TOILET FLUSHER HAVING ELECTROMECHANICALLY INDUCED RELEASE OF ACTIVE AGENT

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ABSTRACT
Dosing mechanism for free-flowing preparations, comprising a dosing device having an energy source, a control unit, and a sensor unit, and at least one first tank containing a first preparation that can be coupled to the dosing device, the dosing device comprising a micropump controllable by the control unit and having a specific delivery rate of less than 500 l/min.
Receive sensor signal
Compare sensor signal with threshold value

Power On

Turn on micropump

Receive sensor signal
Compare sensor signal with threshold value

Turn off micropump

Sensor signal > threshold value?

Sensor signal < threshold value?

Fig. 6
3. Receive sensor signal
   Compare sensor signal with threshold value
   Select preparation
   Control the valves
   Turn on micropump
   Receive sensor signal
   Compare sensor signal with threshold value

Fig. 7
Power On

Receive sensor signal

Compare sensor signal with threshold value

Select the preparation

Select the micropump

Turn on micropump

Receive sensor signal

Compare sensor signal with threshold value

Turn off micropump

Sensor signal > threshold value?

Sensor signal < threshold value?

Fig. 8
TOILET FLUSHER HAVING ELECTROMECHANICALLY INDUCED RELEASE OF ACTIVE AGENT

CROSS REFERENCE TO RELATED APPLICATIONS


[0002] The invention relates to a toilet flusher having an electromechanically induced release of preparations in and/or on a toilet bowl.

[0003] Precise dosing of flowable or free-flowing compositions in accordance with demand is of relevance for a variety of fields of application.

[0004] In the household area, dosing of flowable substances has gained increasing importance, based primarily on precise and demand-controlled dosing of active ingredients so that, firstly, the surroundings are protected through protection of resources and avoidance of overdosing and misdosing and, secondly, efficacy of the active ingredients thereby dosed is optimized.

[0005] Dosing of cleaning compositions and perfume compositions in the toilet area is currently implemented by so-called toilet flusers or fresheners. These are single-chamber or multichamber containers, which are suspended in the toilet bowl in such a way that an active ingredient is released from the toilet flusher into the toilet bowl when flushing the toilet bowl with water.

[0006] Such devices are known from EP 0828902 or DE 10113036, for example.

[0007] One important disadvantage of these toilet flusers is that dosing depends essentially on the respective local flow conditions in the toilet bowl during the flushing operation. However, these flow conditions may vary greatly, depending on the type of toilet and the positioning of the toilet flusher in and/or on the toilet bowl. For example, with some types of toilets, it may happen that no active ingredients are released from the toilet flusher because of insufficient water or none at all flows over the toilet flusher during the flushing operation, and therefore the dosing mechanism of the toilet flusher is not triggered.

[0008] Furthermore, if flushing water overflows a toilet flusher when used, this may result in a disturbance in the water guidance intended by the toilet manufacturer reducing the flushing power of the toilet.

[0009] It is therefore desirable to have a dosing device for the release of active ingredients into a toilet bowl that implements dosing of active ingredients into the toilet bowl in a manner independent of the toilet flushing operation.

[0010] Furthermore, it is desirable if the active ingredient is released not only after activation of flushing. For example, it would be advantageous to dose perfumes or sudsing agents into the toilet bowl immediately prior to use of the toilet as a preventive measure against the possible release of odorous human metabolic excretory products, which are often perceived as unpleasant, during use of the toilet.

[0011] Furthermore, dosing devices referred to herein often have a large design volume which is esthetically displeasing and often poses functional problems because the usable space in a toilet bowl is reduced due to the dosing devices hanging into the toilet opening.

[0012] The present invention addresses these issues by providing a toilet flusher which implements accurate dosing of compositions on occurrence of defined mechanical, electrical, physical and/or chemical parameters in or on the toilet bowl.

[0013] This is achieved by a toilet flusher comprising a power source, a control unit and a sensor unit, which form a dosing apparatus as well as at least one first container containing a first preparation coupled to the dosing apparatus.

[0014] Coupled in this context means that the container can be connected to the dosing apparatus in such a way that the interior of the container is connected in a communicating manner to the dosing apparatus, and leakage-free removal of preparation from the container is implemented.

[0015] The inventive toilet flusher consists of various components which may in turn be combined to form modules. The components of the toilet flusher comprise at least one pump, a dispensing element, a control unit, a sensor unit, a power source, a container, a fastening means and a preparation. In a preferred embodiment of the invention, the pump, control unit, sensor unit and power source components may be combined to form the “dosing apparatus” module. The components and modules are described below.

Dosing Apparatus

[0016] The power source needed for operation of the toilet flusher, a control unit, a sensor unit and at least one pump are integrated into the dosing apparatus. The dosing apparatus preferably consists of a splash-proof housing, which prevents splashing water, which may occur when using the inventive toilet flusher in a toilet bowl, from penetrating into the interior of the dosing apparatus.

[0017] Furthermore, it is preferable for the dosing apparatus to be situated on the outer edge of the toilet bowl, thus protecting against the effects of splashing water and also permitting convenient operation of the dosing apparatus. Furthermore, the dosing apparatus does not penetrate into the interior of the toilet, so the usable cross-sectional area of the toilet bowl is not reduced by the arrangement on the outer edge.

[0018] Since preparations to be dosed may have a pH between 2 and 12, depending on intended application, all components of the toilet flusher that come in contact with the preparations should have a corresponding acid resistance and/or alkali resistance. Furthermore, by suitable choice of materials, these components should be largely chemically inert (e.g., inert with respect to nonionic surfactants, enzymes and/or perfumes).

[0019] It is particularly advantageous to cast the electric components of the inventive toilet flusher (e.g., power source, control unit and sensor) separately or jointly with one another so that the dosing apparatus is essentially waterproof (i.e., the dosing apparatus is functional even when completely surrounded with liquid). Casting materials that may be used include multicomponent epoxy and acrylate casting compounds such as methacrylate esters, urethane methacrylates and cyanocrylates or two-component materials with polyurethanes, silicones, epoxy resins.

