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(54) Title: ORAL CARE IMPLEMENT HAVING VISUAL INDICATOR OF DEPLETION OF A FLUID

(57) Abstract: An oral care implement having a visual indicator of depletion. In one aspect, the oral care implement comprises a body having a reservoir containing a composition including an oral care fluid and an indicator fluid, the oral care fluid being a different color than the indicator fluid and immiscible with respect to the indicator fluid; a delivery member formed of a capillary material; and the oral care fluid and the indicator fluid arranged within the reservoir so that upon the oral care fluid within the reservoir being substantially depleted, the indicator fluid is delivered to a visible portion of the delivery member by capillary action.



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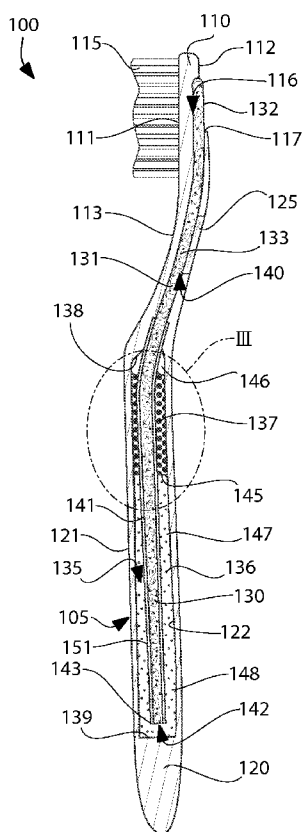


FIG. 2

HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

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## ORAL CARE IMPLEMENT HAVING VISUAL INDICATOR OF DEPLETION OF A FLUID

## FIELD OF THE INVENTION

[0001] The present invention relates generally to dispensers, and more specifically to oral care implements having a fluid delivery system and a visual indicator of depletion of the fluid.

## BACKGROUND OF THE INVENTION

[0002] Toothbrushes are typically used by applying toothpaste to a bristle section followed by brushing regions of the oral cavity, e.g., the teeth, tongue and/or gums. Some toothbrushes have been equipped with fluid reservoirs and systems for delivering auxiliary oral care fluids, such as whitening agents, breathe freshening agents and others to a user's oral cavity, in addition to dentifrice. In known toothbrushes having fluid delivery capabilities, the oral care fluid is delivered to a user's oral cavity via an applicator. However, in such toothbrushes a user is unable to determine when the oral care fluid within the applicator has been depleted. Thus, a need exists for a visual indication to inform the toothbrush user that the oral care fluid within the reservoir has been depleted.

## BRIEF SUMMARY OF THE INVENTION

[0003] Exemplary embodiments of the invention are directed to oral care implements that have a fluid delivery system. The inventive oral care implement comprises a body having a reservoir containing an oral care fluid and an indicator fluid therein, the oral care fluid and the indicator fluid are delivered to an applicator via capillary action. In the inventive oral care implement, the oral care fluid is a different color than the indicator fluid. When the oral care fluid is close to depletion, the indicator fluid becomes visible to a consumer.

[0004] In one embodiment, the invention can be an oral care implement comprising: a body comprising a reservoir containing a composition including an oral care fluid and an indicator fluid, the oral care fluid being a different color than the indicator fluid and immiscible with respect to the indicator fluid; a delivery member formed of a capillary material; and the oral care fluid and the indicator fluid arranged within the reservoir so that upon the oral care fluid within the reservoir being substantially depleted, the indicator fluid is delivered to a visible portion of the delivery member by capillary action.

[0005] In another embodiment, the invention can be an oral care implement comprising: a body comprising a reservoir containing a composition including an oral care fluid, the oral care fluid being a first color; a delivery member formed of a capillary material having a second color; and a visible portion of the delivery member appearing the first color when fully adsorbed with the oral care fluid and a third color upon depletion of the oral care fluid within the reservoir, wherein the first, second and third colors are different from one another.

[0006] In yet another embodiment, the invention can be a dispenser comprising: a reservoir containing a composition including a first fluid and a second fluid, the first fluid being a different color than the second fluid and immiscible with respect to the first fluid; a delivery member formed of a capillary material; and the first and second fluids arranged within the reservoir so that upon the first fluid within the reservoir being substantially depleted, the second fluid is delivered to a visible portion of the delivery member by capillary action.

