

Description

Background of the Invention

This invention relates to fluid control valves for very high temperature service, and more particularly to gate valves that will contain the operating pressure satisfactorily during and after exposure to a fire.

As reflected in the patent and other literature, much effort has been expended in recent years to provide industry, and especially that involved in oil and gas production, with stem operated valves that will withstand the destructive effects of fire or other high temperatures without losing their function of safe, fluid-tight control of high pressure systems. This effort has resulted in a variety of designs for valves with metal-to-metal seals, stem backseating, and fusible elements to prevent backseating during normal operating temperatures yet facilitate it when such temperatures are exceeded. However meritorious these designs might be, each has one or more disadvantages that prevents total satisfaction of the user.

Summary of the Invention

The present invention, considered as directed toward overcoming the disadvantages of the known fire-resistant stem operated valves, provides improvements in the location of the fusible element and its functional relationship with the valve stem, stem bearings and bonnet, an improved backseat design for the valve stem, and an improved metal-to-metal sealing system between the valve closure element and valve body.

The present invention is as defined in the accompanying Claim 1.

A prior art that is of interest in assessing the present invention is that disclosed in FR-A-2 511 470. In order that the features of the present invention that go beyond this prior art may be readily ascertained, the accompanying Claim 1 has been divided into a two-part form on the basis that FR-A-2 511 470 is the nearest prior art.

As incorporated in a non-rising stem gate valve, the present invention comprises, singly or in any combination, a fusible element surrounding a supporting sleeve that is secured to the valve stem in an improved manner, an annular backseat element on the valve stem with an annular metal sealing surface preferably of round cross-sectional configuration, and a seat element with an annular sealing surface of round cross-sectional configuration that establishes a fluid-tight metal-to-metal seal with the valve body.

Brief Description of the Drawings

Figure 1 is a view in central vertical section, with some parts in full, of a fire-resistant gate valve embodying features of the present invention.

Figure 2 is an enlargement of the stem bearing area in the upper portion of Figure 1.

Figure 3 is an enlargement of the stem backseat area in the central portion of Figure 1.

Figure 4 is an enlargement of the gate seat area in the lower portion of Figure 1.

Figure 5 is a view along the line 5-5 of Figure 1.

Figure 6 is a view along the line 6-6 of Figure 1.

Figure 7 is a view like Figure 4, but on a reduced scale, showing another form of gate seat with an annular metal sealing surface of round cross-sectional configuration.

Figure 8 is a view like Figure 3, showing another configuration of backseat for the valve stem.

Figure 9 is a view like Figure 2, but on a reduced scale, illustrating another embodiment of a fusible ring assembly according to the present invention.

Figure 10 is a view like Figure 2, showing yet another embodiment of a fusible ring assembly in accordance with the present invention.

Description of the Preferred Embodiment

As illustrated in Figure 1, the preferred embodiment of an improved fire-resistant gate valve 10 having features of the present invention comprises a body 12 with a flow passage 14, a valve chamber 16 intersected by the flow passage 14, a valve bonnet 18 releasably secured to the body 12 as by a plurality of circumferentially spaced studs 20 and nuts 22, a bonnet cap 24 secured to the bonnet 18 by threads 26, a valve gate (valve closure member) 28 disposed in the chamber 16 to control flow through the passage 14, a valve stem 30 extending from the gate 28 through the bonnet 18 and the cap 24, and a handwheel 32 or other suitable means for rotating the stem 30. The stem 30 is threaded into a lift pin 34 (Figs. 1, 5 and 6) that resides in a transverse bore 36 through the gate 28, so that as the stem is rotated, the gate is translated between its closed position (illustrated) and its open position in the valve chamber 16 of the body 12. The valve chamber 16 is shown in its preferred embodiment, as a circular cavity but the cavity could be rectangular, square, etc., in cross section. The valve chamber 16 is used to align the valve gate 28 properly. The valve gate 28 would be shaped to conform with the valve chamber 16, circular, rectangular, square, etc.

