Valve seat retainer having a full uninterrupted gasket face.

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Description

The invention relates generally to valves and more particularly concerns a seat retainer for a valve which offers a full uninterrupted gasket face for minimizing leakage at the interface of an adjacent fluid handling component. The invention will be specifically disclosed in connection with a recessed seat retainer secured to a valve body by an internally disposed key assembly arranged to firmly, but releaseably, secure the seat retainer to the valve body without creating external fluid leak paths.

In many fluid handling systems, considerable precautions are taken to prevent leakage of fluid from the system to the ambient environment. In addition to the loss of the fluid itself, fluid leakage may result in explosions, fires, environmental contamination, and/or increased maintenance costs. Concern of about fluid wound gasket is particularly pronounced when the fluid being handled is corrosive or toxic.

One of the most likely locations for leakage in a fluid handling system is at the joint between the system components. In a piped piping system, one of the most troublesome leak locations is the interface between a valve and an adjacent system component, such as a pipe flange. In order to enhance sealing and minimize fluid leakage, a gasket is almost always interposed between adjacent system components.

When the fluid in the handling system is at an extreme temperature or pressure or when the fluid is corrosive or toxic, the most preferred and efficient type of gasket is a spiral wound type. A spiral wound gasket consists of preformed metal strips wound in a spiral with a selected filler material interposed and laminated between the metal strips. The filler material may be selected to meet the specific requirements of the system and the handled fluid. Common filler materials include asbestos materials, graphite and polytetrafluoroethylene (PTFE).

A valve seat is commonly secured relative to a valve body by a seat retainer, which retainer is securely fastened to the valve body to compressingly engage the interposed valve seat. By far the most prevalent method of fastening a seat retainer to a valve body is through the employment of screws which extend through screw holes in the retainer and are threadably received by bores in the valve body.

The existence of screw holes in a gasket face of a retainer poses significant limitations upon the effectiveness of the spiral wound gasket. Spiral wound gaskets tend to collapse into the voids created by the screw holes and do not adequately seal the voids. As a result, external leak paths for the fluid are created. Furthermore, the collapse of one or more spirals of a spiral wound gasket into a screw hole void has a domino effect upon the adjacent spirals. Thus, a leak path is created not only at the screw hole location, but also at adjacent areas.

The sealing band width of a spiral wound gasket is frequently less than the width of the retainer face and, for some valve sizes, it is possible to avoid the above mentioned problems by locating the screw holes either radially inside or radially outside this sealing band. However, locating the screw holes inside the sealing band decreases the area of the fluid flow path for many valves, reducing fluid flow through the valve and making the valve less efficient. Locating the screw holes outside the sealing band results in totally unaired seal paths through the screw holes.

Several prior art attempts have been made to eliminate retainer screw holes and to provide a full uninterrupted retainer face suitable for spiral wound gaskets. In one prior art design, the retainer is provided with a plurality of spaced lugs extending radially outward from the outer periphery of the retainer. These lugs have screw holes for receiving screws to hold the retainer to the valve body, although the screw holes of such designs inherently have voids, just as the more conventional screw fastened retainers, the screw holes are located radially outside the retainergasket interface.

Unfortunately, such radially extending lug designs have several limitations. First of all, the valve seat closure member exerts a considerable force upon the valve seat. The seat, in turn, transmits this force to the retainer. Thus, when the retainer is fastened to the valve body only about the outer periphery of the retainer, the retainer becomes a relatively lengthy moment arm and is subject to excessive flexure. In order to avoid excessive flexure, such retainers must be relatively thick (have a relatively large axial dimension). As a result, standard valves having such retainers will not meet industry standards for end to end dimensions. Additionally, retainers of this prior art design cannot be recessed and, in effect, produce a valve with a splitt body having a potential leak path to the external environment around the entire circumference of the fluid flow path.

Another prior art approach is discussed in US—A—3,998,933. The valve body discussed in US—A—4,399,933 has lugs circumferentially spaced along the outer peripheral surface. The lugs have threaded bore holes, which receive screws for securing an interchangeable adapter plate adapted to connect the valve body to one of several types of pipe flange fittings. The adapter plate also overlies the outer periphery of the seat retainer and secures the seat retainer relative to the valve body. This adapter plate method of securing a retainer thus suffers from the same limitations as the radially extending lug designs discussed above.

In another prior art attempt to secure a seat retainer to a valve body while providing a full gasket face, threaded bores have been drilled radially inwardly through the valve body and into a central recess disposed about the flow passage. Set screws were then externally introduced through the threaded bores and extended into V-shaped grooves in the outer diameter of a retainer.
positioned in the recess. The set screws were then operative to hold the retainer in the recess.

