

Description

The present invention relates to an improved shaft locking device which may be used to lock the shaft of a valve in one position and when it is subjected to fire or other excessive heat it releases the shaft to allow it to move to a safe position, for example, to a position in which the gate of the valve is closed. Further, this invention can have application to other shafts which are desired to be held in one position during normal operations and can be released from the locked position either manually or in response to fire or excessive heat.

In U. S. Patent No. 4,214,600 it is suggested to support the bearings of a gate valve stem with a bushing of heat responsive material, such as eutectic material, which when subject to the heat releases the bearing support so that the stem moves outwardly to a position in which a shoulder on the stem back seats against a shoulder on the bonnet or body surrounding the stem to close against leakage out of the valve around the stem.

U.K. Patent No. 1,452,135 (A FR-A 2209 905) as the generic prior art discloses a fluid control valve incorporating a heat responsive safety device. This also discloses the use of eutectic material which melts to allow movement of the valve stem (thus closing the valve), once a predetermined temperature is reached. However the safety device disclosed therein does not allow manual closure of the valve.

It is further known to have a shaft with a groove in its exterior surface and a sleeve surrounding the shaft having ports extending therethrough with a tubular actuator surrounding the sleeve to engage balls in the ports and hold them against the groove in the shaft and partially in the ports so that the sleeve and shaft are locked against axial movement with respect to each other.

The present invention provides a heat sensitive shaft locking apparatus as defined by the features of claim 1 and a valve comprising such an apparatus as defined by the features of claim 5.

In a preferred embodiment of the invention, an annular body surrounds a rod extension which has recesses around its exterior and balls positioned in ports in the annular body and held in such position by a heat responsive means engaged in the recesses to prevent the rod extension from sliding through the interior of the annular body. In this form of the invention the rod extension is adapted to be engaged by the valve stem or other shaft which is to be locked against movement. These devices are applicable for connection on the bonnet of a valve in surrounding relationship to the valve stem with the outer end of the stem in engagement with the balls or the rod extension so that when subjected to fire or excessive heat the

stem moves outwardly to change the position of the gate, to back seat the stem or both, if desired.

An object of the present invention is to provide an improved shaft locking device which mechanically locks the shaft and allows complete freedom of movement of the shaft when released.

Another object of the present invention is to provide an improved shaft locking device suitable for use on a valve stem which when released provides an unrestricted diameter bore through which the stem moves.

A further object is to provide an improved shaft locking device which on release does not require movement of structure other than the locking balls and the shaft.

These and other objects and advantages of the present invention are hereinafter set forth and explained with reference to the drawings:

FIGURE 1 is a sectional view of an improved valve having the improved shaft locking apparatus thereon with the shaft in locked position.

FIGURE 2 is a sectional view of the valve shown in FIGURE 1 with the shaft locking apparatus in its relaxed position.

FIGURE 3 is a sectional view taken axially through the shaft locking apparatus which is in its locked position.

FIGURE 4 is a sectional view taken along line 4 - 4 in FIGURE 3.

FIGURE 5 is a sectional view similar to FIGURE 3 but showing the shaft locking apparatus in its relaxed position.

FIGURE 6 is a sectional view taken along line 6 - 6 in FIGURE 5.

FIGURE 7 is another sectional view similar to FIGURE 3 but illustrating the position of the shaft locking apparatus in its manual released position.

FIGURE 8 is a sectional view taken along line 8 - 8 in FIGURE 3 illustrating the rotatable connection of the outer ring to the body of the shaft locking apparatus.

FIGURE 9 is a sectional view of a modified form of the present invention shown in its shaft locking position.

FIGURE 10 is a sectional view taken along line 10 - 10 in FIGURE 9.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Valve 10 shown in FIGURES 1 and 2 includes body 12 having inlet 14, outlet 16 and valve chamber 18 with valve gate 20 positioned in the valve chamber 18 to open or close flow through valve 10, stem 22 secured to gate 20 with actuator 24 connected to body 12 so that piston 26 connects to stem 22 and is moved downward responsive to

pressure supplied to actuator 24 against the force of spring 28. Stem 22 extends out through the upper end of actuator 24 and, as shown in FIGURE 1, is held in its inner or downward position by improved shaft locking device 30.