Near the upper end of the bonnet 18 is an annular packing 38 that provides a fluid seal between the bonnet and the stem 30, and a gland-type packing nut 40, threaded into the bonnet, serves as a retainer for the packing. Above the

packing nut 40 the stem 30 is surrounded by a pair of thrust bearing assemblies 42,44 (bearing means 42 and further bearing means 44) that facilitate easy rotation of the stem to open and/or close the valve.

Between the bearing assemblies 42, 44 is a fusible ring assembly 46 (Figures 1 & 2) that axially supports the stem 30 in its illustrated position during normal operating temperatures. The assembly 46 comprises an axially-split sleeve 48 with an annular radial flange 48a extending outwardly from its lower end, a retaining ring 50 with an annular radial flange 50a extending inwardly from its upper end, and a fusible ring 52 sandwiched between the flanges 48a,50a. The sleeve 48 is formed by two equal half-round segments (only one shown) that fit around a reduced diameter stem portion 30b (seen best in Figure 2) and between opposed annular shoulders 30c,30d. The retaining ring 50 freely surrounds the sleeve 48 and the fusible ring 52, and has one or more lateral ports 54 through which material of the ring 52 can exit after being melted by a fire or other sufficiently elevated temperature.

As seen best in Figure 3, extending radially outwardly from the stem 30 below the bonnet 18 and above the stem's threaded portion 30a is an annular backseat flange 56 with an upwardly facing annular metallic sealing surface 56a of round cross-sectional configuration. The lower portion of the bonnet bore 58 is counterbored at 60 to provide an annular radial surface 62 that functions as a seat for the sealing surface 56a. The backseat flange 56 also can be provided with O-rings 64,66 to function as sealing elements between the flange and the bonnet 18 at normal temperatures.

When the fusible ring 52 melts, as in response to exposure of the valve 10 to a fire or other sufficiently high temperature, the fluid pressure in the valve body forces the stem 30 upwardly until the sealing surface 56a of the stem flange 56 comes to rest against the bonnet seat surface 62, thereby effecting a metal-to-metal backseat of the stem on the bonnet and preventing escape of fluid through the bonnet bore 58. As the foregoing occurs, the split sleeve 48 is carried upwardly with the stem 30.

In order that positive stem backseating can be achieved, even at relatively low valve pressures, a helical spring 68 (seen best in Figure 2), residing in a counterbore 40a in the upper portion of the packing nut 40 and compressed between the nut and the bearing assembly 42, is included to move that bearing assembly, and thus also the split sleeve 48 and the stem 30, upwardly when the fusible ring 52 melts.

As illustrated in Figures 1 and 4, the downstream side 28a of the valve gate 28 is sealed in fluid-tight manner to the valve body 12 by a seat

comprising a uniquely-shaped sleeve-like metal seat element 70 residing in a counterbore 72 in the body flow passage 14. The seat element 70 includes an annular sealing lip 74 with a sealing surface 74a of round cross-sectional configuration. Before installation, the outside diameter of the sealing surface 74a is slightly greater than the diameter of the counterbore 72 so that when the element 70 is installed in functional position the sealing surface presses against the counterbore to provide a metal-to-metal seal between the element 70 and the valve body 12. An O-ring 76, carried in an external groove 78 in the element 70, can be included to prevent pressure at normal operating temperatures from migrating from the flow passage 14 and between the element 70 and the counterbore 72 to the lip 74.

On the upstream side 28b of the gate 28 another sleeve-like seat element 80 (Figure 1), residing in a counterbore 82 in the flow passage 14, is biased against the gate by one of more Belleville springs 84 (two shown), and this axial load also produces an initial seal between the downstream side 28a of the gate 28 and the upstream end 70a of the element 70.

Figure 7

Another version of the downstream seat element embodying the present invention is shown as 90 in Figure 7. The sleeve-like element 90 has an annular sealing surface 92 of round cross-sectional configuration on its downstream radial end surface 94, and this sealing surface bears against and cooperates with an opposed radial surface 96 in the valve body counterbore 72 to provide a fluid-tight metal-to-metal seal between the valve body 12 and the element 90. Additional sealing capability at normal temperatures and low pressures can be obtained by including an O-ring 98 in a circumferential groove 100 on the outer surface of the element 90.

