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Description

The invention relates to a valve device for use in a fitting having a valve inlet through which fluid can flow in an inflow direction, a valve outlet through which fluid can flow in an outflow direction for drawing process water, and a self-actuating extraction valve arranged in the flow path between the valve inlet and the valve outlet for releasing the flow path. Such a valve device is known from US6343389B1. The invention further relates to a fitting having a corresponding valve device.

Such valve devices are frequently used to control fluid flows in the field of sanitary fittings, for example, for drawing process water in washbasins, as is known from standard faucets. The valve devices are usually arranged within the fitting, such that they cannot be easily seen from the outside.

Corresponding valve devices generally have an extraction valve, which is arranged in the flow path between the valve inlet and the valve outlet. When the extraction valve is closed, the water cannot pass through it and, consequently, no water can be drawn from the fitting. To draw water, the corresponding extraction valve must first be opened, whereby the flow path between the valve inlet and the valve outlet is released. The water thereby flows out of the line in an inflow direction into the valve, passes through the opened extraction valve, flows through the valve outlet in an outflow direction and is routed to the fitting outlet.

In order to keep the forces needed to actuate, i.e. open and close, the extraction valve as low as possible, the practice is also known of designing the extraction valve as a self-actuating valve. With such an extraction valve, the water pressure at the valve inlet primarily ensures that the valve is kept in the closed position, as well as that the valve can be very easily opened. The detailed operation of a self-actuating valve is also described, for example, in DE 10 2015 104 258 A1.

When the extraction valve is in a closed state, the process water is essentially motionless in the valve inlet and in the line upstream of the valve. Although this does not pose a problem with regular drawing of water, it may be the case, with longer non-opening of the extraction valve, that, for example, germs and deposits build up in the water. Specifically in the guest house and hotel sector, for this reason, personnel are often instructed to carry out stagnation flushing in the individual rooms at regular intervals. In this case, water is left to run unused for a certain time, for example, into a washbasin, a bath or a shower tray, to counteract the build-up of germs and deposits due to longer

standing periods. Fittings, which automatically perform such stagnation flushings at regular intervals, are also known.

Although the build-up of germs and deposits can be prevented by this process, for example, a washbasin with stagnation flushing is made wet every time and, therefore,
5 needs to be subsequently cleaned and/or dried accordingly. This cleaning makes stagnation flushing as a whole expensive and time-intensive.

On this basis, the aim of the invention is to provide a valve device, which improves stagnation flushing.

This aim is achieved by a valve device of the aforementioned type, in that a flushing
10 outlet through which fluid can flow in a flushing direction is provided, wherein a flushing valve is arranged in the flow path between the valve inlet and the flushing outlet to release the flow path.

The water in the line upstream of the valve can be diverted through the flushing outlet and, therefore, does not need to flow through the valve outlet and then into the
15 washbasin, bath, shower tray or the like. With stagnation flushing, the flow path from the valve inlet to the flushing outlet can be released by means of the flushing valve, such that the water that is sometimes contaminated with germs or deposits cannot drain away through the valve outlet, but rather through the flushing outlet. Due to the flushing outlet, the valve thus has a second additional outlet, which is only used for stagnation flushing,
20 in addition to the normal valve outlet. In normal operation, i.e. when drawing process water via the valve outlet, the flushing outlet is unnecessary, and the stagnation valve can be closed accordingly. Additional cleaning, for example, of washbasins or baths, after stagnation flushing is thus unnecessary and stagnation flushing is improved as a whole.

In a further development of the valve device, it has proven advantageous for the
25 valve device to comprise a valve housing and for the valve housing to have the valve inlet and the valve outlet. In this respect, the valve device can be easily handled and also easily positioned and installed by means of the valve housing. In this respect, the valve housing is advantageously designed in one piece. Due to its one-piece design, the valve housing can be a prefabricated component designed as a basic element, which has been produced
30 in an upstream working step. In this respect, the valve housing can be designed as a module assembly and the remaining components can be arranged on the valve housing when installing the valve device. The valve inlet and the valve outlet can be permanently and integrally connected to one another.

Accordingly, in a further development of the invention, it has also proven advantageous for the valve housing to also have the flushing outlet. In this respect, the flushing outlet can also be permanently and integrally connected to the valve inlet and the valve outlet via the valve housing, which, accordingly, further simplifies handling of the valve.

As regards the extraction valve and the flushing valve, it has proven advantageous for the valve housing to have a first valve seat for the extraction valve and a second valve seat for the flushing valve. Due to the arrangement of the valve seats on the valve housing, the valves themselves do not need to have any corresponding valve seats. This means, not only, that the valves can be designed to be very flat, but also results in a small overall size of the valve device. The valve seats can be circular, which ensures that a greater flow of water can pass through the corresponding valve in the open state, at the same time, a reliable seal can also be achieved by the circular design when the valves are closed. As regards the arrangement of the two valve seats, it has proven advantageous for them to be arranged concentrically to one another. In this respect, the valve seats can both be circular, and the corresponding circles can lie on a common axis. It is advantageous for the flushing valve to connect the valve inlet to the flushing outlet and the extraction valve to connect the valve inlet to the valve outlet.

According to an advantageous embodiment, the valve outlet can have a flow regulator. A flow regulator is understood to mean a nozzle, which unifies, slows and/or spreads a jet of water, and, in doing so, generally adds air to the jet of water. In this respect, corresponding flow regulators are also referred to as aerators. In this embodiment, the valve outlet can have a deflection, in particular a 90° deflection, and, in this respect, the flow regulator can be arranged at an angle to the valve outlet. The process water can flow into the valve in the inflow direction, through the extraction valve in the outflow direction into the valve outlet and then through the deflection into the flow regulator and from there into, for example, a washbasin.

As regards the design of the valve inlet, valve outlet and flushing outlet, it has proven advantageous for them each to be tubular. A corresponding tubular design facilitates a uniform flow and also offers advantages in terms of production.

It is also suggested that the valve inlet and/or the valve outlet and/or the flushing outlet should have a line connection for connection to a fluid line. The respective inlets and/or outlets can be very easily connected to the corresponding lines by means of the

corresponding line connections. The connection can be detachable such that the corresponding lines can be inserted into the corresponding line connections. This is advantageous, in particular, when installing the valve device. The line connections can be screwed into the respective inlets and/or outlets or connected in one piece to the latter.

5 When the line connections are screwed in, a seal can be provided, which prevents water from inadvertently escaping.

In a further development of the flushing valve, it has proven advantageous for it to be designed as a self-actuating valve. By means of this design, the force needed to actuate the flushing valve can be kept comparatively low, and the flushing valve can be both
10 opened and closed with little effort.

However, in an alternative embodiment, the flushing valve can also not be designed as a self-actuating valve, but rather, for example, as a lever valve or ball valve. Corresponding valves usually have a smaller installation space and, structurally, a considerably simpler design than self-actuating valves. Furthermore, the quantity of
15 water to be drained with stagnation flushing is generally comparatively low anyway and the flushing valve is also actuated considerably less frequently in practice in contrast to the extraction valve.

As regards installation, it has proven advantageous for the extraction valve and the flushing valve to be detachably connected to the valve housing. When installing the valve
20 device, the extraction valve and the flushing valve can be connected to the valve housing in a very simple manner, for example, by means of a plug-in connection or a screw connection. In this respect, the valve housing can form the main body of the valve device, and the flushing valve and the extraction valve can be connected to the valve housing. The valve housing can have a plug contour, into which the valves can be advantageously
25 inserted in one direction only. This simplifies positioning and connection of the valves to the valve housing.

Furthermore, it has proven advantageous for the extraction valve and the flushing valve to be actuatable independently of one another. This facilitates variable control of the valve device and/or the flow paths. However, in practice, it has proven advantageous
30 for the valve device to only have three different switching states and/or positions, namely a closed position, in which the valve device allows no water to pass through, as well as a stagnation position for stagnation flushing and a drawing position for drawing process water. To draw process water, the extraction valve can be opened, and the flushing valve

closed. For stagnation flushing, the extraction valve can be closed, and the flushing valve opened. In this respect, provision can be made, for example, to prevent the extraction valve being opened when the flushing valve is open, such that stagnation flushing must first be ended before process water is drawn and, accordingly, the flushing valve must be closed in order for the extraction valve to be opened. In order to completely shut off the water, both the extraction valve and the flushing valve can be closed.