Shaft locking device 30 is secured to sleeve 32 which extends from the end of actuator 24 away from body 12 with stem 22 extending therethrough into the lower portion of device 30 as hereinafter explained. Device 30 includes body 34 having bore 36 and counterbore 38 extending therethrough. Threads 40 on the interior of the open end of counterbore 38 are provided to secure device to actuator 24 by threading onto sleeve 32. Body 34 is connected to sleeve 32 by threading thereon to properly position stem 22 as hereinafter described. As best seen in FIGURE 3, bore 36 is sized to allow the outer end of stem 22 to pass therethrough when device 30 is in its relaxed position as hereinafter explained. The exterior portion of body 34 around bore 36 is reduced in diameter in comparison to the exterior of the remainder of body 34. Ports 44 extend through the upper portion of body 34 to provide communication between the exterior of the upper portion of body 34 into bore 36. The inner ends of ports 44 each include shallow rim 46 extending inwardly of the ports 44 sufficiently to function as hereinafter set forth. One of balls 48 is positioned in each of ports 44. Balls 48 have a diameter which is smaller than the diameter of ports 44 by an amount to allow balls 48 to move freely in ports 44. Rims 46 are sized to allow balls 48 when in engagement with rims 46 to extend partially into bore 36 sufficiently to cause engagement of the upper end of stem 22 to prevent it from moving completely into bore 36 from its locked position as shown in FIGURES 1, 3 and 4. The threaded engagement of body 34 with sleeve 32 is sufficient to bring the outer end of stem 22 into engagement with balls 48. Means 50 is provided to releasably secure balls 48 in this position. Such securing means 50 includes ring 52 which is positioned on shoulder 53 of body 34 and around the upper reduced diameter portion of body 34 in surrounding relationship to ports 44. Machine screws 54 are positioned in segmental slots 56 in ring 52 and threaded into the upper exterior of body 34. As can be seen from FIGURES 3 and 8, slots 56 include upper and lower arcuate shoulders 58 and 60 against which the underside of heads 62 of screws 54 engage. This structure of ring 52 allows it to be manually rotated with respect to body 34. Ports 64 extend radially through ring 52 in the position in registry with ports 44 through body 34 as shown in FIGURES 3 and 4. Support discs 66 are positioned in the inner ends of ports 64 to be in engagement with balls 48 when balls 48 are in engagement with shallow rims 46 in their locked

position. The outer ends of ports 64 include inwardly directed rims 68 against which washers 70 are positioned. Fire responsive relaxation means 72 is positioned between support discs 66 and washers 70. Such means 72 includes disc 74 of a material which either melts or otherwise greatly reduces the volume which it occupies between support discs 66 and washers 70 responsive to excessive heat or a fire. A typical material which has found to be successful to provide the desired relaxation means 72 is a metal eutectic which melts at a relative low temperature without being prone to excessive creep. A solder material has been found to be acceptable. It is also believed that there are plastic materials which degrade or turn to powder responsive to heat that may be used as the material for disc 74.

The interior of ring 52 includes arcuate recesses 76 between ports 64 as shown in FIGURES 4, 6, and 7. The function of recesses 76 is to provide a relief to the support of balls 48 allowing the manual release of stem 22 to either cause gate 20 to be moved in an emergency or to test the operation of valve 10. This is accomplished by the rotation of ring 52 so that screws 54 are positioned at the opposite ends of slots 56 which positions internal ring recesses 76 in registry with ports 44 through body 32. This allows balls 48 to retract into recesses 76 and out of their locked positions partially within bore 36. The upper end of stem 22 includes an outer taper 78 which has an upper edge engaging the balls 48 at a position displaced inwardly from their centers so that the force of spring 28 causes balls 48 to be cammed outwardly into internal recesses 76 and release stem 22 from its locked position.

The same situation results when sufficient heat or a fire is encountered which is sufficient to greatly reduce the volume of discs 74 so that the force of spring 28 exerted by stem 22 on balls 48 moves balls and support discs 66 outwardly. This moves balls 48 from their locking position within bore 36 to allow stem to move upwardly therethrough to the position shown in FIGURES 2 and 5.

