

Description

The present invention relates to a gate valve capable of shearing a wire line or small pipe extending through its bore. Gate valves have been used for shearing through wire lines and small tubular members but difficulties have been encountered after a shearing has taken place with prior shearing gate valves. Often the problem is that the valve which has accomplished the shearing no longer has a satisfactory seal. An additional problem is that prior shearing gate valves have also damaged the shearing edges during their initial shearing operation and had to be repaired prior to being placed in service thereafter.

US-A-4281819 discloses a gate valve comprising a body having an inlet, an outlet, a valve chamber communicating with the inner ends of the inlet and the outlet, and a recess surrounding the opening of each of the inlet and the outlet into the valve chamber; a seat ring positioned in each of the recesses within the valve chamber and having a bore therethrough aligned with respective ones of the inlet and outlet; a gate movably positioned within the valve chamber and having an opening therethrough which is brought into and out of alignment with the bores of the seat rings to open and close flow through the body responsive to movement of the gate in the valve chamber; an actuator connected to the body and to the gate for moving the gate between its open and closed positions; and an insert ring of a hard, wear resistant material positioned within each of the seat rings; and according to the first aspect of the present invention, such a gate valve is characterised by an insert sleeve of a hard, wear resistant material positioned within the opening through the gate, the sleeve and the insert rings being installed and maintained in their respective positions in a compression preload condition and each end of the insert sleeve coacting with a respective one of the insert rings so as to be capable of shearing therebetween a wire line or pipe, which extends, in use, through the valve, when the gate is moved to its closed position.

According to a second aspect of the present invention, a gate valve comprising a body having an inlet, an outlet, a valve chamber communicating with the inner ends of the inlet and the outlet, and a recess surrounding the opening of each of the inlet and the outlet into the valve chamber; a seat ring positioned in each of the recesses within the valve chamber and having a bore therethrough aligned with respective ones of the inlet and outlet; a gate movably positioned within the valve chamber and having an opening therethrough which is brought into and out of alignment with the bores of the seat rings to open and close flow through the body responsive to movement of the gate in the valve chamber; an actuator connected to the body and to the gate for moving the gate between its open and closed positions; and an insert ring of a hard, wear resistant material positioned within one of the seat rings; (as disclosed in US-A-4281819) is characterised by an insert sleeve of a hard, wear resistant material positioned within the opening through the gate and having a bore which aligns with the mating bores in the seat rings, the insert sleeve and the insert ring being installed and maintained in their respective positions in a compression preload condition and coacting so as to be capable of shearing therebetween a wire line or pipe, which extends, in use, through the valve, when the gate is moved to its closed position, there being no insert ring in the other seat ring for coaction with the sleeve to make a second shearing.

The present invention thus provides to a shear type of gate valve in which both the gate and the seat ring(s) include inserts of hard material to assist in the shearing of wire lines or tubular members extending through the valve when it is to be closed. The hard material, such as tungsten carbide or a material having compression and wear resistant properties approaching those properties of tungsten carbide, is formed into rings of suitable size and shape which are positioned in their respective recesses in the gate and the seat ring(s). The recess for each of the rings and the size of the ring are preselected so that the rings, once positioned in their recesses, are maintained in compression at all times.

In the accompanying drawings:

Fig. 1 is a sectional view of the improved shearing type of gate valve of the present invention shown in its open position.

Fig. 2 is a similar sectional view of the valve illustrated in Figure 1 in closed position after shearing a wire line extending therethrough.

Fig. 3 is a quarter sectional view of the improved seat ring illustrating the insert ring of hard material positioned in a recess in the seat ring.

Fig. 4 is an elevation view of the improved gate of the present invention with the hardened ring positioned therein.

Fig. 5 is a sectional view taken along line 5 - 5 in Figure 4 to show the position of the ring extending through the gate in surrounding relationship to the gate opening.

FIGURE 6 is a sectional view of the valve member having a partial sleeve insert and the seat rings which coact with the valve member in a modified form of the present invention which provides shearing on one edge of the valve member and allows the sheared element to withdraw from the other side before the

valve member is fully closed.

FIGURE 7 is a similar sectional view of the structure shown in FIGURE 6 but with the valve member or gate sufficiently closed to have substantially completed its shearing of the cable or wire extending therethrough.

5 FIGURE 8 is another similar view with the valve member or gate in its completed shearing position to illustrate the wider opening of the non-shearing side of the gate.

