KR 20030008504 A shows a showerhead with control buttons, for controlling delivery of additives through a control and mixing box. The additives are provided by a set of additive containers.

Known systems are usually foreseen for fixed installation in connection with a bathtub or shower or faucet, and are limited in what they can do. There is a need for a water conditioning unit that is versatile and at the same time easy to handle. More generally, there is a need for improvement over existing systems.

It is therefore an object of the invention to create a water conditioning unit and a dispensing unit of the type mentioned initially, which overcomes the disadvantages mentioned above.

These objects are achieved by a water conditioning unit and a dispensing unit according to the claims.

According to an aspect of the present invention, there is provided a water conditioning unit for a washing device, the water conditioning unit being configured to provide, controlled by a user, water at different flow rates and with different spraying characteristics and with additives admixed to the water, the water conditioning unit comprising

- an inlet fitting for attaching the water conditioning unit to a water supply, in particular wherein the inlet fitting is configured for attaching a water supply hose;
- an outlet fitting for attaching the water conditioning unit to a dispensing unit, in particular wherein the outlet fitting is configured for attaching a hose leading to a showerhead; and
- one, two or more docking adapters configured for attaching, one, two or more additive containers;

wherein hydraulic elements guiding and controlling a flow of water between the inlet fitting and the outlet fitting are implemented in a hydraulic assembly, the hydraulic assembly comprising a total manifold and hydraulic elements, in particular sensors and actuators controlling the flow of water, the total manifold comprising internal channels guiding the flow of water and carrying the hydraulic elements, and

wherein the total manifold comprises a first plate and second plate, attached to one another, with channels guiding the flow of water being arranged between the two plates and being defined by hollow spaces between the two plates.

In embodiments, ~~T~~the water conditioning unit is for use in a washing device, the water conditioning unit being configured to provide, controlled by a user, water at different flow rates and with different spraying characteristics and with additives admixed to the water, the water conditioning unit comprising

- an inlet fitting for attaching the water conditioning unit to a water supply, in particular wherein the inlet fitting is configured for attaching a water supply hose;
- an outlet fitting for attaching the water conditioning unit to a dispensing unit, in particular wherein the outlet fitting is configured for attaching a hose leading to a showerhead;
- one, two or more docking adapters configured for attaching, one, two or more additive containers.

PATENT CLAIMS

1. A water conditioning unit ~~(2)~~ for a washing device ~~(10)~~, the water conditioning unit ~~(2)~~ being configured to provide, controlled by a user, water at different flow rates and with different spraying characteristics and with additives admixed to the water, the water conditioning unit ~~(2)~~ comprising

   - an inlet fitting ~~(11)~~ for attaching the water conditioning unit ~~(2)~~ to a water supply, in particular wherein the inlet fitting ~~(11)~~ is configured for attaching a water supply hose;
   - an outlet fitting ~~(32)~~ for attaching the water conditioning unit ~~(2)~~ to a dispensing unit ~~(3)~~, in particular wherein the outlet fitting ~~(32)~~ is configured for attaching a hose ~~(33)~~ leading to a showerhead ~~(34)~~; and
   - one, two or more docking adapters ~~(76)~~ configured for attaching, one, two or more additive containers ~~(25)~~;~~.~~

~~2. The water conditioning unit (2) of claim 1,~~ wherein hydraulic elements guiding and controlling a flow of water between the inlet fitting ~~(11)~~ and the outlet fitting ~~(32)~~ are implemented in a hydraulic assembly ~~(50)~~, the hydraulic assembly ~~(50)~~ comprising a total manifold ~~(57)~~ and hydraulic elements, in particular sensors and actuators controlling the flow of water, the total manifold ~~(57)~~ comprising internal channels guiding the flow of water and carrying the hydraulic elements, and~~.~~ wherein the total manifold comprises a first plate and second plate, attached to one another, with channels guiding the flow of water being arranged between the two plates and being defined by hollow spaces between the two plates.

~~3~~2. The water conditioning unit ~~(2)~~ of claim ~~2~~1, wherein the total manifold ~~(57)~~ functions as a support structure holding and supporting the hydraulic elements.

34. The water conditioning unit ~~(2)~~ of ~~one of~~ claim~~s~~ 12 or~~to~~ 23, wherein the internal channels are arranged inside the total manifold, guiding water and, as the case may be, also additives, between the hydraulic elements.

~~5. The water conditioning unit (2) of one of claims 2 to 4, wherein the total manifold (57) comprises a first plate (51) and second plate (52), attached to one another, with channels guiding the flow of water being arranged between the two plates (51, 52) and being defined by hollow spaces between the two plates (51, 52).~~

46. The water conditioning unit ~~(2)~~ of one of claims 12 to 35, wherein, for one or more of the hydraulic elements, the total manifold ~~(57)~~ is shaped to form a functional part of the hydraulic element.