Shaft locking apparatus 80 shown in FIGURES 9 and 10 is a modified form of the present invention which is generally preferred over the type previously described since it provides a larger contact surface between the locking elements and the shaft extension that in the apparatus illustrated in FIGURES 1 through 8. Shaft locking apparatus 80 is shown together with shaft 82 which it is designed to control but the structure to which it is to connect, such as the valve sleeve 32 shown in FIGURES 1 and 2, is not shown for purposes of clarity. Locking apparatus 80 includes body 84 having bore 86, first counterbore 88, second counterbore 90 with rod extension 92 having cylindrical body 94 and flange

96. Rod extension 92 is positioned with the end of its body 94 within bore 86 and its flange 96 within first counterbore 88. Connecting means, such as threads 98, are provided on the interior of second counterbore 90 for connecting to the structure with which shaft 82 is associated. Third counterbore 100 in body 84 extends into the opposite end of body 84 from counterbores 88 and 90. Plate 102 is secured to the end of rod extension 92 positioned in bore 86 by screw 104 and has a diameter larger than bore 86 but sufficiently small to allow it to move freely in third counterbore 100. Plate 102 is positioned against shoulder 106 between bore 86 and third counterbore 100 when rod extension 92 is in its locked position as shown in FIGURES 9 and 10.

Locking means 108 surrounds the portion of body 84 surrounding bore 86 and includes ring 10, balls 112 positioned within ports 114 extending radially through body 84 into bore 86 and terminating in stop rim 116 to limit the inward movement of balls 112 through ports 114, and ball supporting means 118 positioned within ports 120 extending radially through ring 110. Ball supporting means 118 includes flange 122 extending into each of ports 120 at the exterior of ring 110, washer 124 positioned against flange 122, heat responsive disc 126 positioned against the inner side of washer 124 and support disc 128 positioned between heat responsive disc 126 and ball 112. Pin 130 is threaded into the exterior of body 84 above ring 110 to retain ring 110 in its position surrounding body 84 between external shoulder 132 and pin 130. When balls 112 are in their locked position, they are against stop rims 116 and extend inward into the interior of bore 86 and engage ball recesses 134 on the exterior of rod extension 92. In this position balls 112 are held in this position and prevent axial movement of rod extension 92 so that shaft 82 is locked against upward axial movement as shown in FIGURE 9. Recesses 136 are provided on the interior of ring 110 as can be seen from FIGURE 10 so that manual release of the support of balls 112 from engagement with rod extension 92 can be provided.

While the partial spherical shape of ball recesses 134 is the preferred form of the engagement of balls 112 with rod extension 92, it should be understood that they could engage satisfactorily in a groove extending around the exterior of rod extension 92 at the desired location.

The operation of shaft locking apparatus 80 is similar to apparatus shaft locking apparatus 30 in that rod extension 92 is restrained against axial movement by the positioning of balls 112 within the recesses 134. When the apparatus 80 is subjected to excessive heat or fire conditions, the means 108 supporting balls 112 relaxes its support and balls

112 are free to move out of their locked position. Normally, such movement is responsive to an axial shaft loading on the shaft which allows rod extension to cam balls 112 radially outward in their ports 114 whenever their support is relaxed.

The rotation of ring 110 allows manual release of the locked position of balls 112 within rod extension recesses 134. Ring 110 is held in position around annular body 84 and against shoulder 132 by pins 130 but is free to be rotated thereon to bring internal ring recesses 136 into registry with ball ports 114 to thus allow manual relaxation of balls 112 from their locked position.

Claims

1. A heat sensitive shaft locking apparatus (30) comprising a shaft (22) to be locked, said apparatus comprising an annular body (34) having a bore (36) extending axially therethrough, a plurality of ports (44) extending through said body (34) in communication with said bore (36) and the exterior of said body (34), retention means (48) positioned in each of said ports and arranged to extend partially into the bore to restrict the opening in the bore, means for supporting (66, 72) said retention means to retain them in their position restricting said bore (36), said supporting means including a material (72) responsive to heat so as to allow said supporting means to release its engagement with said retention means to allow them to move away from the bore (36), the arrangement being such that, in use, said shaft (22) is normally positioned within said annular body (34) and is retained against movement by the partial restriction of the bore (36) by said retention means, and is allowed to move axially by movement of said retention means (48) out of said bore in response to conditions of excess heat, characterised in that said retention means comprise a ball (48) positioned in each port (44), means (46) are provided at the inner end of each port to allow only a portion of each ball (48) to extend into said bore (36) to provide said restriction, a ring (52) positioned in surrounding relationship to said annular body (34), said ring (52) having port recesses (64) and internal recesses (76) between said port recesses (64), and said ring (52) being mounted around said annular body (34) so that it can be rotated manually to bring said internal recesses (76) into registry with said ball ports (44) to allow said balls to retract from said bore (36).