FIGURE 9 is a view of another modified form of the present invention showing only the valve member or gate and the seat rings with the gate in the open position.

FIGURE 10 is a view of the structure shown in FIGURE 9 with the gate in its complete shearing position with respect to the seat rings.

FIGURE 11 is a view of the structure shown in FIGURES 9 and 10 with the gate in its closed and sealed position with respect to the seat rings.

Valve 10, shown in FIGURES 1 and 2, includes body 12 having an inlet 14, an outlet 16 with valve chamber 18 between the inner ends of inlet 14 and outlet 16 and bonnet 20 which is secured to body 12 around the opening of chamber 18 into body 12. Bonnet 20 supports actuator 22 which is shown as a simple pneumatic actuator having piston chamber 24 with piston 26 slidable therein and spring 28 urging piston 26 upward as shown. Connecting rod 30 extends from piston 26 through bonnet 20 into engagement with gate 32 for moving gate 32 within chamber 18 to open or close flow therethrough between inlet 14 and outlet 16.

20 Gate 32 is positioned between seat rings 34 and 36 which are positioned in recesses 38 and 40 of body 12, respectively, which surround the inner ends of inlet 14 and outlet 16 in chamber 18. Opening 42 which extends through gate 32 is lined with hardened sleeve 44 which coacts with hardened insert rings 46 and 48 positioned in seat rings 34 and 36 in the shearing action of the gate 32 during its closing movement when there is a wire line 50 or a tubular member (not shown) extending through valve 10. The shearing of wire line 50 is shown in FIGURE 2. Wire line 50 has been sheared in two places by the action of sleeve 44 on the seat ring insert rings 46 and 48.

30 Seat rings 34 and 36 are identical and seat ring 34 is illustrated in FIGURE 3 to explain the details of structure of rings 34 and 36. Ring 34 is annular in shape having bore 52, inner recess 54 on one end, projection 56 on the opposite end with seal ring groove 58 in its face for receiving a suitable seal ring; and external groove 60 in outer surface 64. Ring 34 is sized to fit tightly within recess 38 of body 12. Inner recess 54 is sized to have an inner diameter D which is smaller than the diameter of insert ring 46 prior to assembly. When assembled, insert ring 46 fits within inner recess 54 and abuts shoulder 62 of inner recess 54. Insert ring 48 is identical to insert ring 46.

35 The external diameter of insert ring 46 and the internal diameter D of recess 54 are selected to have an interference fit. The amount of interference is selected to provide a preselected amount of compression on insert ring 46 after it has been assembled within recess 54. The amount of such compression is to be sufficient to maintain insert ring 46 in compression during all operations including shearing of wire line 50 or a tubular members (not shown) which may be extending through valve 10 when it is to be closed. The reason for placing insert ring 46 in compression is that it is made of a brittle material, such as tungsten carbide or other suitable hard material, which has little strength in tension. By preloading insert ring 46 with sufficient compression to ensure that it is never placed in tension, insert ring 46 is never exposed to conditions which would result in its failure, such as a chipping of its shearing edges. It is suggested that assembly of insert ring 46 with seat ring 34 be accomplished with seat ring 34 heated sufficiently to allow insertion of insert ring 46 without undue loading of either component during assembly. After seat ring 34 has cooled with insert ring 46 positioned in its recess 54, seat ring 34 will shrink sufficiently to provide the desired compression preload of insert ring 46. The compressive preload on insert rings 46 and 48 is sufficient to ensure that there is no relative movement of the insert rings and seat rings 34 and 36 during operation of the gate valve. Groove 60 is provided to allow the seat ring to be removed from the body by prying with a screw driver or similar tool.

45 50 As shown in FIGURES 4 and 5, gate 32 is a generally flat elongated plate and includes means 66 for suitable connection to connecting rod 30 and opening 42 in which sleeve 44 of hardened material is positioned. Sleeve 44 is made of the same or similar material to the material of insert ring 46. The inner diameter of opening 42 is sized with respect to the external diameter of sleeve 44 so that on insertion of sleeve 44 therein (by a shrink fit), it is preloaded with sufficient compression preloading to ensure that it will not be loaded in tension during its use. This is done, preferably in the same manner as the assembly of insert ring 46 within seat ring 34. Gate 32 is heated sufficiently to allow sleeve 44 to be readily inserted into opening 42. The diameter of opening 42 is sufficiently smaller after cooling than the outer diameter of sleeve 44 to provide the desired preselected compression preload on sleeve 44. This will ensure that during

all operations of gate 32, sleeve 44 will be under compression and will perform its sealing and shearing functions without destruction, chipping or other damage thereto. The compressive preload on sleeve 44 is sufficient to ensure that there is no relative movement between sleeve 44 and gate 32 during operation of gate valve 10.