[0020] An important advantage of the invention is seen in the separation of the toilet flusher into a dosing apparatus and a container coupleable to the dosing apparatus, enabling the
toilet flusher to be used in a flexible manner for a wide variety of application cases and adapted easily.

Pump—

[0021] A pump according to the present invention is a fluid energy machine removing or conveying small quantities of a fluid in particular by conversion of a mechanical drive power into a fluid power.

[0022] Fluids refer to liquids and gases as well as mixtures thereof and with solids.

[0023] Useful pumps include displacement pumps, oscillating pumps, diaphragm pumps, piston pumps, rotary pumps, dynamic pumps, centrifugal pumps, electrophoretic pumps, electro-osmotic pumps, magnetohydrodynamic pumps, surface-acoustic-wave pumps, capillary force pumps, electrowetting pump, and thermocapillary pump.

[0024] The pump can be connected to the power source either directly or with the control unit in between.

[0025] In another embodiment of the invention, dispensing of at least one preparation is induced by gravity without action of a pump. Dispensing of the preparation from the container to the surroundings in this configuration is controlled by a valve, for example, which opens to release the preparation and is closable to prevent dispensing. The valve can be controllable directly by the power source or by the control unit connected in between.

[0026] The pump, the sensor and the control unit are advantageously configured in such a way that a defined dispensing quantity of active ingredient preparation is dispensed into the toilet bowl independent of the arrangement of the toilet flusher in or on the toilet bowl and/or the quantity of flushing water acting on the toilet flusher.

[0027] By means of the pump, it is also possible for at least two different defined dispensing quantities of at least one active ingredient preparation to be releasable. An important advantage of this embodiment of the invention is the dosing of active ingredients into the toilet bowl on demand so that more effective use of active ingredients in a manner that is more conservative with resources may be induced.

[0028] In another preferred embodiment of the invention, the pump is configured so that it is suitable for release of an active ingredient preparation having a viscosity of <500 mPas.

Micropump—

[0029] The delivery rate of a micropump is usually between 50 mL and 100 mL per minute, preferably between 250 mL and 30 mL per minute, especially preferably between 500 mL and mL per minute.

[0030] The micropump preferably has a design volume of less than 5 cm³, especially preferably less than 3 cm³, in particular preferably less than 2 cm³.

[0031] The specific delivery rate of a micropump, based on the ratio of the delivery rate to the design volume of a micropump, is usually less than 500 (1/min). The specific delivery rate is preferably between 1 and 300, especially preferably between 1.5 and 200, in particular preferably between 2 and 150, most especially preferably between 2.5 and 100.

Diaphragm Pumps—

[0032] Diaphragm pumps are particularly advantageous for dosing of cleaning preparations and active ingredient preparations as well as perfume.

Diaphragm pumps usually comprise an inlet valve into and an outlet valve out of a pump chamber, formed by a pump diaphragm and an actuator.

[0034] The actuator induces a compression of the pump chamber (mechanical action on the pump diaphragm when the intake valve is closed) so that the fluid in the pump chamber is delivered through the opened outlet valve out of the pump chamber.

[0035] If the ejection operation is concluded, the outlet valve is closed and decompression of the pump chamber is induced by the actuator, so the fluid is now drawn through the opened intake valve into the pump chamber.

[0036] Through a suitable configuration and/or control of the valves and the actuator, the direction of conveyance of the micropump may be influenced and/or reversed.

[0037] The actuator of the diaphragm pump can be chosen from electromotor, piezoceramic, bimetallic, memometallic, pneumatic, peristaltic, electrostatic, electromagnetic, and thermal drive units, for example.

[0038] The valves can be an active or passive valve. Passive valves include flap valves, diaphragm valves or no-moving-parts valves.

[0039] Depending on the field of application, dispensing of the preparation from the dosing device on the pressure side may be accomplished by drop, stream, spray, diffusion or evaporation.

[0040] For preparations which form deposits during prolonged storage, it may be advantageous to arrange the container holding the preparation on the pressure side of the pump. In this configuration, only a fluid free of deposit-forming substances is conveyed through the pump. In this case, it is particularly advantageous to use air as the fluid.

[0041] The fluid is pumped into the container under pressure. The container has a pressure-equalizing valve which releases the product flow out of the container when a defined pressure in the container is exceeded.

[0042] It is possible to use the dosing apparatus for a wide variety of preparations without endangering the functionality of the pump due to possible deposits or reactions between two preparations.

Dispensing Elements—

[0043] Any type of devices suitable for dispensing an active substance to the surroundings of the dosing device are referred to as dispensing elements.

[0044] Dispensing elements include nozzles, spray heads, drop dosing devices, foam spray heads, piezo elements, porous elements,wick systems, capillary systems, atomizers, ultrasonic atomizers, ionizing atomizers, etc.

[0045] For dispensing active ingredients into the toilet and/or the inside surfaces of the toilet bowl, nozzles, spray heads, drop dispensers, foam spray heads, piezo elements and the like are particularly suitable.

[0046] For dispensing an active ingredient preparation into the air, nozzles, nebulizers, spray heads, piezo elements, sintered plates, porous elements, wick systems and the like are suitable.

[0047] Dispensing elements can have the same or different spray cone shapes for dispensing the preparations. For example, it is conceivable for one dispensing element to create a jet having a point-shaped application area, while another dispensing element creates a planar application field. Various combinations of a wide variety of spray foam shapes are also conceivable.
[0048] The dispensing element may also provide electrostatic charging of active ingredient droplets so that wetting, adhesion and/or distribution of the active ingredient on a surface and/or in the air are improved.

[0049] Furthermore, the dispensing element may be designed as a fan, configured either for improving the air by intake of foul odors or with regard to optimized distribution of active ingredient in and/or on the toilet bowl.

[0050] The dispensing elements may in particular be configured so that one or more active ingredients are dispensed in different directions from one another. A few possible configurations with regard to the dispensing direction are listed in the following table as examples, although this list is not intended to be conclusive.

