United States Patent

Curington et al.

[15] **3,688,840**

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[54] **METHOD AND APPARATUS FOR USE IN DRILLING A WELL**

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[52] **U.S. Cl.** **166/.6,** 285/25, 285/317

[51] **Int. Cl.** **E21b 43/01**

[58] **Field of Search** .....166/.5, .6; 175/7; 285/25, 285/28, 29, 137 A

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[57] **ABSTRACT**

A method and apparatus in which upper service lines are lowered with a riser pipe for connection with lower service lines each fixedly mounted to one side of a wellhead member to which the riser pipe is to be connected. Upon connection of the riser pipe to the wellhead member, the upper service lines are rotated about the axis of the pipe into approximate alignment with the lower service lines and then lowered into fluid connection therewith.

24 Claims, 5 Drawing Figures

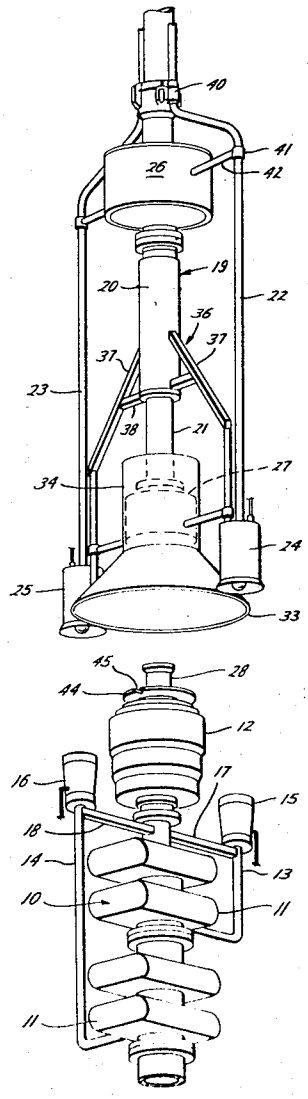

Fig. 1

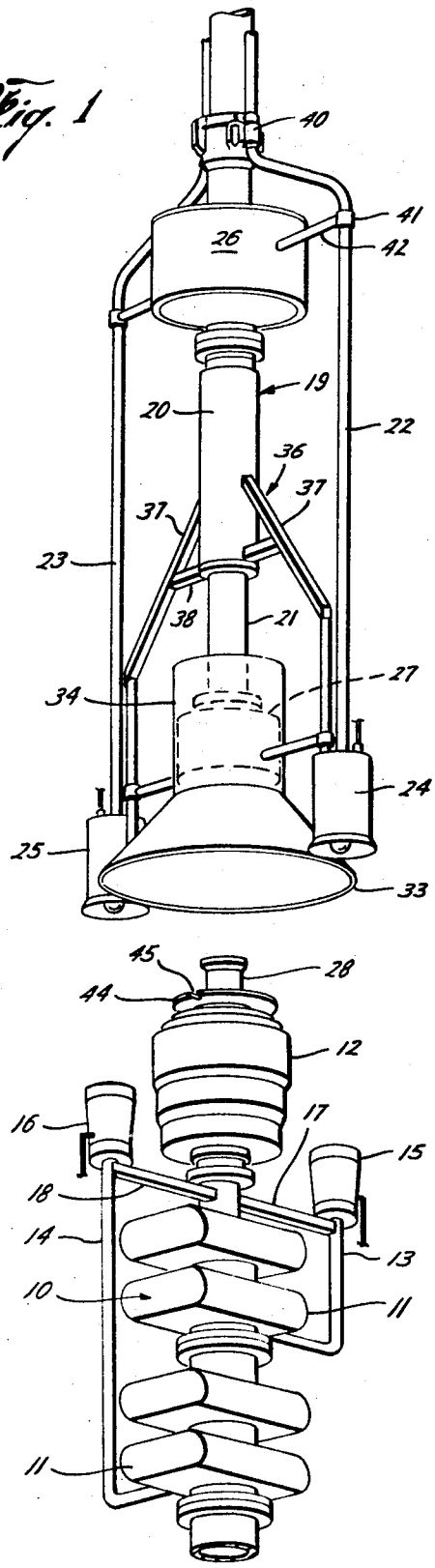

Fig. 2

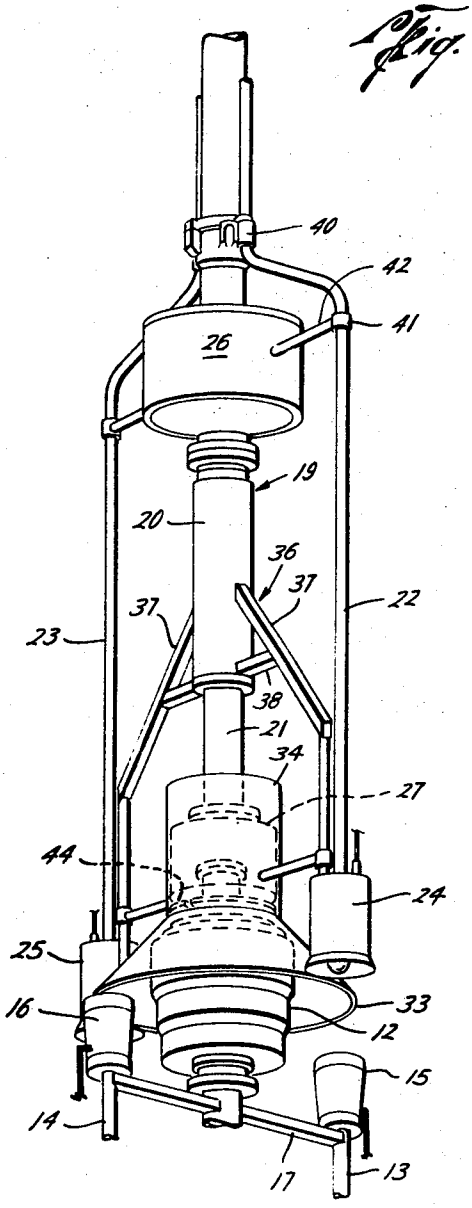

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Fig. 3

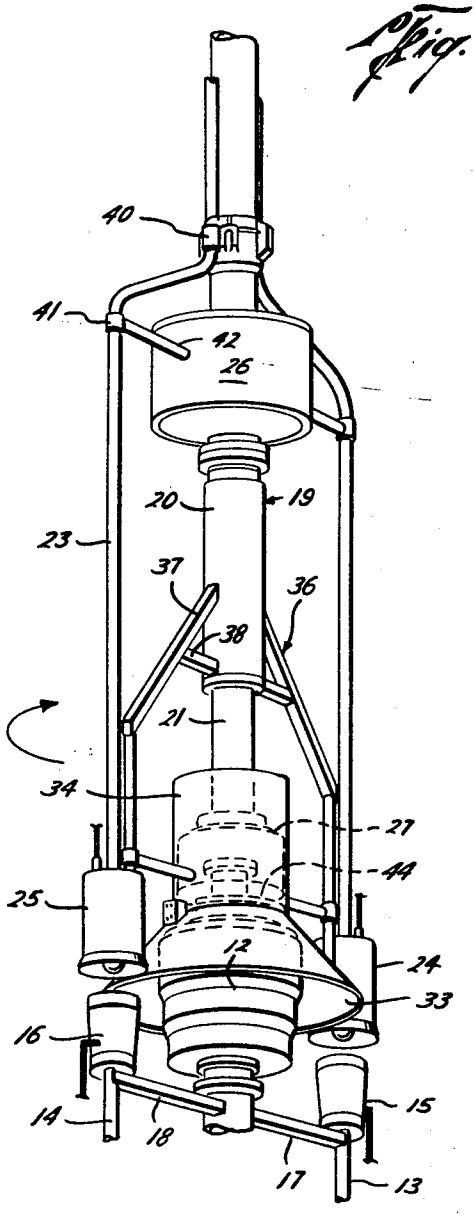
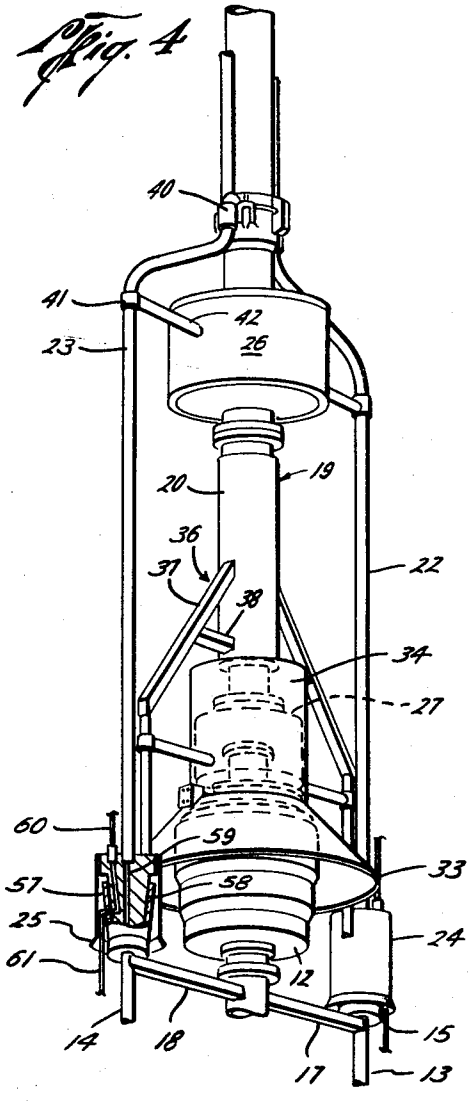


