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(54) A shut off device

(57) A shut-off device (1, 21), such as a valve or a cock, for pipelines and comprising a casing (2) provided with a flow passageway (3). The casing (2) is provided with an inlet (4) and an outlet (5) and at least one shut-off member (6) provided with a cavity (7), said member being movable between a position in which the flow passageway (3) is open and a position in which the flow passageway (3) is closed. An auxiliary chamber (9) is arranged in the casing (2) and communicates with the cavity of the shut-off member. The auxiliary chamber is defined by a separate, almost non-resilient wall portion (15) abutting an abutment face (12) on the wall (13) of the casing. A pressure-relieving passageway or vent (14) formed in the wall of the casing is arranged between an abutment face at the auxiliary chamber and the inlet (4) or outlet (5) of the shut-off device. When an excess pressure arises in the auxiliary chamber 9 the wall portion 15 moves away from the abutment face 12 allowing fluid to escape into the pressure relieving passageway 14. Two such shut off devices (26, 46, figure 3) may be provided in a double block and bleed valve.

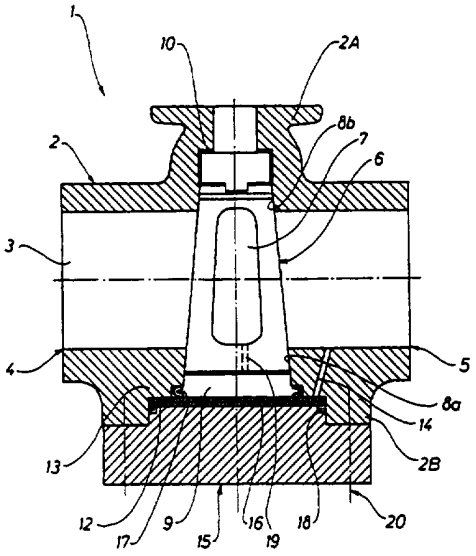

Fig. 1

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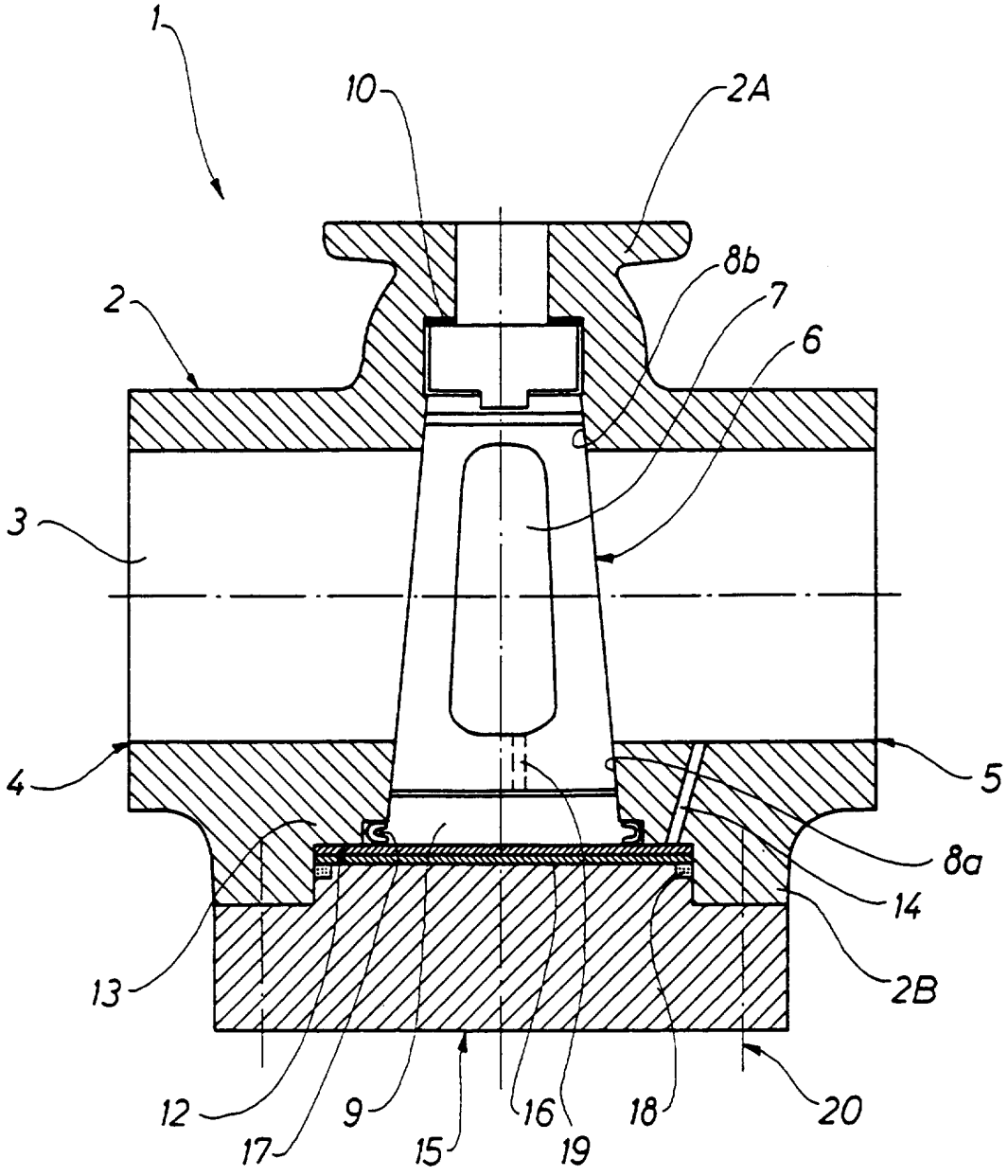