[0007] In a further embodiment, the invention can be a dispenser comprising: a reservoir containing a composition including a first fluid, the first fluid being a first color; a delivery member formed of a capillary material having a second color; and a visible portion of the delivery member appearing the first color when fully adsorbed with the first fluid and a third color upon depletion of the first fluid within the reservoir, wherein the first, second and third colors are different from one another.

[0008] In a still further embodiment, the invention can be a method of providing a visual indication of depletion of an oral care fluid contained within a reservoir of an oral care implement having a delivery member formed of a capillary material, the method comprising: a) providing an indicator fluid in the reservoir with the oral care fluid, the oral care fluid being a different color than the indicator fluid and immiscible with respect to the indicator fluid; and b) upon depletion of the oral care fluid from the reservoir, delivering the indicator fluid to a visible portion of the deliver member.

[0009] In another embodiment, the invention can be a method of providing a visual indication of depletion of an oral care fluid of a first color contained within a reservoir of an oral care implement having a delivery member formed of a capillary material of a second color, the method comprising: a) changing the appearance of the visible portion of the delivery member from the second color to the first color by adsorbing the oral care fluid into a visible portion of the delivery member; and b) upon depletion of the oral care fluid from the reservoir, changing

the appearance of the visible portion of the delivery member from the first color to a third color, wherein the first, second and third colors are different from one another.

[0010] Further areas of applicability of the present invention will become apparent from the detailed description provided hereinafter. It should be understood that the detailed description and specific examples, while indicating the preferred embodiment of the invention, are intended for purposes of illustration only and are not intended to limit the scope of the invention.

#### BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The present invention will become more fully understood from the detailed description and the accompanying drawings, wherein:

[0012] Figure 1 is a rear perspective view of a toothbrush according to a first embodiment of the present invention;

[0013] Figure 2 is a longitudinal cross-sectional view of the toothbrush of FIG. 1 taken along line II-II of FIG. 1, the reservoir contains a full amount of an oral care fluid and an indicator fluid;

[0014] Figure 3 is a close-up view of section III of FIG. 2;

[0015] Figure 4 is a similar view as FIG. 2, wherein the oral care fluid has been depleted from the reservoir and the indicator fluid is adsorbed into a bottom portion of a delivery member;

[0016] Figure 5 is a similar view as FIG. 2, wherein the indicator fluid has been delivered to a visible portion of the delivery member by capillary action;

[0017] Figure 6 is a longitudinal cross-sectional view of a toothbrush according to a second embodiment of the present invention, wherein the reservoir contains a full amount of an oral care fluid and an indicator fluid;

[0018] Figure 7 is a similar view as FIG. 6, wherein the oral care fluid has been depleted from the reservoir and the indicator fluid is adsorbed into a bottom portion of a delivery member;

[0019] Figure 8 is a similar view as of FIG. 6, wherein the indicator fluid has been delivered to a visible portion of the delivery member via capillary action;

[0020] Figure 9 is a longitudinal cross-sectional view of a toothbrush according to a third embodiment of the present invention, wherein a delivery member fills the entirety of the reservoir and contains the oral care fluid and an indicator fluid pre-adsorbed therein;

[0021] Figure 10 is a similar view as FIG. 9, wherein the indicator fluid begins to be transported through the delivery member via capillary action;

[0022] Figure 11 is a similar view as FIG. 9, wherein the indicator fluid has been transported to a visible portion of the delivery member via capillary action;

[0023] Figure 12 is a longitudinal cross-sectional view of a toothbrush according to a fourth embodiment of the present invention, wherein a delivery member is formed of a first color and a reservoir contains an oral care fluid formed of a second color;

[0024] Figure 13 is a similar view as FIG. 12, wherein the delivery member has adsorbed the oral care material and taken on the color of the oral care material; and

[0025] Figure 14 is a similar view as FIG. 12, wherein the visible portion of the oral care material has been depleted from the reservoir and the visible portion of the delivery member has become a third color.

#### DETAILED DESCRIPTION OF THE INVENTION

[0026] The following description of the preferred embodiment(s) is merely exemplary in nature and is in no way intended to limit the invention, its application, or uses.

