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(54) **MULTI-FUNCTION TOILET DEVICE**

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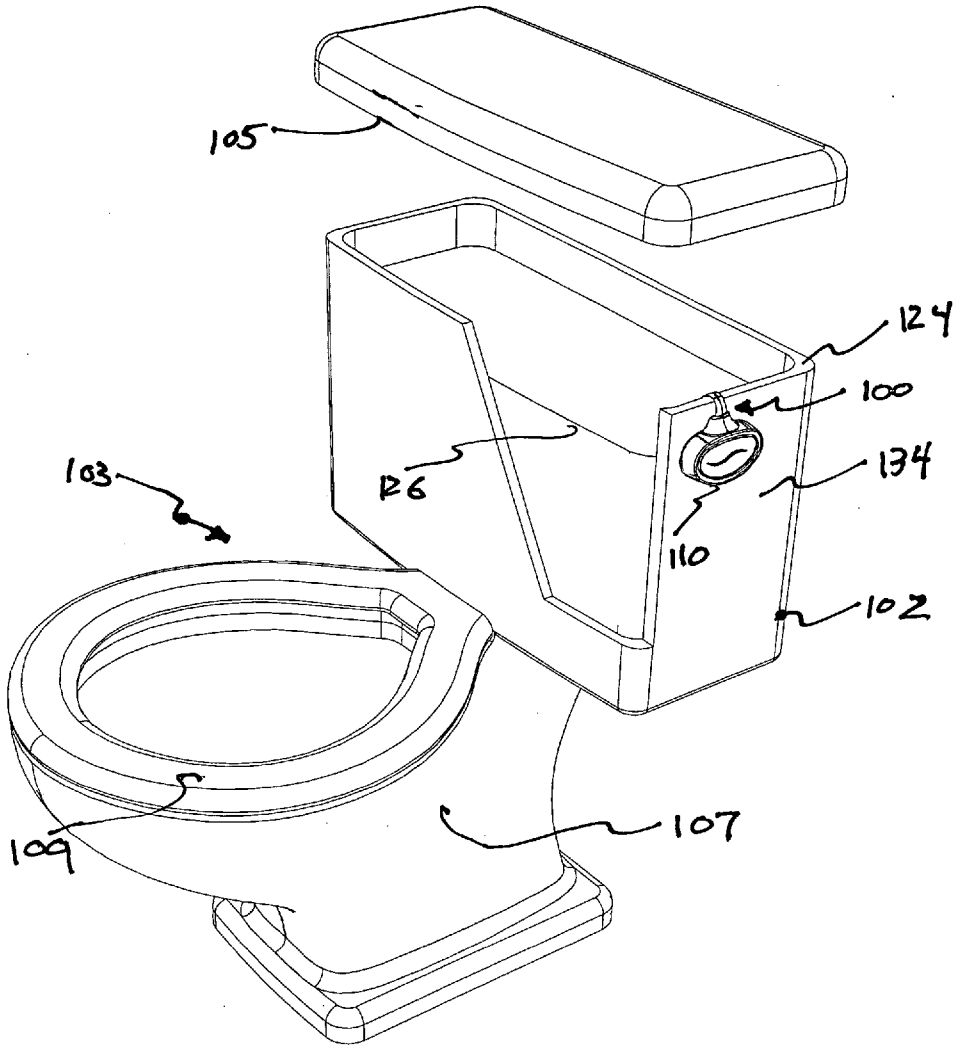
(57) **ABSTRACT**

Described is a multi-function device for attachment to the tank of a toilet fixture. The multi-function device provides a diffusible air-treatment concentrate for deodorizing or otherwise treating the ambient air surrounding the toilet. At the same time, the multi-function device provides a water-soluble water-treatment concentrate for treating the flush water stored in the toilet tank. The device includes a connector with an air-treatment housing coupled to one end and a water-treatment housing coupled to the opposite end of the connector. The connector is configured such that the air-treatment housing, in which the air-treatment concentrate is disposed, is positioned adjacent the exterior surface of the toilet tank and the water-treatment housing, in which the water-treatment concentrate is disposed, is positioned adjacent the interior surface of the toilet tank below the fill-level of the tank.



