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(54) **FLUID LINE EXIT BLOCK WITH DUAL METAL-TO-METAL SEALING**

FLUIDLEITUNGSAUSTRITTSBLOCK MIT DOPPELTER METALL--METALL-DICHTUNG

BLOC DE SORTIE DE CONDUITE DE FLUIDE POURVU D'UNE DOUBLE ÉTANCHÉITÉ MÉTAL-MÉTAL

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Description

BACKGROUND

Field of the Disclosure

[0001] This invention relates in general to wellhead systems, and in particular, to a fluid line exit block seal arrangement of a wellhead system.

Description of Prior Art

[0002] For many surface and subsea oil and gas wells, hydrocarbon production devices, such as a series of pipes, fittings, valves, and gauges, are used on a wellhead as part of a wellhead assembly to control the flow of fluids into the well. One, or a plurality of, penetrators or stems are typically installed in the hydrocarbon production device to allow downhole fluid lines, such as hydraulic control lines or fluid injection lines, to be routed through a sidewall of the hydrocarbon production device and down to a location below the wellhead. Wellhead assemblies are required to have an increasing number of downhole control lines and chemical injection lines.
US 2013/168104 A1 discloses a well completion system which includes a wellhead, a control line assembly for use in completions that is mounted to the wellhead, and a tubing hanger.
US 4181175 A discloses a control line exiting coupling which provides radial penetration of a control line through a tubing hanger wall, with a back seat for sealing should internal pressure create a packing leak on the penetrator.
WO 2009/014797 A1 discloses a sealing system including an energizing member that simultaneously seats a plurality of sealing elements about a plurality of control lines, respectively.
WO 2010/107987 A1 discloses a penetrator comprising a housing and a bulkhead positioned within the housing and configured to slide relative to the housing.

SUMMARY OF THE DISCLOSURE

[0003] Methods and systems of embodiments of the current disclosure can provide multiple fluid lines passing into a pressure containing portion of the wellhead assembly. Embodiments of the current disclosure provide control line exit blocks for mounting to a hydrocarbon production device that is suitable for high temperature and high pressure applications, such as for temperatures up to 176,7 Grad Celsius (350 °F) and pressures up to 1034 bar (15,000 psi). Dual metal to metal seals prevent pressure and fluids from escaping from the pressure containing portion and into the atmosphere between the control line exit block and hydrocarbon production device. The integrity of the dual metal to metal seals can be verified before installation of the control line exit block is completed.

[0004] The invention is defined by the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] Some of the features and benefits of the present invention having been stated, others will become apparent as the description proceeds when taken in conjunction with the accompanying drawings, in which:

Figure 1 is a perspective view of an example of a hydrocarbon production device with a termination block assembly in accordance with an embodiment of this disclosure.

Figure 2 is a perspective view of the hydrocarbon production device of Figure 1, with an external multi-bowl portion not shown, in order to better visualize the fluid lines.

Figure 3 is a section view of the hydrocarbon production device of Figure 1, showing a control line extending out of the hydrocarbon production device and to the termination block assembly.

Figure 4 is a detail sectional view of a portion of the hydrocarbon production device and the termination block assembly of Figure 3.

Figure 5 is a section view of the termination block assembly of Figure 3.

Figure 6 is another section view of the termination block assembly of Figure 3.

Figure 7 is a perspective view of an alternate termination block assembly in accordance with an embodiment of this disclosure.

Figure 8 is a side elevation view of the termination block assembly of Figure 7.

Figure 9 is a section view of the termination block assembly of Figure 7, viewed along the section line indicated in Figure 8.

Figure 10 is a section view of the termination block assembly of Figure 7, viewed along the section line indicated in Figure 9.

Figure 11 is a perspective view of an alternate termination block assembly in accordance with an embodiment of this disclosure.

Figure 12 is a section view of the termination block assembly of Figure 11, viewed along the section line indicated in Figure 14.

Figure 13 is a section view of the termination block assembly of Figure 11, viewed along the section line indicated in Figure 12.

Figure 14 is a section view of the termination block assembly of Figure 11, viewed along the section line indicated in Figure 13.

DETAILED DESCRIPTION OF THE DISCLOSURE

[0006] The methods and systems of the present disclosure will now be described more fully hereinafter with reference to the accompanying drawings in which embodiments are shown. The methods and systems of the present disclosure may be in many different forms and should not be construed as limited to the illustrated embodiments set forth herein; rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey its scope to those skilled in the art. Like numbers refer to like elements throughout.

[0007] In the drawings and specification, there have been disclosed illustrative embodiments and, although specific terms are employed, they are used in a generic and descriptive sense only and not for the purpose of limitation.

[0008] Referring to Figure 1, hydrocarbon production device 10 is shown, as an example, as a wellhead assembly. Hydrocarbon production device 10 could alternately be part of a Christmas tree or other choke, valve, adapter, or tubular assembly associated with a hydrocarbon well, that is subject to internal pressure. Termination block assemblies 12 are mounted to hydrocarbon production device 10. In embodiments of this disclosure, there can be one or more termination block assemblies 12, and as an example, there can be eight termination block assemblies 12, spaced radially around the outer diameter of hydrocarbon production device 10 at a generally similar axial location along hydrocarbon production device 10.

[0009] Figure 3 is a section view of a portion of hydrocarbon production device 10 that does not show the central axis of hydrocarbon production device 10; but instead is a section view of fluid line 14 as it passes through sidewall passage 15 of hydrocarbon production device 10 and into termination block assembly 12. Fluid line 14 can be a control line, such as a hydraulic control line, a chemical injection line, or another type of fluid conduit used to convey fluids or communicate pressure through a sidewall of hydrocarbon production device 10. Fluid line 14 extends through the sidewall of hydrocarbon production device 10 by way of sidewall passage 15, from pressure containing portion 16 of hydrocarbon production device 10 to an outside surface of hydrocarbon production device 10.

[0010] In certain embodiments of this disclosure, fluid line 14 extends into a pressurized annulus between tubular members located within the wellbore. In alternate embodiments of this disclosure, fluid line 14 extends into the pressurized main central bore of the hydrocarbon well, which is a non-annular space. In the example of Figure 2, fluid line 14 extends into an annular space between hanger 18 and concentric tubular member 20 that is located radially inward from hanger 18. After passing out of a lower end of hanger 18, fluid line 14 can extend within the annular space between the outer wellhead member 22 and the tubular member 20. In certain embodiments, portions of fluid line 14 could be defined by passages formed within a sidewall of hanger 18. Tubular member 20 could be, for example, production tubing, casing, or unfinished pipe. Outer wellhead member 22 could be, for example, a multibowl wellhead.

[0011] Looking at Figures 1-14, termination block assembly 12 includes fluid line block 28. In the non-limiting illustrated examples, fluid line block 28 is a generally square or rectangular block shaped member formed of metal. Fluid line block 28 has inner surface 30 that mates with corresponding surface 32 of hydrocarbon production device 10. Fluid line block 28 can be secured to hydrocarbon production device 10 with threaded members 34 or with other known fasteners. Fluid line block 28 has protruding member 36 that extends from inner surface 30. Protruding member 36 can be formed as an integral part of fluid line block 28 and has a cylindrical outer surface and block inner bore 38. Block inner bore 38 extends from an end of protruding member 36 to a junction with fluid passage 42, which is made up of a number of linear fluid passage segments 42a-42d, as will be further described below (Figures 6, 10, 14).

[0012] Termination block assembly 12 includes inlet port 40. Inlet port 40 is located at an outer surface of fluid line block 28, which as illustrated is on an opposite side of inner surface 30. Inlet port 40 can be used for injecting fluids, such as pressurized media for a control system or chemicals for injection into the hydrocarbon well. Inlet port connector 41 can be located in inlet port 40 to mate with the fluid delivery system used to provide the fluid to inlet port 40 and to seal inlet port 40 when no fluids are being supplied to inlet port 40. Inlet port connector 41 can be selected to withstand high pressure and high temperature, such as a temperature of up to 176,7 Grad Celsius (350 °F) and a pressure of up to 1034 bar (15,000 psi). In embodiments of this disclosure, fluid line block 28 can have one inlet port 40 (Figures 6, 13), and in alternate embodiments, fluid line block 28 can have more than one inlet port 40, such as, for example, three inlet ports 40 (Figure 9).

