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(54) **AUTOMATIC FAUCET**

(57) A control faucet comprising:
 - a faucet shell (101) for providing a faucet cavity,
 - a control cartridge (120) having a top surface and a bottom surface, wherein said bottom surface comprises at least one inlet opening (122) for receiving water to be controlled, a controlling means for controlling at least the flowrate through said control cartridge (120) and at least one outlet opening (126) for delivering controlled water, and

- an electrically operable shutoff valve (130) adapted to at least either block water flow or allow it to be fluidly connected to said outlet opening (126), where controlled water from said outlet opening (126) passes a conduit in said valve (130) before exiting said faucet (100),
 - wherein said control cartridge (120) and said valve (130) are positioned at least substantially inside said faucet cavity.

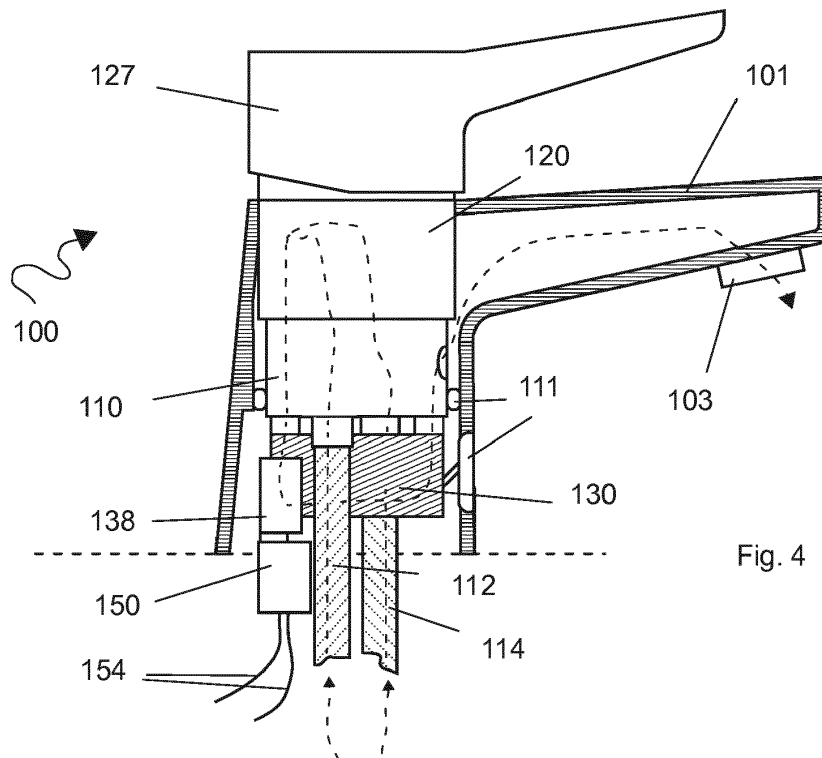


Fig. 4

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Description**FIELD OF THE INVENTION**

[0001] The current invention relates to control faucets, mixer faucets, automatic faucets and dual faucets with at least one automatically controlled line of water.

BACKGROUND OF THE INVENTION

[0002] Sinks and faucets are supplied in restrooms and kitchens. In public restrooms, there is an increased focus on cheap and effective sanitation, and therefore automatic non-touch faucets are becoming more prevalent. Even in private homes, there is a need for automatic faucets. One reason is to serve the elderly and children who may not have the dexterity to control a manual faucet with precision.

[0003] Faucets essentially comprise hydraulic parts built into a shell made from brass or zinc alloys or other such materials which may be plated with chromium or other metals chosen for their aesthetics and ease of machinability. Standards have arisen for many of these hydraulic parts which allows designers to develop and prototype various faucet designs and easily to achieve the best results, both from an economical and aesthetic standpoint. Standard parts allow a designer to compete on system design and the faucet look-and-feel. One such standard part used in faucet systems is a ceramic cartridge which allows control of water mixing and dispensing pressure. This, however, is not used with automatic faucets.

[0004] Many automatic faucets do not allow the user to regulate flow or temperature since the addition of such features requires additional space. Thus, the regulation controls are placed below the table where they are inaccessible in an effort to decrease the size of the faucet above the tabletop.

[0005] The hydraulic and electrical systems of automatic faucets are redesigned from scratch for every design, which increases the burden on faucet designers. This results in a specially designed internal unit that is expensive to develop and difficult to repair.

[0006] There is then a need for a cheaper or standardised liquid system for automatic faucets.

SUMMARY OF THE INVENTION

[0007] It is the aim of the current invention to alleviate at least some of the above-mentioned problems. This is achieved by a control faucet for providing a controlled outlet of water through a liquid outlet, said control faucet comprising a faucet shell for providing a faucet cavity. For example, when installed on a tabletop, the faucet shell encapsulates the cavity from the outside environment, but may provide access from beneath the tabletop to this cavity.