The extraction valve and the flushing valve can be actively controllable and thus selectively release the respective flow paths. The two valves are therefore not self-opening valves, which can be used, for example, to relieve pressure.

To actuate the valves, it has proven advantageous for the extraction valve and/or the flushing valve to be actuable by means of solenoid actuation. This offers advantages, not only as regards precise control, but also simplifies sealing, as the valves can be moved contactlessly by means of solenoid actuation. Solenoid actuation can be electromagnetic actuation, in particular, coil control.

To actuate and/or control the extraction valve and/or the flushing valve, it has proven advantageous for the valves to have a control unit. By means of the control unit, the respective valves can be reliably switched back and forth between the closed position and the open position. The control unit can be designed to be bistable or monostable. In particular for the flushing valve, a monostable control unit is useful, for example, as a flushing process generally only lasts a few seconds. Furthermore, it is not readily apparent from the outside whether stagnation flushing is performed, as the water for this flushing only flows within the closed line system. Therefore, it may be the case, in certain circumstances, that stagnation flushing is started but not ended and, in this respect, for water to be inadvertently wasted. This could be prevented with a monostable flushing valve, as a corresponding valve only releases the flow path for the duration of actuation and then independently returns to the closed position. It is advantageous in this respect for the flushing valve to be pretensioned in the closed position.

The control unit can be operated purely manually by hand, for example, by means of a button, a switch, a lever, a wheel or the like. However, it is nevertheless also possible for the control unit and/or control units to be controlled electrically via a radio link or a wired connection and for the valves to be opened and/or closed in this way. Contactless actuation is also possible. Furthermore, provision may also be made for the flushing valve to be regularly opened at predetermined intervals, in order to regularly perform

stagnation flushing. A programmable processing unit can be provided for the corresponding control.

As regards the control units, it has further proven advantageous for them to each have a control coil. By means of a control coil, the pilot valve closing elements can be very
5 precisely moved and no direct contact is necessary, as the coils can move the closing elements magnetically.

As regards the design of the extraction valve and the flushing valve, it has proven advantageous for them to be designed as diaphragm valves. The valves can have a diaphragm that moves relative to the respective valve seat and a pressure chamber
10 arranged behind the diaphragm in the direction of flow. The pressure present at the valve inlet can be present in the pressure chamber, which can be greater than the pressure in the valve outlet and/or in the flushing outlet. The diaphragm can thus be pressed onto the valve seat by means of this pressure and/or the pressure difference, as the pressure chamber can be arranged on the side of the diaphragm opposite the valve seat. To allow
15 the water to flow from the valve inlet into the respective pressure chambers, the diaphragms have corresponding connecting channels, which are arranged, in particular, in the lateral area of the diaphragm. In the respective closed position of the valves, the diaphragm can rest on the respective valve seat and thus reliably seal the valve inlet relative to the valve outlet and/or relative to the flushing outlet.

In this respect, the extraction valve can have a closing element that moves relative to a valve seat, in particular a diaphragm, and a pressure chamber arranged on the side of the closing element opposite the valve seat, such that the closing element can be pressed onto the valve seat by the pressure in the pressure chamber. The flushing valve can be designed accordingly. A pilot valve can be provided to move the closing element
20 of the extraction valve. The flushing valve can be designed accordingly. The respective pilot valve can be coupled with the extraction valve and/or with the flushing valve, in particular fluidly coupled, such that the closing element of the extraction valve and/or the flushing valve is moved by the respective pilot valve and the respective valve can be opened and closed in this way.
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To attach the diaphragm, it has proven advantageous for the valve housing to have a groove-shaped diaphragm holder for each diaphragm, in which the respective diaphragm can be held. The diaphragm can thus be secured by means of this diaphragm holder, which facilitates reliable opening and closing of the respective valve.
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Furthermore, it has proven advantageous for the extraction valve and/or the flushing valve to have a valve cover and for the respective diaphragm to be clamped between the valve cover and the valve housing. A secure grip on the diaphragm can thus be guaranteed. Furthermore, the diaphragm can also be easily replaced or repaired. This is because, when a valve cover is released from the valve housing, the corresponding diaphragm can be directly accessible. The valve covers can have connection points for connecting to the valve housing, for example, in the form of drill holes, which are suitable for a screw connection. To attach the diaphragm to the valve cover, it can also have a groove, in particular, a circular circumferential groove. The diaphragm can thus be mounted and/or clamped in the edge region, both in the valve cover groove, as well as in the valve housing groove and/or diaphragm holder. Due to the circular design of the grooves, the diaphragm can be clamped circumferentially, which ensures reliable closing of the respective valve seat. In this case, due to its flexibility, the clamped diaphragm can only move perpendicular to the valve seat and thus, for example, not slip laterally relative to the latter.

Furthermore, it has proven advantageous for the edge region of the diaphragm to be designed as a sealing region. As a result of the edge region being designed as a sealing region and being able to extend into recesses in the valve housing and the valve and/or the valve cover, it is possible to prevent liquid from leaking out between the valve cover and the valve housing. In this respect, it is advantageous for the edge region of the diaphragm to be larger than the two recesses, such that the edge region of the diaphragm is at least slightly deformed on connection of the valves to the valve housing. This produces a good sealing effect. The sealing region of the diaphragm can extend perpendicular to the closing region of the diaphragm, in particular upwards and downwards, relative to a central region of the diaphragm. The sealing region can be designed as a sealing lip. The valve cover and the valve housing can surround the edge region of the diaphragm in a form-fitting manner. The edge region of the diaphragm can form a seal in a radial direction both relative to the valve housing and relative to the valve cover. By means of such a radial seal, the valve covers only need to be pressed onto the valve housing in an axial direction with little force, such that mechanical component relief is obtained.

As regards positioning the pressure chamber, it has proven advantageous for it to be arranged between the diaphragm and the valve cover. The valve cover can be designed

to be pot-shaped at least in some regions and the diaphragm can span this pot-shaped region. In this respect, the pressure chamber can be bounded on one side by the diaphragm and on the other sides by the valve cover. When the respective valve is opened, the diaphragm can move into the pressure chamber. This movement can be restricted by the size of the pressure chamber and/or the design of the valve cover. Furthermore, the valve enables a water discharge path to be clearly defined. In this respect, the pressure chamber can be designed such that no and/or very few dead zones are formed, and the valves are also flushed as water flows through. No water is able to collect and build up in the valve, resulting in hygienic advantages.

Furthermore, it has proven advantageous for the pressure chamber of the extraction valve to be connected to the valve outlet via a pilot channel and for the pressure chamber of the flushing valve to be connected to the flushing outlet via a pilot channel. The water present in the pressure chamber can flow into the respective outlet via the respective pilot channels, as a result of which the pressure in the pressure chamber falls and the diaphragm lifts up independently from the respective valve seat. The pilot channels can be arranged in the valve housing and can be designed in the manner of drill holes. The pilot channels can extend perpendicular to the valve outlet and/or the flushing outlet and, in this respect, parallel to the direction of movement of the diaphragms.

Furthermore, it has proven advantageous for the extraction valve and the flushing valve to each have a pilot valve for selectively opening the respective pilot channels. When the pilot channel is closed, the water cannot drain away from the pressure chamber, but rather, in this case, presses the respective diaphragm onto the valve seat. When the pilot valve is opened, the respective pilot channel can be released, such that the water can flow out of the pressure chamber through the pilot channel into the respective outlet. The pressure in the pressure chamber thereby decreases, such that the diaphragm is lifted up from the valve seat and the respective valve can be opened accordingly by means of the pilot valve. In this respect, the pilot valves serve as relay valves and require considerably lower actuation forces for actuation, than would be the case with direct actuation of the extraction valve and/or the flushing valve. In this respect, it is sufficient for the pilot valves to be controlled via the respective control units. The actuation and control described above as regards the valves thus also apply accordingly to the pilot valves of the respective valves.

According to the invention, the inflow direction and the flushing direction are arranged opposite one another. The water is thus redirected in the valve during stagnation flushing and flows back out of the valve counter to the inflow direction in the flushing direction. The valve inlet can be connected to a water line of a water supply system and the flushing outlet can be connected to a line of a wastewater system. As
5 corresponding systems often largely run in parallel, the water can be redirected from the supply system into the wastewater system by the deflection in the valve during stagnation flushing.