2. A heat sensitive shaft locking apparatus (30) according to claim 1, wherein



96. Rod extension 92 is positioned with the end of its body 94 within bore 86 and its flange 96 within first counterbore 88. Connecting means, such as threads 98, are provided on the interior of second counterbore 90 for connecting to the structure with which shaft 82 is associated. Third counterbore 100 in body 84 extends into the opposite end of body 84 from counterbores 88 and 90. Plate 102 is secured to the end of rod extension 92 positioned in bore 86 by screw 104 and has a diameter larger than bore 86 but sufficiently small to allow it to move freely in third counterbore 100. Plate 102 is positioned against shoulder 106 between bore 86 and third counterbore 100 when rod extension 92 is in its locked position as shown in FIGURES 9 and 10.

Locking means 108 surrounds the portion of body 84 surrounding bore 86 and includes ring balls 112 positioned within ports 114 extending radially through body 84 into bore 86 and terminating in stop rim 116 to limit the inward movement of balls 112 through ports 114, and ball supporting means 118 positioned within ports 120 extending radially through ring 110. Ball supporting means 118 includes flange 122 extending into each of ports 120 at the exterior of ring 110, washer 124 positioned against flange 122, heat responsive disc 126 positioned against the inner side of washer 124 and support disc 128 positioned between heat responsive disc 126 and ball 112. Pin 130 is threaded into the exterior of body 84 above ring 110 to retain ring 110 in its position surrounding body 84 between external shoulder 132 and pin 130. When balls 112 are in their locked position, they are against stop rims 116 and extend inward into the interior of bore 86 and engage ball recesses 134 on the exterior of rod extension 92. In this position balls 112 are held in this position and prevent axial movement of rod extension 92 so that shaft 82 is locked against upward axial movement as shown in FIGURE 9. Recesses 136 are provided on the interior of ring 110 as can be seen from FIGURE 10 so that manual release of the support of balls 112 from engagement with rod extension 92 can be provided.

While the partial spherical shape of ball recesses 134 is the preferred form of the engagement of balls 112 with rod extension 92, it should be understood that they could engage satisfactorily in a groove extending around the exterior of rod extension 92 at the desired location.

The operation of shaft locking apparatus 80 is similar to apparatus shaft locking apparatus 30 in that rod extension 92 is restrained against axial movement by the positioning of balls 112 within the recesses 134. When the apparatus 80 is subjected to excessive heat or fire conditions, the means 108 supporting balls 112 relaxes its support and balls

112 are free to move out of their locked position. Normally, such movement is responsive to an axial shaft loading on the shaft which allows rod extension to cam balls 112 radially outward in their ports 114 whenever their support is relaxed.

The rotation of ring 110 allows manual release of the locked position of balls 112 within rod extension recesses 134. Ring 110 is held in position around annular body 84 and against shoulder 132 by pins 130 but is free to be rotated thereon to bring internal ring recesses 136 into registry with ball ports 114 to thus allow manual relaxation of balls 112 from their locked position.

Claims

1. A heat sensitive shaft locking apparatus (30) comprising a shaft (22) to be locked, said apparatus comprising an annular body (34) having a bore (36) extending axially therethrough, a plurality of ports (44) extending through said body (34) in communication with said bore (36) and the exterior of said body (34), retention means (48) positioned in each of said ports and arranged to extend partially into the bore to restrict the opening in the bore, means for supporting (66, 72) said retention means to retain them in their position restricting said bore (36), said supporting means including a material (72) responsive to heat so as to allow said supporting means to release its engagement with said retention means to allow them to move away from the bore (36), the arrangement being such that, in use, said shaft (22) is normally positioned within said annular body (34) and is retained against movement by the partial restriction of the bore (36) by said retention means, and is allowed to move axially by movement of said retention means (48) out of said bore in response to conditions of excess heat, characterised in that said retention means comprise a ball (48) positioned in each port (44), means (46) are provided at the inner end of each port to allow only a portion of each ball (48) to extend into said bore (36) to provide said restriction, a ring (52) positioned in surrounding relationship to said annular body (34), said ring (52) having port recesses (64) and internal recesses (76) between said port recesses (64), and said ring (52) being mounted around said annular body (34) so that it can be rotated manually to bring said internal recesses (76) into registry with said ball ports (44) to allow said balls to retract from said bore (36).