- 5 Testing of a 2 9/16 inch, 15,000 psi model of the improved design shearing gate valve has resulted as follows:

	Size	Type	Times Cut
10	2.08 mm (.082")	Solid Wire	2
	2.33 mm (.092")	Solid Wire	3
	2.74 mm (.108")	Solid Wire	7
	4.78 mm (.188")	Stranded Wire	8
	5.54 mm (.219")	Stranded Logging Cable	3
15	6.35 mm (.250")	Stranded Logging Cable	2
	11.9 mm (.469")	Stranded Logging Cable	3
	4.78 mm (.188")	Stranded, Bundle of 12	1
	25.4 mm (1.00")	2.41 mm (.095") Wall Tubing	1
	31.8 mm (1.25")	2.77 mm (.109") Wall Tubing	2
20	44.5 mm (1.75")	2.77 mm (.109") Wall Tubing	1
	11.9 mm (.469")	Stranded Logging Cable Inside 25.4 mm X 2.41 mm (1.0" X .095") Tubing	1
	11.9 mm (.469")	Stranded Logging Cable Inside 31.8 mm X 2.41 mm (1.25" X .095") Tubing	2

- 25 The valve was tested to full rated working pressure of 103 MPa (15,000 psi) after each shearing with no detectable leakage.

The illustrated valve used on a well and having a wire line or cable extending therethrough is positioned to have the left side of the valve as shown in the drawings connected facing in the downward direction. The wire line or cable which is sheared by the gate is dropped in the well and with the valve 10 the portion between seat rings 34 and 36 is retained in the opening through sleeve 44. In some applications, it is a simple matter to fish for the lost wire line or cable and recover it from the well after the gate is again opened but the short section of the cable trapped in the gate and falling into the well may be harder to remove from the well and be a problem if not removed. For that reason the two modified forms of the present invention hereinafter described with respect to the remainder of the drawings have all of the advantages of valve 10 and do not allow a short section of the cable or wire line to drop into the well. This is accomplished by providing a structure in which there is a single shearing of the wire line or cable and a configuration to allow the lower portion of the sheared cable element to fall from the interior of the gate and from the valve into the well without any short section being sheared from its upper end.

Valve gate 100 includes the usual threaded opening 102 in which the valve stem (not shown) attaches to the gate 100. Bore 104 extends partially through gate 100 and intersects with tapered bore 106 which extends through the remainder of gate 100. Counterbore 108 extends into gate 100 and forms shoulder 110 with bore 104 and annular surface 112 into which insert sleeve 114 is inserted as shown. Seat ring 116 is positioned to engage the face of gate 100 surrounding bore 104 and counterbore 108 and includes annular groove 118 to accommodate a seal ring and a counterbore 120 which receives insert ring 122 as shown. Seat ring 124 is positioned to engage the face of gate 100 on the side of the opening of tapered bore 106 and has opening 126 therethrough which mates with the diameter of tapered bore 106 opening in the side of gate 100 and converges to a smaller diameter to mate with the diameter of the flow passage which it engages in the valve. Insert sleeve 114 and ring 122 are made of hard materials such as tungsten carbide previously described and are maintained in compression.

With the structure shown in FIGURE 6 any cable or wire extending through the opening in the gate 100 is sheared by the shearing action between insert sleeve 114 with insert ring 122 as the gate 100 moves to its closed position. It should be noted as hereinafter explained that the shearing action is complete before the open area communicating between tapered bore 106 and opening 126 has closed sufficiently to restrict the movement of the cable element. This allows the wire or cable remaining therein to drop or be pulled therefrom before gate 100 is in its closed position.

As illustrated in FIGURE 7, gate 100 has moved to its substantially closed position with either complete shearing or almost complete shearing of any cable element extending through the valve. The dimension A illustrates the opening on the non-shearing side of gate 100 in this position which is more than sufficient to allow the cable element to fall or be removed from the interior of gate 100. Further closing of gate 100 is

illustrated in FIGURE 8. Dimension B illustrates the opening on the non-shearing side of gate 100 after the shearing is complete between insert sleeve 114 and insert ring 122. In the valve illustrated it is preferred that the diverging taper on the tapered bore 106 and the taper on the bore 126 of seat ring 124 have angles of taper which are preferred to be in the range of 10 to 12 degrees or less and at most 15 degrees or less so that there is a minimum of disturbance to the flow therethrough and still provide the opening through which the lower sheared portion of the cable element can drop from the gate bore before the gate completely closes.

