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(54) Liquid dosing device propelled by water pressure

(57) Dosing device for adding a second liquid to a primary liquid in a specific proportion, consisting of a reservoir (1) in which a float (7) has been applied in such a way that it will only close the liquid supply (2) and open the liquid drainage (3) when the desired amount of primary liquid is stored in the reservoir (1) and in which the second liquid is measured by a pump, controlled by pressure changes in the supply line, and then added to the primary liquid.

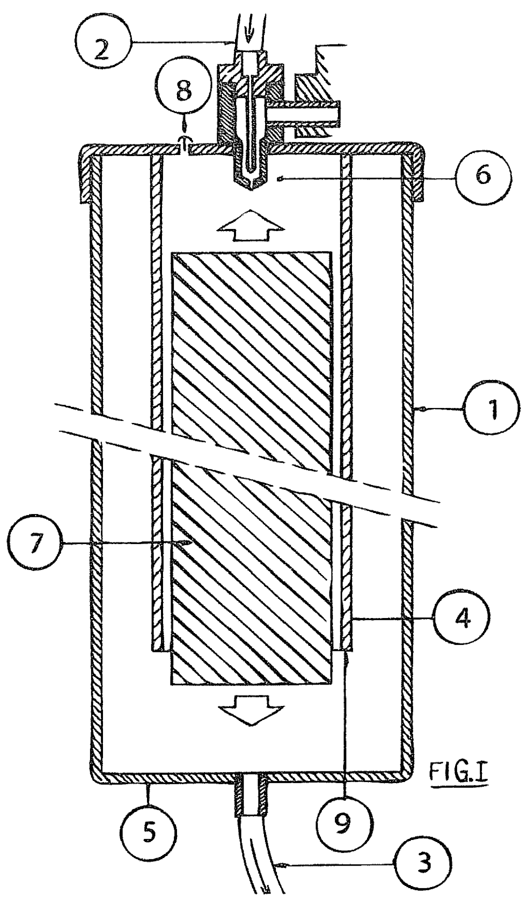

FIG.I

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Description

[0001] Various methods are known to add a second liquid, for example consisting of automatically dosed medicines or disinfectants, to a primary liquid. Frequently a dosing device is used that is connected to a supply line or a reservoir with the primary liquid.

[0002] Some dosing devices operate using electricity and electronics. An amount of the primary liquid is measured as exactly as possible and next, by means of programmed electronics, the desired amount of the second liquid is added.

[0003] Also known are devices that function without making use of electricity. One of such devices is known from patent application EP0885357.

[0004] Both types of machines are expensive, complex and also have the disadvantage that the second liquid, sometimes an aggressive medicine or disinfectant, mixes with the first liquid in the device in such a place that the mixture comes in contact with the vulnerable parts of the dosing pump sometimes causing damage to the device.

[0005] The goal of the invention is to develop a dosing device that does not have these disadvantages.

[0006] According to the invention this goal is reached by providing the machine, consisting of a reservoir that is connected to the water pipes, with a device that ensures that the reservoir is filled with a measured amount of the primary liquid. By emptying and refilling this reservoir each time a specific amount of liquid is obtained that is used for application. The machine is also provided with a device that can measure a specific amount of the second liquid and can add it to the measured amount of primary liquid described before, so the mixture can be applied.

[0007] One method to measure a specific amount of the primary liquid is to place a bell in the reservoir, which sits underneath not on the bottom of the reservoir, but remains free thereof. In the bell is a float. The supply of water, which takes place on the inside of the bell, is closed off by the float as soon as the liquid has reached the desired level in the reservoir. As soon as the reservoir empties again the level of the liquid outside the bell will drop first and not under the bell. This is due to the fact that air is not allowed under the bell. However, as soon as the water level on the outside of the bell drops below the bottom of the bell, air will be allowed there and the bell will empty and the float will open the liquid supply again after which the process repeats itself. In order to keep the amount of water that has to be added each time as constant as possible, it will be necessary for the supply line of the liquid, which in the construction sample consists of water and is under normal water pressure, to be able to fill the reservoir much faster than the reservoir can empty itself.

[0008] Another method to measure a specific amount of primary liquid is to place a tube around the liquid supply at the top in the reservoir, in which a float can move up and down. By choosing to have a small space between the float and the inside wall of the tube that is around the liquid supply, a significant downward pressure will be put on the float as soon as the liquid supply is opened. This is because the liquid meets resistance in passing the small space between the narrow oblong part of the float and the inside wall of the tube around the liquid supply.