2. A heat sensitive shaft locking apparatus (30) according to claim 1, wherein



said shaft (22) is normally positioned partially within said bore (36) and has its end engaging said balls (48) which prevent passage of said shaft (22) through the bore (36) and when said support means (66, 72) is subjected to excessive heat conditions and relaxes its support of said balls (48), the balls (48) retract out of said bore (36) and allow passage of said shaft (22) therethrough.

3. A heat sensitive shaft locking apparatus (30) according to claim 1 including

a rod extension (92) positioned within said bore (86) and having at least one recess (134) for receiving said balls (112) in their locked position of being partially within said bore (86),

and wherein said shaft (82) is normally in engagement with one end of said rod extension (92) and whereby locking of said rod extension (92) by said balls (112) prevents axial movement of said shaft (82) until retraction of said balls (112) out of said bore (86) allows axial movement of said shaft (82).

4. A heat sensitive shaft locking apparatus (30) according to claim 1, wherein said support means (66) includes

a support disc (66) engaging said ball (48) positioned in each of said ring port recesses (64),

and wherein said heat responsive material forms a heat sensitive disc (74) positioned in supporting engagement to said support disc (66) and arranged to relax its supporting engagement of said support disc (66) responsive to excessive heat conditions, and

means (68, 70) in said ring port (64) for supporting said heat sensitive disc (74) in supporting engagement to said support disc (66) during normal operation and providing a path for the relaxation of said heat sensitive disc (74) during conditions of excessive heat.

5. A valve (10) comprising

a body (12) having an inlet (14), an outlet (16), and a valve chamber (18) therebetween and having an opening through said body (12),

a bonnet secured to said body (12) and closing the opening of said valve chamber (18) through said body (12),

a valve member (20) positioned in said valve chamber (18) and having a shaft or stem (22) extending through said bonnet,

said valve member (20) coacting with said inlet (14) and said outlet (16) to block flow therebetween in one of its positions and to allow flow therebetween in its opposite position,

and a heat sensitive shaft locking apparatus according to any preceding claim, wherein said apparatus is secured to said bonnet and arranged to selectively lock the stem (22).

6. A valve according to claim 5, wherein

said stem (22) is normally positioned partially within said bore (36) and has its end engaging said balls (48) to prevent passage of said stem (22) through the bore (36) and when said support means (66) is subjected to excessive heat conditions, to relax its support of said balls (48), the balls (48) retracting out of said bore (36) to allow passage of said stem (22) therethrough.

7. A valve (10) according to claim 5 including

a stem extension (92) positioned within said bore (86) and having at least one recess (114) for receiving said balls (112) in their locked position of being partially within said bore (86),

said stem (82) being in engagement with one end of said stem extension (92) whereby locking of said stem extension (92) by said balls (112) prevents axial movement of said stem (82) and retraction of said balls (112) out of said bore (86) allows axial movement of said stem (82).

