(19) DANMARK

(10) **DK/EP 3919792 T3**

(12) Oversættelse af europæisk patentskrift

Patent- og Varemærkestyrelsen

(51) Int.Cl.: ***F 16 K 27/02 (2006.01)*** ***E 03 C 1/10 (2006.01)***

(45) Oversættelsen bekendtgjort den: **2023-10-02**

(80) Dato for Den Europæiske Patentmyndigheds bekendtgørelse om meddelelse af patentet: **2023-08-09**

(86) Europæisk ansøgning nr.: **21177151.4**

(86) Europæisk indleveringsdag: **2021-06-01**

(87) Den europæiske ansøgnings publiceringsdag: **2021-12-08**

(30) Prioritet: **2020-06-04 DE 102020114892**

(84) Designerede stater: **AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**

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(54) Benævnelse: **VENTILLEGEME**

(56) Fremdragne publikationer:
**EP-A1- 2 644 788**
**EP-A1- 2 644 789**
**WO-A1-2018/121812**
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**US-A- 4 790 346**
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Description

The present invention relates to a valve body for use as part of a valve with a flow channel and a valve seat arranged in the flow channel. A further object of the invention is a valve, in particular a servo valve, with a closing element arranged between a first valve body and a second valve body for opening and closing a valve seat, an upstream valve inlet, a downstream valve outlet and a flow channel for connecting the valve inlet to the valve outlet.

Such valve bodies and valves with such valve bodies are used in different areas of technology. A fluid flows into the valve via a valve inlet. The valve inlet is connected to the valve outlet via a flow channel arranged in the valve body, via which the fluid emerges from the valve outlet of the valve.

The state of the art is described, for example, in US4790346 and EP2644789.

In order to be able to switch the fluid flow, a valve seat is arranged in the flow channel. This can interact with a closing element of the valve in such a way that the fluid is prevented from flowing through the flow channel from the valve inlet to the valve outlet. For this purpose, the closing element, which is arranged movably relative to the valve seat, can lie on the valve seat and thus close the flow channel.

However, such valves cannot be used in the transition between pipeline areas of different risk categories, such as a pipeline region of a clean fluid network, for example a drinking water system, and a potentially contaminated pipeline area. Because at such a transition, contamination safety is essential. In particular, toxic substances, radioactive, mutagenic and carcinogenic substances as well as microbial and viral pathogens must be prevented from passing from a contaminated outlet-side fluid via the valve against its main flow direction into a clean fluid network and thus into a clean fluid source.

However, when opening conventional valves, turbulence can occur between the fluids on both sides of the valve seat. Likewise, a pressure drop on the valve inlet side or an increase in pressure on the valve outlet side can cause the fluid on the valve outlet side to back suction or back pressure against the main flow direction of the valve. Both can lead to a backflow of fluid from the valve outlet via the valve seat to the valve inlet, which must be prevented to ensure contamination safety. However, the known valves are unsuitable for preventing such backflow when open. When using the known valves, for example in the transition between a drinking water system and a pipeline area that can

come into contact with dirty water or wastewater, contamination of the entire drinking water system could occur.

In order to prevent this, in conventional valves, an additional separation point must be provided before or after the valve between the pipeline areas of different hazard categories, which ensures a sufficiently high level of contamination safety for the respective application. This separation point is formed by an additional separation element, which is arranged in the transition between the two pipeline areas and is connected to both pipeline areas via connection points. With such an additional separating element, the pipeline regions can be separated from one another with a sufficiently high level of contamination protection.

Since both the separating element and the valve each have at least two connections for connection to the two pipeline areas or for integration into one of the pipeline areas, the use of conventional valves that require the use of additional separating elements is associated with increased assembly effort. A tight connection must be made at each of these connections during assembly, which is labour-intensive and time-consuming. In addition, each connection point on these connections represents a potential weak point in the respective pipeline area and therefore carries a certain risk of leakage.

The object of the present invention is therefore to provide a valve body and a valve which are characterized by low assembly effort and a low risk of leakage while maintaining a high degree of contamination safety.

This object is achieved in a valve body of the type mentioned in that the flow channel has an integrally formed injector separating section.

Due to the integrally formed injector separating section, the valve body can separate pipeline areas in a contamination-proof manner, so that an additional separating element is not required. The valve body can be direct, i.e. without an additional separating element, can be used in the transition between pipeline areas of different risk categories. In this way, the connection points between the valve body and an additional separating element are eliminated. Since fewer connections have to be made during assembly, the assembly effort and at the same time the risk of leakage are reduced.

According to the invention, the valve body has an upstream valve inlet and a downstream valve outlet. The valve body can be connectable to pipeline areas via the valve inlet and the valve outlet. As part of a valve, the valve body can remain connected to pipeline areas via the valve inlet and valve outlet when other valve parts are replaced

for maintenance or repair. Connections of the valve inlet and valve outlet to pipeline areas do not have to be loosened and re-established. The maintenance or repair effort can be reduced. The valve inlet can be connected to the valve outlet via the flow channel.