<table>
<thead>
<tr>
<th>Dispensing direction A</th>
<th>Dispensing direction B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perfume dispensed into the toilet bowl</td>
<td>Perfume dispensed into the surroundings</td>
</tr>
<tr>
<td>Cleaning agent dispensed into the toilet bowl</td>
<td>Cleaning agent dispensed below the edge of the toilet during flushing or outside of the flushing operation</td>
</tr>
<tr>
<td>Cleaning agent dispensed into the toilet bowl</td>
<td>Perfume dispensed into the surroundings</td>
</tr>
</tbody>
</table>

[0051] Other desired combinations of the configurations listed in the above table are also possible.

[0052] Furthermore, it is advantageous to arrange the dispensing element movably on the bracket of the toilet flusher. The dispensing element and the spray cone of the preparation may be directed by the user in a targeted manner to wet a defined application field in or on the toilet with the preparation in this way.

[0053] The dispensing element(s) is/are advantageously configured in such a way that a defined dispensing quantity of at least one active ingredient preparation is directed independent of the positioning of the toilet flusher on the toilet bowl, and is applied to the interior of the toilet bowl in a defined manner. Advantages of such an embodiment include more specific exposure of the toilet bowl surfaces to one or more active ingredients so that different surfaces may be treated with different active ingredients. For example, in the case of a flat flusher, the pan may be wetted with an active ingredient to prevent deposits while an active ingredient to prevent lime deposits is applied to the walls running in a funnel shape from the pan to the edge of the toilet.

Control Unit—

[0054] A control unit according to the present application is a device suitable for influencing conveyance of material, power and/or information. To this end, the control unit influences the converter with information which it processes in the sense of the goal of the control.

[0055] Converters include, for example, pumps and/or valves.

[0056] Since the toilet flusher does not use any mechanical control elements to release the product in a preferred embodiment of the invention, the toilet flusher may be miniaturized to the extent that it may also be used in applications in which the size of the toilet flusher is critical.

[0057] In particular, the control unit may be a programmable microprocessor. In a particularly preferred embodiment of the invention, a plurality of dosing programs are stored in the microprocessor which are selectable and executable in accordance with the container coupled to the toilet flusher. It is also conceivable for the dosing programs to be manually retrievable by the user.

[0058] The control unit is preferably also arranged on the toilet bowl facing outward from which it may easily be operated by the user, in particular when the user is sitting on the toilet.

[0059] In a particularly preferred embodiment of the invention, the control unit may comprise a dosing program for introducing at least two different active ingredient preparations into a toilet bowl or into the surroundings of the toilet bowl in which at least two different active ingredient preparations are released in at least two successive times \( t_1 \) and \( t_2 \), wherein at least one active ingredient preparation is introduced into the interior of a toilet bowl.

[0060] An important advantage of such a dosing program includes an optimized cleaning power due to extremely accurate control of possible chemical reactions through a suitably time-offset release of the corresponding preparation or preparations, a few examples of which are listed in the following table, although this list is not conclusively:

<table>
<thead>
<tr>
<th>( t_1 )</th>
<th>( t_2 )</th>
<th>Advantage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleaning agent in the toilet bowl in the flushing operation</td>
<td>Perfume in the toilet bowl after the flushing operation</td>
<td>Optimized release of perfume because the perfume is released into the toilet bowl after the flushing operation and therefore is not washed away with the flushing water. The perfume is not &quot;destroyed&quot; by the cleaning agent preparation.</td>
</tr>
<tr>
<td>Perfume in the toilet bowl immediately before use</td>
<td>Cleaning agent in the toilet bowl during the flushing operation</td>
<td>Optimized release of perfume because the perfume is released into the toilet bowl before the flushing operation and therefore is not washed away with the flushing water. The perfume is not &quot;destroyed&quot; by the cleaning agent preparation.</td>
</tr>
<tr>
<td>Cleaning agent A in the toilet bowl immediately before use</td>
<td>Cleaning agent B in the toilet bowl during the flushing operation</td>
<td>Cleaning agent A may prevent deposits in the toilet bowl by forming a protective film of cleaning agent A in the toilet bowl immediately before use of the toilet, this film then being flushed from the toilet surface during the process of flushing cleaning agent B.</td>
</tr>
</tbody>
</table>
The control unit can be designed so that it is possible to adjust parameters in the dosing programs. For example, sensor threshold values can be adjusted during preconfiguration of the toilet flusher, or by the user during use to induce release of active ingredient at a certain sensor threshold value. The setting of one or more parameters can be implemented by a suitably configured input device on the toilet flusher. In this way, control of the toilet flusher can be further optimized and adapted to a certain application case.

Sensor Unit—

The sensor unit can include one or more active and/or passive sensors for qualitative and/or quantitative detection of mechanical, electric, physical and/or chemical variables sent as control signals to the control unit.

In particular, sensors of the sensor unit include timers, infrared sensors, brightness sensors, temperature sensors, motion sensors, elongation sensors, rpm sensors, proximity sensors, flow rate sensors, color sensors, gas sensors, vibration sensors, pressure sensors, conductivity sensors, turbidity sensors, sound sensors, lab-on-a-chip sensors, force sensors, acceleration sensors, inclination sensors, pH sensors, moisture sensors, magnetic field sensors, RFID sensors, magnetic field sensors, Hall sensors, biochips, odor sensors, hydrogen sulfide sensors and/or MEMS sensors.

The sensor unit in its simplest conceivable embodiment can also be embodied as a tilt, pressure or touch sensor.

For preparations whose viscosity fluctuates greatly as a function of temperature, it is advantageous for volume and/or mass control of the dosed preparations to provide flow rate sensors in the dosing device. Suitable flow rate sensors include diaphragm flow rate sensors, magnetic-inductive flow meters, mass flow rate measurement according to the Coriolis method, eddy counter flow rate measurement methods, ultrasonic flow rate measurement methods, particulate flow rate measurement, ring-piston flow rate measurement, thermal mass flow rate measurement or active pressure flow rate measurement.