Fig. 4



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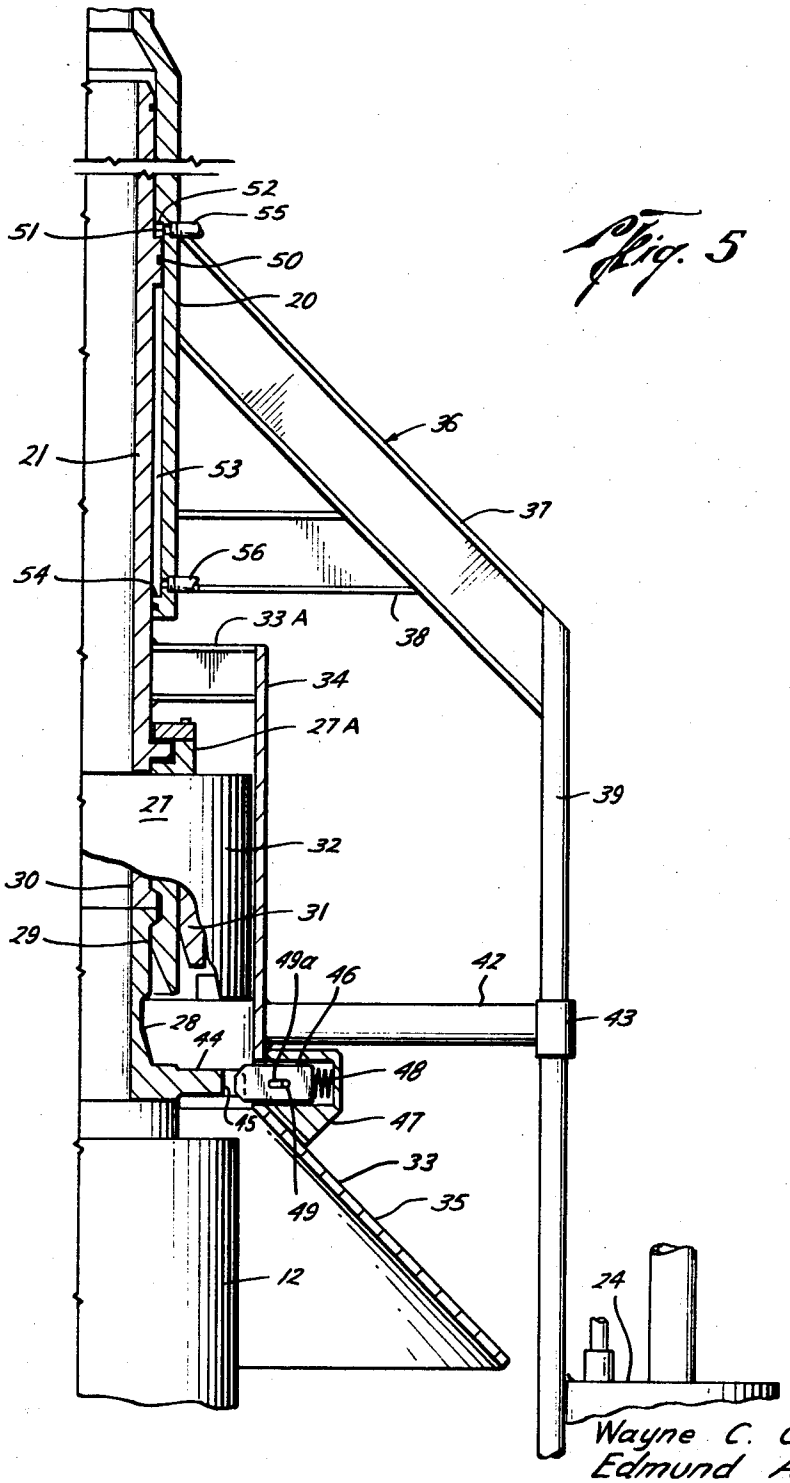

Fig. 5

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METHOD AND APPARATUS FOR USE IN DRILLING A WELL

This invention relates generally to methods and apparatus for use in drilling a well at an underwater location. More particularly, it relates to improvements in methods and apparatus for connecting a riser pipe to a wellhead member, such as a blowout preventer stack, and connecting one or more upper service lines to one or more lower service lines each on one side of the wellhead member.

In the drilling of a well of this type, access is had to the well bore through a riser pipe extending upwardly from the blowout preventer stack mounted above the underwater casing head. The riser pipe may be lowered with the blowout preventer stack or separately therefrom for remote connection above the casing head. The preventer stack is provided with lower service lines including "choke" and "kill" lines having their upper ends positioned adjacent the stack. Upper service lines are lowered with or separately from the riser pipe for manual or remote fluid connection to such lower service lines.

This connection may also serve to connect other service lines leading to or from various parts of the underwater wellhead, such as lines for operating valves and for charging accumulators. Also, the lines may be hydraulic, pneumatic or electric. Thus, their description herein as choke and kill lines is merely illustrative.