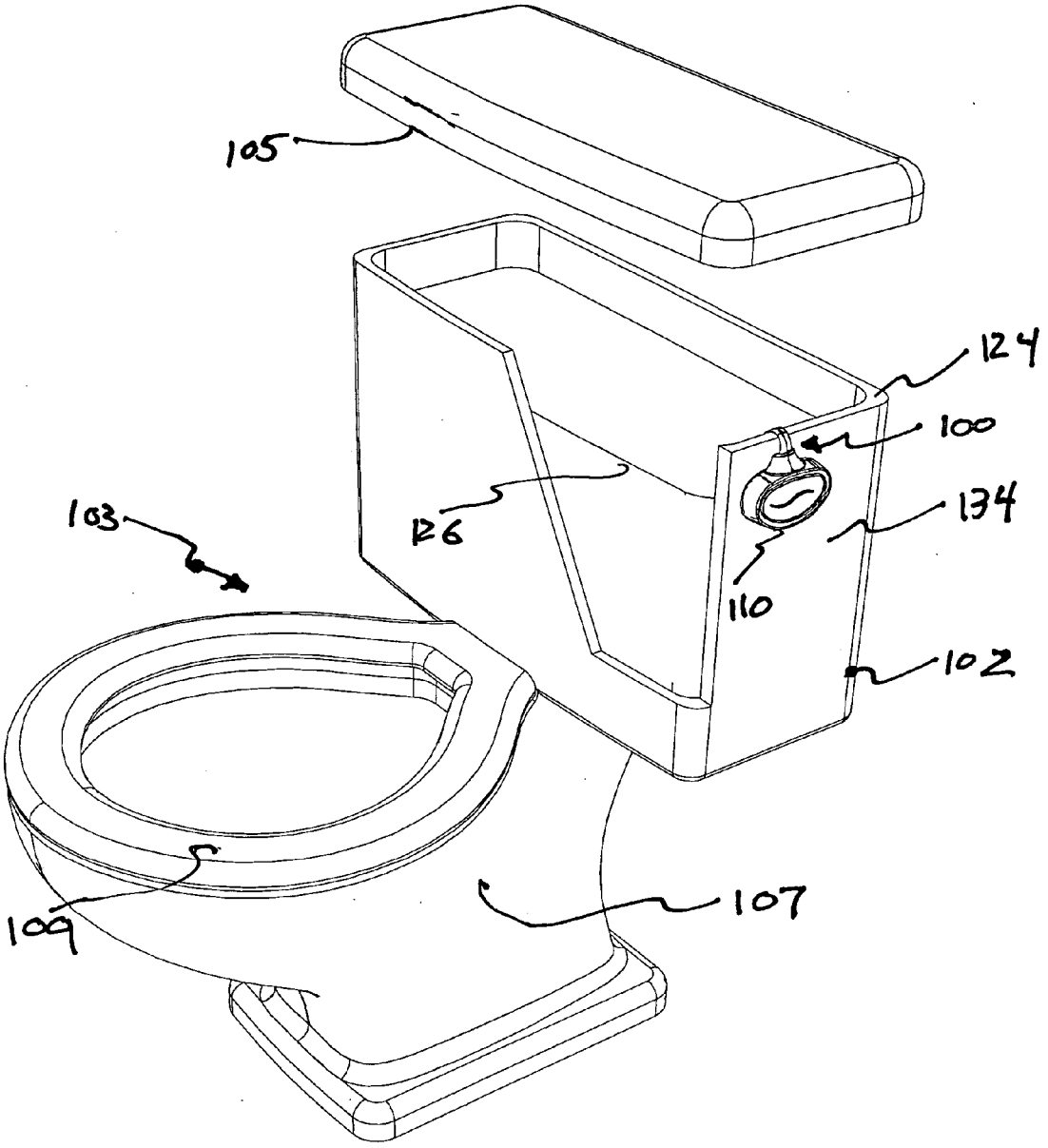


FIG. 1A

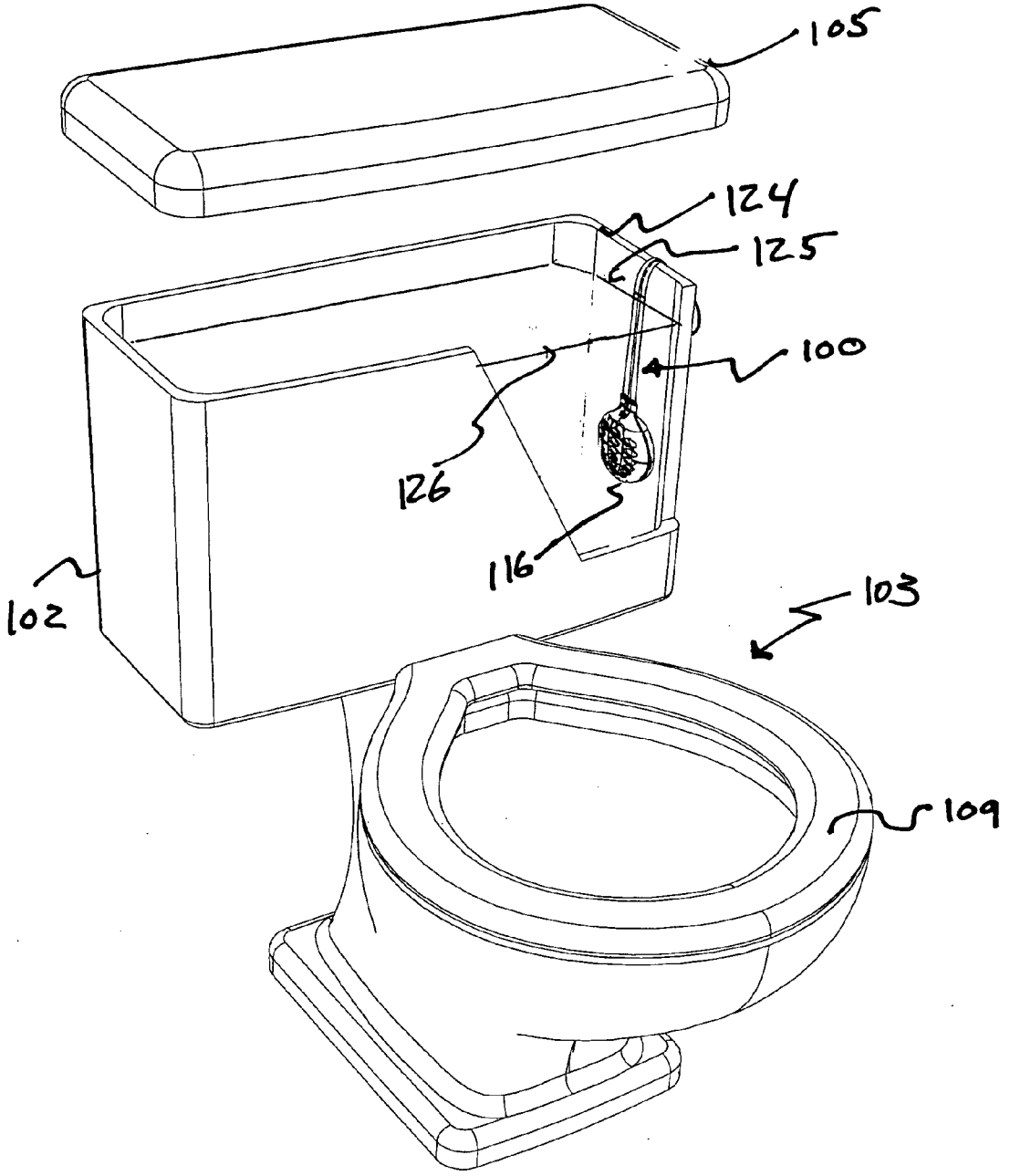


FIG. 1B

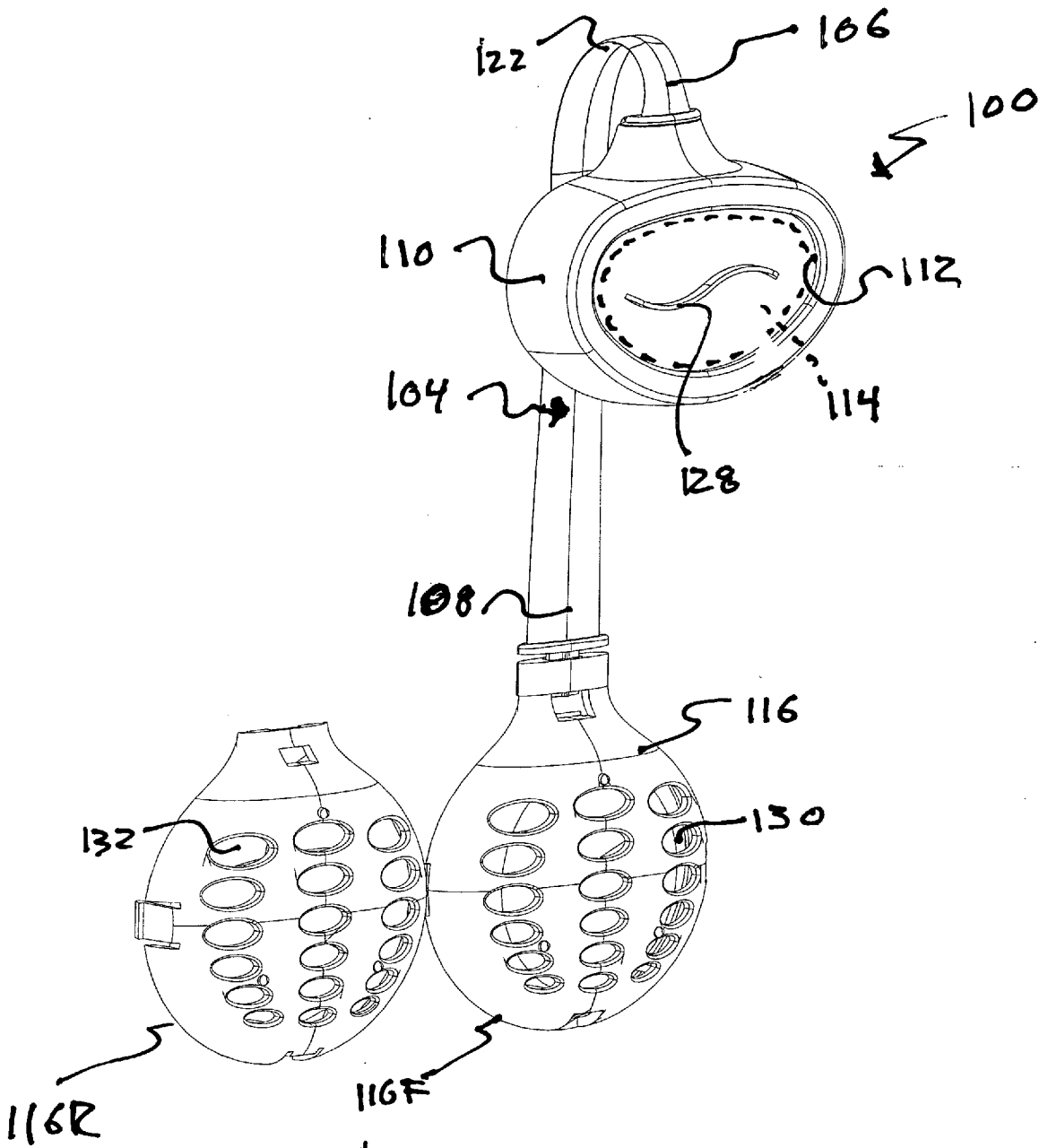


FIG. 2A

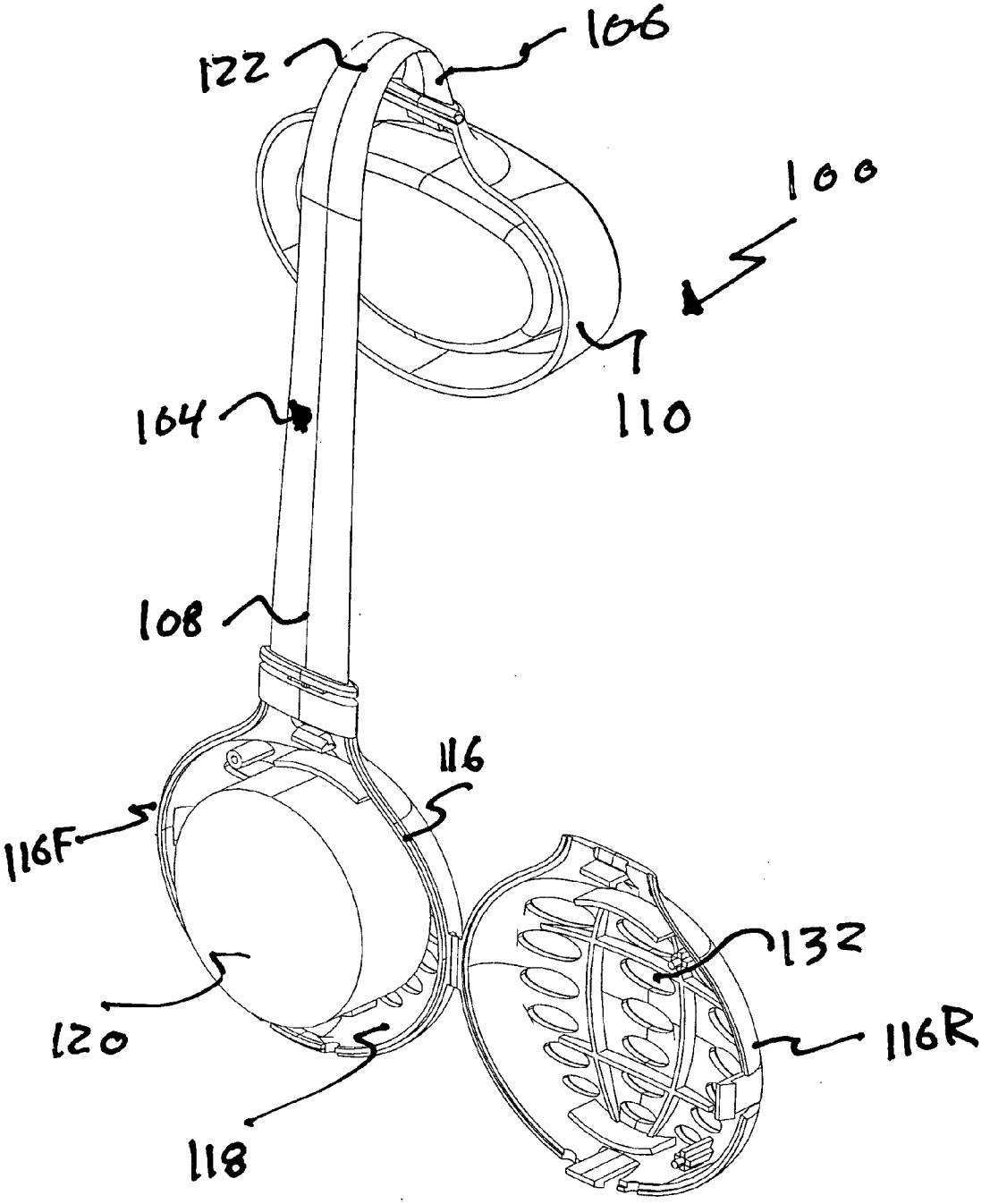


FIG. 2B

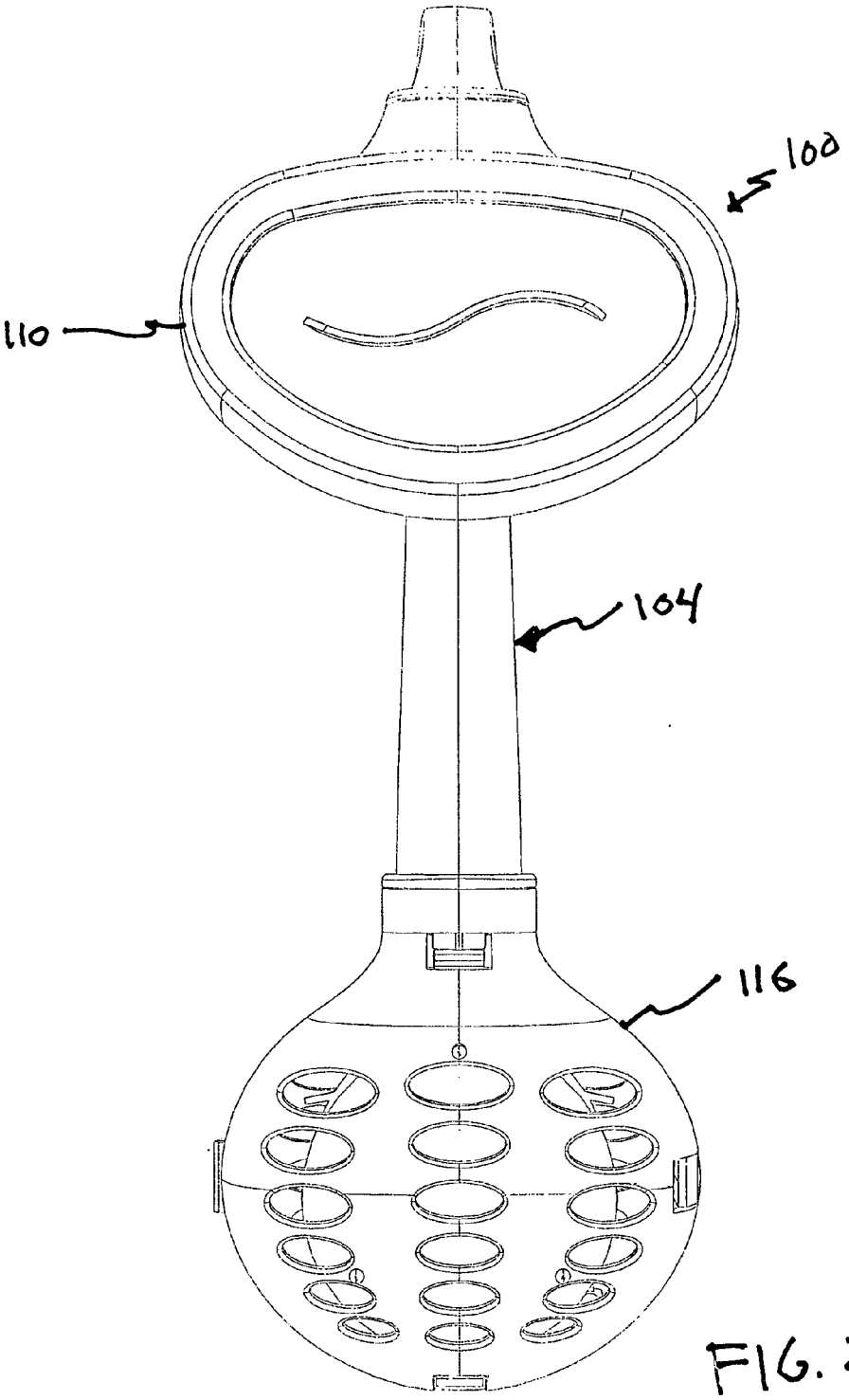


FIG. 2C

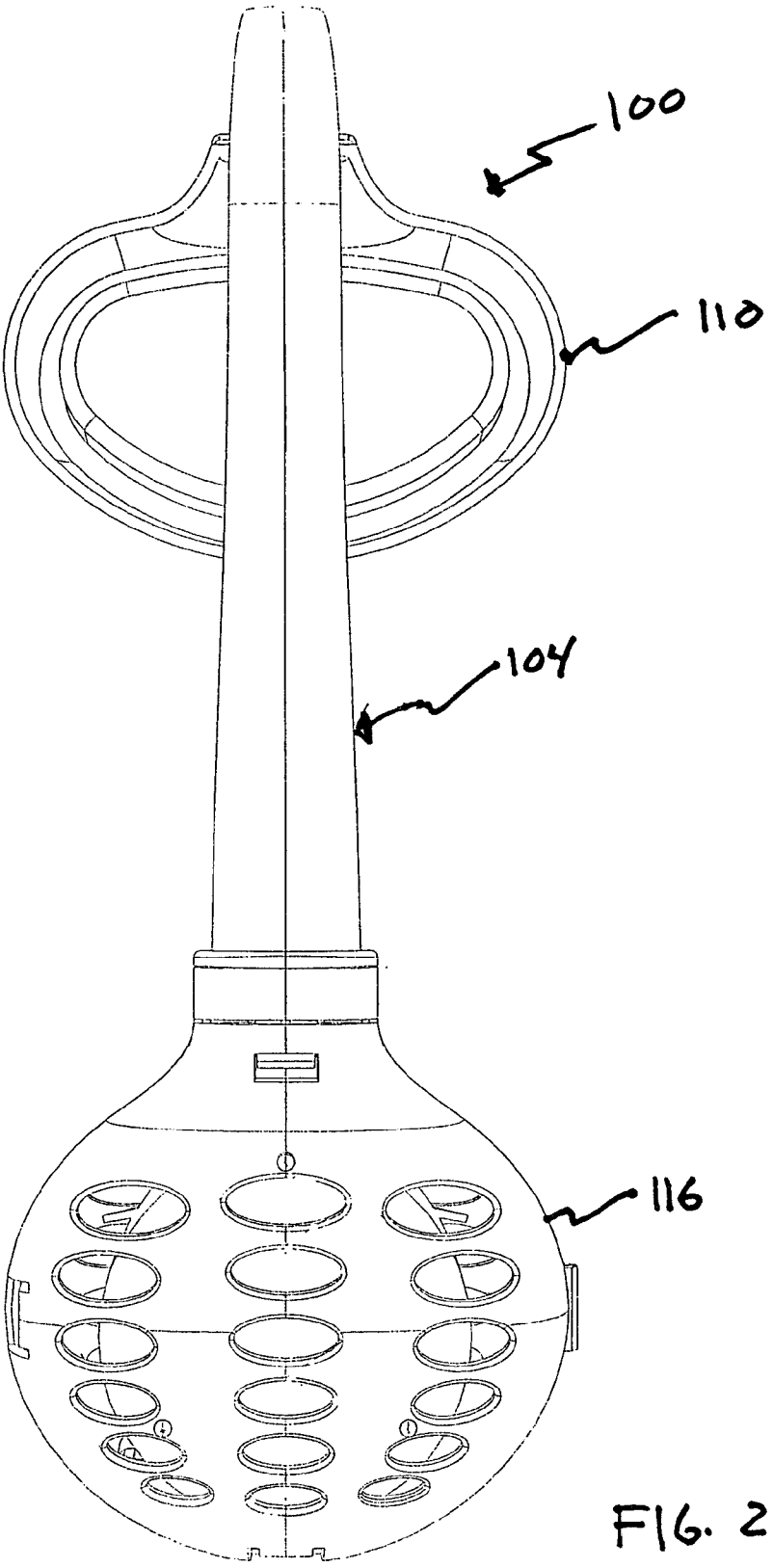


FIG. 2D

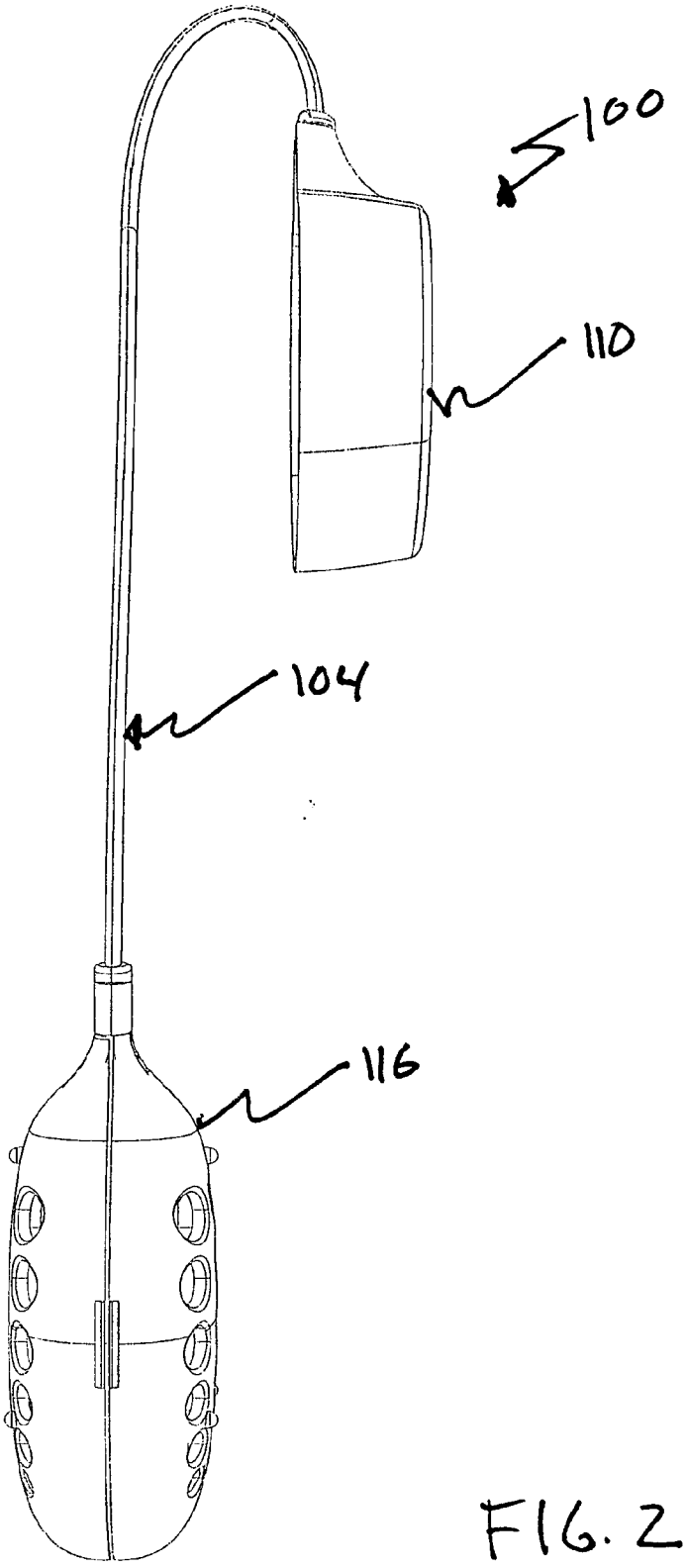


FIG. 2E

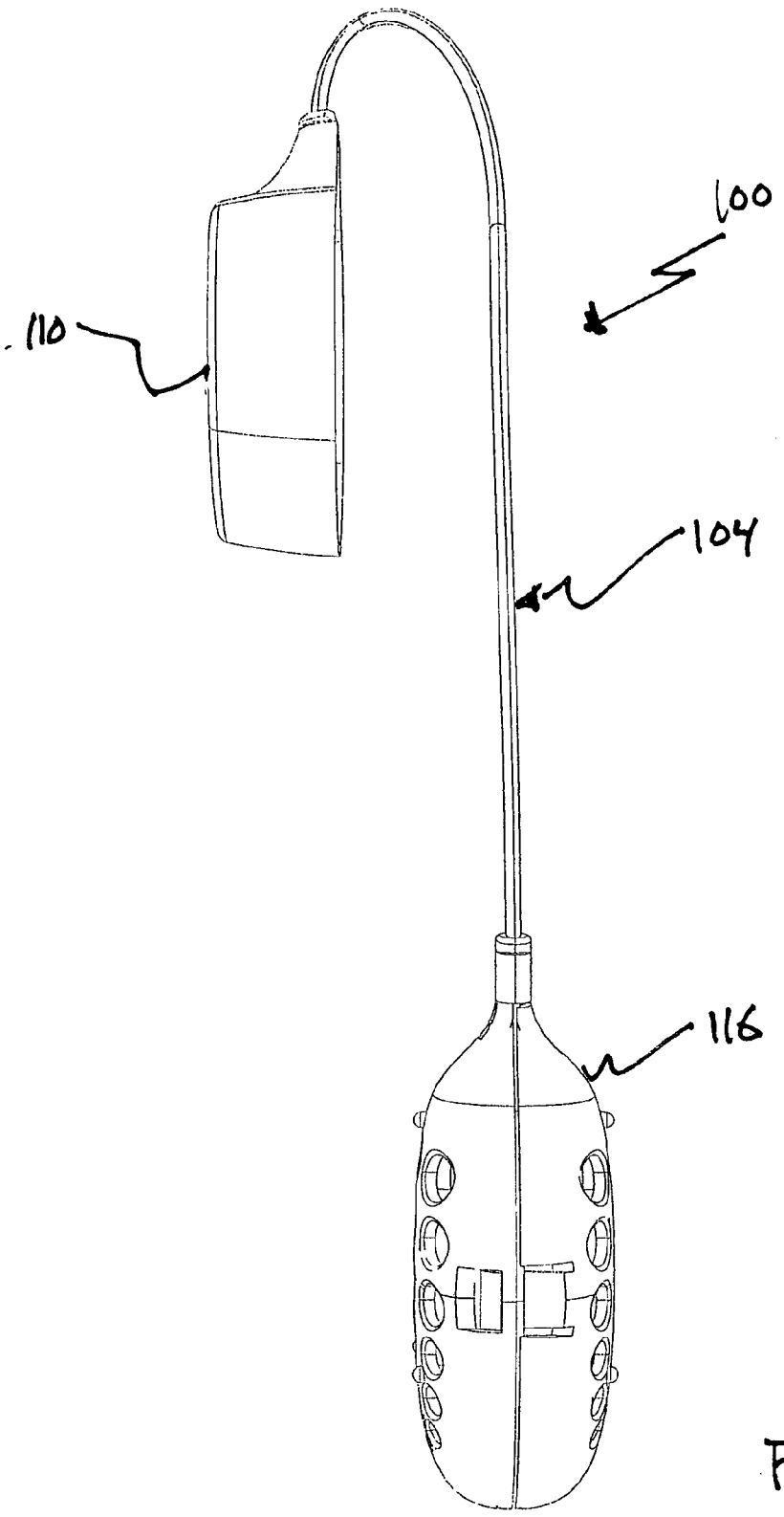


FIG. 2F

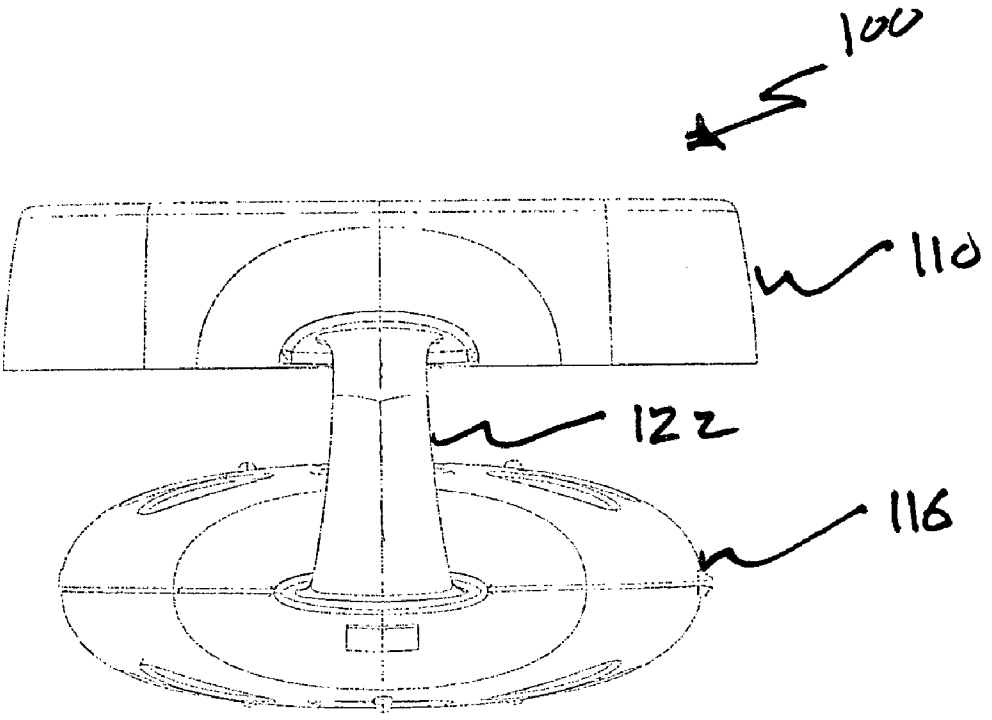


FIG. 2G

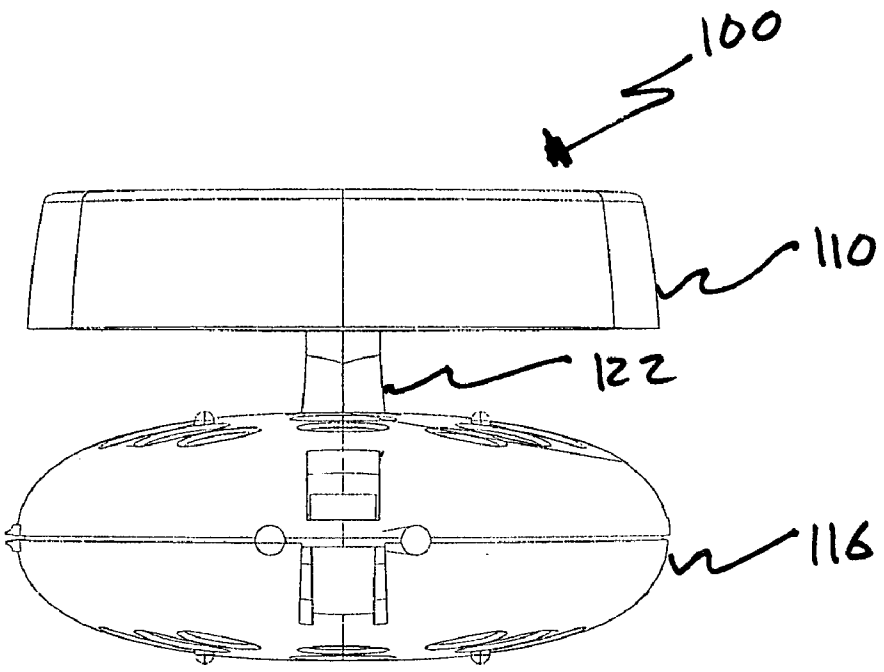


FIG. 2H

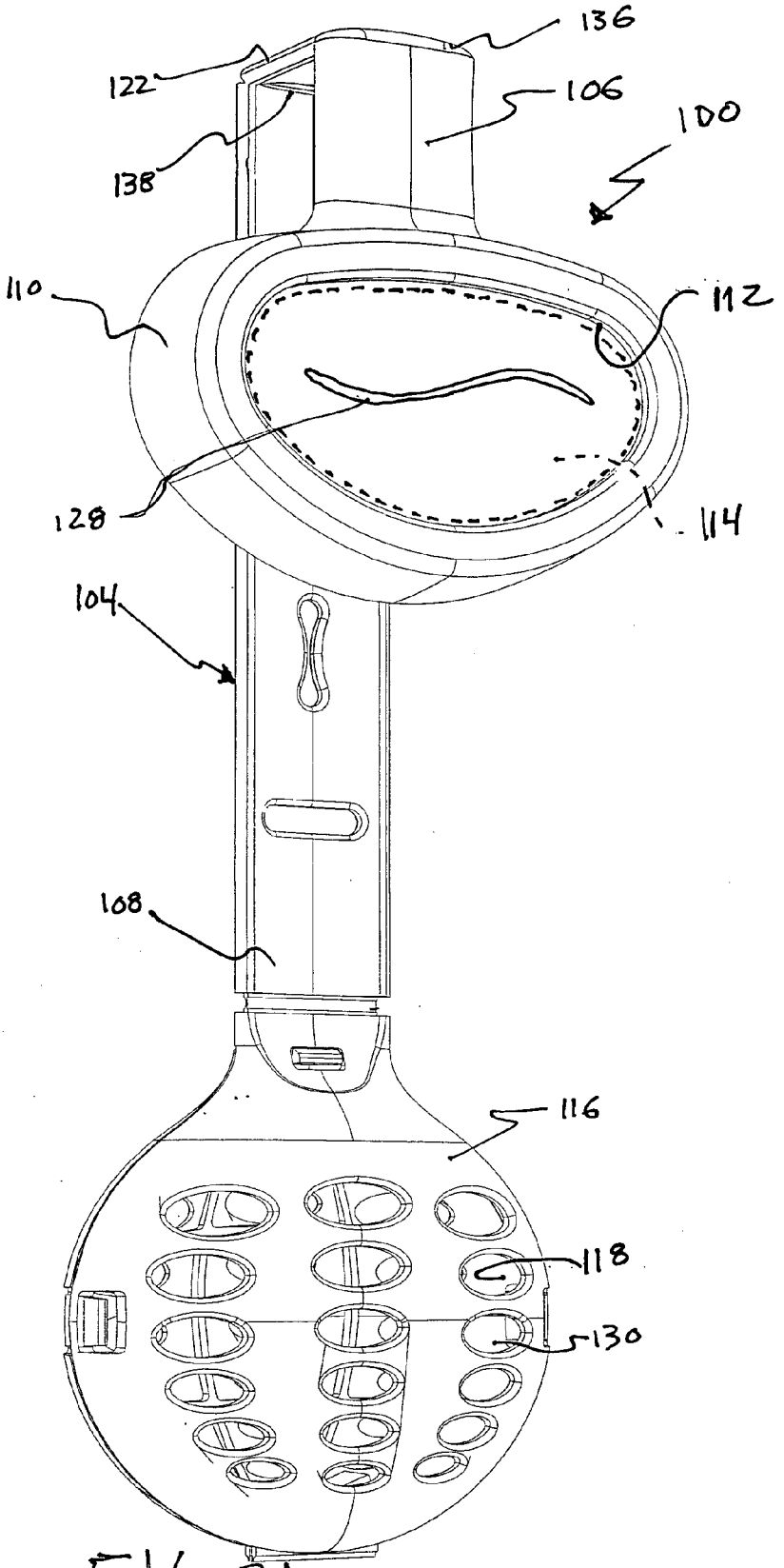


FIG. 3A

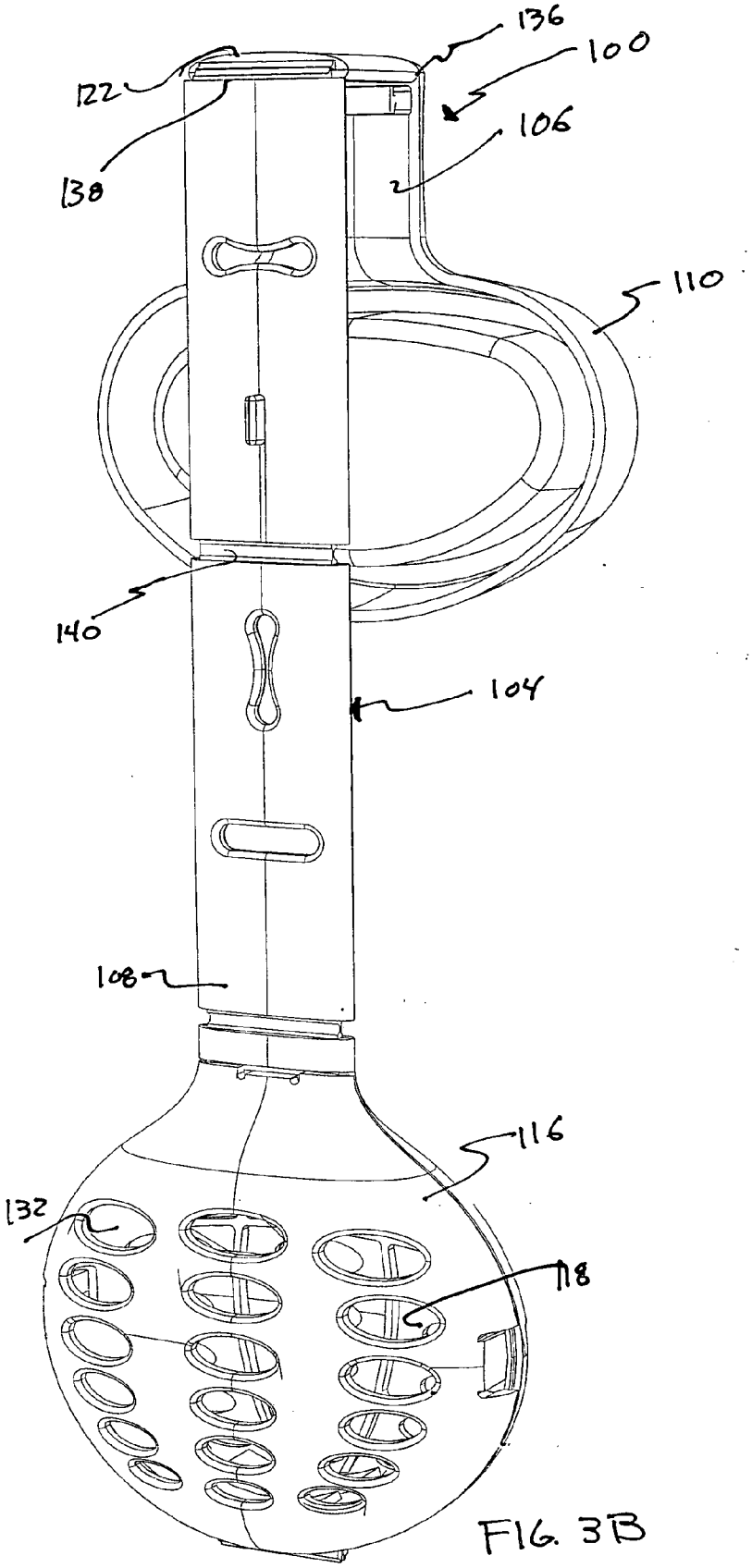


FIG. 3B

MULTI-FUNCTION TOILET DEVICE

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] This invention relates generally to multi-function dispensers and more specifically to a device for diffusing an air-treatment concentrate to the ambient air surrounding a toilet and for dispersing a water-treatment concentrate to the tank of the toilet.