Although using a recessed retainer is highly advantageous, drilling holes through the valve body creates an additional leak path for the handled fluid. A similar prior art attempt also using set screws is disclosed in DE—A—28 40 275. The set screws are axially threaded in a cover ring and axially clamp the retainer ring in position. Similar problems are encountered as those already recited in connection with the usual fastening of the retainer by screws extending through screw holes in the retainer and threaded into the valve body.

A valve according to the precharacterizing portion of claim 1 is disclosed in US—A—4 162 782 and in DE—A—2 553 155. In US—A—4 162 782 the seat retainer is press-fitted into the valve body recess, special means are provided, also forming voids in the gasket face of the retainer and valve body, for the removal of the retainer, such as for the replacement of the valve seat. In DE—A—2 553 155 the seat retainer is held in place on a valve body by a snap ring assembly. Snap ring assemblies have proved satisfactory for securing the retainer to the valve body during shipment. Further, snap ring assemblies are satisfactory in actual usage when the valve is sandwiched between two pipe flanges. So long as the retainer is compressingly interposed between the valve body and an adjacent pipe flange, there is no opportunity for the retainer to separate from the valve body.

Moreover, difficulties are experienced in removing retainers secured by snap rings, such as for the replacement of a valve seat. It is common practice to position a screw driver between the valve seat and the retainer to pry a snap ring secured retainer from a valve body. However, such a procedure is likely to damage the seat, particularly if the seat is formed of a "soft" material.

Additionally, valves are occasionally used in dead end service at the end of a process line. In such a use, one face of the valve will not be abutted by an adjoining pipe flange. Thus, if the seat retainer is positioned on the exterior side of a dead end line and secured by only a snap ring assembly, the holding force of the snap ring assembly may be overcome and, the retainer may once again become a potentially dangerous projectile. Dislodgement of the retainer also frees the valve seat and results in gross leakage.

Accordingly, the object of the present invention is to provide a valve with a removable seat retainer securely fastened to the valve body and which offers a full uninterrupted face without voids for interfacing with a gasket such as spiral wound gasket to minimize fluid leakage in a valve fluid handling system.

In accordance with the invention, this is achieved by the features recited in the characterizing portion of claim 1.

Advantageous embodiments of the valve are recited in the dependent claims 2 to 5.

A method is disclosed (claims 6 and 7) for securing the seat retainer in the annular recess of valve body.

One advantage of the valve of the invention is that the seat retainer is securely affixed to the valve body during bench testing. Securement of the seat retainer to the valve body at a location proximal to the resultant force exerted upon the retainer during valve operation is achieved in order to minimize any flexure of the retainer. The valve of the invention has potential for dead end service irrespective of valve orientation.

The valve and method of securing the seat retainer will now be described in greater detail with reference to the drawings, wherein:

Fig. 1 is a perspective view of a lug style butterfly valve with a sector cut away, illustrating a typical prior art seat retainer for securing a valve seat in a valve body and showing fastening screws extending through the retainer into the valve body;

Fig. 2 is a fragmentary cross-sectional view of the prior art valve of Fig. 1 depicting the valve in interposed relationship to two pipe flanges;

Fig. 3 is a fragmentary cross-sectional view of the valve of Fig. 1, but with a seat retainer and key assembly constructed in accordance with the present invention;

Fig. 4 is a fragmentary elevational view, partially in cross-section, of the retainer face side of the valve of Fig. 3 showing the key assembly and the unencumbered face of the seat retainer;

Fig. 5 is a cross-sectional view similar to Fig. 2 showing a valve interposed between a pair of flanges and illustrating a further embodiment of the invention; and

Fig. 6 is an elevational view, taken in cross-section, of the valve of Fig. 5.

Reference will now be made in detail to the present preferred embodiment of the invention, an example of which is illustrated in the accompanying drawings.

Referring now to the drawings, Fig. 1 shows a prior art high performance butterfly valve, generally designated by the numeral 10. The illustrated valve 10 has a lug style body 12 having first and second axial sides 12a, 12b with a plurality of spaced radially extending lugs 12c. Each lug 12c has an aperture 12d extending through the body 12 from one axial side 12a to the other 12b. A centrally disposed bore 14 also extends through the body 12 and serves as a fluid flow passage for a fluid media being controlled by the valve 10.

A closure member, specifically illustrated as a disc 16, is pivotally mounted in the bore 14 for selectively opening and closing the fluid flow...
passage through the body 12 and controlling the flow of fluid media therethrough. The disc 16 is mounted on the outer surface of a shaft 18, which shaft 18 extends radially through the bore 14 and outwardsly through the body 12 where it interfaces with an actuator (not shown). The non-illustrated actuator engages flats 18a on the outboard end of shaft 18 and is operative to rotate the shaft 18 which, in turn, pivots the disc 16 between open and closed positions in a manner well known in the art.