[0008] The control faucet further comprises a control

cartridge having a top surface and a bottom surface, wherein said bottom surface comprises at least one inlet opening for receiving water to be controlled, a controlling means for controlling at least the flowrate through said control cartridge, and at least one outlet opening for delivering controlled water.

[0009] The control cartridge is conveniently a ceramic cartridge. It may have only a single inlet opening or two, or more than two. The examples given in the present disclosure describe a ceramic cartridge having two inlet openings and one outlet opening on the first, bottom side. This should not be seen as limiting to the scope of the invention which may be incorporated with ceramic cartridges having other numbers of inlet openings.

[0010] The mixer faucet further comprises an electrically operable shutoff valve fluidly connected to the outlet opening of the control cartridge, where controlled water from the outlet opening passes a conduit in the valve before exiting the faucet, where the control cartridge and said valve are positioned at least substantially inside said faucet cavity.

[0011] The electrically operable shutoff valve is a valve of a type that allows shutting off the water flow through the valve as well as allowing water flow through the valve depending on an electrical signal. Typically, a closed valve will open when receiving an electrical signal and then close again once the signal is stopped. In the present disclosure, a valve and a shutoff valve are used interchangeably to denote the electrically operable shutoff valve.

[0012] The faucet cavity is the cavity inside the faucet where the hydraulic parts are located, which is at least partially open from below. If the hydraulic parts, such as the valve part, extend from the faucet cavity, it extends downwards to under the tabletop.

[0013] Thereby, by supplying the electrically operated shutoff valve and cartridge at least substantially inside said faucet cavity, a small combined footprint of the internal components of the mixer faucet is achieved.

[0014] Furthermore, the mixer faucet allows standard ceramic cartridges to be used in a valve-controlled faucet while retaining the small size of the faucet. At least the small diameter of the faucet is retained. No external valve unit or water mixer is needed which reduces the space needed to install valve-controlled / automatic faucets. The terms "valve-controlled faucet" and "automatic faucet" are used interchangeably in the text of the present disclosure.

[0015] Even furthermore, because the valve part is supplied beneath the cartridge that in turn is provided inside the mixer faucet, the top side of the cartridge is free to be used to provide control inputs to the faucet. In this way, user faucet control is enhanced: temperature and water flow can be controlled in a faucet that uses a valve according to the invention. Previously known automatic faucets making use of magnetic valves only allow adjusting the temperature and not the flow of the water. Instead, in the art of magnetic valves, water is either

turned on or turned off. Alternatives to the magnetic valve include servo control of the cold and warm water supply which allows electronic control of all elements, but such control systems are expensive and will often require placement of the controls under the tabletop.

[0016] In addition, not only is production eased for using standard cartridges, but also standard faucet controller parts can be used.

[0017] By the control cartridge and the valve being coupled is meant that they are provided as a single unit for installation. Thereby, when the internal components are installed in the faucet shell in a faucet cavity, no more installation is necessary. No external valve is to be installed beneath the tabletop, for example.

[0018] A further benefit of the control cartridge and the valve being coupled is that the amount of assembly required by the end user is minimised. A vulnerable point for incorrect installation is the connection points of water-bearing element. Since the control cartridge and valve are coupled, this connection can be carried out at the manufacturer, and water pressure tests can be performed to minimise the risk of leakage.

[0019] Both the control cartridge and the valve being inserted into the cavity, they are inserted and affixed here as desired. They may protrude from the cavity to beneath the tabletop if the designer of the mixer faucet so desires. This may for example be the case for very low profile mixer faucets.

[0020] The invention works very well with standard ceramic disc cartridges with single stems/taps for controlling the cartridge.

[0021] In an embodiment, the control faucet is a mixer faucet and the control cartridge is a mixer cartridge whose bottom surface has at least a second inlet opening for receiving water to be mixed, the mixer cartridge having mixing means for mixing water received from said two inlet openings, where the outlet opening is connected to deliver mixed water.

[0022] Thereby, the faucet further allows controlling an output water temperature. When compared with automatic faucets of the art, the invention allows conventional control handles for the standard cartridge as well as easy flow and temperature control.

[0023] The control stem is adapted to receive two control inputs. A first control input controls the mixing ratio between the hot and cold water inputs in order to control the tempered water temperature, while a second control input controls a constriction of the output tempered water in order to control the tempered water flow rate.

[0024] In an embodiment, the valve is positioned below the control cartridge. Thereby, the construction of the faucet is further improved.

[0025] In an embodiment, the valve is a magnetic valve. Thereby, a useful type of valve is used.

[0026] In an embodiment, the valve has a body sufficiently small to fit in a volume below said control cartridge and adjacent to said control cartridge and inside the diameter of a faucet cavity provided by a faucet shell, where

the valve body is further sufficiently small to fit this volume along with said at least one water hose, preferably at least two water hoses, connected to said faucet, whereby the minimum diameter of the mixer faucet is determined by said control cartridge.

[0027] Thereby, the faucet can be compact and installed in space limited places. Furthermore, when installed, the faucet takes up only little space.

[0028] In an embodiment, the valve has a slim body that fits between two water hoses that are connected to said faucet.