According to the invention, at least the valve seat, preferably also the valve inlet and the valve outlet, are formed in one piece with the valve body. Due to the one-piece design with the valve body, the valve inlet, the valve outlet and/or the valve seat can form a one-piece valve body together with the injector separating section.

According to the invention, the injector separating section in the flow channel is designed in the manner of a free jet section.

Fluid flowing along the main flow direction can travel from the valve inlet to the valve outlet via the injector separation section by overcoming the injector separation section as a free jet, i.e. without being limited by a wall.

The injector separation section can form a negative pressure barrier. The transfer of a pressure drop on the valve inlet side via the injector separation section to the valve outlet can be prevented by the injector separation section designed as a vacuum barrier. The fluid on the valve outlet side is prevented from being sucked back against the main flow direction. A high level of contamination safety can be achieved.

According to the invention, the valve body has openings extending from the injector separation section to the outside of the valve. A back pressure of a fluid on the valve outlet side against the main flow direction can be prevented because fluid being pressured back can escape through the openings. In this way, the injector separation section can form a valve body's own backflow protection to prevent the fluid from backflow from the valve outlet via the valve seat to the valve inlet.

The injector separation section can divide the flow channel along the main flow direction into a region of a lower risk category located upstream of the injector separation section and a region of a higher risk category located downstream of the injector separation section. The hazard categories can, for example, be determined according to DIN EN 1717.

According to the invention, the injector separation section is arranged between the valve seat and the valve outlet.

In this way, fluid can only flow across the injector separation section when the valve seat is released. A permanent flow of fluid over the injector separation section, in

particular an escape of the fluid flowing when the valve seat is closed through openings in the valve body, can be avoided.

The flow channel section located in front of the injector separation section, in particular a flow channel section coming from the valve seat, can have a smaller cross section than the flow channel section adjoining the injector separation section. The flow channel section located in front of the injector separation section can in this way serve in the manner of an injector for injecting the fluid into the injector separation section. Due to the larger diameter of the flow channel section on the valve outlet side, corresponding back pressure against the main flow direction can be avoided.

According to an advantageous embodiment of the invention, the injector separation section is, in particular partially, surrounded by a cage-shaped frame. The cage-shaped frame can have a plurality of struts that run essentially parallel to one another. Fluid flowing into the injector separation section on the valve outlet side can escape via the frame, in particular against the main flow direction, without being able to overcome the injector separation section, in particular without being able to reach the region of the valve body on the valve inlet side.

Windows designed in the manner of openings in the valve body can be arranged between the struts. Fluid can easily flow out of the valve body through the windows.

Advantageously, the frame can be made from a form stable material, in particular a hard plastic or a metal. The cage-shaped frame can improve the stability of the valve body, especially in the region of the injector separation section. The frame preferably consists entirely of form stable materials, in particular a form stable material. Forces acting on the frame, for example assembly forces occurring during assembly of the valve body, can be diverted into further regions of the valve body via the frame made of form stable material. The frame can preferably be formed in one piece with the valve body.

In this context, it is further advantageous if the cage-shaped frame has several struts that are uniformly offset at an angle to one another, in particular four struts offset at an angle of 90°. The struts can be arranged angularly offset in the circumferential direction around the injector separation section. Due to the uniform angular offset of the individual struts to one another, forces that occur can be distributed evenly across the struts. In particular, the struts can run essentially parallel to a longitudinal axis of the injector separation section.

According to the invention, it is provided that a nozzle for concentrating a flowing fluid in the flow channel is arranged on the flow side of the injector separation section. With the upstream nozzle, i.e. a nozzle located on the valve inlet side relative to the injector separation section along the main flow direction, inflowing fluid can be bundled into a bundled free jet. The bundled free jet can overcome the injector separation section in a bundled manner without the fluid coming into contact with the edge region of the injector separation section, such as the cage-shaped frame.

In this context, it has proven to be advantageous if the nozzle is designed on the downstream side in the manner of a nipple-shaped projection. The design of the nozzle in the form of a nipple-shaped projection, i.e. projecting along the main flow direction relative to adjacent regions of the valve body, makes it possible to deflect any back-splashed fluid away from a nozzle opening of the nozzle in a simple manner. Contamination of the inside of the nozzle by the sprayed-back fluid can be easily avoided. Preferably, the nozzle is designed to be rotationally symmetrical along the longitudinal axis of the injector separation section, as is the injector separation section itself.

It has proven to be further advantageous if the nozzle is arranged, in particular completely, outside the cage-shaped frame. This arrangement allows the nozzle, which is designed in the manner of a nipple-shaped projection, particularly on the downstream side, to be shielded from the outside of the valve body. The sides of the nozzle lying transversely to the longitudinal axis of the injector separation section can be covered in this way. In particular, these regions of the nozzle cannot be exposed through the windows extending between the struts of the cage-shaped frame.