Fig. 1

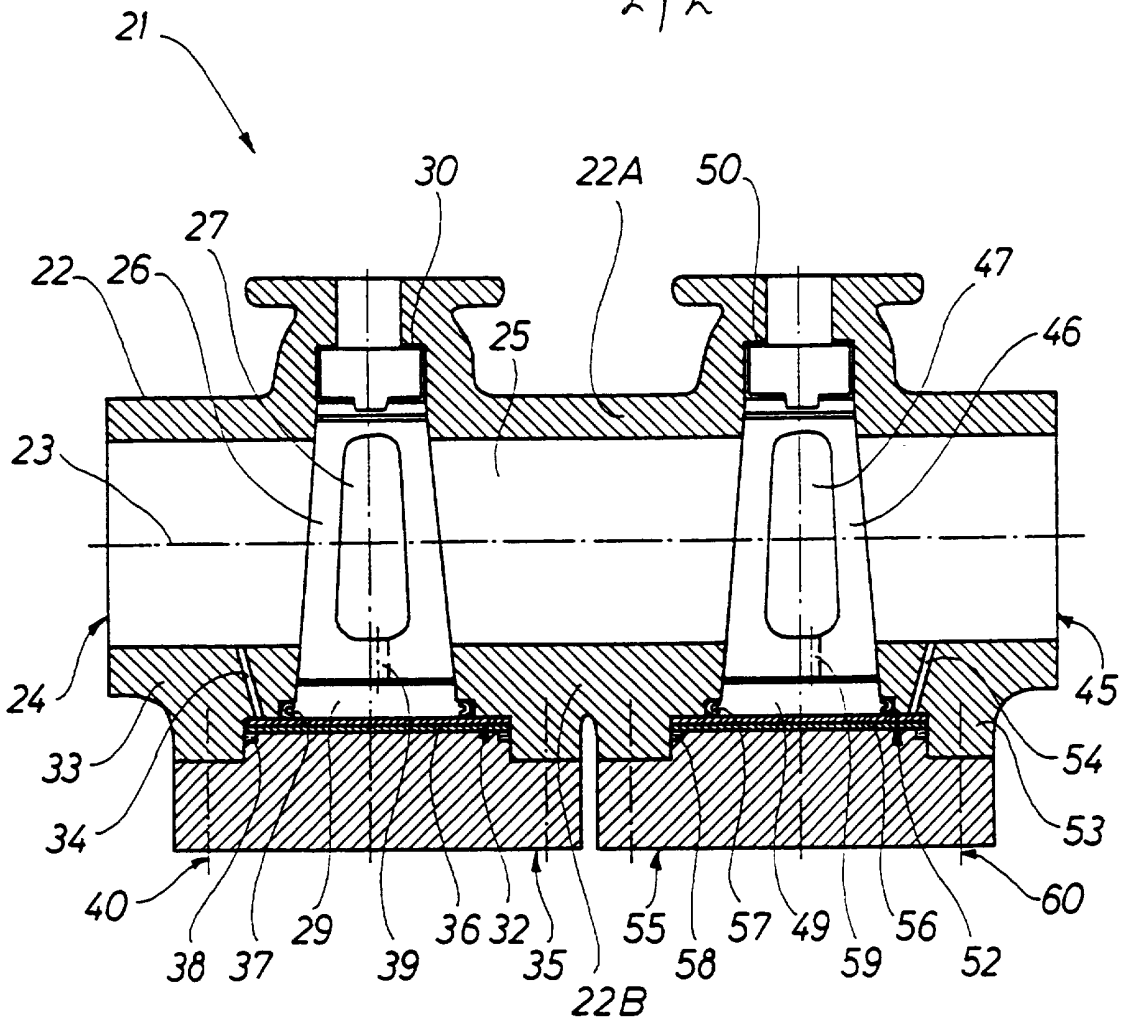
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Fig. 2