[0029] This geometry allows the automatic faucet of the invention to distribute the water as desired while maintaining a non-obtrusive parts footprint in the faucet shell. In other words, it is possible to achieve the ends of the invention in a confined space that matches the desires of end users while being cheap and effective to produce.

[0030] In an embodiment, the control faucet further comprises a sensor, said sensor being adapted to transmit a sensor signal. The valve is then operated based on the sensor signal. Thereby, the valve faucet may be operated based on sensed parameters.

[0031] A variety of sensor types may be used with the mixer faucet of the invention. Conventional proximity or motion sensors may be used. Such sensors typically rely on passive infrared or active infrared detection. Other convenient sensor types can be used as well, such as touch sensors that transmit a signal when someone touches a designated area of the faucet, such as the entire faucet shell.

[0032] In an embodiment, the sensor is a motion sensor adapted to register motion in front of the faucet. Thereby, a user can easily activate the faucet by gesturing in a sensor field in front of the faucet.

[0033] In an embodiment, the sensor is an active infrared sensor. Thereby, a user can easily activate the faucet by gesturing in a sensor field in front of the faucet.

[0034] In an embodiment, the control faucet further comprises a distribution block, the distribution block providing channels to connect said outlet with a valve inlet and to connect a valve outlet with a distribution block outlet. The distribution block outlet is simply an opening in the distribution block. Because distribution blocks are commonly used, providing a distribution block adapted specifically to fit between the cartridge and valve allows easy use of existing faucet designs.

[0035] In an embodiment, the distribution block outlet is located in the peripheral surface of the distribution block. Thereby, conventional manual faucets may be upgraded to be automatic faucets by changing the distribution block and inserting the valve.

[0036] In an embodiment, the water distribution block is an adapter piece having a hot channel and a cold channel. The hot channel has a hot inlet where a hose supplying hot water is to be attached. The cold channel has a cold inlet where a hose supplying cold water is to be attached. The hot channel and the cold channel then con-

nect to the inlets on the mixer cartridge. Thereby, a compact adapter piece is supplied which furthermore allows fitting a standard cartridge with a form-fitted valve in a user friendly and quick manner.

[0037] In an embodiment, the mixer faucet has an internal diameter of 42 mm or less around the control cartridge and the valve. Thereby, the faucet can be made compact to meet the aesthetic needs of users. By using a reduced control cartridge size, the faucet is compact and can be used for various uses, as well as meeting the aesthetic needs of even more users.

[0038] In an embodiment, a dual faucet has a control faucet as described. The dual faucet further has a manually operated control cartridge for providing tempered water to said liquid outlet based at least substantially on the position of a control stem of said manually operated mixer cartridge.

[0039] By a dual faucet is understood a faucet that allows operating the water flow both manually and through the use of a sensor-triggered valve. This may be achieved by having two separate control cartridges within the same faucet and connected to each type of control. Alternatively, it may be achieved by having two separate control systems connected to a single control cartridge.

SHORT LIST OF THE DRAWINGS

[0040] In the following, example embodiments are described according to the invention, where:

Fig. 1 is a schematic drawing of an automatic faucet according to the invention,

Fig. 2 is a schematic drawing of the liquid pathway through an automatic faucet according the invention, and

Figs. 3A-C illustrate the use of an automatic faucet according to the invention,

Fig. 4 is a side-view of a faucet according to the invention,

Fig. 5 is an axiomatic view of parts of a faucet according to the invention, and

Fig. 6 is a schematic drawing of a dual faucet according to the invention.

DETAILED DESCRIPTION OF DRAWINGS

[0041] In the following the invention is described in detail through embodiments hereof that should not be thought of as limiting to the scope of the invention.

[0042] Fig. 1 is a schematic drawing of an automatic faucet 100 according to the invention. The faucet is fastened to a tabletop 10, and has a hot inlet hose 112 and a cold inlet hose 114 supplying water. The hot water may

be provided by any convenient means, such as a dedicated heater located near to the faucet, a general hot water tank or an inline heater.

[0043] The automatic faucet 100 also has a control cartridge 120 with a control input means 128. In the illustrated embodiment, the control cartridge has two openings 122, 124 for receiving water of two temperatures to be mixed as well as a tempered outlet 126 for providing the mixed water. The control cartridge 120 receives a first control input to control the mixing ratio of hot water and cold water to produce a tempered water of a desired temperature. The control cartridge 120 is further adapted to receive a second control input through the control stem 128 to control the flow of tempered water. Rotating the control stem 128 provides the first control input to control the mixing ratio of hot and cold water, while tilting the control stem 128 relative to the extension of the control stem 128 controls the amount of water that is let through the control cartridge. Such control cartridge 120 with the described control stem is common in use with manual faucets and is a standard part, although it is not previously used with automatic faucets. In an alternative embodiment, the control cartridge is either only adapted for controlling the flow of received liquid from at least one liquid inlet or only for mixing received liquid without changing the combined flow. In a situation where only flow is to be controlled, the control cartridge would only need one opening for receiving water from e.g. one water hose.

