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Modular gland arrangements for a fluid end assembly

Abstract

A closure element for a fluid end assembly that has two or more recessed grooves formed in its outer surface. The grooves are axially offset. A seal is placed in one and only one of the grooves. As wear occurs, the seal is relocated to one of the other grooves. Instead of a series of axially offset grooves in a single closure element, a kit may be formed from two or more otherwise identical closure elements, each with a single recessed groove at a different axial position. Another closure element has a series of ledge-like surfaces defining spaces within which a seal may be received. One outer surface surrounds one or more of the other surfaces. A seal is placed in one and only one of the spaces. As wear occurs, the seal is relocated to one of the other spaces.

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OTHER PUBLICATIONS

Exhibit “A” includes cross-sectional views of fluid end assemblies known in the art prior to Aug. 25, 2016. cited by applicant

Exhibit “B” includes side views of valve seats known in the art prior to Sep. 29, 2015. cited by applicant
Exhibit “C” is a cross-sectional view of a plunger end of a fluid assembly known in the art prior to Sep. 29, 2015. cited by applicant
Exhibit “D” includes an engineering drawing and pictures of a mud pump known in the art prior to Sep. 29, 2015. cited by applicant

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Background/Summary

SUMMARY
(1) The present invention is directed to a kit comprising a fluid end assembly, a closure element, and at least one annular first seal. The fluid end assembly comprises a housing having an external surface and an internal chamber. A first conduit is formed in the housing that has a first and a second section, each section independently interconnecting the internal chamber and the external surface. A second conduit is also formed in the housing that intersects the first conduit and independently interconnects the internal chamber and the external surface. The closure element comprises a body having at least two structural features. Each structural feature comprises a pair of external surfaces formed in an outer surface of the body. The external surfaces join at a first corner line and form two boundaries of a recessed space within which an annular seal is receivable. The annular first seal is positionable within the recessed space of any of the structural features.
(2) The present invention is also directed to a kit comprising a fluid end assembly, a first closure element, annular first seal, a second closure element, and an annular second seal. The fluid end assembly comprises a housing having an internal chamber and a conduit that intersects the internal chamber and opens at a first surface of the housing. The first closure element comprises a body having a pair of external surfaces formed in an outer surface of the body. The external surfaces join at a first corner line and form two boundaries of a recessed space within which an annular seal is receivable. The annular first seal is positioned within the recessed space of the first closure element. The second closure element comprises a body having a pair of external surfaces formed in an outer surface of the body. The external surfaces join at a first corner line and form two boundaries of a recessed space within which an annular seal is receivable. The recessed space of the second closure element is axially offset from the recessed space of the first closure element if those closure elements were superimposed. The annular second seal is positioned within the recessed space of the second closure element.

Description

BRIEF DESCRIPTION OF THE DRAWINGS
(1) FIG. **1** is a perspective view of a fluid end assembly. The housing has been partially cut away to better display installed closure elements.
(2) FIG. **2** is a perspective view of a discharge cover from the fluid end assembly of FIG. **1**.
(3) FIG. **3** is a cross-sectional view of the discharge cover of FIG. **2**, positioned within a conduit of a fluid end assembly.
(4) FIG. **4** is a cross-sectional view of a sleeve positioned within a conduit of the fluid end

assembly. A plunger is disposed within the sleeve.
(5) FIG. **5** is a side elevation view of a second embodiment of a discharge cover.
(6) FIG. **6** is a cross-sectional view of the discharge cover of FIG. **5**, positioned within a conduit of a fluid end assembly.
(7) FIG. **7** is a cross-sectional view of a second embodiment of a sleeve positioned within a conduit of a fluid end assembly. A plunger is shown disposed within the sleeve.
(8) FIG. **8** is an exploded perspective view of components of the fluid end assembly. The discharge covers are those shown in FIG. **2**, and the sleeves are those shown in FIG. **4**.
(9) FIG. **9** is an exploded perspective view of some of the components of another fluid end assembly. The discharge covers are those shown in FIG. **5**.
(10) FIG. **10** is an exploded view of the fluid end assembly of FIG. **9**, from a different perspective. The sleeves are those shown in FIG. **7**.
(11) FIG. **11** is a side elevation of a first discharge cover. Together with the second and third discharge covers shown in FIGS. **12** and **13**, it forms a kit of a third embodiment of discharge covers.
(12) FIG. **12** is a side elevation view of a second discharge cover.
(13) FIG. **13** is a side elevation view of a third discharge cover.
(14) FIG. **14** is an exploded perspective view of some of the components of another fluid end assembly. The discharge covers are those shown in FIGS. **11-13**.
(15) FIG. **15** is an exploded view of the fluid end assembly of FIG. **14**, from a different perspective.