The disc 16, which is shown in a partially open position in Fig. 1, has a spherical sealing surface 16a about its periphery. When the disc 16 is moved to a closed position to completely block fluid flow through the bore 14, the sealing surface 16a sealingly contacts an annular seat member 20 extending radially into the bore 14. The seat member 20 is secured in a recess 22a positioned to be in radial alignment with the disc 16 when the disc 16 is in the closed position. The recess 22 is jointly formed by a seat retainer 26 and an annular cavity 25 counterbored into an annular recess 24 in the first axial side 12a of the body 12. The illustrated seal 20 is a bidirectional axially pliant pressure assisted seat such as disclosed in U.S. Patent 4,289,286 to Krause. The seat retainer ring 28 has an axial endwall 28a and an outer cylindrical sidewall 28b which respectively engage an axial endwall 24a and a cylindrical sidewall 24b of the annular recess 24. A plurality of circumferentially spaced screws 30 selectively secure the seat retainer 26 to the body 12. The spaced screws 30 of Fig. 1 extend axially through apertures 27 in the retainer ring 26 and are received by threaded bores 29 (not shown in Fig. 1, see Fig. 2) in the body 12.

As most clearly depicted in the illustration of Fig. 2, the body 12 is adapted to be interposed between a pair of flanges 34 and 36, which may, for example, be the ends of a corresponding pair of pipes 38 and 40. In the illustrated arrangement, bolts 42 (only one of which is shown in Fig. 2) extend through the apertures 12d in the body lugs 12c as well as through aligned apertures 44 and 46 in the respective flanges 34 and 36. The bolts 42 support the valve body 12 in the space between the flanges 34, 36 and, with the aid of nuts 47, apply a compressive force between the flanges 34, 36 and the valve body 12.

In order to enhance the sealing relationship between the valve 10 and the adjacent pipes 38 and 40, gaskets 48 are positioned on both axial sides of the valve 10 and are interposed between the flanges 34, 36 and valve body 12. The gaskets 48 illustrated in Fig. 2 are of the spiral wound type wherein metal strips are wound in a spiral and laminated with a selected interposed filler material. Spiral wound gaskets of this type are commercially available and are highly preferred in many applications when the fluid media being controlled by the valve 10 is toxic or corrosive or at extreme temperatures or pressures. The illustrated gaskets 48 include radially inwardly disposed spiral wound sections 48a and radially outwardly disposed solid metal outer ring sections 48b. The solid ring outer ring sections 48b are formed of an appropriate fluid media matched metal and function to limit axial compression of the radially inward gasket section 48a. The solid metal outer ring sections 48b also prevent blow-out of the spiral wound section 48a and assist in properly centering the gasket 48 relative to the flanges 34, 36 and the valve body 12.

Recessed type seat retainers 26, such as depicted in the illustrated valve 10 are strongly preferred over face mating type retainers when expensive or potentially hazardous fluids are being controlled by a valve. Face mating type retainers effectively produce a split valve body, and, as a result, provide a potential fluid leak path between the body and retainer to the external environment. When a recessed retainer type valve is being used, it is highly desirable to engage the interface between the valve body and the outer diameter of the seat retainer with the flange gasket to seal off all potential avenues of external leakage. When the gasket is of the spiral wound type, this objective is best achieved by engaging the spiral wound portion 48a of the gasket with the interface 49 of the retainer 26 and the valve body 12.

Fig. 2 depicts the relationship between a preferred type of spiral wound gasket 48 and the prior art butterfly valve of Fig. 1. It is seen that spiral wound portion 48a of the gasket 48 desirably overlaps the valve 10 at the retainer-body interface 49. However, the continuity of the outboard face of the retainer 26 is interrupted by screw apertures 27 and the spiral wound portion also extends over these apertures 27. The voids created by the screw apertures 27 prevent adequate sealing between the retainer 26 and the gasket 48 at these locations. Moreover, the spiral wound metal strips in the gasket portion 48a tend to collapse into the voids of the apertures 27, further reducing the sealing effectiveness of the gasket 48. In addition, the collapse of the spiral wound metal strips tends to create a cascading effect in which even those portions of the spiral wound metal strips outside the aperture voids are misaligned from their sealing relationship with the valve 10. As a result of such collapsing and cascading of the spiral wound gasket portions 48a, external leak paths for the fluid media being controlled by the valve 10 are created. For these reasons, the most preferred type of gasket, the spiral wound gasket is unsuitable for use with many sizes of prior art valves.