[0044] The control cartridge outlet 126 is connected to a valve inlet channel 116 that connects to a valve inlet opening 122 of a valve 130. The valve 130 that is set to block the flow of water when at idle and operable with an electric signal. When the valve receives no signal otherwise, the tempered water from the control cartridge is blocked by the valve and substantially no amount of water leaves the faucet 100. When a sensor 140 registers the presence of something - such as the hand of a user - in front of the faucet, it transmits a signal to a processor 150. The processor 150 then controls the valve 130 to open it. The water flow is unblocked, and the tempered water can leave the faucet according to the setting of the control stem 128. The processor 150 adjusts the outflow of water through the outlet channel 118 according to a predetermined timing pattern.

[0045] The electronic components - at least the valve 130, sensor 140, and processor 150 - are powered by a battery 152 that is conveniently positioned in a user-friendly location to allow changing it when the battery is exhausted. Such a location is typically below the table. The circuit may be connected to a circuit of the building to prevent the need battery, as desired.

[0046] Fig. 2 is a schematic drawing of an automatic faucet 100 according the invention where the liquid pathway through the automatic faucet 100 is marked. The automatic faucet of Fig. 2 is identical to the one described with Fig. 1. Fig. 2 illustrates how the water is moved through the automatic faucet. Cold and hot water are moved through inlet hoses to the cartridge. In the car-

tridge, the hot and cold water are mixed according to how the control input means is adjusted. What results is tempered water that is let out of a cartridge outlet. From the cartridge, the tempered water is conducted downwards to the magnetic valve. In an inactivated state, the tempered water is blocked here. When the sensor is activated, it opens the valve and the tempered water passes through the now open valve to flow out of the faucet.

[0047] By placing a valve 130 beneath the control cartridge 116 through which the tempered water has to pass to flow from the control cartridge 116 to the faucet outlet, a small automatic faucet 100 size is achieved while allowing use of standard cartridges that take up most of the cross-sectional area of standard faucet sizes. Furthermore, because the mixing is achieved in the faucet itself, these advantages are combined with a negligible space requirement below the tabletop, whereas normal automatic faucets are constructed by mixing water and having valves beneath the table. This allows adaptation of manual faucet systems to automatic faucet systems or installation in space-limited areas in a user-friendly manner while meeting aesthetic requirements.

[0048] Figs. 3A-C illustrate the use of an automatic faucet according to the invention. Fig. 3A illustrates an automatic faucet 100 according to the invention. As can be seen, a standard control unit 127 is compatible with the automatic faucet 100. The standard control unit engages with the control stem (not shown). Since the automatic faucet 100 is designed in an effort to allow a user to touch the control unit 129 less often than normally for a manual faucet, it is even possible to shape the control unit differently, such as with a significantly smaller protrusion 129 while still being useful.

[0049] The reader will note that the control unit 127 is positioned in a constricted orientation. This orientation provides a second control input of tempered water constriction. Even if a user put a hand in front of the sensor 140, into a sensing field 146 of the automatic faucet shown in fig. 3A, the control cartridge 120 blocks the tempered water flow when the control unit 127 is thusly oriented. Thereby, the automatic faucet can be turned off easily if a user is using a sink below the faucet for something sufficiently wet or when water is not needed or desired such as when washing vegetables or scrubbing the sink itself. This is not attainable with automatic faucets of the art.

[0050] Fig. 3B illustrates an automatic faucet 100 according to the invention where a user has tilted the control unit 120 to release the flow of tempered water from the control cartridge 120. However, since the motion sensor 140 is not activated, it does not transmit a signal to the processor 150. Therefore, the valve 130 still blocks the tempered water that then does not flow from the automatic faucet 100 of Fig. 3B.

[0051] The automatic faucet 100 of Fig. 3B is ready to provide tempered water to a user who activates the motion sensor 140.

[0052] Fig. 3C illustrates a user washing hands 3 under

an automatic faucet according to the invention. The control unit 127 is in a position allowing flow through the control cartridge 120. When a user moves a hand 3 into the sensing field 146 of the sensor 140, the sensor 140 transmits a signal to the processor. This opens the valve 140 and tempered water 1 flows from the automatic faucet 100 at the predetermined flowrate and temperature according to the orientation of the control unit 127 allowing the user to wash hands in the user defined tempered water 1.

[0053] Figs. 4-5 illustrate exemplary arrangements of components in a faucet according to the invention.

[0054] Fig. 4 is a cross-sectional side-view of an automatic faucet 100 according to the invention, further showing the liquid pathway of the automatic faucet 100.

[0055] Inlet hoses 112, 114 are connected to a distribution block 110 that is specially adapted to provide the liquid flows in the tight confines of the automatic faucet according to the invention. The distribution block 110 provides liquid contact to the two inlet openings of the control cartridge 120. Washers or other liquid constriction means are used between the distribution block and control cartridge to prevent the water from moving among channels and out of the liquid conduit.

