and 94b. Side passage 97 extends through housing ring 78 into communication with bore 94a above the lower seals around the exterior of plug 96 and thus by movement of plug 96 upward can be in communication through bore 94a with the annulus below housing ring 78. Passage 97a through housing ring 78 communicates with bore 94b above plug 96 and is used to move plug 96 downward into position closing communication between side passage 97 and the lower end of bore 94a. Upper plug 98 is positioned within bore 94c at the upper end of bore 94 and includes spring loaded detent 100 contained therein and projecting upwardly therefrom as shown and hereinafter described.

As described above, tubular extension 54, as best seen in FIGURE 5 B, is curved from its upper position within the center of housing 32 to its offset lower position which is in alignment with either bore 90 or bore 92, depending on the rotation of upper tubular member 30 with respect to housing 32. As shown in FIGURES 5C and 6, plate 102 is positioned above housing ring 78 within skirt 56

and the lower end of tubular extension 54 extends through opening 104 in plate 102. Skirt 56 surrounds the upper exterior of lower housing 78 and O rings 105 provide a seal therebetween so that the exterior of skirt is completely sealed and will retain pressure which is exerted therein. Arcuate slot 106 also extends through plate 102 and the upper end of spring loaded detent 100 extends through slot 106 to limit the rotary movement of tubular member 26 and tubular extension 54 to positions in axial alignment with bores 90 and 92. Connecting means 38 is any suitable connecting means to provide the connection of the lower end of riser selector 20 to the upper end of the Christmas tree or tubing hanger running tool (not shown in FIGURE 5C).

Position indicating means 42 is best seen in FIGURE 7 and includes ports 108, 110 and 112 extending through neck 114 of flange 46 and port 110 is always in communication with partial annular groove 44 while ports 108 and 112 are alternately in communication with partial groove 110 depending upon the rotation of upper tubular member 26. By supplying hydraulic fluid to port 110 and connecting ports 108 and 112 to indicating devices sensing pressure of hydraulic fluid at each of the alternate ports, an indication of the position of tubular extension 54 with respect to bores 90 and 92 is provided.

It should be noted that by limiting the length of offset portion 54a of tubular extension 54, the length of riser selector 28 is limited and the major portion of riser 20 is composed of sections of single bore tubular members. This greatly reduces the cost of the riser but does not interfere with the access to the subsea wellhead for completion or workover operations and is not nearly as cumbersome as the risers of the prior art.

Claims

1. A subsea riser for connecting a multiple bore subsea wellhead (24) to the surface, the riser comprising a string of single bore tubular elements (26) extending, in use, from the surface to near to the wellhead, and, at the bottom of the string, a riser selector (28), the riser selector comprising a lower housing member (78) having multiple, substantially vertical bores (90,92) therethrough spaced around the centre of the lower housing member, means (38) for fixing the lower housing member (78) to the wellhead, a tubular housing (32) fixed at its lower end to the lower housing member (78), an upper tubular member (30) which is rotatably mounted within the tubular housing (32) and projects upwardly therefrom, the upper tubular member and lowermost tubular element of the

string being provided with means for fixing them together with a substantially vertical bore in the upper tubular member (30) in register with a substantially vertical bore in the lowermost tubular element (26) of the string, the upper tubular member (30) having a tubing extension (54) extending downwardly through a gradual transition so as to terminate at its lower end with an offset substantially vertical portion (54a) which can be selectively brought into register with different ones of the bores of the lower housing member (78) upon rotation of the upper tubular member (30) relative thereto, and the upper tubular member also having a tubular skirt (56) which extends downwardly around the tubing extension (54) and within the tubular housing (32) and is in sealing engagement at its lower end with the lower housing member.

