

PORTABLE FLUID DISPENSER

FIELD OF INVENTION

The present disclosure relates to a handheld fluid dispenser.

5 BACKGROUND

The process of irrigation involves the transmission of a body of fluid from one point to another. In the context of patient care, irrigation is the delivery of a steady stream of fluid to an organ for example the mouth or a wound, so as to achieve hydration and the removal of deeper debris. This can be accomplished with a handheld fluid dispenser.

10 An exemplary fluid dispenser should process the following qualities. Firstly, it should be operable with one hand in order to allow an operator to manipulate the organ or wound with the other hand. Secondly, fluid flow control should be responsive to allow the operator to quickly commence and halt fluid delivery so as to ensure over-irrigation does not occur. Thirdly, the irrigator is able to handle different fluid with different viscosity. Fourthly the
15 irrigator must be easy to wash and clean after use especially the fluid delivery passage that is exposed to the fluid. Fifthly, the irrigator must preferably be devoid of electrical components and circuits or if present, isolated from potential exposure to fluids while at the same time being affordable. Lastly, the irrigator must be affordable with minimum elaborate parts and components.

20 Accordingly, there exists a need for a portable fluid dispenser with the aforementioned qualities.

SUMMARY OF THE INVENTION

A primary embodiment of the present invention is a handheld device for dispensing a fluid comprising a container having a reservoir of the fluid, with the container having a lid and an
25 air chamber located above the reservoir, an air delivery conduit for supplying air into the air chamber and a fluid discharge outlet having an end that is immersed in the fluid wherein during a first state of operation, air in the air chamber is released thru the air outlet. Optionally, during a second state of operation, pressure in the air chamber pushes the fluid out through the discharge outlet. Optionally, the air outlet is connected to the air delivery
30 conduit. Optionally, the air outlet is defined by a surface of the lid. Optionally, the handheld device further comprises an air pump operably attached to the air delivery conduit. Optionally, the air pump is located remotely. Optionally, the air pump is selected from a group comprising a positive displacement pump and an air compressor. Preferably, the

positive displacement pump is selected from a group comprising a gear pump, screw pump, rotary vane pump, plunger pump, piston pump, progressing cavity pump and peristaltic pump. Most preferably, the positive displacement pump is a diaphragm pump.

BRIEF DESCRIPTION OF DRAWINGS

5 Fig. 1 is a schematic representation of a fluid dispenser as known in the art.

Fig. 2 is a further schematic representation of a fluid dispenser as known in the art.

Fig. 3 is a schematic representation depicting a fluid dispenser according to a preferred embodiment.

10 Fig. 4 is a schematic representation depicting a fluid dispenser according to a second embodiment.

DETAILED DESCRIPTION OF THE INVENTION

In the following detailed description, reference is made to the accompanying drawings, which form a part hereof. The illustrative embodiments described in the detailed description, drawings and claims are not meant to be limiting. Other embodiments can be utilized, and
15 other changes can be made, without departing from the scope of the subject matter presented herein.

Referring to Fig. 1, a schematic representation of a fluid dispenser **101** as known in the art is depicted. The fluid dispenser **101** includes a container **111** that defines a reservoir **103** in which fluid is stored. The container **111** has a lid **104** which serves as an access point for
20 replenishing the fluid. The reservoir **103** is in fluid communication with a pump **107** by way of fluid inlet **108**. During operation, the pump **107** is energised and pulls fluid from the reservoir into the pump **107** and discharges the fluid through a water outlet **109** for dispensation via water conduit **106**. Additionally, a valve (not depicted) such as an electromechanical valve, including a solenoid valve or electrically driven valve may be along the water conduit **106** for
25 additional flow control.