Valve 200, shown in FIGURES 9, 10 and 11, is similar to the valve of FIGURES 6, 7 and 8 in that it provides the single shearing of the cable element to avoid the problem of the short cable element section being sheared and dropped into the well separate from the remainder of the cable element. Valve 200 is similar in structure to valve 10 except for the structure of the gate and the seat rings which are shown in the drawings. Gate 202 is of the usual form and has a means 203 for connecting to a valve stem (not shown) and is positioned between seat rings 204 and 206 as shown. Bore 208 extends through gate 202 and insert sleeve 210 is positioned therein. Sleeve 210 is of a hard material as previously described and is preloaded in compression for the reasons previously described. Sleeve 210 includes outlet bore 212 and inlet tapered surface 214 which diverges outwardly toward seat ring 206. Seat ring 206 includes tapered surface 215 on its interior which mates with the diameter of the inlet end of tapered surface 214 and reduces the bore in seat ring 206 to the flow diameter through the valve passages.

Seat ring 204 has central bore 216 and counterbore 218 which extends inwardly from side 220 of seat ring 204 which engages gate 202 and forms cylindrical surface 222 and shoulder 224. Insert ring 226 is positioned in counterbore 218 with the diameter of surface 222 being preselected to provide the desired preloading compression of insert ring 226 which is made of a hardened material such as tungsten carbide or other materials as previously discussed.

As shown in FIGURES 9, 10 and 11, gate 202 is shown in its open position (FIGURE 9), in its position at the completion of shearing of the cable element (FIGURE 10) and in its closed position of sealing against seat ring 204. As can be seen in FIGURE 10, with the completion of the shearing of the cable element extending through gate 202, there is sufficient open space between the interior of gate insert sleeve 212 and the interior of seat ring 206 to allow the sheared cable element to fall into the well without any additional shearing of the cable element.

From the above it can be seen that the improved design of the shearing gate valve of the present invention provides a gate valve which can shear a wire line or other tubular member extending therethrough without damage to the hardened insert rings or the hardened insert sleeves or without in any way interfering with the sealing of the gate and the seat ring. This allows the valve 10 to be used without repair or replacement through many cycles of closing and shearing whereas shearing gate valves of the prior art could only be expected to accomplish a single shearing and even following such single shearing may have been damaged sufficiently to provide an imperfect seal. It should be noted that the use of the forms of the present invention which provide the single shearing of the cable element require less force to complete the shearing of the cable element than the form of the present invention which provides the dual shearing of the cable element.

Claims

1. A gate valve comprising a body (12) having an inlet (14), an outlet (16), a valve chamber (18) communicating with the inner ends of the inlet and the outlet, and a recess (38,40) surrounding the opening of each of the inlet and the outlet into the valve chamber; a seat ring (34,36) positioned in each of the recesses within the valve chamber and having a bore therethrough aligned with respective ones of the inlet and outlet; a gate (32) movably positioned within the valve chamber and having an opening (42) therethrough which is brought into and out of alignment with the bores of the seat rings to open and close flow through the body responsive to movement of the gate in the valve chamber; an actuator (24-30) connected to the body and to the gate for moving the gate between its open and closed positions; and an insert ring (46,48) of a hard, wear resistant material positioned within each of the seat rings; characterised by an insert sleeve (44) of a hard, wear resistant material positioned within the opening (42) through the gate, the sleeve and the insert rings being installed and maintained in their respective positions in a compression preload condition and each end of the insert sleeve coacting with a respective one of the insert rings so as to be capable of shearing therebetween a wire line or pipe, which extends, in use, through the valve, when the gate is moved to its closed position.



illustrated in FIGURE 8. Dimension B illustrates the opening on the non-shearing side of gate 100 after the shearing is complete between insert sleeve 114 and insert ring 122. In the valve illustrated it is preferred that the diverging taper on the tapered bore 106 and the taper on the bore 126 of seat ring 124 have angles of taper which are preferred to be in the range of 10 to 12 degrees or less and at most 15 degrees or less so that there is a minimum of disturbance to the flow therethrough and still provide the opening through which the lower sheared portion of the cable element can drop from the gate bore before the gate completely closes.

