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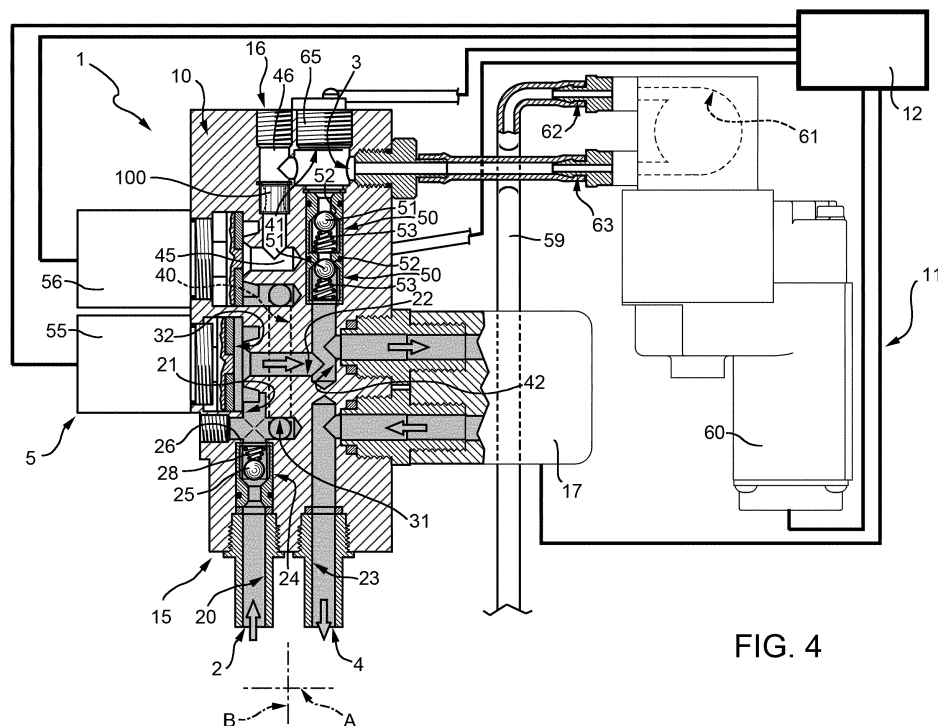
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(54) WASHING UNIT FOR A DISPENSING SYSTEM

(57) A unit (1) for washing a beverage dispensing system is described, comprising: a first inlet (2) which can be supplied with a first water-based fluid; a second inlet (3) which can be supplied with a sanitizing fluid; an outlet (4) that can be selectively run through by the first fluid or by a mixture of the first fluid and the second fluid; and valve means (5; 55, 56), which are selectively alternatively available: in a first configuration, in which they

connect in a fluid manner the first inlet (2) with the outlet (4) and isolate in a fluid manner the first inlet and the second inlet (2, 3), so as to dispense the first fluid through the outlet (4); or in a second configuration, in which they connect in a fluid manner the first inlet (2) with the second inlet (3) and with the outlet (4), so as to dispense the mixture of the first and second fluid through the outlet (4).

**FIG. 4****EP 3 067 311 A1**

Description

[0001] The present invention relates to a washing unit for a dispensing system, in particular suited to dispense a beverage, for example beer, wine or beverages like coca-cola or other soft drinks.

[0002] In a known way, the dispensing systems commonly used in commercial establishments essentially comprise:

- a tank removable and suited to contain the beverage;
- a plurality of dispensers suited to dispense the beverage; and
- a plurality of conduits and control valves interposed along the conduits to selectively dispense the beverage by means of respective conduits.

[0003] In order to periodically disinfect the dispensing system, first the tank is removed and respective closing devices are applied - known in the field as false heads - in a position closing the respective dispensers.

[0004] Afterwards, an operator manually supplies a first flow of water inside the conduits so as to rinse the conduits and the valves, thereafter supplies a mixture of water and a sanitizing substance so as to disinfect the aforesaid conduits and valves, and finally again the flow of only water is supplied to rinse the aforesaid conduits and valves.

[0005] Being performed manually, the washing operation of the dispensing system requires specialized personnel and the interruption of the correct operation of the dispensing system for a predetermined period of time, typically during the opening of the commercial business, thereby generating non negligible costs.

[0006] The need is felt in the field to wash the dispensing system so as to ensure the highest degree of sterility and, at the same time, to limit as much as possible the costs and time associated with said operation.

[0007] The object of the present invention is to produce a washing unit for a dispensing system, which satisfies the requirement specified above in a simple and inexpensive way.

[0008] Said object is achieved by the present invention in that it relates to a washing unit for a dispensing system as defined in claim 1.

[0009] For a better understanding of the present invention in what follows a preferred embodiment is described, purely by way of non-limiting example and with reference to the accompanying drawings, wherein:

- Figure 1 is a perspective view of a washing module for a dispensing system, according to the present invention;
- Figure 2 is a front view of the washing unit of Figure 1;
- Figure 3 is a bottom view of the washing unit of Figures 1 and 2;
- Figure 4 is a schematic and partially sectioned view of the washing unit of Figures from 1 to 3, in a first

operating configuration; and

- Figure 5 is schematic and partially sectioned view of the washing unit of Figures from 1 to 4, in a second operating configuration.

[0010] With reference to the attached figures, 1 indicates a washing unit for a dispensing system (not shown), suited to dispense, by way of a plurality of dispensers, a beverage, for example beer, wine or beverages like coca-cola or other soft drinks.