As regards the inflow direction and the outflow direction, it has proven
10 advantageous for them to be arranged parallel to one another. Thus, when the extraction valve is opened, the water can flow in the inflow direction and then flow back out of the valve through the extraction valve in the outflow direction. The inflow direction and the outflow direction thus define the main flow direction of the water. It is advantageous for the water to flow through the valve device in a substantially axial direction. As regards the
15 different flow directions, it has also proven advantageous for the flushing direction and the outflow direction to be arranged opposite one another.

Furthermore, it has proven advantageous for the valve inlet and the valve outlet to be arranged on opposite sides. In this respect, this design enables the water to flow into the valve device on one side and to flow back out of the valve device on the other side
20 and to be used there as process water. The flushing outlet can be arranged on the same side as the valve inlet, such that, during stagnation flushing, the water flows back out of the valve accordingly on the same side.

Furthermore, it has proven advantageous for a main valve axis arranged parallel to the inflow direction and/or to the outflow direction to be provided, wherein the
25 extraction valve and the flushing valve are opposite one another relative to the main valve axis. As a result of the flushing valve and the extraction valve being opposite one another, the valve device can have a very compact design and a low construction volume. Furthermore, a uniform weight distribution can also be achieved by this design.

It has proven advantageous, as regards the two valves, i.e. the extraction valve and
30 the flushing valve, for the latter to be designed, at least substantially, identically. This enables the complexity of the valve device to be reduced. In this respect, the flushing valve and the extraction valve can be valves in the same assembly. Whether the corresponding valve acts as an extraction valve or as a flushing valve does not depend, in

this respect, on the design of the valve per se, but rather at which point it is connected to the valve housing. When the valve connects the valve inlet and the valve outlet to one another, it is an extraction valve, and when the valve connects the valve inlet and the flushing outlet to one another, it is a flushing valve.

5 Furthermore, it has proven advantageous, as regards the compactness of the valve device, for the control devices to extend parallel to the main valve axis. The control devices can thus be mounted very close to the valve housing and can be arranged, for example, on opposite sides of the main valve axis and/or the valve outlet. It is advantageous for the control devices to be, in particular, directly adjacent to the valve housing. Therefore, as it is perpendicular to the main valve axis, the valve device can be
10 relatively flat, which is advantageous in many installation situations. In this respect, the coils of the control devices can extend parallel to the main valve axis.

 As regards the diaphragms of the extraction valve and the flushing valve, it has proven advantageous for them to move in opposite directions to one another when the
15 respective valve is opened and when the respective valve is closed. This means that the two valves are arranged on opposite sides of the valve housing. If, for example, the diaphragm of the extraction valve and the diaphragm of the flushing valve are both moved from the closed position to the open position, the movable central regions of the diaphragms would move accordingly away from one another. On closing, the central
20 regions of the diaphragms could move accordingly towards one another.

 Furthermore, the diaphragm and/or diaphragms of the extraction valve and/or the flushing valve can move perpendicular to the main valve axis on opening and closing. The diaphragms can move accordingly in a main switching axis, which is arranged perpendicular to the main valve axis.

25 As regards the respective pilot valves, it has proven advantageous for the latter to each have a pilot valve closing element, which is movable parallel to the main valve axis. This design also contributes to a compact construction. The pilot valves can be connected to the valve covers of the respective valves, such that, in this respect, the valves can be designed as assemblies. The control units can be permanently or detachably connected
30 to the other components of the pilot valves. When moving the pilot valve closing elements, they can be moved into the coil of the control device or moved out of the control device. It is also advantageous for the displacement volume of the diaphragm to be greater than the pilot volume of the respective pilot valve. As a result, during each

opening process, the pilot valve is also completely flushed and, in this respect, the risk of the build-up of stagnation water is reduced. A corresponding valve is also described in EP 3 070 383 A1, the disclosed content of which is incorporated in its entirety by reference.

5 The pilot valve seats, on which the pilot valve closing elements rest and/or sit in the closed position, can be arranged on the respective valve or on the common valve housing. The pilot valve seats can form the ends of the pilot channels, such that the pilot channels can be reliably closed by means of the pilot valve closing elements.

Embodiments and characteristics of the valve device, which have been described as part of this application either exclusively as regards the extraction valve, or exclusively
10 as regards the flushing valve, or exclusively in combination for both the extraction valve and the flushing valve, can also be provided accordingly in each case for the other valve, as well as only for one of the two valves. In this respect, for example, the extraction valve can have one or more of the characteristics described above and the flushing valve can have both the same or other of the characteristics described above.

15 As regards the aforementioned aim, a fitting, in particular a washbasin fitting, which has a valve device in the embodiment described above, is also proposed. The advantages already described as regards the valve device are obtained.

The fitting can have a fitting body and a fitting arm arranged, in particular, at an angle to the fitting body, wherein the fitting arm can have a fitting outlet, from which the
20 process water can flow. Fitting bodies and fitting arms can also be connected to one another in one piece. The valve device can be arranged in the fitting body and thus not be visible from the outside. Due to the compact design of the valve device, there is even space for it in narrow valve bodies. The inflow direction can extend parallel to the longitudinal axis of the valve body, such that the water can flow from below, for example
25 through a mounting area of the valve body, into the valve inlet of the valve device. The flushing direction can also extend accordingly parallel to the longitudinal axis of the valve body, such that the water can emerge downwards from the valve body through the mounting area.

In this respect, the valve device can be arranged advantageously such that the main
30 valve axis is aligned parallel to the main flow direction of the fluid in the fitting body.

In an alternative embodiment, the valve device can be arranged in the fitting arm. Due to the compact design of the valve device, it can thus be positioned close to the fitting outlet, such that the line is flushed as far as possible to the fitting outlet during stagnation

flushing. This means that the region between the valve device and/or between the flushing valve and the fitting outlet is not flushed during stagnation flushing. This distance can be kept very small by the positioning of the valve in the fitting arm. Provision can also be made for the valve outlet to be connected in one piece to the fitting outlet and/or for the valve outlet to be designed as a fitting outlet. In this respect, the valve outlet can have a bend, such that the process water can flow downwards out of the valve outlet.

Furthermore, it has proven advantageous for the fitting outlet and/or the valve outlet to have a flow regulator, as already described above as regards the valve device.

In a further development of the fitting, provision is made for the valve outlet to be connected to the fitting outlet and the flushing outlet to be connected to a return for connection to a siphon. The water can thus flow, for example, past the washbasin directly into the siphon arranged below the washbasin via the flushing outlet. Therefore, the corresponding return essentially serves as a bypass for the washbasin.

Furthermore, it has proven advantageous for the fitting to have a mixer faucet, which is connected upstream of the valve device. The mixer faucet can have two inlets, one for hot water and one for cold water, as well as an outlet for water at a desired temperature. A flow of water at a desired temperature can be produced by mixing hot and cold water in the mixer faucet, which can flow into the inlet channel of the valve device.

In a further development of the fitting, it has proven advantageous for the latter to have a sensor system for monitoring the vicinity of the fitting. It is possible, for example, after stagnation flushing, for thermal disinfection flushing to be carried out via the valve outlet, in order, for example, to also eliminate germs between the extraction valve and the fitting outlet and/or to thermally disinfect regions not flushed during stagnation flushing. As such thermal disinfection entails a certain risk of scalding, as the hot water emerges from the fitting outlet, the sensor system can detect whether, for example, there is a hand in the vicinity of the fitting that, in this respect, could be exposed to a risk of scalding from thermal disinfection flushing.

Further details and advantages of the invention are intended to be explained below with reference to the accompanying drawings. The drawings show:

Fig. 1 a schematic sectional view through a valve device,

Fig. 2 a sectional view through the valve housing according to the illustration in Fig. 1,

Fig. 3 a sectional view through the valve device with two line connections and an interface shown,

Fig. 4 a cross-sectional view of the valve device according to the illustration in Fig. 1,

5 Fig. 5a a sectional view through a fitting with a valve device,

Fig. 5b a perspective side view of the fitting according to Fig. 5a,

Fig. 6a, 6b various views of a valve device arranged in a fitting arm, and

Fig. 7 a schematic view of a use of a fitting with a valve device on a washbasin.