[0013] Fluid passage 42 is located within fluid line block 28 for allowing fluid communication between inlet port 40 and fluid line 14. Fluid passage 42 extends from block inner bore 38 to inlet port 40. When fluid line block 28 is secured to hydrocarbon production device 10, fluids can flow through inlet port 40, through fluid passage 42 to block inner bore 38, and pass into fluid line 14. Fluid passage 42 is made up of a number of linear fluid passage segments 42a-42d that intersect each other, where 42a is the fluid passage segment that is adjacent to inlet port 40 and the fluid passage segments are lettered consecutively from inlet port 40 to block inner bore 38.

[0014] In addition to inlet port 40, termination block assembly 12 can have second port 44 that provides a po-

tential flow path from outside of fluid line block 28 to fluid line 14 and provides additional access to fluid passage 42. Second bore connector 46 can be located in second port 44 to seal second port 44 so that fluids from within fluid line block 28 cannot escape through second port 44 to the outside environment. Second bore connector 46 can be threaded into second port 44 and can be selected to withstand high pressure and high temperature, such as a temperature of up to 176,7 Grad Celsius (350 °F) and a pressure of up to 1034 bar (15,000 psi). In embodiments of this disclosure, second port 44 is located on a surface opposite protruding member 36 (Figures 3-6). In alternate embodiments, second port 44 is located on a different face of fluid line block 28 than protruding member 36 at an end of a portion of fluid passage 42 (Figures 9, 13). In embodiments of this disclosure, fluid line block has one second port 44 (Figures 3-6, 11-13). In alternate embodiments fluid line block has more than one second port 44, such as, for example, three second ports 44 (Figures 7-9).

[0015] Termination block assembly 12 includes needle valve assembly 48. Needle valve assembly 48 can affect the flow of fluids through fluid passage 42. Needle valve assembly 48 includes needle valve body 50 with a needle portion 52 and an external needle valve portion 53. Needle portion 52 moves axially along a segment of fluid passage 42 and has needle end 54 that mates with needle seat 56 formed within such segment of fluid passage 42. Needle seat 56 is defined by a change in inner diameter of fluid passage 42. Needle end 54 extends across fluid passage 42 at needle seat 56 to create a seal and prevent the flow of fluids past needle end 54. Needle seat 56 can be located proximate to a junction of fluid passage segments 42a-42d to prevent fluids from moving from one fluid passage segment 42a-42d to the next fluid passage segment 42a-42d. External needle valve portion 53 extends outside of fluid line block 28 and can be used to adjust the position of needle portion 52. In certain embodiments of this disclosure, fluid line block 28 has one needle valve assembly 48 (Figure 6) and in other embodiments, fluid line block 28 has more than one needle valve assembly 48, such as, for example six needle valve assemblies 48 (Figures 7, 9-10) or two needle valve assemblies (Figures 11, 13-14).

[0016] Termination block assembly 12 further includes primary seal 58. Primary seal 58 is located at the end of protruding member 36 and can be formed as an integral part of fluid line block 28. Primary seal 58 is a tubular shaped flexible end portion of protruding member 36. Primary seal 58 has outer diameter 62 that engages a sidewall passage surface of sidewall passage 15 of hydrocarbon production device 10, forming a metal to metal seal between fluid line block 28 and hydrocarbon production device 10. The inner diameter block inner bore 38 can be successively smaller away from the outer end of protruding member 36 so that the largest diameter of block inner bore 38 is at the open outer end of block inner bore 38. The wall thickness of primary seal 58 tapers so that it is smaller at the outer open end of block inner bore 38. The wall thickness of primary seal 58 deceases towards the outer open end of block inner bore 38 due to the increasing inner diameter of block inner bore 38. In addition, the shape of outer diameter 62 and of block inner bore 38 of primary seal 58 may be frusto-conical so that the wall thickness of primary seal 58 decreases towards the outer open end of block inner bore 38. When fluid line block 28 is secured to hydrocarbon production device 10, block inner bore 38 circumscribes a portion of fluid line 14, which extends from hydrocarbon production device 10.

[0017] Primary seal 58 is biased to be urged radially inward when fluid line block 28 is secured to hydrocarbon production device 10 so that primary seal 58 applies a radially outward force on sidewall passage 15. For example, the inner diameter of the sidewall passage surface of sidewall passage 15 can be smaller than the relaxed diameter of outer diameter 62 so that when primary seal 58 is located within sidewall passage 15, primary seal 58 will be forced to flex inward to fit within sidewall passage 15. This biases primary seal 58 so that it applies a radially outward force along the inner diameter of the sidewall passage surface of sidewall passage 15, creating a seal between outer diameter 62 of primary seal 58 and the inner diameter of the sidewall passage surface of sidewall passage 15. In this way, a first metal to metal seal is formed between fluid line block 28 and hydrocarbon production device 10 with primary seal 58.

[0018] Termination block assembly 12 additionally includes secondary seal 64. Secondary seal 64 is a generally ring shaped member that circumscribes protruding member 36. Secondary seal 64 can be a metal seal ring with base 66 and leg 68 that extends radially outward from base 66. Leg 68 extends in a direction generally normal to base 66 in a direction opposite to protruding member 36. Leg 68 is located within, and in a relaxed state protrudes from, radial recess 69 on inner surface 30. One side of leg 68 engages inner surface 30 and the opposite side of leg 68 can engage corresponding surface 32 when fluid line block 28 is secured to hydrocarbon production device 10, forming a metal to metal seal between fluid line block 28 and hydrocarbon production device 10. Base 66 of secondary seal 64 is located within annular cavity 70. Primary seal 58 and secondary seal 64 define annular cavity 70 between fluid line block 28 and hydrocarbon production device 10. Annular cavity 70 is also defined in part by block annular groove 72 located on inner surface 30 and in part by apparatus annular groove 74 located on corresponding surface 32. The surface of base 66 from which leg 68 extends engages an inner diameter of annular cavity 70. The surface of base 66 on one side of leg 68 engages an inner diameter of block annular groove 72 and the surface of base 66 on an opposite side of leg 68 engages an inner diameter of apparatus annular groove 74.

[0019] Termination block assembly 12 has a test port 76. Test port 76 is located at a surface of termination

block assembly 12. Test passage 78 extends from test port 76 to block annular groove 72, providing a fluid path from test port 76 to annular cavity 70. A test port fitting 77 is located within test port 76 to seal test port 76 when test port 76 is not in use.

[0020] In an example of operation, to terminate fluid line 14 at hydrocarbon production device 10, fluid line 14 can be fed out of pressure containing portion 16 of hydrocarbon production device 10 through sidewall passage 15 to corresponding surface 32 at an outside of hydrocarbon production device 10. Anchor fitting 80 can be fitted over fluid line 14 to retain fluid line 14 in position relative to the hydrocarbon production device 10. Anchor fitting 80 is non-pressure containing. Anchor fitting 80 has an outer diameter that engages an inner diameter of sidewall passage 15 and an inner diameter that engages fluid line 14 so that fluid line 14 does not move radially inward along the axis of sidewall passage 15.

[0021] Secondary seal 64 is placed over protruding member 36 so that secondary seal 64 circumscribes protruding member 36 and is spaced radially outward from protruding member 36. As discussed above, a portion of base 66 of secondary seal 64 is located within block annular groove 72 so that leg 68 sits partially within radial recess 69 on inner surface 30. The outer end of fluid line 14 can then be fed into the open outer end of protruding member 36 and along block inner bore 38 so that block inner bore 38 circumscribes fluid line 14. In an example of operation, as fluid line 14 is being fed through block inner bore 38, fluid line block 28 will be moved towards hydrocarbon production device 10 and primary seal 58 inserted into sidewall passage 15. The elasticity of the material used for forming primary seal 58 allows it to flex inward to fit within sidewall passage 15, creating a first metal to metal seal between outer diameter 62 of primary seal 58 and the inner surface of sidewall passage 15, thereby sealing between fluid line block 28 and hydrocarbon production device 10.