The riser pipe and upper service lines may be remotely releasable from the stack and lower service lines, respectively, to permit them to be retrieved therefrom in the event of storms or other emergency conditions. Then, of course, it may be necessary to reconnnect these parts at the underwater location, when conditions return to normal.

Heretofore, it has been the practice to guide the lower ends of the riser pipe and upper service lines into position for connection with the upper ends of the stack and lower service lines by means of cables extending from the base of the wellhead to the water level. Thus, as well known in the art, these guided parts are provided with sleeves which slide vertically over the cables to both axially align and rotationally orient their lower ends with respect to those parts to which they are to be connected.

Guide systems of this type become more difficult to use as wells are drilled at deeper underwater depths, and it has been more recently proposed to replace them with sonar or thrust tools of various types for moving the parts to be connected into desired positions beneath the water level. However, these serve only to move such parts in a linear direction, and thus are not usable to orient them in a rotational sense, as would be required in aligning the upper service lines with the lower service lines.

It is therefore an object of this invention to provide a method and apparatus for remotely connecting both the riser pipe and one or more upper service lines to the stack and lower service lines, respectively, without the use of guidelines and, more particularly, to lower the riser pipe and the upper service lines in a single run.

A further object is to provide such a method and apparatus in which both the riser pipe and upper service lines are so connected without the necessity of manipulating the service lines separately of the riser pipe from above water level.

Still another object is to provide such a method and apparatus in which both the riser pipe and upper service lines may be remotely disconnected and retrieved.

Yet another object is to provide such a method which requires a minimum of steps and is easy to perform, and to provide such apparatus which is of simple and inexpensive construction.

These and other objects are accomplished, in accordance with the illustrated embodiment of the present invention, by a method and apparatus in which the upper service lines are supported from the riser pipe with their lower ends each to one side thereof for rotation and vertical movement with respect to the lower end of the riser pipe. With the lower ends of such lines in raised positions, the riser pipe is lowered to a position in which its lower end is on approximately the same level as the upper end of the stack, and then moved laterally by sonar or a suitable thruster tool, as required, to approximately align it with the stack. At this time, a remotely operable connector at the lower end of the riser pipe is caused to connect with a complementary part on the upper end of the stack.

The lower ends of the upper service lines are then rotated about the axis of the riser pipe into positions in which they are approximately axially aligned with the upper ends of the lower service lines, and at this time, lowered into connection therewith. More particularly, an orienting part is carried by the riser pipe and rotatable with the lower ends of the upper service lines for engaging a complementary part on the stack, when the lower end of the riser pipe is connected thereto, so as to fix the lower ends of such lines in the desired rotational positions for lowering into connection with the upper ends of the lower service lines.

Preferably, a guide funnel is supported by the riser pipe in a position to engage the stack when it is lowered with the riser pipe so as to guide the riser pipe into approximate alignment with the stack. It may be found that with a guide funnel of this type, sonar or thruster tools will not be needed to laterally move the lower end of the riser pipe and, in any case, the use of the funnel will reduce the work required by such devices and make it possible to more accurately bring the riser pipe into close alignment with the stack.

The lower ends of the upper service lines are supported from the riser pipe in such a way that they may be rotated, and preferably lowered as well, through manipulation of the riser pipe and its associated parts. For this purpose, the riser pipe has upper and lower sections which are telescopically arranged, and the lower ends of the upper service lines are supported from the upper riser section so that they may be rotated and moved vertically therewith. As the riser pipe is lowered to connection with the stack, its lower end is extended so that it may be connected to the stack with the lower ends of the upper service lines spaced above the upper ends of the lower service lines. Upon connection of the lower riser pipe section to the stack, the upper riser pipe section is rotated to position the lower ends of the upper service lines in approximate axial alignment with the upper ends of the lower service lines, and then lowered so as to connect them.

Preferably, there is at least one chamber between the upper and lower riser pipe sections to which pressure fluid may be introduced for moving the upper section vertically with respect to the lower section. Thus, the

upper section may be lowered with power assist to connect the service lines or may be raised with power assist to disconnect them. In the illustrated embodiment of the invention, there are two such chambers, one for extending the riser pipe and the other for retracting it.

In the drawings, wherein like reference characters are used throughout to designate like parts:

FIG. 1 is a perspective view of the riser pipe and upper service lines as they are being lowered;

FIG. 2 is a view similar to FIG. 1, but showing the lower end of the riser pipe connected to the stack;

FIG. 3 is a view similar to FIG. 2, but upon rotation of the upper service lines into position in which their lower ends are approximately aligned with the upper ends of the lower service lines;

FIG. 4 is a view similar to FIG. 3, but upon lowering of the upper service lines into fluid connection with the lower service lines; and

FIG. 5 is an enlarged view, partly in section, of the lower end of the riser pipe connected to the upper end of the blowout preventer stack.

