shown) for providing a pressure-tight seal around an opening (not shown) located in the lower piping component 8 proximate the interface of the lower split body assembly 4 and the valve 1, thereby facilitating fluid communication between the lower piping component 8, the valve 1, and the upper piping component 7.

In some illustrative embodiments, the upper and/or lower piping components 7, 8 may comprise, for example, a tubular product such as pipe, that may commonly be used for moving fluids, such as water, chemicals, petroleum products, and the like, from one location to another. Furthermore, the sizes of the respective upper and lower piping components 7, 8 may vary from application to application, and may be adjusted as required to meet the overall operating conditions, such as flow rate, pressure, and the like, specified for the valve assembly 10 and/or any piping system within which the valve assembly 10 may operate. For example, the nominal sizes of the upper and lower piping components 7, 8 may in some illustrative embodiments be as small as 2" NPS (nominal pipe size), and in other embodiments may be as large as 12" NPS, or even larger. Furthermore, depending on the application requirements, in some embodiments the nominal sizes of the upper and lower piping components 7, 8 may be the same (*e.g.*, both may be 4" pipes), whereas in other embodiments the sizes of the upper and lower piping components 7, 8 may be different. For example, in certain embodiments, the upper piping component 7 may be a 2" or 3" pipe, whereas the lower piping component 8 may be larger, such as, for example, a 4" or 6" pipe. In other embodiments, the upper piping component 7 may have a larger nominal size than the lower piping component 8. Other nominal size combinations may also be used.

Generally, the nominal size of the valve 1 will match the nominal size of the larger of the two piping components 7, 8. For example, in an embodiment of the present disclosure

wherein the upper and lower piping components 7, 8 are both a 3" nominal size, then the valve 1 will be a nominal 3" valve. On the other hand, in an illustrative embodiment wherein the upper piping component 7 is a 4" pipe and lower piping component 8 is a 3" pipe, then the valve 1 will nominally be a 4" valve.

As shown in Fig. 1, in some illustrative embodiments of the valve assembly 10, the upper split body assembly 3 may also comprise a pig stopper 5 that is adapted for regulating the movement of a pipe pig (not shown) through the upper piping component 7, depending on the overall flow requirements of the piping system within which the valve assembly 10 may operate. In those embodiments employing the use of pig stopper 5, the upper split body assembly 3 may be also be adapted to provide a pressure seal around an opening (not shown) located in the upper piping component 7 proximate the interface of the upper split body assembly 3 and the pig stopper 5. Additionally, depending the system requirements, the lower split body assembly 4 may, in some illustrative embodiments, also comprise a pig stopper 5 as described above.

In certain embodiments, the valve assembly 10 may also comprise a valve actuator 6 that is adapted for opening and/or closing the valve 1, depending on system conditions and/or operators instructions. For example, and depending on the overall piping system design, it may be desired to move, or transfer, a process fluid, such as a liquid chemical product, a petroleum product, and the like, from a first piece of shipping and/or storage equipment (not shown) that may be connected to the upper piping component 7 to a second piece of shipping and/or storage equipment (not shown) that may be connected to the lower piping component 8. To facilitate such an operation, a signal may be that instructs the valve actuator 6 to open the valve 1 so as to thereby permit process fluid to flow from the first piece of shipping

adjacent sealing surfaces of existing piping components. Furthermore, it should readily be appreciated that the length-adjustable spacer ring assembly disclosed herein may also be used in conjunction with pressure-retaining components other than valves – such as pumps, vessels, tanks, filters, and similar processing equipment and the like – so as to adjust the overall length (or length) of the pressure-retaining component and thereby precisely fit the pressure-retaining component in a fixed space between adjacent sealing surfaces.

The particular embodiments disclosed above are illustrative only, as the invention may be modified and practiced in different but equivalent manners apparent to those skilled in the art having the benefit of the teachings herein. For example, the process steps set forth above may be performed in a different order. Furthermore, no limitations are intended to the details of construction or design herein shown, other than as described in the claims below. It is therefore evident that the particular embodiments disclosed above may be altered or modified and all such variations are considered within the scope and spirit of the invention. Accordingly, the protection sought herein is as set forth in the claims below.