This configuration has a number of drawbacks. Firstly, physical interaction between the internal components of the pump **107** and the fluid increases maintenance overhead since said internal components are relatively inaccessible. Secondly, the need for an on/off switch to be located on the fluid dispenser **101** to allow a user to control the dispensation of fluid by
30 completing and breaking an electrical circuit that runs between an internal power source (not depicted) and the pump **107** means the device itself either requires additional engineering to

ensure electrical components are kept waterproof which results in significantly higher manufacturing costs. On another hand, during cleaning, the pump **107** and electrical circuit can only have minimal direct interaction with water and cleaning fluids. In addition, the fluid dispenser **101** may require significant disassembly of internal components to effectively
5 clean.

Referring to Fig. 2, a schematic representation of another fluid dispenser **201** as known in the art is depicted. The fluid dispenser **201** includes a container **211** that defines a reservoir **203** in which fluid is stored. The container **211** has a lid **204** which serves as an access point for replenishing the fluid. An air chamber **205** is located in the container **211** between the
10 fluid stored in the container **211** and the lid **204** as air is supplied by an air delivery conduit **202**. The lid **204** forms an air-tight seal such that air can only enter the air chamber **205** via the air delivery conduit **202**. Pump **207** is connected to the air delivery conduit **202** thru an air outlet **208**.

During operation, the pump **207** is energised and receives atmospheric air at an air inlet **209**
15 via air supply port **210**. Exterior atmospheric air entering pump **207** is delivered to the air chamber **205** by way of air delivery conduit **202**. This leads to a rapid increase in pressure within air chamber **205** which in turn forces the fluid out of the reservoir thru a fluid outlet **206**. Additionally, a valve (not depicted) such as an electromechanical valve including a solenoid valve or motorised valve may be located along fluid outlet **206** for additional flow
20 control. Accordingly, the dispensing of fluid via the fluid outlet **206** is directly coupled to the delivery of air which in turn rapidly pressurises the air chamber **205**. That is, dispensation starts almost immediately when the delivery of air into the air chamber **205** commences.

While doing away with the need for the fluid to physically interact with the pump, an on/off switch located on the fluid dispenser **201** itself to complete and break an electrical circuit that
25 runs between an internal power source (not depicted) and the pump/valve which would once again require water-proofing just like in the case of the above fluid dispenser **101**.

Referring to Fig. 3, a schematic representation of a handheld fluid dispenser **301** according to a preferred embodiment of the present invention is depicted. The portable dispenser **301** comprises a container **311** having a reservoir **303**. The container **311** is enclosed by lid **304**
30 which forms an air-tight seal with the container **311**. For the purposes of irrigation, the reservoir **303** can typically be expected to be filled with water. However, it is envisaged that different fluids of varying viscosity including but not limited to more viscous fluids for example such as honey and cleaning fluids may be stored therein depending on the use case. The reservoir **303** can be replenished by disconnecting the container **311** from the lid **304**. In the

context of the present invention, the lid **304** can be any re-sealable access point that permits access to the reservoir **303** for the purposes of fluid replenishment. An air chamber **305** is formed in a space above the fluid and the lid receives air supplied by air delivery conduit **302**. The air chamber **305** is normally in fluid communication with the exterior atmosphere by way of an air outlet **308**. It will be readily understood by a skilled person that any conduit that permits fluid communication between the air chamber **305** and the exterior atmosphere may be employed.

During operation, and while in a first operation state, air is actively supplied into the air chamber **305** via the air delivery conduit **302**. Air supplied in this manner is preferably done so as a constant stream but may also be supplied in pulses. In contrast with the above known fluid dispenser **201**, the active supply of air to air chamber **305** does not at first instance lead to fluid dispensation due to the presence of the air outlet **308** which in its normally open state provides the delivered air from air delivery conduit **302** with a route to exit air chamber **305** and return to the exterior atmosphere thus preventing air pressure within the air chamber **305** from increasing.