With reference to the details of the above-described drawings, the blowout preventer stack, best shown in FIG. 1 and indicated in its entirety by reference character **10**, is mounted above a casing head (not shown) at an underwater level. The stack includes a series of ram-type preventers **11** and an annular-type preventer **12**. Lower service lines comprising choke and kill lines **13** and **14** connect with the stack in a manner well known in the art. The upper ends **15** and **16** of these lower service lines are mounted on opposite sides of and vertically below the upper end of the stack by means of arms **17** and **18** extending radially from the stack.

The riser pipe **19** includes upper and lower sections **20** and **21** telescopically arranged for extension and retraction, and as shown in FIG. 1, the lower section **21** is extended as its lower end is moved into position above the upper end of the stack **10**. A pair of service lines **22** and **23** are supported from the riser pipe with their lower ends **24** and **25**, respectively, on opposite sides of and spaced below the lower end of the riser pipe **19**. More particularly, lower ends **24** and **25** are fixedly connected to the riser pipe **19** and spaced from its axis the same lateral distance as the upper ends **15** and **16** of the choke and kill lines are spaced from the axis of the blowout preventer stack, and when lowered with the upper riser section, are below the lower end of the riser pipe.

The upper riser pipe section **20** includes a ball joint **26** which enables the portion thereof above the joint to be inclined while the portion thereof below remains substantially vertical. The ball joint may be of any conventional construction permitting this swivelling, but at the same time preventing rotation of the two portions of the riser pipe section with respect to one another. Thus, torque transmitted to the pipe above the joint will be transmitted to the portion below it.

There is a connector **27** at the lower end of lower riser pipe section **21** for remotely and releasably connecting the riser pipe in alignment with the upper end of stack **10**. Thus, a neck **28** is connected to and extends upwardly from annular preventer **12** in position to be engaged by parts on connector **27**, which are moved into and out of latching position by means of fluid pressure from a remote source such as above water level. For this purpose, the connector may be of substantially the same construction as the connector shown and described in U.S. Pat. No. 3,239,248.

Thus, as best shown in FIG. 5, the connector includes a plurality of dogs **29** supported by an upper tubular portion **30** for swinging between positions in which the lower ends of the dogs are spaced outwardly for movement downwardly over the upper end of neck **28**, and inwardly with respect thereto for latching beneath a shoulder at the upper end of the neck **28**. The dogs are so moved by means of a locking ring **31** moved between locking and releasing positions with respect to the dogs by means of fluid responsive actuators (not shown) contained within outer cylindrical body **32** about the ring. As shown in FIG. 5, when connector **27** is latched to neck **28**, the bore through its tubular portion **30** is aligned with the bore through the neck **28**, which in turn aligns the lower riser pipe section and the bore through the preventer stack.

The lower end of the riser pipe **19** is guided into at least approximate alignment with the upper end of the blowout preventer stack by guide funnel **33** connected to lower riser pipe section **21** by means of arms **33***a* (FIG. 5). As shown, the funnel includes an upper cylindrical portion **34** about the connector body **32** and a lower conical portion **35** which extends below the lower end of the connector. As will be apparent from the drawings, the conical portion may engage the upper ends of the blowout preventer stack as the lower end of the riser pipe **19** is lowered onto it, and thereby cause the lower end of the riser pipe to move laterally, upon continued downward movement, so as to bring its lower end into approximate alignment with the stack. As will be appreciated from FIG. 5, the inner lower ends of the latching dogs **29** provide a still further guiding function as the tubular member **30** seats upon the neck **28**. As previously mentioned, it may be necessary to employ an underwater manipulator of some type for bringing the conical portion **35** of the funnel into a position in which it will engage and thus perform a guiding function with respect to the upper end of the stack.

Each of the lower ends **24** and **25** of upper service lines **22** and **23** is fixedly connected to the upper section **20** of the riser pipe by means of a frame **36**. This frame includes a pair of arms **37** extending downwardly and outwardly at approximately 45° from opposite sides of the upper riser pipe section and reinforced by means of lateral braces **38**. Posts **39** extend vertically downwardly from the outer ends of the arms **37**, and each of the lower ends **24** and **25** is connected to the outer side of one of the posts **39** in any suitable manner, as by welding. As shown in FIG. 5, the posts are disposed radially outwardly from the guide funnel portion **35**.

Lines **22** and **23** extend upwardly from their lower ends to positions along opposite sides of the upper riser section **20** above ball joint **26**, where each is secured by a clamp **40** from which it further extends upwardly with the riser pipe to water level. These lines are also supported by collars **41** on the outer ends of arms **42** extending from ball joint **26**. At least portions of these lines intermediate clamp **40** and collars **41** are flexible to accommodate angling at the ball joint.