DETAILED DESCRIPTION

(16) Fluid end assemblies are typically used in oil and gas operations to deliver highly pressurized corrosive and/or abrasive fluids to piping leading to the wellbore. The assemblies are typically attached to power ends run by engines. The power ends reciprocate plungers within the assemblies to pump fluid throughout the fluid end. Fluid may be pumped through the fluid end at pressures that range from 5,000-15,000 pounds per square inch (psi). Fluid used in high pressure hydraulic fracturing operations is typically pumped through the fluid end at a minimum of 8,000 psi; however, fluid will normally be pumped through the fluid end at pressures around 10,000-15,000 psi during such operations.
(17) With reference now to FIG. **1**, a fluid end assembly **10** comprising a housing **12** having an external surface **14** and an internal chamber **16** is shown. A first conduit **18** and a second conduit **20** are formed within the housing **12**. The conduits **18** and **20** intersect each other to form the internal chamber **16**. As shown in FIG. **1**, the diameter of the conduits **18** and **20** may vary throughout the housing **12**. This allows the conduits **18** and **20** to closely receive structures of different sizes described later herein.
(18) The first conduit **18** shown in FIG. **1** has aligned first and second sections **22** and **24**, and the second conduit **20** has aligned third and fourth sections **26** and **28**. Each section **22**, **24**, **26**, and **28** independently connects the internal chamber **16** and the external surface **14**. The sections **22**, **24**, **26**, and **28** are aligned such that the conduits **18** and **20** are orthogonal to one another. However, the sections **22**, **24**, **26**, and **28** may also be aligned so they intersect the internal chamber **16** at a non-straight angle.
(19) In another embodiment, the second conduit **20** may only comprise a third section **26**, meaning the second conduit **20** only has one opening on the external surface **14**. The fourth section **28** is not required for operation of the fluid end **10**. The fourth section **28** is typically machined in the housing **12** for ease of creating the second conduit **20** and to provide an opening to service parts within the housing **12**, if needed.
(20) The second section **24** has an intake opening **68**. The intake opening **68** may be secured to a piping system that delivers fluid to the fluid end **10**. A set of valves **70** and **72** are positioned within the first conduit **18**. The valves **70** and **72** help move fluid within the housing **12**. An intake valve **72** prevents fluid from flowing back through the intake opening **68** after entering the housing **12**. A

discharge valve **70** allows fluid to exit the fluid end **10** through a discharge opening **74** positioned proximate a top end **76** of the fluid end **10**. Each of the valves **70**, **72** may also have a seal **78** positioned around its outer surface to block fluid from leaking around the valves **70**, **72**.

(21) With reference to FIGS. **1** and **8**, the housing **12** may have a plurality of first and second conduits **18** and **20** positioned adjacent one another. Each first conduit **18** may have an intake opening **68** formed in its second section **24**. The intake openings **68** may each be connected to a different coupler or pipe that leads to the same piping system (not shown). This allows fluid to enter the fluid end **10** through multiple openings. In contrast, only one discharge opening **74** may be formed in the housing **12**. Each first section **22** of the first conduits **18** may be connected to the discharge opening **74**. This allows fluid to exit the housing **12** through a single opening.

(22) A second discharge opening (not shown) may also be formed in the housing **12** that is in fluid communication with the discharge opening **74**. This allows fluid to exit the housing **12** through two openings. Additional discharge openings may also be formed in the housing **12**, if needed.