[0003] 2. Description of the Related Art

[0004] Assemblies for diffusing air-treatment concentrates are well known. Such air-treatment assemblies were used to provide an air-diffused fragrance to mask offensive odors in the living areas of a house or the work and service areas of commercial environments. Diffusion of masking fragrances was especially useful in bathrooms and kitchen areas that were subject to a higher incidence of offensive odors. Assemblies were also used to diffuse an air-treatment concentrate capable of otherwise treating ambient air. Various means were developed to improve the diffusion of fragrances or treatment concentrates from the assemblies of the prior art. For example, fan assists were included in the assemblies to increase airflow across the air-treatment concentrate and thus the diffusion of the concentrate in ambient air. Heating elements were also included in some prior art assemblies to increase the temperature of the air-treatment concentrate to aid in volatilization of the concentrate and thus the diffusion of the concentrate.

[0005] Assemblies for discharging a water-treatment concentrate to the flush water contained in the tank or bowl of a toilet are also well known in the art. Such water-treatment assemblies were used to clean, color, or otherwise treat the water used to flush the toilet.

[0006] One type of such prior art water-treatment assembly, sometimes referred to as a "tank-hanger" assembly, pretreated the flush water by placement of a water-treatment concentrate directly in the toilet tank, or by placement of a water-treatment concentrate in a housing or reservoir. One type of tank-hanger assembly was the "active" assembly, which pumped or siphoned a solution of dissolved water-treatment concentrate into the toilet tank, usually at the flush cycle (See, for example, U.S. Pat. No. 4,357,718 by Corsette). With an active assembly, the housing containing the water-treatment concentrate could be located inside the toilet tank above the fill-level of the toilet tank or could be located completely or partially below the fill-level. Another type of tank-hanger assembly was the "passive" assembly, in which the water-treatment concentrate was placed inside the toilet tank in a housing at least partially submerged below the toilet tank fill-level. The water-treatment concentrate then passively dispersed in the tank water during the quiescent period between toilet flushes (See, for example, U.S. Pat. No. 4,216,027 by Wages).