It is also conceivable to store a viscosity curve as a function of temperature for at least one preparation in the control unit, so that dosing is adjusted by the control unit in accordance with the temperature and thus the viscosity of the preparation.

In another embodiment of the invention, a device for direct determination of the viscosity of the preparation is provided.

The alternatives mentioned above for determining the dosing quantity and/or viscosity of a preparation serve to generate a control signal processed by the control unit for control of a pump, whereby constant dosing of a preparation is induced.

In another preferred embodiment of the invention, the sensor is configured so that detection of a flushing operation is implemented without any significant influence on flow conditions in the toilet bowl. For example, ultrasonic sensors may be used for this purpose.

Power Source—

According to the present application, the power source is a component of the dosing device, which is expedient for providing power suitable for self-sufficient operation of the dosing device.

The power source preferably supplies electricity. The power source can be, for example, a battery, a power pack, solar cells or the like.

It is particularly advantageous to design the power source to be replaceable (e.g., in the form of a replaceable battery).

However, it is also possible for the power source to be a mechanical power source such as a dynamo, which converts mechanical or fluid energy into electric power. This can then be stored in suitable storage elements such as a capacitor or battery.

Container—

A container according to the present application refers to a packaging suitable for enclosing or holding preparations and can be coupled to the dosing apparatus for dispensing the preparation.

An arrangement comprising two containers, preferably separate from one another, with each containing an active ingredient fluid, is especially preferred. However, multiple storage containers for multiple active ingredient fluids may also be provided. The storage containers are separated from one another in order to suppress premature mixing of the active ingredient fluids. They can be designed to be physically separate or as separate components in a cohesive body.

The volume ratio formed from the design volume of the dosing apparatus and the filling volume of the container preferably is <1, especially preferably <0.1, in particular preferably <0.05. With a given total design volume of the dosing apparatus and the container, the predominant proportion of the design volume is provided by the container and the preparation contained therein.

The container usually has a filling volume of <5000 mL, in particular <1000 mL, preferably <500 mL, especially preferably <250 mL, most especially preferably <50 mL.

The invention is suitable for dimensionally stable containers such as cups, tins, cartridges, bottles, canisters, cans, boxes, drums or tubes, but can also be used for flexible containers such as bags or sacks, in particular when used according to the bag-in-bottle principle.

A container can also have multiple chambers which can be filled with different compositions. It is also possible for a plurality of containers to be arranged to form one unit (e.g., a cartridge).

Examples of possible combinations of containers and/or chambers having the corresponding preparations are summarized in the following table for a few applications.

<table>
<thead>
<tr>
<th>Container A</th>
<th>Container B</th>
<th>Container C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleaning agent</td>
<td>Perfume</td>
<td></td>
</tr>
<tr>
<td>Cleaning agent A</td>
<td>Cleaning agent B</td>
<td></td>
</tr>
<tr>
<td>Cleaning agent</td>
<td>Cleaning agent B</td>
<td>Perfume</td>
</tr>
</tbody>
</table>

In a preferred embodiment of the invention, the container has an RFID label containing at least information about the contents of the container, readable by the sensor unit.

This information can be used to select a dosing program stored in the control unit. In this way, optimal dosing program for each preparation is always used. It is also possible that no dosing is performed by the dosing device when no RFID label is present or when an RFID label bears a false or defective identifier and, instead of an optical or acoustic signal to be generated, alerts the user to the presence of an error.
To rule out misuse of the containers, the containers may also have structural elements which cooperate with corresponding elements on the dosing apparatus according to a lock-and-key principle, so that only containers of a certain type are coupled to the dosing apparatus, for example. Furthermore, with this embodiment it is possible for information about the container coupled to the dosing apparatus to be transmitted to the control unit so that the dosing device can be controlled in a manner coordinated with the contents of the corresponding container.

In another embodiment of the invention, the container may be under pressure. This is advantageous when the preparation is sprayed or dispensed without requiring a pump in between. In this case, the preparation can be dispensed, for example, in a manner that is controlled and/or regulated by a control valve operatively connected to the control unit. This embodiment has the additional advantage that no power need be supplied by the power source for conveying the preparation, so the power source can either be designed with smaller dimensions or have a longer lifetime.

Fasteners—

The toilet flusher can additionally comprise fasteners to affix the toilet flusher to the toilet bowl. Fasteners include suction cups, adhesive tape, brackets or the like, for example.

Alternatively, the toilet flusher can be attached to the toilet tank, the toilet seat or the toilet lid. Fasteners known in the art can be used here.

Preparations—

Preparations according to the present application are compositions containing at least one substance from the group of cleaning agents and/or perfumes.

According to another preferred embodiment of the invention, preparations include substances for modifying surfaces, in particular, ceramic surfaces.

Preparations suitable according to the invention include, for example, scent phases, in particular perfumed scent phases. Such scent phases usually contain at least one perfume, preferably perfume oil, at least one surfactant or one emulsifier, water and optionally additional ingredients such as preservatives, thickeners, chelating agents, dyes, additional surfactants or emulsifiers, stabilizers, lime dissolvers, etc.

Bleach phases, in particular chlorine-containing bleach phases, preferably hypochlorite-based bleach phases, are likewise suitable as preparations according to the invention, wherein the bleach phases can contain additional ingredients such as thickeners, surfactants or emulsifiers, neutralizers, dyes, perfumes, etc., in addition to the actual bleaching agent and/or water.

Additional preparations suitable according to the invention include limewashing active ingredient phases, preferably acidic limewashing active ingredient phases. These limewashing active ingredient phases can contain additional ingredients such as surfactants or emulsifiers, thickeners, perfumes, preservatives, etc., in addition to the actual lime-dissolving agent—which is preferably an organic or inorganic acid—and water.