[0027] The description of illustrative embodiments according to principles of the present invention is intended to be read in connection with the accompanying drawings, which are to be considered part of the entire written description. In the description of the exemplary embodiments of the invention disclosed herein, any reference to direction or orientation is merely intended for convenience of description and is not intended in any way to limit the scope of the present invention. Relative terms such as “lower,” “upper,” “horizontal,” “vertical,” “above,” “below,” “up,” “down,” “left,” “right,” “top,” “bottom,” “front” and “rear” as well as derivatives thereof (e.g., “horizontally,” “downwardly,” “upwardly,” etc.) should be construed to refer to the orientation as then described or as shown in the drawing under discussion. These relative terms are for convenience of description only and do not require that the apparatus be constructed or operated in a particular orientation unless explicitly indicated as such. Terms such as “attached,” “affixed,” “connected,” “coupled,” “interconnected,” “secured” and similar refer to a relationship wherein structures are secured or attached to one another either directly or indirectly through intervening structures, as well as both movable or rigid attachments or relationships, unless expressly described otherwise. Moreover, the features and benefits of the invention are described by reference to the exemplary embodiments illustrated herein. Accordingly, the invention expressly should not be limited to such exemplary embodiments, even if indicated as being preferred. The discussion herein describes and illustrates some

possible non-limiting combinations of features that may exist alone or in other combinations of features. The scope of the invention is defined by the claims appended hereto.

[0028] Referring to Figure 1, an oral care implement **100** in accordance with one embodiment of the present invention is illustrated. In the exemplified embodiments disclosed herein, the invention is illustrated and described in the form of a manual toothbrush. However, the invention is not so limited in all embodiments, and the oral care fluid delivery system and the visual indicator of depletion techniques described herein can be incorporated into other oral care implements as desired, including without limitation a powered toothbrush, an interdental device, a soft tissue cleanser or any other type of oral care implement as is known in the art. Furthermore, in certain other embodiments the invention may simply be a dispenser comprising the structure and techniques for depletion indication described herein.

[0029] The oral care implement **100** extends from a proximal end **101** to a distal end **102** along a longitudinal axis A-A. The oral care implement **100** generally comprises a body **105** having a head **110** and a handle **120**. The body **105** is constructed of a material having suitable rigidity for handling of the oral care implement **100** and being sufficiently impervious to fluids so that oral care fluid can be stored within an internal reservoir (discussed below). Suitable material include hard plastics, such as polyethylene, polypropylene (PP), polyamide, polyester, cellulose, SAN, acrylic, ABS or any other of the commonly known thermoplastics used in toothbrush manufacture.

[0030] The head **110** is coupled to a distal end of the handle **120**. In the exemplary embodiment, the head **110** and the handle **120** are integrally formed as a single unitary structure using a molding, milling, machining or other suitable process. However, in other embodiments the handle **120** and the head **110** may be formed as separate components which are operably connected at a later stage of the manufacturing process by any suitable technique known in the art, including without limitation thermal or ultrasonic welding, a tight-fit assembly, a coupling sleeve, threaded engagement, adhesion, or fasteners. Whether the head **110** and the handle **120** are of a unitary or multi-piece construction (including connection techniques) is not limiting of the present invention, unless specifically claimed. In some embodiments of the invention, the head **110** may be detachable (and replaceable) from the handle **120** using techniques known in the art.

[0031] The head **110** comprises a front surface **111** and a rear surface **112**. The front surface **111** and the rear surface **112** of the head **110** can take on a wide variety of shapes and contours, none of which are limiting of the present invention. For example, the front and rear surfaces **111**, **112** can be planar, contoured or combinations thereof. Moreover, if desired, the rear surface **112** of the head **110** may also comprise additional structures (in addition to an applicator **132**, described in detail below) for oral cleaning, such as an elastomeric soft tissue cleanser. An example of a suitable elastomeric soft tissue cleanser is disclosed in U.S. Patent 7,143,462, issued December 5, 2006 to the assignee of the present application, the entirety of which is hereby incorporated by reference. Furthermore, while the head **110** is normally widened relative to a neck **113** of the handle **120**, it could in some constructions simply be a continuous extension or narrowing of the handle **120**.

[0032] The head **110** also comprises a plurality of tooth cleaning elements **115** extending from the front surface **111**. The tooth cleaning elements **115** are generically illustrated as a plurality of tufts of bristles. However, the invention is in no way limited by the configuration or material of the tooth cleaning elements **115**. Furthermore, while the plurality of tooth cleaning elements **115** are particularly suited for brushing and/or polishing teeth, the plurality of tooth cleaning elements **115** can also be used to clean oral soft tissue, such as a tongue, gums, or cheeks instead of or in addition to teeth.

