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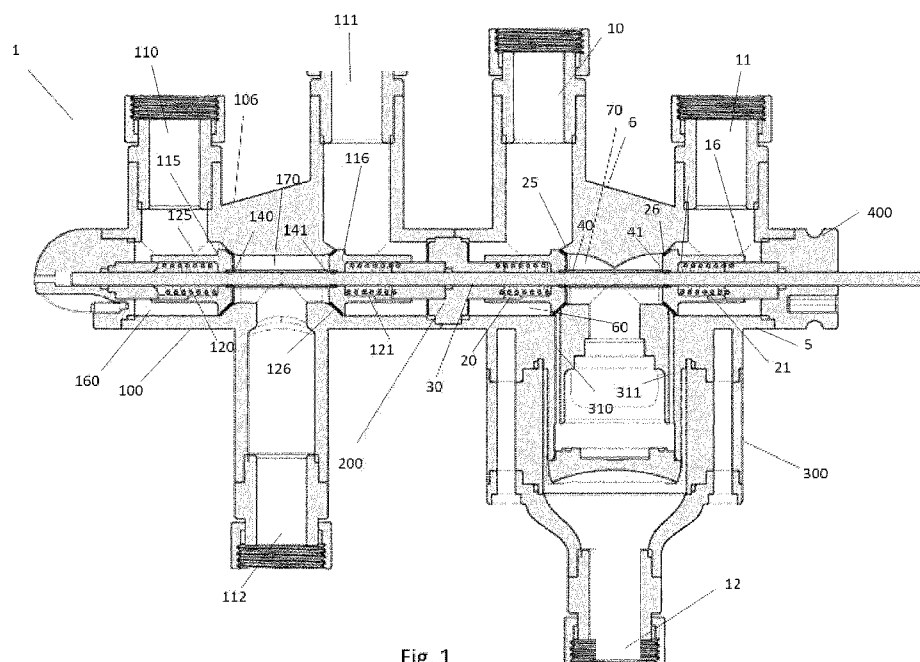


Fig. 1

(57) Abstract: A multi-way valve (1) with a first valve housing (6) defining a first hollow (60) and including a first valve (5), a first fluid connection (10), a second fluid connection (11) and a third fluid connection (12), and where, - a first fluid passage is formed between the first fluid connection (10) and the third fluid connection (12), which passage can be closed by a valve body (15, 16), and - where a second fluid passage is formed between the second fluid connection (11) and the third fluid connection (12), which passage can be closed by a valve body (15, 16), and - an actuating element (30) that is moveable such that when the actuating element (30) is moved from the central position into the first direction, the valve body (15, 16) is moved by in closing direction relative to the first valve seat (25) and when the actuating element (30) is moved into the opposite second direction the valve body (15, 16) is moved in closing direction relative to the second valve seat (26), where the first valve (1) connected to a pressure regulating valve (300) such that

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the first fluid passage from respectively the first fluid connection (10) to the third fluid connection (12) passes a pressure regulator valve opening defined by a pressure regulator valve seat (340) and pressure regulator valve element (350).

MULTI-WAY VALVE WITH PRESSURE REGULATING VALVE

BACKGROUND

5 Multi-way valves are used e.g. in cooling and heating systems, or other systems where one or more fluid flows are to be directed differently. In e.g. cooling and heating systems such a valve may be included to change between a cooling fluid and heating fluid to be passed to a cooling and heating circuit, e.g. for
10 domestic cooling and heating, HVAC systems etc.

It is known that such systems often observe changing pressures of different reasons, e.g. turning on and off cooling and heating devices. This lowers the efficiency of the system,

15 The present invention aims to overcome such problems.

SUMMARY OF THE INVENTION

20 The solution is as indicated in the claims, especially claim 1.

This includes introducing a multi-way valve with a first valve housing defining a first hollow and including a first valve, a first fluid connection, a second fluid connection and a third fluid connection, and where,

- 25 - a first fluid passage is formed between the first fluid connection and the third fluid connection, which passage can be closed by a valve body, and
- where a second fluid passage is formed between the second fluid connection and the third fluid connection, which passage can be closed by a valve body, and
- 30 - an actuating element that is moveable such that when the actuating element is moved from the central position into the first direction, the valve body is moved by in closing direction relative to the first valve seat and when the actuating element is moved into the opposite second

direction the valve body is moved in closing direction relative to the second valve seat,

characterized in that the first valve connected to a pressure regulating valve such that the first fluid passage from respectively the first fluid connection to the third fluid connection passes a pressure regulator valve opening defined by a pressure regulator valve seat and pressure regulator valve element.

The pressure regulating valve may comprise a first pressure conduit making pressure connecting from the first hollow to a second pressure chamber, and where the first valve seat and valve body forms the regulating valve for both the first fluid passage and the first pressure conduit.

The first pressure conduit may connect to the first hollow at a position within the first valve seat, or at least in a position such that the when the valve body is in the closing position relative to the first valve seat it also closes the respective first pressure conduit.

The pressure regulating valve may comprise a second pressure conduit making pressure connecting from the first hollow to the second pressure chamber, and where the second valve seat and valve body forms the regulating valve for both the second fluid passage and the second pressure conduit.