2. A subsea riser according to claim 1, including means (40) for limiting the extent of rotation of the upper tubular member (30) with respect to the lower housing member (78).
3. A subsea riser according to claim 2, wherein the lower housing (78) includes two bores (90,92) extending therethrough and the rotation limiting means includes a plate (102) mounted within the housing immediately above the lower housing member and having an opening (104) therethrough for receiving the lower end of the offset portion (54a) of the upper tubular member and an arcuate slot (106), pin means (100) supported by the lower housing member and extending into the arcuate slot (106), the arcuate slot (106) being positioned to cause the plate to stop rotation of the tubular member (30) when the lower offset end thereof is in registry with one of the two bores (90,92) in the lower housing member.
4. A subsea riser according to any one of the preceding claims, including control lines (72) extending into the interior of the tubular housing (32) at its upper end and exiting therefrom at its lower end, the control lines being positioned within the annular space between the interior of the tubular housing (32) and the exterior of the skirt (56) so that they do not interfere with the rotation of the upper tubular member and are not damaged thereby.
5. A subsea riser according to any one of the preceding claims, wherein the length of the offset portion (54a) of the upper tubular member (30) is at least ten feet (3.0 metres) in length.



and the lower end of tubular extension 54 extends through opening 104 in plate 102. Skirt 56 surrounds the upper exterior of lower housing 78 and O rings 105 provide a seal therebetween so that the exterior of skirt is completely sealed and will retain pressure which is exerted therein. Arcuate slot 106 also extends through plate 102 and the upper end of spring loaded detent 100 extends through slot 106 to limit the rotary movement of tubular member 26 and tubular extension 54 to positions in axial alignment with bores 90 and 92. Connecting means 38 is any suitable connecting means to provide the connection of the lower end of riser selector 20 to the upper end of the Christmas tree or tubing hanger running tool (not shown in FIGURE 5C).

Position indicating means 42 is best seen in FIGURE 7 and includes ports 108, 110 and 112 extending through neck 114 of flange 46 and port 110 is always in communication with partial annular groove 44 while ports 108 and 112 are alternately in communication with partial groove 110 depending upon the rotation of upper tubular member 26. By supplying hydraulic fluid to port 110 and connecting ports 108 and 112 to indicating devices sensing pressure of hydraulic fluid at each of the alternate ports, an indication of the position of tubular extension 54 with respect to bores 90 and 92 is provided.

It should be noted that by limiting the length of offset portion 54a of tubular extension 54, the length of riser selector 28 is limited and the major portion of riser 20 is composed of sections of single bore tubular members. This greatly reduces the cost of the riser but does not interfere with the access to the subsea wellhead for completion or workover operations and is not nearly as cumbersome as the risers of the prior art.

Claims

1. A subsea riser for connecting a multiple bore subsea wellhead (24) to the surface, the riser comprising a string of single bore tubular elements (26) extending, in use, from the surface to near to the wellhead, and, at the bottom of the string, a riser selector (28), the riser selector comprising a lower housing member (78) having multiple, substantially vertical bores (90,92) therethrough spaced around the centre of the lower housing member, means (38) for fixing the lower housing member (78) to the wellhead, a tubular housing (32) fixed at its lower end to the lower housing member (78), an upper tubular member (30) which is rotatably mounted within the tubular housing (32) and projects upwardly therefrom, the upper tubular member and lowermost tubular element of the

string being provided with means for fixing them together with a substantially vertical bore in the upper tubular member (30) in register with a substantially vertical bore in the lowermost tubular element (26) of the string, the upper tubular member (30) having a tubing extension (54) extending downwardly through a gradual transition so as to terminate at its lower end with an offset substantially vertical portion (54a) which can be selectively brought into register with different ones of the bores of the lower housing member (78) upon rotation of the upper tubular member (30) relatively thereto, and the upper tubular member also having a tubular skirt (56) which extends downwardly around the tubing extension (54) and within the tubular housing (32) and is in sealing engagement at its lower end with the lower housing member.

2. A subsea riser according to claim 1, including means (40) for limiting the extent of rotation of the upper tubular member (30) with respect to the lower housing member (78).
3. A subsea riser according to claim 2, wherein the lower housing (78) includes two bores (90,92) extending therethrough and the rotation limiting means includes a plate (102) mounted within the housing immediately above the lower housing member and having an opening (104) therethrough for receiving the lower end of the offset portion (54a) of the upper tubular member and an arcuate slot (106), pin means (100) supported by the lower housing member and extending into the arcuate slot (106), the arcuate slot (106) being positioned to cause the plate to stop rotation of the tubular member (30) when the lower offset end thereof is in registry with one of the two bores (90,92) in the lower housing member.
4. A subsea riser according to any one of the preceding claims, including control lines (72) extending into the interior of the tubular housing (32) at its upper end and exiting therefrom at its lower end, the control lines being positioned within the annular space between the interior of the tubular housing (32) and the exterior of the skirt (56) so that they do not interfere with the rotation of the upper tubular member and are not damaged thereby.
5. A subsea riser according to any one of the preceding claims, wherein the length of the offset portion (54a) of the upper tubular member (30) is at least ten feet (3.0 metres) in length.