[0033] As used herein, the term “tooth cleaning elements” is used in a generic sense to refer to any structure that can be used to clean, polish or wipe the teeth and/or soft oral tissue (e.g. tongue, cheek, gums, etc.) through relative surface contact. Common examples of “tooth cleaning elements” include, without limitation, bristle tufts, filament bristles, fiber bristles, nylon bristles, spiral bristles, rubber bristles, elastomeric protrusions, flexible polymer protrusions, combinations thereof and/or structures containing such materials or combinations. Suitable elastomeric materials include any biocompatible resilient material suitable for uses in an oral hygiene apparatus. To provide optimum comfort as well as cleaning benefits, the elastomeric material of the tooth or soft tissue engaging elements has a hardness property in the range of A8 to A25 Shore hardness. One suitable elastomeric material is styrene-ethylene/butylene-styrene block copolymer (SEBS) manufactured by GLS Corporation. Nevertheless, SEBS material from other manufacturers or other materials within and outside the noted hardness range could be used.



[0034] The plurality of tooth cleaning elements **115** can be mounted to the head **110** in any manner known in the art. For example, staples/anchors, in-mold tufting (IMT) or anchor free tufting (AFT) could be used to mount the cleaning elements/tooth engaging elements. In AFT, a plate or membrane is secured to the brush head such as by ultrasonic welding. The bristles extend through the plate or membrane. The free ends of the bristles on one side of the plate or membrane perform the cleaning function. The ends of the bristles on the other side of the plate or membrane are melted together by heat to be anchored in place. Any suitable form of cleaning elements may be used in the broad practice of this invention. Alternatively, the bristles could be mounted to tuft blocks or sections by extending through suitable depressions in the tuft blocks so that the base of the bristles is mounted within or below the tuft block.

[0035] The body **105** of the oral care implement **100** comprises an outer surface **121** with a window **125** formed therein. In the exemplified embodiment, the window **125** is formed into a rear surface **114** of the neck portion **113** of the body **105**. However, in certain other embodiments, the window **125** can be positioned at other locations on the body **105** including on a front surface of the neck portion **113**, the rear surface **112** of the head **110**, on the handle **110** or at any other location on the outer surface **121** of the body **105**. In still other embodiments, the window **125** may be altogether omitted. The window **125** is a portion of the body **105** that is sufficiently transparent so as to enable a user to see through the outer surface **121** of the body **105** and into an internal region of the oral care implement **100** as will be described below. Of course, the invention is not limited to the window **125** being a completely transparent portion of the outer surface **121** of the body **105**. As used herein, the term transparent is intended to include translucent materials or other materials that are capable of being seen through.

[0036] In the exemplified embodiment, the window **125** is a portion of the outer surface **121** of the body **105** that is transparent and elongated along the longitudinal axis **A-A** of the oral care implement **100**. However, the invention is not to be so limited and in certain other embodiments the window **125** can take on any shape as long as the window **125** is large enough to enable a user to see through the outer surface **121** of the body **105** and into the internal region of the oral care implement **100**. More specifically, the window **125** should enable a user to be able to see the color of a portion of a delivery member **130** that is disposed within the internal region of the oral care implement **100** and aligned with the window **125** as will be described below.

[0037] Referring now to FIGS. 1 and 2 concurrently, the oral care implement **100** will be described in more detail. The body **105** of the oral care implement **100** generally comprises an outer surface **121** and an inner surface **122**. The inner surface **122** of the body **105** defines an internal reservoir **135** containing a fluid composition therein. More specifically, the reservoir **135** is defined by the space between a floor **139** of the reservoir **135**, a ceiling **138** of the reservoir **135** and the inner surface **122** of the body **105**. Thus, the body **105** forms a housing, which contains the reservoir **135** and the fluid composition. In the exemplified embodiment, the reservoir **135** is located within the handle **120**. However, in alternate embodiments the reservoir **135** may be located within the head **110**, the neck **113**, the handle **120**, and/or combinations thereof. The reservoir **135** can be conceptually divided into a top portion **146**, a middle portion **147** and a bottom portion **148**. In addition, while the reservoir **135** is illustrated as a single reservoir, in certain embodiments, the reservoir **135** may consist of multiple reservoirs.

