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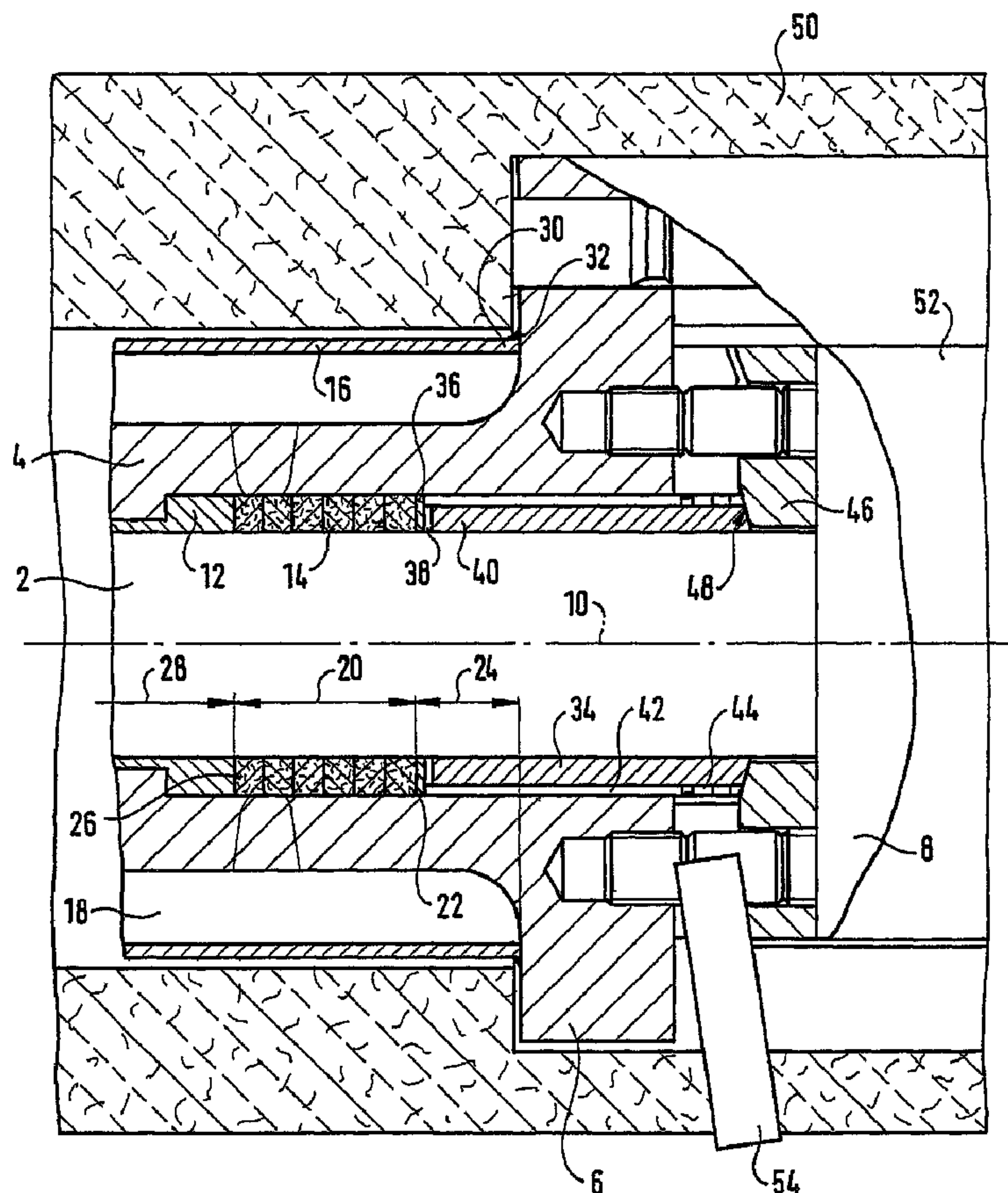
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(54) Title: STUFFING BOX FOR A VALVE