[0009] However, as soon as due to the level of the liquid in the reservoir the upward pressure becomes greater than the mentioned downward pressure, the float will close off the relatively small opening of the supply and at that time only a little upward pressure will be needed to keep it closed. As soon as the reservoir starts to empty again, the level of the liquid will have to go way down before the float opens the water supply again and, due to the currently created greater downward pressure, the liquid in the reservoir will have to rise to a much higher level before the float closes the supply again. Here too applies that the supply must be able to fill the reservoir much faster than it can empty itself.

[0010] The dosing of the second liquid to be added can take place as follows.

[0011] With the filling of the reservoir the pressure in the supply line is reduced, so each time a pressure difference occurs in the supply line. This can be used for the dosing of the product.

[0012] In order to increase this pressure difference in the supply line during the filling and the non-filling locally, a narrow passage, which is smaller than the opening to the reservoir, is placed in the supply line just before the opening in the reservoir. The shape can also be chosen in such a way that a water jet air pump is formed there. By making a branch to a spring controlled pump right there, an accurately specified amount of product can be added to the reservoir each time the reservoir is filled.

[0013] In order to prevent partial emptying of the reservoir of the device during the filling, as described in the first variant with the bell, and to be able to more accurately measure the specific amount of primary liquid, the reservoir has been provided with a shut-off outside and inside the bell. These shut-offs are operated by the pressure differences in the above described branch, so when low pressure or a partial vacuum occurs with the filling, the shut-off outside the bell is closed and the shut-off inside the bell is opened. This way air can escape and no overpressure occurs inside the bell. Also liquid can not flow from the reservoir during the filling, so each time the liquid that has to be measured will be determined accurately. As soon as the liquid supply to the reservoir is closed, the overpressure in the branch will close the shut-off outside the bell and open the shut-off inside the bell, so liquid can flow from the reservoir and air will not be allowed underneath the bell.

[0014] In order to prevent partial emptying of the reservoir of the device during the filling, as described in the second variant with the tube, and to be able to more accurately measure the specific amount of primary liquid, the reservoir has been provided with a shut-off in the outlet opening of the reservoir, which is operated by the pressure differences in the above-described branch, so when low pressure or a partial vacuum occurs with the filling, the shut-off is closed. This way liquid will not flow from the reservoir during the filling, so each time the liquid that has to be measured is determined accurately. As soon as the liquid supply to the reservoir is closed, the overpressure in the branch will open the shut-off, so the measured amount of liquid can flow from the reservoir.

[0015] The invention will be further explained below on the basis of a model illustrated in figures of a construction sample of the device.

Fig. 1

Shows a cross section of the device according to the invention. Reservoir (1) has been provided with a liquid supply (2) in a liquid drainage (3). This reservoir can measure and contain a specific amount of primary liquid. For this the bell (4) is in the reservoir (1), which remains free from the bottom (5) of this reservoir. The liquid outlet opening (6) ends in the bell. This is connected to the liquid supply (2). In the bell is the float (7), which will close the outlet opening (6) as soon as the reservoir (1) has been filled with the desired amount of the primary liquid. The non-return valve (8) placed in the bell will allow the air to escape with the filling of the reservoir in order to prevent overpressure from occurring in the bell (4). If the reservoir starts to empty, first the level of the liquid outside the bell will drop, because inside the timer partial vacuum occurs. When the level drops below the open bottom (9) of the bell (4), only then air will be supplied and the bell will empty itself. This will allow the outlet opening (6) to be opened, new liquid will flow into the reservoir and the process will repeat itself.

Fig. 2

Shows a variant of the device according to the invention as described in Fig. 1

Around the liquid outlet opening (10) in the reservoir (11) is a tube (12) in which the float (13) can move. The space between the float (13) and the inside of the tube (12) has been created so small that with the opening of the outlet opening (10) the inflowing liquid meets resistance in passing the narrow space. This creates a greater downward pressure on the float (13). Now, when with the rising of the liquid level around the float the upward pressure becomes greater than the downward pressure, the float (13) will close off the small outlet opening (10).

Only a little upward pressure is needed to keep it closed. Consequently the float (13) will only open the outlet opening (10) when the liquid level has significantly dropped and a measured amount of the primary liquid can flow from the reservoir before the liquid outlet opening (10) is opened again, repeating the process.