Referring now to Fig. 4, a fragmentary view of the valve 10 with an improved retainer 51 constructed in accordance with the present invention is shown from the retainer side. A plurality of spaced semi-circular keyseats 50 (only one of which is illustrated) are machined in the cylindrical sidewall 24b, of the annular recess 24. A Woodruff key 52 is fitted in each of the semi-circular keyseats 50, and these Woodruff keys 52 extend radially inwardly into the annular recess 24. An annular keyway 54 is also machined about...
the outer diameter of the seat retainer 51 for accommodating the Woodruff keys 52.

As best illustrated in the cross-sectional depiction of Fig. 3, the keyway 54 is an open sided groove having a bottom wall 54a extending perpendicularly between a pair of parallel sidewalls, an inboard sidewall 54b and an outboard sidewall 54c. Additionally, the improved seat retainer 51 has a peripheral opening 56 formed by the removal of a circumferential sector of the inboard keyway sidewall 54b. The opening 56 is dimensioned to be large enough to axially accommodate the portion of the Woodruff key 52 which extends into the annular keyway 54. Thus, with the opening 56 on retainer ring 51 circumferentially aligned and in registry with the Woodruff key 52, the retainer ring 51 may be axially inserted into the annular recess 24 to position the Woodruff key 52 into the keyway 54. In this position, the axial outboard face of the retainer 51 lies in substantially the same plane as the first axial face 12a of body 12. The retainer 51 may then be rotated to bring the Woodruff key 52 and the opening 56 out of registry. The Woodruff key 52 then engages the annular keyway sidewall 54b, which sidewall 54b is then operative to prevent axial movement of the retainer 51 with respect to the valve body 12.

As indicated by the fragmentary portion of the improved retainer 51 in Fig. 4, the use of the Woodruff key 52 to secure the retainer 51 to the valve body 12 eliminates the need for the securing screws 30 used in the prior art retainer ring 28 of Fig. 1. It necessarily follows that the screw apertures 27 may also be eliminated, and that the retainer 51 may have an uninterrupted gasket face, free from the troublesome aperture voids. Thus, the spiral wound portion 48a of gasket 48 may be placed in overlying relationship with the retainer-valve body interface 49 without concern that the metal spirals will collapse and create external leak paths.

Furthermore, the Woodruff key 52, keyseat 50 and annular keyway 54 are all entirely internal with respect to the valve body-retainer structure and do not provide any external leak paths. Moreover, inasmuch as the retainer 51 is not ordinarily subjected to forces which would tend to rotate the retainer 51 relative to the body 12, the retainer is safely secured against dislodgement from the valve body 12 by the transmitted interface force between the closure 16 and seat member 20 during bench testing of the valve 10. Optionally, an anti-rotational mechanism, such as a small roll pin axially extending between the retainer 51 and the body 12 may be used to positively avoid any rotation of the retainer 51 relative to the body 12 which could bring the notch opening 56 into registry with the Woodruff key 52.

It will be appreciated by those skilled in the art that while it is possible to securely mount the retainer in an analogous manner by radially outwardly extending keys on the retainer received by a keyway in the valve body, the required opening in the keyway (corresponding in function to opening 56 of the preferred embodiment) in such designs would create a void in the sealing face of the valve body. Hence, in effect, the troublesome void would merely be transferred from the retainer to the valve body.

Figs. 3 and 4 further depict a rotational hole 57 formed in the face of retainer 51. A similar, but non-illustrated rotational hole is spaced approximately 180 degrees about the face of retainer 51. These rotational holes 57 receive pins from a spanner wrench and are used to rotate the retainer 51 to bring the notch opening 56 into and out of registry with the Woodruff key 52.

Additionally, as shown in Fig. 4, the retainer face side of the valve body 12 has a pair of punch marks 59 and 61 at circumferentially spaced locations about the bore 14. These punch marks 59, 61 are arranged to cooperate with one of the rotational holes 57 to provide a visual indication as to whether or not the keys 52 have the retainer 51 locked into securement with the body 12. As illustrated in Fig. 4, alignment between rotational hole 57 and the punch mark 59 visually indicates that the retainer 51 is in an open or unsecured position whereas alignment between rotational hole 57 and punch mark 61 visually indicates that the retainer 51 is in a locked or secured position. Alternatively, it may be preferable to arrange and space the rotational holes 57 on the retainer 51 such that the rotational holes 57 are aligned with the shaft 18 when the openings 56 are in registry with the keys 52. In this way, alignment of the rotational holes 57 with the shaft 18 will give a visual indication that the retainer 51 is in an unsecured position. Contrastingly, misalignment of the rotational holes 57 with the shaft 18 provides a visual indication that the retainer is secured against axial dislodgment.