[0022] Moving fluid line block 28 towards hydrocarbon production device 10 mates inner surface 30 of fluid line block 28 with corresponding surface 32 of hydrocarbon production device 10. Rotating threaded fasteners 34 secures fluid line block 28 to hydrocarbon production device 10. Mating inner surface 30 with corresponding surface 32, engages leg 68 of secondary seal 64 with both inner surface 30 of fluid line block 28 and corresponding surface 32 of hydrocarbon production device 10. Mating surfaces 30, 32 energizes secondary seal 64 to form a second metal to metal seal between fluid line block 28 and hydrocarbon production device 10. In the illustrated examples the axial height of leg 68 is greater than the axial height of radial recess 69, thus leg 68 will deform when energized to fill the radial length of radial recess 69.

[0023] The integrity of primary and secondary seals 58, 64 can be tested by way of test port 76. As a pressure media is injected through test port 76 and into test passage 78, pressure media will enter annular cavity 70 and be in fluid communication with both primary seal 58 and secondary seal 64. In an example of operation, the pressure of pressure media is monitored, monitoring can take place in the test passage 78, cavity 70, test port 76, or a combination of these. Detecting a decrease in pressure of pressure media can indicate that either primary or secondary seal 58, 64 is leaking. If pressure media escapes around secondary seal 64, it can be supposed that secondary seal 64 is leaking. If no pressure media escapes around secondary seal 64, and the pressure of the pressure media is decreasing, secondary seal 58 may be leaking.

[0024] Looking at Figures 3-6, a fluid line connector 82 can be secured to the end of fluid line 14 and second port connector 46 can be installed in second port 44. During use of fluid line 14, control fluids, injection fluids, or other fluids used in conjunction with hydrocarbon production device 10 can be injected through inlet port 40. Needle valve assembly 48 can be used to provide pressure integrity by adjusting access of the fluids to fluid passage 42. In the embodiment of Figure 6, needle end 54 can move axially along fluid passage segment 42b. When needle end 54 is mated with needle seat 56, fluid will not be able to travel along fluid passage segment 42b. When needle end 54 is spaced apart from needle seat 56, fluid can travel from inlet port 40, through fluid passage segment 42a then through fluid passage segment 42b, and into block inner bore 38. From block inner bore 38, fluid can enter fluid line 14 and into pressure containing portion 16 of hydrocarbon production device 10.

[0025] Turning to Figures 7-10, termination block assembly 12 has six needle valve assemblies 48'. Three needle valve assemblies 48a' can block fluid from traveling along fluid passage segment 42a' and three needle valve assemblies 48b' can block fluid from traveling along fluid passage segment 42c'. When needle end 54 of each of the needle valve assemblies 48' is spaced apart from needle seat 56, fluid can travel from one of three inlet ports 40, through one of three corresponding fluid passage segments 42a' and fluid passage segments 42b', into a single fluid passage segment 42c' and then into single block inner bore 38. From block inner bore 38, fluid can enter fluid line 14 and into pressure containing portion 16 of hydrocarbon production device 10.

[0026] Turning to Figures 11-14, termination block assembly 12 has two needle valve assemblies 48". Needle valve assembly 48a" can block fluid from traveling along fluid passage segment 42a" and needle valve assembly 48b" can block fluid from traveling along fluid passage segment 42c". When needle end 54 of each of the needle valve assemblies 48" is spaced apart from needle seat 56, fluid can travel from inlet port 40, through fluid passage segment 42a", fluid passage segment 42b", and fluid passage segment 42c" and then into block inner bore 38. From block inner bore 38, fluid can enter fluid line 14 and into pressure containing portion 16 of hydrocarbon production device 10.

[0027] Returning again to Figures 2-14, in each of the embodiments of the current disclosure, primary seal 58 and secondary seal 64 prevent pressure and fluids from pressure containing portion 16 of hydrocarbon production device 10 from being discharged to the environment. Primary seal 58 and secondary seal 64 are redundant seals, both sealing between fluid line block 28 and hydrocarbon production device 10, and providing dual metal to metal sealing capabilities suitable for high pressure and high temperature applications.

[0028] The terms "vertical", "horizontal", "upward", "downward", "above", and "below" are used herein only for convenience because elements of embodiments of this disclosure may be utilized in various positions.

[0029] The system and method described herein, therefore, are well adapted to carry out the objects and attain the ends and advantages mentioned, as well as others inherent therein. While a presently preferred embodiment of the system and method has been given for purposes of disclosure, numerous changes exist in the details of procedures for accomplishing the desired results.

Claims

1. A termination block assembly for fluidly coupling a fluid line (14) at a hydrocarbon production device (10), the termination block assembly comprising:

   a fluid line block (28) with an inner surface (30) adapted to be selectively mated to a corresponding surface (32) of the hydrocarbon production device (10), the fluid line block (28) having a protruding member (36) extending from the inner surface (30);
   a primary seal (58) located at an end of the protruding member (36), the primary seal (58) having an inner diameter suitable for selectively circumscribing the fluid line (14) extending from the hydrocarbon production device (10), and an outer diameter suitable for selectively engaging a sidewall passage surface of the hydrocarbon production device (10) and sealing between the fluid line block (28) and the hydrocarbon production device (10);
   a secondary seal (64) circumscribing the protruding member (36), engaging both the inner surface (30) of the fluid line block (28) and the corresponding surface (32) of the hydrocarbon production device (10) and sealing between the fluid line block (28) and the hydrocarbon production device (10), **characterized in that** the primary seal and the secondary seal define an annular cavity (70) between the fluid line block and the hydrocarbon production device; and **in that** a test port (76) is in fluid communication with the annular cavity for monitoring pressure within the annular cavity.

2. The termination block assembly of claim 1, wherein the primary seal (58) includes a flexible end portion of the protruding member (36) selectively forming a metal to metal seal with the sidewall passage surface of the hydrocarbon production device (10).

3. The termination block assembly of claim 1 or 2, wherein the secondary seal (64) is a metal seal ring with a base (66) and a leg (68) that extends from the base (66) and engages both the inner surface (30) of the fluid line block (28) and the corresponding surface (32) of the hydrocarbon production device (10).

4. The termination block assembly of any of claims 1-3, wherein the fluid line block (28) has the test port (76) and wherein the primary seal (58) and the secondary seal (64) are testable with the test port (76).

5. The termination block assembly of any of claims 1-4, further comprising an anchor fitting (80) adapted to be attached to the fluid line (14) retaining the fluid line (14) in position relative to the hydrocarbon production device (10).

6. The termination block assembly of any of claims claim 1-5, wherein the fluid line block (28) includes an inlet port (40) and a fluid passage (42) between the inlet port (40) and the fluid line (14).

7. The termination block assembly of claim 6, wherein the fluid line block (28) includes at least one needle valve assembly (48) with a needle end (54) that engages a needle seat (56) within the fluid passage (42), selectively sealing the fluid passage (42).

8. The termination block assembly of claim 6, wherein the inlet port (40) is in fluid communication with an annulus between tubular members (18, 20) of a wellbore.

9. The termination block assembly of claim 6, wherein the inlet port (40) is in fluid communication with a non-annular bore of a hydrocarbon well.