(23) With reference to FIG. **1**, a plurality of closure elements **30**, **32**, and **34** are shown positioned within the first, third, and fourth sections **22**, **26**, and **28**. The closure element positioned within the first section **22** is a discharge cover or discharge plug **30**, and the closure element positioned within the fourth section **28** is a suction cover or suction plug **32**. The covers **30** and **32** are substantially identical. Each cover **30**, **32** is sized to fully block fluid flow within the section **22** or **28** it is situated in. The covers **30** and **32** are retained within each section **22** or **28** by a retaining nut **36** that threads into each section **22** and **28** proximate the external surface **14** of the housing **12**.

(24) The closure element positioned within the third section **26** is a sleeve **34**. The sleeve **34** is tubular and sized to be closely received within the third section **26**. The sleeve **34** is retained within the third section **26** by a tubular retaining nut **40**. The retaining nut **40** threads into the third section **26** proximate the external surface **14** of the housing **12**.

(25) A plunger **42** is shown disposed within the sleeve **34** and the retaining nut **40**. During operation, the plunger **42** reciprocates within the housing **12** to pump fluid throughout the fluid end **10**. The plunger **42** is powered by a power end run by an engine (not shown) that is connected to a first end **44** of the plunger **42**.

(26) Each of the closure elements **30**, **32**, and **34** has a seal **46** positioned around its outer surface to block fluid from leaking from the sections **22**, **26**, or **28**. The seals **46** block the flow of fluid by tightly engaging an inner surface or sealing surface **48** of conduits **18** and **20**.

(27) Fluid end assemblies **10** are susceptible to corrosive and/or abrasive fluid becoming trapped between the seal **46** and the sealing surface **48**. This may cause the sealing surfaces **48** to erode over time and prevent the seals **46** from tightly engaging the sealing surfaces **48**. Fluid may leak from the sections **22**, **26**, and **28** if the seals **46** cannot effectively seal against the sealing surfaces **48**. If fluid leaks from the fluid end **10**, the housing **12** will likely need to be replaced, because it may no longer maintain the requisite fluid pressure for operation.

(28) The present invention is directed to a system including one or more closure elements **30**, **32**, and **34** that permit the seal **46** to be relocated within the conduits **18** and **20** over time. Relocating the seal **46** also relocates the sealing surface **48**. Thus, if the original sealing surface **48** suffers erosion, the seal **46** can be moved to engage with a different sealing surface **48** in the conduits **18** or **20**. Such relocation will help extend the life of the fluid end housing **12**.

(29) Turning now to FIG. **2**, a first embodiment of the closure element **100** is shown. A discharge cover **30** is shown in FIG. **2**, but a suction cover **32** or a sleeve **34** may also be used with the closure element **100** (FIGS. **4** and **8**). The closure element **100** comprises a body **102** having a top surface **104**, a bottom surface **106** and an outer surface **108**.

(30) The body **102** further comprises a plurality of structural features making up a first recessed space **110**, a second recessed space **112**, and third recessed space **114**. The recessed spaces **110**, **112**, and **114** are each formed by paired external surfaces **116** and **118** that join at a first corner line **120** and form a ledge at an outer edge of the body **102**. The external surfaces **116** and **118** form the

boundaries of each recessed space **110**, **112**, and **114**. An annular seal **122** is positionable within one of the recessed spaces **110**, **112**, and **114** (FIGS. **3** and **4**).

(31) The first recessed space **110** has a larger circumference than the second recessed space **112**, and the second recessed space **112** has a larger circumference than the third recessed space **114**. The structural features making up the recessed spaces **110**, **112**, and **114** shown in FIG. **2** follow substantially the same path around the outer surface **108** of the body **102**. However, the recessed spaces **110**, **112**, and **114** may follow differently shaped paths around the outer surface **108** of the body **102**, if desired.

(32) With reference now to FIGS. **3** and **4**, the closure elements **100** are shown positioned within the conduits **18** and **20**. The discharge cover **30** is shown in FIG. **3** and the sleeve **34** is shown in FIG. **4**. The closure elements **100** are positioned within the sections **22** or **28** such that the bottom surface **106** faces towards the internal chamber **16** (FIG. **1**). The retaining nut **36** or **40** is positioned above the top surface **104** of the closure element **100**. As shown in FIG. **4**, the sleeve **34** is hollow in the center to make room for the plunger **42**. A packing seal or series of packing seals **50** may also be positioned inside of the sleeve **34** to block fluid from leaking between the sleeve **34** and the plunger **42**.