A further embodiment of the invention is shown in Figs. 5 and 6. In this embodiment, a plurality of spaced cylindrical seats 60 are drilled into the cylindrical sidewall 24b of the annular recess 24. A corresponding plurality of keys, in the form of cylindrical pins 62, are fitted in the seats 60 and extend radially inwardly into the annular recess 24. The keys (or pins) 62 are received in the annular keyway 54 of seat retainer 51 in the same manner as the Woodruff key 52 in the embodiment of Figs. 3 and 4. The keys 62 thus engage the axial inboard sidewall 54b to prevent the retainer 51 from axially dislodging from the valve body 12. As in the embodiment of Figs. 3 and 4, the retainer 51 has circumferential openings 56 in the axially inboard sidewall 54a. These openings 56 are initially aligned during assembly with the keys 62, and the retainer 51 is axially inserted into the annular recess 24 to bring the keys 62 into the keyway 54. The retainer 51 is then rotated with respect to the valve body 12 to move the openings 56 out of registry with the keys 62 and to lock the retainer 51 in place.

The embodiment of Figs. 3 and 4 offers manufacturing advantages over the embodiment of Figs. 5 and 6. This latter mentioned embodiment
requires a right angle drilling head for drilling the keyseat 60. In addition to the relatively high costs associated with a right angle head, such heads are physically bulky and will not fit into the bore 14 for smaller valve sizes. In contrast, Woodruff key cutters are substantially less expensive and commonly used with the appropriate machine tools. Furthermore, Woodruff key cutters are substantially smaller than right angle drilling heads in physical size and easily fit into even relatively small valve bores.

It is possible, as is most readily apparent from Fig. 6, to drill the seat 60 radially inwardly through the valve body 12 from the outside. However, such a technique produces an external flowpath for the controlled fluid media and seriously compromises the sealing integrity of the valve 10. It is possible to weld an externally drilled seat hole, but, in addition to necessitating an additional manufacturing step, welding of valve bodies frequently does not provide fluid tight sealing.

It will also be appreciated by those skilled in the art that the key type securement system used in the above described embodiments advantageously secures the retainer to the valve body at a location proximal to the location at which the resultant force exerted against the retainer from the closure of disc 16 is applied against the retainer 51. As a result, the retainer is not subjected to substantial bending moments and does not tend to deflect excessively during valve closure.

In summary, numerous benefits have been described which result from employing the concepts of the invention. The valve provides a recessed retainer with a full uninterrupted face for interfacing with a gasket. Advantageously, the retainer face is suitable for use with a spiral wound type gasket. A spiral wound type gasket is highly preferred in many applications, especially when the fluid media being handled by the valve is toxic or corrosive or under extreme temperatures or pressures. The use of an entirely internally disposed key system between the retainer and the valve body allows for easy installation of the retainer to the valve body and prevents sudden axial dislodgement of the retainer relative to the valve body during bench testing of the valve.

Furthermore, the securement is achieved without introducing external fluid leakpaths. Thus, the potential danger of the retainer becoming a lethal projectile is eliminated while the sealing integrity of the valve is preserved. Moreover, the retainer is secured to the valve body at a location proximal to the location at which the resultant force applied against the retainer from the valve seat-closure member interface force is applied. Thus, the retainer is not subjected to the excessive bending moments as in the prior art designs and does not tend to deflect excessively from the transmitted closing force of the closure member.

Claims

1. Valve for minimizing fluid leakage at an interface with an adjacent fluid handling component, comprising:
   a. a valve body (12) having first and second axial sides (12a, 12b) with a fluid flow passage (14) extending therethrough from one axial side to the other, said valve body (12) having an annular recess (24) in the first axial side (12a), said annular recess (24) circumscribing said fluid flow passage (14) and including an axial end wall (24a) and a cylindrical side wall (24b);
   b. a closure member (16) movable in said valve body (12) between open and closed positions for selectively blocking fluid flow through said fluid flow passage (14);
   c. a valve seat (20) disposed in said annular recess (24) about said fluid flow passage (14), said valve seat (20) being sealingly engageable with said closure member (16) when said closure member (16) is in the closed position; and
   d. a seat retainer (51) selectively securable in said annular recess (24), said valve seat (20) being interposed between said seat retainer (51) and said valve body (12), said seat retainer (51) having an axial end wall and a cylindrical sidewall,
   characterized in that the cylindrical sidewall of the said seat retainer (51) has an annular keyway (54) at least partially defined by an axially outboard keyway sidewall (54c) and an axially inboard keyway sidewall (54b); that a closed ended keyset (50; 60) is formed in the cylindrical sidewall (24b) of the annular recess (24); and that at least one key member (52; 62) is disposed in the key seat (50; 60) and extends radially inwardly from the cylindrical sidewall (24b) of the annular recess (24) into said annular keyway (50; 60) for holding said seat retainer (51) in said annular recess (24) and securing said valve seat (20) relative to said valve body (12), the axially inboard keyway sidewall (54b) having a circumferential opening (58) dimensioned to axially receive the portion of the key member (52; 62) extending into the annular recess (24), said axially inboard keyway sidewall (54b) further being adapted for engagement with the axial endwall (24a) of the annular recess (24), said at least one key member (52; 62) being mounted in the annular recess (24) without creating an external leak path for a fluid media in said fluid flow passage (14).