Patentansprüche

1. Endblockanordnung für die fluidische Kopplung einer Fluidleitung (14) an einer Kohlenwasserstoffproduktionsvorrichtung (10), wobei die Endblockanordnung Folgendes umfasst:

   einen Fluidleitungsblock (28) mit einer inneren Oberfläche (30), die angepasst ist, um selektiv mit einer entsprechenden Oberfläche (32) der Kohlenwasserstoffproduktionsvorrichtung (10)

zusammengepasst zu werden, wobei der Fluidleitungsblock (28) ein vorstehendes Element (36) aufweist, das sich von der inneren Oberfläche (30) erstreckt;
eine primäre Versiegelung (58), die an einem Ende des vorstehenden Elementes (36) angeordnet ist, wobei die primäre Versiegelung (58) einen inneren Durchmesser aufweist, der geeignet ist, um die Fluidleitung (14), die sich von der Kohlenwasserstoffproduktionsvorrichtung (10) erstreckt, selektiv zu umgeben, und einen äußeren Durchmesser, der geeignet ist, um eine Oberfläche eines Seitenwanddurchganges der Kohlenwasserstoffproduktionsvorrichtung (10) selektiv in Eingriff zu nehmen und eine Abdichtung zwischen dem Fluidleitungsblock (28) und der Kohlenwasserstoffproduktionsvorrichtung (10) herzustellen;
eine sekundäre Versiegelung (64), die das vorstehende Element (36) umgibt, wobei sowohl die innere Oberfläche (30) des Fluidleitungsblocks (28) und die entsprechende Oberfläche (32) der Kohlenwasserstoffproduktionsvorrichtung (10) in Eingriff genommen werden und eine Abdichtung zwischen dem Fluidleitungsblock (28) und der Kohlenwasserstoffproduktionsvorrichtung (10) hergestellt wird,
dadurch gekennzeichnet, dass
die primäre Versiegelung und die sekundäre Versiegelung eine ringförmige Vertiefung (70) zwischen dem Fluidleitungsblock und der Kohlenwasserstoffproduktionsvorrichtung definieren; und
dass ein Messanschluss (76) in Fluidkommunikation mit der ringförmigen Vertiefung ist, um den Druck innerhalb der ringförmigen Vertiefung zu überwachen.

2. Endblockanordnung nach Anspruch 1, wobei die primäre Versiegelung (58) einen flexiblen Endabschnitt des vorstehenden Elements (36) für die selektive Bildung einer Metall-auf-Metall-Versiegelung mit der Oberfläche des Seitenwanddurchgangs der Kohlenwasserstoffproduktionsvorrichtung (10) enthält.

3. Endblockanordnung nach Anspruch 1 oder 2, wobei die sekundäre Versiegelung (64) ein Metallversiegelungsring mit einer Basis (66) und einem Schenkel (68) ist, der sich von der Basis (66) erstreckt, und sowohl die innere Oberfläche (30) des Fluidleitungsblocks (28) und die entsprechende Oberfläche (32) der Kohlenwasserstoffproduktionsvorrichtung (10) in Eingriff nimmt.

4. Endblockanordnung nach einem der Ansprüche 1 bis 3, wobei der Fluidleitungsblock (28) den Messanschluss (76) aufweist, und wobei die primäre Versiegelung (58) und die sekundäre Versiegelung (64) mit dem Messanschluss (76) testbar sind.

5. Endblockanordnung nach einem der Ansprüche 1 bis 4, ferner umfassend eine Verankerung mit einem Dübel (80), der angepasst ist, um an der Fluidleitung (14) befestigt zu werden und dabei die Fluidleitung (14) relativ zur Kohlenwasserstoffproduktionsvorrichtung (10) in Position zu halten.

6. Endblockanordnung nach einem der Ansprüche Anspruch 1 bis 5, wobei der Fluidleitungsblock (28) einen Einlassanschluss (40) und einen Fluiddurchgang (42) zwischen dem Einlassanschluss (40) und der Fluidleitung (14) enthält.

7. Endblockanordnung nach Anspruch 6, wobei der Fluidleitungsblock (28) mindestens eine Nadelventilanordnung (48) mit einem Nadelende (54) enthält, das einen Nadelsitz (56) innerhalb des Fluiddurchgangs (42) in Eingriff nimmt, wobei der Fluiddurchgang (42) selektiv abgedichtet wird.

8. Endblockanordnung nach Anspruch 6, wobei der Einlassanschluss (40) in Fluidkommunikation mit einem Ring zwischen den rohrförmigen Elementen (18, 20) eines Bohrlochs ist.

9. Endblockanordnung nach Anspruch 6, wobei der Einlassanschluss (40) in Fluidkommunikation mit einem nicht ringförmigen Bohrloch einer Kohlenwasserstoffbohrung ist.

Revendications

1. Ensemble bloc de terminaison pour accoupler fluidiquement une canalisation de fluide (14) au niveau d'un dispositif de production d'hydrocarbure (10), l'ensemble bloc de terminaison comprenant :

un bloc de canalisation de fluide (28) avec une surface interne (30) adaptée pour être appariée sélectivement à une surface correspondante (32) du dispositif de production d'hydrocarbure (10), le bloc de canalisation de fluide (28) ayant un organe saillant (36) s'étendant depuis la surface interne (30) ;
un joint d'étanchéité primaire (58) situé au niveau d'une extrémité de l'organe saillant (36), le joint d'étanchéité primaire (58) ayant un diamètre interne approprié pour circonscrire sélectivement la canalisation de fluide (14) s'étendant depuis le dispositif de production d'hydrocarbure (10), et un diamètre externe approprié pour s'enclencher avec une surface de passage de paroi latérale du dispositif de production d'hydrocarbure (10) et assurer l'étanchéité entre le

bloc de canalisation de fluide (28) et le dispositif de production d'hydrocarbure (10) ;
un joint d'étanchéité secondaire (64) circonscrivant l'organe saillant (36), s'enclenchant à la fois avec la surface interne (30) du bloc de canalisation de fluide (28) et la surface correspondante (32) du dispositif de production d'hydrocarbure (10) et assurant l'étanchéité entre le bloc de canalisation de fluide (28) et le dispositif de production d'hydrocarbure (10), **caractérisé en ce que** le joint d'étanchéité primaire et le joint d'étanchéité secondaire définissent une cavité annulaire (70) entre le bloc de canalisation de fluide et le dispositif de production d'hydrocarbure ; et
en ce qu'un orifice d'essai (76) est en communication fluidique avec la cavité annulaire pour surveiller une pression au sein de la cavité annulaire.

2. Ensemble bloc de terminaison selon la revendication 1, dans lequel le joint d'étanchéité primaire (58) comporte une portion d'extrémité flexible de l'organe saillant (36) formant sélectivement un joint d'étanchéité métal sur métal avec la surface de passage de paroi latérale du dispositif de production d'hydrocarbure (10).

3. Ensemble bloc de terminaison selon la revendication 1 ou 2, dans lequel le joint d'étanchéité secondaire (64) est une bague d'étanchéité en métal avec une base (66) et un pied (68) qui s'étend de la base (66) et s'enclenche à la fois avec la surface interne (30) du bloc de canalisation de fluide (28) et la surface correspondante (32) du dispositif de production d'hydrocarbure (10).

4. Ensemble bloc de terminaison selon l'une quelconque des revendications 1 à 3, dans lequel le bloc de canalisation de fluide (28) comporte l'orifice d'essai (76) et dans lequel le joint d'étanchéité primaire (58) et le joint d'étanchéité secondaire (64) peuvent faire l'objet d'un essai avec l'orifice d'essai (76).

5. Ensemble bloc de terminaison selon l'une quelconque des revendications 1 à 4, comprenant en outre une ferrure d'ancrage (80) adaptée pour être attachée à la canalisation de fluide (14) retenant la canalisation de fluide (14) en position par rapport au dispositif de production d'hydrocarbure (10).

6. Ensemble bloc de terminaison selon l'une quelconque des revendications 1 à 5, dans lequel le bloc de canalisation de fluide (28) comporte un orifice d'entrée (40) et un passage de fluide (42) entre l'orifice d'entrée (40) et la canalisation de fluide (14).

7. Ensemble bloc de terminaison selon la revendication 6, dans lequel le bloc de canalisation de fluide (28) comporte au moins un ensemble soupape à pointeau (48) avec une extrémité de pointeau (54) qui s'enclenche avec un siège de pointeau (56) au sein du passage de fluide (42), assurant sélectivement l'étanchéité du passage de fluide (42).

8. Ensemble bloc de terminaison selon la revendication 6, dans lequel l'orifice d'entrée (40) est en communication fluidique avec un espace annulaire entre des organes tubulaires (18, 20) d'un puits de forage.

9. Ensemble bloc de terminaison selon la revendication 6, dans lequel l'orifice d'entrée (40) est en communication fluidique avec un sondage non-annulaire d'un puits d'hydrocarbure.