Figure 8

An alternate backseat design for the valve stem 30 is illustrated in Figure 8, this design comprising a frusto-conical enlarged portion 110 of the stem above its threaded portion 30a, and a complementary beveled inlet 112 to the bonnet bore 58. The beveled inlet 112 functions as a seat for the frusto-conical stem portion 110, so that when the fusible ring 52 melts the stem 30 will rise until the stem portion 110 comes to rest against the beveled inlet, thereby providing a fluid-tight metal-to-metal seal between the stem and the bonnet.

Figure 9

Figure 9 illustrates a modified embodiment of the fusible ring assembly 46. In this embodiment there is no retainer ring, such as that at 50 in Figures 1 and 2, and the fusible ring 52 is in direct contact with the upper bearing assembly 44.

Figure 10

Another modified embodiment of fusible ring assembly is illustrated in Figure 10. In this embodiment, the lower bearing assembly 142 has a significantly larger outside diameter than its counterpart 42 (Figures 1 and 2) and underlies the lower end of the retainer ring 50. Accordingly, in the Figure 10 embodiment the fusible ring 52 provides no support function to either of the bearing assemblies 142, 44, and when this fusible ring melts the stem 30 and the split sleeve 48 rise until the stem backseats on the bonnet, but the lower bearing assembly 142 remains in its illustrated position.

Claims

1. A valve (10) comprising:

(a) a body (12) having a chamber (16) intersected by a fluid flow passageway (14); and a linearly movable valve closure member (28) positioned in said chamber to control fluid flow through said passage;

(b) a bonnet (18) secured to said body (12) and having a linear bore (58) communicating with said chamber (16);

(c) a bonnet cap (24) having a bearing retaining chamber and secured adjacent to said linear bore (58) in said bonnet (18) and having a valve stem opening in an end wall thereof, said valve stem opening being axially aligned with said linear bore;

(d) a valve stem (30) extending through said valve stem opening and said linear bore and connected to said closure member (28);

(e) bearing means (42) in said bearing retaining chamber and positioned against said bonnet (18, 40) and surrounding said stem (30);

(f) said stem having a cylindrical groove (30b), one edge (30c) of which is adjacent said bearing means (42);

(g) a tubular support sleeve (48) seated in said groove (30b) and extending to the ends thereof, said sleeve having an outer cylindrical wall approximately equal in diameter to that of said stem (30) and having a circular flange (48a) extending radially outwardly from an end of said outer cylindrical wall;

(h) a ring (52) made of a fusible material which melts at a temperature exceeding a

normal range of operating temperatures in said bearing retaining chamber, said ring (52) surrounding said tubular sleeve (48) and having a diameter approximately equal in size to the diameter of said circular flange (48a) and abutting against said circular flange (48a);

(i) backseating means (56) on said stem (30) and positioned in said chamber (16) in said body (12) and co-operating backseating means (60, 62) in said bonnet (18) and providing a fluid tight metal-to-metal seal in response to axial movement of said stem (30) toward said valve stem opening in said bonnet cap (24) as a consequence of said ring (52) of fusible material melting, said ring (52) normally supporting said stem (30) against said axial movement at said normal range of operating temperatures;

(j) a further bearing means (44) in said bearing retaining chamber, said further bearing means (44) being positioned against said wall of the bonnet (18) that has said valve stem opening therein;

there being a plurality of discharge holes (54) for discharging melting fusible material therethrough concurrent with axial movement of said stem (30) and said circular flange (48a) in consequence of said temperature exceeding said normal range of operating temperatures;

characterized by

(k) said circular flange (48a) being in abutting relationship with said bearing means (42);

(l) a cylindrical cup (50) having an inside cylindrical wall substantially equal in size to the diameter of said circular flange (48a) and having an end wall (50a) abutting against said further bearing means (44) and encircling said sleeve (48), said cup being sleeved over said fusible ring (52) and said circular flange (48a);

(m) said fusible ring (52) abutting against said end wall (50a) of the cylindrical cup (50) and preventing axial movement of said stem (30) in either direction; and

(n) said plurality of discharge holes (54) being provided in said cup (50).