(33) Continuing with FIGS. **3** and **4**, the sealing surface **48** for each seal **122** comprises paired surfaces formed in the internal walls of the conduits **18** or **20**. The paired surfaces correspond with the recessed spaces **110**, **112**, and **114** formed in the closure element **100**. Thus, the inner walls of the conduits **18** or **20** further bound the recessed spaces **110**, **112**, and **114** to tightly engage the seal **122**.

(34) Turning now to FIG. **5**, a second embodiment of the closure element **200** is shown. A discharge cover **30** is shown in FIGS. **5**, but a suction cover **32** or a sleeve **34** may also be used with the closure element **200** (FIGS. **7**, **9**, and **10**). The closure element **200** comprises a body **202** having a top surface **204**, a bottom surface **206** and an outer surface **208**.

(35) A plurality of structural features are formed in the body **202** that make up a first recessed space **210**, a second recessed space **212**, and third recessed space **214**. The recessed spaces **210**, **212**, and **214** are each formed by paired external surfaces **216** and **218** that join at a first corner line **220** and form a ledge at an outer edge of the body **202**. The recessed spaces **210**, **212**, and **214** are further bounded by a third external surface **222** of the body **202** that joins one of the paired external surfaces **216**, **218** at a second corner line **224**. The three external surfaces **216**, **218**, and **222** together form a groove in the body **202**.

(36) The recessed spaces **210**, **212**, and **214** are axially spaced on the outer surface **208** of the body **202** and are substantially identical in shape and size. However, the spaces **210**, **212**, and **214** may vary in size and shape, if desired. An annular seal **226** is positionable within one of the recessed spaces **210**, **212**, and **214** (FIGS. **6** and **7**).

(37) With reference now to FIGS. **6** and **7**, the closure elements **200** are shown positioned within the conduits **18** and **20**. The discharge cover **30** is shown in FIG. **6** and the sleeve **34** is shown in FIG. **7**. The closure elements **200** are positioned within the sections **22** or **28** such that the bottom surface **206** faces towards the internal chamber **16** (FIG. **1**). The retaining nut **36** or **40** is positioned above the top surface **204** of the closure element **200**. As shown in FIG. **7**, the sleeve **34** is hollow in the center to make room for the plunger **42**. Like closure element **100**, a packing seal or series of packing seals **228** may also be positioned inside of the sleeve **34** to block fluid from leaking between the sleeve **34** and the plunger **42**.

(38) Continuing with FIGS. **6** and **7**, the sealing surface **48** for each seal **226** is the area of the internal wall of the conduit **18** or **20** that tightly engages the seal **226**. This area is typically the portion of the internal wall directly across from the position of the seal **226**, when the closure element **200** is positioned within the conduits **18** or **20**.

(39) Turning now to FIGS. **8-10**, the first and second embodiments of the closure elements **100** and **200** may be utilized in the same manner. In operation, an operator will put a first seal **122**A or **226**A

in the first recessed space **110** or **210** and leave the second and third recessed spaces **112**, **212**, **114**, and **214** empty (FIGS. **2** and **5**). The operator will then install the closure element **100** or **200** into one of the conduits **18** or **20** and secure it with the retaining nut **36** or **40**.

(40) The power end attached to the fluid end **10** is then activated such that fluid begins to flow throughout the fluid end **10**. During operation, the sealing surface **48** within the conduit **18** or **20** will start to erode. If the seal **122**A or **226**A starts to leak, the power end is deactivated to stop fluid flow. The closure element **100** or **200** is removed from the conduit **18** or **20** and the first seal **122**A or **226**A is removed from the first recessed space **110** or **210** (FIGS. **2** and **5**).