6. A subsea riser according to any one of the preceding claims, wherein the length of the offset portion (54a) of the upper tubular member (30) is approximately thirty feet (9.1 metres).

7. A subsea riser according to any one of the preceding claims, including means (42) associated with the tubular housing for indicating the relative rotary position of the tubular member (30) with respect to the tubular housing (32).

8. A subsea riser according to claim 7, wherein the indicating means (42) includes a flange (46) secured to the tubular housing (32) and having a neck (114) surrounding the tubular member, a partial annular groove (44) in the exterior of the tubular member (30) within the flange neck, a plurality of ports (108, 110, 112) extending through the flange neck (114) at a level to communicate the partial annular groove (44) with at least one of the ports supplying hydraulic fluid under pressure to the groove (44) and the other of the ports when in communication with the groove delivering hydraulic fluid to the surface to indicate the rotary position of the tubular member (30) within the tubular housing (32).

Patentansprüche

1. Unterwasser-Steigrohr zur Verbindung eines Unterwasser-Mehrfachbohrlochkopfes (24) mit der Oberfläche, **dadurch gekennzeichnet**, daß das Steigrohr umfaßt: einen Strang aus einzügigen rohrförmigen Elementen (26), der sich in Betrieb von der Oberfläche bis nahe zum Bohrlochkopf erstreckt, und eine Steigrohrwähleinrichtung (28) am unteren Ende des Stranges, wobei die Steigrohrwähleinrichtung ein unteres Gehäuseeteil (78) mit einer Vielzahl von durch dieses hindurchgehenden, im wesentlichen vertikalen Bohrungen (90, 92), die um die Mitte des unteren Gehäusesteiles beabstandet angeordnet sind, besitzt, eine Einrichtung (38) zur Befestigung des unteren Gehäusesteiles (78) am Bohrlochkopf, ein rohrförmiges Gehäuse (32), das mit seinem unteren Ende am unteren Gehäuseeteil (78) befestigt ist, einen oberen rohrförmigen Körper (30), welcher drehbar innerhalb des rohrförmigen Gehäuses (32) angeordnet ist und aus diesem nach oben hervorragt, wobei der obere rohrförmige Körper und das unterste rohrförmige Element des Stranges mit Mitteln zu deren Verbindung mit einer im wesentlichen vertikalen Bohrung im oberen rohrförmigen Körper (30)

in Ausrichtung mit einer im wesentlichen vertikalen Bohrung im untersten rohrförmigen Element (26) des Stranges versehen sind, und der obere rohrförmige Körper (30) eine Rohrverlängerung (54) aufweist, die sich nach unten durch einen abgestuften Übergang so erstreckt, daß sie in ihrem unteren Endbereich in einem gekröpften, im wesentlichen vertikalen Abschnitt (54a) endet, welcher bei Drehung des oberen rohrförmigen Körpers (30) relativ zum unteren Gehäuseeteil (78) wahlweise in Ausrichtung mit einer von verschiedenen Bohrungen im unteren Gehäuseeteil (78) gebracht werden kann, und der obere rohrförmige Körper außerdem einen rohrförmigen Bund (56) aufweist, welcher sich nach unten um die Rohrverlängerung (54) und in das rohrförmige Gehäuse (32) erstreckt, und sich mit seinem unteren Ende in dichtendem Eingriff mit dem unteren Gehäuseeteil befindet.

2. Unterwasser-Steigrohr nach Anspruch 1, **dadurch gekennzeichnet**, daß es eine Einrichtung (40) zur Begrenzung der relativen Verdrehbarkeit des oberen rohrförmigen Körpers (30) gegenüber dem unteren Gehäuseeteil (78) aufweist.