[0011] In particular, the dispensing system comprises essentially:

- a tank removable and suited to contain the beverage;
- a plurality of dispensers suited to dispense the beverage; and
- a plurality of conduits and control valves interposed along the conduits to selectively dispense the beverage by way of respective conduits.

[0012] The unit 1 is suited to automatically perform a cycle of double rinse, double disinfection and final rinse of the conduits and valves of the dispensing system, once the tank containing the beverage is disconnected from the dispensing system and the dispensers of the dispensing system are closed with respective closing devices.

[0013] Advantageously, the unit 1 comprises (Figures 4 and 5):

- an inlet mouth 2, suited for being supplied with a flow of water;
- an inlet mouth 3, suited for being supplied with a flow of a sanitizing fluid;
- an outlet mouth 4, from which a mixture of water and sanitizing substance flows out and which is connected with the conduits and valves of the dispensing system during a disinfection operation thereof; and
- valve means 5, which are selectively alternately arranged:

in a first configuration (Figure 4), wherein they connect in a fluid manner the inlet mouth 2 with the outlet mouth 4 and

they isolate in a fluid manner the inlet mouth 2 and the inlet mouth 3 from each other, so as to dispense water through the outlet mouth 4; or

in a second configuration (Figure 5), wherein they connect in a fluid manner the inlet mouth 2 with the inlet mouth 3 and with the outlet mouth 4, so as to dispense a mixture of water and sanitizing fluid through the outlet mouth 4.

[0014] The unit 1 is suited to perform upon the dispensing system a washing cycle comprising the steps of:

- arranging the valve means 5 in the first configuration, so as to perform a rinsing step with water only;
- arranging the valve means 5 in the second configuration,

ration, so as to perform a disinfecting step and with the water and sanitizer mixture; and

- arranging the valve means 5 again in the first configuration, so as to perform a rinsing step with water only.

[0015] The rinsing and disinfection steps are repeated twice, each time one after the other.

[0016] In greater detail, the unit 1 comprises:

- a casing 10, which defines the inlet mouths 2, 3 and the outlet mouth 4;
- an assembly 11, which is suited to withdraw the disinfectant from a tank (not shown) and to supply the same to the inlet mouth 3; and
- a control unit 12 (visible only in Figures 4 and 5), which is functionally connected with the valve means 5 and is programmed to arrange the valve means 5 themselves selectively in the first or in the second configuration.

[0017] The casing 10 comprises, in turn:

- a fluid line 15, which is run through by water, when the valve means 5 are in the first configuration;
- a fluid line 16, which is run through in part by water and in part by water and sanitizer mixture, when the valve means 5 are in the second configuration;
- the valve means 5; and
- a flow rate gauge 17.

[0018] More precisely, the fluid line 15 extends between the inlet mouth 2 and the outlet mouth 4, thus bypassing the inlet mouth 3.

[0019] The fluid line 15 comprises, in turn, proceeding according to the progressing water direction from the inlet mouth 2 to the outlet mouth 4:

- a conduit 20, which defines the inlet mouth 2;
- a chamber 21, to which the conduit 20 is facing and which can be selectively obstructed or left free by the valve means 5;
- a conduit 22; and
- a conduit 23, which defines the outlet mouth 4.

[0020] The fluid line 15 also comprises a non-return valve 24 (Figure 4) interposed along the conduit 20.

[0021] In the illustrated embodiment, the non-return valve 24 comprises, in turn:

- a spherical shutter 25, in the example shown, movable inside the conduit 20 between a closed position in which it abuts against a shoulder 26 of the conduit 20 and an open position in which it is spaced from the shoulder 26 and leaves free, therefore, a passage space for the water inside the conduit 20; and
- an elastic element 28, a helical spring in the example shown, which is interposed between the shutter 25

and a fixed wall of the conduit 20.

[0022] The shutter 25 is interposed, along the conduit 20, between the elastic element 28 and the inlet mouth 2.

[0023] In this way, the non-return valve 24 is configured to allow the flow of water from the inlet mouth 2 towards the chamber 21 and to prevent the return flow of water in the opposite direction.

[0024] The chamber 21 comprises, in turn:

- a portion 31, inside which the conduit 20 is open and connected in a fluid manner with the fluid line 16; and
- a portion 32, which is connectable in a fluid and selective manner with the conduit 22, by way of the valve means 5 as will be explained in more detail in the following description. In the example shown, the conduits 20, 23 and the portion 32 extend parallel to an axis A, which is, in use, arranged vertically; and the portion 31 and the conduit 22 extend parallel to an axis B, which is orthogonal to the axis A and is, in use, arranged horizontally.

[0025] The fluid line 16 extends from the chamber 21 up to the conduit 23 through the inlet mouth 3 and bypassing the conduit 22.

[0026] The fluid line 16 comprises, in turn, proceeding according to the progressing direction of water and water and sanitizer mixture:

- a conduit 40, inside which the portion 31 of the chamber 21 opens;
- a conduit 41, inside which the inlet mouth 3 of the sanitizer opens; and
- a conduit 42, which extends between the conduit 41 and the conduit 22, and is also in fluid communication with the conduit 23.

[0027] The conduit 41 comprises, in turn, proceeding from the conduit 40 towards the conduit 42:

- a portion 44, which can be selectively obstructed or left free by the valve means 5;
- a portion 45; and
- a portion 46 inside which the inlet mouth 3 opens.

[0028] The conduit 41 houses, in addition, a flow regulator 100 (Figures 5 and 6), which is arranged at the interface between the portions 45, 46.

[0029] The flow regulator 100 is a constriction, suited to allow the passage from the portion 45 to the portion 46 of the correct water flow rate to be mixed with the sanitizer inside the portion 46.