A further embodiment provides that an orifice, in particular in the form of a disc, is arranged in the injector separation section. The aperture can have an aperture opening through which the fluid can pass through the aperture along the injector separation section. The diaphragm can extend into the injector separation section essentially transversely to the longitudinal axis. Advantageously, the panel can be arranged on the struts of the cage-shaped frame, in particular formed in one piece with them. The aperture opening of the aperture advantageously has a larger clear cross section than the flow channel section lying in front of the injector separation section along the main flow direction. In particular, the clear cross section of the aperture opening can be larger than the nozzle opening. The aperture opening and the nozzle opening can preferably be arranged concentrically along the longitudinal axis of the injector separation section. The

aperture can serve as protection against splashing back of a fluid that has passed through the aperture along the injector separation section. If the fluid jet hits an obstacle along the main flow direction behind the diaphragm and is reflected or scattered there, individual back splashes can be prevented by the diaphragm from splashing back up to the inflow region of the injector separation section and in particular the nozzle.

In this context, it has proven to be particularly advantageous if the diaphragm is arranged in the downstream half of the injector separation section. The downstream half of the injector separation section is that half of the injector separation section which faces the flow channel section leading to the valve outlet along the main flow direction. Arranging the orifice in the downstream half of the injector separation section can increase the protective effect of the orifice against fluid splashing back.

According to an exemplary embodiment of the invention, the valve outlet is designed in the manner of a hose nozzle. The design in the manner of a hose nozzle enables a quick and reliable connection of the valve body to a tubular pipeline region.

In an advantageous embodiment of the invention, the valve inlet is designed in the manner of a threaded connection, in particular with an external thread. The design of the valve inlet in the manner of a threaded connection enables a particularly reliable and tight connection of the valve body to a pipeline area on the valve inlet side. A threaded connection has proven to be advantageous, particularly for connecting to a pipeline area with a low risk category, since the penetration of potentially contaminating substances on the outside of the valve can be prevented via the connection to the valve inlet. A valve inlet in the manner of a threaded connection can be easily connected to a corresponding counter-threaded connector of a pipeline area to produce a tight connection.

In a valve of the type mentioned at the outset to solve the above problem, it is proposed that the first valve body is designed as a valve body according to the invention.

Thanks to the integrally formed injector separating section, the valve body can separate pipeline areas in a contamination-proof manner, so that an additional separating element is not required. The valve can be direct, i.e. without an additional separating element, can be used in the transition between pipeline areas of different risk categories. In this way, the connection points between the valve and an additional separating element are eliminated. Since fewer connections have to be made during assembly, the assembly effort and at the same time the risk of leakage are reduced. The valve can be a

valve operated by its own medium, i.e. a valve that uses the fluid to be switched for valve actuation, in particular a servo valve actuated by its own medium.

The features described in connection with the valve body according to the invention can also be used individually or in combination in the valve. The advantages are the same as those described above.

Further details and advantages of a valve body according to the invention and a valve according to the invention will be explained below by way of example using the exemplary embodiments of the invention shown schematically in the figures. These show the following:

Fig. 1 a valve according to the invention in a first embodiment,

Fig. 2 a valve body of the valve according to Fig. 1,

Fig. 3 a longitudinal section through the valve body according to Fig. 2,

Fig. 4 a detailed view of a longitudinal section through the valve according to Fig. 1,

Fig. 5 a perspective detailed view of a longitudinal section through the valve according to Fig. 1 and

Fig. 6 a longitudinal section through a valve body according to a second embodiment.

Fig. 1 shows a valve 100 according to the invention. The valve 100 has a first valve body 1 and a second valve body 101 as well as a closing element 102 arranged between the first valve body 1 and the second valve body 101. The closing element 102 can be designed as a closing membrane and clamped between the valve bodies 1, 101, which is why the closing element 102 in Fig. 1 cannot be seen, cf. also Fig. 4.

A valve actuator 103 is additionally arranged on the second valve body 101. With this valve actuator 103, the closing element 102 can be actuated within the valve 100. For actuation, the valve actuator 103 can be electrically controlled via corresponding connection points 104. In this way, the valve 100 can also be designed as a servo valve, which, in addition to a completely open and a completely closed position, can also assume at least one intermediate position, in particular a continuously variable number of intermediate positions. For actuation, the valve actuator 103 can switch the position of the closing element 102 directly, for example via a plunger connected to the closing element 102. Likewise, the valve actuator 103 can be designed as a pilot control system and can indirectly switch the position of the closing element 102.

The valve body 1 is connected in a fluid-tight manner to the second valve body 101 via fastening means 105. The valve body 1, which is separated from the second valve body 101 and in the valve actuator 103, is shown separately in Figs. 2 and 3. To reduce the overall weight, the valve body 1 has several recesses 21, through which material and thus the overall weight can be saved. In order to further ensure the stability of the valve body 1, the valve body 1 is provided with several stabilizing ribs 20. This results in a valve body 1 that is constructed like a truss on the outside.

In the edge region of the top side O of the valve body 1, several fastening points 22 are provided. The fastening points 105 of the second valve body 101 can engage at these fastening points 22 to connect the two valve bodies 1, 101 to one another.

The valve body 1 has an inflow-side valve inlet 2, via which a fluid to be controlled can flow into the valve body 1, and a valve outlet 3, via which this fluid can flow out of the valve body 1 again.