[0038] The fluid composition includes an oral care fluid **136** and an indicator fluid **137**. The oral care fluid **136** is a different color than the color of the indicator fluid **137**, and it is preferred that the colors of the two fluids **136**, **137** are sufficiently distinct. Thus, in certain embodiments, the oral care fluid **136** can be a blue fluid and the indicator fluid **137** can be a red fluid. Of course, other visible colors can be utilized as desired. In certain other embodiments, one of the oral care fluid **136** or the indicator fluid **137** will be transparent while the other one of the oral care fluid **136** or the indicator fluid **137** will be a visible color (such as red, blue, green, yellow, purple, orange, etc.). Thus, as used herein, transparent, white and black are considered “colors” for certain embodiments of the present the invention. Moreover, in certain embodiments, different shades or intensities of the same visible color may be considered “different colors.” Further, in certain embodiments, both fluids **136**, **137** may be transparent fluids with different colored suspensions. For example, oral care fluid **136** may contain a transparent fluid with red beads suspended therein, and the indicator fluid **137** may contain a transparent fluid with blue beads suspended therein.

[0039] While the invention is not to be limited by the particular colors of the oral care fluid **136** and the indicator fluid **137**, it may be preferable that the indicator fluid **137** be an intense color so that it is easily seen through the window **125** (described in more detail below). In all embodiments illustrated in this application, different colors are illustrated as different stippling patterns. For example, in the exemplified embodiment of FIGS. 1-5, the smaller-sized stipples of

the oral care fluid **136** represent a first color while the larger-sized stipples of the indicator fluid **137** represent a second color that is different than the first color.

[0040] The oral care fluid **136** and the indicator fluid **137** are immiscible with respect to one another, and thus are incapable of mixing together to form a homogenous solution. As such, the oral care fluid **136** remains separate from the indicator fluid **137** within the reservoir **135**, even when in contact with one another. In the embodiment exemplified in FIGS. 2 and 3, the indicator fluid **137** floats atop of the oral care fluid **136** to form a fluid-to-fluid interface **145**. In certain other embodiments as will be described below in FIGS. 6-8, the relative arrangement of the indicator fluid **137** and the oral care fluid **136** can be switched so that the oral care fluid **136** floats atop the indicator fluid **137**. In certain embodiments, the oral care fluid **136** preferably takes up between 75-99% of the volume of the reservoir **135**, and more preferably between 90-99% of the volume of the reservoir **135**, and most preferably 95% of the volume of the reservoir **135**. The indicator fluid **137** can occupy the remaining volume of the reservoir **135**. In such embodiments, the indicator fluid **137** preferably takes up between 1-25% of the volume of the reservoir **135**, and more preferably between 1-10% of the volume of the reservoir **135** and most preferably 5% of the volume of the reservoir **135**. Of course, the invention is in no way limited to the afore-mentioned ratios unless specifically recited in the claims.

[0041] Referring specifically to FIGS. 2 and 3 concurrently, in order to enable the indicator fluid **137** to float atop of the oral care fluid **136**, the indicator fluid **137** can be formed of a fluid that is less dense than the fluid of the oral care fluid **136**. In one such embodiment, the indicator fluid **137** can be a colored oil-based fluid, such as mineral oil or ethyl acetate that is colored with riboflavin, and the oral care fluid **136** can be a hydrophilic or water-based fluid. In still other embodiments, the oral care fluid **136** is a hydrophilic fluid and the indicator fluid **137** is a hydrophobic fluid, irrespective of their relative densities. Of course, as noted above the invention is not so limited and either one of the oral care fluid **136** or the indicator fluid **137** can be the hydrophobic or hydrophilic material and either one of the oral care fluid **136** or the indicator fluid **137** can be the more dense fluid or less dense fluid. The desired relative properties and positioning of the oral care fluid **136** and the indicator fluid **137** will depend on such factors such as the particular structure of the oral care implement **100**, the delivery member **130**, and/or the reservoir **135**.

[0042] The oral care fluid **136** is a fluid that provides a user with an oral hygiene benefit upon use, specific examples of which will be described below. The indicator fluid **137** is merely intended to indicate to a user when the oral care fluid **136** has been substantially depleted. Specifically, the indicator fluid **137** indicates to a user that the oral care fluid **136** has been depleted because the indicator fluid **137** is adsorbed by a delivery member **130** (described below) after the oral care fluid **136** has been substantially depleted. As a result, the indicator fluid **137** changes the appearance, such as the color, of a visible portion of the delivery member **130**. Thus, the indicator fluid **137** does not need to provide oral hygiene benefits to a user. However, the invention is not so limited and in certain embodiments the indicator fluid **137** may provide oral hygiene benefits to a user. Furthermore, it should be understood that regardless of whether or not the indicator fluid **137** actually provides oral hygiene benefits to a user, the indicator fluid **137** should be selected so as to be non-toxic when ingested for precaution.