10 The illustration in Fig. 1 shows a sectional view of a valve device 1 for use in a fitting 10. Before covering the design of the valve device 1 in greater detail, basic operation of the valve device 1 is first covered in detail with reference to Fig. 7. Fig. 7 shows a simplified schematic view of a washbasin 50 with a fitting 10 designed as a faucet. To draw water at the fitting 10, one of the two actuating elements 10.3 can be actuated, thereby releasing
15 the flow path from the supply line 30 through the valve device 1 to the fitting outlet 10.21, such that the water can flow out of the fitting 10 into the washbasin 50. At the bottom of the washbasin 50, there is a drain, which is connected to a siphon 40 and via which the water can be discharged as wastewater.

With water standing for long periods in the supply line 30, there may occasionally
20 be a build-up of germs, which is why, in this case, this water cannot be used as process water. Therefore, the valve device 1 has two different outlets, namely a valve outlet 4 at the top, from which the process water can be routed to the fitting outlet 10.21, and a second outlet designed as a flushing outlet 6, which is arranged on the opposite side of the valve device 1. The water that is stagnant and, possibly, contaminated with germs can
25 be routed from the flushing outlet 6 via the return 20 directly into the drain of the washbasin 50 and/or directly into the siphon 40. After lengthy standing periods, corresponding stagnation flushing can thus first be carried out before process water can be drawn at the fitting outlet 10.21.

One of the two actuating elements 10.3 is actuated for stagnation flushing, as a
30 result of which the water is routed from the supply line 30 into the return 20 and not to the fitting outlet 10.21. After stagnation flushing, when the stagnant water has come to an end and the line is flushed with fresh water, the flow of water can be switched from the return to the fitting outlet.

The precise construction of the valve device 1 is now intended to be covered in greater detail with reference to the other Figures. As is evident in the illustration in Fig. 1, the valve device 1 has a valve inlet 3, a valve outlet 4 for process water and a flushing outlet 6 for stagnation flushing. The water flowing into the valve device 1 in the inflow direction E can either flow through the valve device 1 and emerge out of the valve outlet 4 in the outflow direction A or it can be flipped through 180 degrees for stagnation flushing and, in this case, exit the valve device 1 in the opposite flushing direction S via the flushing outlet 6 and be routed to a drain. In order to route the water accordingly either through the valve outlet 4 or the flushing outlet 6, two valves 5, 7, which can be actuated independently of one another, are provided. The valve 5 is thereby designed as an extraction valve 5 and can release or block the flow path from the valve inlet 3 to the valve outlet 4. Similarly, the flushing valve 7 can control the flow from the valve inlet 3 to the flushing outlet 6.

As already described above, after lengthy standing periods, stagnation flushing is first carried out, for which the flushing valve 7 is opened for a certain time, such that the stagnant water can drain away. Thereafter, the flushing valve 7 is closed and the extraction valve 5 is opened, such that the water can flow as process water to the fitting outlet 10.21, which is connected to the valve outlet 4.

As is further evident in the illustration in Fig. 1, both the extraction valve 5 and the flushing valve 7 are designed as self-actuating valves, such that the actuation forces needed to open or close the valves 5, 7 are comparatively low. In the closed state, as shown in Fig. 1, there is the same pressure as in the valve inlet 3 in each of the two pressure chambers 5.3, 7.3 of the valves 5, 7. This means that the diaphragms 5.2, 7.2 of the valves 5, 7 each have a channel-shaped opening to one side of the valve seats 5.1, 7.1 and thus the pressure chambers 5.3, 7.3 are connected to the valve inlet E. This pressure is sufficient to press the respective diaphragms 5.2, 7.2 on the respective valve seat 5.1, 7.1 and to thus reliably close the flow paths.

The associated pilot valves 5.6, 7.6 must be actuated in order to open the valves 5, 7. The pilot valves each have a pilot valve closing element 5.62, 7.62, which rest, in the closed position, on a pilot valve seat 5.61, 7.61 and thus close the respective pilot channels 5.5, 7.5, which end in the valve outlet 4 and/or in the flushing outlet 6. When the pilot closing elements 5.62, 7.62 are moved into an open position, in which they do not rest on the corresponding pilot valve seats 5.61, 7.61, the pilot channels 5.5, 7.5 are also released

accordingly. As the pressure chambers 5.3, 7.3 are connected via the pilot channels 5.5, 7.5 to the respective outlets 4, 6, with an open pilot channel 5.5, 7.5, the water present in the pressure chamber 5.3, 7.3 flows into the corresponding outlet 4, 6.

5 If, for example, the pilot valve 5.6 of the extraction valve 5 is opened, this results in a pressure drop in the pressure chamber 5.3 above the diaphragm 5.2 due to the water flowing through the pilot channel 5.5. In this case, the water pressing from below from the valve inlet 3 against the diaphragm 5.2 has sufficient compressive force to move the diaphragm 5.2 into the pressure chamber 5.3 and to lift it up from the valve seat 5.1. The water can then flow through the extraction valve 5 to the valve outlet 4. To close the
10 extraction valve 5, the pilot channel 5.5 is again closed via the pilot valve 5.6, which results in a pressure increase in the pressure chamber 5.3 and thus to a lowering of the diaphragm 5.2 until it once again rests on the valve seat 5.1 and the flow path is blocked. Only the small pilot valve 5.6 and/or the small pilot valve closing element 5.62 is moved to thus open and close the valve 5. In the illustration in Fig. 1, the pilot closing element
15 5.62, 7.62 and the pilot valve seat 5.61, 7.61 are not clearly visible, but these elements are shown in Fig. 3. As opening and closing the two valves 5, 7 is performed in a correspondingly identical manner, reference is made to the description of the extraction valve 5 for operation of the flushing valve 7. The various flow paths of the waters can also be identified with reference to Fig. 2. The actual valves 5, 7 are not shown, but only the
20 valve housing 2, which acts as the main body of the valve device 1 and is designed in one piece, is visible, wherein the valve inlet 3, as well as the two outlets 4, 6, form part of the valve housing 2.

The valve housing 2 has a main valve axis HV, in the direction of which the water flows through the valve device 1 from the inflow channel 3 to the outflow channel 4 in
25 normal operation. In this respect, the inflow direction E and the outflow direction A also run on the same direction and parallel to the main valve axis HV. On the other hand, the two valves 5, 7 and/or the respective diaphragms 5.2, 7.2 of the two valves 5, 7 move, on opening and closing, perpendicular to the main valve axis HV and in the direction of a main switching axis HS. This also means that the water is redirected when passing through
30 the valves 5, 7. As regards the extraction valve 5 with reference to Fig. 3, for example, first through approximately 90 degrees to the left, then through 180 degrees and subsequently through 90 degrees to the right in the outlet channel 4. The water therefore flows through the valves 5, 7 and/or the corresponding valve seats 5.1, 7.1 in the direction of the main

switching axis HS and perpendicular to the main valve axis HV and/or accordingly perpendicular to the inflow direction E. The pilot channels 5.5, 7.5 also extend perpendicular to the main valve axis HV and parallel to the main switching axis HS.

To connect the extraction valve 5 and the flushing valve 7 to the valve housing 2, they can be attached to opposite sides of the valve housing 2 and then, for example, connected to the latter via a screw connection. The valve housing 2 thus acts as a main body, on which the two valves 5, 7 can be arranged. In addition to the inlet and outlet channels 3, 4, 6 and the valve seats 5.1, 7.1, the valve housing 2 also has a groove-shaped diaphragm holder 2.3, 2.4, which is visible in Fig. 2 and extends circularly and concentrically to the respective valve seat 5.1, 7.1. When connecting the valves 5, 7 to the valve housing 2, these diaphragm holders 2.3, 2.4 act as recesses and/or as mounts for the diaphragms 5.2, 7.2.

As shown in Fig. 1, the valves 5, 7 essentially consist of a valve cover 5.7, 7.7, to which the respective diaphragm 5.2, 7.2 is attached. The valve covers 5.7, 7.7 also have circular and groove-shaped diaphragm holders, which are arranged such that, when installed, they are aligned with the diaphragm holders 2.3, 2.4 arranged in the valve housing 2. The diaphragms 5.2, 7.2 and/or the corresponding edge region of the diaphragms 5.2, 7.2 is/are thus clamped between the corresponding valve cover 5.2, 7.2 and the valve housing 2 and/or the groove-shaped recesses. The edge region of the diaphragms 5.2, 7.2 is thereby thickened in the manner of a sealing lip relative to the central region of the diaphragm and extends perpendicular to the main valve axis HS. This wedged and/or clamped edge region is thus not used for positioning and attaching the respective diaphragm 5.2, 7.2, but also acts as a seal, such that the water cannot escape between the valve housing 2 and the respective valve cover 5.7, 7.7.