Patentansprüche

1. Thermische Spindelverriegelung (30) mit einer zu verriegelnden Spindel (22), umfassend ein ringförmiges Gehäuse (34), das eine Bohrung (36) besitzt, die dieses axial durchdringt, einer Anzahl von Öffnungen (44), die durch das Gehäuse (34) gehen und Verbindungen zwischen der Bohrung (36) und der Außenseite des Gehäuses (34) schaffen, Rückhalteteile (48), die in jeder der Öffnungen angeordnet sind und teilweise in die Bohrung ragen, um die Bohrungsöffnung zu verengen, Mittel (66, 72) zur Stützung der Rückhalteteile, um diese in ihrer Position zur Einengung der Bohrung (36) festzuhalten, wobei die Stützmittel ein wärmeempfindliches Material (72) enthalten, um den Stützmitteln zu ermöglichen, ihre Verbindung mit den Rückhalteteilen zu lösen, damit diese aus der Bohrung (36) zurückweichen können, wobei die Anordnung so ist, daß sich die Spindel in Ruhestellung in dem ringförmigen Gehäuse (34) befindet und durch die teilweise Verengung der Bohrung (36) durch die Rückhalteteile gegen Bewegung gesperrt ist, und sich axial bewegen kann durch die Bewegung der Rückhalteteile (48) aus der Bohrung infolge von unverhältnismäßiger Erwärmung, dadurch



- gekennzeichnet, daß die Rückhalteteile umfassen: eine Kugel (48), die in jeder Öffnung (44) angeordnet ist, Mittel (46), die sich am inneren Ende jeder Öffnung befinden und dafür sorgen, daß nur ein Teil jeder Kugel (48) in die Bohrung (36) ragt und für die Verengung sorgt, einen Ring (52), der das ringförmige Gehäuse (34) übergreift und der Ring (52) Öffnungen (64) und innere Ausnehmungen (76) zwischen den Öffnungen (64) besitzt und der Ring (52) so um das ringförmige Gehäuse (34) angeordnet ist, daß es manuell gedreht werden kann, um die inneren Ausnehmungen (76) in Übereinstimmung mit den Kugelöffnungen (44) zu bringen und den Kugeln zu ermöglichen, sich aus der Bohrung (36) zurückzuziehen.
2. Thermische Spindelverriegelung (30) nach Anspruch 1, dadurch gekennzeichnet, daß die Spindel (22) sich im Ruhezustand teilweise innerhalb der Bohrung (36) befindet und ihr Ende an den Kugeln (48) anliegt, was das Eindringen der Spindel (22) in die Bohrung (36) verhindert und wenn die Stützeinrichtung (66, 72) unverhältnismäßiger Wärme ausgesetzt wird und die Abstützung der Kugeln (48) beendet, die Kugeln (48) aus der Bohrung (36) zurückgezogen werden und die Bewegung der Spindel (22) durch diese ermöglichen.
3. Thermische Spindelverriegelung (30) nach Anspruch 1, umfassend eine Spindelverlängerung (92), die innerhalb der Bohrung (86) angeordnet ist und mindestens eine Aussparung (134) zur Aufnahme der Kugeln (112) besitzt, die sich in ihrer verriegelten Position teilweise in der Bohrung (86) befinden, und bei der die Spindel (82) sich im Ruhezustand in Verbindung mit einem Ende der Spindelverlängerung (92) befindet und die Verriegelung der Spindelverlängerung (92) durch die Kugeln (112) die axiale Bewegung der Spindel (82) verhindert, bis das Herausschieben der Kugeln (112) aus der Bohrung (86) die axiale Bewegung der Spindel (82) ermöglicht.
4. Thermische Spindelverriegelung (30) nach Anspruch 1, bei der die Stützmittel (66) umfassen eine Stützscheibe (66), die an der Kugel (48), die in jeder der ringförmigen Ausnehmungen (64) angeordnet ist, anliegt und worin das wärmeempfindliche Material eine wärmeempfindliche Scheibe (74) bildet, die in stützender Position an der Stützscheibe (66) anliegt und so angeordnet ist, daß sie ihre stützende Funktion gegenüber der Stützscheibe (66) in Abhängigkeit von unverhältnismäßigen Wärmebedingungen zu beenden und Mittel (68, 70) in der Ringöffnung (64) zur Stützung der wärmeempfindlichen Scheibe (74) in stützender Funktion zur Stützscheibe (66) während des Ruhezustandes und das Vorsehen einer Bahn zum Ausweichen der wärmeempfindlichen Scheibe (74) während unverhältnismäßiger Wärmebedingungen.
5. Ein Ventil (10), umfassend ein Gehäuse (12), das einen Einlaß (14), einen Auslaß (16) und eine Ventilkammer (18) zwischen diesen und eine Öffnung durch das Gehäuse (12) besitzt, eine Kappe, die am Gehäuse (12) befestigt ist und die Öffnung der Ventilkammer (18) durch das Gehäuse (12) verschließt, einen Ventilschieber (20) der in der Ventilkammer (18) angeordnet ist und eine Spindel oder Welle (22) besitzt, die durch die Kappe hindurchtritt, wobei der Ventilschieber (20) nie dem Einlaß (14) und dem Auslaß (16) zusammenwirkt, um den Fluß zwischen ihnen in einer seiner Stellungen zu unterbrechen bzw. ihn in seiner entgegengesetzten Stellung zu ermöglichen, und eine thermische Spindelverriegelung entsprechend den vorhergehenden Ansprüchen, die an der Kappe befestigt ist und die Welle (22) selektiv verriegelt.
6. Ventil nach Anspruch 5, bei dem die Welle (22) im Ruhezustand sich teilweise in der Bohrung (36) befindet, wobei ihr Ende an den Kugeln (48) anliegt, um die Bewegung der Welle (22) durch die Bohrung (36) zu verhindern, und wenn die Stützmittel (66) unverhältnismäßiger Erwärmung ausgesetzt sind, sie die Abstützung der Kugeln (48) beenden und die Kugeln (48) aus der Bohrung (36) geschoben werden und die Bewegung der Welle (22) durch diese ermöglicht wird.
7. Ventil (10) nach Anspruch 5, umfassend eine Wellenverlängerung (92), die innerhalb der Bohrung (86) angeordnet ist und mindestens eine Aussparung (114) zur Aufnahme der Kugeln (112) in ihrer verriegelten Position, bei der sie sich teilweise in der Bohrung (86) befindet, besitzt, und die Welle (82) an einem Ende der Wellenverlängerung (92) anliegt, wobei die Verriegelung der Wellenverlängerung (92) durch die Kugeln (112) eine axiale Bewegung der Welle (82) verhindert und das Herausschieben der Kugeln (112) aus der Bohrung (86) die axiale Bewegung der Welle (82) ermöglicht.