Valve 200, shown in FIGURES 9, 10 and 11, is similar to the valve of FIGURES 6, 7 and 8 in that it provides the single shearing of the cable element to avoid the problem of the short cable element section being sheared and dropped into the well separate from the remainder of the cable element. Valve 200 is similar in structure to valve 10 except for the structure of the gate and the seat rings which are shown in the drawings. Gate 202 is of the usual form and has a means 203 for connecting to a valve stem (not shown) and is positioned between seat rings 204 and 206 as shown. Bore 208 extends through gate 202 and insert sleeve 210 is positioned therein. Sleeve 210 is of a hard material as previously described and is preloaded in compression for the reasons previously described. Sleeve 210 includes outlet bore 212 and inlet tapered surface 214 which diverges outwardly toward seat ring 206. Seat ring 206 includes tapered surface 215 on its interior which mates with the diameter of the inlet end of tapered surface 214 and reduces the bore in seat ring 206 to the flow diameter through the valve passages.

Seat ring 204 has central bore 216 and counterbore 218 which extends inwardly from side 220 of seat ring 204 which engages gate 202 and forms cylindrical surface 222 and shoulder 224. Insert ring 226 is positioned in counterbore 218 with the diameter of surface 222 being preselected to provide the desired preloading compression of insert ring 226 which is made of a hardened material such as tungsten carbide or other materials as previously discussed.

As shown in FIGURES 9, 10 and 11, gate 202 is shown in its open position (FIGURE 9), in its position at the completion of shearing of the cable element (FIGURE 10) and in its closed position of sealing against seat ring 204. As can be seen in FIGURE 10, with the completion of the shearing of the cable element extending through gate 202, there is sufficient open space between the interior of gate insert sleeve 212 and the interior of seat ring 206 to allow the sheared cable element to fall into the well without any additional shearing of the cable element.

From the above it can be seen that the improved design of the shearing gate valve of the present invention provides a gate valve which can shear a wire line or other tubular member extending therethrough without damage to the hardened insert rings or the hardened insert sleeves or without in any way interfering with the sealing of the gate and the seat ring. This allows the valve 10 to be used without repair or replacement through many cycles of closing and shearing whereas shearing gate valves of the prior art could only be expected to accomplish a single shearing and even following such single shearing may have been damaged sufficiently to provide an imperfect seal. It should be noted that the use of the forms of the present invention which provide the single shearing of the cable element require less force to complete the shearing of the cable element than the form of the present invention which provides the dual shearing of the cable element.

Claims

1. A gate valve comprising a body (12) having an inlet (14), an outlet (16), a valve chamber (18) communicating with the inner ends of the inlet and the outlet, and a recess (38,40) surrounding the opening of each of the inlet and the outlet into the valve chamber; a seat ring (34,36) positioned in each of the recesses within the valve chamber and having a bore therethrough aligned with respective ones of the inlet and outlet; a gate (32) movably positioned within the valve chamber and having an opening (42) therethrough which is brought into and out of alignment with the bores of the seat rings to open and close flow through the body responsive to movement of the gate in the valve chamber; an actuator (24-30) connected to the body and to the gate for moving the gate between its open and closed positions; and an insert ring (46,48) of a hard, wear resistant material positioned within each of the seat rings; characterised by an insert sleeve (44) of a hard, wear resistant material positioned within the opening (42) through the gate, the sleeve and the insert rings being installed and maintained in their respective positions in a compression preload condition and each end of the insert sleeve coacting with a respective one of the insert rings so as to be capable of shearing therebetween a wire line or pipe, which extends, in use, through the valve, when the gate is moved to its closed position.