As shown in Fig. 3, a flow channel 4 extends between the valve inlet 2 and the valve outlet 3, which connects the valve inlet 2 to the valve outlet 3. A fluid flowing through the valve body 1 from the valve inlet 2 to the valve outlet 3 follows the main flow direction S. This main flow direction S is redirected several times within the valve body 1. First, the main flow direction S runs parallel to the longitudinal axis of the valve inlet 2 before it is diverted essentially at right angles towards a valve seat 5 inside the valve body 1. This valve seat 5 arranged in the flow channel 4 represents the region of a reversal of flow direction. As shown in Fig. 3, the main flow direction S runs in the region of the flow channel 4 surrounding the valve seat 5 radially outwards towards the top side 0 of the valve body 1, while the main flow direction S in the flow channel section 4.1 surrounding the valve seat 5 leads away from the top side 0.

The top side 0 of the valve body 1 is not closed in the region of the valve seat 5. This enables easier processing of the inside of the valve body 1. In particular, the partially open top side 0 of the valve body 1 allows a bead of the closing element 102 to be accommodated in a corresponding receiving groove 23, as shown in Fig. 4. In this way, the closing element 102 can be arranged particularly easily between the two valve bodies 1, 101 of the valve 100. The second valve body 101 can be arranged on the valve body 1 via the partially opened top side O. In this way, the valve actuator 103 of the second valve body 101 can act on the closing element 102 through the opened top side O to actuate the valve 100.

Subsequent to the flow channel section 4.1, the flow channel 4 has an injector separating section 6 which is integrally formed on the valve body 1. A flow channel section 4.2 adjoining this injector separation section 6 then leads to the valve outlet 3. The main flow direction S runs in the two flow channel sections 4.1, 4.2 and in the injector separation section 6 along the longitudinal axis L of the injector separation section 6. The injector separation section 6 is arranged between the valve seat 5 and the valve outlet 3.

As shown in Fig. 1 to Fig. 5, the injector isolating section 6 is partially surrounded by a cage-shaped frame 7. This frame 7 consists of several struts 8, which surround the injector separation section 6 without entering into it or representing an obstacle to a fluid jet running along the injector separation section 6. Overall, this cage-shaped frame 7 has four plate-shaped struts 8 running parallel to the longitudinal axis L of the injector separating section 6. These four struts 8 are uniformly offset at an angle to one another of essentially 90°. Due to the uniform distribution of the individual struts 8 of the frame 7, an equally uniform axial force transmission can take place along the frame 7. For example, a force exerted when pushing a hose onto the valve outlet 3, which is designed in the manner of a hose nozzle, can be transmitted and diverted via the frame 7 into the further valve body 1. The occurrence of unevenness in the power transmission and the resulting deformations of the frame 7 and damage to the valve body 1 can be avoided.

Windows 9 extend between the individual struts 8 of the frame 7. These windows 9 are designed in the manner of openings in the valve body 1, which connect the injector separation section 6 to the outside of the valve body 1. Through these windows 9, the frame 7 allows the fluid flowing back against the main flow direction S to exit the valve body 1 without being able to flow back to the valve seat 5 or to the valve inlet 2. Since the injector separation section 6 is not surrounded by a closed volume, but rather by the cage-shaped frame 7, no negative pressure can build up along the injector separation section 6, which could pull a fluid counter to the main flow direction S from the valve outlet 3 into the valve body 1. In this way, the injector separating section 6 serves as a backflow preventer, which can effectively prevent any backflow of a fluid against the main flow direction S from the valve outlet 3 towards the valve seat 5 and to the valve inlet 2.

In addition, the valve body 1 has a nozzle 10 with a nozzle opening 11 on the upstream side of the injector separation section 6, with which a fluid flowing along the main flow direction S through the flow channel section 4.1 in the direction of the injector separation section 6 is bundled. This nozzle 10 opens into a nozzle channel 24 on the

downstream side, which forms part of the flow channel 4 and connects the nozzle 10 to the injector separation section 6. The nozzle channel 24 opens into the injector separation section 6.

The clear cross section of the nozzle channel 24 essentially corresponds to the clear cross section of the nozzle opening 11 of the nozzle 10. In this way, a fluid jet bundled through the nozzle 10 enters the injector separation section 6 with a diameter which corresponds to the diameter of the nozzle opening 11 and can overcome this in free flight. Due to this bundling, this fluid jet does not come into contact with the environment, such as the frame 7. In this respect, retroactive contamination counter to the main flow direction S can be avoided.

In addition, an orifice 13 the form of a disc is arranged in the injector separation section 6. This orifice 13 has an orifice opening 14 whose clear cross section is larger than the clear cross section of the nozzle channel 24. The fluid jet radiated from the nozzle 10 via the nozzle channel 24 into the injector separation section 6 in this way has a cross section which lies below the clear cross section of the orifice opening 14. In this way, the fluid jet can pass through the orifice opening 14 without contact. The orifice opening 14 is arranged concentrically together with the nozzle channel 24 along the longitudinal axis L of the injector separation section 6.

The orifice 13 in the form of a disc is formed in one piece with the struts 8 of the frame 7. In the radial direction, this orifice 13 is flush with the struts 8 on the outside.