[0030] It is important to note that flow regulators 100 suited to allow the passage of different water flow rates towards the portion 46 may be used to regulate the proportions of water and sanitizer flowing out from the outlet mouth 4. In this way, it is possible to use the operation of the unit 1 for washing the dispensing system containing

beverages of various type and, therefore, with different sugar content.

[0031] The fluid line 16 comprises, furthermore, a pair of non-return valves 50, which are interposed along the conduit 42 and are arranged in series one to the other in a fluid manner.

[0032] In the illustrated embodiment, each non-return valve 50 comprises, in turn:

- a spherical shutter 51, in the example shown, movable inside the conduit 42 between a closed position in which it abuts against a shoulder 52 of the conduit 42, and an open position in which it is spaced from the shoulder 52 and leaves free, therefore, a passage space for the water inside the conduit 42; and
- an elastic element 53, a helical spring in the example shown, which is interposed between the shutter 51 and a fixed wall of the conduit 42.

[0033] Each shutter 51 is interposed, along the conduit 42, between the respective elastic element 53 and the inlet mouth 3.

[0034] In this way, the non-return valves 50 are configured to allow the flow of water and sanitizer mixture from the inlet mouth 3 towards the end of the conduit 42 opposite to the inlet mouth 3, and to prevent the return flow of water in the opposite direction.

[0035] In the example shown, the conduits 40, 42 and the portion 44 of the conduit 41 extend parallel to the axis A; the portion 45 of the conduit 41 extends parallel to the axis B.

[0036] The valve means 5 essentially comprise (Figure 4 and 5):

- a valve 55, which is interposed along the fluid line 15; and
- a valve 56, which is interposed along the fluid line 16.

[0037] In greater detail, the valve 55 is movable between:

- an open position (Figure 4), in which it leaves free a passage space for the water through the portion 32 of the chamber 21; and
- a closed position (Figure 5), in which it occludes the chamber 21 and prevents the passage of water through the portion 32 of the chamber 21.

[0038] The valve 56 is movable between:

- an open position (Figure 5), in which it leaves free a passage space for water through the portion 44 of the conduit 41; and
- a closed position (Figure 4), in which it occludes the portion 44 of the conduit 41 and prevents the passage of water through the portion 44 of the conduit 41.

[0039] Preferably, the valves 55, 56 are solenoid valves.

[0040] The control unit 12 is programmed to:

- arrange the valve 55 in the respective open position and the valve 56 in the respective closed position (Figure 4), when the valve means 5 are in the first configuration; or
- arrange the valve 55 in the respective closed position and the valve 56 in the respective open position (Figure 5), when the valve means 5 are in the second configuration.

[0041] In this way, when the valve means 5 are in the first configuration (Figure 4), the valve 55, in the open position, allows the water to flow from the inlet mouth 2 to the outlet mouth 4 along the fluid line 15, and the valve 56 in the closed position prevents the water from flowing along the conduit 41 of the fluid line 16 towards the inlet mouth 3.

[0042] On the contrary, when the valve means 5 are in the second configuration (Figure 5), the valve 55 in the closed position prevents the water from flowing along the conduit 22, and the valve 56 in the open position allows the water to flow towards the inlet mouth 3 and along the fluid line 16.

[0043] The flow rate gauge 17 is suited to generate a signal associated with:

- the flow rate of water flowing out from the outlet mouth 4, in the case wherein the valve means 5 are in the first configuration (Figure 4); or
- the flow rate of the water and sanitizer mixture flowing out from the outlet mouth 4, in the case wherein the valve means 5 are arranged in the second configuration (Figure 5).

[0044] The flow rate gauge 17 is interposed in series and in a fluid manner between the conduit 42 of the fluid line 16 and the conduit 23 of the fluid line 15.

[0045] In this way, when the valve means 5 are arranged in the first configuration (Figure 4), the flow rate gauge 17 detects the amount of water flowing from the conduit 22 towards the conduit 23 through the conduit 42.

[0046] Otherwise, when the valve means 5 are arranged in the second configuration (Figure 5), the flow rate gauge 17 detects the amount of water and sanitizer mixture, which flows from the conduit 42 to the conduit 23.

[0047] The flow rate gauge 17 is, in the example shown, a mass flow sensor.

[0048] The assembly 11 comprises:

- a conduit 59, which is connected in a fluid manner to a tank (not shown) containing the sanitizer;
- an electric motor 60; and
- a pump 61, which is driven by the electric motor 60.

[0049] In greater detail, the pump 61 comprises:

- a suction 62, which is connected with the conduit 59 in a fluid manner; and
- a discharge 63, which is connected in a fluid manner with the inlet mouth 3 of the casing 10.

[0050] Preferably, the pump 61 is a peristaltic pump, so as to preserve the sterility of the sanitizer.

[0051] The control unit 12 is programmed to receive an input signal from the flow rate gauge 17.

[0052] The unit 1 comprises, furthermore, one or more sensors 65, which are functionally connected with the control unit 12 and are suited to detect the presence or absence of the sanitizer inside the conduit 41.

[0053] In the example shown, the sensors 65 are electrical terminals suited to detect the electrical conductivity within the mixture flowing inside the conduit 41.

[0054] The control unit 12 is also programmed to acquire a value representative of the volume of the conduits and of the valves of the dispensing system to be cleaned and, to maintain the valve means 5 in the second configuration for a time window associated with said representative value, so as to supply the correct amount of water and sanitizer mixture to the dispensing system and through the outlet mouth 4.

[0055] The control unit 12 is also functionally connected to the pump 61.