[0043] As noted above, the oral care fluid **136** provides oral health benefits to a user upon contact with the user's oral cavity. For example, in certain embodiments the oral care fluid **136** is a mouthwash solution that cleans the oral surfaces when applied thereto and provides the user with breath freshening benefits. In other embodiments, the oral care fluid **136** is a tooth cleaning solution. Of course, the oral care fluid **136** is not to be in any way limiting of the present invention and may include fluids or agents that deliver therapeutic, cosmetic, experiential and/or sensorial benefits to a consumer during an interdental cleaning regimen. Specifically, the oral care fluid **136** can be anti-sensitivity agents, fluoride, tartar protection agents, antibacterial agents, oxidative or whitening agents, enamel strengthening or repair agents, tooth erosion preventing agents, tooth sensitivity ingredients, gum health actives, nutritional ingredients, tartar control or anti-stain ingredients, enzymes, sensate ingredients, flavors or flavor ingredients, breath freshening ingredients, oral malodor reducing agents, anti-attachment agents or sealants, diagnostic solutions, occluding agents, dry mouth relief ingredients, catalysts to enhance the activity of any of these agents, colorants or aesthetic ingredients, arginine bicarbonate, chlorohexidine, triclosan, CPC, zinc oxide and combinations thereof. In certain embodiments, the oral care fluid **136** is free of a dentifrice as the oral care fluid **136** is intended to supplement traditional brushing of the teeth rather than supplant it.

[0044] Still referring to FIGS. 2 and 3, the body **105** of the oral care implement **100** also comprises a channel **140** that extends from the reservoir **135** to an opening **117** in the outer

surface **121** of the body **105**. In the exemplified embodiment, the opening **117** is located on the rear surface **112** of the head **110**. However, the invention is not so limited and in certain other embodiments the opening **117** may be formed at other locations on the outer surface **121** of the body **105**. For example, the opening **117** may be located on the handle **120** or the neck **113**, or even on the front surface **111** of the head **110** if desired. The opening **117** forms a passageway from the channel **140** to a depression **116** on the rear surface **112** of the head **110**. The depression **116** provides a basin in which the applicator **132** can nest. As such, the applicator **132** is exposed on the rear surface **112** of the head **110** and can be considered a visible portion of the delivery member **130** (described below).

[0045] The channel **140** forms a passageway from the reservoir **135** to the opening **117**. In the exemplified embodiment, the channel **140** is an axial channel extending along the longitudinal axis **A-A**. In other embodiments, the channel **140** may extend substantially transversely or at an oblique angle to the longitudinal axis **A-A**. The channel **140** may be linear, curved, and/or combinations thereof. The exact shape and orientation of the channel **140** will be dictated by considerations such as the position of the opening **117** on the body **105**, the position of the reservoir **135** within the body **105**, and the shape of the body **105**.

[0046] The delivery member **130** is an elongated rod formed of a capillary material that is disposed within the reservoir **135** and extends from the reservoir **135**, through the channel **140** and the opening **117** and into the depression **116**. The delivery member **130** can be conceptually divided into a conduit portion **131** that is disposed within the channel **140** and the applicator **132** that nests within the depression **116**. Thus, in the exemplified embodiment, the delivery member **130** has two visible portions, one of which is the applicator **132** (which is visible by virtue of being exposed) and the other of which is the visible portion **133** of the delivery member **130** (which is aligned with and visible through the window **125**). It should be understood that in some embodiments the window **125** may be altogether omitted so that the only portion of the delivery member **130** that is visible to a user is the applicator **132** and/or another exposed portion.

[0047] As will be described in more detail below, a user will be able to determine when the oral care fluid **136** within the reservoir **135** has been substantially depleted based when the user sees the color of the indicator fluid **137** (or a color that is a combination of the color of the indicator fluid **137** and the color of the oral care fluid **136**) on the applicator **132** or the visible portion **133**

of the delivery member **130**. In other words, the color change on the applicator **132** or the visible portion **133** of the delivery member **130** will indicate to the user that the oral care fluid **136** within the reservoir **135** has been substantially depleted. In the exemplified embodiment, the delivery member **130** and the applicator **132** are integral to one another and of unitary construct. However, in other embodiments the delivery member **130** and the applicator **132** can be separate and distinct components and/or structures that are fluidly and/or structurally coupled together when the oral care implement **100** is assembled.