2. A gate valve according to claim 1, wherein the hard, wear resistant material of the insert sleeve (44) and the insert rings (46,48) is tungsten carbide.
- 5 3. A gate valve according to claim 1, wherein the hard, wear resistant material of the insert sleeve (44) and the insert rings (46,48) is a material having compression and wear resistant properties approaching those properties of tungsten carbide.
- 10 4. A gate valve comprising a body (12) having an inlet (14), an outlet (16), a valve chamber (18) communicating with the inner ends of the inlet and the outlet, and a recess (38,40) surrounding the opening of each of the inlet and the outlet into the valve chamber; a seat ring (116,124;206,204) positioned in each of the recesses within the valve chamber and having a bore therethrough aligned with respective ones of the inlet and outlet; a gate (100;202) movably positioned within the valve chamber and having an opening (104-108;208) therethrough which is brought into and out of alignment with the bores of the seat rings to open and close flow through the body responsive to movement of the gate in the valve chamber; an actuator (24-30) connected to the body and to the gate for moving the gate between its open and closed positions; and an insert ring (122;226) of a hard, wear resistant material positioned within one of the seat rings (116;204); characterised by an insert sleeve (114;210) of a hard, wear resistant material positioned within the opening through the gate and having a bore which aligns with the mating bores in the seat rings, the insert sleeve and the insert ring being installed and maintained in their respective positions in a compression preload condition and coacting so as to be capable of shearing therebetween a wire line or pipe, which extends, in use, through the valve, when the gate is moved to its closed position, there being no insert ring in the other seat ring (124,206) for coaction with the sleeve (114,210) to make a second shearing.
- 15 20 5. A gate valve according to claim 4, wherein the end portion (106;214) of the gate opening adjacent to said other seat ring (124;206) tapers in the direction away from said other seat ring, and the bore (126;215) through said other seat ring (124;206) tapers in the direction away from the gate whereby the gate opening remains partly in communication with the bore through said other seat ring when a shearing coaction between the insert sleeve (114;210) and insert ring (122;226) is just completed.
- 25 30 6. A gate valve according to claim 4 or claim 5, wherein the hard, wear resistant material of the insert sleeve (114;210) and the insert ring (122;226) is tungsten carbide.
- 35 7. A gate valve according to claim 4 or claim 5, wherein the hard, wear resistant material of the insert sleeve (114;210) and the insert ring (122;226) is a material having compression and wear resistant properties approaching those properties of tungsten carbide.

Patentansprüche

- 40 1. Schiebeventil, bestehend aus einem Körper (12) mit einem Einlaß (14), einem Auslaß (16), einer Ventilkammer (18), die mit den inneren Enden des Einlasses und des Auslasses verbunden ist, und einer Ausnehmung (38, 40), die die Öffnungen des Einlasses und des Auslasses in die Ventilkammer umgibt, je einem Ventilring (34, 36), der in jeder der Ausnehmungen in der Ventilkammer angeordnet ist, und eine durch ihn hindurchgehende Bohrung aufweist, die mit entsprechenden Bohrungen am Ein- und Auslaß ausgerichtet ist; einem Schieber (32), der innerhalb der Ventilkammer beweglich angeordnet ist und eine durch ihn hindurchführende Öffnung (42) aufweist, welche mit den Bohrungen der Ventilringe in und außer Flucht gebracht werden kann, um den Durchfluß durch den Körper in Abhängigkeit von der Bewegung des Schiebers im Ventilkörper zu öffnen und zu schließen; einem Betätiger (24-30), der mit dem Körper und dem Schieber zum Bewegen des Schiebers zwischen dessen offener und geschlossener Stellung verbunden ist; und je einen Ring-Einsatz (46, 48) aus einem harten, verschleißfesten Material, der in jedem der Ventilringe angeordnet ist; gekennzeichnet durch einen Buchseneinsatz (44) aus hartem, verschleißfestem Material, der innerhalb der Öffnung (42) durch den Schieber, die Buchse und die Ring-Einsätze angeordnet ist, die in ihren entsprechenden Lagen unter einer Druck-Vorbelastung eingesetzt und gehalten werden, und jedes Ende des Buchseneinsatzes mit einem entsprechenden Ende des Ring-Einsatzes zusammenwirkt, so daß es möglich ist, zwischen diesen ein Drahtseil oder Rohr, welches sich in Funktion durch das Ventil erstreckt, abzuscheren, wenn der Schieber in seine Schließstellung bewegt wird.
- 45 50 55