Fig. 3

Shows the device according to the invention for the measuring and adding of the second liquid to the primary liquid. This measuring takes place because a branch (15) has been applied to the liquid supply line (14). At the site of the branch the supply line has been shaped in such a way that during the filling of the reservoir (17) a partial vacuum occurs in the branch (15) with the opening of the liquid outlet opening (18). On the other hand, the full pressure of the supply line (14) remains in the branch, if the liquid outlet opening (18) to the reservoir (17) remains closed. This change in pressure is used to control a piston pump, membrane pump or another type of pump (19). This way the amount of the second liquid from the supply reservoir (21) can be pulled up and, accurately measured, be added to the primary liquid in the reservoir (17) via the hose (20).

Fig. 4

Shows a device according to the invention that serves to prevent partial emptying of the reservoir (1) of the device, as described in Fig. 1, during filling. This way the desired amount of primary liquid is more accurately measured. For this the reservoir (22) has been provided with a shut-off (23) at the bottom and a shut-off (26) at the top inside the bell (24). These shut-offs are controlled by the pressure differences in the branch (25) of the supply line. With the filling of the reservoir a low pressure or a partial vacuum will occur, which closes one shut-off (23) and opens the other shut-off (26). Via the shut-off (26) air can escape and overpressure will not occur within the bell (24) and because the other shut-off (23) is closed, liquid cannot flow from the reservoir (22) during filling. This way the liquid that has to be measured is determined accurately. As soon as the liquid outlet opening (27) to the reservoir is closed, the overpressure in the branch (25) will open the shut-off (23) and close the shut-off (26), so liquid can flow from the reservoir and air will not be allowed underneath the bell.

Fig. 5

Shows a device according to the invention that serves to prevent partial emptying of the reservoir (11) of the device, as described in Fig. 2, during filling. This way the desired amount of primary liquid is more accurately measured. For this the reservoir (28) has been provided with a shut-off (29). This shut-off is controlled by the pressure differences in the branch (31). When a low pressure or a partial vacuum occurs with filling, the shut-off (29) will be closed, so no liquid can flow from the reservoir during filling. This way the liquid that has to be measured is determined accurately each time. As soon as the liquid supply (32) to the reservoir (28) is closed, the overpressure in the branch (31) will open the shut-off (29), so the measured amount of liquid can flow from the reservoir (28).

Claims

1. A dosing device that can add a second liquid to a primary liquid in a specific proportion, by first measuring a specific amount of primary liquid and then adding a specific measured amount of a second liquid to this, with which the device consists of a reservoir (1) with a liquid supply (2) and a liquid drainage (3) and the reservoir (1) can measure and contain a specific amount of the primary liquid **with the characteristic** that in the reservoir (1) is a bell (4) that remains free from the bottom (5) of this reservoir and in which bell the liquid outlet opening (6) ends, in which in the bell is a float (7) that will close off the liquid outlet opening (6) as soon as the desired amount of the primary liquid has flowed into the reservoir (1) while a non-return valve (8) placed in the bell allows air to escape, so no overpressure occurs within the bell, with which when the reservoir starts to empty first the liquid outside the bell will drop because inside the bell a partial vacuum is created and only when the level of the liquid drops below the open bottom (9) of the bell, air will be supplied and the bell (4) will empty, following which the float (7) will open the liquid outlet opening (6) again, after which the process will repeat itself.

2. A variant of the device according to conclusion 1 **with the characteristic** that around the liquid outlet opening (10) in the reservoir (11) a tube (12) is placed in which the float (13) can move, in which the space between the float (13) and the inside wall of the tube (12) has been created so small that when the liquid outlet opening (10) is opened the liquid meets resistance in passing this narrow space creating a large downward pressure on the float (13) and with which, when the upward pressure becomes greater than the downward pressure due to the rising of the level of the liquid around the float (13), the float (13) will close the relatively small liquid outlet opening (10) and because only a little upward pressure is needed to keep it closed, the float will only open the outlet opening when the liquid level has dropped significantly so a measured amount of primary liquid can flow from the reservoir each time before the liquid outflow opening is opened again, after which the process will repeat itself.

3. A device according to conclusion 1 and 2 **with the characteristic** that the second liquid is measured and added because a branch (15) has been applied to the liquid supply line (14), in which the supply line at that place due to the constriction (16) is shaped in such a way that a partial vacuum occurs in the branch (15) during the filling of the reservoir (17), while, if the liquid outlet opening (18) to the reservoir (17) is closed, there will be full pressure of the supply line in the branch and with which this change of pressure is used to control a piston pump, membrane pump or another type of pump (19), through which the amount of the second liquid from the supply reservoir (21) can be pulled up and measured accurately and can flow into the reservoir (17) via a hose (20) and thus is added to the primary liquid.