2. The valve according to Claim 1, characterized by said inside diameter of said cup being equal to or less than the outside diameter of said bearing means.

3. The valve according to Claim 1 characterized by said cup and said circular flange completely enclosing said fusible ring.

Figure 9 illustrates a modified embodiment of the fusible ring assembly 46. In this embodiment there is no retainer ring, such as that at 50 in Figures 1 and 2, and the fusible ring 52 is in direct contact with the upper bearing assembly 44.

Figure 10

Another modified embodiment of fusible ring assembly is illustrated in Figure 10. In this embodiment, the lower bearing assembly 142 has a significantly larger outside diameter than its counterpart 42 (Figures 1 and 2) and underlies the lower end of the retainer ring 50. Accordingly, in the Figure 10 embodiment the fusible ring 52 provides no support function to either of the bearing assemblies 142, 44, and when this fusible ring melts the stem 30 and the split sleeve 48 rise until the stem backseats on the bonnet, but the lower bearing assembly 142 remains in its illustrated position.

Claims

1. A valve (10) comprising:

- (a) a body (12) having a chamber (16) intersected by a fluid flow passageway (14); and a linearly movable valve closure member (28) positioned in said chamber to control fluid flow through said passage;
- (b) a bonnet (18) secured to said body (12) and having a linear bore (58) communicating with said chamber (16);
- (c) a bonnet cap (24) having a bearing retaining chamber and secured adjacent to said linear bore (58) in said bonnet (18) and having a valve stem opening in an end wall thereof, said valve stem opening being axially aligned with said linear bore;
- (d) a valve stem (30) extending through said valve stem opening and said linear bore and connected to said closure member (28);
- (e) bearing means (42) in said bearing retaining chamber and positioned against said bonnet (18, 40) and surrounding said stem (30);
- (f) said stem having a cylindrical groove (30b), one edge (30c) of which is adjacent said bearing means (42);
- (g) a tubular support sleeve (48) seated in said groove (30b) and extending to the ends thereof, said sleeve having an outer cylindrical wall approximately equal in diameter to that of said stem (30) and having a circular flange (48a) extending radially outwardly from an end of said outer cylindrical wall;
- (h) a ring (52) made of a fusible material which melts at a temperature exceeding a

normal range of operating temperatures in said bearing retaining chamber, said ring (52) surrounding said tubular sleeve (48) and having a diameter approximately equal in size to the diameter of said circular flange (48a) and abutting against said circular flange (48a);

(i) backseating means (56) on said stem (30) and positioned in said chamber (16) in said body (12) and co-operating backseating means (60, 62) in said bonnet (18) and providing a fluid tight metal-to-metal seal in response to axial movement of said stem (30) toward said valve stem opening in said bonnet cap (24) as a consequence of said ring (52) of fusible material melting, said ring (52) normally supporting said stem (30) against said axial movement at said normal range of operating temperatures;

(j) a further bearing means (44) in said bearing retaining chamber, said further bearing means (44) being positioned against said wall of the bonnet (18) that has said valve stem opening therein;

there being a plurality of discharge holes (54) for discharging melting fusible material therethrough concurrent with axial movement of said stem (30) and said circular flange (48a) in consequence of said temperature exceeding said normal range of operating temperatures;

characterized by

(k) said circular flange (48a) being in abutting relationship with said bearing means (42);

(l) a cylindrical cup (50) having an inside cylindrical wall substantially equal in size to the diameter of said circular flange (48a) and having an end wall (50a) abutting against said further bearing means (44) and encircling said sleeve (48), said cup being sleeved over said fusible ring (52) and said circular flange (48a);

(m) said fusible ring (52) abutting against said end wall (50a) of the cylindrical cup (50) and preventing axial movement of said stem (30) in either direction; and

(n) said plurality of discharge holes (54) being provided in said cup (50).

2. The valve according to Claim 1, characterized by said inside diameter of said cup being equal to or less than the outside diameter of said bearing means.