FIG. 1

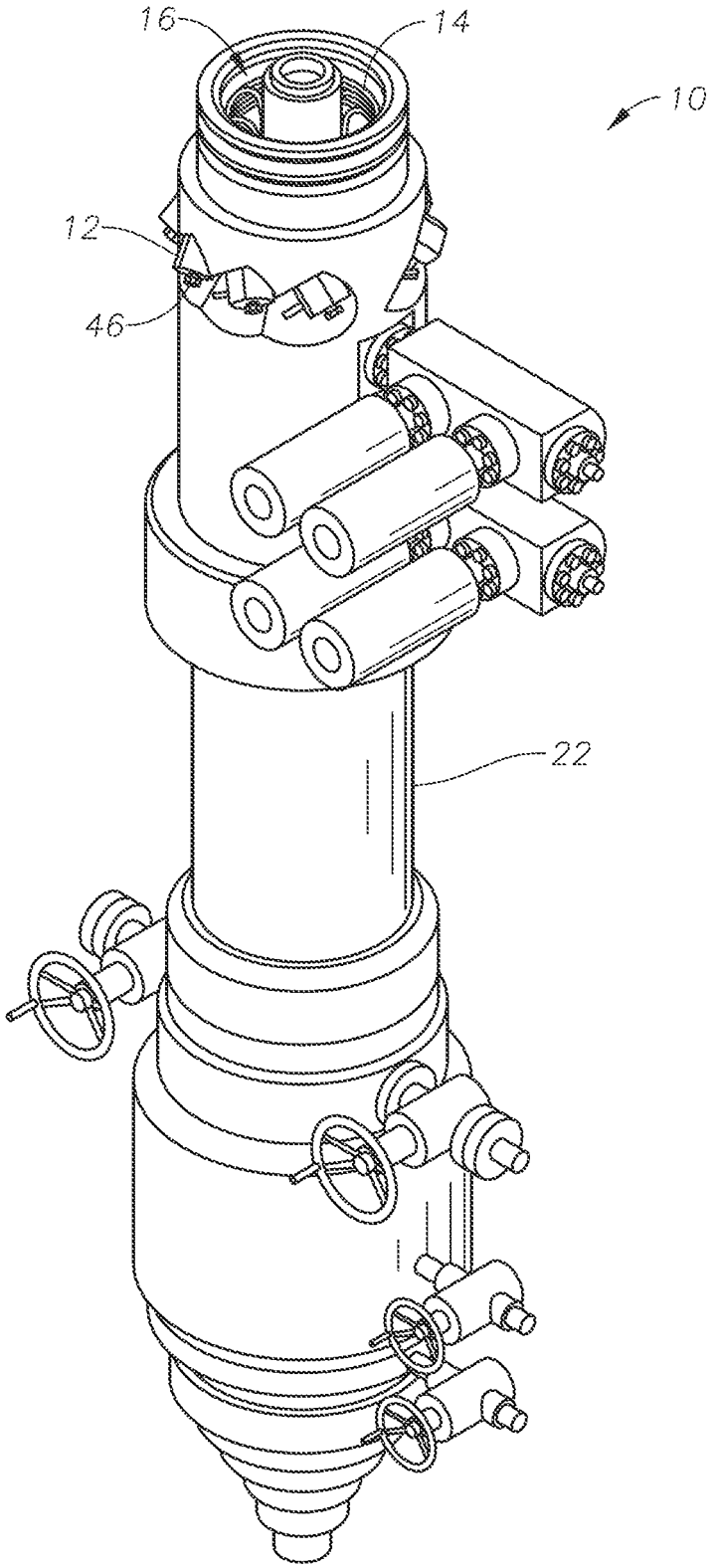
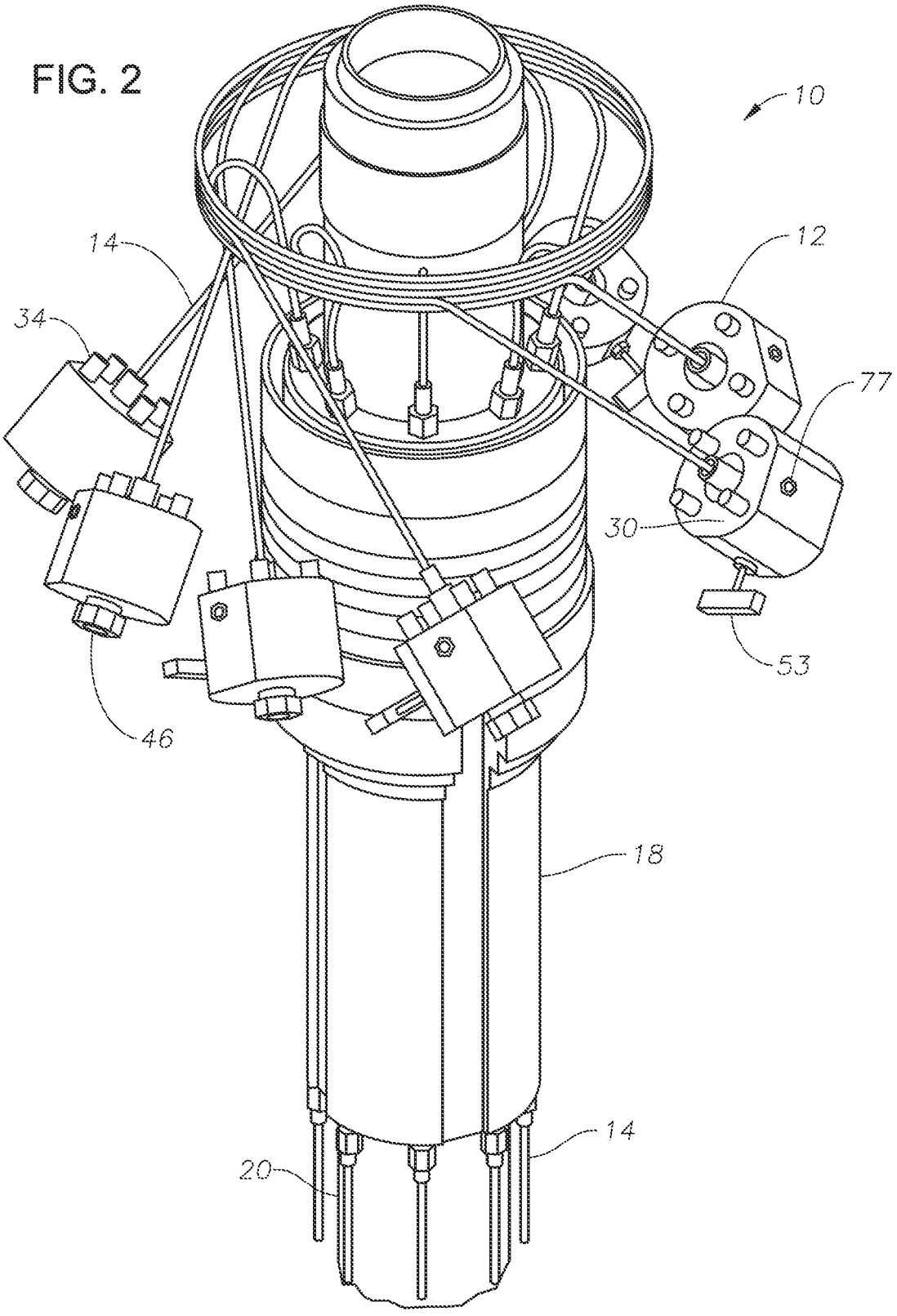