The second pressure conduit may connect to the first hollow at a position within the second valve seat, or at least in a position such that the when the valve body is in the closing position relative to the second valve seat it also closes the respective second pressure conduit.

The first and second pressure conduits may be positioned in fluid connection to a first intermediate chamber formed between the respective first and second valve seats, and where the valve body are positioned outside the first intermediate chamber.

The first pressure conduit and the second pressure conduit each may connect the first hollow at a position outside the first intermediate chamber.

5 The first pressure conduit and second pressure conduit may be closed independently.

The first pressure conduit may open when the first fluid passage is open, whereas second pressure conduit is closed, correspondingly the second fluid passage is closed, and where the second pressure conduit then is open when
10 the second fluid passage is open, whereas first pressure conduit is closed, correspondingly the first fluid passage is closed.

In an embodiment the second pressure chamber is formed at one side of a diaphragm connected to the pressure regulating valve element, and where a
15 first pressure chamber is positioned at the opposite side of the diaphragm and where the first pressure chamber is in pressure communication with one side of the first valve seat and the second pressure chamber is via the first pressure conduit in pressure communication with the other side of the first valve seat.

20 The valve may include a biasing element arrangement arranged such that it pushes the valve body towards respective first and second valve seats.

The valve body may form a first valve body and a second valve body, and where said first fluid passage can be closed by the first valve body, and where
25 said second fluid passage can be closed by the second valve body.

In an embodiment the actuating element is moveable from a central position into two opposite directions, such that when the actuating element is moved from the central position into the first direction, the first valve body is moved by
30 in closing direction relative to the first valve seat and when the actuating element is moved into the opposite second direction the second valve body is moved in closing direction relative to the second valve sat.

The actuating element may be moveable from a central position into two opposite directions by a rotation.

The actuating element may moveable from a central position into two opposite
5 directions by a translocation on a direction parallel to the extension of the actuating element.

FIGURES

10 Fig. 1 An embodiment multi-way valve including a pressure regulating valve.

15 Fig. 2 Illustration of a pressure regulating valve according to an embodiment of the present invention.

Fig. 3 Details of the closing valves of a multi-way valve.

DETAILED DESCRIPTION OF THE INVENTION

20 It should be understood, that the detailed description and specific examples, while indicating embodiments of the invention, are given by way of illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from the detailed
25 description.

30 Fig. 1 illustrates an embodiment multi-way valve (1) with a first valve housing (6) defining a first hollow (60). A first valve (5) is positioned in the first hollow (60) and is in fluid connection to a first fluid connection (10), a second fluid connection (11) and a third fluid connection (12). A first fluid passage connects the first fluid connection (10) and the third fluid connection (12) via a first intermediate chamber (70), which passage can be closed by a first valve body (15). Further, a second fluid passage connects the second fluid connection (11)

and the third fluid connection (12) via the first intermediate chamber (70), which passage can be closed by a second valve body (16).

The first intermediate chamber (70) thus may be formed between the first (25) and second (26) valve seats and be directly connected to the third fluid connection (12).

A first spring arrangement (20, 21) is positioned with a first spring (20) in connection with the first valve body (15) and a second spring (21) in connection with the second valve body (16), the first spring arrangement (20, 21) pushing the first (15) and second (16) valve bodies towards respective a first (25) and second (26) valve seats.

An actuating element (30) is connected to the first (15) and second (16) valve bodies and is moveable from a central position into two opposite directions. When the actuating element (30) is moved from the central position into the first direction, the first valve body (15) is moved by in closing direction relative to the first valve seat (25) and when the actuating element is moved into the opposite second direction the second valve body (16) is moved in closing direction relative to the second valve seat (26).

In one embodiment this is ensured by respectively a first carrier (40) and second carrier (41). The first (40) and/or second (41) carrier may be formed by projections or one or more widened sections of the actuating element (30) positioned between the first (15) and second (16) valve bodies. The first (15) and/or second (16) valve bodies then are connected to the actuating element (30) such that they can slide along it in the direction from the respective first (40) and/or second (41) carrier in the respective first and second directions.

The first (40) and/or second (41) carrier are formed such that the first (15) and second (16) valve bodies cannot pass the respective first (40) and/or second (41) carrier. This gives, when the actuating element (30) moves into the second direction, the first carrier (40) contacts the first valve body (15) pushing it

against the tension of the connected first spring (20) and away from the closing position where it contacts the first valve seat (25). The first valve body (15) thus by the first carrier (40) is pushed into an open position allowing fluid flow between the first (10) and third (12) fluid connections. The second valve body (16) is unaffected by the movement into the second direction of the actuating element (30) in the sense the second carrier (41) is moved away from the second valve body (16), the connected second spring (20) still pushing it in the closing direction where it contacts the second valve seat (26).

In the same manner, when the actuating element (30) moves into the first direction, the second carrier (41) contacts the second valve body (16) pushing it against the tension of the connected second spring (21) and away from the closing position where it contacts the second valve seat (26). The second valve body (16) thus by the second carrier (41) is pushed into an open position allowing fluid flow between the second (11) and third (12) fluid connections. The first valve body (15) is unaffected by the movement into the first direction of the actuating element (30) in the sense the first carrier (40) is moved away from the first valve body (15), the connected first spring (20) still pushing it in the closing direction where it contacts the first valve seat (25).