The orifice 13 in the form of a disc is not centred along the longitudinal axis L of the injector separation section 6, but is arranged offset in the direction of the valve outlet 3. In this way, the central plane of the orifice 13 divides the length l of the injector separating section 6 along the main flow direction S into an upstream section A and an outflow section B, as shown in Fig. 4. Here, the distance A is larger than the distance B. The orifice 13 is therefore arranged in the downstream half of the injector separation section 6.

The orifice 13 serves as additional splash protection. If a fluid jet that has already passed through the orifice opening 14 comes into contact with the wall of the valve body 1 or a foreign body penetrating through the windows 9 in this downstream region of the injector separation section 6, it will be scattered, so that back splashing occurs, but the individual back splashes are stopped by the orifice 13. This means there is no back

splashing to the upstream start of the injector separation section 6. Contamination of the upstream region of the valve 100 is additionally prevented in this way.

Downstream, i.e. facing the injector separation section 6 along the main flow direction S, the nozzle channel 24 is optionally designed in the manner of a nipple-shaped projection 12. As shown in Fig. 3 to Fig. 5, this nipple-shaped projection 12 protrudes along the main flow direction S relative to the region of the valve body 1 surrounding it. Even in the event that part of the fluid still splashes back, the nipple-shaped projection 12 functions as a deflector, which deflects back-splashing fluid through its slanted outer wall.

The length R of the frame 7 is longer than the length I of the injector separation section 6, which begins immediately after the nozzle channel 24.

In the exemplary embodiment shown, the nozzle 10 is arranged completely outside the cage-shaped frame 7 along the main flow direction S. Relative to the frame 7, the nozzle 10 is arranged set back against the main flow direction S. In this way, the entire nozzle 10 is shielded from external influences that could affect it, for example, through the windows 9.

In order to be able to fasten the valve body 1 and the entire valve 100 during assembly, the valve body 1 has at least one fastening opening 19. With this fastening opening 19, the valve body 1 and the valve 100 can be fastened, for example plugged on, to a complementary shaped mounting element. Alternatively, the fastening opening 19 can be provided with an internal thread in order to be fastened during assembly to a corresponding counter element with an external thread, for example a screw or a threaded rod.

In Figs. 4 and 5, the closing element 102 arranged between the valve bodies 1, 101 can be seen in detail. This closing element 102 is shown in the closed position of the valve 100. In this position, the closing element 102 rests completely on the valve seat 5 and closes it in a fluid-tight manner. The interaction of the closing element 102 with the valve seat 5 blocks the flow channel 4 in such a way that a fluid flowing in via the valve inlet 2 cannot pass through the valve seat 5 and consequently cannot escape from the valve outlet 3.

The valve 100 shown is designed as a servo valve operated by its own medium. To operate the closing element 102, it has a pilot valve that can be actuated by the valve actuator 103. The pilot valve includes a pilot channel 108 arranged in the closing element

102 and a pilot closing element 106. With its elastic closing means 107, the pilot closing element 106 can close the pilot channel 108.

In the closed state shown, the valve seat 5 is closed by the closing element 102, which is pressed towards the valve seat 5 by the fluid located in the region between the closing element 102 and the valve body 101.

To open the valve 100, the plunger-shaped pilot closing element 106 is lifted from the pilot channel 108 and this is released. For this purpose, the pilot valve is designed as a bistable electromagnetic valve. By energizing an electromagnet belonging to the valve actuator 103, the pilot closing element 106 can be transferred back and forth in a bistable manner between two positions. In the first position, the pilot closing element 106 closes the pilot channel 108 and in the second position, the pilot closing element 106 releases the pilot channel 108.

The fluid located in the region between the closing element 102 and the valve body 101 can now flow out through the released pilot channel 108. The closing element 102 is then no longer pressed by the fluid in the direction of the valve seat 5, but is pushed away from the valve seat 5 by the fluid flowing towards it along the main flow direction S. The valve seat 5 is released in this way.

To close the valve 100, the pilot closing element 106 closes the pilot channel 108 again, so that the closing element 102 is pressed towards the valve seat 5 by the fluid now accumulating in the region between the closing element 102 and the valve body 101 and closes it.

Fig. 6 shows an alternative embodiment of the valve body 1, in which the valve inlet 2 and the valve outlet 3 form diametrically opposite ends of the valve body 1. While in the first embodiment, as shown in Figs. 1 to 5, there is an angle of essentially 90° between the valve inlet 2 and the valve outlet 3, in the embodiment shown in Fig. 6, the valve inlet 2 and the valve outlet 3 are essentially concentric and aligned with each other. The valve body 1 of this embodiment can be arranged in a straight pipeline area, which connects two line areas of different hazard categories.

Similar to the previously described embodiment of the valve body 1, the main flow direction S in this embodiment initially runs parallel to the valve inlet 2 before being deflected in the valve body 1 by essentially 90° towards the top side 0 of the valve body 1. In the region of the valve seat 5 there is also a reversal of flow direction, wherein the main flow direction S points away from the surface 0 along the flow channel section 4.3 coming

from the valve seat 5. In contrast to the first embodiment described above, a renewed flow deflection of the main flow direction S by essentially 90° into the flow channel section 4.1 of the flow channel 4 takes place after the flow channel section 4.3. The main flow direction S in this flow channel section 4.1 also coincides in this embodiment with the main flow direction S in the injector separation section 6 and the flow channel section 4.2 leading to the valve outlet 3.