Arms 42 extending from portion 34 of the guide funnel have collars 43 at their outer ends for sliding vertically along the posts 39. As shown in FIG. 5, connector 27 is connected to the lower riser pipe section 21 by means of a swivel 27*a* so as to permit such section to rotate relative to the connector when the latter is connected to the stack. As shown, the swivel connection comprises a part connected to the upper end of connector housing 32 to provide an annular groove for receiving an annular flange extending from the lower riser pipe section above the connector. Thus, the guide funnel, both sections 21 and 22 of the riser pipe, and the lower ends 24 and 25 of the upper service lines rotate as a unit.

Upon connection of connector 27 to neck 28, the upper riser pipe section 20 may be rotated by suitable means above water level so as to in turn rotate the lower ends 24 and 25 of the upper service lines from the positions of FIG. 2 into the positions of FIG. 3 in which they are at least approximately aligned with the upper ends of the lower service lines. Lower ends 24 and 25 are caused to be located in these positions by means of parts on the guide funnel and the neck 28 on the upper end of the blowout preventer stack which are caused to engage one another and thus fix the relative rotational position of the ends of the service lines to be connected, upon rotation of the riser pipe, as indicated by the arrow in FIG. 3.

The slidable connection of the collars 43 along the posts 39 permits the upper riser pipe section and ends 24 and 25 of the upper service lines to be moved vertically with respect to the guide funnel and the lower riser pipe section. Thus, with the lower ends 24 and 25 fixed in the rotational positions of FIG. 3, the upper riser pipe section 20 may be lowered so as to lower such ends to the positions of FIG. 4 for fluid connection with the upper ends of the lower service lines.

The orienting parts comprise a circular plate 44 on the neck 28 at the upper end of the blowout preventer stack, and a notch 45 in the plate adapted to receive a lug 46 carried by the guide funnel. The lug is located at a level to engage the outer periphery of the plate as the connector 27 latches on to the neck 28, and is spring-pressed inwardly so as to move into the notch when the guide funnel has been rotated into a position in which the inner end of the lug is opposite the notch. At this time, of course, the guide funnel and thus the lower ends of the supply lines are fixed in a rotational position, determined by the location of the notch 45, in which they are at least approximately axially aligned with the upper ends of the choke and kill lines.

As shown in FIG. 5, the lug is movable radially within a housing 47 secured in any suitable fashion to the inside of the funnel. A coil spring 48 is held between the housing and the outer end of the lug 46 to urge it radially inwardly, and the lug is guided during its radial movement by means of a pin 49 extending from a side of slot 49*a* in the housing into a slot in the lug.

As shown in FIG. 5, upper and lower riser pipe sections 21 and 22 are spaced from one another to provide an annular space between them which is divided into upper and lower chambers 51 and 53, respectively, by means of a piston 50 on the lower riser pipe section slidable within the upper riser pipe section. The upper end of the upper chamber 51 is closed by an annular shoulder 52 on an intermediate portion of upper riser pipe section 20, and the lower chamber 53 is closed at its lower end by means of an annular shoulder 54 on the lower end of upper riser pipe section 21. The piston 50 as well as portions of riser pipe section 20 above and below the shoulders 52 and 54, respectively, are provided with sliding seals which render the chambers pressure tight. Of course, the shoulders also limit relative vertical movement of the riser pipe sections by engaging in alternate positions with opposite sides of piston 50.

Pressure fluid is admitted to or exhausted from upper chamber 51 through a conduit 55, and pressure is admitted to or exhausted from lower chamber 53 by means of a conduit 56. The conduits may, of course, extend to a source of pressure fluid above water level, or other remote location at which suitable controls are provided for their selective admission to and exhaustion from the conduits.

It may be found desirable to hold pressure on upper chamber 51 so as to maintain lower riser pipe section 21 in extended position with respect to upper section 20, and thus the lower ends of the choke and kill lines, as the riser pipe is lowered into position for connecting its lower end to the upper end of the preventer stack. Then, upon introduction of pressure fluid to lower chamber 53, and exhaust from upper chamber 51, the upper riser section 20 may be moved downwardly to the position of FIG. 5, so as to provide a power assist for moving the ends of the upper service lines into fluid connection with the upper ends of the choke and kill lines. On the other hand, in order to raise the ends of the upper service lines, as when it is desired to retrieve them with the riser pipe, pressure fluid may be introduced into chamber 51 and exhausted from chamber 53 so as to thereby lift upper riser section 20 from the position shown in FIG. 5.

The ends of the service lines may be of any suitable construction for permitting them to be fluidly connected merely upon axial movement into engagement with one another. For this purpose, and as shown in FIG. 4, the upper end of a lower service line, such as end 16 of line 14, includes a receiver 57 having a conically shaped opening into which a complementary part 58 at the lower end 25 of line 23 is adapted to be stabbed. As shown, the part 58 has a passageway 59 extending downwardly through it for connecting line 23 with line 14. As also indicated in FIG. 4, additional lines 60 may connect with part 58 for connecting a source of supply pressure with another service line 61 for operating other equipment in or about the underwater wellhead.