3. The valve according to Claim 1 characterized by said cup and said circular flange completely enclosing said fusible ring.



4. The valve according to Claim 1 or 2 or 3 characterized by said support sleeve comprising two halves nested in said groove in said stem.
5. The valve according to Claim 4 characterized by a spring means (68) in said bonnet biasing said bearing means in an axial direction against said circular flange.
6. The valve according to Claim 5 characterized by said backseating means comprising an annular radial flange (56) on said stem with an axially facing annular ridge-like sealing surface (56a) of rounded axial cross-sectional configuration, and an annular flat radial seat (62) on said bonnet that cooperates with said sealing surface to establish said fluid-tight metal-to-metal seal between said stem and said bonnet.
7. The valve according to Claim 6 characterized by seal means (70) in said passage way for providing a fluid-tight metal-to-metal seal between said body and said valve closure element in both the normal and backseating operating conditions of the valve.

Revendications

1. Vanne (10) comprenant :

- (a) un corps (12) ayant une chambre (16) recoupée par un passage (14) de circulation d'un fluide, et un obturateur (28) mobile linéairement et disposé dans la chambre afin qu'il règle l'écoulement du fluide dans le passage,
- (b) un chapeau (18) fixé au corps (12) et ayant un trou rectiligne (58) communiquant avec la chambre (16),
- (c) un capuchon (24) de chapeau ayant une chambre de retenue de palier, fixé près du trou rectiligne (58) formé dans le chapeau (18) et ayant une ouverture de passage de tige de vanne dans une paroi d'extrémité, l'ouverture de passage de tige de vanne étant alignée axialement sur le trou rectiligne,
- (d) une tige (30) de vanne, passant dans l'ouverture de passage de tige de vanne et dans le trou rectiligne, et raccordée à l'obturateur (28),
- (e) un palier (42) placé dans la chambre de retenue de palier et placé contre le chapeau (18, 40) et entourant la tige (30),
- (f) la tige ayant une gorge cylindrique (30b) dont un bord (30c) est adjacent au palier (42),
- (g) un manchon tubulaire de support (48)

logé dans la gorge (30b) jusqu'aux extrémités de celle-ci, le manchon ayant une paroi cylindrique externe dont le diamètre est approximativement égal à celui de la tige (30) et ayant un flasque circulaire (48a) dépassant radialement vers l'extérieur d'une extrémité de la paroi cylindrique externe,

(h) une bague (52) formée d'un matériau fusible qui fond à une température qui dépasse la plage des températures normales de fonctionnement, la bague (52) étant placée dans la chambre de retenue de palier, entourant le manchon tubulaire (48) et ayant un diamètre approximativement égal à celui du flasque circulaire (48a), la bague étant en butée contre le flasque circulaire (48a),

(i) un dispositif (56) formant siège auxiliaire sur la tige (30), disposé dans la chambre (16) formée dans le corps (12), et un dispositif coopérant (60, 62) formant siège auxiliaire disposé dans le chapeau (18), afin qu'un joint étanche métal-sur-métal soit formé à la suite du déplacement axial de la tige (30) vers l'ouverture de passage de tige formée dans le capuchon (24) du chapeau à la suite de la fusion de la bague (52) d'une matière fusible, la bague (52) supportant normalement la tige (30) afin qu'elle ne puisse pas se déplacer axialement, dans la plage des températures normales de fonctionnement,

(j) un dispositif (44) formant un palier supplémentaire placé dans la chambre de retenue de palier, le palier supplémentaire (44) étant disposé contre la paroi d'extrémité du chapeau (18) qui a l'ouverture de passage de tige, plusieurs trous d'évacuation (54) étant destinés à évacuer la matière fusible fondue lors du déplacement axial de la tige (30) et du flasque circulaire (48a) lorsque la température dépasse la plage des températures normales de fonctionnement,

caractérisée en ce que

- (k) le flasque circulaire (48a) est en butée contre le palier (42),
- (l) une cuvette cylindrique (50), ayant une paroi interne cylindrique de dimensions pratiquement égales au diamètre du flasque circulaire (48a) et une paroi d'extrémité (50a) qui est en butée contre le palier supplémentaire (44) et entoure le manchon (48), est glissée sur la bague fusible (52) et le flasque circulaire (48a),
- (m) la bague fusible (52) est en butée contre la paroi d'extrémité (50a) de la cuvette cylindrique (50) et empêche le déplacement axial de la tige (30) dans les deux sens, et



(n) les trous d'évacuation (54) sont formés dans la cuvette (50).