As is evident from Fig. 1, the diaphragms 5.2, 7.2 in the central region, which rest, in the closed position, on the respective valve seats 5.1, 7.1, are reinforced, such that the diaphragms 5.2, 7.2 cannot be deformed due to the active water pressure and sufficient tightness is ensured. However, the diaphragms 5.2, 7.2 between the central region and the clamped edge region are flexible, such that opening and closing movements can be reliably carried out. The diaphragms 5.1, 7.1 and/or the corresponding central regions move, during a corresponding movement, in the direction of the main switching axis HS and thus perpendicular to the inflow direction E.

To enable the valve device 1 to be integrated into a fitting 10, its design must be as compact as possible. Therefore, an important design aspect is that the extraction valve 5 and the flushing valve 7 are arranged on opposite sides of the valve housing 2 and are designed to be very flat. Accordingly, the diaphragms 5.2, 7.2 also extend parallel to the main valve axis HV. The same applies to the two control units 5.4, 7.4, by means of which the pilot valve closing elements 5.62, 7.62 can be moved back and forth in the direction of the actuation axes B arranged parallel to the main valve axis HS, as illustrated in Fig. 3. The control units 5.4, 7.4 each have a coil with a plurality of windings for actuating the pilot closing valves 5.62, 7.62, such that the pilot valve closing elements 5.62, 7.62 can be moved magnetically and thus contactlessly. As a result of the control units 5.4, 7.4, as well as the respective coils, extending in the direction of the main valve axis HV, they can be arranged as a whole very close to the valve housing 2, which leads, overall, to a relatively narrow valve device 1, as is evident from Fig. 3.

Fig. 3 also shows an interface 5.41 connected to the control unit 5.4, by means of which the control unit 5.4 and/or the corresponding coil can be controlled. As is also evident from the schematic view in Fig. 7, this interface 5.41 can be connected, for example, to an actuating element 10.3, such that the pilot valve closing element 5.62 is moved by means of the actuating element 10.3 and can thus be released or blocked according to the flow path from the inlet channel 3 to the outlet channel 4. Although this is not shown in Fig. 3, the control unit 7.4 of the flushing valve also has a corresponding interface, which is connected to an actuating element 10.3 for opening and closing the flushing valve 7. In this respect, the two valves 5, 7 and/or the corresponding control units 5.4, 7.4 and interfaces are identical in construction.

Furthermore, line connections 4.1, 6.1 are shown in Fig. 3, which facilitate a simple connection of the respective outlets 4, 6 to the corresponding lines. The line connections 4.1, 6.1 are screwed into the ends of the outlets 4, 6 and provided with an O-ring seal. During installation of the valve device 1, the lines can thus be simply inserted into the corresponding line connections 4.1, 6.1. Although the valve inlet 3 is not equipped with a line connection according to the illustration in Fig. 3, it can nevertheless also have a corresponding line connection.

The valve device 1 is shown in a sectional view in the illustration in Fig. 4, which runs vertically through the valve device 1, as is evident from the A-A line in Fig. 1. It is evident in the center of the valve housing 2, as well as in the connecting channels (not

shown in Fig. 1 due to the section) from the valve inlet 3 to the diaphragm 7.2 of the flushing valve 7, from where the water can flow through the diaphragm 7.2 into the pressure chamber 7.3. The compact design can also be easily identified due to the control units 5.4, 7.4 arranged in the inflow direction E and/or in the direction of the main valve axis HV and directly alongside the valve housing 2.

Figs. 5a and 5b show an installation situation of the valve device 1 in a fitting 10 designed as a washbasin fitting. The fitting 10 essentially consists of two parts, namely a fitting body 10.1 with a mounting area 10.11, by means of which the fitting 10 can be installed, for example, on a washbasin 50 and a fitting arm 10.2 arranged at an angle to the fitting body 10.1, from which the process water can flow downwards, as is known from standard faucets. To draw process water from the fitting 10, the water flows from below and passes from below through the mounting area 10.11 into the valve device 1 and/or into the valve inlet 3 and exits it again at the upper end through the valve outlet 4 in the outflow direction A. In the fitting 10, the water is redirected after the valve device 1 and then flows downwards out of the fitting outlet 10.21.

As is also evident, the valve device 1 is positioned in the fitting body 10.1 and arranged such that the main valve axis HV extends in a vertical direction and thus also in a longitudinal direction to the fitting body 10.1. Purely due to the positioning of the control units 5.4, 7.4 alongside the valve housing 2 and in the direction of the main valve axis HV, the valve device 1 has sufficient space in the fitting body 10.1.

As is evident from Fig. 5b, two separate supply lines are provided, wherein cold water can be supplied in one of the lines and hot water can be supplied in the other. In this respect, the valve device 1 can also be preceded by a mixer faucet, which mixes the hot and cold flows accordingly and with which a desired temperature can be set. For stagnation flushing, the water is redirected in the valve device 1 and exits the latter via the flushing outlet 6. The extraction valve 5 is thereby closed and the flushing valve 7 is opened, as already described above. The flushing outlet 6 is connected to a return 20, which, as illustrated in Fig. 7, can end in the drain of the washbasin 50.

The illustrations in Figs. 6a and 6b show an alternative embodiment of the valve device 1, which nevertheless also corresponds to the above embodiment in large parts, such that, in this respect, reference is made to the above description. The essential difference is that the valve device 1 is suitable for arrangement directly in the fitting arm 10.2 and thus immediately before the water's exit point. In this embodiment, the valve

outlet 4 is flattened and the fitting outlet 10.21, designed as a flow regulator, is integrated directly into the valve outlet 4. It is not necessary, in this respect, to connect the valve outlet 4 to the fitting outlet 10.21, as shown in Figs. 5a and 5b, but rather such that the end of the valve outlet 4 itself constitutes part of the fitting 10.

5 This embodiment offers the advantage that, during stagnation flushing, all the water can preferably be replaced before the fitting outlet 10.21, whereas with the arrangement of the valve device 1 in the fitting body 10.1, the line between the valve device 1 and/or the flushing valve 7 and the fitting outlet 10.21 is comparatively long and germs and deposits can possibly build up there. On the other hand, in this case, the valve
10 arm 10.2 must nevertheless be of a sufficient size to accommodate the valve device 1.

Reference symbols:

	1	Valve device
	2	Valve housing
	2.1	Installation position
5	2.2	Installation position
	2.3	Diaphragm holder
	2.4	Diaphragm holder
	3	Valve inlet
	4	Valve outlet
10	4.1	Line connection
	5	Extraction valve
	5.1	Valve seat
	5.2	Diaphragm
	5.3	Pressure chamber
15	5.4	Control unit
	5.41	Interface
	5.5	Pilot channel
	5.6	Pilot valve
	5.61	Pilot valve seat
20	5.62	Pilot valve closing element
	5.7	Valve cover
	6	Flushing outlet
	6.1	Line connection
	7	Flushing valve
25	7.1	Valve seat
	7.2	Diaphragm
	7.3	Pressure chamber
	7.4	Control unit
	7.5	Pilot channel
30	7.6	Pilot valve
	7.61	Pilot valve seat
	7.62	Pilot valve closing element
	7.7	Valve cover

	10	Fitting
	10.1	Fitting body
	10.11	Mounting area
	10.2	Fitting arm
5	10.21	Fitting outlet
	10.3	Actuating element
	20	Return
	30	Supply line
	40	Siphon
10	50	Washbasin
	A	Outflow direction
	B	Actuation axis
	E	Inflow direction
	HV	Main valve axis
15	HS	Main switching axis
	S	Flushing direction