WHAT IS CLAIMED:

1. A device, comprising:

a first pressure component having a first end;

an adjustable spacer ring that is adapted to be operatively coupled to said first pressure component and to adjust a combined overall length of said first pressure component and said adjustable spacer ring;

a second pressure component having a second end that is adapted to be positioned proximate said first end of said first pressure component, wherein said adjustable spacer ring is further adapted to contact said second end of said second pressure component when said combined overall length is adjusted; and

a slidably movable sealing element that is adapted to be positioned between said first and second pressure components and to slidably move in a substantially axial direction relative to said first and second pressure components.

2. The device of claim 1, wherein said adjustable spacer ring is adapted to be operatively coupled to said first pressure component at a threaded interface and to rotate on said threaded interface so as to move relative to said first end of said first pressure component.

3. The device of claim 1, wherein a distance said adjustable spacer ring is adapted to move is in the range of 1-6 mm relative to said first and second pressure components.

4. The device of claim 1, wherein said slidably movable sealing element is further adapted to affect a pressure-tight seal between said first and second ends of said respective first and second pressure components.

5. A device, comprising:

a first pressure component having a circumferential sealing surface;

a second pressure component having a radial sealing surface that is adapted to be positioned proximate said circumferential sealing surface, wherein said radial sealing surface is substantially perpendicular to said circumferential sealing surface when positioned proximate thereto;

a slidably movable sealing component that is adapted to be positioned between and axially moved relative to said first and second pressure components, wherein said slidably movable sealing component is further adapted to affect a pressure-tight radial seal with said circumferential sealing surface of said first pressure component and a pressure-tight face seal with said radial sealing surface of said second pressure component; and

means for moving said slidably movable sealing component in a substantially axial direction relative to said first and second pressure components so as to affect said pressure-tight face seal.

6. The device of claim 5, wherein said slidably movable sealing component comprises first sealing means for affecting said pressure-tight radial seal with said circumferential sealing surface of said first pressure component and second sealing means for affecting said pressure-tight face seal with said radial sealing surface of said second pressure component.

7. The device of claim 6, wherein said slidably movable sealing component is positioned in and adapted to slidably move within a groove of said first pressure component, said groove comprising said circumferential sealing surface.

8. The device of claim 6, wherein said first sealing means comprises a seal ring positioned between an inside circumferential sealing face of said slidably movable sealing component and said circumferential sealing surface of said first pressure component.

9. The device of claim 6, wherein said second sealing means comprises a seal ring positioned between a lower radial sealing surface of said slidably movable sealing component and said radial sealing surface of said second pressure component.

10. The device of claim 9, wherein said means for axially moving said slidably movable sealing component is adapted to move said lower radial sealing surface of said slidably movable sealing component into sealing contact with said radial sealing surface of said second pressure component.

11. A length-adjustable pressure-retaining device, comprising:

a first pressure component;

a spacer ring that is adapted to be operatively coupled to said first pressure component, to adjust an overall combined length of said first pressure component and said spacer ring by moving relative to an end of said first pressure component and a face of a second pressure component positioned adjacent thereto, and to transfer a load

used for fixedly attaching said first pressure component to said second pressure component between said first and second pressure components; and

a movable sealing element that is adapted to move relative to said end of said first pressure component and a sealing surface of said second pressure component and to provide a pressure-tight seal between said first and second pressure components, wherein said movable sealing element comprises first sealing means for affecting a pressure-tight seal with said first pressure component and second sealing means for affecting a pressure-tight seal with said second pressure component, said first and second sealing means comprising first and second seal rings, respectively

12. The length-adjustable pressure-retaining device of claim 11, wherein said spacer ring comprises a bearing surface at one end thereof that is adapted to contact said face of said second pressure component and means for bringing said bearing surface into contact with said face of said second pressure component.