2. Schiebeventil nach Anspruch 1, dadurch gekennzeichnet, daß das harte, verschleißfeste Material des Buchseneinsatzes (44) und der Ring-Einsätze (46, 48) Wolframkarbid ist.
3. Schiebeventil nach Anspruch 1, dadurch gekennzeichnet, daß das harte, verschleißfeste Material des Buchseneinsatzes (44) und der Ringeinsätze (46, 48) ein Material ist, das Druck- und Verschleißfestigkeitseigenschaften aufweist, die den entsprechenden Eigenschaften von Wolframkarbid annähernd gleich sind.
4. Schiebeventil, bestehend aus einem Körper (12) mit einem Einlaß (14), einem Auslaß (16), einer Ventilkammer (18), die mit den inneren Enden des Einlasses und des Auslasses verbunden ist, und einer Ausnehmung (38, 40), die die Öffnungen des Einlasses und des Auslasses in die Ventilkammer umgibt, je einem Ventilring (116, 124; 206, 204), der in jeder der Ausnehmungen in der Ventilkammer angeordnet ist, und eine durch ihn hindurchgehende Bohrung aufweist, die mit entsprechenden Bohrungen am Ein- und Auslaß ausgerichtet ist; einen Schieber (100, 202), der innerhalb der Ventilkammer beweglich angeordnet ist und eine durch ihn hindurchführende Öffnung (104-108; 208) aufweist, welche mit den Bohrungen des Ventilrings in und außer Flucht gebracht werden kann, um den Durchfluß durch den Körper in Abhängigkeit von der Bewegung des Schiebers im Ventilkörper zu öffnen und zu schließen; einen Betätiger (24-30), der mit dem Körper und dem Schieber zum Bewegen des Schiebers zwischen dessen offener und geschlossener Position verbunden ist; und je einen Ring-Einsatz (122; 226) aus einem harten, verschleißfesten Material, der in einem der Ventilringe (116; 204) angeordnet ist; gekennzeichnet durch einen Buchseneinsatz (114; 210) aus einem harten, verschleißfesten Material, der innerhalb der Öffnung durch den Schieber angeordnet ist und eine Bohrung aufweist, welche mit zugehörigen Bohrungen in den Ventilringen, dem Buchseneinsatz und dem Ring-Einsatz ausgerichtet ist, die in ihren entsprechenden Lagen unter einer Druckvorbelastung eingesetzt und gehalten werden und so zusammenwirken, daß es möglich ist, zwischen ihnen ein Drahtseil oder ein Rohr, welches sich in Funktion durch das Ventil erstreckt, abzuscheren, wenn der Schieber in seine Schließstellung bewegt wird, wobei kein Ring-Einsatz in dem anderen Ventilring (124, 206) zum Zusammenwirken mit der Buchse (114, 210) vorhanden ist, um ein zweites Abscheren zu vollziehen.
5. Schiebeventil nach Anspruch 4, dadurch gekennzeichnet, daß das Endteil (106; 214) der Schieberöffnung, das zum anderen Ventilring (124; 206) ausgerichtet ist, sich in Richtung hinweg vom anderen Ventilring keilförmig verjüngt, und die Bohrung (126; 215) durch den anderen Ventilring (124; 206) sich in Richtung hinweg vom Schieber keilförmig verjüngt, wobei die Schieberöffnung teilweise in Verbindung mit der Bohrung durch den anderen Ventilring verbleibt, wenn ein Schervorgang zwischen dem Buchseneinsatz (114; 210) und dem Ring-Einsatz (122; 226) gerade abgeschlossen ist.
6. Schiebeventil nach den Ansprüchen 4 oder 5, dadurch gekennzeichnet, daß das harte, verschleißfeste Material des Buchseneinsatzes (114; 210) und des Ringeinsatzes (122; 226) Wolframkarbid ist.
7. Schiebeventil nach den Ansprüchen 4 oder 5, dadurch gekennzeichnet, daß das harte, verschleißfeste Material des Buchseneinsatzes (114; 210) und des Ring-Einsatzes (122; 226) ein Material ist, das Druck- und Verschleißfestigkeitseigenschaften aufweist, die den entsprechenden Eigenschaften von Wolframkarbid annähernd gleich sind.

45 Revendications

1. Vanne à tiroir portant un corps (12) ayant une entrée (14), une sortie (16), une chambre (18) de vanne communiquant avec les extrémités intérieures de l'entrée et de la sortie, et une cavité (38, 40) entourant l'ouverture aussi bien de l'entrée que de la sortie dans la chambre de vanne; un anneau formant siège (34, 36) positionné dans chacune des cavités à l'intérieur de la chambre de vanne et ayant un alésage traversant aligné avec l'entrée et la sortie respective; un tiroir (32) pouvant se déplacer positionné à l'intérieur de la chambre de vanne et ayant une ouverture traversante (42) qui est amenée en alignement avec les alésages des anneaux formant sièges et hors d'alignement avec ceux-ci pour ouvrir et fermer l'écoulement à travers le corps en réponse au déplacement du tiroir dans la chambre de vanne; un actionneur (24 à 30) relié au corps et au tiroir pour déplacer le tiroir entre ses positions ouvertes et fermées; et un anneau rapporté (46, 48) en matériau dur résistant à l'usure positionné à l'intérieur de chacun des anneaux formant sièges, caractérisée en ce qu'elle comporte un manchon rapporté (44) en matériau dur résistant à l'usure positionné à l'intérieur de l'ouverture (42)