(57) **Abrégé/Abstract:**

The invention relates to a valve that contains a piston (2) linked with the valve body (8) and received in a housing (4), and a stuffing box (14) interposed between the piston (2) and the housing (4). The stuffing boxes of valves used for media having a high melting

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point and being operated close to the melting point risk being damaged by so-called freezing medium due to the adhesive properties of the medium in temperature ranges below the melting point. The aim of the invention is therefore to improve such a valve with few constructive efforts in such a manner that the material of the stuffing box reliably works in the liquid range of the medium. To this end, the housing (4) is provided with a heating device (16) in the area of the stuffing box (14). The axial length of said heating device is larger than the axial length of the stuffing box (14), and the heating device (16) axially protrudes beyond an axial end (22) of the stuffing box (14) by a predetermined length (24, 28).

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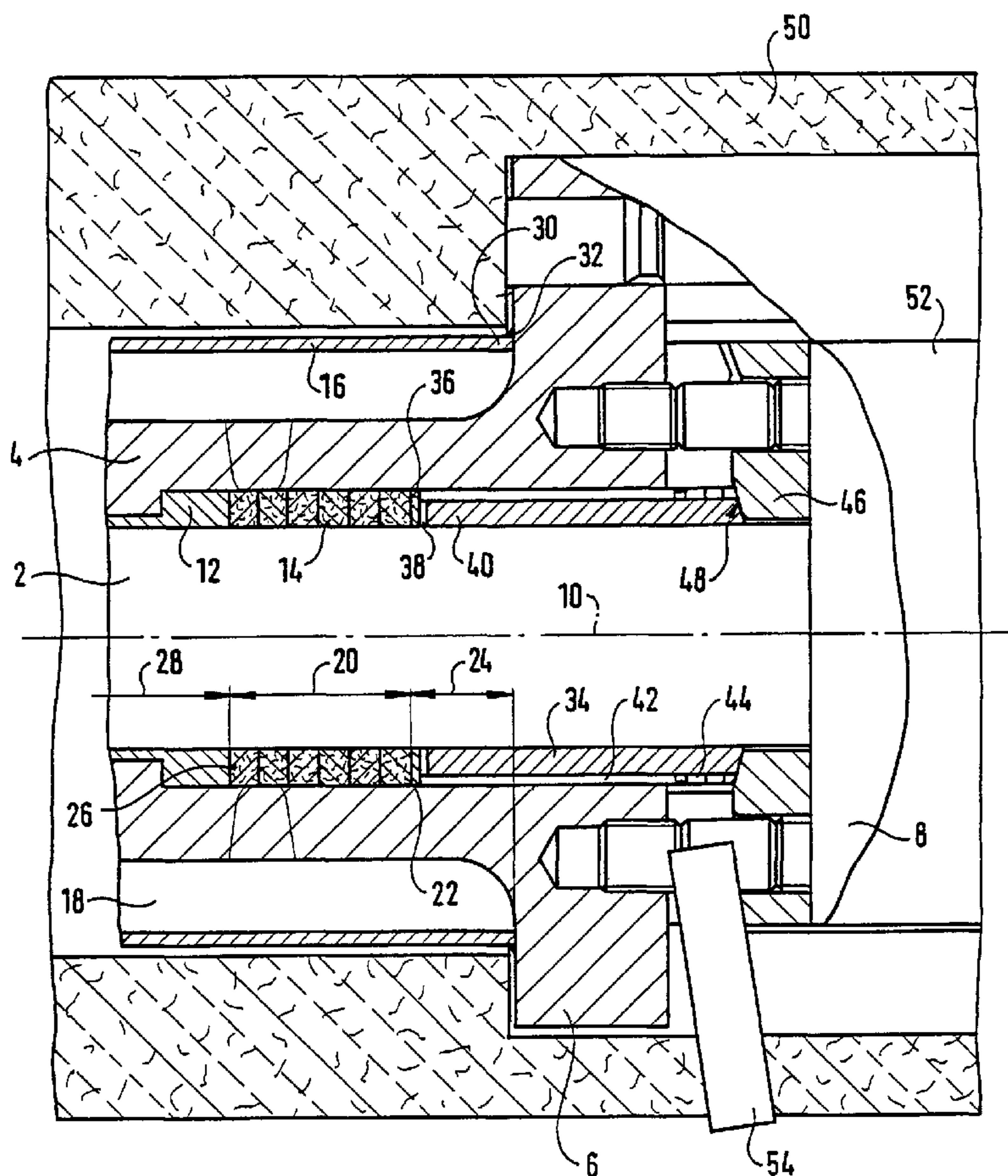
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[Fortsetzung auf der nächsten Seite]