FIG. 2



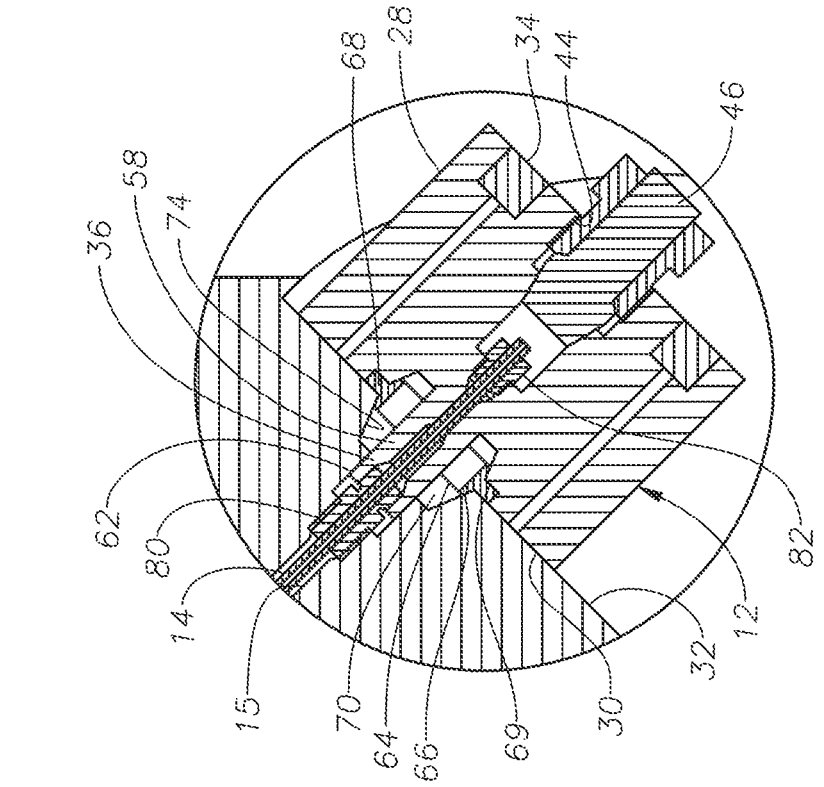


FIG. 4

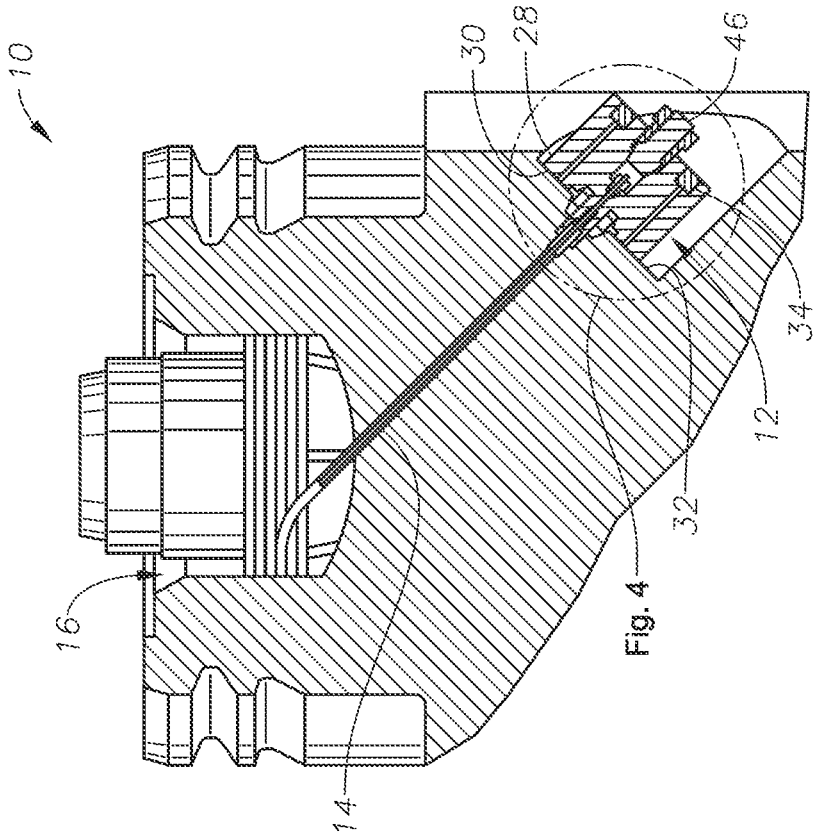


FIG. 3

Fig. 4

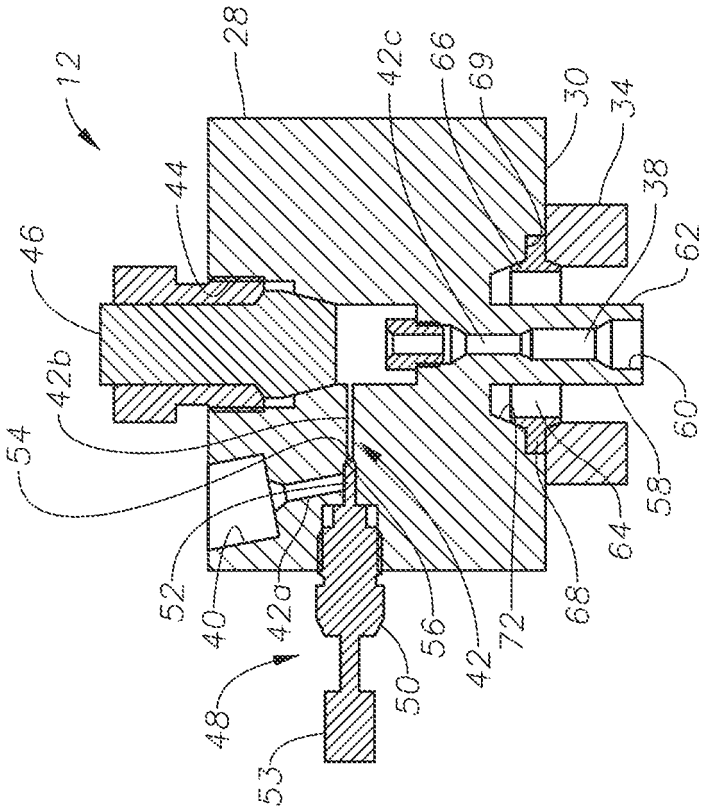

12
28
42c
66
69
30
34
38
62
44
46
42b
54
60
58
64
52
40
42a
56
42
72
68
48
50
53

FIG. 6

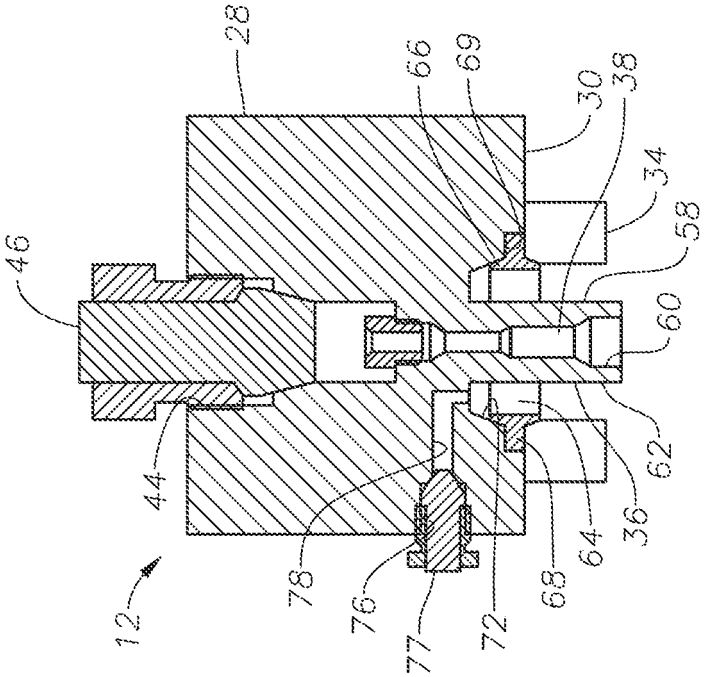

28
66
69
30
38
34
58
46
60
62
44
36
64
68
78
76
77
72