It is also possible to use as preparations highly concentrated surfactant phases, so-called Suds boosters. Such highly concentrated surfactant phases can also contain additional conventional ingredients besides surfactants. Suds boosters are advantageous in pretreating the toilet bowl with a carpet of foam, for example, to prevent and/or reduce adherence of metabolite excretory products on the toilet surface and/or to induce encapsulation of bad odors.

Optionally also suitable according to the invention are preparations having an antibacterial and/or fungicidal and/or antiviral active ingredient phase, where the active ingredient phase can optionally contain, in addition to the antibacterial and/or fungicidal and/or antiviral active ingredient and water, additional ingredients such as surfactants or emulsifiers, thickeners, perfumes, preservatives, etc.

It is also possible for the preparations to have enzyme-containing active ingredient phases. Such enzyme-containing active ingredient phases can optionally contain, in addition to enzyme(s) and water, additional ingredients such as surfactants or emulsifiers, thickeners, perfumes, preservatives, etc.

It is likewise possible for preparations used according to the invention to be absorbent active phases, in particular odor-absorbing active phases. These can contain, in addition to the absorbent, in particular odor absorbents and water, additional ingredients if necessary, such as surfactants or emulsifiers, thickeners, perfumes, preservatives, etc.

According to an especially preferred embodiment, the inventive toilet flusher offers the possibility of using combinations of different preparations in the storage containers, such that one of the storage containers contains a scent phase as defined above.

Examples of useful preparation combinations include perfumed scent phases in combination with chlorine bleaches (which are not stable when stored together), perfumed scent phases with a highly concentrated surfactant phase (suds booster), scent phase with a lime-dissolving acidic active ingredient phase, scent phase combined with an antibacterial active ingredient phase, various acid systems, scent phase combined with an enzyme-containing active ingredient phase, perfumed acid phase combined with a water-tinting phase, scent phase with an odor-absorbing phase, perfumed acid phase with active oxygen, perfumed acid phase with a active ingredient, thickened with polyacrylate, etc.

Of particular interest are viscous to gelatinous active ingredient fluids having a viscosity in the range of a few thousand mPas, in particular from 200 to 5000 mPas, preferably 500 to 3500 mPas (measured with a RotoVisko LVT2 II, spindle 31, 5 rpm, 20°C.).

In another preferred embodiment of the invention, the preparations have a viscosity of less than 2000 mPas, in particular less than 1000 mPas (measured with a RotoVisko LVT2 II, spindle 31, 5 rpm, 20°C.). Such low-viscosity to aqueous preparations are suitable in particular when the preparation is to be sprayed in or on the toilet bowl.

Due to the use of low-viscosity active ingredient preparations, much faster and more accurate dosing is inducible in combination with the inventive toilet flusher, and no thickener systems need be used. Furthermore, active ingredient systems, which may be prepared only with a low viscosity (e.g., based on chlorine HCl, etc.), may also be used.

According to another embodiment of the invention, the preparation can be under pressure. This is advantageous when the preparation is sprayed or dispensed without requiring a pump in between. In this case, dispensing of the preparation can be controlled and/or regulated, for example, by a
control valve operatively connected to the control unit. This embodiment has the additional advantage that no power need be supplied by the power source for conveying the preparation, so the power source can be designed with smaller dimensions or has a longer lifetime.