4. A device according to 1 and 3 **with the feature** that, in order to prevent partial emptying of the reservoir (22) during filling and in this way to exactly create the amount of primary liquid that has to be measured, the reservoir (22) has been provided with a shut-off (23) at the bottom and a shut-off (26) at the top within the bell (24), which are controlled by the pressure differences in the branch (25), so when a low pressure or partial vacuum occurs with filling, the shut-off (23) is closed and the shut-off (26) is opened so air can escape and overpressure does not occur within the bell (24), and with which shut-off (23) is closed so no liquid flows from the reservoir (22) during filling and thus the liquid that has to be measured is determined accurately each time and as soon as the liquid outlet opening (27) to the reservoir is closed the overpressure in the branch opens the one shut-off (23) and closes the other shut-off (26) so liquid can flow from the reservoir and no air is allowed under the bell.

5. A device according to 2 and 3 **with the characteristic** that, in order to prevent partial emptying of the reservoir (28) during filling and in this way to exactly create the amount of primary liquid that has to be measured, the reservoir (28) has been provided with a shut-off (29), which is controlled by the pressure differences in the branch (31), so when a low pressure or a partial vacuum occurs with filling, the shut-off (29) is closed so no liquid flows from the reservoir and thus the liquid that has to be measured is determined accurately each time and as soon as the liquid supply (32) to the reservoir (28) is closed, the overpressure in the branch (31) opens the shut-off (29) so the measured amount of liquid can flow from the reservoir (28).