2. Vanne selon la revendication 1, caractérisée en ce que le diamètre interne de la cuvette est inférieur ou égal au diamètre externe du palier. 5
3. Vanne selon la revendication 1, caractérisée en ce que la cuvette et le flasque circulaire entourent totalement la bague fusible. 10
4. Vanne selon l'une quelconque des revendications 1, 2 ou 3, caractérisée en ce que le manchon de support comporte deux moitiés emboîtées dans la gorge formée dans la tige. 15
5. Vanne selon la revendication 4, caractérisée par un ressort (68) placé dans le chapeau et repoussant le palier en direction axiale contre le flasque circulaire. 20
6. Vanne selon la revendication 5, caractérisée en ce que le dispositif formant un siège auxiliaire comporte un flasque radial annulaire (56) disposé sur la tige et ayant une surface annulaire d'étanchéité (56a) formant une nervure dirigée axialement, ayant une section axiale arrondie, et un siège radial annulaire plat (62) formé sur le chapeau et coopérant avec la surface d'étanchéité afin que le joint étanche métal-sur-métal soit formé entre la tige et le chapeau. 25 30
7. Vanne selon la revendication 6, caractérisée par un dispositif d'étanchéité (70) placé dans le passage et destiné à former un joint étanche métal-sur-métal entre le corps et l'obturateur de la vanne à la fois dans les conditions de fonctionnement normal de la vanne et dans les conditions de coopération du siège auxiliaire. 35 40

Patentansprüche

1. Ventil (10) mit:
 - (a) einem Körper (12), der eine Kammer (16) hat, die von einem Fluidströmungsdurchgang (14) geschnitten ist; und einem linear bewegbaren Ventilschließelement (28), welches in der Kammer angeordnet ist, um die Fluidströmung durch den Durchgang zu steuern; 45
 - (b) einer Schutzkappe (18), die an dem Körper (12) festgelegt ist und eine lineare Bohrung (58) hat, die mit der Kammer (16) in Verbindung steht; 50
 - (c) einem Ventilkappendeckel (24), der eine Lagerhaltekammer hat und benachbart zu der linearen Bohrung (58) in der Ventilkappe 55

(18) festgelegt ist und eine Ventilschieberöffnung in einer Endwand desselben hat, wobei die Ventilschieberöffnung zu der linearen Bohrung axial ausgerichtet ist;

(d) einem Ventilschieber (30), der sich durch die Ventilschieberöffnung und die lineare Bohrung erstreckt und mit dem Schließelement (28) verbunden ist;

(e) einer Lagereinrichtung (42) in der Lagerhaltekammer, die gegen die Ventilkappe (18, 40) angeordnet ist und den Schieber (30) umgibt;

(f) wobei der Schieber eine zylindrische Vertiefung (30b) hat, von der eine Kante (30c) benachbart zu der Lagereinrichtung (42) ist;

(g) einer röhrenförmigen Trägerbüchse (48), die in der Vertiefung (30b) sitzt und sich zu Enden derselben erstreckt, wobei die Büchse eine äußere zylindrische Wand mit etwa dem gleichen Durchmesser wie der Schieber (30) und einen kreisförmigen Flansch (48a) hat, der sich radial nach außen von einem Ende der äußeren zylindrischen Wand erstreckt;

(h) einem Ring (52), hergestellt aus einem schmelzbaren Material, das bei einer Temperatur schmilzt, die einen normalen Bereich von Betriebstemperaturen in der Lagerhaltekammer überschreitet, wobei der Ring (52) die röhrenförmige Büchse (48) umgibt und einen Durchmesser etwa gleicher Größe des Durchmessers des kreisförmigen Flansches (48a) hat und gegen den kreisförmigen Flansch (48a) anstößt;