[0007] Another type of prior art water-treatment assembly, sometimes referred to as a "rim-hanger" assembly, treated the flush water flowing from the rim of the toilet bowl only during the flush cycle. Since a rim-hanger assembly treated the flush water only during the short time of the flush cycle, it was generally ineffective in providing the treatment level provided by a tank-hanger assembly. As noted earlier, in a tank-hanger assembly a dispersible water-treatment concentrate, such as a hypochlorite tablet or puck, could be placed in continuous contact with the flush water stored in the toilet tank. No rim-hangers can currently claim sanitization or superior cleaning to tank-hanger dispersed hypochlorite tablets.

[0008] Further, attempts were made in the prior art to include air-treatment concentrates with the water-treatment concentrates contained in both tank-hanger and rim-hanger prior art assemblies. However, the approach of including air-treatment concentrates within the water-treatment concentrates proved an ineffective means to achieve air freshening of the ambient bathroom air surrounding a toilet fixture. In the case of tank-hangers, air-treatment concentrate, which diffused into the headspace above the toilet tank fill-level, did not have an effective exit point from the enclosed toilet tank to enter the ambient air. In the case of rim-hangers, the periodic dosing of the ambient air only during the flush cycle of the toilet proved ineffective in providing continuous air freshening of the general bathroom air. Rim-hangers had the additional disadvantage of being unsightly and, after the recommended four to six weeks of continuous use, becoming germ laden.

[0009] Accordingly, what is needed is a simple, easy-to-use device that provides, in combination, effective toilet flush water-treatment and that further provides effective continuous treatment of the ambient bathroom air surrounding the toilet fixture.

SUMMARY OF THE INVENTION

[0010] In accordance with the principles of the present invention, in one embodiment, a multi-function toilet device provides, in combination, an air-treatment concentrate for treating the ambient air surrounding the toilet, and a water-treatment concentrate for treating the toilet flush water. The air-treatment concentrate is positioned adjacent the exterior of the toilet tank and the water-treatment concentrate is positioned adjacent the interior of the toilet tank.

[0011] The multi-function toilet device comprises the air-treatment concentrate, the water-treatment concentrate, and a connector; wherein the air-treatment and water-treatment concentrates are coupled to the connector. The connector of the multi-function toilet device includes an air-treatment end portion and a water-treatment end portion opposite the air-treatment end portion. The air-treatment concentrate is coupled to the air-treatment end portion of the connector and treats the ambient air surrounding the toilet. The water-treatment concentrate is coupled to the water-treatment end portion of the connector and treats the toilet flush water. The connector is configured to position the air-treatment concentrate adjacent an exterior surface of the toilet tank and to position the water-treatment concentrate adjacent an interior surface of the toilet tank. The air-treatment concentrate and water-treatment concentrate can be placed at any point along the connector so long as both are not coupled at the same end portion.

[0012] To use the multi-function toilet device, the tank lid of the toilet is removed, the connector is placed over the lip of the toilet tank to position the air-treatment concentrate adjacent the exterior surface of the toilet tank and to position the water-treatment concentrate adjacent the interior surface of the toilet tank. In one embodiment, the water-treatment concentrate is positioned at least partially below the fill-level

of the toilet tank. After placement of the connector and positioning of the air-treatment and water-treatment concentrates, the tank lid is replaced on the toilet tank over the connector.

[0013] In one embodiment, the multi-function toilet device of the present invention further includes an air-treatment housing coupled to the air-treatment end portion of the connector and a water-treatment housing coupled to the water-treatment end portion of the connector, opposite the air-treatment end portion of the connector. Disposed within the air-treatment housing is the air-treatment concentrate and disposed within the water-treatment housing is the water-treatment concentrate.

[0014] The air-treatment housing can include a heating element or a fan coupled to the multi-function toilet device to enhance diffusion of the air-treatment concentrate. The water-treatment housing can be an active device, which provides pumping or siphoning of an aliquot of water-treatment concentrate pre-mixed with toilet tank water. Alternatively, the water-treatment housing can be a passive device, which merely contains and positions the water-treatment concentrate at least partially below the toilet tank fill-level to passively disperse into the tank water.

[0015] The air and water-treatment housings can be adjustably coupled to the connector to allow suitable positioning of the housings upon installation of the multi-function toilet device of the present invention. In one embodiment, the air and water-treatment housings are slideably adjustable along the connector.

[0016] The connector can take alternate shapes. In one embodiment, the connector is a planer ribbon configured generally as a rigid inverted "J" shaped bracket. The inverted "J" has a "top" intermediate the two unequal length "legs" that makeup the air-treatment and water-treatment end portions of the connector such that the top contacts the lip of the toilet tank and the legs hang adjacent the interior and exterior of the toilet tank to suitably position the air-treatment concentrate and water-treatment concentrate, respectively. In another embodiment, the connector is generally shaped in the form of an inverted "U", having the air-treatment end portion and the water-treatment end portion of equal length. Various other configurations of the connector are possible and would be apparent to those of ordinary skill in the art. For example, the connector may be simply shaped as an inverted "L" having only one end portion.

[0017] In yet another embodiment, the connector is a planar ribbon having living hinges, well known to those of ordinary skill in the art, and adapted to allow folding of the connector into, for example, the inverted "J", "U", or "L" configurations described and to allow adjustment of the air-treatment and water-treatment housings for suitable positioning at installation of the multi-function toilet device. In one embodiment, the connector is simply a bendable wire, band, ribbon, or tube configurable as described above to accommodate placement on the toilet tank and positioning of the air-treatment and water-treatment housings adjacent the toilet tank interior surface and exterior surface, respectively. For these embodiments, the multi-function toilet device may be conveniently packaged in a flat folded configuration and bent to a suitable configuration before use.

[0018] In yet another embodiment, the connector is not placed over the tank lip but is rather attached to the removable toilet tank lid such that the air-treatment concentrate is positioned adjacent the exterior surface of the tank and the water-treatment concentrate is positioned adjacent the interior surface of the tank when the toilet tank lid is replaced.

[0019] The connector, air-treatment and water-treatment housings of the multi-function toilet device of the present invention can be made of any suitable material. Exemplary materials include but are not limited to metal, and metal composites, ceramics, polypropylene (PP), high density polyethylene (HDPE), polyethylene terephthalate (PET), polystyrene (PS), acrylonitrile-butadiene-styrene (ABS), polymer composites, and other engineered plastics that may be formed with a variety of fabrication technologies, such as, for example, thermoforming or blowmolding.

[0020] The multi-function toilet device can be disposed after depletion of the water-treatment and air-treatment concentrates or can be refillable with the concentrates. Further, the device of the present invention can include one or more indicia that alert the user that the air or water-treatment concentrates are depleted.

[0021] Further features and advantages of the present invention will become apparent to those of ordinary skill in the art in view of the detailed description of embodiments below, when considered together with the attached drawings and claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] The foregoing aspects and others will be readily appreciated by the skilled artisan from the following description of illustrative embodiments when read in conjunction with the accompanying drawings, in which:

[0023] **FIG. 1A** shows a right side perspective view of a toilet containing a multi-function toilet device in accordance with the principles of the present invention;

[0024] **FIG. 1B** shows a left side perspective view of the toilet containing the multi-function toilet device of **FIG. 1A**;

[0025] **FIG. 2A** shows a frontside perspective view of the multi-function toilet device of **FIG. 1A**;

[0026] **FIG. 2B** shows a backside perspective view of the multi-function toilet device of **FIG. 1A**;

[0027] For clarity of presentation, **FIGS. 2C through 2H** show a standard front, rear, left side, right side, top, and bottom view, respectively, of the multi-function toilet device of **FIG. 1A**;

[0028] **FIG. 3A** shows a frontside perspective view of another embodiment of the multi-function toilet device according to the present invention; and

[0029] **FIG. 3B** shows a rearside perspective view of the multi-function toilet device of **FIG. 3A**.

DETAILED DESCRIPTION

[0030] Reference will now be made to the drawings wherein like numerals refer to like parts throughout. Exemplary embodiments of the present invention are illustrated in the context of a multi-function toilet tank device placed on a toilet fixture having a toilet tank, a removable tank lid covering the toilet tank, and a toilet bowl having a bowl rim. The skilled artisan will readily appreciate, however, that the

materials and methods disclosed herein will have application in a number of other contexts where diffusion of an air-treatment concentrate to the ambient air and dissolution or dispersal of a water-treatment concentrate into a liquid storage tank is desirable, particularly where ease of use is important.

[0031] The aforementioned needs are satisfied by the multi-function toilet device of the present invention which includes a connector with an air-treatment end portion and a water-treatment end portion opposite the air-treatment end portion; an air-treatment concentrate coupled to the air-treatment end portion of the connector; and a water-treatment concentrate coupled to the water-treatment end portion of the connector. The connector is configured to position the air-treatment concentrate adjacent an exterior surface of the toilet tank and to position the water-treatment concentrate adjacent an interior surface of the toilet tank at least partially below the fill-level of the toilet tank.

[0032] In use the tank lid of the toilet is removed, the connector is placed over the lip of the tank to position the air-treatment concentrate adjacent the exterior surface of the tank and to position the water-treatment concentrate adjacent the interior surface of the tank below the fill-level of the tank.

[0033] More particularly, **FIG. 1A** shows a right side perspective view of a toilet **103** containing a multi-function toilet device **100** in accordance with the principles of the present invention. **FIG. 1B** shows a left side perspective view of toilet **103** containing multi-function toilet device **100** of **FIG. 1A**. Referring to FIGS. **1**A and **1**B together, toilet **103** includes a toilet tank **102** having a toilet tank lip **124** at the top of toilet tank **102**, a toilet tank lid **105** that fits on toilet tank lip **124**, and a toilet bowl **107** having a toilet bowl rim **109**.