Revendications

1. Dispositif (30) de verrouillage de tige sensible à la chaleur, comprenant une tige (22) qu'il s'agit de verrouiller, le dispositif comprenant un corps annulaire (34) ayant un alésage (36) qui le traverse axialement, une pluralité d'orifices (44) qui s'étendent à travers ledit corps (34) en communication avec l'alésage (36), et avec l'extérieur dudit corps (34), des moyens de retenue (48) positionnés dans chacun des orifices et agencés pour s'engager partiellement dans l'alésage afin de rétrécir l'ouverture dans l'alésage, des moyens (66, 72) servant à donner appui auxdits moyens de retenue pour les retenir dans leur position qui rétrécit ledit alésage (36), lesdits moyens d'appui comprenant une matière (72) qui répond à la chaleur de façon à laisser lesdits moyens d'appui de relâcher leur prise avec lesdits moyens de retenue pour les laisser se dégager de l'alésage (36), l'agencement étant tel qu'en utilisation, ladite tige (22) soit normalement positionnée dans ledit corps annulaire (34) et soit bloqué en déplacement par le rétrécissement partiel de l'alésage (36) par lesdits moyens de retenue et soit autorisé à se déplacer axialement par le mouvement des moyens de retenue (48) qui se dégagent dudit alésage en réponse à des conditions de chaleur excessive, caractérisé en ce que lesdits moyens de retenue comprennent une bille (48) positionnée dans chaque orifice (44), des moyens (46) sont prévus à l'extrémité intérieure de chaque orifice pour ne laisser qu'une partie de chaque bille (48) s'engager dans ledit alésage (36) pour établir rétrécissement, une bague (52) est positionnée autour dudit corps annulaire (34), ladite bague (52) présentant des cavités (64) d'orifices et des cavités intérieures (76) entre lesdites cavités d'orifices (64), et ladite bague (52) étant montée autour dudit corps annulaire (34) de manière qu'on puisse la faire tourner manuellement pour placer lesdites cavités intérieures (76) en coïncidence avec lesdits orifices de billes (44) pour laisser lesdites billes se rétracter dudit alésage (36).