[0056] When the water has been mixed in the cartridge, it is led back down to the distribution block 110 again, and from here to the valve 130. As can be seen in the figure, the valve fits between the two inlet hoses 112, 114 for a compact form factor fluid constriction. The shown valve part 130 comprises a liquid conduit. Along the path of the conduit, an electrically controlled valve blocks or allows the liquid flow. The channel then feeds the water back up to the distribution block 110 to be fed out of the automatic faucet 100. Furthermore, the processor 150 and sensor 140 units are provided, where at least the processor 150 is integrated into the valve 130. In the shown embodiment, electrical power is fed to the components through electrical connectors 154. When the tempered water leaves the distribution block 110 through the outlet, a fluid-tight seal 111 prevents that the water passes downwards to the components below or the space beneath the faucet. Instead, the water passes upwards in a space defined between the faucet shell 101 on one side and the distribution block 110 and the control cartridge 120 on the other side.

[0057] Fig. 5 is an exploded view of a distribution block 110, a valve 130 and inlet hoses 112, 114. The spacing of the valve 130 in the automatic faucet 100 is maybe even more clearly understood when looking at this figure.

[0058] Since control cartridges 120 are standard parts, the spacing beneath any such control cartridges is known to be taken up substantially by the inlet hoses 112, 114 as seen.

[0059] The valve 130 has a slim body 136 that fits between the inlet hoses 112, 114 and moves the water from a valve inlet 132 to a valve outlet 134. If needed, an electronic valve house 138 that is adapted to cut off the flow of the water extends into a space next to the inlet hoses

112, 114 without obstructing them, and is built into the slim body 136. As is seen, the valve house 138 is located to the side. This geometry allows the automatic faucet of the invention to distribute the water as desired while maintaining a non-obtrusive parts footprint in the faucet shell. In other words, it is possible to achieve the ends of the invention in a confined space that matches the desires of end users while being cheap and effective to produce.

[0060] In the embodiment of the invention shown in Fig. 5, the conduit in the valve 130 is shaped as a U-loop where the valve inlet 132 and valve outlet 134 exit the body of the valve 130 on the same side. The valve can take other geometries in other embodiments of the invention. It could for example be an L-loop where the valve outlet 134 is connected directly to the liquid outlet 103 of the faucet. Such an L-loop could be directed to any side of the valve 130. In other variations, the valve could include a longer conduit with more bends, such as an S-loop or a W-loop. The disclosed invention is not limited to an exact shape of the conduit between the valve inlet 132 and the valve outlet 134.

[0061] The distribution block is in the example of Fig. 5 shown to have four liquid channels to be connected in pairs respectively to the inlet hoses 112, 114 and to the valve inlet 132 and valve outlet 134. In other embodiments of the invention, the number of liquid channels through the distribution block as well as their positions may be different. These channels are adapted to accommodate the number of hoses connected to the control cartridge 120 as well as the geometry of the valve 130.

[0062] Fig. 6 is a schematic drawing of a dual faucet 200 according to the invention. The dual faucet has a water system as described with Figs. 1 and 2, although the constructional arrangement differs due to practical and aesthetic reasons.

[0063] The dual faucet 200 has a hot water inlet 112 and a cold water inlet 114. Both inlets are connected to two mixer cartridges arranged in parallel. The first of these mixer cartridges is an automatic mixer cartridge 120 arranged with a valve 130, processor 150 and motion sensor 140 controlling its water output as described in relation to the other figures. These parts are powered in any convenient way such as by battery 152. These components are comprised in an automatic line of the dual faucet 200. When the sensor is activated and water is output through the automatic line, the water is fed to a combined outlet channel 218.

[0064] The dual faucet 200 further has a manual line for providing water through the faucet irrespective of the settings and activations of the automatic line. The dual faucet 200 has a second mixer cartridge being a manual mixer cartridge 220 forming part of this manual line. When a user provides a second control input to the manual mixer cartridge 220, tempered water is the output from the manual line of the dual faucet 200 and let into the combined outlet channel 218.

[0065] A user is enabled to get a glass of cold water

by controlling the manually controlled cartridge 220 of the dual faucet 200 without changing the adjustment of the automatic mixer cartridge 120, which, in the given example, could be adjusted to provide warm water for washing hands.