(41) A second seal **122**B or **226**B is positioned within the second recessed space **112** or **212** leaving the first and third recessed spaces **110**, **210**, **114**, and **214** empty (FIGS. **2** and **5**). The closure element **100** or **200** is installed into the same conduit **18** or **20** it was removed from and operations may resume. Because the position of the second seal **122**B or **226**B is axially spaced from that of the first seal **122**A or **226**A, the second seal **122**B or **226**B will have a new non-eroded sealing surface **48** on the internal surface of the conduit **18** or **20** (FIGS. **3**, **4**, **6** and **7**). Thus, the second seal **122**B or **226**B will offer enhanced resistance from leakage from the conduit **18** or **20**.

(42) As the sealing surfaces **48** experience erosion, the seal **122**B or **226**B may begin to leak. In such case, the power end is again deactivated and the closure element **100** or **200** is removed from the conduit **18** or **20**, and the second seal **122**B or **226**B is removed from the second recessed space **112** or **212**. A third seal **122**C or **226**C is positioned within the third recessed space **114** or **214** leaving the first and second recessed spaces **110**, **210**, **112**, and **212** empty (FIGS. **2** and **5**). The closure element **100** or **200** is again installed into the conduit **18** or **20** and operations may resume. Because the position of the third seal **122**C or **226**C is axially spaced from that of the first and second seal **122**A, **122**B, **226**A, and **226**B, the third seal **122**C or **226**C will have a new non-eroded sealing surface **48** (FIGS. **3**, **4**, **6**, and **7**). Thus, the third seal **122**C or **226**C will offer enhanced resistance from leakage from the conduit **18** or **20**.

(43) The operator may choose any order of positioning the seals within the grooves desired. The order of operation described above is non-limiting and is just one method of using the closure elements **100** or **200**. For example, the operator may start by positioning the third seal **122**C or **226**C in the third recessed spaces **114** or **214**, rather than starting by positioning the first seal **122**A or **226**A in the first recessed spaces **110** or **210**.

(44) The same methods described above may be employed using a closure element **100** or **200** having only two recessed spaces or having more than three recessed spaces. Once the final seal no longer seals properly against its sealing surface **48**, the fluid end housing **12** will likely need to be replaced.

(45) In operation, this method is employed for each conduit **18** or **20** individually. FIGS. **8-10** show the seals **122**A, **122**B, **122**C, **226**A, **226**B, and **226**C positioned within a different recessed space **110**, **112**, **114**, **210**, **212**, and **214** (FIGS. **2** and **5**) in each type of closure element **100** and **200** for illustrative purposes only. In reality, each closure element **100** or **200** starts with the first seal **122**A or **226**A in the first recessed space **110** or **210**. The first seal **122**A or **226**A may be removed and the second seal **122**B or **226**B is placed in the second recessed space **112** or **212**, and so on, only when necessary for each closure element **100** or **200**.

(46) Turning now to FIGS. **11-13**, a third embodiment of the closure element **300** is shown. The closure element **300** utilizes a kit comprising multiple closure elements **302**, **304**, and **306**. Discharge covers **30** are shown in FIGS. **11-13**, but suction covers **32** or sleeves **34** may also be used with the closure element **300** (FIGS. **14** and **15**).

(47) The kit making up the closure element **300** includes a first closure element **302**, a second closure element **304**, and third closure element **306**. Except as described hereafter, the closure elements **302**, **304**, and **306** are identical in size and shape to closure elements **200**. Each closure element **302**, **304**, and **306** has a single structural feature formed in the outer surface of its body **314** in the form of a recessed space **308**, **310**, and **312**. The recessed spaces **308**, **310**, and **312** are