(54) Title: STUFFING BOX FOR A VALVE

(54) Bezeichnung: STOPFBUCHSE FÜR EIN VENTIL



(57) Abstract: The invention relates to a valve that contains a piston (2) linked with the valve body (8) and received in a housing (4), and a stuffing box (14) interposed between the piston (2) and the housing (4). The stuffing boxes of valves used for media having a high melting point and being operated close to the melting point risk being damaged by so-called freezing medium due to the adhesive properties of the medium in temperature ranges below the melting point. The aim of the invention is therefore to improve such a valve with few constructive efforts in such a manner that the material of the stuffing box reliably works in the liquid range of the medium. To this end, the housing (4) is provided with a heating device (16) in the area of the stuffing box (14). The axial length of said heating device is larger than the axial length of the stuffing box (14), and the heating device (16) axially protrudes beyond an axial end (22) of the stuffing box (14) by a predetermined length (24, 28).

(57) Zusammenfassung: Ein Ventil enthält einen mit einem Ventilkörper (8) verbundenen und in einem Gehäuse (4) gelagerten Kolben (2) sowie eine zwischen dem Kolben (2) und dem Gehäuse (4) angeordnete Stopfbuchse (14). In Ventilen für ein Medium mit einem hohen

Schmelzpunkt, wobei nahe am Schmelzpunkt gearbeitet wird, besteht die Gefahr

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von Beschädigungen der Stopfbuchse durch sogenanntes gefrierendes Medium, infolge der Klebeeigenschaften des Mediums in Temperaturbereichen unterhalb des Schmelzpunktes. Das Ventil soll daher mit geringem konstruktiven Aufwand dahingehend ausgebildet werden, dass das Material der Stopfbuchse zuverlässig im Flüssigbereich des Mediums arbeitet. Zur Lösung wird vorgeschlagen, dass das Gehäuse (4) im Bereich der Stopfbuchse (14) eine Heizeinrichtung (16) aufweist, deren axiale Länge größer ist als die axiale Länge der Stopfbuchse (14), und daß die Heizeinrichtung (16) zumindest über ein axiales Ende (22) der Stopfbuchse (14) in einer vorgegebenen Länge (24, 28) axial hinausragt.

STUFFING BOX FOR A VALVE

The invention relates to a valve with a stuffing box seal in accordance with the features set forth in the preamble of Claim 1.

US Patent 4,886,241 describes such a valve with a stuffing box seal, which is arranged between the housing and the piston connected with the housing and axially displaceable or rotatable within the housing. In valves for media with a high melting point, which operate near the melting point, there is a risk of damaging the stuffing box due to "freezing" of the medium as a result of the adhesive properties of the medium in temperature ranges below the melting point. In principle, these problems can be counteracted by heating the housing, but the complexity required therefor has thus far been quite considerably.

Based thereon, the object of the invention is to configure the valve with low design complexity in such a way that the stuffing box material works reliably within the liquid range of the medium and/or the stuffing box material is protected from the freezing point. The temperature of the stuffing box should very reliably remain in the

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liquid range above the melting point of the medium flowing through the valve despite the simple construction.

This object is attained by the features set forth in Claim 1.