57. The water conditioning unit ~~(2)~~ of claim 46, wherein the total manifold ~~(57)~~ is shaped to form at least one valve seat for a hydraulic element that implements a valve function.

68. The water conditioning unit ~~(2)~~ of claim 46 or 57, wherein the total manifold ~~(57)~~ is shaped to form at least one flow restrictor ~~(221)~~ for restricting a flow rate through one of the internal channels of the total manifold ~~(57)~~.

~~9. The water conditioning unit (2) of one of claims 2 to 8, wherein the hydraulic assembly (50) has an elongated shape, with a first end (61) and a second end (62) opposed to the first end (61), the inlet fitting (11) and the outlet fitting (32) both being arranged at the first end (61).~~

710. The water conditioning unit ~~(2)~~ of one of claims 12 to 69, wherein, inside the hydraulic assembly ~~(50)~~, a high-flow water channel ~~(24)~~ controlled by a high-flow valve ~~(21)~~, constitutes a shortest flow path for the water flowing from the inlet fitting ~~(11)~~ to the outlet fitting ~~(32)~~, compared to other flow paths from the inlet

fitting ~~(11)~~ to the outlet fitting ~~(32)~~ that are implemented in the hydraulic assembly ~~(50)~~.

8~~11~~. The water conditioning unit ~~(2)~~ of one of claims 1~~2~~ to 7~~10~~, wherein, inside the hydraulic assembly ~~(50)~~, an initial spray flow path ~~(222)~~ leads from the inlet fitting ~~(11)~~ to a branching point ~~(223)~~, where it branches into a spray water channel ~~(23)~~ and an admixing channel ~~(22)~~,

- the spray water channel ~~(23)~~ being controlled by a plain water valve ~~(20)~~ and leading to a junction ~~(30)~~ which in turn leads to the outlet fitting ~~(32)~~,
- the admixing channel ~~(22)~~ being controlled by a mixer valve ~~(19)~~ and leading to the second end ~~(62)~~ and from there into an admixing section ~~(224)~~ of the admixing channel ~~(22)~~, the admixing section ~~(224)~~ leading back in the direction of the first end ~~(61)~~, to the junction ~~(30)~~.

9~~12~~. The water conditioning unit ~~(2)~~ of one of claims 1~~2~~ to 8~~11~~, wherein a pressure reducer ~~(18)~~ is arranged to limit a pressure at a branching point ~~(223)~~, where it branches into a spray water channel ~~(23)~~ and an admixing channel ~~(22)~~, in particular to a pressure of less than three bar, in particular to a pressure of two bar.

10~~3~~. The water conditioning unit ~~(2)~~ of one of claims 1~~2~~ to 9~~12~~, wherein a flow restrictor ~~(221)~~ is arranged to further limit a flow in the spray water channel ~~(23)~~, in particular to a flow between one and two litres per minute.

11~~4~~. The water conditioning unit ~~(2)~~ of one of claims 1~~2~~ to 10~~3~~, wherein the total manifold ~~(57)~~ further comprises a mixing manifold ~~(56)~~ arranged on *or being part of* the second plate ~~(52)~~, the mixing manifold ~~(56)~~ comprising an admixing channel ~~(22)~~ arranged to guide a flow of water from the second end ~~(62)~~ to the first end ~~(61)~~, with additive inlets, optionally comprising additive check valves ~~(27)~~, arranged along the admixing channel ~~(22)~~ for admixing additives to the flow of water.

125. The water conditioning unit ~~(2)~~ of claim 114, wherein a volume of the admixing channel ~~(22)~~, from the first additive inlet, seen in the direction of flow, to the junction ~~(30)~~, is less than thirty millilitres, in particular less than twenty millilitres, in particular less than ten millilitres.

136. The water conditioning unit ~~(2)~~ of claim 114 or 125, comprising two or more peristaltic pumps ~~(26)~~ arranged in a row, with their axes of rotation at least approximately at a right angle to a direction of the admixing channel ~~(22)~~, wherein two outermost peristaltic pumps ~~(26)~~ of the row are arranged to turn in opposite directions.

147. The water conditioning unit ~~(2)~~ of one of the preceding claims, wherein all hydraulic elements guiding and controlling a flow of water between the inlet fitting ~~(11)~~ and the outlet fitting ~~(32)~~ are arranged inside a compact base unit ~~(75)~~.

158. The water conditioning unit ~~(2)~~ of claim 147, wherein the base unit ~~(75)~~ is configured for the, one, two or more additive containers ~~(25)~~ to be inserted into and connected to corresponding docking adapters ~~(76)~~ in a vertical direction, in particular in a downward direction.