Claims

1. A control faucet (100) for providing a controlled outlet of water through a liquid outlet (103), said control faucet comprising:
 - a faucet shell (101) for providing a faucet cavity,
 - a control cartridge (120) having a top surface and a bottom surface, wherein said bottom surface comprises at least one inlet opening (122) for receiving water to be controlled, the control cartridge (120) further having controlling means for controlling at least the flowrate through said control cartridge (120) and at least one outlet opening (126) for delivering controlled water, and
 - an electrically operable shutoff valve (130) fluidly connected to said outlet opening (126), where controlled water from said outlet opening (126) passes a conduit in said valve (130) before exiting the faucet (100),
 - wherein said control cartridge (120) and said valve (130) are positioned at least substantially inside said faucet cavity.
2. A control faucet (100) according to claim 1, where said control faucet is a mixer faucet, where said control cartridge is a mixer cartridge whose bottom surface comprises at least a second inlet opening (124) for receiving water to be mixed, the mixer cartridge having mixing means for mixing water received from said two inlet openings (122, 124), where the outlet opening (126) is connected to deliver mixed water.
3. A control faucet (100) according to any of claims 1-2, wherein the valve (130) is positioned below said control cartridge (120).
4. A control faucet (100) according to any of claims 1-3, wherein said valve (130) is a magnetic valve.
5. A control faucet (100) according to any of claims 1-4, wherein said valve (130) has a body (136) sufficiently small to fit in a volume below said control cartridge (120) and adjacent to said control cartridge (120) and inside the diameter of a faucet cavity provided by a faucet shell (101), where the valve body is further sufficiently small to fit this volume along with said at least one water hose (112), preferably at least two water hoses (112, 114) connected to said faucet (100), whereby the minimum diameter of the mixer

faucet (100) is determined by said control cartridge (120).

- 6. A control faucet (100) according to any of claims 1-5, wherein said valve (130) has a slim body (136) that fits between two water hoses (112, 114) connected to said faucet (100). 5
- 7. A control faucet (100) according to any of claims 1-6, wherein the control faucet further comprises a sensor, and where said sensor is adapted to transmit a sensor signal, where said valve is operated based on said sensor signal. 10
- 8. A control faucet (100) according to claim 7, wherein the sensor (140) is a motion sensor adapted to register motion in front of the faucet. 15
- 9. A control faucet (100) according to any of claims 1-8, wherein said control faucet (100) further comprises a distribution block (110), the distribution block (110) providing channels to connect said outlet (126) with a valve inlet (132) and to connect a valve outlet (134) with a distribution block outlet (113). 20
- 10. A control faucet (100) according to any of claims 1-9, wherein said distribution block outlet (113) is located in the peripheral surface of the distribution block. 25
- 11. A control faucet (100) according to any of claims 1-10, wherein said mixer faucet (100) has an internal diameter of 42mm or less around the control cartridge (120) and the valve (130). 30
- 12. A dual faucet (200) comprising a control faucet (100) according to any of claims 1-11, wherein said dual faucet (200) further has a manually operated control cartridge (220) for providing tempered water to said liquid outlet (103) based at least substantially on the position of a control stem (228) of said manually operated mixer cartridge (220). 35

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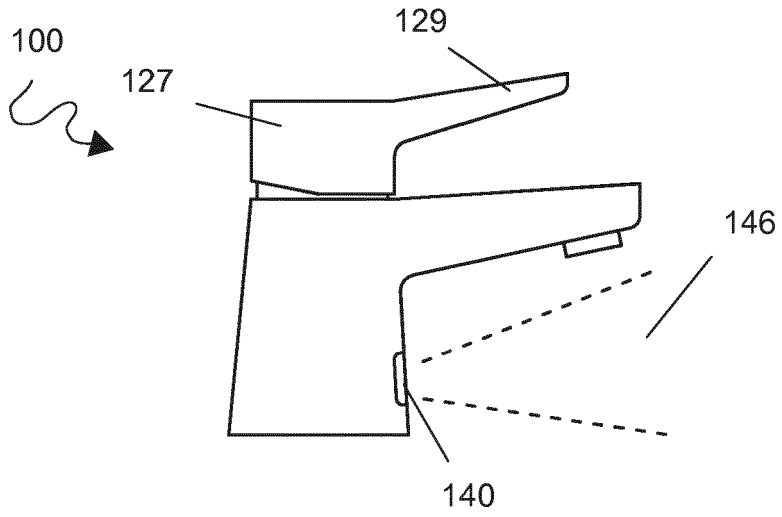