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A SHUT-OFF DEVICE

The invention relates to a shut-off device, such as a valve or a cock, for pipelines and comprising a casing provided with a flow passageway, where the casing has an inlet and an outlet, and at least one shut-off member provided with a cavity and movable between a position in which the flow passageway is open and a position in which the flow passageway is closed, and where an auxiliary chamber associated with the shut-off member is arranged in the casing and communicating with the cavity of the shut-off member, sealing means being provided between the shut-off member and the casing.

A ball valve is known allowing for relief of possible excess pressure occurring in the flow medium in the cavity of the valve ball and in a second cavity associated therewith, if the excess pressure is unusually high, e.g. as a result of a fire, even though the valve ball seals firmly on the downstream side. The pressure is relieved on the upstream side through pressure-relieving passageways formed in a pair of sealing rings between the valve ball and the valve casing. This ball valve is fairly complex. After prolonged normal use of the valve, undesired leaks may easily occur in said sealing rings. Moreover, the ball valve is quite unfit for use, if it is required that the shut-off member abuts the casing metal to metal.

The object of the invention is to provide a shut-off device of the above type and which in terms of structure is more simple than the known shut-off devices.

According to the invention there is provided a shut-off device, wherein the auxiliary chamber is defined by a separate, almost non-resilient wall portion abutting an abutment face on the wall of the casing, a pressure-relieving passageway formed in the wall of the casing being provided between said abutment face and the inlet or outlet of the shut-off device respectively. As a result, the excess pressure occurring at very high temperatures, e.g. as a result of a fire, in the cavity of the shut-off member (when the shut-off device is closed) is balanced in a more simple manner than previously known, as the resilient wall portion abutting an abutment face on the wall of the casing yields under these conditions, thus ensuring free passage between the auxiliary chamber and the pressure-relieving passageway. Particular sealing means between the shut-off member and the casing are completely superfluous.

According to the invention, the separate resilient wall portion may be formed as a bottom part bolted on the casing and one or more sealing means, preferably in form of steel plates, a graphite ring or the like, may be inserted between the bottom part and the abutment face. Consequently, under normal pressure and temperature conditions, the pressure-relieving passageway remains tightly closed in a reliable manner; however, said passageway may be opened in an emergency.

Moreover, a sealing ring of an essentially C-shaped cross section may be inserted into a circumferential groove associated with the abutment face. As a result a good sealing capacity at high pressure is obtained.

According to the invention, the auxiliary chamber may advantageously communicate with the cavity of the shut-off member via a passageway.

An embodiment of the shut-off device according to the invention where the valve is of the double block-and-bleed type and thus comprises two shut-off members is characterised in that a pressure-relieving passageway is provided between the abutment face in a first auxiliary chamber of the first shut-off member and the inlet of the shut-off device, and/or a second pressure-relieving passageway is provided between the abutment face in a second auxiliary chamber and the outlet of the shut-off device. This embodiment has proved particularly reliable.