Patentkrav

1. Ventilindretning til anvendelse i et armatur (10) med et ventilindløb (3), der kan gennemstrømmes i en indstrømningsretning (E), et ventiludløb (4) til udtagning af brugsvand, der kan gennemstrømmes i en udstrømningsretning (A),
5 og en i strømningsvejen mellem ventilindløbet (3) og ventiludløbet (4) anbragt udtagningsventil (5) til frigivelse af strømningsvejen, der kan aktiveres af sit eget medium, med et skylleudløb (6), der kan gennemstrømmes i en skylleretning (S), idet der i strømningsvejen mellem ventilindløbet (3) og skylleudløbet (6) er anbragt en skylleventil (7) til frigivelse af strømningsvejen, **kendetegnet ved,**
10 **at** indstrømningsretningen (E) og skylleretningen (S) er anbragt modsat hinanden.
2. Ventilindretning ifølge krav 1, **kendetegnet ved** et ventilhus (2), der rummer ventilindløbet (3), ventiludløbet (4) og skylleudløbet (6).
15
3. Ventilindretning ifølge krav 2, **kendetegnet ved, at** ventilhuset (2) har et første ventilsæde (5.1) til udtagningsventilen (5) og et andet ventilsæde (7.1) til skylleventilen (7).
- 20 4. Ventilindretning ifølge et af de foregående krav, **kendetegnet ved, at** skylleventilen (7) er udformet som ventil, der kan aktiveres af sit eget medium.
5. Ventilindretning ifølge et af kravene 2 til 4, **kendetegnet ved, at**
25 udtagningsventilen (5) og skylleventilen (7) er forbundet aftageligt med ventilhuset (2).
6. Ventilindretning ifølge et af de foregående krav, **kendetegnet ved, at** skylleventilen (7) kan betjenes over en magnetbetjening.
30
7. Ventilindretning ifølge et af kravene 2 til 6, **kendetegnet ved, at** ventilhuset (2) har en rilleformig membranholder (2.3, 2.4) til hver membran (5.2, 7.2), i hvilken den pågældende membran (5.2, 7.2) kan holdes.

8. Ventilindretning ifølge et af de foregående krav,
kendetegnet ved, at udtagningsventilen (5) og/eller skylleventilen (7) har et ventildæksel (5.7, 7.7), og en pågældende membran (5.2, 7.2) er opspændt mellem ventildækslet (5.7, 7.7) og ventilhuset (2).

5

9. Ventilindretning ifølge et af de foregående krav,
kendetegnet ved, at ventilindløbet (3) og ventiludløbet (4) er anbragt på over for hinanden liggende sider.

10 **10.** Ventilindretning ifølge et af de foregående krav, **kendetegnet ved** en parallelt med indstrømningsretningen (E) og/eller udstrømningsretningen (A) anbragt hovedventilakse (HV), idet udtagningsventilen (5) og skylleventilen (7) ligger over for hinanden med hensyn til hovedventilaksen (HV).

15 **11.** Ventilindretning ifølge krav 10, **kendetegnet ved, at** udtagningsventilens (5) og/eller skylleventilens (7) membran (5.2, 7.2) ved åbning og ved lukning bevæger sig vinkelret på hovedventilaksen (HV).

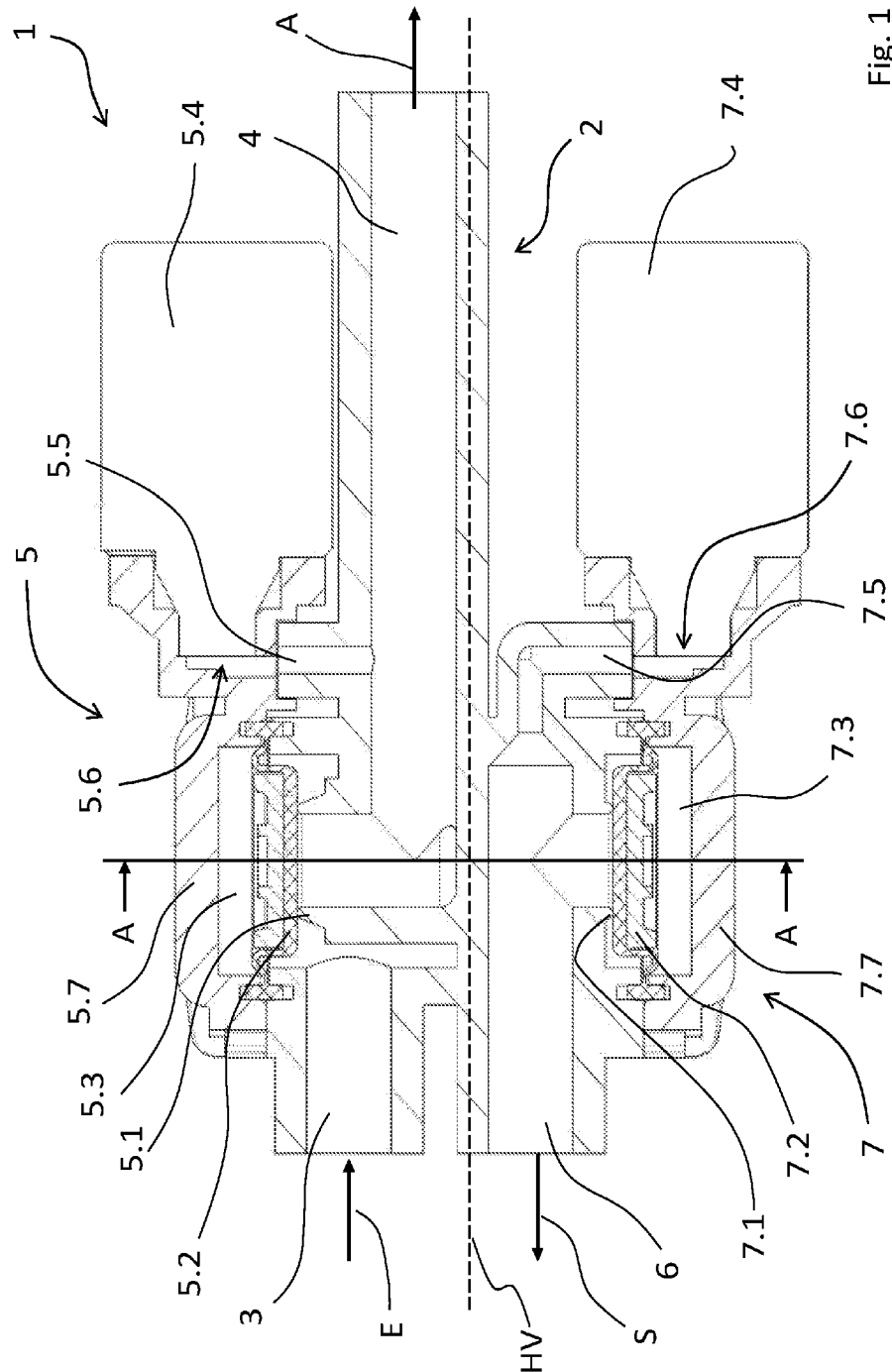
12. Armatur, især vaskebordsarmatur, med en ventilindretning (1) ifølge et af
20 kravene 1 til 11.

13. Armatur ifølge krav 12, **kendetegnet ved** en armaturarm (10.2) med et armaturudløb (10.21), hvor ventilindretningen (1) er anbragt i armaturarmen (10.2).

25

14. Armatur ifølge et af kravene 12 eller 13, **kendetegnet ved, at** ventiludløbet (4) er forbundet med et armaturudløb (10.21), og skylleudløbet (6) er forbundet med en tilbageføring (20) til forbindelse med en sifon (30).