The multi-way valve (1) may further comprise a second valve housing (106) with a second valve (105) positioned in a second hollow (160) and is in fluid connection to a third fluid connection (110), a fifth fluid connection (1) and a sixth fluid connection (112). A third fluid passage connects the third fluid connection (110) and the sixth fluid connection (112) via a second intermediate chamber (170), which passage can be closed by a third valve body (115). Further, a fourth fluid passage connects the fifth fluid connection (111) and the sixth fluid connection (112) via the second intermediate chamber (170), which passage can be closed by a fourth valve body (116).

The second intermediate chamber (170) thus may be formed between the third (125) and fourth (126) valve seats and be directly connected to the sixth fluid connection (112).

A second spring arrangement (120, 121) is positioned with a third spring (120) in connection with the third valve body (115) and a fourth spring (121) in connection with the fourth valve body (116), the second spring arrangement
5 (120, 121) pushing the third (115) and fourth (116) valve bodies towards respective a third (125) and fourth (126) valve seats.

The actuating element (30) is in addition to the first (15) and second (16) valve bodies also connected to the third (115) and fourth (116) valve bodies. When
10 the actuating element (30) is moved from the central position into the first direction, the third valve body (115) is moved by in closing direction relative to the third valve seat (125) and when the actuating element is moved into the opposite second direction the fourth valve body (116) is moved in closing direction relative to the fourth valve sat (126).

15 In one embodiment this is ensured by respectively a third carrier (140) and a fourth carrier (141). The third (140) and/or fourth (141) carrier may be formed by projections or one or more widened sections of the actuating element (30) positioned between the third (115) and fourth (116) valve bodies. The third
20 (115) and/or fourth (116) valve bodies then are connected to the actuating element (30) such that they can slide along it in the direction from the respective third (140) and/or fourth (141) carrier in the respective first and second directions.

25 The third (140) and/or fourth (141) carrier are formed such that the third (115) and fourth (116) valve bodies cannot pass the respective third (140) and/or fourth (141) carrier. This gives, when the actuating element (30) moves into the second direction, the third carrier (140) contacts the third valve body (115) pushing it against the tension of the connected third spring (120) and away from
30 the closing position where it contacts the third valve seat (125). The third valve body (115) thus by the third carrier (140) is pushed into an open position allowing fluid flow between the fourth (10) and sixth (12) fluid connections. The fourth valve body (116) is unaffected by the movement into the second direction

of the actuating element (30) in the sense the fourth carrier (141) is moved away from the fourth valve body (116), the connected fourth spring (121) still pushing it in the closing direction where it contacts the fourth valve seat (126).

5 In the same manner, when the actuating element (30) moves into the first direction, the fourth carrier (141) contacts the fourth valve body (116) pushing it against the tension of the connected fourth spring (121) and away from the closing position where it contacts the fourth valve seat (126). The fourth valve body (116) thus by the fourth carrier (141) is pushed into an open position
10 allowing fluid flow between the fifth (111) and sixth (112) fluid connections. The third valve body (115) is unaffected by the movement into the first direction of the actuating element (30) in the sense the third carrier (140) is moved away from the third valve body (115), the connected third spring (120) still pushing it in the closing direction where it contacts the third valve seat (125).

15 The first valve housing (6) and second valve housing (106) may connect with an end-surface against an end-surface and with the first hollow (60) aligned with the second hollow (160). The respective end-surfaces being open leaving the first hollow (60) and the second hollow (160) open to the externals before the
20 first valve housing (6) and second valve housing (106) are connected.

The same actuating element (30) positioned in both the first hollow (60) and the second hollow (160), and therefore both in the first valve housing (6) and second valve housing (106) crossing the connection position of the connected
25 end-surfaces.

One of the first valve housing (6) and second valve housing (106) may be open at the opposite end relative to the connected end-surface, where the actuating element (30), or part of it, may be introduced. After mounting of the actuating
30 element (30) this opening then is closed by a cover (400) connected to the first valve housing (6). The cover (400) may be formed with a through hole for the actuating element (30), which then reaches out of the multi-way valve (1) by the through hole to be connected e.g. to an actuator. Sealing elements like O-rings

etc. inside the through hole may contact the actuating element (30) sealing the connected first hollow (60) and the second hollow (160) from the externals.

Inside the first hollow (60) and the second hollow (160) is positioned a sealing separator and carrier (400), which may be positioned at the connection position of the connected end-surfaces of the first valve housing (6) and second valve housing (106), crossing this connection position, thus operating as a sealing of the connected valve housings (6, 106). In addition, the sealing separator and carrier (400) may be formed with a through hole for the actuating element (30).

Sealing elements like O-rings etc. inside the through hole may contact the actuating element (30) sealing the connected first hollow (60) from the second hollow (160).