[0056] More precisely, the control unit 12 is, furthermore, programmed to adjust the speed of the pump 61, so as to optimally adjust the flow of the sanitizer through the inlet mouth 3 and reduce the dispersion of the same in the waste water.

[0057] In use, the unit 1 is suited to automatically perform two consecutive cycles of rinse with water and of disinfection with a water and sanitizer mixture, and a final rinse cycle of the conduits and valves of the dispensing system, once the tank containing the beverage has been disconnected from the dispensing system, the dispensers of the dispensing system are closed with respective closing devices.

[0058] In order to perform said cycle, the control unit 12 sequentially arranges the valve means 5:

- in the first configuration (Figure 4), in which the valve 55 is in the open position and the valve 56 is in the closed position, during the steps of rinsing with water only;
- in the second configuration (Figure 5), in which the valve 55 is in the closed position and the valve 56 is in the open position, during the disinfecting steps with the water and sanitizer mixture; and
- again in the first configuration (Figure 4), during the rinsing step with water alone.

[0059] The water enters the casing 10 through the inlet mouth 2.

[0060] When the valve means 5 are in the first configuration, only water flows out from the outlet mouth 4, while when the valve means 5 are in the second config-

uration, the water and sanitizer mixture flows out from the outlet mouth 4.

[0061] At the same time, the pump 61 supplies the inlet mouth 3 with the sanitizer.

5 **[0062]** In the following the operation of the unit 1 during the rinsing steps is described when the valve 55 is in the open position and the valve 56 is in the closed position (Figure 4), i.e. when the valve means 5 are in the first configuration.

10 **[0063]** The water enters the casing 10 through the inlet mouth 2 and passes through the fluid line 15 and the flow rate gauge 17, until reaching the outlet mouth 4 by-passing the inlet mouth 3 of the sanitizer.

15 **[0064]** In greater detail, the water flows along the conduit 20, the chamber 21, the conduit 22 and the conduit 23.

[0065] The non-return valve 24 allows the water to flow from the conduit 20 to the chamber 21 and prevents it from returning in the opposite direction.

20 **[0066]** Thanks to the fact that the valve 55 is in the open position, the water flows into the portion 32 of the chamber 21 and from the latter inside the conduit 23.

25 **[0067]** The water flows also from the portion 31 of the chamber 22 up to the conduit 40 and to a portion of the conduit 41 arranged upstream from the portion 44, proceeding according to the progressing direction of the water along the fluid line 16.

30 **[0068]** Thanks to the fact that the valve 56 is in the closed position, the water cannot flow through the portion 44 of the conduit 41 and reach the inlet mouth 3 of the sanitizer.

35 **[0069]** In the following the operation of the unit 1 is described during both the disinfecting steps when the valve 55 is in the closed position and the valve 56 is in the open position (Figure 5), i.e. when the valve means 5 are in the second configuration.

40 **[0070]** The water enters the casing 10 through the inlet mouth 2, and then flows along the conduit 20, the portion 31 of the chamber 21, the conduit 40, mixes with the sanitizer inside the conduit 4. Afterwards, the water and sanitizer mixture flows along the conduits 42, inside the flow rate gauge 17, and finally, along the conduit 22 and the outlet mouth 4 connected to the dispensing system.

45 **[0071]** The non-return valve 50 allows water to flow from the conduit 20 to the chamber 21 and prevents it from returning in the opposite direction.

[0072] Thanks to the fact that the valve 56 is in the open position, the water can flow along the portions 44, 45, 46 of the conduit 41.

50 **[0073]** Thanks to the fact that the valve 55 is in the closed position, the water cannot reach the portion 32 of the chamber 21 and, therefore, the conduit 23.

[0074] The control unit 12 acquires a value representative of the volume of the conduits and valves of the dispensing system to be cleaned, receives the flow rate measurement from the flow rate gauge 17 and maintains the valve means 5 in the second configuration for a time window associated with that representative value, so as

to supply the appropriate amount of mixture of water and sanitizer to the dispensing system and through the outlet mouth 4.

[0075] The control unit 12 also verifies, thanks to the sensor 65, that the sanitizer is inside the conduit 42.

[0076] From an examination of the unit 1 according to the present invention, the advantages that it allows to obtain are evident.

[0077] In particular, the unit 1 performs the rinsing and disinfection of the dispensing system in a fully automatic manner, without requiring the use of specialized personnel and without requiring to interrupt, during business hours, the activity of the commercial business.

[0078] This leads to a remarkable saving of costs.

[0079] Finally it is clear that the unit 1 described and illustrated herein can be subject to modifications and alternatives which do not depart from the scope of protection defined by the claims.

Claims

1. A washing unit (1) for a beverage dispensing system, **characterized by** comprising:

- a first inlet (2) which can be supplied with a first water-based fluid, in particular water;
- a second inlet (3) which can be supplied with a sanitizing fluid;
- an outlet (4) that can be run through, in use, selectively by said first fluid or by a mixture of said first fluid and the second fluid; and
- valve means (5; 55, 56), which are selectively alternatively available:

in a first configuration, in which they connect said first inlet (2) in a fluid manner with said outlet (4) and isolate in a fluid manner said first inlet and said second inlet (2, 3), so as to dispense said first fluid through the outlet (4) itself; or

in a second configuration, in which they connect in a fluid manner said first inlet (2) with said second inlet (3) and with said outlet (4), so as to dispense said mixture of said first and second fluid through said outlet (4).