BRIEF DESCRIPTION OF THE DRAWINGS

[0103] FIG. 1 is schematic block diagram of one embodiment of a toilet flusher according to the present invention having a preparation container on the intake side of the pump.
[0104] FIG. 2 is schematic block diagram of another embodiment of a toilet flusher according to the present invention having a preparation container on the pressure side of the pump.
[0105] FIG. 3 is schematic block diagram of another embodiment of a toilet flusher according to the present invention having a two-chamber preparation container on the intake side of the pump.
[0106] FIG. 4 is schematic block diagram of another embodiment of a toilet flusher according to the present invention having a passively valve-controlled two-chamber preparation container on the intake side of the pump.
[0107] FIG. 4a is schematic block diagram of another embodiment of a toilet flusher according to the present invention having an actively valve-controlled two-chamber preparation container on the intake side of the pump.
[0108] FIG. 5 is schematic block diagram of another embodiment of a toilet flusher according to the present invention having two pump-connected preparation containers.
[0109] FIG. 6 is a flow chart illustrating one embodiment of controlling a toilet flusher with a pump.
[0110] FIG. 7 is a flow chart illustrating an embodiment of controlling a toilet flusher having a pump and a multichamber preparation container.
[0111] FIG. 8 is a flow chart illustrating an embodiment of controlling a toilet flusher having multiple pumps and a multichamber preparation container.
[0112] FIG. 9 is a schematic block diagram of one embodiment of a toilet flusher according to the present invention having an RFID label on a preparation container.
[0113] FIG. 10 is a schematic block diagram of one embodiment of a toilet flusher according to the present invention having a removable refilling container.
[0114] FIG. 11 is a schematic block diagram of one embodiment of a toilet flusher according to the present invention having a refilling container attached to the dosing apparatus.
[0115] FIG. 12 is a schematic block diagram of one embodiment of a toilet flusher according to the present invention having a battery integrated into the refilling container.
[0116] FIG. 13 is a schematic block diagram of one embodiment of a toilet flusher according to the present invention having a two-chamber refilling container and two pumps.
[0117] FIG. 14 is a schematic block diagram of one embodiment of a toilet flusher according to the present invention having a two-chamber refilling container, a pump and a control valve.
[0118] FIG. 15 is a perspective view of one embodiment of a toilet flusher according to the present invention having an extendable bracket.
[0119] FIG. 16 is a perspective view of one embodiment of a toilet flusher according to the present invention having a removable container and wick system.
[0120] FIG. 17 is a side view of one embodiment of a toilet flusher according to the present invention having a dispensing element arranged on a bracket end.
[0121] FIG. 18 is a top view of one embodiment of a toilet flusher according to the present invention having a dispensing element arranged on a bracket end attached to a toilet bowl.
[0122] FIG. 19 is a perspective view of one embodiment of a toilet flusher according to the present invention having individually replaceable containers.
[0123] FIG. 20 is a perspective view of one embodiment of a dispensing element according to the present invention having an integrated sensor unit and two dispensing nozzles.
[0124] FIG. 21 is a perspective view of one embodiment of a dispensing element according to the present invention having an integrated sensor unit, two dispensing nozzles and two spray cones.
[0125] FIG. 22 is a perspective view of one embodiment of a toilet flusher according to the present invention having a dispensing element and two spray cones and attached to a toilet bowl.
[0126] FIG. 23 is a side view of one embodiment of a toilet flusher according to the present invention having a dispensing element arranged beneath the toilet edge and two differently oriented spray cones.
[0127] FIG. 24 is a side view of one embodiment of a toilet flusher according to the present invention having a dispensing element arranged beneath the toilet edge and a spray cone directed beneath the edge of the toilet.
[0128] FIG. 25 is a perspective view of one embodiment of a toilet flusher according to the present invention having two individually replaceable containers and an inspection flap in a closed position and in an opened position.
[0129] FIG. 1 shows the inventive toilet flusher 1 consisting of the dosing apparatus 2 and a container 9 connected to the dosing apparatus 2 and containing a preparation 10.
[0130] The dosing device or apparatus 2 includes a power source 3, control unit 4, sensor unit 5 and pump 6, preferably arranged in a housing. The pump 6 is connected to the power source 3 via the control unit 4. The control unit 4 is in turn connected to the sensor unit 5, which sends control signals for controlling the pump 6 to the control unit 4.
[0131] The pump 6 has a pressure line 7 and an intake line 8, with the intake line 8 connected to the container 9 containing the preparation 10. The pump 6 thus delivers the flowable preparation 10 through the intake line 8 out of the container 9 into the pressure line 7, from which the preparation 10 is dispensed to the surroundings of the toilet flusher 1. The pressure line 7 can be configured such that it counteracts gelation of the preparation dispensed (e.g., by choice of a suitable diameter).
[0132] The container 9 can have a pressure-equalizing valve 11 for inducing equalization of pressure between the surroundings and interior of the container 9 when the pump 6 pumps the preparation 10 out of the container 9.
[0133] The pump 6 may be triggered by the control unit 4 so that direction of conveyance of the pump is reversed and any preparation still present in the pump 6 and lines 7 and 8 is delivered back into the container 9. This backflushing can be advantageous when the preparation 10 thickens, clogging the lines 7 or 8.
[0134] FIG. 2 shows another embodiment of the dosing device known from FIG. 1 in which the container 9 is connected to the pump 6 on the pressure side. Here the pump 6 builds up pressure in the container 9 by pumping ambient air
into the container 9, thereby displacing the preparation out of the container 9. A valve 11 can be provided on the preparation output side of the container 9, enabling dispensing of the preparation 10 out of the container 9 when a defined pressure is reached in the container 9. This can be advantageous when there is a defined spray stream-type or spray mist-type dispensing instead of dropwise dispensing.  

In addition, a nonreturn valve 11a can be provided in the pressure line 7 between the pump 6 and the container 9, preventing pressure built up in the container 9 from escaping through the pressure line 7 when the pump 6 is stopped.

FIG. 3 shows the dosing apparatus 2 from FIG. 1 wherein a two-chamber container formed from the containers 9 and 3 is connected to the intake line 8 of the pump 6. The containers 9 and 13 can each contain different compositions 10 and 14.

The containers 9 and 13 can each have pressure-balancing valves 11, 12.

The output openings on the bottom sides of the containers 9 and 13 are connected to the intake line 8 and to the pump 6 so that the preparations 10 and 14 are pumped through the intake line 8 in defined ratios to one another. It may be necessary here for flow conditions in the pressure lines 8 leading to the output openings in the bottom sides of the containers 9 and 13 to be designed accordingly.

When using more than two different preparations 10 and 14, it is advantageous to control dosing so that two compatible preparations are transferred one after the other through the lines 7, 8, and the pump 6.

Incompatibility of two preparations can be due, for example, to an exothermic reaction, thickening, flocculation, a change in pH, a color change or the like.

In addition, a third container containing a flushing fluid that cleans the lines 7, 8 and the pump 6 of at least one of the preparations 10, 14 can also be provided. Air can also be provided for flushing the lines 7, 8, and the pump 6. By flushing the lines 7, 8, and the pump 6, it is possible to prevent residues of incompatible preparations from coming into contact with one another.

FIG. 4 shows a further embodiment of the toilet flusher 1 known from FIG. 3. The pressure lines 8 leading to the output openings on the bottom sides of the containers 9 and 13 each have a passive valve 15 and 16, allowing a defined setting of the dosing ratios of the preparations 10 and 14 out of the containers 9 and 13.

The valves 15 and 16 may also be designed as temperature-sensitive bimetal valves that open and/or close at a defined temperature. In particular, the valves 15 and 16 can be different bimetal valves so that, for example, on reaching a defined temperature, only one preparation can be conveyed by the pump 6 out of one of the containers 9 or 13.

The dosing apparatuses according to FIGS. 1-4 all have a control unit 4 that regulates the pump 6 by processing signals from the sensor unit 5.

FIG. 6 illustrates a basic control algorithm 20 in the form of a flow chart.

The control algorithm 20 is activated as soon as the dosing apparatus 2 is turned on. The control unit 4 receives signals from the sensor unit 5 in a first process step 21. In the control unit 4, the received sensor signal is compared with a threshold value stored in the control unit 4.

In subsequent process step 24, there is a check on whether the sensor signal and the threshold value are in a defined ratio to one another on the basis of a selection condition. If this condition is met, the pump 6 is activated by process step 25. If this condition is not met, sensor signals according to process step 22 are additionally received by the control unit and evaluated.

As can be seen from process steps 25-29, the pump 6 remains in an activated state until a sensor signal is obtained that causes the micropump to be deactivated based on comparison with a threshold value stored in the control unit 4. According to this procedure, preparation is pumped from the containers as long as the sensor signal varies between two predefined threshold values for activating and deactivating the pump 6.