~~19. The water conditioning unit (2) of claim 17 or 18, wherein the base unit (75) is configured for three or more additive containers (25) arranged in a line to be inserted into and connected to corresponding docking adapters (76) in a vertical direction, in particular in a downward direction.~~

~~20. The water conditioning unit (2) of one of the preceding claims, wherein the base unit (75) comprises user interface elements comprising additive selecting elements, in particular one selector button (71) for each docking adapter (76) or additive source, and an additive concentration controller (72) for setting an~~

~~amount of additive delivered from one or more selected docking adapters (76) or additive sources when the water conditioning unit (2) is in an additive dispensing mode, and optionally admixing mode selecting elements, and optionally indicator elements, in particular indicator light rings (73), indicating the one or more selected docking adapter (76) or additive source.~~

~~21. The water conditioning unit (2) of claim 20, wherein the user interface is configured to allow for more than one docking adapter (76) or additive source to be selected, and wherein a controller (100) is configured to, for a particular setting of the additive concentration controller (72)~~

- ~~if a single docking adapter (76) or additive source is selected, to control the amount of additive delivered by this single docking adapter (76) or additive source to be equal to a reference amount corresponding to this particular setting of the additive concentration controller (72); and~~
- ~~if two or more docking adapters (76) or additive sources are selected, to control the total amount of additive delivered by these two or more docking adapters (76) or additive sources to be equal to the same reference amount corresponding to this particular setting of the additive concentration controller (72).~~

16~~22~~. The water conditioning unit ~~(2)~~ of one of the preceding claims, configured to implement, for at least one of the additives, one or more of the following admixing modes

- a continuous admixing mode, wherein, the flow of the additive and the water is continuous;
- a pulsed additive admixing mode, wherein the flow of the additive is pulsed;
- a pulsed water admixing mode, wherein the flow of the water is pulsed.

~~23. A method for operating the water conditioning unit (2) of claim 20 or 21, comprising the steps of~~

- ~~according to a user input, selecting a single docking adapter (76) or additive source, or selecting two or more docking adapters (76) or additive sources;~~
- ~~and for a particular setting of the additive concentration controller (72)~~
  - ~~if a single docking adapter (76) or additive source is selected, controlling the amount of additive delivered by this single docking adapter (76) or additive source to be equal to a reference amount corresponding to this particular setting of the additive concentration controller (72); and~~
  - ~~if two or more docking adapters (76) or additive sources are selected, controlling the total amount of additive delivered by these two or more docking adapters (76) or additive sources to be equal to the same reference amount corresponding to this particular setting of the additive concentration controller (72).~~

~~24. A dispensing unit (3), for use in combination with the water conditioning unit (2) of the claims 1 to 22, comprising a showerhead (34) with a spray outlet (37) and a high-flow outlet (38),~~

- ~~the spray outlet (37) being configured to create a spray of droplets at a spray flow rate,~~
- ~~the high-flow outlet (38) being configured to create a jet of water at a high-flow flow rate,~~

~~the high-flow rate being at least twice, in particular three times the spray flow rate.~~

~~25. The dispensing unit (3) of claim 24, comprising an additive button (35) for setting an operation mode of the mixer valve (19) and the plain water valve (20) for the water conditioning unit (2) to deliver either water through the spray water channel (23), or water admixed with additive through the admixing channel (22).~~

~~26. The dispensing unit (3) of one of claims 24 to 25, comprising a flow selector (36) for setting an operation mode of the high-flow valve (21) and the mixer valve (19) or plain water valve (20), as the case may be, for the water conditioning unit (2)~~

- ~~to deliver water through the high-flow water channel (24) when the flow selector (36) is in a high flow position, or~~
- ~~to deliver water through either the spray water channel (23) or the admixing channel (22), as the case may be, when the flow selector (36) is in a spray position.~~

~~27. The dispensing unit (3) of claim 26, wherein the flow selector (36) is configured to operate a diverter (39) to guide a flow of water from the hose (33)~~

- ~~to the high-flow outlet (38), when the flow selector (36) is in the high flow position, or~~
- ~~to the spray outlet (37), when the flow selector (36) is in the spray position.~~

~~28. A dispensing unit (3), comprising a showerhead (34) with a spray outlet (37) and a high-flow outlet (38),~~

- ~~the spray outlet (37) being configured to create a spray of droplets at a spray flow rate, by creating two or more colliding jets of water,~~
- ~~the high-flow outlet (38) being configured to create a jet of water at a high-flow flow rate,~~

~~the high-flow rate being at least twice, in particular three times the spray flow rate.~~

~~29. The dispensing unit (3) of claim 28, comprising a flow selector (36) configured to operate a diverter (39) to guide a flow of water from the hose (33)~~

- ~~to the high-flow outlet (38), when the flow selector (36) is in the high flow position, or~~
- ~~to the spray outlet (37), when the flow selector (36) is in the spray position.~~