The first valve housing (6) and second valve housing (106) may be connected in any manner, such as being welded, brazed or bolted together, assemble them with respectively external and internal threads or in any other manner. In one embodiment each of the first valve housing (6) and second valve housing (106) is formed with teeth interconnecting when assembled together, and where the teeth are recesses such than when the two valve housings (6, 106) are connected the combined recesses of the teeth form a recess at the full circumference. A crimping ring or material then could be positioned in the recesses holding the teeth, and thereby the first valve housing (6) and second valve housing (106) firmly together.

The multi-way valve (1) may be adapted to be connected to a flow circuit such that the first (10) and/or second (11) fluid connection forms part of a flow circuit with the fourth (110) and/or fifth (111) fluid connection.

In an embodiment the first valve (1) is connected to a pressure regulating valve (300) such that the passage from respectively the first (10) and second (11) fluid connections to the third fluid connection (12) passes a pressure regulator valve opening defined by a pressure regulator valve seat (340) and pressure regulator valve element (350).

Fig. 2 shows the pressure regulating valve (300) in more details. A pressure regulator inlet (320) is in fluidic connection to the first intermediate chamber (70) and to the third fluid connection (12) via flow path (330) passing the valve opening, where the first intermediate chamber (70) is in fluid communication with a first pressure chamber (301) formed at the first side of a diaphragm (360).

The pressure regulating valve (300) includes a first pressure conduit (310) and a second pressure conduit (311), each connecting the first hollow (60) to a second pressure chamber (302) which is formed at the second side of the diaphragm (360) connected to the pressure regulating valve element (350). In the illustrated embodiment a pressure biasing element (370) is positioned in connection to the pressure regulating valve element (350) tensioning it to define a balancing pressure. In the illustrated embodiment the direction of tension is in the opening direction of the pressure valve opening, but the reverse is also possible.

The one side of the diaphragm (360) then is in pressure connection to the first hollow (60) by the fluid in the second pressure chamber (302), and the opposing side is in pressure connection to the fluid in the pressure regulator inlet (320) by the fluid in the first pressure chamber (301). The relative changes in the pressures at the two opposing sides of the diaphragm (360) forms a changing differential pressure across the diaphragm (360) making it deflect. The pressure regulating valve element (350) is connected to the diaphragm (360) and is therefore shifted relative to the pressure regulator valve seat (340) changing the pressure regulator valve opening.

The first pressure conduit (310) and a second pressure conduit (311) each may connect the first hollow (60) at a position outside the first intermediate chamber (70). The first (310) and second (311) pressure conduits thus makes pressure communication from the side of respectively the first and second fluid passages before the first (25) and second (26) valve seats to the one side of the diaphragm (360). The opposing side being in pressure communication to the

pressure regulator inlet (320) corresponding to the first intermediate chamber (70), or after the respective first (25) and second (26) valve seats, seen in the flow direction from the respective first (10) and second (11) fluid connections to the third fluid connection (12). If the flow is in the direction from the third fluid connection (12) to the respective first (10) and second (11) fluid connections, the side before the first (25) and second (26) valve seats will be the one in the first intermediate chamber (70), and the other sides of the first (25) and second (26) valve seats correspondingly is after. The relevant part is that the two opposing sides of the diaphragm (360) is in fluid communication respectively to before and after the first (25) and second (26) valve seats.

In the illustrated embodiment the first pressure conduit (310) and a second pressure conduit (311) each may connect the first hollow (60) at a position within the respectively first (25) and second (26) valve seats, or at least in a position such that the when the respective first valve body (15) and second valve body (16) are in the closing position relative to the first (25) and second (26) valve seats, they also closes the respective first pressure conduit (310) and a second pressure conduit (311).

The respectively first (25) and second (26) valve seats and first (15) and second (16) valve bodies thus may form the regulating valves for both the first and second fluid passages and the respective first pressure conduit (310) and second pressure conduit (311). The first pressure conduit (310) and second pressure conduit (311) therefore can be closed independently. The first pressure conduit (310) then is open when the first fluid passage is open, whereas second pressure conduit (311) is closed, correspondingly the second fluid passage is closed. In the same manner, the second pressure conduit (311) then is open when the second fluid passage is open, whereas first pressure conduit (310) is closed, correspondingly the first fluid passage is closed.

The advantage is, that the only one of the first pressure conduit (310) second pressure conduit (311) is open to the one side of the diaphragm (360) at one time. The pressure of the fluid in relation to the other the first (310) or second

(310) thus is closed and does not make any tribute or influence of the pressure changes. This is relevant since the pressure of fluids in respectively the first fluid passage and second fluid passage may be different and fluctuate differently.

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Fig. 3 is an embodiment of the first valve body (15) and / or second valve body (16), where they are formed with inner spring hollows (500) to accommodate the springs (20, 21). The first spring (20) thus are positioned within a spring hollow (500) of the first valve body (15) and the second spring (21) in the spring hollow (500) of the second valve body (16). The third (120) and fourth (121) springs correspondingly may be positioned within spring hollows (500) of the respectively third (115) and fourth valve bodies (116). The springs (20, 21, 120, 120) in this manner is supported by the hollows (500).