13. The length-adjustable pressure-retaining device of claim 12, wherein said means for bringing said bearing surface of said spacer ring into contact with said face of said second pressure component comprises an internally threaded surface that is adapted to threadably engage an externally threaded surface of said first pressure component.

14. The length-adjustable pressure-retaining device of claim 11, wherein said each of said first and second seal rings comprise an O-ring seal.

15. The length-adjustable pressure-retaining device of claim 11, wherein said movable sealing element is positioned in a groove located in said end of said first pressure component.

16. The length-adjustable pressure-retaining device of claim 15, wherein said first sealing means further comprises said first seal ring being positioned against an inside surface of said groove.

17. The length-adjustable pressure-retaining device of claim 15, wherein said second sealing means further comprises means for moving said movable sealing element in said groove and compressing said second seal ring against said sealing surface of said second pressure component.

18. The length-adjustable pressure-retaining device of claim 17, wherein said means for moving said movable sealing element relative to said sealing surface of said second pressure-retaining component comprises a plurality of fasteners.

19. The length-adjustable pressure-retaining device of claim 11, wherein said first seal ring is adapted to affect a radial seal on a sealing surface of said first pressure component and a face seal on said sealing surface of said second pressure component, said sealing surface of said first pressure component being substantially perpendicular to said sealing surface of said second pressure component.

20. A length-adjustable pressure assembly, comprising:

a first pressure-retaining component having a first length, said first pressure-retaining component comprising:

a first end that is adapted to sealingly engage a first sealing surface of a first mating pressure part; and

a second end comprising a groove;

a second pressure-retaining component that is adapted to be positioned in said groove, said second pressure-retaining component being further adapted to sealingly engage said second end of said first pressure-retaining component and to sealingly engage a second sealing surface of a second mating pressure part, wherein a distance between said first sealing surface and said second sealing surface is greater than said first length; and

a spacer ring that is adapted to adjust an overall combined length of said first pressure-retaining component and said spacer ring between at least a first overall combined length that is less than said distance between said first and second sealing surfaces and a second overall combined length that is substantially the same as said distance between said first and second sealing surfaces.

21. The length-adjustable pressure assembly of claim 20, wherein said spacer ring is adapted to threadably engage said first pressure-retaining component.

22. The length-adjustable pressure assembly of claim 20, wherein said spacer ring is adapted to contact a contact surface of said second mating pressure part.

23. The length-adjustable pressure assembly of claim 20, wherein said second pressure-retaining component is adapted to move in said groove relative to said second end of said first pressure-retaining component and to said second sealing surface of said second mating pressure part.

shown) for providing a pressure-tight seal around an opening (not shown) located in the lower piping component 8 proximate the interface of the lower split body assembly 4 and the valve 1, thereby facilitating fluid communication between the lower piping component 8, the valve 1, and the upper piping component 7.

In some illustrative embodiments, the upper and/or lower piping components 7, 8 may comprise, for example, a tubular product such as pipe, that may commonly be used for moving fluids, such as water, chemicals, petroleum products, and the like, from one location to another. Furthermore, the sizes of the respective upper and lower piping components 7, 8 may vary from application to application, and may be adjusted as required to meet the overall operating conditions, such as flow rate, pressure, and the like, specified for the valve assembly 10 and/or any piping system within which the valve assembly 10 may operate. For example, the nominal sizes of the upper and lower piping components 7, 8 may in some illustrative embodiments be as small as 2" (≈51mm) NPS (nominal pipe size), and in other embodiments may be as large as 12" (≈305mm) NPS, or even larger. Furthermore, depending on the application requirements, in some embodiments the nominal sizes of the upper and lower piping components 7, 8 may be the same (*e.g.*, both may be 4" (≈102mm) pipes), whereas in other embodiments the sizes of the upper and lower piping components 7, 8 may be different. For example, in certain embodiments, the upper piping component 7 may be a 2" (≈51mm) or 3" (≈76mm) pipe, whereas the lower piping component 8 may be larger, such as, for example, a 4" (≈102mm) or 6" (≈152mm) pipe. In other embodiments, the upper piping component 7 may have a larger nominal size than the lower piping component 8. Other nominal size combinations may also be used.