When dispensing of the fluid from the reservoir **303** is desired, a second operation state is assumed, where the air outlet **308** is occluded while air is being actively delivered via air delivery conduit **302** into the air chamber **305**. This second operation state can be attained as simply as by occluding the lumen of the air outlet **308** with a finger. This quickly leads to a build-up in air pressure within the air chamber **305** which in turn forces the fluid to discharge from the reservoir **303** via the fluid outlet **306**. Dispensation of fluid can be easily halted by removing obstruction to the lumen of air outlet **308**, for example, by lifting ones finger away. In this manner, the air outlet **308** serves as simple on/off switch or control valve that does not rely on an electrical circuit or an electrical component.

Referring to Fig. 4, a schematic representation of handheld fluid dispenser **401** according to a second embodiment of the present invention is depicted. An air outlet **408** is connected to an air delivery conduit **402** and accordingly shares a common passageway into air chamber **405**. The air outlet **408** may be located anywhere along air delivery conduit **402**. The on/off switch functionality provided by opening/occluding air outlet **408** remains operable. As in the above embodiment, air is delivered into air chamber **405** by an air pump **407** through the air delivery conduit **402**. The air pump **407** is preferably selected from a group comprising a positive displacement pump, an air compressor and a blower. The positive displacement pump can be a gear pump, screw pump, rotary vane pump, plunger pump, piston pump, progressing cavity pump and peristaltic pump most preferably a diaphragm pump. A skilled person would readily understand that any device capable of moving air (compressed or

- otherwise) via air delivery conduit **402** can be employed in this manner. With air outlet **408** serving as an on/off switch, air pump **407** and its power supply (if applicable) can be located remotely from the device and away from the device proper as depicted in Fig. 4. For example, the air pump **407** can be attached to a user's belt or on any solid surface. This
- 5 increases the portability and permits easy cleaning of the portable fluid dispenser **401** which can now be fully immersed in a cleaning fluid or in a dishwasher as there is no electrical safety concern since the air pump **407** can simply be disconnected from the air delivery conduit **402**. In an alternative embodiment, the air pump **407** can be co-located with the portable fluid dispenser **401**.
- 10 It will be appreciated by persons skilled in the art that various modifications can be made to the embodiments described above. For example, alternatively or in addition to the lid **304**, **404**, an access hatch (not depicted) defined by an exterior surface of the container **311**, **411** that is in fluid communication with the reservoir **303**, **403** can be employed to allow the reservoir **303**, **403** to be refilled without the need for disconnection. In another example, the
- 15 air outlet **308**, **408** can be occluded by a mechanical valve, for example a throttle valve or a stopper. In another example, the air outlet **308**, **408** can be made of a soft, flexible material that allows the air outlet **308**, **408** to be occluded by a fastening device for example, a clamp.

CLAIMS

1. A handheld device for dispensing a fluid comprising:
 a container having a reservoir of the fluid, with the container having a lid and an air chamber located above the reservoir;
 5 an air delivery conduit for supplying air into the air chamber;
 a fluid discharge outlet having an end that is immersed in the fluid; and
 an air outlet, wherein during a first state of operation, air entering the air chamber is simultaneously released through the air outlet.
2. The device according to claim 1, wherein during a second state of operation,
 10 pressure in the air chamber pushes the fluid out through the discharge outlet.
3. The device according to claim 1, wherein the air outlet is connected to the air delivery conduit.
4. The device according to claim 1, wherein the air outlet is defined by a surface of the lid.
- 15 5. The device according to claim 2, further comprising an air pump.
6. The device according to claim 5, wherein the air pump is located remotely from the device.
7. The device according to claim 5 or 6, wherein the air pump is selected from a group comprising a positive displacement pump, an air compressor and a blower.
- 20 8. The device according to claim 7, wherein the positive displacement pump is selected from a group comprising a gear pump, screw pump, rotary vane pump, plunger pump, piston pump, progressing cavity pump and peristaltic pump.
9. The device according to claim 7, wherein the positive displacement pump is a diaphragm pump.