3. Unterwasser-Steigrohr nach Anspruch 2, **dadurch gekennzeichnet**, daß das untere Gehäuseeteil (78) zwei durch dieses hindurchgehende Bohrungen (90, 92) aufweist, und die Einrichtung zur Begrenzung der relativen Verdrehbarkeit umfaßt: eine Scheibe (102), die im Gehäuse unmittelbar über dem unteren Gehäuseeteil angeordnet ist, eine Öffnung (104) zur Aufnahme des unteren Endes des gekröpften Abschnittes (54a) des oberen rohrförmigen Körpers, einen bogenförmigen Schlitz (106), und ein Stiftelement (100), das im unteren Gehäuseeteil befestigt ist, und in den bogenförmigen Schlitz (106) ragt, wobei der bogenförmige Schlitz (106) so angeordnet ist, daß die Scheibe die Drehung des rohrförmigen Körpers (30) stoppt, wenn dessen unteres gekröpftete Ende sich in Ausrichtung mit einer der beiden Bohrungen (90, 92) im unteren Gehäuseeteil befindet.

4. Unterwasser-Steigrohr nach mindestens einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet**, daß Steuerleitungen (72) am oberen Ende in das Innere des rohrförmigen Gehäuses (32) hineinführen und aus diesem an dessen unterem Ende austreten, und die Steuerleitungen innerhalb des Ringraumes zwischen dem Inneren des rohrförmigen Gehäuses (32) und der Außenseite des Bundes (56)



angeordnet sind, so daß sie die Verdrehung des oberen rohrförmigen Körpers nicht behindern und durch diese nicht beschädigt werden.

5. Unterwasser-Steigrohr nach mindestens einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet**, daß die Länge des gekröpften Abschnittes (54a) des oberen rohrförmigen Körpers (30) mindestens zehn Fuß (3,0 Meter) beträgt.
6. Unterwasser-Steigrohr nach mindestens einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet**, daß die Länge des gekröpften Abschnittes (54a) des oberen rohrförmigen Körpers (30) annähernd dreißig Fuß (9,1 Meter) beträgt.
7. Unterwasser-Steigrohr nach mindestens einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet**, daß eine Einrichtung (42) mit dem rohrförmigen Gehäuse verbunden ist, die die Lage der Verdrehung des rohrförmigen Körpers (30) relativ zum rohrförmigen Gehäuse (32) anzeigt.
8. Unterwasser-Steigrohr nach Anspruch 7, **dadurch gekennzeichnet**, daß die Anzeigeeinrichtung (42) umfaßt: einen Flansch (46), der am rohrförmigen Gehäuse (32) befestigt ist und ein Halsteil (114) aufweist, das den rohrförmigen Körper umgibt, eine teillringförmige Nut (44) an der Außenseite des rohrförmigen Körpers (30) innerhalb des Flansch-Halsteiles, eine Vielzahl von Öffnungen (108, 110, 112), die durch das Flansch-Halsteil (14) in einer Höhe hindurchgehen, um zur teillringförmigen Nut (44) durch mindestens eine der Öffnungen Verbindung herzustellen und der Nut (44) und den anderen der Öffnungen, wenn sie mit der Nut in Verbindung stehen, unter Druck stehendes hydraulisches Fluid zuzuführen, so daß diese hydraulisches Fluid zur Oberfläche leiten, um die Lage der Verdrehung des rohrförmigen Körpers (30) im rohrförmigen Gehäuse (32) anzuzeigen.

Revendications

1. Colonne montante immergée pour relier à la surface une tête de puits (24) immergée à plusieurs forages, la colonne montante comportant une ligne d'éléments tubulaires (26) de forage unique s'étendant, en utilisation, depuis la surface jusqu'à proximité de la tête de puits, et, au niveau de la partie inférieure de la ligne, un sélecteur (28) de colonne montante, le sélecteur de colonne montante comportant un