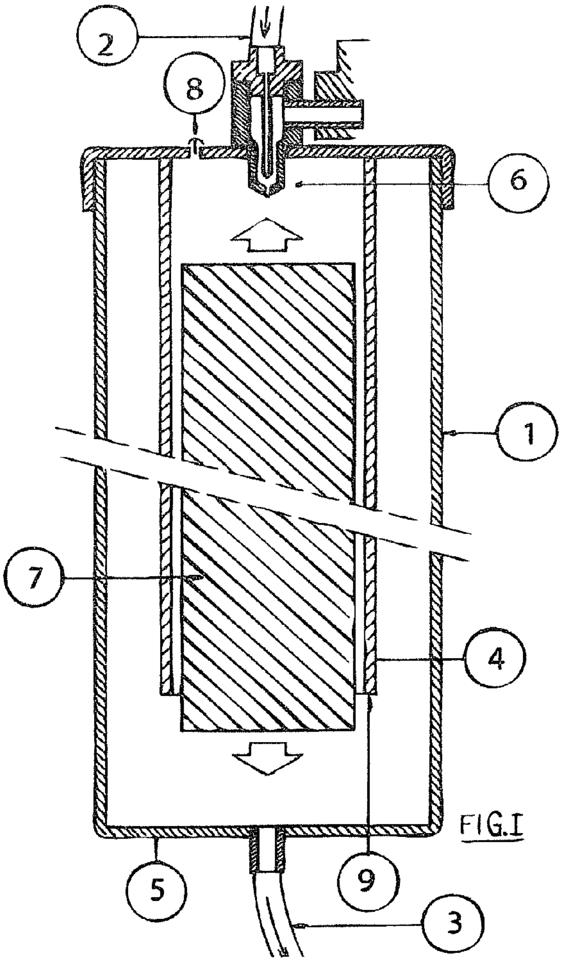

FIG.I

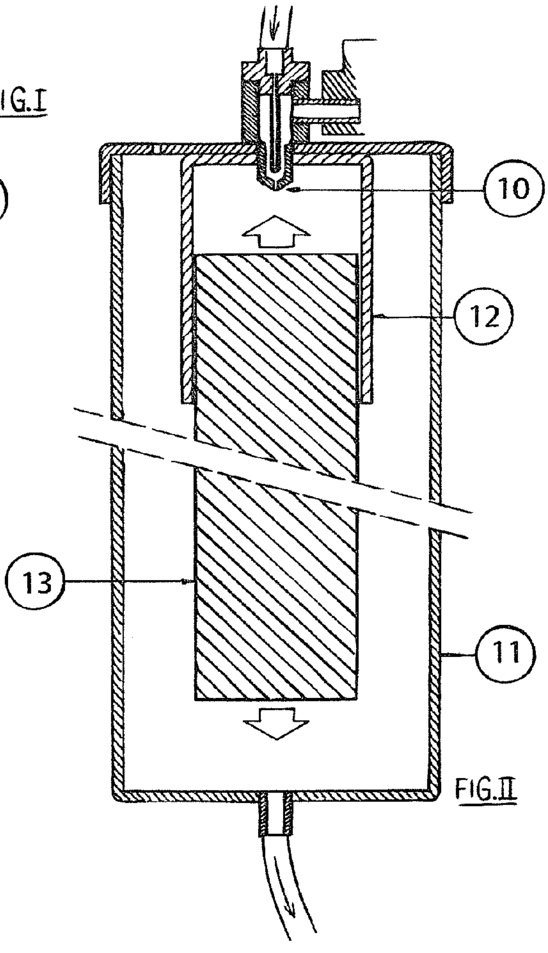

FIG.II

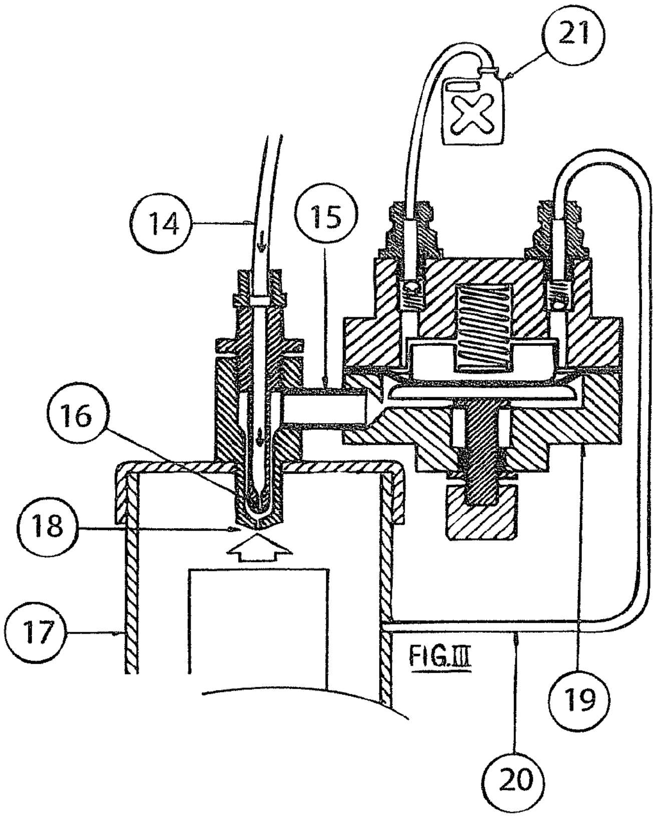

FIG.III

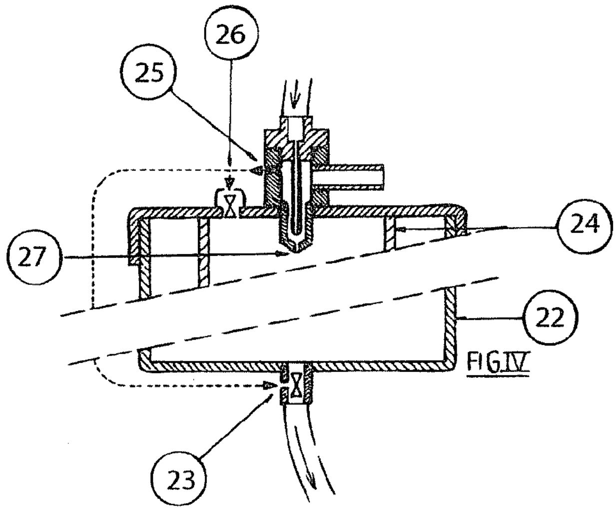

FIG.IV

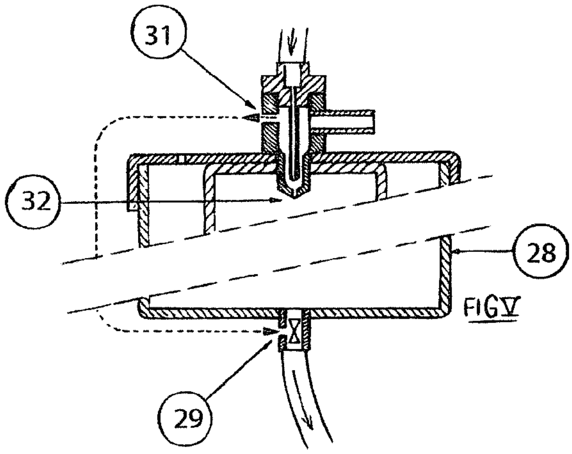

FIG.V

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EUROPEAN SEARCH REPORT

Application Number
EP 14 07 5061

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The present search report has been drawn up for all claims

1

Place of search	Date of completion of the search	Examiner
Munich	5 November 2014	Lange, Christian

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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