2. The unit according to claim 1, **characterized by** comprising:

- a first fluid line (15), which extends between said first inlet (2) and said outlet (4), is isolated in a fluid manner from said second inlet (3) and can be run through by said first fluid when said valve means (5; 55, 56) are in said first configuration; and
- a second fluid line (16), which can be run

through in part by said first fluid and in part by the mixture of said first and second fluid, when said valve means (5; 55, 56) are in said second configuration;

said second fluid line (16) being connected in a fluid manner with said first inlet (2) and said outlet (4), and being in direct communication with said second inlet (3).

3. The unit according to claim 2, **characterized in that** said first fluid line (15) comprises, proceeding from said first inlet (2) to said outlet (4):

- a first portion (20) defining said first inlet (2);
- a second portion (23) defining said outlet (4); and
- a third portion (22), which is interposed between said first and said second portion (20, 23) and is isolated in a fluid manner from said second inlet (3).

4. The unit according to claim 3, **characterized in that** said second fluid line (16) comprises, proceeding according to the progressing direction of said first fluid or said mixture of said first fluid and second fluid:

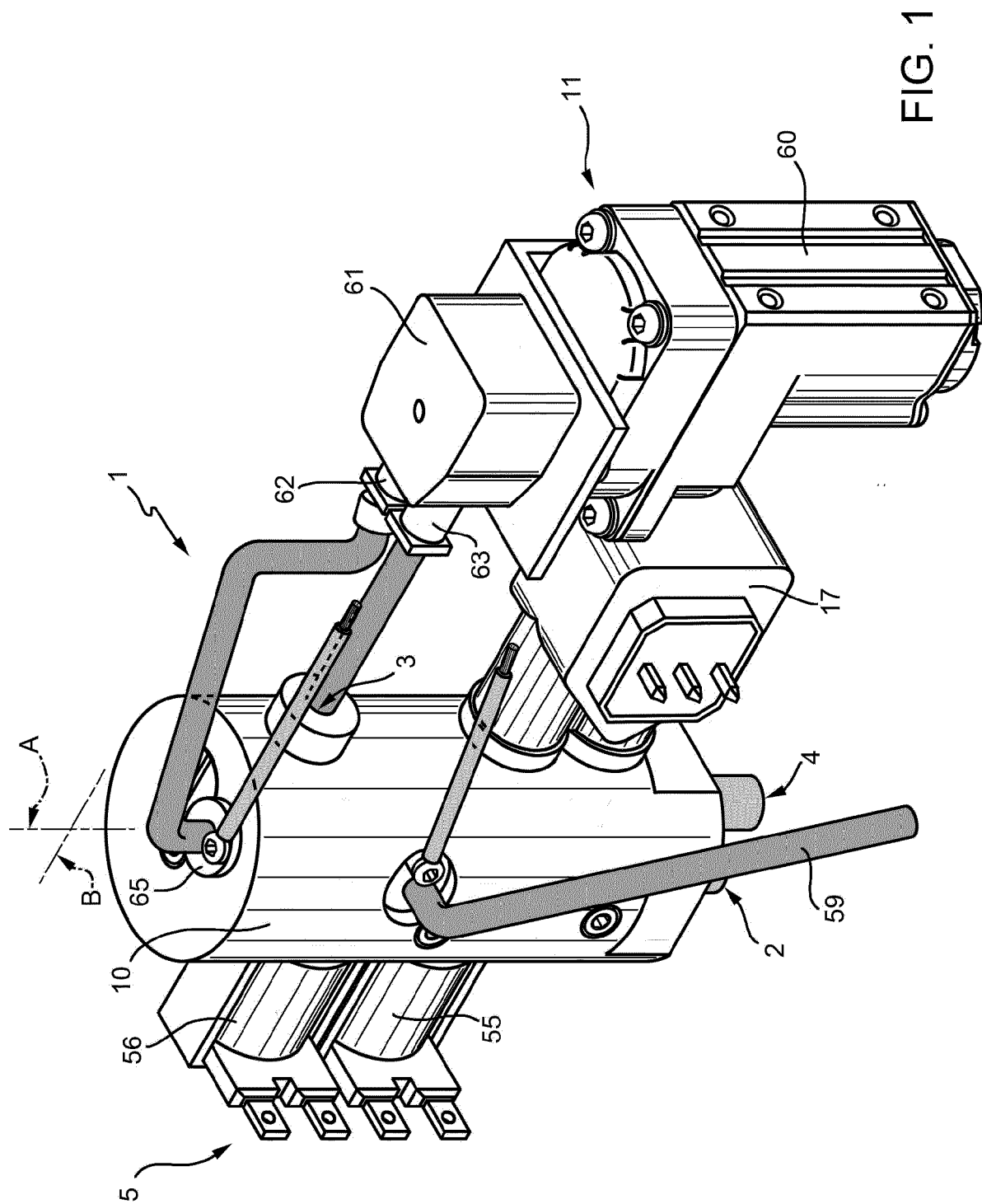
- a fourth portion (40) connected in a fluid manner with said first portion (20) of said first fluid line (15);
- a fifth portion (41) connected in a fluid manner with said second inlet mouth (3); and
- a sixth portion (42), which is connected in a fluid manner with said second portion (23) of said first fluid line (15).

5. The unit according to claim 4, **characterized in that** said valve means (5; 55, 56), when arranged in said first configuration, connect in a fluid manner said first portion (20) and said second portion (23) of said first fluid line (15), and isolate in a fluid manner said first portion (20) of said first fluid line (15) and said fourth portion (40) of said second fluid line (16); said valve means (5; 55, 56), when arranged in said second configuration, connect in a fluid manner said first portion (20) of said first fluid line (15) and said fourth portion (40) of said second fluid line (16), and isolate in a fluid manner said first and said second portion (20, 23) of said first fluid line (15).