Finally, according to the invention, the pressure-relieving passageway may be formed of a bore in the wall of the casing, whereby the pressure-relieving passageway is provided in a particularly simple manner, thus making the manufacture of the shut-off device more economical.

The invention is explained in detail below with reference to the drawings, in which

Fig. 1 is a cross-sectional view of a first embodiment of the shut-off device according to the invention, the shut-off member being shown in a non-sectional view.

Fig. 2 is a sectional view of a second embodiment of the shut-off device according to the invention, the shut-off members being shown in a non-sectional view.

The shut-off device 1 shown in Fig. 1 comprises a casing 2 provided with a flow passageway 3. The flow passageway is provided with an inlet 4 on the left-hand side and an outlet 5 on the right-hand side.

A conical recess 8a is formed in the lower part 2B of the casing 2, and a conical recess 8b is formed in the upper part 2A of the casing. A conical shut-off member 6 is arranged in both recesses transversely of the flow direction, and at the recess 8b in the upper

part 2A of the casing a projection is arranged and adapted to receive the uppermost and narrowest ends of the shut-off member 6. The conical shut-off member 6 (plug member) has a through-going cavity and can be moved between a position in which the flow passageway 3 is open and a position in which the flow passageway 3 is closed.

In the lower part 2B of the casing below the shut-off member 6, an auxiliary chamber 9 is arranged into which the flow medium present in the cavity 7 of the shut-off member 6 may flow via a passageway 19. The auxiliary chamber is defined by the casing 2, the shut-off member 6 and a separate, almost non-resilient wall portion, e.g. in form of a bottom cover 15 secured to the lower part 2B of the casing by means of bolts 20. The bottom cover abuts an abutment face 12 on the wall 13 of the casing. A pressure-relieving passageway 14 is formed in the wall 13 of the casing between said abutment face and the outlet 5 of the shut-off device; optionally, the pressure-relieving passageway can be arranged between the abutment face 12 (the auxiliary chamber 9) and the inlet 4.

Furthermore, sealing means 10 are provided between the shut-off member 6 and the casing 2.

The shut-off device 21 shown in Fig. 2 is of the double block-and-bleed type and comprises a casing 22 provided with a flow passageway 23. The casing has an inlet 24, an intermediate part 25 and an outlet 45.

Two slightly conical recesses are formed in the casing 22 for insertion of two conical shut-off members 26, 46 transversely of the flow direction and two projections provided with bores are arranged at the recesses in the bottom part to receive the uppermost and narrowest ends of the two conical shut-off members 26,46. Both shut-off members 26, 46 are hollow, each having a through-going cavity 27, 47. Each of the shut-off members can be moved between a position in which the flow passageway 23 is open and a position in which the flow passageway 23 is closed.

For closure of the two recesses in the lower portion 22B of the casing two almost non-resilient bottom covers 35,55 are secured by means of bolts 40,60. The bottom covers 35 and 55 abut each their own abutment face 32, 52 respectively, formed on the casing.

In association with and below the first shut-off member 26, an auxiliary chamber 29 defined by the wall 33 of the casing, the bottom cover 35 and the shut-off member 26 is arranged and communicating with the cavity 27 of the shut-off member 26 through a passageway 39. In association with the second shut-off member 46, a second auxiliary chamber 49 defined by the wall 53 of the casing, the bottom cover 55 and the shut-off

member 46 is arranged and communicating with the cavity 47 of the second shut-off member 46 via a second passageway.

A pressure-relieving passageway 34 is provided at the first shut-off member 26 between the abutment face 32 and the inlet 24 of the shut-off device, and a second pressure-relieving passageway 54 is provided at the second shut-off member 46 between the abutment face 52 and the outlet 45 of the shut-off device.

As shown in Fig. 2, one or more sealing means 36,56 (e.g. steel plates and/or graphite rings) can be inserted in the same manner as shown in Fig. 1 between the covers 35,55 and the abutment faces 32,52, and furthermore, a sealing ring 37,57 of an essentially C-shaped cross-section can be inserted into a circumferential groove associated with the abutment faces 32,52.