Alternatively, it is also possible for the control described in the introduction to be modified so that a simple trigger circuit is implemented in which activation of the micropump according to process step 25 results in dispensing of a defined quantity of preparation, so that the micropump is automatically turned off without requiring any additional deactivation condition for the pump 6 based on sensor signals.

As shown in FIG. 4a, it is also possible to design the valves 15 and 16 as components actively controlled by the control unit 4. The mixing ratio of the two preparations 10 and 14 can thus be influenced actively and in a time-variant manner.

The control for this embodiment is shown in FIG. 7 as a flow chart 30.

FIG. 5 shows another possibility for active and time-variant influencing of the mixing ratio. In this embodiment of the invention, each of the containers 9 and 13 is coupled to a pump 6 and 19 individually regulated by the control unit 4. FIG. 8 shows the corresponding control algorithm.

FIG. 9 shows the dosing device from FIG. 1 wherein an RFID label 42 suitable for identifying the size and contents 10 of the container 9 is arranged on the container 9.

The sensor unit 5 includes an RFID receiver unit able to read out information from the RFID label 42 provided on the container 9. This information is sent as a control signal to the control unit 4 to induce dosing of the preparation 10 based on the contents of the container 9. In particular, control signals induced by the RFID label 42 can be used to select a dosing program stored in the control unit.

In this manner, a universal dosing apparatus for a variety of dosing applications can be provided, such as dosing of preparations in dishwashers, washing machines, dryers, toilets or in residential rooms.

As an alternative to the RFID label 42, those skilled in the art may also provide other means for inducing automatic identification of the container 9 and its contents 10 by the dosing apparatus.

Furthermore, an additional dispensing device 43 can be provided on the opening on the pressure side of the pressure line 7. This dispensing device 43 induces distribution of the preparation into the surroundings of the dosing device 1 in a manner different from dropwise dispensing. This may involve, for example, a stream-type or spray mist-type of dispensing of the preparation or a dispensing based on evaporation or diffusion. The dispensing device 43 may therefore be designed as a nozzle, atomizer, distributor plate or porous surface, for example. In particular, the dispensing device may be designed so that it counteracts gelation of the preparations released.

FIG. 10 shows the toilet flusher from FIG. 1 with a container 9 detachable from the dosing apparatus 2. On its lower end at the bottom, the container 9 has a connection 47.
which can be inserted into the receptacle 48 provided on the dosing apparatus 1. The connection 47 can be sealed by a closure so that the preparation 10 is prevented from running out of the container 9 at first in the unused state of the container 9; however, this closure is destroyed when the container 9 is inserted into the dosing apparatus 2 and/or the connection 47 is inserted into the receptacle 48, enabling release of the preparation 10 out of the container 9 by the dosing apparatus 2 into the surroundings. FIG. 11 shows the toilet flusher in its assembled state.

0159] The control unit 4 is also coupled to an acoustic converter 46 that converts a voltage and/or a current of the control unit into an audible acoustic signal. The control unit 4 can include memory for a plurality of acoustic signals and/or music and/or speech recordings retrieved manually or triggered by a sensor and executed (i.e., sent to the acoustic converter 46).

0160] Furthermore, a lamp 44 can be connected to the control unit 2 and turned on and off on a predefined operating state of the dosing unit 2. The lamp can be in the form of an LED or LCD display, for example.

0161] The dosing apparatus 2 can be turned on and off with the operating element 45. Furthermore, it is possible for various programs stored in the control unit 4 to be retrieved and executed with the operating element 45.

0162] FIG. 12 shows another embodiment of the inventive toilet flusher in which the power source 3 in the form of a battery is integrated into the container 9. The battery 3 is connected in an electrically conducting manner to the dosing apparatus 2 via a suitably designed coupling. The capacity of the battery 3 is advantageously designed so that it supplies power to the dosing apparatus 2 over the period of use until the preparation 10 has been completely emptied from the container 9.

0163] FIG. 13 illustrates a design of the inventive toilet flusher, known generally from FIG. 5, shown here in a detailed schematic diagram. The chamber 9 is subdivided by a wall 49 into two chambers in which a first preparation 10 and a second preparation 14 are stored. Each of the chambers is connected to the surroundings, communicating through an air pressure-balancing valve 11 and/or 12 for each, and having a connection 47a and/or 47b at its end on the bottom side.

0164] FIGS. 15 to 17 show another embodiment of the inventive toilet flusher. The toilet flusher includes a dosing apparatus 2 and container 9 which is detachably affixed to the dosing apparatus 2. The dosing apparatus has an elevated rear wall from which the fastener 52 extends vertically in the form of a bracket. The bracket 52 is positioned between the edge of the toilet and the toilet seat, where it is affixed to the toilet bowl by the toilet seat resting on it. As FIG. 17 shows, a suction button can also be included on the dosing apparatus, additionally securing the toilet flusher on the toilet by vacuum.

0165] On the head side of the fastening means 52 facing upward, a pressure and/or strain measurement sensor is provided as the sensor unit 5. When a pressure is applied to this sensor unit 5 (e.g., by someone using the toilet and sitting on the toilet seat), the sensor unit 5 generates a corresponding signal which is relayed to the control unit 4 of the dosing apparatus 2.

0166] The container 9 is separable from the dosing apparatus, as seen in FIG. 16. The container 9 has a wick system 50 in its interior, with which preparation is dispensed by the dispensing element 43a from the container 9 to the surroundings by evaporation. The connection 47 and receptacle 48 in the dosing apparatus 2 form a liquid-tight connection in the assembled state of the container 9 and dosing apparatus 2.

0167] A dispensing element 43 in the form of a nozzle head is provided on the bracket 52. The nozzle head 43 is movably arranged on the bracket 52 allowing it to be aligned by the user. The length of the bracket 52 and thus the application point of the nozzle head 43 are adjustable by a telescoping arrangement 53 arranged between the nozzle head 43 and the bracket 52. With the nozzle head 43, a spray cone 54 is created from the preparation. As FIG. 18 shows, this spray cone wets a defined application field in the toilet bowl 55.