30



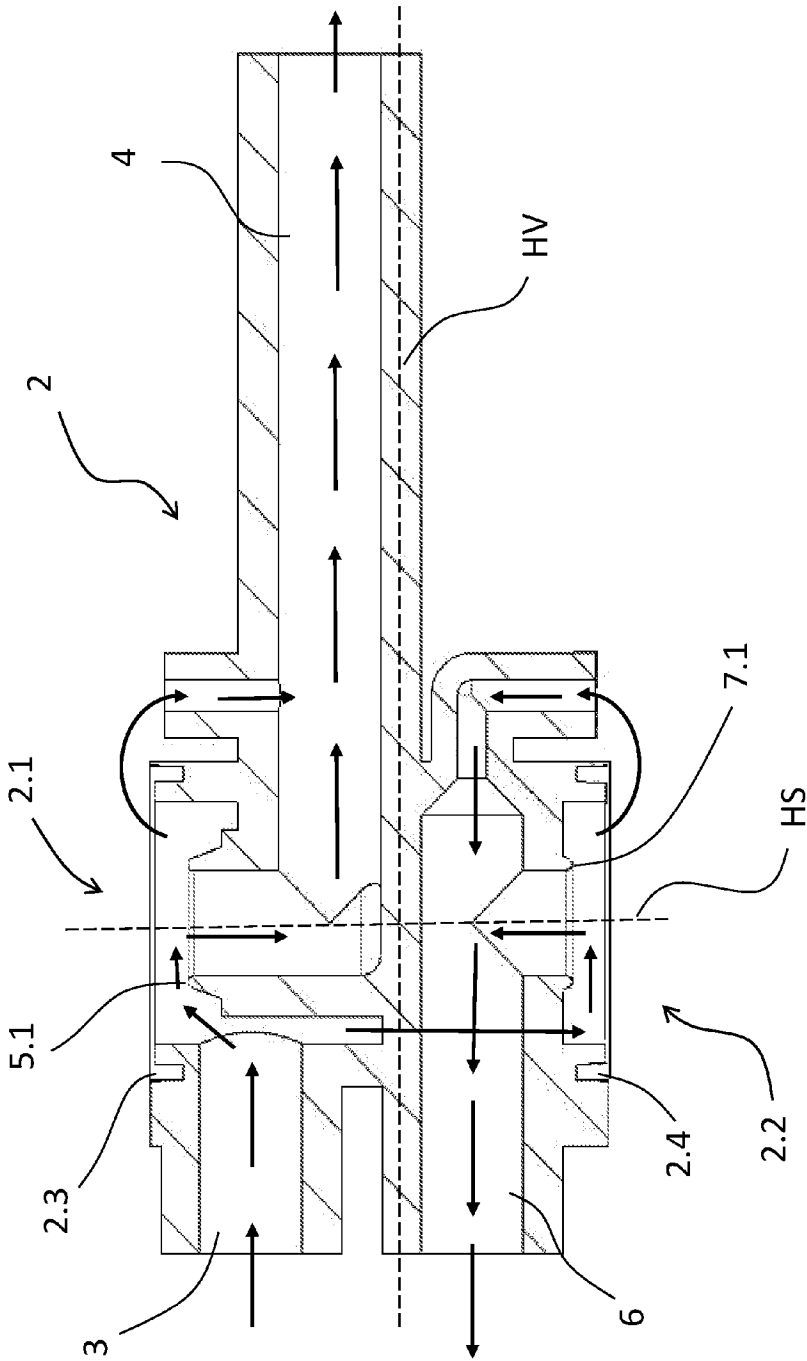


Fig. 2

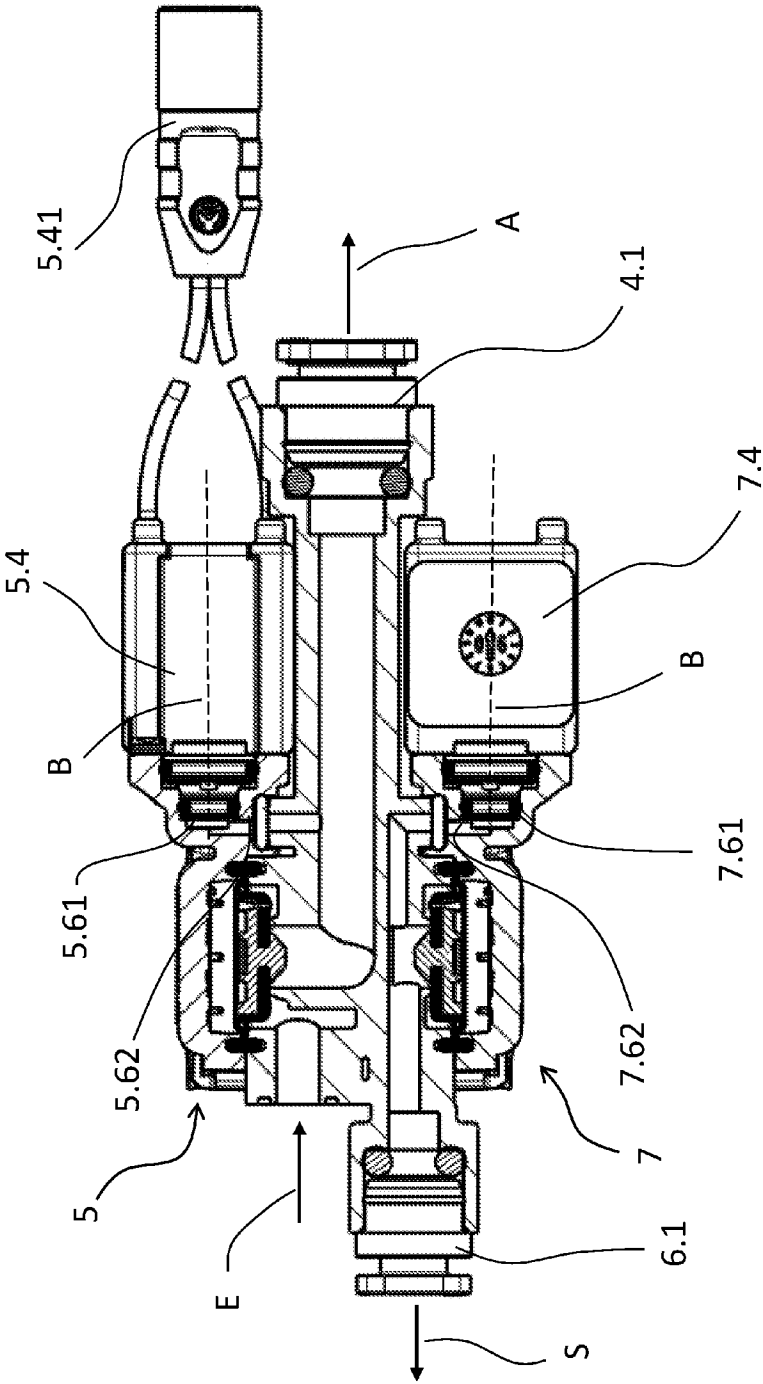
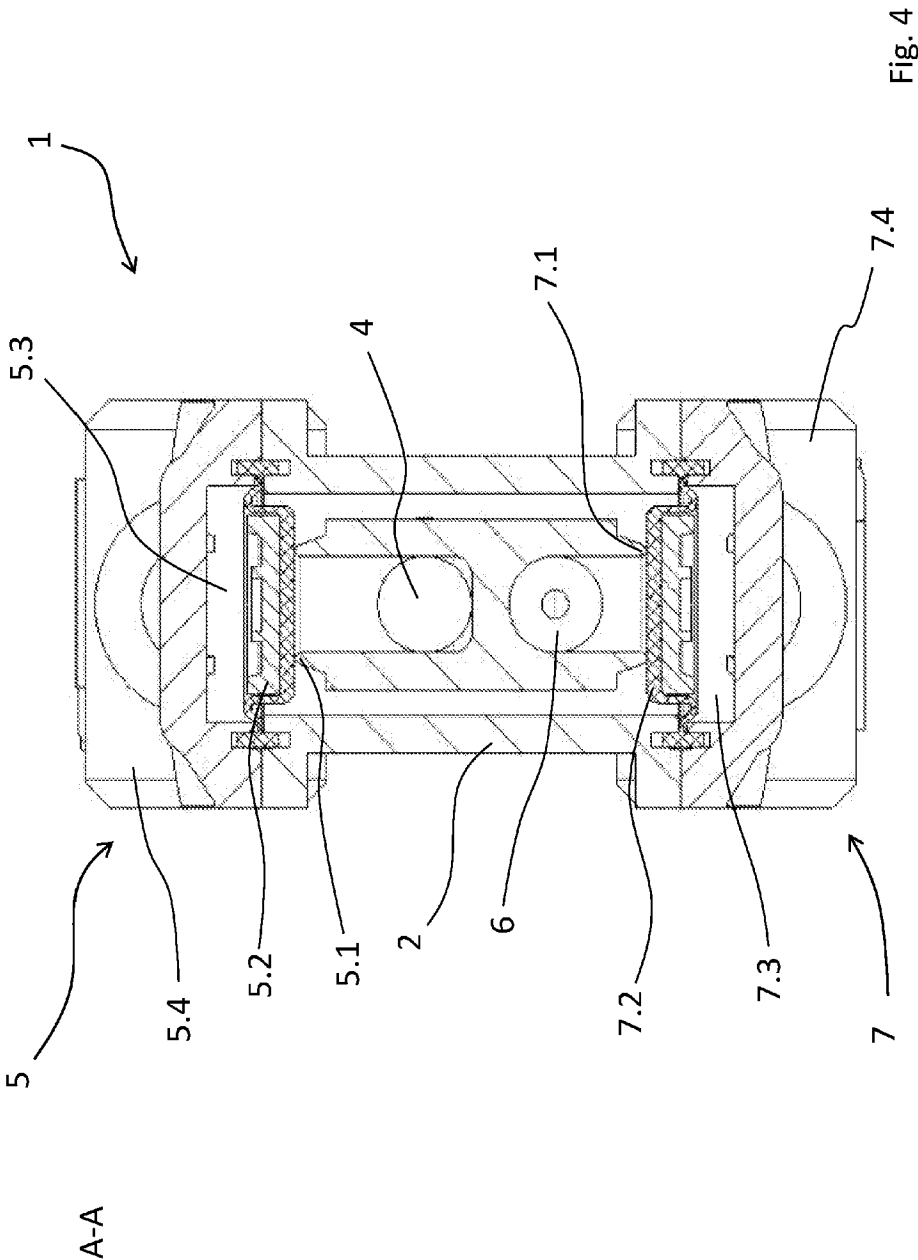