2. Valve according to claim 1, characterized in that the key member (52) is a Woodruff key and the keyseat (50) has a semi-circular configuration.

3. Valve according to claim 1, characterized in that the first axial side (12a) of the valve body (12) is substantially planar and the axially outboard side of the seat retainer (52) lies in substantially the same plane as the first axial side (12a) of the valve body (12) when the key member (52; 62) is disposed in the annular keyway (54).

4. Valve according to claim 3, characterized in that the seat retainer (51) has a ring-like configuration and the axially outboard side of the
5. Valve according to claim 1, characterized in that the key member (62) has a cylindrical configuration and the keysat (60) is a closed ended cylindrical bore extending radially into the valve body (12).

6. Method of securing a seat retainer (51) in an annular valve body recess (24) of a valve according to any one of claims 1 to 5, characterized by the steps of:
   (a) forming the closed ended keysat (50; 60) in the annular recess (24) so that the keysat (50; 60) opens only to the annular recess (24);
   (b) placing the key member (52; 62) in the keysat (50; 60) so as to extend into the annular recess (24);
   (c) forming the annular keyway (54) in the seat retainer (51).
   (d) removing a circumferential portion of a keyway sidewall to provide the opening (56) for inserting the key member (52; 62) into the keyway (54);
   (e) aligning the seat retainer (51) relative to the valve body (12) to bring the opening (56) in the keyway sidewall in registry with the key member (52; 62).
   (f) axially moving the seat retainer (51) relative to the annular recess (24) to position the key member (52; 62) in the keyway (54) and to engage the valve seat (20) between the seat retainer (51) and the valve body (12), and
   (g) after the key member (52; 62) is positioned in the keyway (54), rotating the seat retainer (51) relative to the valve body (12) to bring the opening (56) out of alignment with the key (52; 62) and securing the seat (20) and seat retainer (51) from axial dislodgement from the valve body (12).

7. Method according to claim 6, characterized in that the keysat (50) is semi-circular and the key member (52) is a Woodruff key.

**Patentansprüche**

1. Ventil zum Minimieren von Fluidleckage an einer Grenzfläche mit einem benachbarten Fluidförderbauteil, beinhaltend:
   - ein Ventilgehäuse (12) mit einer ersten und einer zweiten axialen Seite (12a, 12b), durch das sich ein Fluiddurchflußkanal (14) von der einen zur anderen axialen Seite erstreckt, wobei das Ventilgehäuse (12) eine ringförmige Ausnehmung (24) in der ersten axialen Seite (12a) hat, wobei die ringförmige Ausnehmung (24) den Fluiddurchflußkanal (14) umgibt und eine axial Endwand (24a) und eine zylindrische Seitenwand (24b) aufweist.
   - ein Verschlußstück (16), das in dem Ventilgehäuse (12) zwischen einer Öffnungs- und einer Schließstelle bewegbar ist, um die Fluidströmung durch den Fluiddurchflußkanal (14) wahlweise zu blockieren;
   - einen Ventilsitz (20), der in der ringförmigen Ausnehmung (24) um den Fluiddurchflußkanal (14) angeordnet ist, wobei der Ventilsitz (20) mit dem Verschlußstück (16) in abdichtender Berührung ist, wenn das Verschlußstück (16) in der Schließstelle ist, und
   - einen Sitzhalter (51), welcher in der ringförmigen Ausnehmung (24) wahlweise befestigbar ist, wobei der Ventilsitz (20) zwischen dem Sitzhalter (51) und dem Ventilgehäuse (12) angeordnet ist, wobei der Sitzhalter (51) eine axiale Endwand und eine zylindrische Seitenwand hat, dadurch gekennzeichnet, daß die zylindrische Seitenwand des Sitzhalters (51) eine ringförmige Keilnut (54) hat, welche wenigstens teilweise durch eine axial äußere Keilnutenendwand (54c) und eine axiale innere Keilnutenendwand (54b) begrenzt wird, daß
   - ein am Ende geschlossener Keilseitz (50; 60) in der zylindrischen Seitenwand (24b) der ringförmigen Ausnehmung (24) gebildet ist; und daß
dem wenigstens ein Keilteil (52; 62) in dem Keilseitz (50; 60) angeordnet ist und sich von der zylindrischen Seitenwand (24b) der ringförmigen Ausnehmung (24) aus radial einwärts in die ringförmige Keilnut (54) erstreckt, um den Sitzhalter (51) in der ringförmigen Aussparung (24) zu halten und den Ventilsitz (20) relativ zu dem Ventilgehäuse (12) zu befestigen, wobei die axial innere Keilnutenendwand (54b) eine Umfangsöffnung (56) hat, die so bemessen ist, daß sie den Teil des Keilteils (52; 62) axial aufnimmt, der sich in die ringförmige Ausnehmung (24) erstreckt, wobei die axial innere Keilnutenendwand (54b) weiter mit der axialen Endwand (24a) der ringförmigen Ausnehmung (24) in Berührung bringbar ist, wobei das wenigstens eine Keilteil (52; 62) in der ringförmigen Ausnehmung (24) befestigt wird, ohne einen externen Leckweg für ein Fluidmedium in dem Fluiddurchflußkanal (14) zu erzeugen.