In order to retrieve the riser pipe and upper service lines, the operator first raises the upper riser pipe section relative to the lower section thereof, as by the introduction of pressure fluid into chamber 51 and the exhaust of pressure fluid from chamber 53, thereby lifting the lower ends 24 and 25 from connection with the upper ends 15 and 16 of the lower service lines. Alternatively, pressure in chamber 53 may be relieved, and the upper riser pipe section pulled upwardly, which also will raise the lower ends of the upper service lines.

Connector 27 may then be actuated to raise the locking ring 31 and thus release dogs 29 from latching position about neck 28, and the riser pipe raised further

to lift the connector above the neck and raise lug 46 from engagement with notch 45. The riser pipe is then free for continued lifting to raise it and the upper service lines to water level.

From the foregoing it will be seen that this invention is one well adapted to attain all of the ends and objects hereinabove set forth, together with other advantages which are obvious and which are inherent to the method and apparatus.

It will be understood that certain features and subcombinations are of utility and may be employed without reference to other features and subcombinations. This is contemplated by and is within the scope of the claims.

As many possible embodiments may be made of the invention without departing from the scope thereof, it is to be understood that all matter herein set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

The invention having been described, what is claimed is:

1. Wellhead apparatus, comprising a wellhead member having a bore therethrough, a lower service line having an upper end mounted to one side of the wellhead member, a riser pipe, means for releasably connecting the lower end of the riser pipe and upper end of the wellhead member in axial alignment with one another, an upper service line carried by the riser pipe and having a lower end connected to the riser pipe for vertical movement and rotation with respect to the lower end of said riser pipe, means rotatable with the lower end of the upper service line for engaging means on said wellhead member to fix their relative rotational positions, when said riser pipe is connected to the wellhead member and said lower end is rotated into a position relative to said member in which it is axially aligned with the upper end of the lower service line, and means on the upper and lower ends of the service lines for connecting them with one another upon lowering of the lower end of said upper service line to the upper end of said lower service line.

2. Wellhead apparatus of the character set forth in claim 1, including a funnel supported by the riser pipe for guiding the lower end thereof into approximate axial alignment with said wellhead member as it is lowered into position for connection therewith.

3. Wellhead apparatus, comprising a wellhead member having a bore therethrough, a lower service line having an upper end connected to one side of the wellhead member, a riser pipe having upper and lower sections arranged for telescoping relative to one another, means for releasably connecting the lower riser pipe section and wellhead member in axial alignment, an upper service line having a lower end connected to the upper riser pipe section to one side thereof, means carried by said riser pipe for engagement with means on said wellhead member to fix the rotational position of the upper section of said riser pipe relative to said member when the lower section is connected to the wellhead member and said upper section is rotated into a position relative to said member in which the lower end of said upper service line is axially aligned with the upper end of said lower service line, and means on said upper and lower ends of the service lines for connecting said lines with one another upon lowering of said upper riser pipe section relative to said lower riser pipe section and wellhead member.

4. Wellhead apparatus of the character set forth in claim 3, including a funnel supported by the riser pipe for guiding the lower riser pipe section into approximate axial alignment with said wellhead member as it is lowered into position for connection therewith.

5. Wellhead apparatus of the character set forth in claim 4, wherein the funnel is connected to the upper riser pipe section for rotation therewith, and the engageable means carried by the riser pipe is mounted on the funnel.

6. Wellhead apparatus, comprising a wellhead member having a bore therethrough, a lower service line having an upper end connected to one side of the wellhead member, a riser pipe having upper and lower sections arranged for telescoping relative to one another, means for releasably connecting the lower riser pipe section and the wellhead member in axial alignment, an upper service line having a lower end connected to the upper riser pipe section to one side thereof, a first orienting part on the wellhead member, a second orienting part, means connecting the second orienting part to the lower riser pipe section for vertical movement therewith and to the upper riser pipe section for rotation therewith and vertical movement with respect thereto, so that when the lower section is connected to the wellhead member and said upper section is rotated into a position relative to said member in which the lower end of said upper service line is axially aligned with the upper end of said lower service line, said second part will engage said first part to fix said position of said upper section, and means on said upper and lower ends of the service lines for connecting said lines with one another upon lowering of said upper section relative to said lower section and wellhead member.

7. Wellhead apparatus of the character set forth in claim 6, wherein said means connecting the second orienting part to the lower riser pipe section includes means fixedly connecting it to the lower riser pipe section for rotation therewith, and said means connecting said lower riser pipe section and wellhead member includes a connector rotatably connected to said lower section.

8. Wellhead apparatus of the character set forth in claim 6, wherein one of said orienting parts is a ring having a notch therein and the other is a spring-pressed lug for closely fitting within said notch.