The clear cross section of the flow channel section 4.1 is smaller in this exemplary embodiment than the clear cross section of the flow channel section 4.3, which precedes the flow channel section 4.1 in the main flow direction S. Likewise, the clear cross section of the flow channel section 4.2 is larger than the clear cross section of the flow channel section 4.1. The flow channel section 4.1 therefore results in a bundling of the fluid flow, so that the flow channel section 4.1 essentially functions as a nozzle 10. From the end of the flow channel section 4.1 as a nozzle opening 11, a fluid jet can be radiated into the injector separating section 6 in the direction of the flow channel section 4.2. An additional nozzle 10 can be dispensed with.

The other features of this embodiment correspond to those of the embodiment of the valve body 1 already described above.

All embodiments shown have a valve outlet 3 designed in the manner of a hose nozzle. Such a valve outlet 3, designed as a hose nozzle, has an outer cone 16 on the outlet side, which widens against the main flow direction S. A clamping region 18 with a reduced outer diameter in relation to the maximum outer diameter of the outer cone 16 extends against the main flow direction S. In this way, a rear grip 17 is created between the outer cone 16 and the clamping region 18. A hose-like line area can be pushed over the outer cone 16 for connection to the valve body 1. Already through the rear grip 17 and the expansion of the outer cone 16 against the main flow direction S, clamping forces can be established to clamp the hose-like pipeline area. In addition, a hose clamp or the like can be provided around the hose-like line area in the area of the clamping region 18 for additional fastening of the pipeline area to the valve outlet 3, which can reach behind the rear grip 17 for additional fixation.

Likewise, in all of the exemplary embodiments shown, the valve inlets 2 each have a thread 15, via which a line area with a corresponding mating thread can be connected to the valve body 1 in a particularly simple manner. A threaded connection via the thread 15 is characterized in particular by a high level of tightness that can be achieved

and consequently a correspondingly high level of contemplation security against substances that attempt to penetrate via the connection point between the valve 100 and the pipeline area from the outside of the valve in the region of the valve inlet 2.

Although all the embodiments shown have a valve outlet 3 in the form of a hose nozzle and a valve inlet 2 with a thread 15 in the form of an external thread, it is also possible to provide valve bodies 1 which have a thread 15 or a hose nozzle both on the valve inlet side and on the valve outlet side. Likewise, a valve body 1 can be provided, which is designed like a hose nozzle on the valve inlet side and like a thread on the valve outlet side.

The valve body 1 described above and the valve 100 described enable the valve 100 to be used at the transition between line areas of different risk categories.

**Reference numerals:**

| | |
|---|---|
| 1 | valve body |
| 2 | valve inlet |
| 3 | valve outlet |
| 4 | flow channel |
| 4.1 | flow channel section |
| 4.2 | flow channel section |
| 4.3 | flow channel section |
| 5 | valve seat |
| 6 | injector separation section |
| 7 | frame |
| 8 | strut |
| 9 | window |
| 10 | nozzle |
| 11 | nozzle opening |
| 12 | projection |
| 13 | orifice |
| 14 | orifice opening |
| 15 | thread |
| 16 | outer cone |

| | |
|---|---|
| 17 | rear grip |
| 18 | clamping region |
| 19 | fastening opening |
| 20 | stabilizing rib |
| 21 | recess |
| 22 | fastening points |
| 23 | receiving groove |
| 24 | nozzle channel |

| | |
|---|---|
| 100 | valve |
| 101 | valve Body |
| 102 | closing element |
| 103 | valve actuator |
| 104 | connection point |
| 105 | fastening means |
| 106 | pilot closing element |
| 107 | closing means |
| 108 | pilot channel |

| | |
|---|---|
| A | section |
| B | section |
| I | length |
| L | longitudinal axis |
| 0 | top side |
| R | length |
| S | main flow direction |

**Patentkrav**

**1.** Ventillegeme til anvendelse som del af en ventil med en strømningskanal (4) omfattende et i strømningskanalen (4) anbragt ventilsæde (5), et ventilindløb (2) på den opstrøms side og et ventiludløb (3) på den nedstrøms side, hvor strømningskanalen (4) har et i et stykke tildannet injektor-skilleafsnit (6), hvor injektor-skilleafsnittet (6) er anbragt mellem ventilsædet (5) og ventiludløbet (3), og hvor åbninger (9) til udløb af fluid, der skal presses tilbage, strækker sig fra injektor-skilleafsnittet (6) til ventilens ydre,
**kendetegnet ved,**
**at** ventilsædet (5) er udformet i et stykke med ventillegemet (1), og der opstrøms for injektor-skilleafsnittet (6) er anbragt en dyse (10) til samling af et strømmende fluid til en samlet fristråle i strømningskanalen (4).

**2.** Ventillegeme ifølge krav 1, **kendetegnet ved, at** injektor-skilleafsnittet (6) er omgivet, især delvis, af en burformig ramme (7).