[0048] The fluid delivery member **130**, including the conduit portion **131** and the applicator **132**, is formed of a capillary material so that the oral care fluid **136** and the indicator fluid **137** are delivered from the reservoir **135** to the applicator **132** via capillary action. In one embodiment, the delivery of the oral care fluid **136** and the indicator fluid **137** from the reservoir **135** to the applicator **132** is effectuated solely by capillary action or wicking. Thus, the fluid delivery member **130** is formed of a capillary material that can absorb and/or transport a fluidic material via capillary action. More specifically, a capillary material is a material, such as a sponge, that absorbs and holds fluid, and that upon sufficient contact or pressure releases the fluid. Examples of suitable capillary materials include, without limitation, a porous material, a fibrous material or a material comprising one or more capillary channels. Of course, in other embodiments, the delivery of the oral care fluid **136** and/or the indicator fluid **137** from the reservoir **135** to the applicator **132** can be accomplished via a combination of capillary action and mechanical action, such as a pump, an actuatable piston, a pressurizer, or a compressible bladder.

[0049] Still referring to FIGS. 2 and 3, the oral care implement **100** comprises a sheath **141**. The sheath **141** extends from the channel **140** and into the reservoir **135** and terminates near, but prior to the floor **139** of the reservoir **135**. The sheath **141** is disposed within the reservoir **135** so that a space is formed concentrically between an outer surface **151** of the sheath **141** and the inner surface **122** of the body **105** of the oral care implement **100**. The sheath **141** can be formed integrally with the oral care implement **100** or it can be a separate component of the oral care implement **100** that is later affixed or coupled to the oral care implement **100** by any means known in the art, including without limitation thermal or ultrasonic welding, a tight-fit assembly, a coupling sleeve, threaded engagement, adhesion, or fasteners. Alternatively, the sheath **141** can be applied directly to and affixed to the delivery member **130** as a coating or sleeve.

[0050] The delivery member **130** is disposed within the sheath **141** through the top and middle portions **146, 147** of the reservoir **135**. The sheath **141** is formed of a fluid impermeable material so that the oral care fluid **136** and the indicator fluid **137** within the reservoir **135** cannot penetrate through the sheath **141** and be adsorbed by the delivery member **130**. Examples of the material that can be used to form the sheath **141** include hard plastics, such as polyethylene, polypropylene (PP), polyamide, polyester, SAN, acrylic, ABS or any other of the commonly known thermoplastics or films used in the industry. The sheath **141** has an opening **142** at a bottom end **143** thereof that provides fluid communication between the delivery member **130** and the composition within the reservoir **135**, and specifically at the bottom portion **148** of the reservoir **135**. Thus, a fluid that is disposed within the bottom portion **148** of the reservoir **135** will be adsorbed into the capillary material of the delivery member **130** via the opening **142**. Stated simply, the delivery member **130** is in fluid communication with the composition (the oral care fluid **136** and/or the indicator fluid **137**) only at the bottom portion **148** of the reservoir **135**. As used herein, the term adsorb should be understood to include both absorption and adsorption.

[0051] As discussed above, in FIG. 2 the indicator fluid **137** floats atop of the oral care fluid **136** so as to form a fluid-to-fluid interface **145** between the indicator fluid **137** and the oral care fluid **136**. As such, the oral care fluid **136** is positioned within the bottom portion **148** of the reservoir **135** so that the oral care fluid **136** can flow through the opening **142** in the sheath **141** and be adsorbed by the delivery member **130**. The delivery member **130** will not adsorb or soak up the indicator fluid **137** because the indicator fluid **137**, which is floating atop of the oral care fluid **136**, can not penetrate the sheath **141** or enter into the sheath **141** through the opening **142**. This is the case so long as the fluid-to-fluid interface **145** remains above the opening **142**. Thus, as is illustrated in FIG. 2, the capillary material of the delivery member **130** is saturated by the oral care fluid **136**. As such, the capillary material of the delivery member **130** will visually appear as the color of the oral care fluid **136**. Thus, if the oral care fluid **136** is a clear fluid, the delivery member **130** will appear as its natural color and if the oral care fluid **136** is a blue fluid, the delivery member **130** will appear blue (or at least a shade thereof or a resultant color of the delivery member **130** and the oral care fluid **136**). A user is able to see the color of the delivery member **130** at any given time by viewing the visible portion **133** of the delivery member **130** through the window **125** (or by directly viewing the applicator **132**).