9. Wellhead apparatus of the character set forth in claim 6, wherein said connecting means includes a funnel fixedly connected to the lower riser pipe section for guiding the lower riser pipe section into axial alignment with said wellhead member as it is lowered into position for connection therewith.

10. Wellhead apparatus, comprising a blowout preventer stack, lower service lines connected to the stack and having their upper ends each connected to the stack to one side thereof, a riser pipe including upper and lower sections arranged for telescoping relative to one another, means for releasably connecting the lower riser pipe section and stack in axial alignment with one another, upper service lines carried by the riser with their lower ends each connected to the upper riser pipe section to one side thereof, means carried by

said riser pipe for engagement with means on said stack to fix the rotational position of said upper section relative to said member, when the lower section is connected to the wellhead member and said upper section is rotated into a position relative to said member in which the lower ends of said upper service lines are axially aligned with the upper ends of said lower service lines, and means on said upper and lower ends of the service lines for connecting them with one another upon lowering said upper section relative to said lower section and stack.

11. Wellhead apparatus, comprising a riser pipe having upper and lower sections arranged for telescoping relative to one another, a connector on the lower section, an upper service line carried by the riser pipe with its lower end connected to the upper section to one side thereof, an orienting part, means carrying the orienting part from the riser pipe for vertical movement with said lower riser pipe section and for rotation with and vertical movement relative to the upper riser pipe section, and connector means on the lower end of the upper service line.

12. Wellhead apparatus of the character set forth in claim **11**, wherein said carrying means is fixedly connected to the lower riser pipe section, and said connector is rotatably mounted on said lower section.

13. Wellhead apparatus of the character set forth in claim **12**, wherein said carrying means includes a downwardly facing, conically shaped guide funnel about the lower end of the connector.

14. Wellhead apparatus of the character set forth in claim **13**, wherein said orienting part is on the inner side of the guide funnel.

15. Wellhead apparatus of the character set forth in claim **14**, wherein said orienting part comprises an inwardly spring-pressed lug.

16. Wellhead apparatus of the character set forth in claim **12**, including a frame on the riser pipe including a vertical post, and means connecting the lower end of said upper service line to the post, said carrying means including a sleeve vertically slidable over said post.

17. Wellhead apparatus of the character set forth in claim **11**, wherein the upper riser pipe section includes a ball joint, said upper service line is flexible and clamped to said upper section above the ball joint.

18. Wellhead apparatus of the character set forth in claim **11**, including means providing a chamber between the upper and lower riser pipe sections to which pressure fluid may be introduced for moving said upper section vertically with respect to the lower section.

19. A method of connecting a riser pipe and the lower end of an upper service line respectively to an underwater wellhead member and the upper end of a lower service line to one side of the wellhead, said method being accomplished without the use of guidelines and comprising the steps of supporting the upper service line from the riser pipe with its lower end to one side thereof and rotatable and vertically movable with respect to the lower end of the riser pipe, moving the riser pipe to a position in which its lower end is adjacent the upper end of the wellhead while maintaining the lower end of the service line in a relatively raised position, connecting the ends of the riser pipe and wellhead member when so moved, rotating the lower end of the upper service line about the axis of the pipe into a position in which it is approximately axially aligned with the upper end of the lower service line, and lowering the lower end of the upper service line into fluid connection with the upper end of the lower service line.

20. A method of the character set forth in claim **19**, wherein said wellhead member is a blowout preventer stack, and said lower service line connects to the stack.

21. A method of the character set forth in claim **19**, wherein a funnel is supported from the riser pipe in a position to engage the wellhead member when so moved so as to guide the lower end of the riser pipe into approximate alignment with the upper end of the wellhead member.

22. A method of connecting a riser pipe and the lower end of an upper service line respectively to an underwater wellhead member and the upper end of a lower service line to one side of the wellhead, said method being accomplished without the use of guidelines and comprising the steps of providing a riser pipe having upper and lower sections telescopically arranged with respect to one another, supporting the upper service line from the upper riser pipe with its lower end to one side thereof and rotatable and vertically movable therewith, maintaining the upper riser pipe section in a raised position relatively to the lower section thereof and lowering the riser pipe and upper service line to an underwater position in which the lower end of the lower riser pipe section is adjacent the upper end of the wellhead, connecting the ends of the lower section and the wellhead member, rotating the upper riser pipe section so as to rotate the lower end of the upper service line into a position in which it is approximately axially aligned with the upper end of the lower service line and lowering the upper section riser pipe relatively to the lower section so as to lower the lower end of the upper service line into fluid connection with the upper end of the lower service line.

23. A method of the character set forth in claim **22**, wherein an orienting part is supported on the riser pipe and in position to move into engagement with a complementary orienting part on the wellhead member, and thereby fix the lower end of said upper service line in said position, upon rotation of said upper riser pipe section.

24. A method of the character set forth in claim **22**, wherein said wellhead member is a blowout preventer stack, and said lower service line connects to the stack.

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