The proposed valve with a stuffing box seal is distinguished by its functionally reliable construction and ensures with high reliability that the temperature of the stuffing box is always within the liquid range above the melting point of the medium. In the area of the stuffing box, the housing comprises a heating device whose axial length is greater by a predefined amount than the length of the stuffing box. The heating device protrudes over the stuffing box in a predefined area with at least one end, advantageously with both ends. Advantageously, the heating device protrudes over the stuffing box end along an area of 30 to 60 mm. The heating device advantageously comprises a heating jacket surrounding the housing along the exterior. A gap for a heating medium, particularly a heatable fluid, is provided between the housing and the heating jacket. Alternatively, within the scope of the invention, the heating device can comprise tubes through which a heating medium flows, or an electrical heating coil or the like, which are arranged especially on the exterior surface of the housing in the area of the stuffing box.

Furthermore, in the area of the stuffing box and a bearing bushing adjacent to the stuffing box, the piston is advantageously designed to have a constant diameter, where no recesses, annular collars or the like are present. Particularly advantageously, the bearing bushing which is provided for piston guidance is designed with very tight tolerances relative to the housing on the one hand and the piston on the other hand. This is particularly important for sensitive media, which are subject to change as a function of temperature and/or retention time, especially since the selected tolerance affects the quality of sensitive media. In view of the tolerances necessary for the required quality of the medium, the material of the bearing bushing according to the invention has at least approximately the same thermal expansion characteristics as the material of the housing and/or the piston. In addition, the piston guide is advantageously substantially

harder than the housing and/or the piston material in order to prevent "corrosion." Within the scope of the invention, said tolerances are preferably in the range of 0.01 mm to 0.2 mm, preferably in the range of 0.05 mm.

Further developments and special embodiments of the invention are set forth in the dependent claims and in the following description of a special embodiment, which is provided by way of example.

The drawing shows a portion of the valve in an axial cutting plane, namely in the area where a piston 2 passes through a housing 4, which comprises a mounting flange 6. Piston 2 and a valve body 8 that is connected therewith and that is configured, for instance, as a shut-off valve and/or a control valve, are axially displaceable or rotatable about a longitudinal axis 10. A bearing bushing 12 is provided between the cylindrical inner surface of housing 4 and the outer surface of piston 2. Axially adjacent to the bearing bushing 12, a stuffing box 14 or a stuffing box packing with a plurality of sealing rings is provided. Piston 2 has a constant outside diameter in axial direction at least in the area of stuffing box 14, preferably also in the area of bearing bushing 12. The material of the stuffing box or its rings is selected taking into account the thermal and mechanical load. The stuffing box is configured in such a way that sliding and strength-imparting sealing materials are combined. Depending on the temperatures to be controlled by the valve, sealing materials with and/or without fabric insert may be used. Through the number of the sealing rings, an adaptation to the pressure to be controlled by the valve is effected. The piston guide or bearing bushing 12 is manufactured with very tight tolerances relative to piston 2 on the one hand and in housing 4 on the other hand. These tolerances, in particular, are in the range of 0.01 mm to 0.2 mm and preferably in the range of 0.05 mm. Moreover, the material of the bearing bushing 12 has substantially the same thermal expansion characteristics as the material of piston 2 and/or housing 4.

According to the invention, housing 4, which receives bearing bushing 12 and stuffing box 4, has a substantial axial length and is

provided with a heating device 16. Heating device 16 advantageously comprises a heating jacket, which according to the invention surrounds the long housing 4. As may be seen, an especially annular gap 18, through which a heatable medium flows, is present between the preferably cylindrical heating device and the heating jacket 16. The stuffing box 14 has an axial length 20. Particularly advantageously the heating device 16 has a substantially greater axial length than the stuffing box 14 and protrudes at least over one end, in the drawing over the right stuffing box end 22 by a defined length 24, which preferably ranges between 30 and 60 mm. The heating device 16 also protrudes over the second stuffing box end 26 by a defined length 28. According to the invention the temperature of the heating device or the heating medium in gap 18 is defined such that the temperature of the stuffing box is reliably within the liquid range of the medium flowing through the valve. Particularly advantageously the heating jacket 16 with its end 30 associated with valve body 8 is connected with mounting flange 6 of housing 4 by a weld seam 32. As may be seen, gap 18 is therefore also substantially longer than stuffing box 14 whose temperature is thus always reliably within the liquid range above the melting point of the medium.