12

FIG. 5

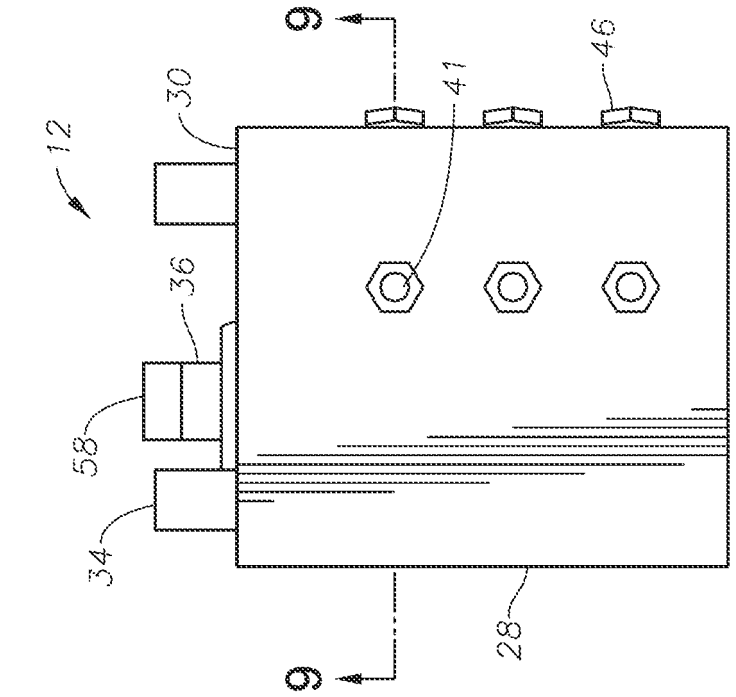


FIG. 8

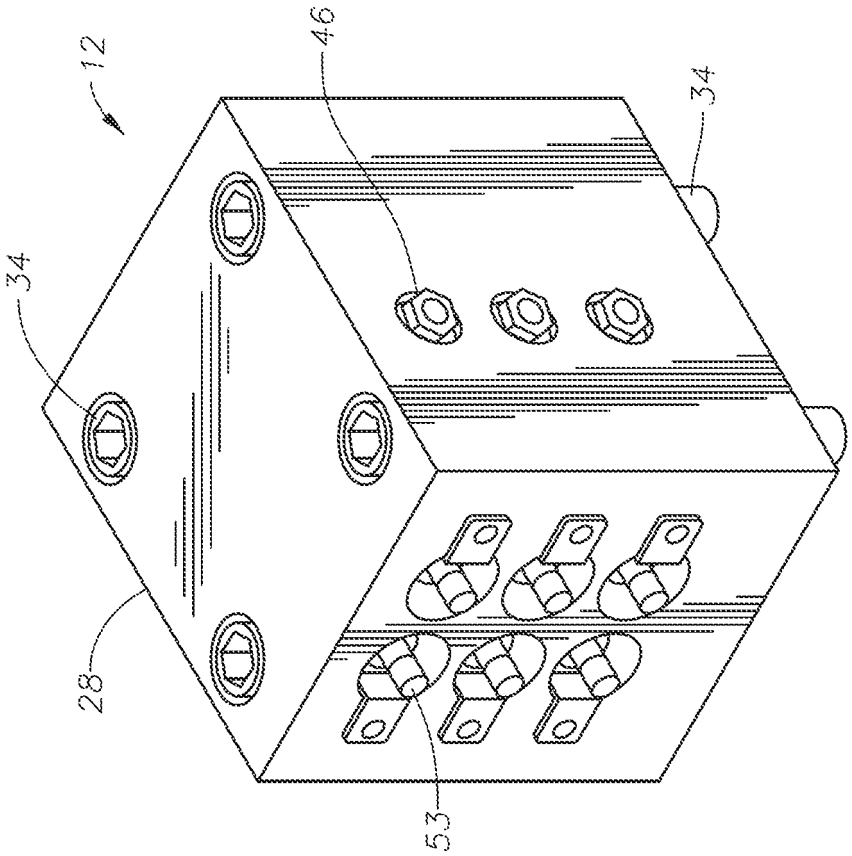


FIG. 7

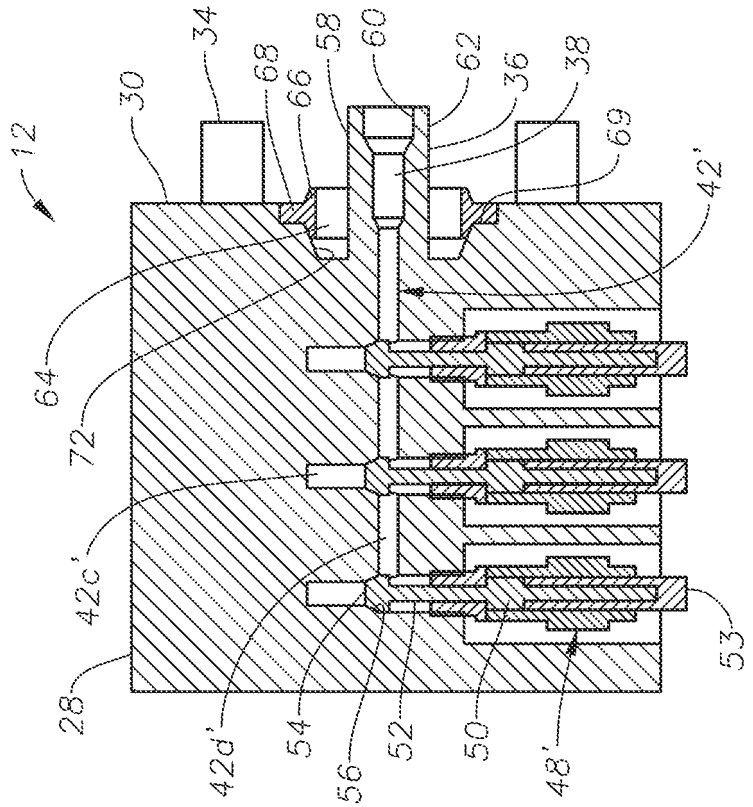

12
30
34
68
66
58
60
62
36
38
69
42'
64
72
42c'
28
42d'
54
56
52
50
48'
53

FIG. 10

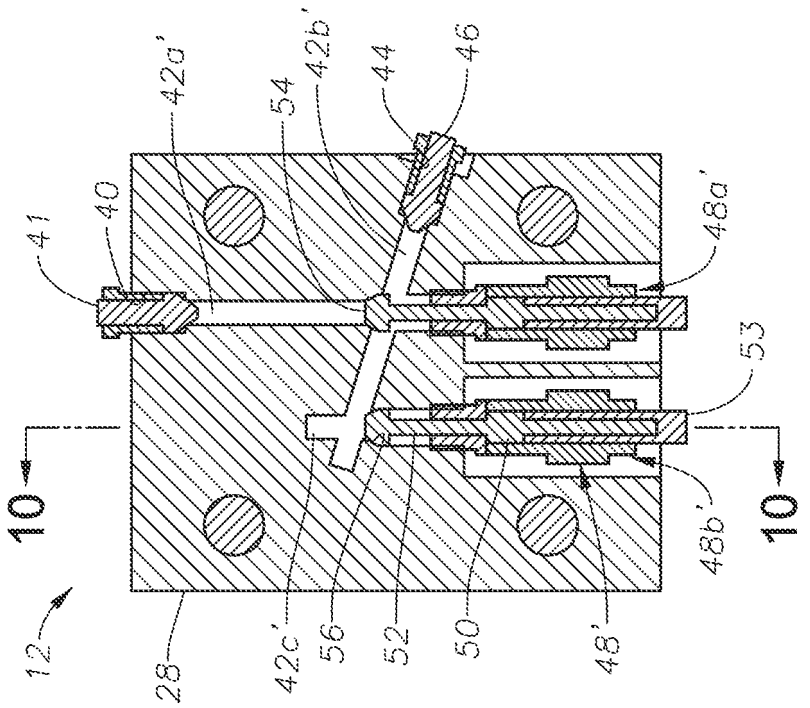

42a'
54
42b'
44
46
41
40
48a'
53
10
10
12
28
42c'
56
52
50
48'
48b'