Valve body supports (520) may be fixed in the first (60) and second (160) inner hollows, possible to e.g. the sealing separator and carrier (200) and cover (400), directly to the first (6) and second (106) valve housings etc. The valve body supports (520) reach into the spring hollows forming supports for the valve bodies (15, 16, 115, 116). The springs (20, 21, 120, 121) thus is confined between an upper side wall of the hollows (500) and the valve body supports (520) and may be fixed to the valve body supports (520).

The sealing separator and carrier (200) may be positioned in a combined inner recess (520) of the combined first (60) and second (160) hollows at the rim where they meet. Each of the first (6) and second (106) valve housings thus may be formed with a part of the recess at their rims together connecting to the inner recess (520) to fix the sealing separator and carrier (200) in position.

The flow path (330) and the respective first pressure (310) and second (311) pressure conduits are sealed from each other. The figures 1-3 are only for illustration and may not show all details like openings, sealing elements, separation walls etc.

Though the illustrated and described embodiments relate to a valve body (15, 16) formed of two individual valve bodies, the first valve body (15) and second valve body (16), in another embodiment they are integrated into a single share valve body (15, 16).

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Though the illustrated and described embodiments relate the actuating element (30) being moveable from a central position into two opposite directions by a translocation on a direction parallel to the extension of the actuating element (30), in a different embodiment the actuating element (30) is moveable from a

10 central position into two opposite directions by a rotation.

List of references:

- 15 1 - Multi-way valve
- 5 - First valve
- 6 - First valve housing
- 10 - First fluid connection
- 11 - Second fluid connection
- 20 12 - Third fluid connection/ fluid outlet
- 15 - First valve body
- 16 - Second valve body
- 20 - First spring
- 21 - Second arrangement
- 25 25 - First valve seat
- 26 - Second valve seat
- 30 - Actuating element
- 40 - First carrier
- 41 - Second carrier
- 30 60 – First hollow
- 70 - First intermediate chamber
- 100 - Second valve
- 106 - Second valve housing

- 110 - Fourth fluid connection
- 111 - Fifth fluid connection
- 112 - Sixth fluid connection
- 115 - Third valve body
- 5 116 - Fourth valve body
- 120 - Third spring
- 121 -Fourth spring
- 125 - Third valve seat
- 126 - Fourth valve seat
- 10 140 - Third carrier
- 141 - Fourth carrier
- 160 - Second hollow
- 170 - Second intermediate chamber
- 200 - Sealing separator and carrier
- 15 300 - Pressure regulating valve
- 301 – First pressure chamber
- 302 – Second pressure chamber
- 310 - First pressure conduit
- 311 - Second pressure conduit
- 20 320 - Pressure regulator inlet/ fluid inlet
- 330 - Flow path
- 340 - Pressure regulator valve seat
- 350 - Pressure regulating valve element
- 360 - Diaphragm
- 25 370 - Pressure biasing element
- 400 – Cover
- 500 – Spring hollow
- 510 - Valve body supports
- 520 - Inner recess

CLAIMS

Claim 1. A multi-way valve (1) with a first valve housing (6) defining a first hollow (60) and including a first valve (5), a first fluid connection (10), a second fluid connection (11) and a third fluid connection (12), and where,

- a first fluid passage is formed between the first fluid connection (10) and the third fluid connection (12), which passage can be closed by a valve body (15, 16), and
- where a second fluid passage is formed between the second fluid connection (11) and the third fluid connection (12), which passage can be closed by a valve body (15, 16), and
- an actuating element (30) that is moveable such that when the actuating element (30) is moved from the central position into the first direction, the valve body (15, 16) is moved by in closing direction relative to the first valve seat (25) and when the actuating element (30) is moved into the opposite second direction the valve body (15, 16) is moved in closing direction relative to the second valve seat (26),

characterized in that the first valve (1) connected to a pressure regulating valve (300) such that the first fluid passage from respectively the first fluid connection (10) to the third fluid connection (12) passes a pressure regulator valve opening defined by a pressure regulator valve seat (340) and pressure regulator valve element (350).

Claim 2. A multi-way valve (1) according to claim 1, wherein the pressure regulating valve (300) comprises a first pressure conduit (310) making pressure connecting from the first hollow (60) to a second pressure chamber (302), and where the first valve seat (25) and valve body (15, 16) forms the regulating valve for both the first fluid passage and the first pressure conduit (310).

Claim 3. A multi-way valve (1) according to claim 2, wherein the first pressure conduit (310) connects to the first hollow (60) at a position within the first valve seat (25), or at least in a position such that the when the valve body

(15, 16) is in the closing position relative to the first valve seat (25) it also closes the respective first pressure conduit (310).

Claim 4. A multi-way valve (1) according to claim 2 or 3, wherein the pressure regulating valve (300) comprises a second pressure conduit (311) making pressure connecting from the first hollow (60) to the second pressure chamber (302), and where the second valve seat (26) and valve body (15, 16) forms the regulating valve for both the second fluid passage and the second pressure conduit (311).

Claim 5. A multi-way valve (1) according to claim 4, wherein the second pressure conduit (311) connects to the first hollow (60) at a position within the second valve seat (26), or at least in a position such that the when the valve body (15, 16) is in the closing position relative to the second valve seat (26) it also closes the respective second pressure conduit (311).