Moreover, sealing rings 30, 50 can be arranged between the upper ends of the two shut-off members 26,46 and the casing 22.

The valve operates in the following manner: At very high temperatures, e.g. as a result of a fire, the pressure in the cavity 27,47 of the two shut-off members 26,46 of the double block-and-bleed valve and in the two auxiliary chambers 29,49 increases dramatically. For safety reasons, the high pressure need be relieved from said cavities to prevent accidents, e.g. the shut-off member cracks or the bolts for the bottom covers break. For environmental reasons, the pressure relief operation is carried out such that the medium is re-fed into the flow passage. Jointly with the almost non-resilient bottom covers 35,55, the pressure-relieving passageways 34,54 ensure that the excess pressure arising in emergencies in said cavities 27,46 and in the auxiliary chambers 29,49 is reliably fed back to the inlet 24 and the outlet 45 respectively, of the double block-and-bleed valve. For removal of any leaked flow medium, when the shut-off member is in its closed position, a bleed valve (not shown) or simply a drain pipe is provided in the intermediate part 25 of the flow passageway and communicating directly with the surroundings outside the shut-off device.

The invention may be modified in many ways without thereby deviating from scope of the invention.

CLAIMS:

1. A shut-off device, such as a valve or a cock, for pipelines and comprising a casing provided with a flow passageway where the casing has an inlet and an outlet and at least one shut-off member provided with a through-going cavity and movable between a position in which the flow passageway is open and a position in which the flow passageway is closed, and where an auxiliary chamber is arranged in the casing and communicating with the cavity of the shut-off member, sealing means being provided between the shut-off member and the casing, wherein the auxiliary chamber is defined by a separate, almost non-resilient wall portion abutting an abutment face on the wall of the casing, a pressure-relieving passageway formed in the wall of the casing being provided between said abutment face and the inlet or outlet of the shut-off device.

2. A shut-off device according to claim 1, wherein the separate, resilient wall portion is formed of a bottom part bolted on the casing and one or more sealing means, preferably in form of steel plates, a graphite ring or the like, is/are arranged between the bottom part and the abutment face.

3. A shut-off device according to claims 1 or 2, wherein a sealing ring of an essentially C-shaped cross section is inserted into a circumferential groove associated with the abutment face.

4. A shut-off device according to one or more of the claims 1 to 3, wherein the auxiliary chamber communicates with the cavity of the shut-off member via a passageway.

5. A shut-off device according to one or more of the claims 1 to 3 and of the double block-and-bleed type, thus comprising two shut-off members, wherein a pressure-relieving passageway is provided between the abutment face in a first auxiliary chamber of the first shut-off device and the inlet of the shut-off device, and/or a second pressure-relieving passageway is provided between the abutment face in a second auxiliary chamber and the outlet of the shut-off device.

6. A shut-off device according to one or more of the claims 1 to 5, wherein the pressure-relieving passageway is formed by a bore in the wall of the casing.

7. A shut-off device essentially as described herein with reference to the accompanying drawings.

8. A device for closing a flow passageway in a pipeline comprising closure means moveably mounted in a casing, a through passageway in said closure means communicating with an auxiliary chamber of said device.

9. A device as claimed in claim 8 having vent means for venting fluid from said through passageway through said chamber, said vent means being normally closed and arranged to open in response to a pressure in said chamber above a predetermined level.

10. A device as claimed in claim 9 wherein said vent means comprises a passageway having an entrance normally closed by a closure, which closure is moveable away from said entrance in response to a pressure increase in said chamber.

The Patent Office

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Claims searched: 1-10

Examiner: Steve Waller
Date of search: 22 August 1996

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): F2V VA10, VA13, VA30, VP15, VP16, VP181, VP30, VW4, VW5, VW16, VW62

Int Cl (Ed.6): F16K 5/02, 5/04, 5/08, 39/06; G01L 19/00

Other: ONLINE: WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X	GB 1,541,269	(ROCKWELL) See figure 1	8
X	GB 0,918,020	(GROVE) See figure 1	8
X	EP 0,565,243 A1	(BTR) See figure	8
X	WO 84/00795 A1	(VAPOR)	8

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.