[0034] **FIG. 2A** shows a frontside perspective view of multi-function toilet device **100** of **FIG. 1A**. **FIG. 2B** shows a rearside perspective view of multi-function toilet device **100** of **FIG. 1A**. Referring to **FIGS. 2A and 2B** together, multi-function toilet device **100** includes a connector **104** having an air-treatment end portion **106** and a water-treatment end portion **108**. In this embodiment, air-treatment end portion **106** is longer than water-treatment end portion **108**. However, those of ordinary skill in the art will recognize that other configurations of connector **104** are possible.

[0035] In one embodiment, coupled to air-treatment end portion **106** is an air-treatment housing **110** that defines an air-treatment housing interior space **112** (**FIG. 2A**) adapted to contain an air-treatment concentrate **114** (**FIG. 2A**) disposed therein. Further, coupled to water-treatment end portion **108** is a water-treatment housing **116** that defines a water-treatment housing interior space **118** (**FIG. 2B**) adapted to contain a water-treatment concentrate **120** disposed therein. In other embodiments, either air-treatment housing **110** or water-treatment housing **116** defines more than one air-treatment housing interior space **112** or water-treatment housing interior space **118**, respectively, to accommodate a different air-treatment concentrate **114** in each separate air-treatment housing interior space **112** or a different water-treatment concentrate **120** in each separate water-treatment housing interior space **118**, respectively. In yet another embodiment, either air-treatment housing **110**, water-treatment housing **116**, or both are eliminated and air-treatment concentrate **114** and water-treatment concentrate **120** are coupled directly to air-treatment end portion **106** and water-treatment end portion **108**, respectively, by, for example, adhesives, cooperating hooks and catches or other integral keyed attachment means, or concentrate mold around techniques.

[0036] Air-treatment concentrate **114** can be any air-diffusible compound formulated to freshen or otherwise treat ambient air. Examples of suitable compounds include, but are not limited to, perfumes, fragrances, botanicals, volatile organic compounds, and combinations thereof. Air-treatment concentrate **114** can be in the form of a liquid, solid, semi-solid, impregnated nonwoven substrate, impregnated cellulosic substrate, impregnated solid or other forms suitable for use in air-treatment applications.

[0037] Likewise, water-treatment concentrate **120** can be any water-dispersible compound formulated to treat toilet flush water. Examples of suitable compounds include, but are not limited to, bleaches, surfactants, disinfectants, inorganic compounds, chelators, optical brighteners, and mixtures thereof. Further, water-treatment concentrate **120** can be formulated to include components, such as polymers, that protect or modify toilet bowl interior surfaces, or components that protect or treat toilet valve parts. Water-treatment concentrate **120** can be in the form of a liquid, solid, semi-solid, impregnated nonwoven substrate, impregnated cellulosic substrate, impregnated solid or in other forms suitable for use in water-treatment applications.

[0038] In one embodiment, connector **104** is rigidly configured as an inverted "J" with air-treatment end portion **106** and water-treatment end portion **108** making up the two unequal length legs the inverted "J" shape of connector **104**. An intermediate portion **122** between air-treatment end portion **106** and water-treatment end portion **108** makes up the "top" of the inverted "J" shape of connector **104**. In use, air-treatment concentrate **114** is placed in air-treatment housing interior space **112** of air-treatment housing **110** and water-treatment concentrate **120** is placed in water-treatment housing interior space **118** of water-treatment housing **116**. Intermediate portion **122** of the inverted "J" shaped connector **104** is then placed on a toilet tank lip **124** of toilet tank **102**. Connector **104** is adapted to position water-treatment concentrate **120** adjacent to a tank interior surface **125** of toilet tank **102** (**FIG. 1B**.). In one embodiment, at least a portion of water-treatment concentrate **120** is positioned below the surface of the water stored in toilet tank **102** when toilet tank **102** is filled to a tank fill-level **126** (**FIGS. 1A and 1B**). Tank fill-level **126** represents the surface of the tank water when toilet tank **102** is completely filled. Accordingly, water-treatment concentrate **120**, disposed within water-treatment housing interior space **118** of water-treatment housing **116**, contacts the water in toilet tank **102** whenever toilet tank **102** is filled with water to tank fill-level **126**. Further, in this embodiment, connector **104** is adapted to position air-treatment housing **110** adjacent a tank exterior surface **134** defined by toilet tank **102** (**FIG. 1A**), thereby providing ambient air contact with air-treatment concentrate **114** disposed within air-treatment housing **110** of multi-function toilet device **100**.

[0039] In another embodiment, water-treatment housing **116** can be of the active pumping or dosing type, well known to those of skill in the art. Dosing type water-treatment

housings **116** provide an aliquot of water-treatment concentrate **120**, formed from water-treatment concentrate **120** dissolved or dispersed in tank water contained in a dosing reservoir (not shown) that may be fluidicly isolated from toilet tank **102** during the quiescent period between toilet flushes. Further, the diffusion of air-treatment concentrate **114** from air-treatment housing interior space **112** can be enhanced by, for example, supplying battery or plug-in electrical furnished heat, forced air, or an ultrasonic energy source to air-treatment concentrate **114**. As noted above, in yet another embodiment, either air-treatment housing **110**, water-treatment housing **116**, or both, are eliminated and air-treatment concentrate **114** and water-treatment concentrate **120** are directly coupled, respectively, to air-treatment end portion **106** and water-treatment end portion **108**. In this embodiment, at least a portion of water-treatment concentrate **120** contacts the water in toilet tank **102** whenever toilet tank **102** is filled to fill-level **126**.

[**0040**] Air-treatment housing **110** includes one or more air-treatment housing apertures **128** that open air-treatment housing **110** to the ambient air adjacent tank exterior surface **134** of toilet tank **102** (**FIG. 1A**), thereby providing exposure of air-treatment concentrate **114**, through air-treatment housing aperture **128**, to the ambient air. Further, one or more water-treatment housing apertures **130** through water-treatment housing **116** provide fluid communication between toilet tank **102** and water-treatment housing interior space **118**.

[**0041**] In the embodiment shown in **FIG. 1A**, water-treatment housing includes water-treatment housing front apertures **130**F through a water-treatment housing front portion **116**F of water-treatment housing **116** and water-treatment housing rear apertures **130**R through a water-treatment housing rear portion **116**R of water-treatment housing **116**. Water-treatment housing front apertures **130**F and water-treatment housing rear apertures **130**R provide water contact with water-treatment concentrate **120**, disposed within water-treatment housing interior space **118**, whenever multi-function toilet device **100** is positioned on toilet tank **102** as described above, and whenever toilet tank **102** is filled with water to tank fill-level **126**. In this embodiment, water-treatment housing rear portion **116**R is pivotably coupled to water-treatment housing front portion **116**F to swing open to accommodate replacement of water-treatment concentrate **120** disposed within water-treatment housing interior space **118**. In one aspect of this embodiment, any or all of air-treatment housing apertures **128**, water-treatment housing front apertures **130**F, and water-treatment housing rear apertures **130**R are adjustable, by, for example, slide elements (not shown) that blank off all, or a part of, air-treatment housing apertures **128**, water-treatment housing apertures **130**.

[**0042**] Those of skill in the art will recognize that other shaped connectors **104** can be adapted to position air-treatment housing **110** and water-treatment housing **116** as described above adjacent tank interior surface **125** and adjacent tank exterior surface **134**, respectively. **FIG. 3A** shows a frontside perspective view of another embodiment of multi-function toilet device **100** according to the present invention. **FIG. 3B** shows a rearside perspective view of multi-function toilet device **100** of **FIG. 3A**. Referring to **FIGS. 3A and 3B** together, in this embodiment, connector **104** includes an air-treatment end hinge **136** and a water-treatment end hinge **138**. Air-treatment end hinge **136** is positioned between air-treatment end portion **106** and intermediate portion **122**. Water-treatment end hinge **138** is positioned between water-treatment end portion **108** and intermediate portion **122**. Hinges **136** and **138** can be "living" hinges or other types of hinges that allow connector **104** to be bent into the "J" shape of the rigidly formed connector **104** described above. In this embodiment, air-treatment end portion **106** and water-treatment end portion **108** are bent inwardly toward each other about air-treatment end hinge **136** and water-treatment end hinge **138**, respectively, such that connector **104** is bent into the "J" shape of the rigidly formed connector **104** described above. In this embodiment, air-treatment end portion **106** is bent about air-treatment end hinge **136**, to form one leg of the inverted "J" shaped structure of connector **104**, water-treatment end portion **108** is bent about water-treatment end hinge **138** to form the second leg of the inverted "J" shaped structure of connector **104**. Intermediate portion **122**, the portion of connector **104** between air-treatment end hinge **136** and water-treatment end hinge **138**, forms the "top" element of the inverted "J" shaped structure of connector **104**. Before use and placement on toilet tank **102** as described above with reference to the rigid connector **104**, air-treatment end hinge **136** and water-treatment end hinge **138** are bent together such that air-treatment housing aperture **128** is made to face outwardly away from tank exterior surface **134** when connector **104** is bent as described and multi-function toilet device **100** is placed over toilet tank lip **124** of toilet tank **102**. Thus, before use, connector **104** can be shipped in a flat rather than "J" shaped configuration, thereby minimizing packaging and shelf space utilized to present multi-function toilet device **100** of the present invention to a consumer on a retail store shelf.

[**0043**] In another embodiment, at least one additional hinge **140** (**FIG. 3B**) is provided on connector **104** adjacent air-treatment housing **110**, adjacent water-treatment housing **116** or otherwise along connector **104**, to allow for adjustment of these components to adapt multi-function toilet device **100** to the configuration of toilet tank **102** (**FIG. 1A**). Further air-treatment housing **110** and water-treatment housing **116** can be adjustable along connector **104**, by being, for example, slidably attached to air-treatment end portion **106** and water-treatment end portion **108** of connector **104**, respectively. By this means, additional adjustability of air-treatment housing **110** and water-treatment housing **116** to adapt to the configuration of toilet tank **102** (**FIG. 1A**) is provided. Further, the width of intermediate portion **122** can be adjustable to span toilet tank lip **124** (**FIG. 1A**), by, for example, providing slidably adjustable components to comprise intermediate portion **122**.