traversant le tiroir, le manchon et les anneaux rapportés étant installés et maintenus dans leur position respective dans un état préchargé en compression et chaque extrémité du manchon rapporté coopérant avec un anneau respectif des anneaux rapportés de manière à pouvoir cisailer entre eux un câble ou un tuyau qui s'étend, en utilisation, à travers la vanne, lorsque le tiroir est déplacé dans sa position fermée.

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2. Vanne à tiroir selon la revendication 1, dans laquelle le matériau dur résistant à l'usure du manchon rapporté (44) et des anneaux rapportés (46, 48) est du carbure de tungstène.
- 10 3. Vanne à tiroir selon la revendication 1, dans laquelle le matériau dur résistant à l'usure du manchon rapporté (44) et des anneaux rapportés (46, 48) est un matériau ayant des propriétés de compression et de résistance à l'usure approchant les propriétés correspondantes du carbure de tungstène.
- 15 4. Vanne à tiroir comportant un corps (12) ayant une entrée (14), une sortie (16), une chambre (18) de vanne communiquant avec les extrémités intérieures de l'entrée et de la sortie, et une cavité (38, 40) entourant l'ouverture dans la chambre de vanne aussi bien de l'entrée que de la sortie; un anneau formant siège (116, 124; 206, 204) positionné dans chacune des cavités situées à l'intérieur de la chambre de vanne et ayant un alésage traversant aligné avec l'entrée et la sortie respective; un tiroir (100; 202) pouvant se déplacer positionné à l'intérieur de la chambre de vanne et ayant une ouverture traversante (104 à 108; 208) qui est amenée en alignement avec les alésages des anneaux formant sièges et hors d'alignement avec ceux-ci pour ouvrir et fermer l'écoulement à travers le corps en réponse au déplacement du tiroir dans la chambre de vanne; un actionneur (24 à 30) relié au corps et au tiroir pour déplacer le tiroir entre ses positions ouverte et fermée; et un anneau rapporté (122; 226) en matériau dur résistant à l'usure positionné à l'intérieur de l'un des anneaux formant sièges (116; 204), caractérisée par un manchon rapporté (114; 210) en matériau dur résistant à l'usure positionné à l'intérieur de l'ouverture traversant le tiroir et ayant un alésage qui est aligné avec les alésages complémentaires situés dans les anneaux formant sièges, le manchon rapporté et l'anneau rapporté étant installés et maintenus dans leur position respective dans un état préchargé en compression et coopérant de manière à être capable de cisailer entre eux un câble ou un tuyau qui s'étend en cours d'utilisation à travers la vanne, lorsque le tiroir est déplacé vers sa position fermée et ne comportant pas d'anneau rapporté dans l'autre anneau formant siège (124, 206) pour coopérer avec le manchon (114, 210) pour réaliser un second cisaillement.
- 20 5. Vanne à tiroir selon la revendication 4, dans laquelle la partie d'extrémité (106; 214) de l'ouverture du tiroir adjacente audit autre anneau formant siège (124; 206) s'évase dans la direction s'éloignant dudit autre anneau formant siège, et l'alésage (126; 215) traversant ledit autre anneau formant siège (124; 206) se rétrécit dans la direction s'éloignant du tiroir de telle sorte que l'ouverture du tiroir reste partiellement en communication avec l'alésage traversant ledit autre anneau formant siège lorsqu'une coopération de cisaillement entre le manchon rapporté (114; 210) et l'anneau rapporté (122; 226) vient d'être réalisée.
- 25 6. Vanne à tiroir selon la revendication 4 ou 5, dans laquelle le matériau dur résistant à l'usure du manchon rapporté (114; 210) et de l'anneau rapporté (122; 226) est du carbure de tungstène.
- 30 7. Vanne à tiroir selon la revendication 4 ou 5, dans laquelle le matériau dur résistant à l'usure du manchon rapporté (114; 210) et de l'anneau rapporté (122; 226) est un matériau ayant des propriétés de résistance à la compression et à l'usure approchant les propriétés correspondantes du carbure de tungstène.
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