6. The unit according to claim 5, **characterized in that** said valve means (5; 55, 56) comprise:

- a first valve (55), which is interposed along said first fluid line (15); and
- a second valve (56), which is interposed along said second fluid line (16); said first valve (55) being selectively movable between:

- a first open position, in which it connects in a fluid manner said first and third portion (20, 23) of said first fluid line (15); and
 - a first closed position, in which it isolates in a fluid manner said first and third portion (20, 23) of said first fluid line (15);
 said second valve (56) being selectively movable between:
 - a second open position, in which it connects in a fluid manner said fourth and fifth portion (40, 41) of said second fluid line (16); and
 - a second closed position, in which it isolates in a fluid manner said fourth and fifth portion (40, 41) of said second fluid line (16);
 said first valve (55) being arranged in said first open position and said second valve (56) being arranged in said second closed position when said valve means (5; 55, 56) are in said first configuration;
 said first valve (55) being arranged in said first closed position and said second valve (56) being arranged in said second open position when said valve means (5; 55, 56) are in said second configuration.
7. The unit according to any one of claims from 4 to 6, **characterized by** comprising at least a first non-return valve (24), which is interposed along said first portion (20) of said first fluid line (15);
 said first non-return valve (24) being configured to allow said first fluid to flow from said first inlet (2) towards said second portion (23) of said first fluid line (15) or towards said fourth portion (40) of said second fluid line (16), and prevent it from flowing in the opposite direction.
8. The unit according to any one of claims from 4 to 7, **characterized by** comprising at least a second non-return valve (50), which is interposed along said sixth portion (42) of said second fluid line (16);
 said second non-return valve (50) being configured to allow the mixture of said first and second fluid to flow from said second inlet (3) towards said outlet (4), and prevent it from flowing in the opposite direction.
9. The unit according to any one of the preceding claims, **characterized by** comprising a pump (61) for supplying said second fluid; said pump (61) comprises, in turn, a suction portion (62) and a supplying portion (63);
 said supplying portion (63) being connected in a fluid manner with said second inlet (3);
 said inlet portion (62) being connectable in a fluid manner with a source of said second fluid.
10. The unit according to claim 9, **characterized in that** said pump (61) is of peristaltic type.
11. The unit according to any one of claims from 4 to 10, **characterized by** comprising a flow rate gauge (17), which is connected in a fluid manner with said outlet (4) and is suited to measure:
 - the flow rate of said first fluid flowing out from said outlet (4), when said valve means (5) are in said first configuration; or
 - the flow rate of said mixture flowing out from said outlet (4), when said valve means (5) are in said second configuration.
12. The unit according to any one of claims from 2 to 11, **characterized by** comprising a control unit (12) operatively connected with said valve means (5; 55, 56) and a motor (60) for actuating said pump (61);
 said control unit (12) being programmed to acquire a signal representative of the volume of said dispensing system to wash and to move said valve means (5; 55, 56) between said first and said second configuration on the basis of said representative signal.
13. The unit according to claim 12, **characterized by** comprising sensor means (65), which are configured to detect or not detect the presence of said second fluid inside said second fluid line (16);
 said sensor means (65) being functionally connected with said control unit (12).
14. The unit according to any one of claims from 2 to 13, **characterized by** comprising a casing (11), which defines said first and second fluid line (15, 16), houses said valve means (5), and defines said first and second inlet and said outlet (2, 3, 4).
15. The unit according to claim 14, when dependent on any one of claims from 9 to 13, **characterized in that** said pump (61) is arranged externally to said casing (11).