0168] FIG. 19 shows another alternative embodiment of the inventive toilet flusher. In this embodiment, the containers 9 and 13 are fixedly connected to the dosing apparatus 2 and can be refilled through an opening (not illustrated in FIG. 19).

0169] FIG. 20 shows a dispensing element 43 arranged on the distal end of the bracket 52 with an integrated sensor 5 and two nozzles 56 and 57. In this exemplary embodiment, the sensor 5 is embodied as an infrared sensor or as an ultrasonic sensor.

0170] The nozzles 56 and 57 can be configured so that they generate the same or different spray cones 54a and 54b, illustrated in FIG. 21. As shown in FIG. 22, the spray cones 54a and 54b can be directed at the same application field in the interior of a toilet bowl 55. However, it is also apparent from FIGS. 23 and 24 that it is possible to aim the two spray cones in different directions.

0171] In the embodiment shown in FIG. 23, the dispensing element 43 is affixed to the lower edge of the toilet bowl 55 on the outside by a hook. The dispensing element 43 is therefore displaceably arranged on the bracket 52, symbolized by the arrow in FIG. 23. In addition, the toilet flusher 1 is affixed to the upper edge of the toilet bowl 55 by a fastener 50, here designed as a suction cup.

0172] The dispensing element 43 has a first nozzle 56 and a second nozzle 57 which are spaced apart from one another and arranged in the dispensing element 43 in such a way that their respective spray cones 54a and 54b point in different directions without overlapping. For example, the spray cone 54a of the first nozzle 56 is directed at the interior of the toilet bowl 55 while the spray cone 54b of the second nozzle 57 is directed at the edge of the toilet bowl. As shown in FIG. 24, it is also possible for a spray cone 54b to be directed beneath the edge of the toilet bowl 55. The spray cones 54a and 54b may be formed from the same or different composition.

0173] A sensor unit 5 in the form of a capacitor sensor protrudes away from the dispensing element beneath the edge of the toilet 55, enabling it to be acted upon by water when the flushing water is activated. The sensor 5 is shaped so that it does not have any significant influence on the guidance of the flushing water in the toilet bowl 55.

0174] FIG. 25 shows another embodiment of the containers 9 and 13 and of the dosing apparatus 2. Here, the receptacle of the containers 9 and 13 in the dosing apparatus is closable by a flap 58 pivotally arranged on the dosing apparatus 2. The two containers 9 and 13 may be removed from or inserted into the receptacle of the dosing apparatus 2 separately in the open state of the flap 58.

0175] In another embodiment of the invention, FIG. 25 shows a toilet flusher 1 having two individually replaceable containers 9 and 13 and an inspection flap 58 in the closed and
The inspection flap 58 is hinge-connected to the back wall of the toilet flusher and is shaped so that the inspection flap 58 covers, preferably completely, the containers 9 and 13 inserted into the toilet flusher 1. The inspection flap 58 can be provided with closing means, providing a childproof closure of the inspection flap 58 with the toilet flusher and thus prevent unintended access to the containers 9 and 13.

The lamps 44 and the operating element 45 are arranged on the front side of the toilet flusher so that they are not covered when the inspection flap 58 is closed, but instead are freely accessible.

We claim:

1. Dosing device comprising:
   a power source,
   a control unit,
   a sensor unit, and
   at least one first container containing a first preparation, wherein the first container is couplable to the dosing device,
   wherein the control unit cooperates with the sensor unit and the power source so that when there is a defined sensor signal, the power source acts on a dispensing element and/or pump so that at least the first preparation is dispensed from the first container to the surroundings.

2. Dosing device according to claim 1, wherein the at least one first container is couplable to the pressure side of the pump.

3. Dosing device according to claim 1, wherein the at least one first container is couplable to the intake side of the pump.

4. Dosing device according to claim 1 further comprising a valve arranged between the at least one first container and the pump.

5. Dosing device according to claim 6, wherein the valve is actively controllable by the control unit so that a first control signal induces opening of the valve and a second control signal induces closing of the valve.

6. Dosing device according to claim 1 further comprising at least one second container containing a second composition, wherein the at least one second container is couplable to a dosing apparatus.

7. Dosing device according to claim 6, wherein the dispensing of the preparation is induced by a first pump couplable to the first container and a second pump couplable to the second container.

8. Dosing device according to claim 1, wherein the at least one first container further comprises an RFID label containing at least information about the contents of the container and is readable by the sensor unit.

9. Dosing device according to claim 6, wherein the dosing apparatus is protected from splash water.

10. Dosing device according to claim 6, wherein the power source, control unit, sensor unit and pump are cast so that the dosing apparatus is waterproof.

11. Dosing device according to claim 6, wherein the dosing apparatus is arranged on the outer edge of the toilet bowl.

12. Dosing device according to claim 1, wherein the control unit (4) is a programmable microcontroller.

13. Dosing device according to claim 13, wherein a plurality of dosing programs is stored on the microcontroller, these programs being selectable and executable in accordance with the container coupled to the dosing apparatus.

14. Dosing device according to claim 6 further comprising a container couplable to the dosing apparatus.

15. Container according to claim 14 further comprising an RFID label having at least information about the contents of the container.

16. Container according to claim 14 further comprising a pressure-equalizing valve.

17. Container according to claim 14 further comprising a nonreturn valve.

18. Method for controlling the dosing device according to claim 1 comprising:
   receiving sensor signals containing at least information about the contents of at least one container and/or information representing at least one physical, chemical or mechanical parameter,
   comparing the sensor signals with threshold values, and
   generating a sensor signal when a condition defined by comparison of the sensor signals with the threshold values is met.

19. Method for controlling the dosing device according to claim 18, wherein the condition defined by comparison of the sensor signals with threshold values for generating a control signal is selected according to the contents of at least one container.