(i) einer Abstützeinrichtung (56) an dem Schieber (30) und benachbart in der Kammer (16) in dem Körper (12) und einer kooperierenden Abstützeinrichtung (60, 62), die in der Ventilkappe (18) angeordnet ist und in Antwort auf eine axiale Bewegung des Schiebers (30) auf die Ventilschieberöffnung in dem Ventilkappendeckel (24) als Folge des Schmelzens des Rings (52) aus schmelzbarem Material eine fluiddichte Metall-Abdichtung schafft, wobei der Ring (52) normalerweise den Schieber (30) bei dem normalen Bereich von Betriebstemperaturen gegen die axiale Bewegung stützt;

(j) eine weitere Lagereinrichtung (44) in der Lagerhaltekammer, wobei die weitere Lagereinrichtung (44) gegen die Endwand der Ventilkappe (18) positioniert ist, in der die Ventilschieberöffnung ist;

wobei es eine Vielzahl von Abfuhröffnungen (54) zum Abführen von schmelzendem schmelzbarem Material gleichzeitig mit einer axialen Bewegung des Schiebers (30) und



des kreisförmigen Flansches (48a) als Folge der Temperaturüberschreitung des normalen Bereiches von Betriebstemperaturen vorgesehen ist;

dadurch gekennzeichnet,

(k) daß der kreisförmige Flansch (48a) in anstossender Beziehung zu der Lagereinrichtung (42) ist;

(l) daß eine zylindrische Schale (50) vorgesehen ist, die eine innere zylindrische Wand im wesentlichen gleicher Größe des Durchmessers des zylindrischen Flansches (48a) und eine Endwand (50a) hat, die gegen die weitere Lagereinrichtung (44) anstößt und die Büchse (48) umgibt, wobei die Schale über den schmelzbaren Ring (52) und den kreisförmigen Flansch (48a) geschoben ist;

(m) daß der schmelzbare Ring (52) gegen die Endwand (50a) der zylindrischen Schale (50) anstößt und eine axiale Bewegung des Schiebers (30) in jeglicher Richtung verhindert; und

(n) daß in der Schale (50) die Vielzahl von Abfuhrlöchern (54) vorgesehen ist.

2. Ventil nach Anspruch 1, dadurch gekennzeichnet, daß der Innendurchmesser der Schale geringer oder gleich dem Außendurchmesser der Lagereinrichtung ist.

3. Ventil nach Anspruch 1, dadurch gekennzeichnet, daß die Schale und der kreisförmige Flansch den schmelzbaren Ring vollständig umschließen.

4. Ventil nach Anspruch 1, 2 oder 3, dadurch gekennzeichnet, daß die Trägerbüchse zwei Hälften umfaßt, die in die Vertiefung in dem Schieber eingesetzt sind.

5. Ventil nach Anspruch 4, gekennzeichnet durch eine Federeinrichtung (68) in der Ventilkappe, wobei die Federeinrichtung (68) die Lagereinrichtung in einer axialen Richtung gegen den kreisförmigen Flansch vorspannt.

6. Ventil nach Anspruch 5, dadurch gekennzeichnet, daß die Abstützeinrichtung einen ringförmigen Radialflansch (56) an dem Schieber mit einer axial gegenüberstehenden ringförmigen kammartigen Abdichtfläche (56a) mit abgerundeter axialer Querschnittskonfiguration und einen ringförmigen flachen Radialsitz (62) an der Ventilkappe hat, die mit der Abdichtfläche kooperiert, um die fluiddichte Metall-Metall-Abdichtung zwischen dem Schieber und der Ventilkappe einzurichten.

7. Ventil nach Anspruch 6, gekennzeichnet durch eine Abdichteinrichtung (70) in dem Durchgang zum Schaffen einer fluiddichten Metall-Metall-Abdichtung zwischen dem Körper und dem Ventilschließelement in sowohl dem normalen als auch dem Abstützbetriebszustand des Ventils.