Between stuffing box 14 - also referred to as a packing - and a pressure sleeve 34 or a packing pressure sleeve, a pressure distribution ring 36 is arranged to ensure uniform transfer of the pressure from the pressure sleeve to the packing. The pressure sleeve or pressure ring 34, at its end facing toward the stuffing box 14, comprises at least one radial relief bore 38 through which any liquid medium flowing out of the stuffing box is guided to the outside of pressure ring 34, where premature freezing of the medium is prevented by the action of the heating device. Although the relatively large or long piston 2 removes a lot of heat, there is thus no risk that the medium will freeze along the outer circumference of the pressure ring 34 due to the heating device. The stuffing box or packing 14 is compressed by means of pressure sleeve 34, and the necessary initial tension is applied to ensure the seal of the system.

According to the invention, pressure sleeve 34 axially extends far enough into the heated area and/or the heating device 22 that cooling of the stuffing box 14 is avoided. As may be seen, pressure sleeve 34 with its end facing toward stuffing box 14 extends into the heated area by a defined length 24 as explained above. Since heat loss is to a significant extent caused by the piston of the valve, end 40 of pressure sleeve 34, which protrudes into the area of the heating device, is particularly important in maintaining the liquid state of the medium. It should be noted here that the durability of the stuffing box packing depends on the liquid state to a significant extent. Advantageously, tolerances relative to the housing side on the one hand and the piston on the other hand are therefor defined for pressure sleeve 34. The tolerances relative to the housing side range from 0.05 mm to 0.2 mm and are preferably on the order of magnitude of 0.08 mm to ensure the supply of heat. The tolerances between pressure sleeve 34 and piston 2 must ensure mobility on the one hand and take into account heat removal via piston 2 on the other hand. They range between 0.05 and 0.4 mm, and are preferably on the order of magnitude of 0.1 mm.

Furthermore, especially axial relief grooves 42 are preferably provided on the outside of pressure sleeve 34 to remove the medium in axial direction. The number of these longitudinal grooves 42 is defined between 1 and 8, preferably between 2 and 4. Since the grooves interfere with the heat transport of heating device 16 their number should be minimized. In addition, radial service grooves 44 are provided on the pressure-flange-side of pressure sleeve 34 and are used to monitor stuffing box packing 14 and/or to engage with a tool. By means of the last groove it can be decided whether to tighten or replace the packing. The radial service grooves are particularly important for the detachability of the pressure sleeve 34. The number of the radial grooves 44 is, in particular, 2 to 6, preferably 2 to 4. To avoid any undesirable heat removal, a heat seal 48 is provided between pressure sleeve 34 and a pressure plate 46.

An insulation 50 surrounding the valve housing at least in the area of piston 2 is preferably provided to prevent heat removal. In

order to avoid that the heat removal via piston 2, pressure sleeve or pressure ring 34 and a rod assembly of a gear (not depicted) causes the medium in the stuffing box to freeze, the working chamber of piston 2 is advantageously also surrounded by insulation 50. This makes it possible to reduce the freezing range of the medium far enough that it cannot have a negative influence on the driving forces.

In addition, a piston protection element 52 is provided to prevent contamination on the one hand and minimize heat losses on the other. To that extent care must be taken during manufacture to avoid a chimney effect. In addition, piston protection element 52 is configured in such a way that the moving part is protected against the medium draining from the stuffing box. The piston protection element is furthermore configured in such a way that the through-flowing portion of the medium can drain in downward direction. Moreover, piston protection element 52 protects against contact, so that nobody can get pinched in the movable part. Finally, a medium outlet 54 is provided, which points downwardly from the area of stuffing box 14. It should be noted that when the valve is installed, the longitudinal axis 10 extends substantially vertically and medium outlet 54 is below stuffing box 14. This downwardly directed medium outlet 54 prevents contamination of the part of insulation 50 that is located below it.