Generally, the nominal size of the valve 1 will match the nominal size of the larger of the two piping components 7, 8. For example, in an embodiment of the present disclosure

wherein the upper and lower piping components 7, 8 are both a 3" (≈76mm) nominal size, then the valve 1 will be a nominal 3" (≈102mm) valve. On the other hand, in an illustrative embodiment wherein the upper piping component 7 is a 4" (≈102mm) pipe and lower piping component 8 is a 3" (≈76mm) pipe, then the valve 1 will nominally be a 4" (≈102mm) valve.

As shown in Fig. 1, in some illustrative embodiments of the valve assembly 10, the upper split body assembly 3 may also comprise a pig stopper 5 that is adapted for regulating the movement of a pipe pig (not shown) through the upper piping component 7, depending on the overall flow requirements of the piping system within which the valve assembly 10 may operate. In those embodiments employing the use of pig stopper 5, the upper split body assembly 3 may be also be adapted to provide a pressure seal around an opening (not shown) located in the upper piping component 7 proximate the interface of the upper split body assembly 3 and the pig stopper 5. Additionally, depending the system requirements, the lower split body assembly 4 may, in some illustrative embodiments, also comprise a pig stopper 5 as described above.

In certain embodiments, the valve assembly 10 may also comprise a valve actuator 6 that is adapted for opening and/or closing the valve 1, depending on system conditions and/or operators instructions. For example, and depending on the overall piping system design, it may be desired to move, or transfer, a process fluid, such as a liquid chemical product, a petroleum product, and the like, from a first piece of shipping and/or storage equipment (not shown) that may be connected to the upper piping component 7 to a second piece of shipping and/or storage equipment (not shown) that may be connected to the lower piping component 8. To facilitate such an operation, a signal may be that instructs the valve actuator 6 to open the valve 1 so as to thereby permit process fluid to flow from the first piece of shipping

adjacent sealing surfaces of existing piping components. Furthermore, it should readily be appreciated that the length-adjustable spacer ring assembly disclosed herein may also be used in conjunction with pressure-retaining components other than valves – such as pumps, vessels, tanks, filters, and similar processing equipment and the like – so as to adjust the overall length (or length) of the pressure-retaining component and thereby precisely fit the pressure-retaining component in a fixed space between adjacent sealing surfaces.

The particular embodiments disclosed above are illustrative only, as the invention may be modified and practiced in different but equivalent manners apparent to those skilled in the art having the benefit of the teachings herein. For example, the process steps set forth above may be performed in a different order. Furthermore, no limitations are intended to the details of construction or design herein shown, other than as described in the claims below. Accordingly, the protection sought herein is as set forth in the claims below.

WHAT IS CLAIMED:

1. A device, comprising:

a first pressure component having a first end;

an adjustable spacer ring that is adapted to be operatively coupled to said first pressure component and to adjust a combined overall length of said first pressure component and said adjustable spacer ring;

a second pressure component having a second end that is adapted to be positioned proximate said first end of said first pressure component, wherein said adjustable spacer ring is further adapted to contact said second end of said second pressure component when said combined overall length is adjusted; and

a slidably movable sealing element that is adapted to be positioned between said first and second pressure components and to slidably move in a substantially axial direction relative to said first and second pressure components.

2. The device of claim 1, wherein said adjustable spacer ring is adapted to be operatively coupled to said first pressure component at a threaded interface and to rotate on said threaded interface so as to move relative to said first end of said first pressure component.

3. The device of claim 1, wherein a distance said adjustable spacer ring is adapted to move is in the range of 1-6 mm relative to said first and second pressure components.

4. The device of claim 1, wherein said slidably movable sealing element is further adapted to affect a pressure-tight seal between said first and second ends of said respective first and second pressure components.