élément (78) formant boîtier inférieur ayant plusieurs alésages (90, 92) pratiquement verticaux traversants, espacés autour de l'axe de l'élément formant boîtier inférieur, des moyens (38) pour fixer l'élément (78) formant boîtier inférieur sur la tête de puits, un boîtier tubulaire (32) fixé au niveau de son extrémité inférieure sur l'élément (78) formant boîtier inférieur, un élément tubulaire supérieur (30) qui est monté de manière rotative dans le boîtier tubulaire (32) et fait saillie vers le haut à partir de celui-ci, l'élément tubulaire supérieur et l'élément tubulaire le plus inférieur de la ligne étant munis de moyens pour fixer ceux-ci ensemble en ayant un alésage pratiquement vertical de l'élément tubulaire supérieur (30) en vis à vis d'un alésage pratiquement vertical de l'élément tubulaire le plus inférieur (26) de la ligne, l'élément tubulaire supérieur (30) ayant un prolongement de tuyauterie (54) s'étendant vers le bas par l'intermédiaire d'une transition graduelle de manière à se terminer au niveau de son extrémité inférieure par une partie décalée (54a) pratiquement verticale qui peut être amenée de manière sélective en vis à vis d'un des alésages différents parmi les alésages de l'élément (78) formant boîtier inférieur lors de la mise en rotation de l'élément tubulaire supérieur (30) par rapport à celui-ci, et l'élément tubulaire supérieur ayant aussi une chemise tubulaire (56) qui s'étend vers le bas autour du prolongement de tuyauterie (54) et à l'intérieur du boîtier tubulaire (32) et est contact étanche au niveau de son extrémité inférieure avec l'élément formant boîtier inférieur.

2. Colonne montante immergée selon la revendication 1, comportant des moyens (40) pour limiter l'amplitude de la rotation de l'élément tubulaire supérieur (30) par rapport à l'élément (78) formant boîtier inférieur.
3. Colonne montante immergée selon la revendication 2, dans laquelle le boîtier inférieur (78) comporte deux alésages (90, 92) s'étendant de manière traversante et les moyens de limitation de la rotation comportent une plaque (102) montée dans le boîtier immédiatement au-dessus de l'élément formant boîtier inférieur et comportant une ouverture traversante (104) destinée à recevoir l'extrémité inférieure de la partie décalée (54a) de l'élément tubulaire supérieur et une fente (106) arquée, des moyens (100) formant doigt supportés par l'élément formant boîtier inférieur et s'étendant à l'intérieur de la fente arquée (106), la fente arquée (106) étant positionnée pour amener la plaque à arrêter la rotation de l'élément tubu-



laire (30) lorsque l'extrémité inférieure décalée de celui-ci est en vis à vis d'un des deux alésages (90,92) de l'élément formant boîtier inférieur.

4. Colonne montante immergée selon l'une quelconque des revendications précédentes, comportant des lignes de commande (72) s'étendant dans la partie intérieure du boîtier tubulaire (32) au niveau de son extrémité supérieure et sortant de celui-ci au niveau de son extrémité inférieure, les lignes de commande étant positionnées dans l'espace annulaire existant entre la partie intérieure du boîtier tubulaire (32) et la partie extérieure de la chemise (56) de telle sorte qu'elles n'interfèrent pas avec la rotation de l'élément tubulaire supérieur et ne se sont pas détériorées par celle-ci. 5
10
15
5. Colonne montante immergée selon l'une quelconque des revendications précédentes, dans laquelle la longueur de la partie décalée (54a) de l'élément tubulaire supérieur (30) est d'une longueur d'au moins 3,0 mètres (10 pieds). 20
25
6. Colonne montante immergée selon l'une quelconque des revendications précédentes, dans laquelle la longueur de la partie décalée (54a) de l'élément tubulaire supérieur (30) est d'approximativement 9,1 mètres (30 pieds). 30
7. Colonne montante immergée selon l'une quelconque des revendications précédentes, comportant des moyens (42) associés au boîtier tubulaire pour indiquer la position relative en rotation de l'élément tubulaire (30) par rapport au boîtier tubulaire (32). 35
8. Colonne montante immergée selon la revendication 7, dans laquelle les moyens indicateurs (42) comportent un rebord (46) fixé sur le boîtier tubulaire (32) et comportant un col (114) entourant l'élément tubulaire, une gorge annulaire partielle (44) située dans la partie extérieure de l'élément tubulaire (30) dans le col du rebord, plusieurs orifices (108,110,112) s'étendant à travers le col (114) du rebord à un niveau pour mettre en communication la gorge annulaire partielle (44) avec au moins un des orifices alimentant un fluide hydraulique sous-pression vers la gorge (44) et l'autre des orifices, lorsqu'il communique avec la gorge, envoie le fluide hydraulique vers la surface pour indiquer la position de rotation de l'élément tubulaire (30) à l'intérieur du boîtier tubulaire (32). 40
45
50
55