configured identically to the recessed spaces **210**, **212**, and **214** formed in the second embodiment of the closure element **200** (FIG. **5**).
(48) The first closure element **302** has a first recessed space **308** formed proximate a top surface **316** of its body **314**. The second closure element **304** has a second recessed space **310** formed proximate the center of the body **314**, and the third closure element **306** has a third recessed space **312** formed proximate a bottom surface **318** of its body **314**. Thus, the recessed spaces **308**, **310**, and **312** are axially offset from one another if the closure elements **302**, **304**, and **306** are superimposed. A first, second, and third seal **320**A, **320**B, and **320**C may be positioned within each corresponding recessed space **308**, **310**, and **312** (FIGS. **14** and **15**).
(49) Turning now to FIGS. **14** and **15**, in operation, the operator will install the first closure element **302** into one of the conduits **18** or **20** and secure it with the retaining nut **36** or **40**. The power end attached to the fluid end **10** is activated such that fluid begins to flow throughout the fluid end **10**. Over time, the sealing surface **48** of the first seal **320**A will start to erode. If the first seal **320**A starts to leak, the power end is deactivated to stop fluid flow. The first closure element **302** is removed from the conduit **18** or **20** and replaced with the second closure element **304**.
(50) Because the position of the second seal **320**B on the second closure element **304** is axially spaced from that of the first seal **320**A on the first closure element **302**, the second seal **320**B will have a new non-eroded sealing surface **48** in the conduit **18** or **20**. Thus, the second seal **320**B will offer enhanced resistance from leakage from the conduit **18** or **20**.
(51) As the sealing surfaces **48** experience erosion, the second seal **320**B may begin to leak. In such case, the power end is again deactivated and the second closure element **304** is removed from the conduit **18** or **20** and replaced with the third closure element **306**. Because the position of the third seal **320**C on the third closure element **306** is axially spaced from the first and second seals **320**A and **320**B on the first and second closure elements **302** and **304**, the third seal **320**C will have a new non-eroded sealing surface **48**. Thus, the third seal **320**C will offer enhanced resistance from leakage from the conduit **18** or **20**.
(52) The operator may choose any order of positioning the closure element **302**, **304**, and **306** within the conduits **18** or **20** desired. The order of operation described above is non-limiting and is just one method of using the kit making up the closure element **300**. For example, the operator may start by positioning the third closure element **306** in the conduit **18** or **20**, rather than starting by positioning the first closure element **302** in the conduit **18** or **20**.
(53) This same method may be employed using only two different closure elements **300** or more than three different closure elements **300**. Once the seal on the final closure element no longer seals properly, the fluid end housing **12** will likely need to be replaced.
(54) This same method may also be employed using the first embodiment **100** of the closure element **100**. In such case, each closure element would only have one recessed space formed in its body that is identical to the recessed spaces **110**, **112**, or **114** shown in FIG. **2**. The recessed spaces would be axially offset if those closure elements were superimposed.
(55) In operation, this method is employed for each conduit section **22**, **26**, or **28** (FIG. **1**) individually. FIGS. **14** and **15** show a different closure element **302**, **304**, or **306** positioned within each conduit section **22**, **26**, or **28** for illustrative purposes only. In reality, each conduit section **22**, **26**, or **28** would start with the first closure element **302**. The first closure element **302** would be removed and replaced with the second closure element **304**, and so on, only when necessary for each conduit section **22**, **26**, or **28**.
(56) Turning back to FIG. **1**, the seals **78** on the valves **70**, **72** may have the same problems as the seals **46** used on the closure elements **30**. Due to this, the embodiments **100**, **200**, and **300** and methods discussed above may also be employed on the valves **70** and **72**.
(57) Various modifications can be made in the design and operation of the present invention without departing from the spirit thereof. Thus, while the principle preferred construction and modes of operation of the invention have been explained in what is now considered to represent its

best embodiments, which have been illustrated and described, it should be understood that the invention may be practiced otherwise than as specifically illustrated and described.