**3.** Ventillegeme ifølge krav 2, **kendetegnet ved, at** rammen (7) er fremstillet af et formstabilt materiale, især en hård plastic eller et metal.

**4.** Ventillegeme ifølge et af kravene 2 eller 3, **kendetegnet ved, at** den burformige ramme (7) har flere ensartet indbyrdes vinkelforskudte stivere (8), især fire 90° vinkelforskudte stivere (8).

**5.** Ventillegeme ifølge et af de foregående krav, **kendetegnet ved, at** dysen (10) nedstrøms er udformet i stil med et nippelformigt fremspring (12).

**6.** Ventillegeme ifølge krav 2 eller et af kravene 3 til 5, når disse er direkte eller indirekte afhængige af krav 2, **kendetegnet ved, at** dysen (10) er anbragt, især fuldstændigt, uden for den burformige ramme (7).

**7.** Ventillegeme ifølge et af de foregående krav, **kendetegnet ved, at** der i injektor-skilleafsnittet (6) er anbragt en, især skiveformig, blænde (13).

**8.** Ventillegeme ifølge krav 7, **kendetegnet ved, at** blænden (13) er anbragt i injektor-skilleafsnittets (6) nedstrøms halvdel.

**9.** Ventillegeme ifølge et af de foregående krav, **kendetegnet ved, at** ventiludløbet (3) er udformet i stil med en slangetylle.

**10.** Ventillegeme ifølge et af de foregående krav, **kendetegnet ved, at** ventilindløbet (2) er udformet i stil med en gevindforbindelse, især med et udvendigt gevind (15).

**11.** Ventil, især servoventil, med et mellem et første ventillegeme (1) og et andet ventillegeme (101) anbragt lukkeelement (102) til åbning og lukning af et ventilsæde (5), et opstrøms ventilindløb (2), et nedstrøms ventiludløb (3) og en strømningskanal (4) til forbindelse af ventilindløbet (2) med ventiludløbet (3), **kendetegnet ved,**
**at** det første ventillegeme (1) er udformet ifølge et af kravene 1 til 10.