Reference Numerals

2	piston
4	housing
6	mounting flange
8	valve body
10	longitudinal axis
12	bearing bushing
14	stuffing box
16	heating device / heating jacket
18	gap
20	length of 14
22	first stuffing box end
24	predefined length of 16
26	second stuffing box end
28	predefined length of 16
30	end of 16
32	weld seam
34	pressure sleeve / pressure ring
36	pressure distributor ring
38	relief bore
40	end of 34
42	relief groove
44	radial service groove
46	pressure plate
48	heat seal
50	insulation
52	piston protection element
54	medium outlet

Claims

1. A valve comprising a piston connected with a valve body and supported in a housing, and a packing or a packed seal arranged between said piston and said housing, wherein the housing is provided in the area of the packing or the packed seal with a heating device having an axial length is greater than that of the packing or the packed seal, and wherein said heating device protrudes axially beyond at least one axial end of the packing or the packed seal by a predetermined length.
2. A valve according to claim 1, wherein the housing in which the packed seal is received is greater in length than the packed seal by a predetermined amount.
3. A valve according to claim 1, wherein a pressure ring associated with the packed seal and surrounding the piston axially protrudes with one end into the area of the heating device.
4. A valve according to claim 1, wherein the heating device comprises a heating jacket which surrounds the housing and which forms a gap through which a heat transfer medium can flow.
5. A valve according to claim 4, wherein the heating jacket is connected with the housing.
6. A valve according to claim 5, wherein the heating jacket is connected with a mounting flange of the housing.
7. A valve according to claim 5, wherein the heating jacket is connected to the housing by a weld seam.
8. A valve according to claim 1, further comprising a seal support bushing having tolerances in the range of 0.01 mm to 0.2 mm relative to at least one of the piston and the housing.
9. A valve according to claim 8, wherein said tolerances are about 0.05 mm.

10. A valve according to claim 8, wherein the support bushing has thermal expansion characteristics substantially equal to at least one of the piston and the housing.
11. A valve according to claim 8, wherein the support bushing at least at surfaces bounding at least one of the piston and the housing, has a greater surface hardness than one of the piston and the housing.
12. A valve according to claim 1, wherein a pressure ring or a packing pressure sleeve associated with the packing or the packed seal has tolerances relative to the housing in the range of 0.05 to 0.2 mm.
13. A valve according to claim 12, wherein the pressure ring or packing pressure sleeve has tolerances relative to the housing of about 0.08 mm.
14. A valve according to claim 1, wherein a pressure ring or packing pressure sleeve associated with the packing or the packed seal has tolerances relative to the piston in the range of 0.05 to 0.4 mm.
15. A valve according to claim 14, wherein said pressure ring or packing pressure sleeve has tolerances relative to the piston of about 0.1 mm.
16. A valve according to claim 14, wherein the pressure ring or the packing sleeve is provided with at least one relief groove along its exterior.
17. A valve according to claim 16, wherein the pressure ring or packing sleeve is provided with up to 8 relief grooves.
18. A valve according to claim 17, wherein the pressure ring or packing sleeve is provided with from 2 to 4 relief grooves.
19. A valve according to claim 16, wherein said relief grooves are axial grooves.
20. A valve according to claim 14, wherein a side of the pressure ring or the packing pressure sleeve facing away from the packed seal is provided with at least one substantially radial service groove.

21. A valve according to claim 20, wherein the pressure ring or packing pressure sleeve is provided with from 2 to 6 substantially radial service grooves.
22. A valve according to claim 21, wherein the pressure ring or packing pressure sleeve is provided with from 2 to 4 substantially radial service grooves.
23. A valve according to claim 1, wherein one of the housing is provided with exterior insulation in the area of at least one of the packed seal and the heating device.
24. A valve according to claim 23, wherein said insulation is also provided surrounding the working chamber of the piston.

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