[**0044**] Further, connector **104** can be adapted to attach directly to toilet tank lid **105** by any suitable attachment means well known to those of ordinary skill in the art. In another embodiment, connector **104** can be placed over toilet bowl rim **109** of toilet bowl **107**. Attachment means suitable for attaching connector **104** to the various toilet parts describe included, but are not limited to, friction, gravity, adhesives and fasteners.

[**0045**] In one aspect of the present invention, connector **104**, air-treatment housing **110**, and water-treatment housing **116** can be integrally formed or can be formed separately for assembly by a consumer before use. Connector **104**, air-

treatment housing **110**, and water-treatment housing **116** can be made of any suitable material, including but not limited to, metal, metal composites, ceramics, polypropylene (PP), high density polyethylene (HDPE), polyethylene terephthalate (PET), polystyrene (PS), acrylonitrile-butadiene-styrene (ABS), polymer composites, and other engineered plastics that may be formed with a variety of fabrication technologies, such as, for example, thermoforming or blowmolding.

[**0046**] In another aspect of the present invention, multi-function toilet device **100** is disposable, having a non-refillable supply of air-treatment concentrate **114** and water-treatment concentrate **120** originally placed in air-treatment housing **110** and water-treatment housing **116**, respectively. Alternatively, multi-function toilet device **100** can be refillable with air-treatment concentrate **114** in air-treatment housing **110** and water-treatment concentrate **120** in water-treatment housing **116**. For example, as shown in **FIGS. 2A and 2B**, water-treatment housing **116** includes a water-treatment housing front portion **116**F and a water-treatment housing rear portion **116**R. Water-treatment housing rear portion **116**R is pivotably coupled to water-treatment housing front portion **116**F to swing open and accommodate replacement of water-treatment concentrate **120** disposed within water-treatment housing interior space **118**. Further, the quantity of non-refillable supply of air-treatment concentrate **114** and water-treatment concentrate **120**, or the capacity of refillable air-treatment housing **110** and water-treatment housing **116**, can be adjusted such that the supply of air-treatment concentrate **114** and water-treatment concentrate **120** last in use for approximately the same period of time. By this means, continuous multi-function operation of device **100** is assured. The replacement or refill process is simplified when both air-treatment concentrate **114** and water-treatment concentrate **120** are changed or replaced together.

[**0047**] In another aspect of the present invention, at least one indicia is utilized to alert a user of multi-function toilet device **100** that the supply of air-treatment concentrate **114** and/or the supply of water-treatment concentrate **120** is depleted and multi-function toilet device **100** is ready for replacement, (e.g., in the case of disposable multi-function toilet devices **100**), or is ready for refill of air-treatment concentrate **114** and/or water-treatment concentrate **120**, (e.g., in the case of refillable multi-function toilet devices **100**). Suitable indicia include, but are not limited to, color change of layered, differently-colored consumables near depletion, exposure of indicia, such as, "Replace Now" wording on air-treatment housing **110** behind shrinking or thinning air-treatment concentrate **114** or on water-treatment housing **116** behind water-treatment concentrate **120**, and loss of color in flush water due to depletion of pre-colored water-treatment concentrate **120**. In another embodiment, wicking of tank water in porous channel or layer (not shown) on connector **104**, which opens up near depletion of water-treatment concentrate **120**, reaches outside toilet tank **102** to provide a visual cue that water-treatment concentrate **120** is depleted. In another embodiment, air-treatment housing **110** and water-treatment housing **116** are constructed of transparent or translucent material such that remaining air-treatment concentrate **114** and water-treatment concentrate **120** are directly viewable.

[**0048**] This invention has been described herein in considerable detail to provide those skilled in the art with information relevant to apply the novel principles and to construct and use such specialized components as are required. However, it is to be understood that the invention can be carried out by different equipment, materials and devices, and that various modifications, both as to the equipment and operating procedures, can be accomplished without departing from the scope of the invention itself.

We claim:

1. A device comprising:

a connector;

an air-treatment concentrate coupled to said connector;

a water-treatment concentrate coupled to said connector;

wherein said connector is configured to position said air-treatment concentrate adjacent an exterior surface of a tank and to position said water-treatment concentrate adjacent an interior surface of said tank.

2. The device of claim 1 wherein at least a portion of said water-treatment concentrate is positioned below a fill-level of said tank.

3. The device of claim 1 wherein said connector is bendable to accommodate placement of said connector on said tank, positioning of said air-treatment concentrate adjacent of said exterior surface of said tank, and positioning said water-treatment concentrate adjacent said interior surface of said tank.

4. The device of claim 1 wherein said connector comprises a structure selected from the group consisting of a bendable wire, a bendable ribbon, a bendable tube, and a bendable band.

5. The device of claim 1 wherein said connector is configurable into a shape selected from the group consisting of an inverted "J", an inverted "U", and an inverted "L".

6. A device comprising:

a connector having an air-treatment end portion, a water-treatment end portion opposite said air-treatment end portion, and an intermediate portion therebetween;

an air-treatment concentrate coupled to said air-treatment end portion of said connector;

a water-treatment concentrate coupled to said water-treatment end portion of said connector; and

wherein said connector is configured to position said air-treatment concentrate adjacent an exterior surface of a tank and to position said water-treatment concentrate adjacent an interior surface of said tank.

7. The device of claim 6 wherein said tank is a toilet tank.

8. The device of claim 6 wherein at least a portion of said water-treatment concentrate is positioned below a fill-level of said tank.

9. The device of claim 6 further comprising:

an air-treatment housing coupled to said air-treatment end portion of said connector, said air-treatment housing defining an air-treatment housing interior space and wherein said air-treatment concentrate is disposed within said air-treatment housing interior space; and

a water-treatment housing coupled to said water-treatment end portion of said connector, said water-treatment housing defining a water-treatment housing interior

space and wherein said water-treatment concentrate is disposed within said water-treatment housing interior space.

10. The device of claim 9 further comprising a fan coupled to said device.

11. The device of claim 9 further comprising a heater coupled to said device.

12. The device of claim 9 further comprising a source of ultrasonic energy coupled to said device.

13. The device of claim 9 wherein said water-treatment housing comprises an active device for pumping or siphoning a solution of said water-treatment concentrate.

14. The device of claim 9 wherein said water-treatment housing comprises a passive device for positioning said water-treatment concentrate at least partially submerged below a fill-level of said tank.

15. The device of claim 9 wherein said connector, said air-treatment housing, and said water-treatment housing are integrally formed.

16. The device of claim 9 wherein said connector, said air-treatment housing, and said water-treatment housing are formed from a material selected from the group consisting of metal, metal composites, ceramics, polypropylene, high density polyethylene, polyethylene terephthalate, polystyrene, acrylonitrile-butadiene-styrene (ABS), polymer composites, and engineered plastics.

17. The device of claim 9 wherein said connector further comprises

at least one hinge adapted along said connector to allow folding of said connector.

18. The device of claim 17 wherein said at least one hinge is a living hinge.

19. The device of claim 9 further comprising:

one or more air-treatment housing apertures through said air-treatment housing; and

one or more water-treatment housing apertures through said water-treatment housing;

20. The device of claim 9 wherein said connector is configured into a shape selected from the group consisting of an inverted "J", an inverted "U", and an inverted "L".

21. The device of claim 9 wherein said air-treatment housing and said water-treatment housing are adjustably coupled to said connector.

22. The device of claim 9 wherein said device is disposable.

23. The device of claim 9 wherein said air-treatment housing is refillable with said air-treatment concentrate and said water-treatment housing is refillable with said water-treatment concentrate.

24. The device of claim 9 wherein said air-treatment concentrate and said water-treatment concentrate lasts in use for approximately the same period of time.

25. The device of claim 9 further comprising at least one indicia that alerts a user of said device that said air-treatment concentrate or said water-treatment concentrate is depleted.

26. A multi-function toilet device for placement on a toilet tank comprising:

a connector having a air-treatment end portion, a water-treatment end portion opposite said air-treatment end portion, and an intermediate portion therebetween;

an air-treatment housing coupled to said air-treatment end portion of said connector, said air-treatment housing defining an air-treatment housing interior space and wherein an air-treatment concentrate is disposed within said air-treatment housing interior space;

a water-treatment housing coupled to said water-treatment end portion of said connector, said water-treatment housing defining a water-treatment housing interior space and wherein a water-treatment concentrate is disposed within said water-treatment housing interior space; and

wherein said connector is configured to position said air-treatment concentrate adjacent an exterior surface of said toilet tank and to position said water-treatment concentrate adjacent an interior surface of said toilet tank.

27. The multi-function toilet device of claim 26 wherein said connector is placed on a tank lip of said toilet tank.

28. The multi-function toilet device of claim 26 wherein said connector is configured as an inverted "J".

29. The multi-function toilet device of claim 26 wherein said connector comprises a structure selected from the group consisting of a bendable wire, a bendable ribbon, a bendable tube, and a bendable band.

30. The multi-function device of claim 26 wherein said water-treatment housing comprises a passive device for positioning said water-treatment concentrate at least partially submerged below a tank fill-level.

31. The multi-function toilet device of claim 26 wherein said connector, said air-treatment housing, and said water-treatment housing are integrally formed.

32. The multi-function toilet device of claim 26 wherein said connector, said air-treatment housing, and said water-treatment housing are separately formed.

33. The multi-function toilet device of claim 26 further comprising:

one or more air-treatment housing apertures through said air-treatment housing; and

one or more water-treatment housing apertures through said water-treatment housing.

34. The multi-function toilet device of claim 33 further comprising one or more slide elements that blank off all, or parts of, said air-treatment housing apertures and said water-treatment housing apertures.

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