Claims

1. A fluid end kit, comprising: a housing having an external surface, an internal chamber, and at least two conduits independently interconnecting the external surface and the internal chamber, each conduit comprising a longitudinal axis; a first plug configured to be closely received within a selected one of the conduits and configured to block the flow of fluid within such conduit, the first plug comprising: a body, comprising: an axis that is configured to be colinear with the longitudinal axis; and one and only one circumferential recess formed therein; and a second plug configured to be closely received within the same selected one of the conduits as the first plug and configured to block the flow of fluid within such conduit, the second plug comprising: a body, comprising: an axis that is configured to be colinear with the longitudinal axis; and one and only one circumferential recess formed therein; in which the respective recesses would be axially offset if the first and second plugs were superimposed.
2. The fluid end kit of claim 1, in which each circumferential recess comprises two sidewalls joined by a base.
3. The fluid end kit of claim 1, in which each conduit is configured to receive the first and second plugs singly, but not jointly.
4. The fluid end kit of claim 1, further comprising: a third plug configured to be closely received within the same selected one of the conduits as the first and second plugs and configured to block the flow of fluid within such conduit, the third plug comprising: a body, comprising: an axis that is configured to be colinear with the longitudinal axis; and one and only one circumferential recess formed therein; in which the recess would be axially offset from the recesses of the first and second plugs if the first, second, and third plugs were superimposed; and at least one annular seal configured to be received in the circumferential recess formed in the first, second, or third plug.
5. The fluid end kit of claim 1, further comprising at least one annular seal configured to be received in the circumferential recesses formed in the first or second plug.
6. A method of using the fluid end kit of claim 1, in which the first plug has an annular seal situated within its groove, and in which the assembled first plug and seal have been installed in a selected conduit of housing to form an operative fluid end, the method comprising: replacing the first plug with the second plug in the selected conduit, the second plug having an annular seal within its groove.
7. The method of claim 6, in which the annular seal installed within the first plug is the same annular seal installed within the second plug.
8. A fluid end assembly, comprising: a fluid end body having at least two conduits, each conduit comprising a longitudinal axis; a closure element installed within a selected one of the conduits, the closure element comprising: a body having an axis configured to be colinear with the longitudinal axis and at least two axially spaced and circumferential steps formed therein, each step configured for receiving an annular seal; and an annular seal positioned within one and only one of the steps formed in the body; in which the annular seal is configured to block the flow of fluid within such conduit.
9. The fluid end assembly of claim 8, further comprising a retaining nut threaded into the fluid end body, the retaining nut configured to secure the closure element within the selected conduit.
10. The fluid end assembly of claim 8, in which the closure element is characterized as a tubular sleeve, the tubular sleeve configured to receive at least a portion of a reciprocating plunger.
11. A method of using the fluid end assembly of claim 8, the method comprising: operating the fluid end with the closure element carrying the annular seal, the seal being installed on a first step of the closure element; and during a break in operation of the fluid end, servicing the closure

element such that a second annular seal carried by the closure element is installed on a second and different step.

12. The method of claim 11, in which the seal installed on the second step of the closure element is different from the seal installed on the first step of the closure element.

13. An assembly, comprising: a fluid end, comprising: a housing, comprising: an external surface; an internal chamber; and at least two independent conduits, each conduit having a longitudinal axis and interconnecting the external surface and the internal chamber; and a replacement part kit, comprising: a first plug configured to be closely received within a selected one of the conduits and configured to block the flow of fluid within such conduit, the first plug comprising: a body having an axis configured to be colinear with the longitudinal axis of the selected conduit and one and only one circumferential recess formed therein; and a second plug configured to be closely received within the same selected one of the conduits and configured to block the flow of fluid within such conduit, the second plug comprising: a body having an axis configured to be colinear with the longitudinal axis of the selected conduit and one and only one circumferential recess formed therein; in which the bodies of the plugs are identically shaped and sized apart from the recesses, with the recesses of the respective plugs being axially offset but otherwise identical.

14. The assembly of claim 13, in which the fluid end further comprises: a retaining nut configured to thread into the housing and hold a selected plug within a selected conduit.

15. The assembly of claim 13, in which each circumferential recess comprises two sidewalls joined by a base.

16. The assembly of claim 13, in which each conduit is configured to receive the first and second plugs singly, but not jointly.

17. The assembly of claim 13, in which the replacement part kit further comprises: a third plug configured to be received within the same selected one of the conduits and configured to block the flow of fluid within such conduit, the third plug comprising a body having an axis configured to be colinear with the longitudinal axis of the selected conduit and one and only one circumferential recess formed therein.

18. A method of using the assembly of claim 13, in which the first plug has an annular seal situated within its groove, and in which the assembled first plug and seal have been installed in a selected conduit of the housing to form an operative fluid end, the method comprising: replacing the first plug with the second plug in the selected conduit, the second plug having a second annular seal within its groove.