2. Dispositif (30) de verrouillage de tige sensible à la chaleur, selon la revendication 1, dans lequel

ladite tige (22) est normalement positionnée partiellement dans ledit alésage (36) et son extrémité est en prise avec lesdites billes (48), qui empêchent alors ladite tige (22) de passer à travers ledit alésage (36) et, lorsque lesdits moyens d'appui (66, 72) sont exposés à des conditions de chaleur excessive, et relâ-

chent leur force d'appui desdites billes (48), les billes (48) se rétractent dudit alésage (36) et laissent ladite tige (22) le traverser.

3. Dispositif (30) de verrouillage de tige sensible à la chaleur, selon la revendication 1, comprenant

une tige prolongatrice (92) positionnée dans ledit alésage (86) et ayant au moins une empreinte (134) pour recevoir lesdites billes (112) dans leur position verrouillée dans laquelle elles sont partiellement contenues dans ledit alésage (86),

et dans lequel ladite tige (82) est normalement en prise avec une extrémité de ladite tige prolongatrice (92), et de sorte que le verrouillage de ladite tige prolongatrice (92) réalisé par lesdites billes (112) bloque le mouvement axial de ladite tige (82) jusqu'à ce que le retrait desdites billes (112) hors dudit alésage (86) autorise le mouvement axial de ladite tige (82).

4. Dispositif (30) de verrouillage de tige sensible à la chaleur, selon la revendication 1, dans lequel lesdits moyens d'appui (66) comprennent :

un disque d'appui (66) qui attaque ladite bille (48) positionnée dans chacune desdites cavités (64) d'orifices de la bague,

et dans lequel ladite matière répondant à la chaleur forme un disque (74) sensible à la chaleur placé en appui par rapport audit disque d'appui (66) et agencé pour relâcher sa force d'appui dudit disque d'appui (66) en réponse à des conditions de chaleur excessive, et

des moyens (68, 70) placés dans ledit orifice (64) de la bague pour donner appui audit disque (74) sensible à la chaleur en prise d'appui par rapport audit disque d'appui (66) pendant le fonctionnement normal, et libèrent une voie pour le dégagement dudit disque (74) sensible à la chaleur dans des conditions de chaleur excessive.

5. Vanne (10) comprenant :

un corps (12) ayant une entrée (14), une sortie (16), et une chambre (18) de vanne située entre l'entrée et la sortie et présentant une ouverture qui traverse ledit corps (12),

un chapeau fixé audit corps (12) et qui ferme l'ouverture de ladite chambre (18) de vanne qui traverse ledit corps (12),

un élément obturateur (20) positionné dans ladite chambre (18) de vanne et ayant un arbre ou une tige (22) qui traverse le chapeau, ledit élément obturateur (20) coopérant avec ladite entrée (14) et ladite sortie (16) pour interrom-



pre l'écoulement entre cette entrée et cette sortie, dans l'une de ses positions et pour laisser le courant s'écouler entre cette entrée et cette sortie dans la position opposée,

et un dispositif de verrouillage de tige sensible à la chaleur selon une quelconque des revendications précédentes, dans laquelle ledit dispositif est fixé audit chapeau et est agencée pour verrouiller sélectivement la tige (22).

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6. Vanne selon la revendication 5, dans laquelle ladite tige (22) est normalement positionnée partiellement dans ledit alésage (36) et son extrémité est en prise avec lesdites billes (48) pour empêcher ladite tige (22) de passer à travers l'alésage (36) et, lorsque les moyens d'appui (66) sont exposés à des conditions de chaleur excessive, pour dégager son appui desdites billes (48), les billes (48) se rétractant alors dudit alésage (36) pour laisser ladite tige (22) traverser ce dernier.

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7. Vanne (10) selon la revendication 5, comprenant

une tige prolongatrice (92) positionnée dans ledit alésage (86) et ayant au moins une empreinte (114) pour recevoir lesdites billes (112) dans leur position verrouillée, dans laquelle elles sont partiellement engagées à l'intérieur dudit alésage (86),

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ladite tige (82) étant en prise avec une extrémité de la tige prolongatrice (92), de sorte que le verrouillage de ladite tige prolongatrice (92) par lesdites billes (112) s'oppose au mouvement axial de ladite tige (82) tandis que le retrait desdites billes (112) hors dudit alésage (86) permet le mouvement axial de ladite tige (82).

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