Claim 6. A multi-way valve (1) according to claim 4 or 5, wherein first (311) and second (312) pressure conduits are positioned in fluid connection to a first intermediate chamber (70) formed between the respective first (25) and second (26) valve seats, and where the valve body (15, 16) are positioned outside the first intermediate chamber (70).

Claim 7. A multi-way valve (1) according to any of the claims 4-6, wherein the first pressure conduit (310) and the second pressure conduit (311) each connect the first hollow (60) at a position outside the first intermediate chamber (70).

Claim 8. A multi-way valve (1) according to any of the preceding claims 4-7, where the first pressure conduit (310) and second pressure conduit (311) are closed independently.

Claim 9. A multi-way valve (1) according to any of the preceding claims 4-8, wherein first pressure conduit (310) is open when the first fluid passage is

open, whereas second pressure conduit (311) is closed, correspondingly the second fluid passage is closed, and where the second pressure conduit (311) then is open when the second fluid passage is open, whereas first pressure conduit (310) is closed, correspondingly the first fluid passage is closed.

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Claim 10. A multi-way valve (1) according to any of the preceding claims, wherein the second pressure chamber (302) is formed at one side of a diaphragm (360) connected to the pressure regulating valve element (350), and where a first pressure chamber (301) is positioned at the opposite side of the diaphragm (360) and where the first pressure chamber (301) is in pressure communication with one side of the first valve seat (25) and the second pressure chamber is via the first pressure conduit (310) in pressure communication with the other side of the first valve seat (25).

15 Claim 11. Pressure regulating valve (300) according to any of the preceding claims, wherein then valve includes a biasing element arrangement (20, 21) is arranged that pushes the valve body (15, 16) towards respective first (25) and second (26) valve seats.

20 Claim 12. Pressure regulating valve (300) according to any of the preceding claims, wherein the valve body (15, 16) forms a first valve body (15) and a second valve body (16), and where said first fluid passage can be closed by the first valve body (15), and where said second fluid passage can be closed by the second valve body (16).

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Claim 13. Pressure regulating valve (300) according to claim 12, wherein the actuating element (30) is moveable from a central position into two opposite directions, such that when the actuating element (30) is moved from the central position into the first direction, the first valve body (15) is moved by in closing direction relative to the first valve seat (25) and when the actuating element is moved into the opposite second direction the second valve body (16) is moved in closing direction relative to the second valve sat (26).

30

Claim 14. Pressure regulating valve (300) according to any of the preceding claims, wherein the actuating element (30) is moveable from a central position into two opposite directions by a rotation.

- 5 Claim 15. Pressure regulating valve (300) according to any of the preceding claims, wherein the actuating element (30) is moveable from a central position into two opposite directions by a translocation on a direction parallel to the extension of the actuating element (30).