Fig. 3



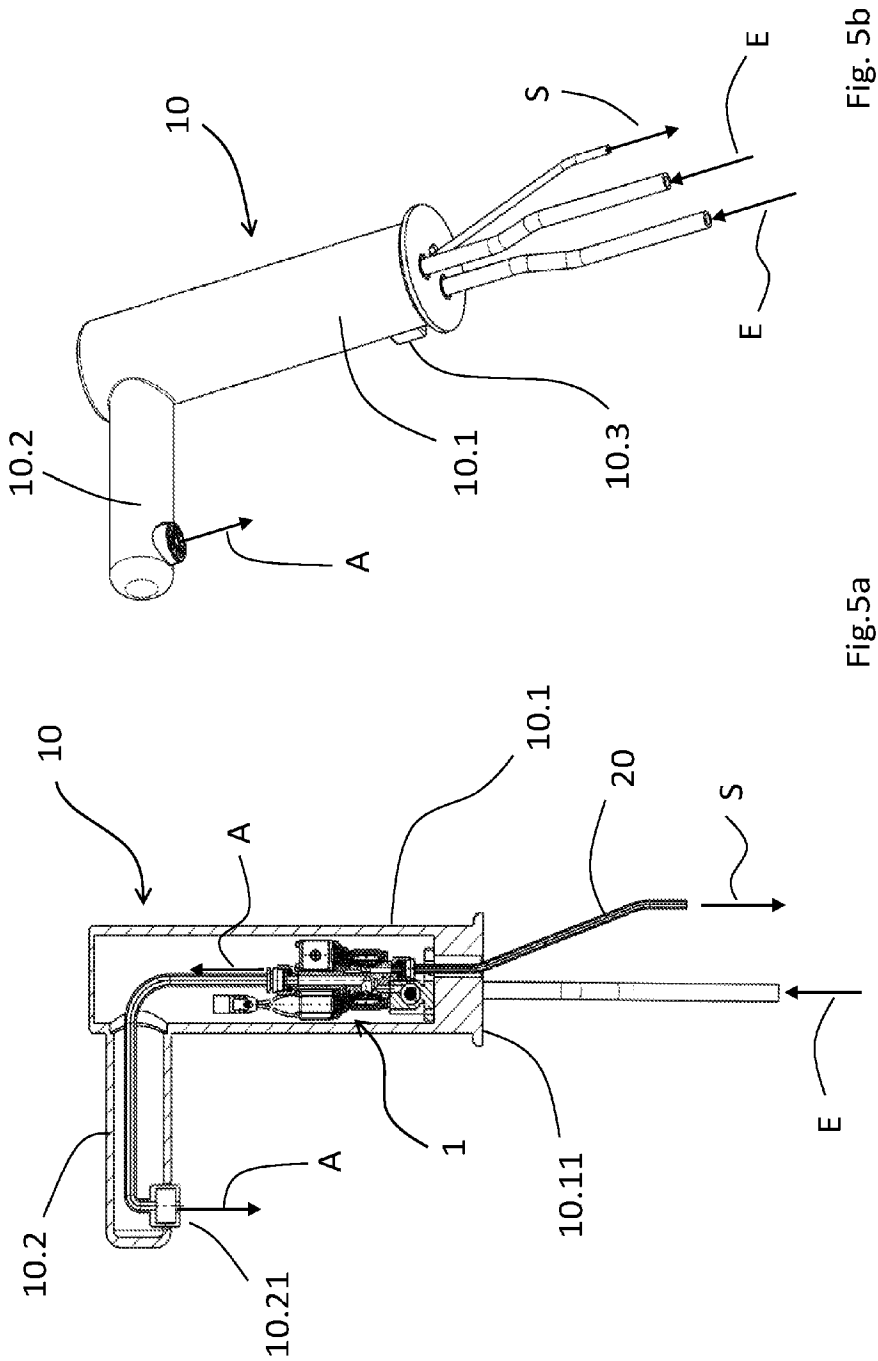
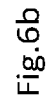
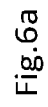


Fig. 5a

Fig. 5b



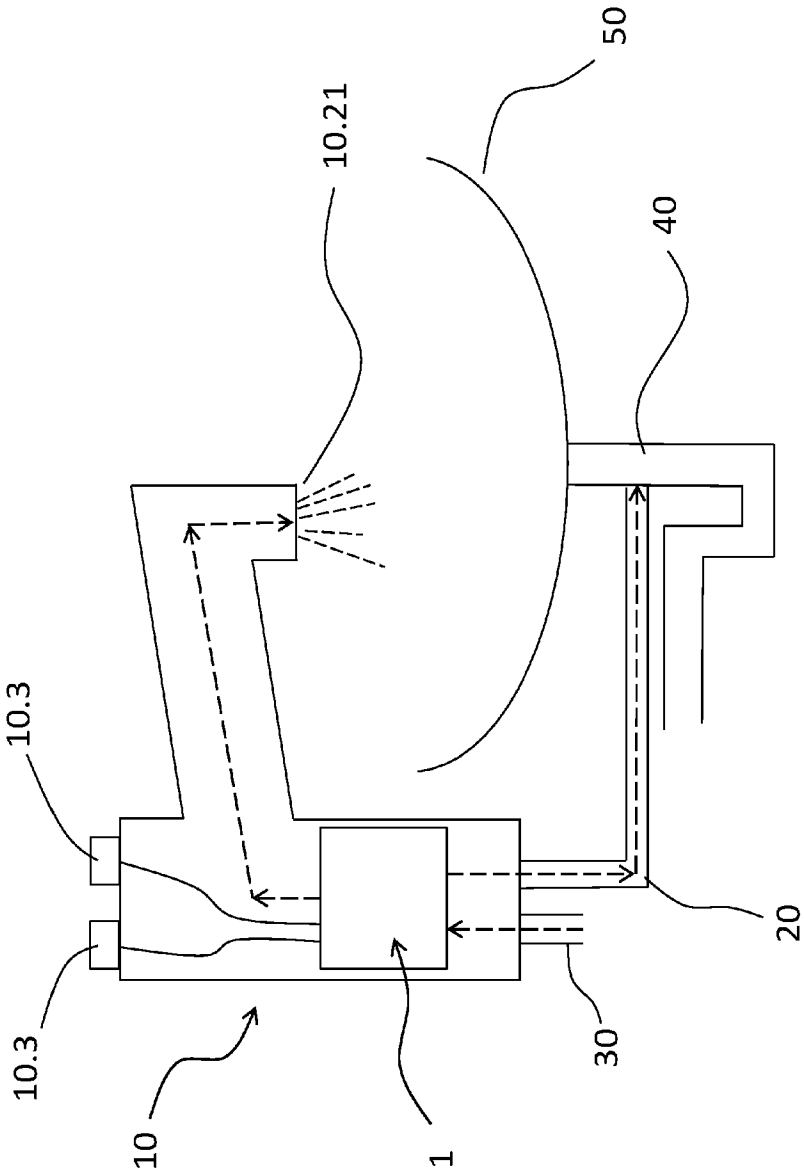


Fig.7