2. Ventil nach Anspruch 1, dadurch gekennzeichnet, daß das Keilteil (52) ein Scheibenkeil ist und der Keilseitz (50) eine halbkreisförmige Konfiguration hat.

3. Ventil nach Anspruch 1, dadurch gekennzeichnet, daß die erste axiale Seite (12a) des Ventilgehäuses (12) im wesentlichen eben ist und die axiale äußere Seite des Sitzhalters (52) in im wesentlichen derselbenEbene die die erste axiale Seite (12a) des Ventilgehäuses (12) liegt, wobei das Keilteil (52; 62) in der ringförmigen Keilnut (54) angeordnet ist.

4. Ventil nach Anspruch 3, dadurch gekennzeichnet, daß der Sitzhalter (51) eine ringartige Konfiguration hat und die axial äußere Seite des Sitzhalters (52) durch Lücken in Form von Löchern nicht unterbrochen ist.

5. Ventil nach Anspruch 1, dadurch gekennzeichnet, daß das Keilteil (62) eine zylindrische Konfiguration hat und der Keilseitz (60) eine am Ende geschlossene zylindrische Bohrung ist, die sich radial in das Ventilgehäuse (12) erstreckt.

6. Verfahren zum Befestigen eines Sitzhalters (52) in einer ringförmigen Ventilgehäuseausnehmung (24) eines Ventils gemäß einem der Ansprüche 1 bis 5, gekennzeichnet durch folgende Schritte:
   - (a) Herstellen des am Ende geschlossenen Keilseitz-
zes (50; 60) in der ringförmigen Ausnehmung (24), so daß der Keilspalt (50; 60) nur zu der ringförmigen Ausnehmung (24) hin offen ist;
(b) Plazieren des Keilteil (52; 62) in dem Keilspalt (50; 60) derart, daß es sich in die ringförmige Ausnehmung (24) erstreckt;
(c) Herstellen der ringförmigen Keilnut (54) in dem Sitzhalter (51),
(d) Abtragen eines Umfangsteils einer Keilnutseitenwand, um die Öffnung (56) zum Einführen des Keilteils (52; 52) in die Keilnut (54) zu schaffen;
(e) Ausrichten des Sitzhalters (51) relativ zu dem Ventilgehäuse (12), um die Öffnung (56) in der Keilnutseitenwand in Deckung mit dem Keilteil (52; 62) zu bringen;
(f) axiales Bewegen des Sitzhalters (51) relativ zu der ringförmigen Ausnehmung (24), um das Keilteil (52; 62) in der Keilnut (54) zu positionieren und den Ventilspalt (30) zwischen der Sitzhalter (51) und dem Ventilgehäuse (12) zu erfassten; und
(g) nachdem das Keilteil (52; 62) in der Keilnut (54) positioniert worden ist, Drehen des Sitzhalters (51) relativ zu dem Ventilgehäuse (12), um die Öffnung (56) aus der Ausrichtung mit dem Keilteil (52; 62) herauszubringen und den Sitz (20) und den Sitzhalter (51) gegen axiale Lösung von dem Ventilgehäuse (12) festzulegen.
7. Verfahren nach Anspruch 6, dadurch gekennzeichnet, daß der Keilspalt (50) halbkreisförmig und das Keilteil (52) ein Schiebenteil ist.