FIG. 9

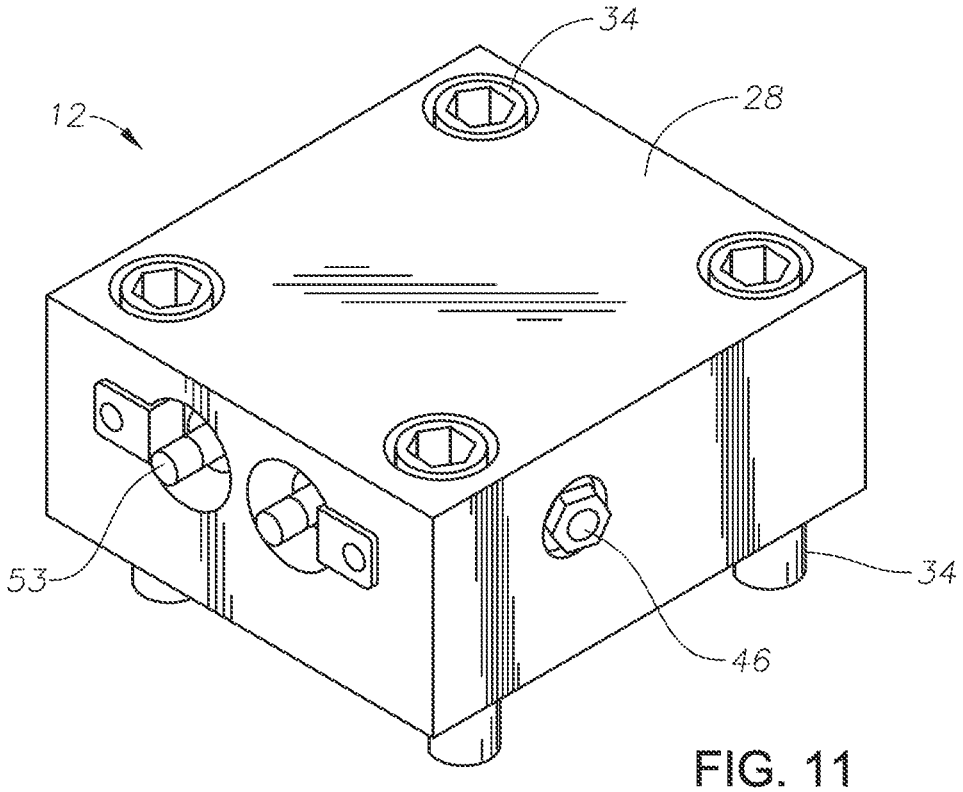


FIG. 11

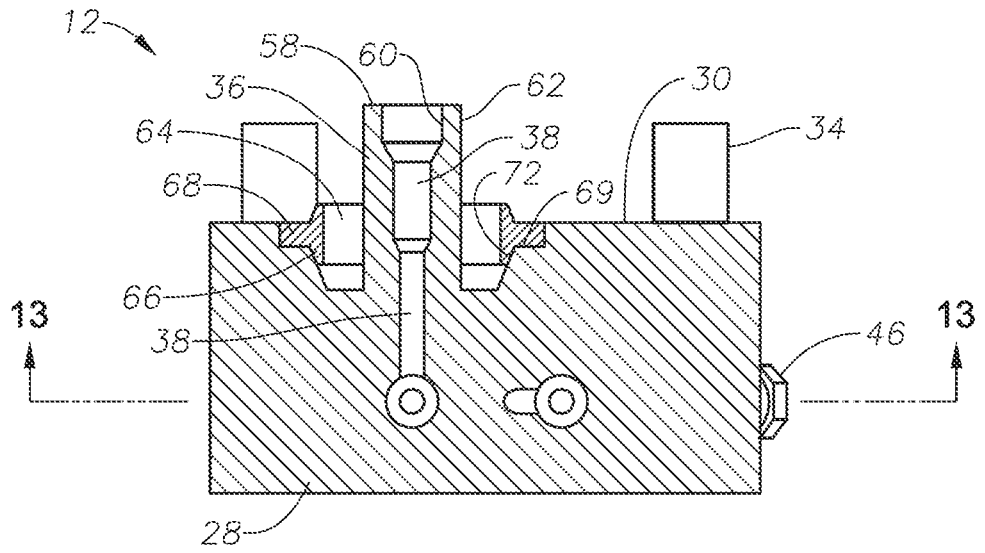


FIG. 12

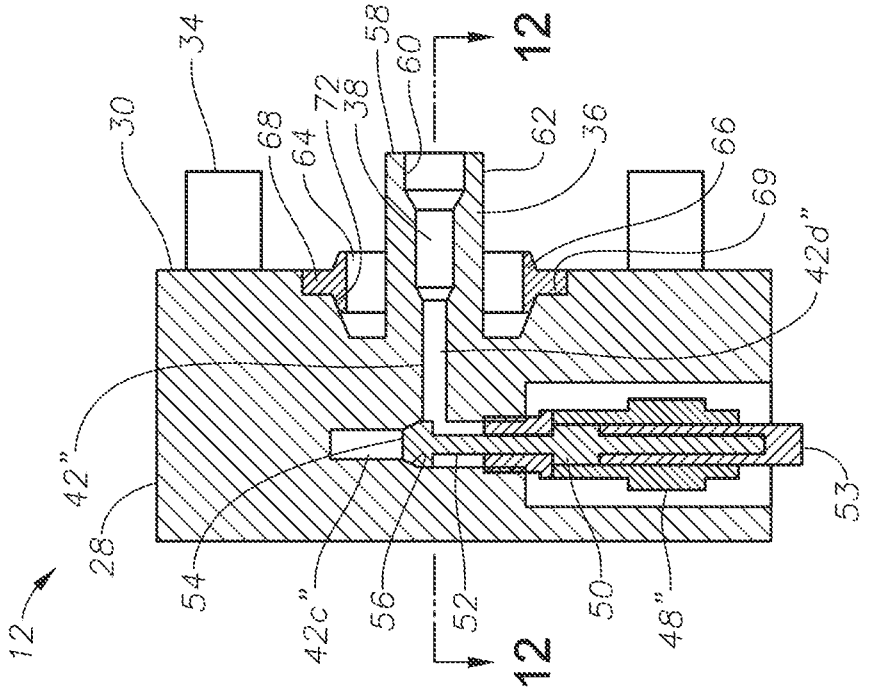

12
12
34
30
68
64
72
38
58
60
62
36
66
69
42d"
42"
28
54
42c"
56
52
50
48"
53

FIG. 14

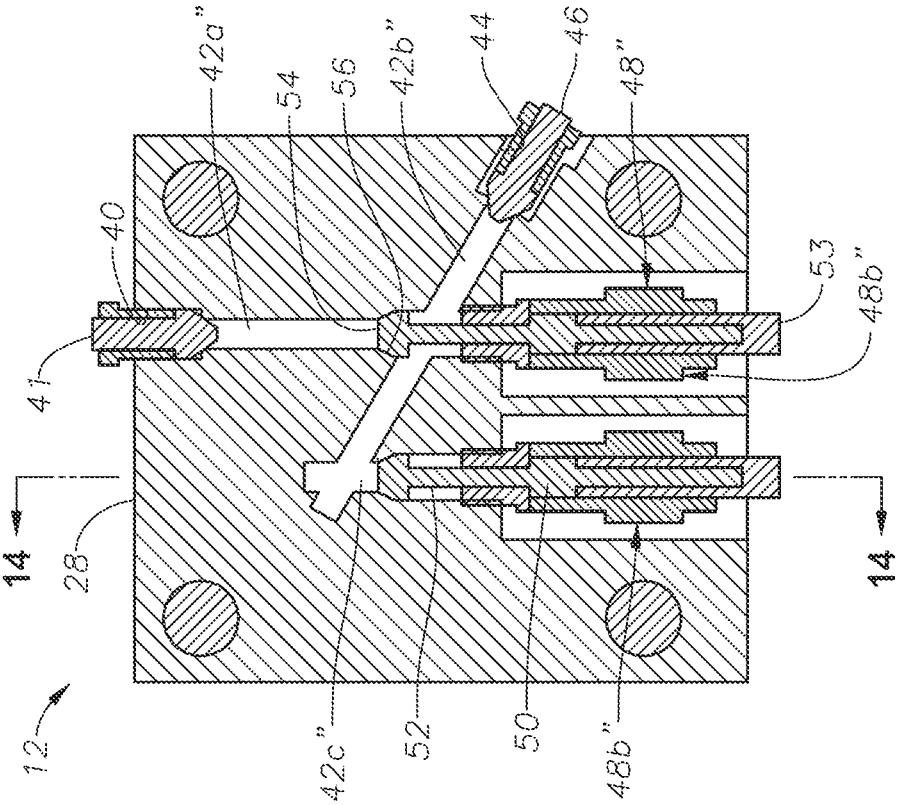

42a"
54
56
42b"
44
46
48"
40
41
53
48b"
14
14
28
12
42c"
52
50
48b"

FIG. 13

REFERENCES CITED IN THE DESCRIPTION

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