Fig. 1

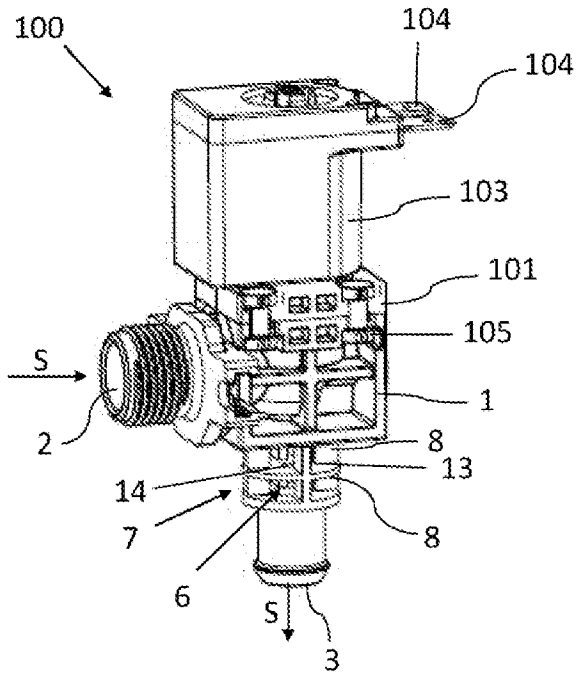


Fig. 2

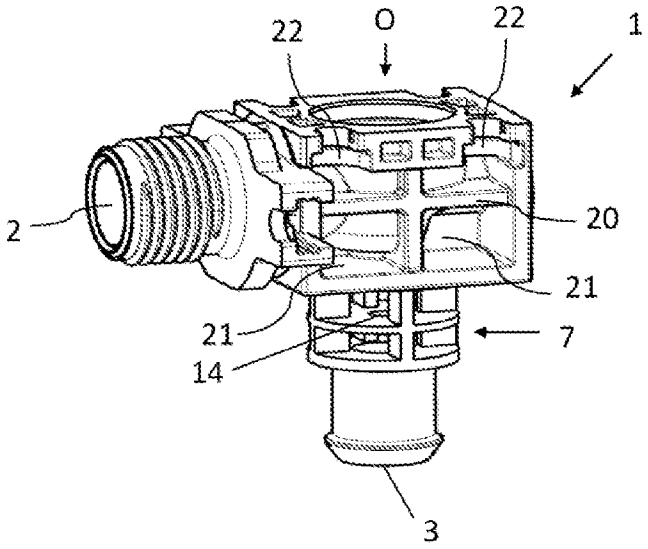

Fig. 3

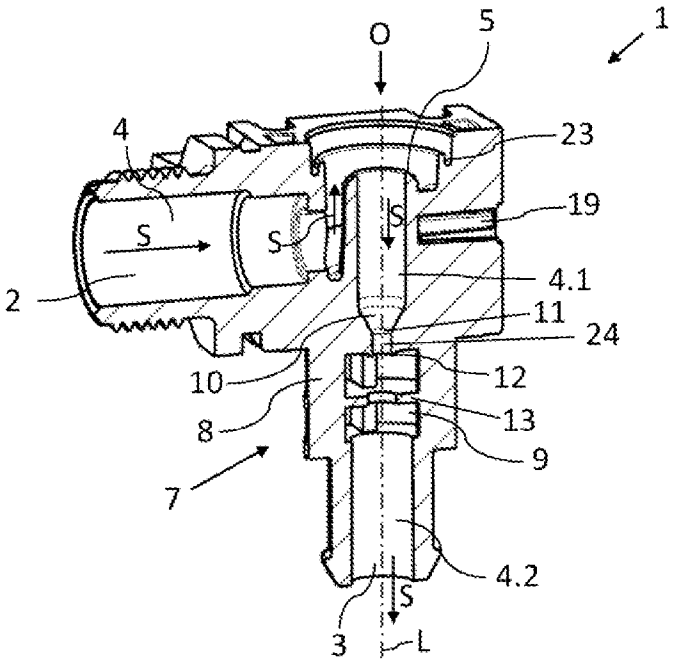
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Fig. 4

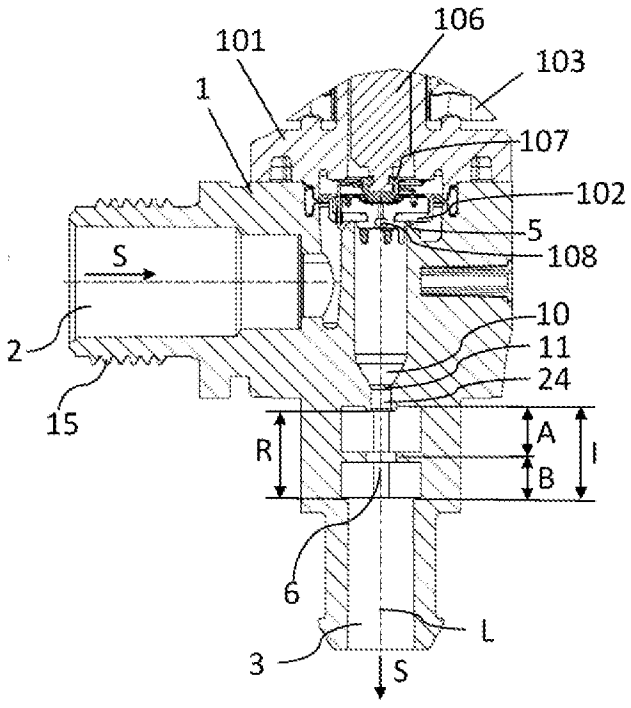
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Fig. 5

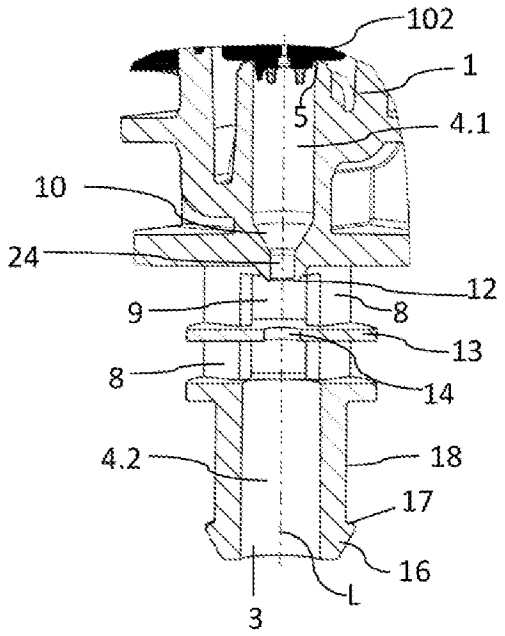
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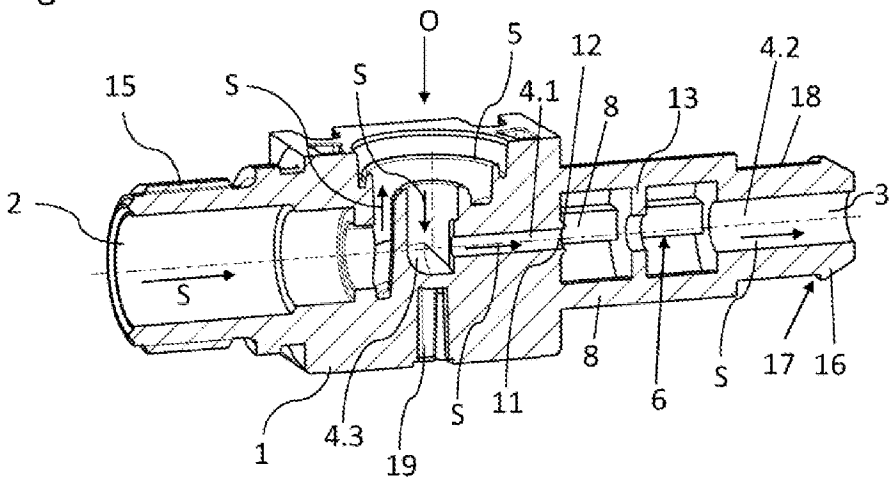
Fig. 6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