Revidenctions

1. Vanne du type permettant de minimiser les pertes de fluide entre ladite vanne et les moyens de transport de fluide qui lui sont rattachés, comprenant: un corps de vanne (12) comportant une première et une seconde face frontale (12a, 12b) et un orifice (14) de passage de fluide s'étendant à travers l'une des faces frontale à l'autre face frontale, ledit corps de vanne (12) comportant un chambrage annulaire (24) prévu dans la première face frontale (12a), ledit chambrage annulaire (24) entourant le passage de fluide (14) et comprenant une paroi frontale (24a) et une paroi cylindrique (24b), un organe d'obturateur (16) mobile à l'intérieur du corps de vanne (12), entre une position d'ouverture et une position de remise à l'état, de façon à contrôler le passage du fluide à travers l'orifice (14), un siège de vanne (20) disposé dans ledit chambrage annulaire (24) autour de l'orifice de passage de fluide (14) et contrôlant le passage du fluide, ledit siège de vanne (20) recevant de façon étanche le ledit organe d'obturateur (16), lorsque celui-ci est en position d'obturateur, et une pièce de maintien (26, 51) susceptible d'être fixée dans ledit chambrage annulaire (24), ledit siège de vanne (20) étant interposé entre la pièce de maintien (26, 51) et le corps de vanne (12), la pièce de maintien (26, 51) ayant une paroi frontale (26a) et une paroi cylindrique (26b), caractérisée en ce que la paroi cylindrique (26b) de la pièce de maintien (26, 51) comporte un logement annulaire de clavette (54) défini au moins partiellement par une paroi frontale externe (54c) et par une paroi frontale interne (54b), en ce que un de clavette (50, 60) est creusé dans la paroi cylindrique (24b) de la chambre annulaire (24), en ce que au moins une clavette (52, 62) est disposée dans le siège de clavette (50, 60) et s'étend radialement à l'intérieur de la paroi cylindrique (24b) du chambrage annulaire (24) vers le susdit logement annulaire de clavette (54), de façon à assurer la fixation de la pièce de maintien (26, 51) dans le chambrage annulaire (24) et à maintenir le siège de vanne (20) par rapport au corps de vanne (12), la paroi frontale interne (54b) du logement annulaire de clavette (54) comportant une ouverture (56) ayant des dimensions telles qu'elle puisse recevoir, axialement, la clavette (52, 62) venant prendre place dans le logement annulaire (54), et en ce que au moins une clavette (52, 62) et monté dans le logement annulaire (54) sans créer de fuites du fluide s'écoulant à travers l'orifice (14).
2. Vanne suivant la revendication 1, caractérisée en ce que la clavette (52) est une clavette Woodruff et le siège de clavette (50) est de section semi-circulaire.
3. Vanne suivant la revendication 1, caractérisée en ce que la face frontale (12a) du corps de vanne (12) est sensiblement plane et la face externe de la pièce de maintien (26, 51) se trouve sensiblement dans le même plan que ladite face frontale (12a) du corps de vanne (12) lorsqu'elle est disposée dans le logement annulaire de clavette (54).
4. Vanne suivant la revendication 3, caractérisée en ce que la pièce de maintien (26, 51) est constituée d'une bague et comporte une face frontale externe non interrompue par des ouvertures.
5. Vanne suivant la revendication 1 caractérisée en ce que la clavette (52) est de section cylindrique et le siège de clavette est constitué d'un trou de section circulaire s'étendant radialement à l'intérieur du corps de vanne (12).
6. Procédé de fixation d'une pièce de maintien (26, 51) dans un chambrage annulaire (24) d'un corps de vanne suivant l'une des revendications 1 à 5 caractérisé en ce que:
   a) on forme un siège de clavette borgné (50, 60) dans le chambrage annulaire (24) de façon à ce que ce siège de clavette (50, 60) s'ouvre seulement vers l'intérieur du chambrage annulaire (24),
   b) on dispose la clavette (52, 62) à l'intérieur de son siège de clavette (50, 60) de façon à ce qu'elle s'étende à l'intérieur du chambrage annulaire (24),
   c) on forme un logement annulaire de clavette (54) à la pièce de maintien (26, 51),
   d) on réalise une ouverture (56) dans la paroi (54b) du logement annulaire de clavette (54) de façon à ce que ladite clavette (52, 62) puisse prendre place à l'intérieur dudit logement annulaire de clavette (54),
   e) on positionne la pièce de maintien (26, 51) par rapport au corps de vanne (12) de façon à ce
que l’ouverture (56) se trouve en parfait alignement avec la clavette (52, 62),
f) on déplace radialement la pièce de maintien (26, 51) par rapport au logement annulaire (24) de façon à ce que la clavette (52, 62) prenne place dans le logement annulaire de clavette (54) et maintienne le siège de vanne (20) entre la pièce de maintien (26, 51) et le corps de vanne (12) et, l’on fait tourner la pièce de maintien (26, 51) par rapport au corps (12) de façon à amener l’ouverture (56) en dehors de l’alignement avec la clavette (52, 62) de façon à ce que le siège (20) et la pièce de maintien (26, 51) se trouvent immobilisés par rapport au corps de vanne (12) à l’encore de tout effort axial.
7. Procesé de fixation, suivant la revendication 6 caractérisé en ce que le siège de clavette (50) est de section semi-circulaire et en ce que la clavette (52) est une clavette Woodruff.