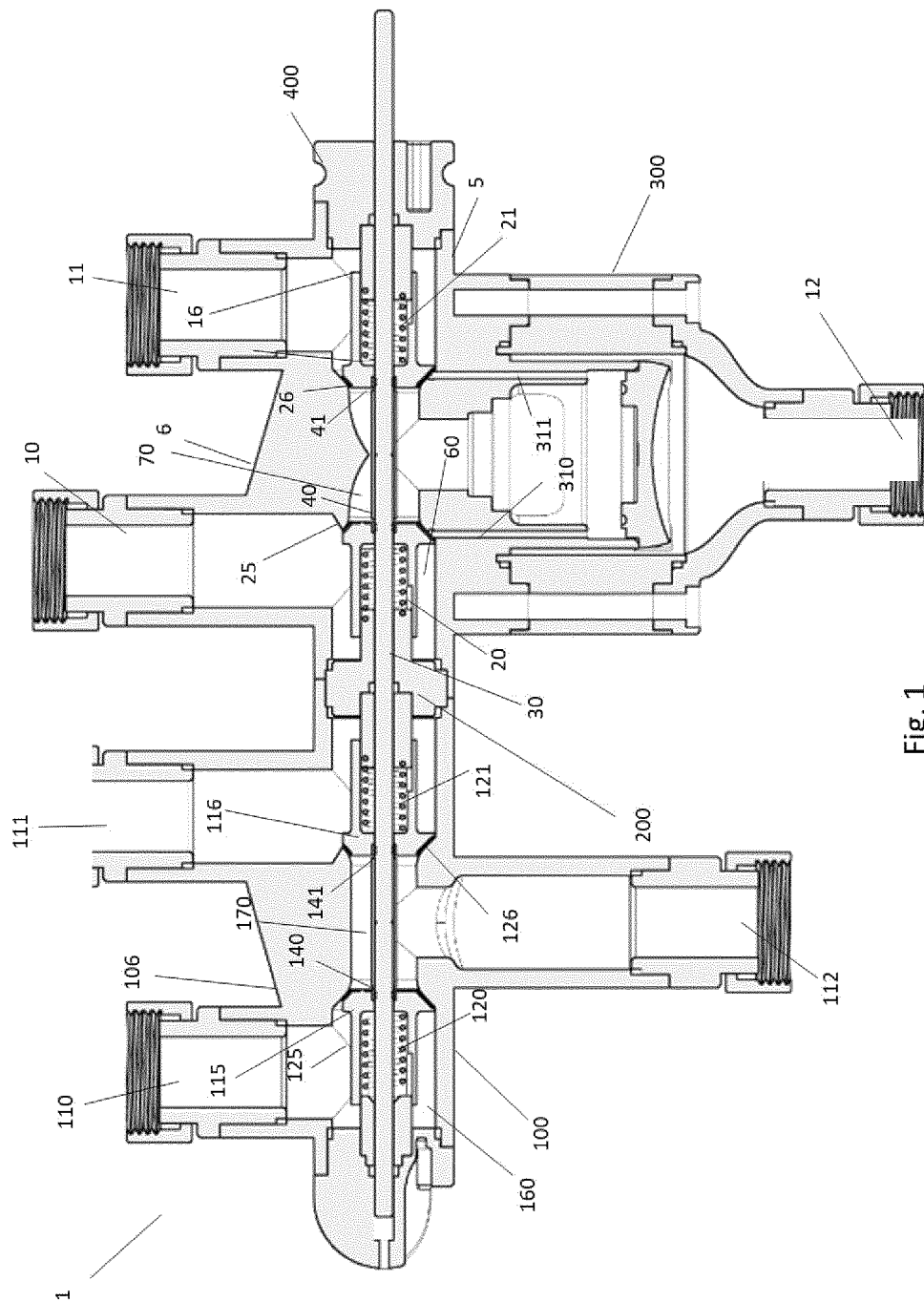


Fig. 1

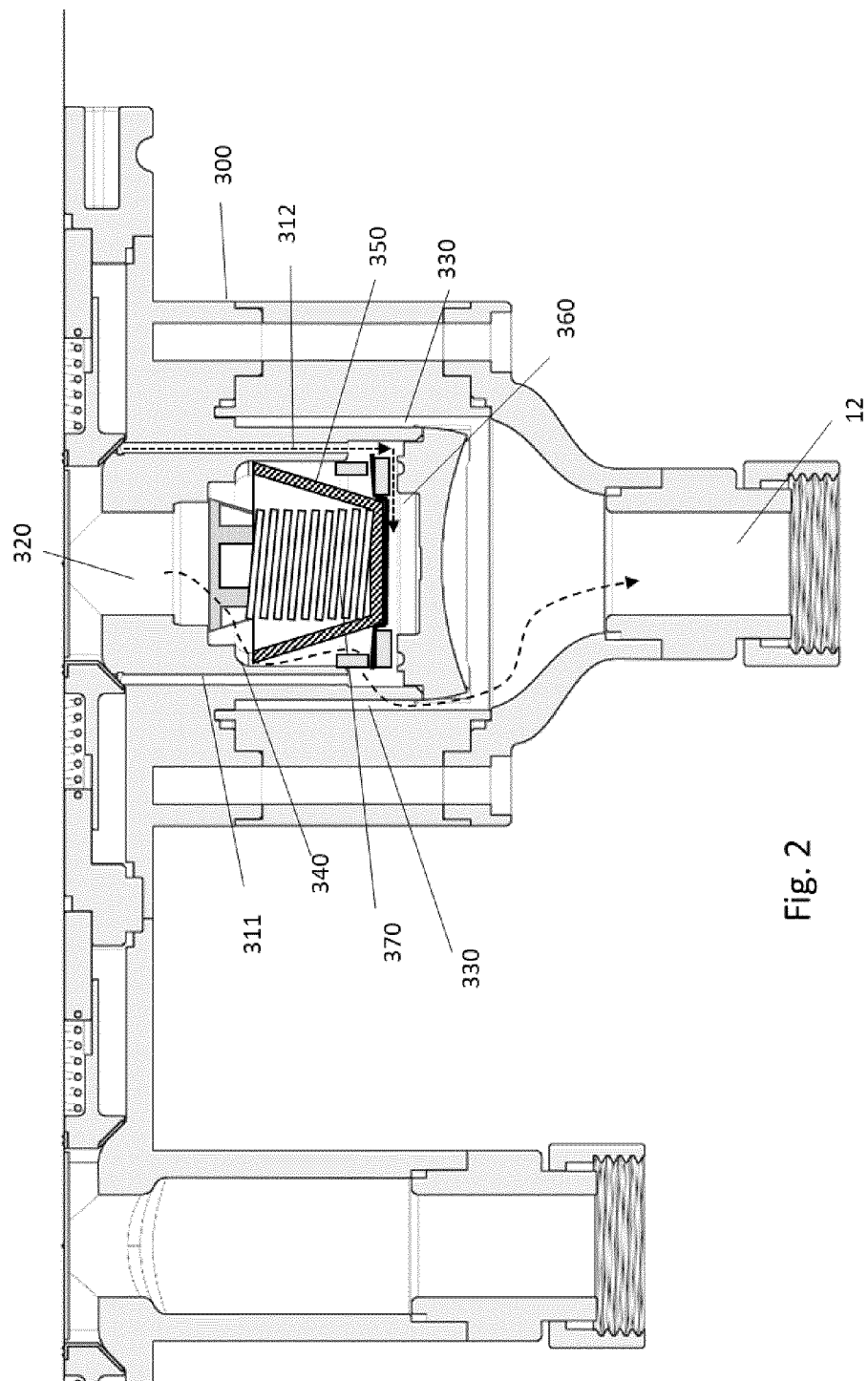


Fig. 2

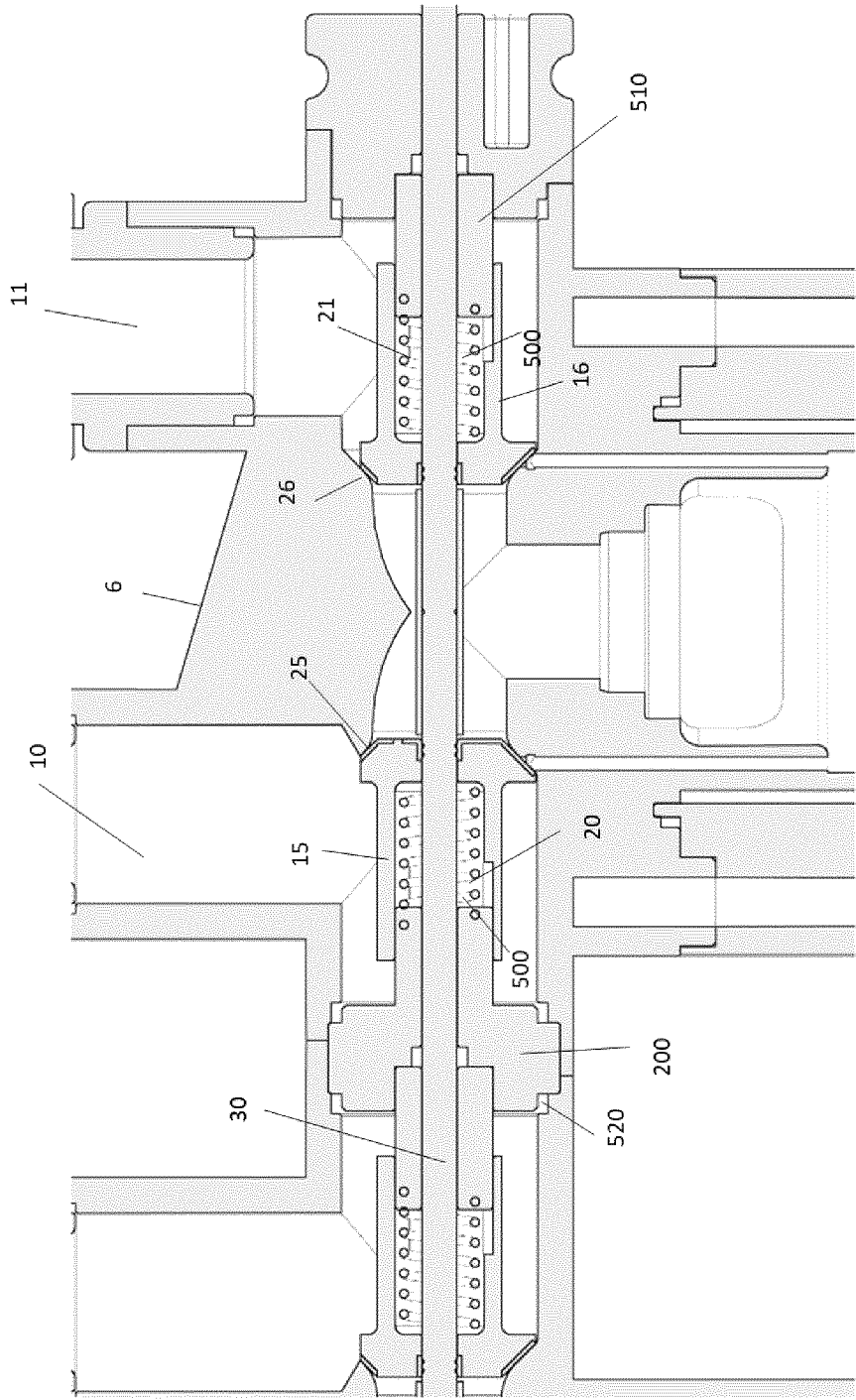


Fig. 3

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2021/087004

A. CLASSIFICATION OF SUBJECT MATTER INV. G05D16/10 ADD.		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) G05D		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPO-Internal, WPI Data		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2 091 939 A (BRIDGHAM EDNA R) 31 August 1937 (1937-08-31) claim 1; figures 1-3 -----	1-15
A	EP 0 726 511 A2 (FESTO KG [DE]) 14 August 1996 (1996-08-14) claims 1-12; figures 1,2 -----	1-15
A	US 2001/027900 A1 (WILCOX WILLIAM S [CA]) 11 October 2001 (2001-10-11) figures 1-12 -----	1-15
☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.		
* Special categories of cited documents : "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance;; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance;; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 8 April 2022		Date of mailing of the international search report 22/04/2022
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016		Authorized officer Camerer, Stephan

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2021/087004

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
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			US 5682918 A	04-11-1997
US 2001027900	A1	11-10-2001	US 2001027900 A1	11-10-2001
			WO 02101479 A2	19-12-2002