Fig. 3A

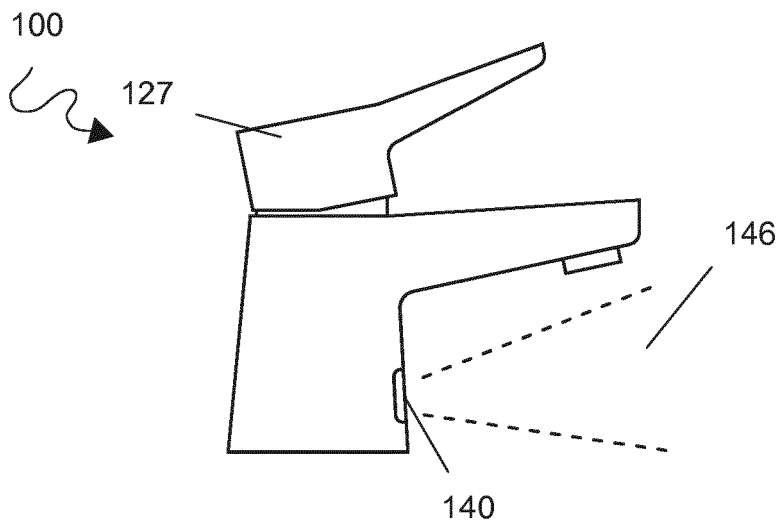


Fig. 3B

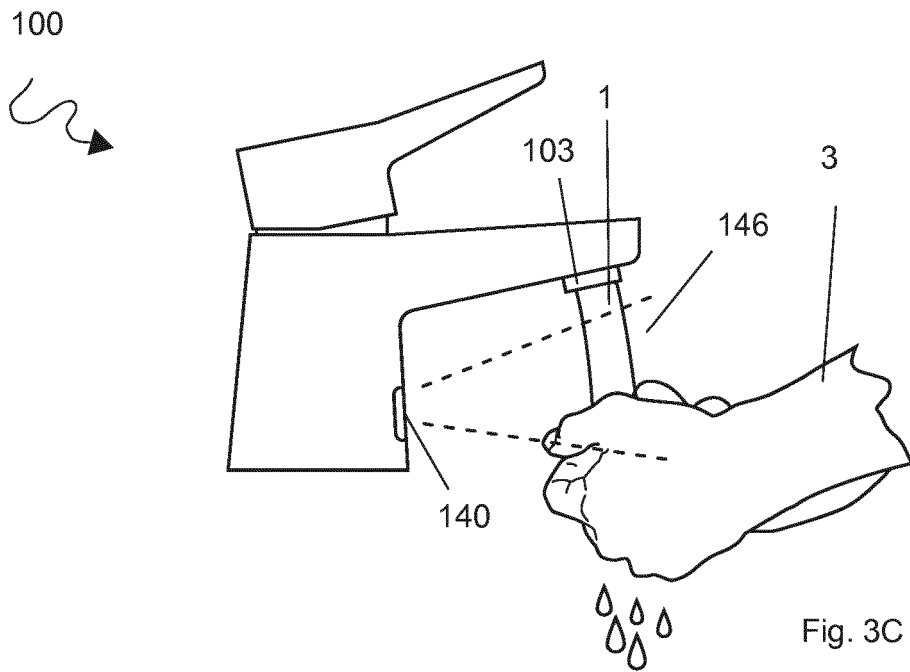


Fig. 3C

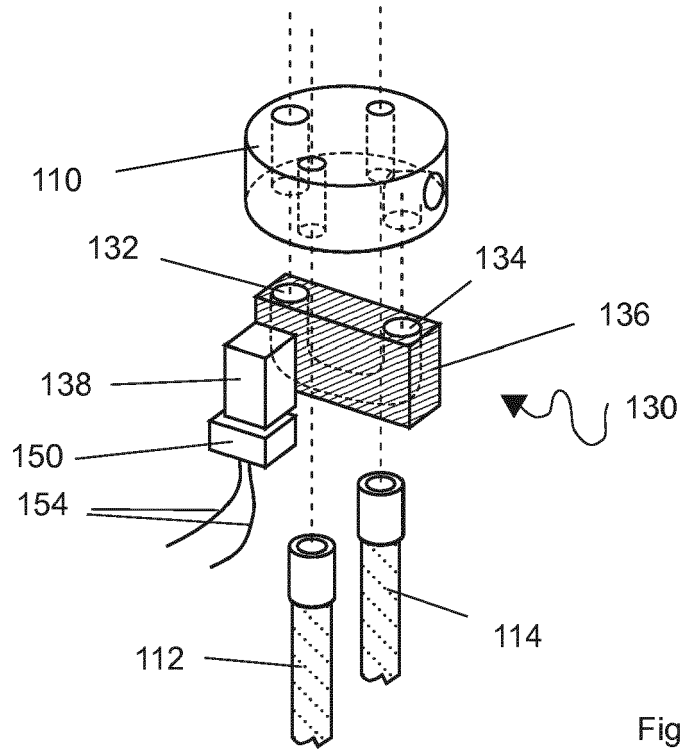


Fig. 5

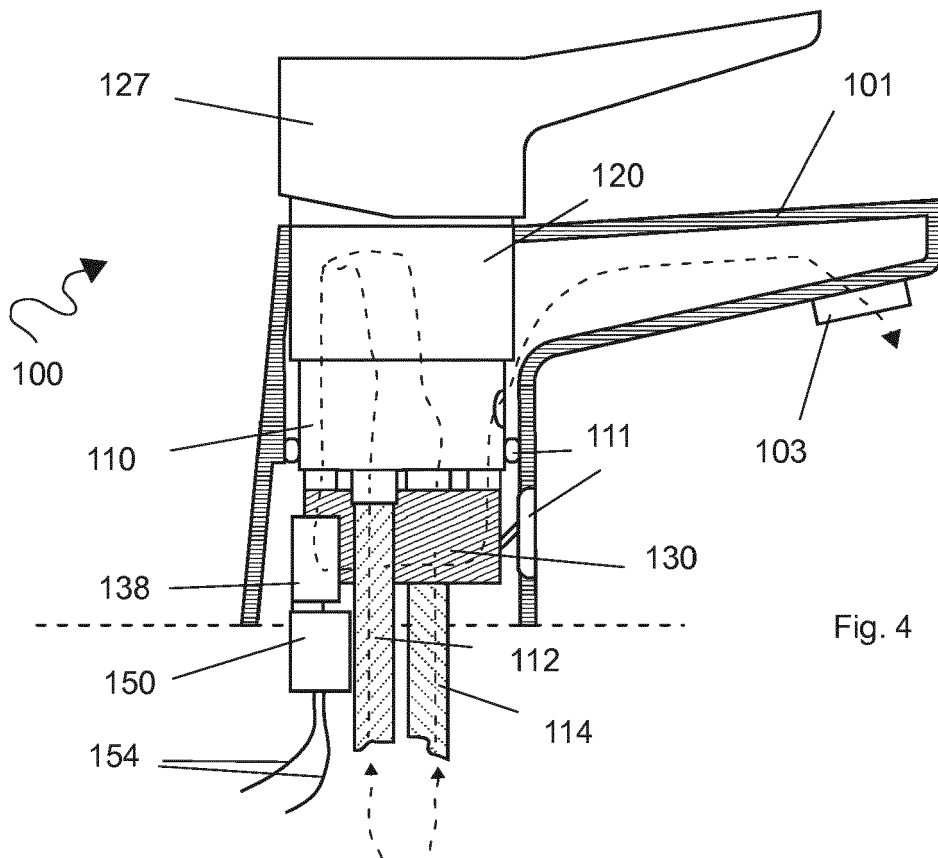


Fig. 4

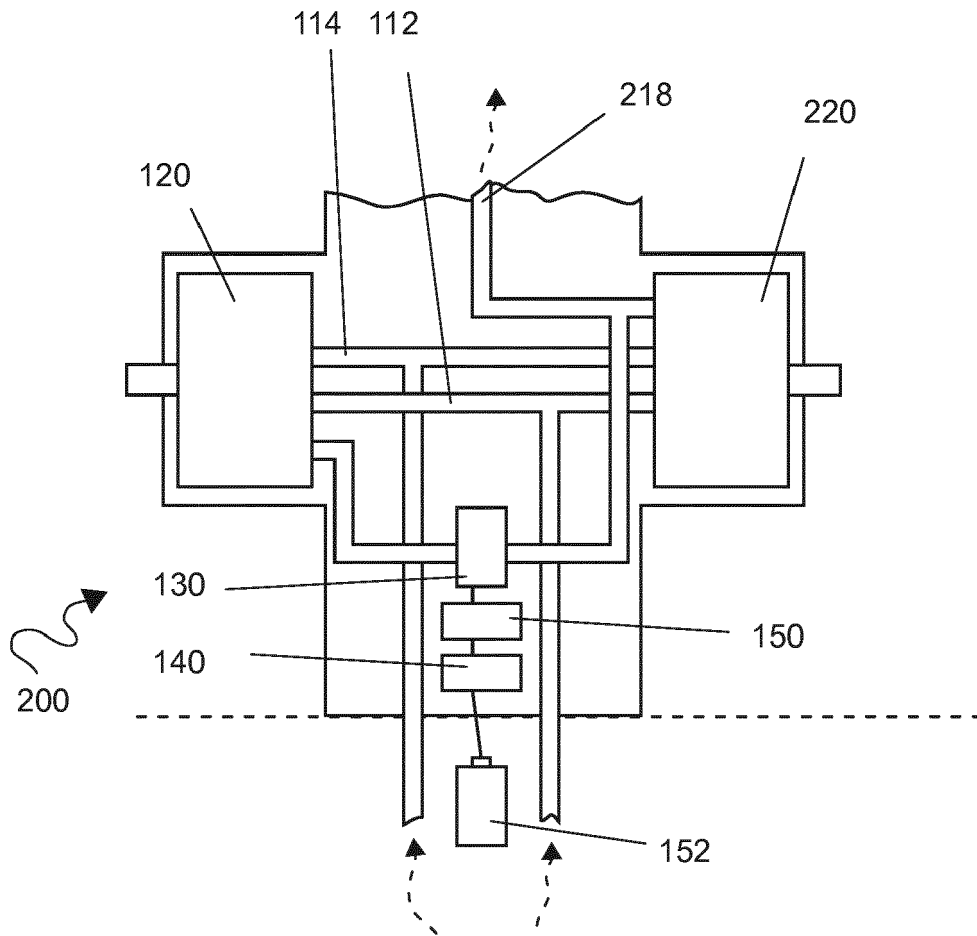


Fig. 6



EUROPEAN SEARCH REPORT

Application Number
EP 19 17 3184

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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)
X	WO 03/093588 A1 (KEROX MULTIPOLAR II IPARI ES K [HU]; HORVATH ZOLTAN [HU]) 13 November 2003 (2003-11-13) * page 4 - page 7; figures 1-4 * -----	1-12	INV. E03C1/05 E03C1/04
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