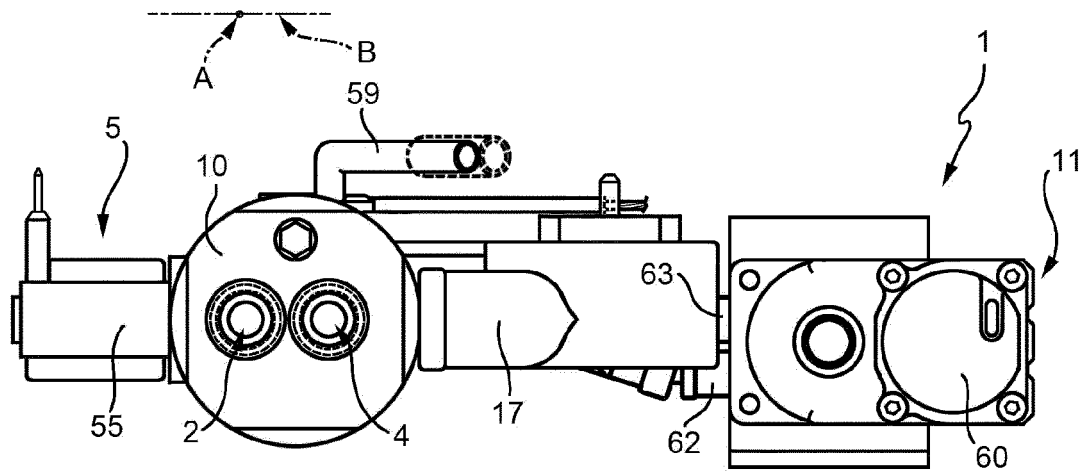


FIG. 3

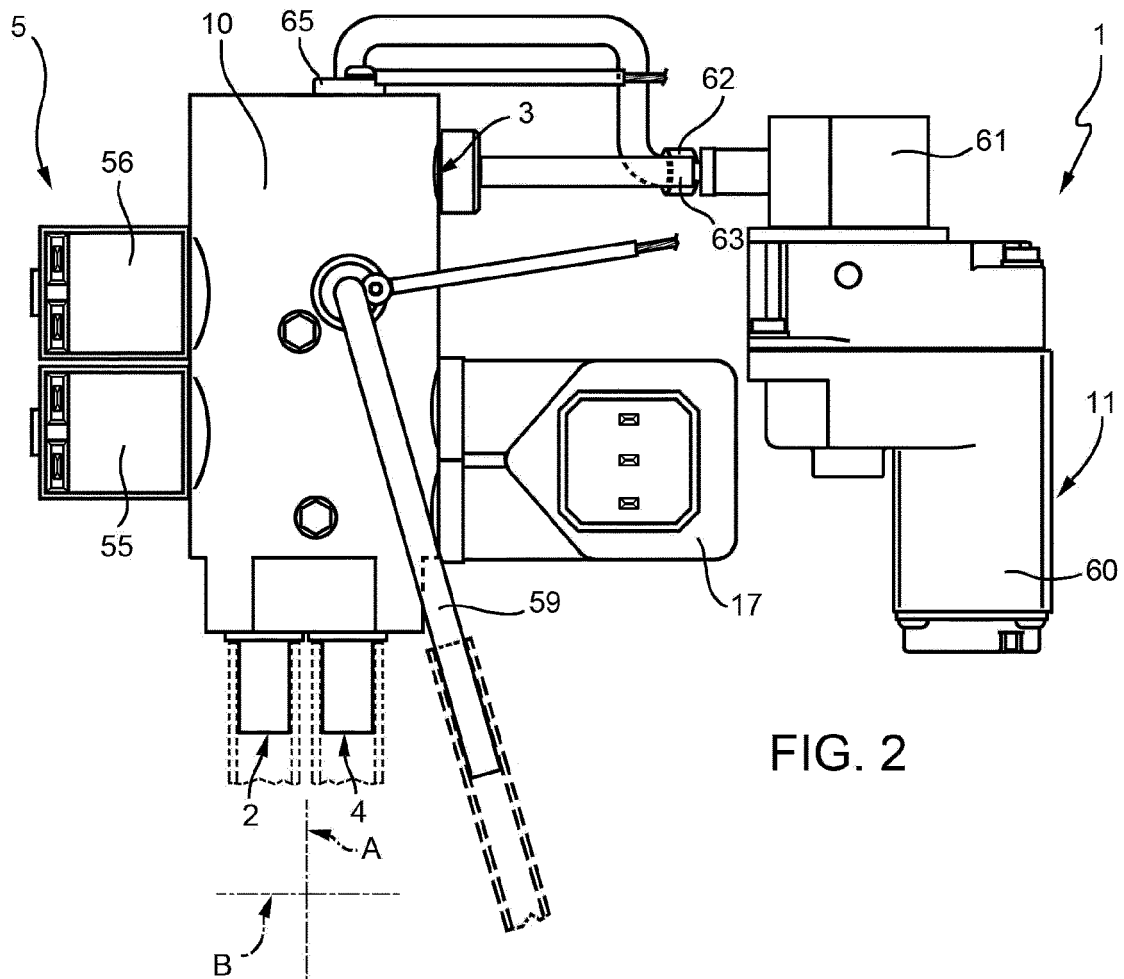


FIG. 2

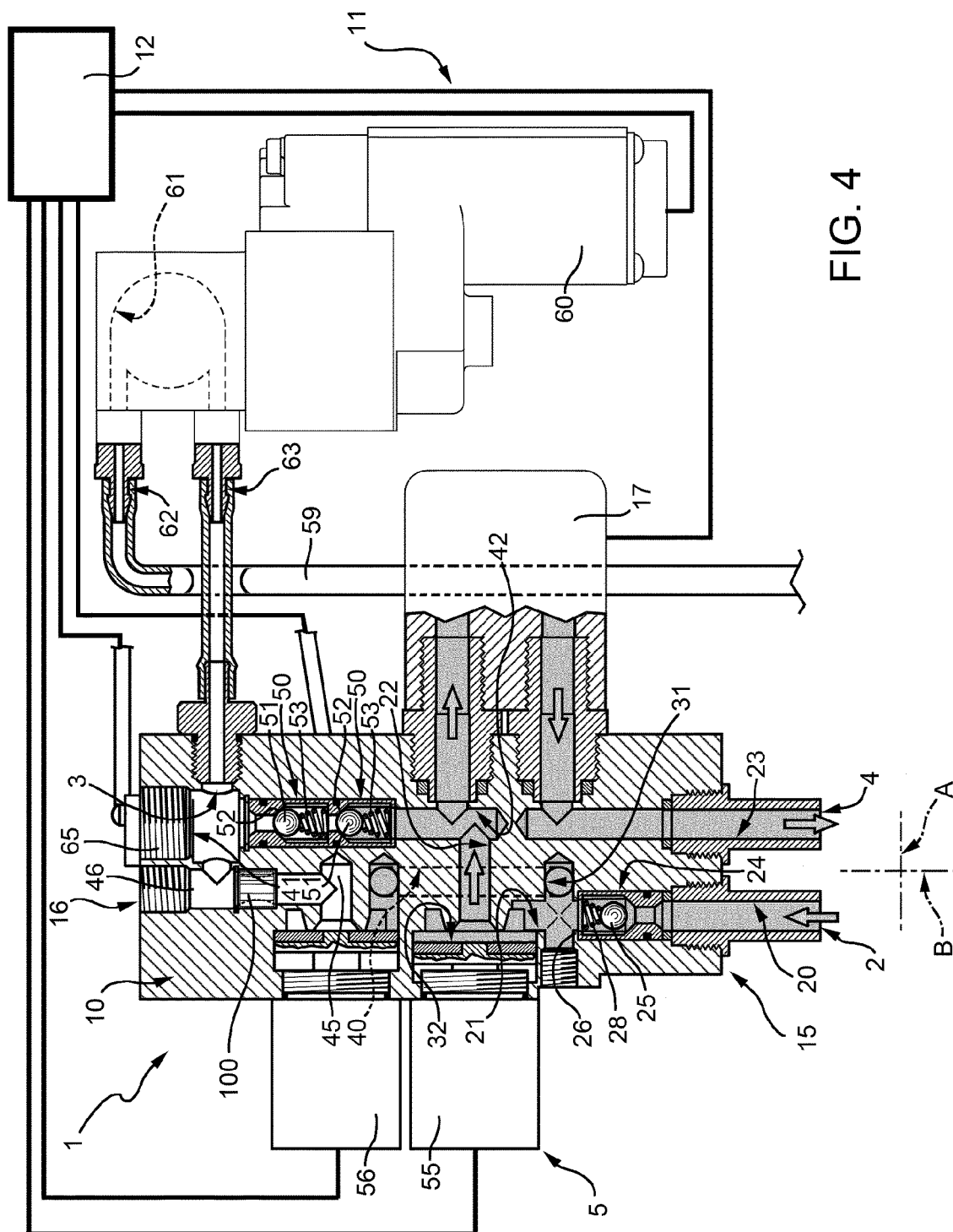


FIG. 4

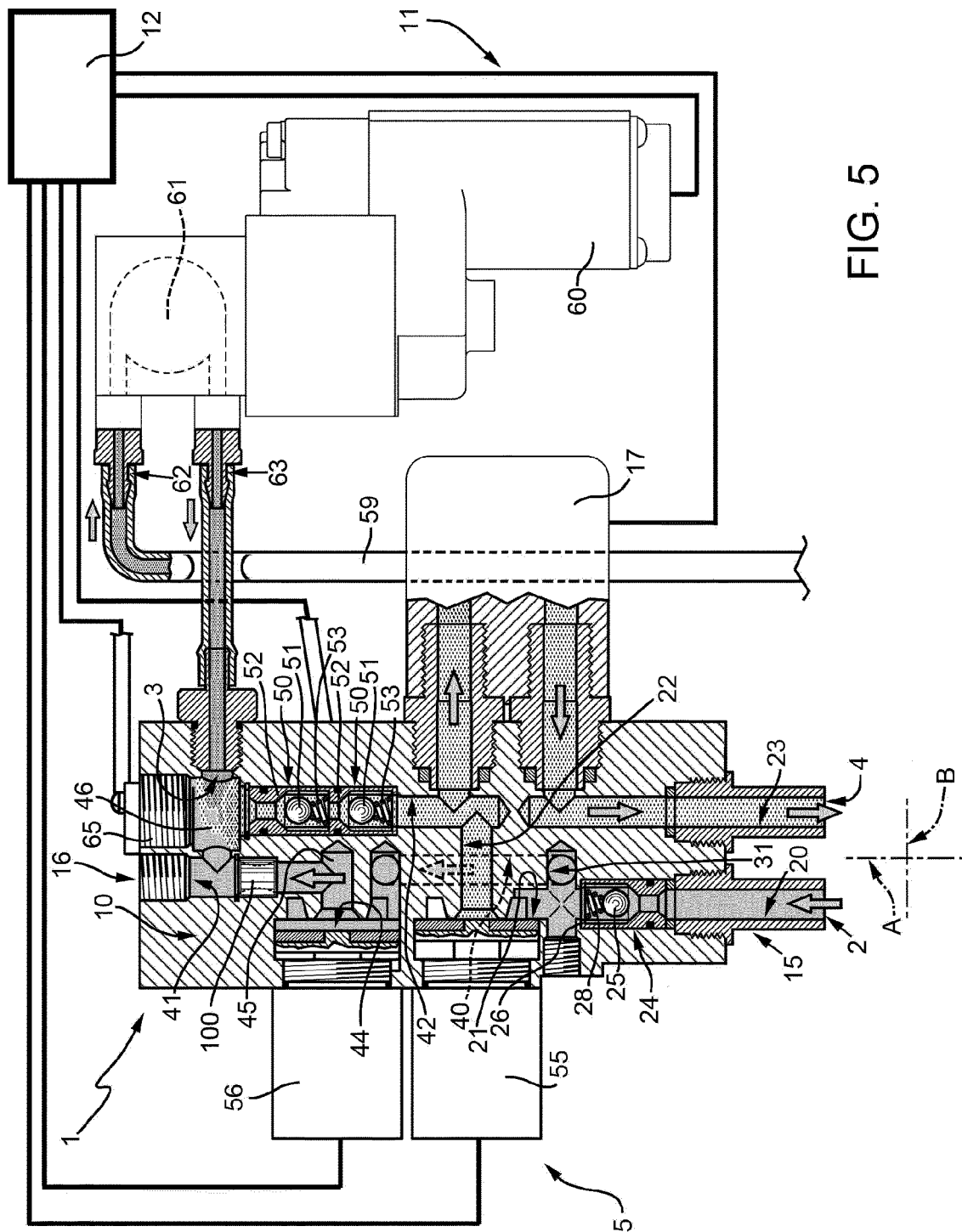


FIG. 5



EUROPEAN SEARCH REPORT

 Application Number
 EP 15 15 9099

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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