[0052] As the oral care implement **100** is used, the pressure of a user's oral surfaces against the applicator **132** causes the applicator **132** (and hence the delivery member **130**, which is formed unitarily with the applicator **132**) to release the oral care fluid **136** that has been adsorbed by the delivery member **130**. As the delivery member **130** continues to release the oral care fluid **136**, it also adsorbs additional oral care fluid **136** from the bottom portion **148** of the reservoir **135** by capillary action to replace the released oral care fluid **136**. Thus, as the oral care implement **100** is used, the fluid-to-fluid interface **145**, and hence also the indicator fluid **137**, moves toward the bottom portion **148** of the reservoir **135** (and also toward the opening **142** at the bottom end **143** of the sheath **141**). Thus, it should be understood that a substantial amount of the indicator fluid **137** is not delivered to the visible portion **133** of the delivery member **130** until the oral care fluid **136** within the reservoir **135** is substantially depleted.

[0053] Referring now to FIGS. 4 and 5 concurrently, the visible cue that indicates depletion of the oral care fluid **136** will be described in more detail. Once the fluid-to-fluid interface **145** is located below the opening **142** the opening **142**, the oral care fluid **136** can be considered to be depleted from the reservoir **135**. However, the delivery member **130** is still saturated with the oral care fluid **136**, thus enabling a user to continue using the oral care implement **100** to receive the benefits of the oral care fluid **136**. As the oral care implement **100** continues to be used as described above, the delivery member **130** begins to adsorb the indicator fluid **137** via the opening **142** in the bottom end **143** of the sheath **141**. In other words, after the oral care fluid **136** is depleted from the reservoir **135**, the indicator fluid **137** no longer floats atop of the oral care fluid **136** and is instead able to enter into the sheath **141** via the opening **142**.

[0054] The user will continue to use the oral care implement **100** until the delivery member **130** has adsorbed a sufficient amount of the indicator fluid **137** so that the indicator fluid **137** is delivered to either the visible portion **133** of the delivery member **130** or to the applicator **132**, which is also visible due to being exposed. Thus, after prolonged use of the oral care implement **100**, the concentration of the indicator fluid **137** within the delivery member **130** will be higher than the concentration of the oral care fluid **136** within the delivery member **130**, thereby changing the visible color of the visible portion **133** (and/or the applicator **132**). In certain embodiments, the oral care implement **100** is capable of being used multiple times before the indicator fluid **137** changes the color of the visible portion **133** (and/or the applicator **132**) of the delivery member **130**. Of course, in certain other embodiments the oral care implement **100** may



be a single use toothbrush such that the indicator fluid **137** becomes visible on the visible portion **133** of the delivery member **130** during the first use of the oral care implement to indicate that the user has used the oral care implement **100** to clean the user's oral surfaces for a sufficient amount of time.

[0055] As has been discussed above, the indicator fluid **137** is a different color than the color of the oral care fluid **136**. As such, when the capillary material of the delivery member **130** adsorbs or soaks up the indicator fluid **137**, the color of the delivery member **130** changes from the color of the oral care fluid **136**, such as blue, to the color of the indicator fluid **137**, such as red. As soon as the user sees that the visible portion **133** of the delivery member **130**, which is visible through the window **125**, has turned to a red color (i.e., the color of the indicator fluid **137**), the user will know that the oral care fluid **136** has been substantially depleted. As such, the user will know to dispose of and replace the oral care implement **100** at that time.

[0056] It should be understood that when the oral care fluid **136** is blue and the indicator fluid **137** is red, the capillary material of the visible portion **133** of the delivery member **130** (or the applicator **132**) may not change directly from blue to red when the indicator fluid **137** is delivered to the visible portion **133** of the delivery member **130**. Rather, the fibers of the capillary material of the delivery member **130** will likely retain some of the blue (or other) color of the oral care fluid **136** because the capillary material has a holding capacity that does not release all of the fluid. As such, as the indicator fluid **137** (which is red in this example) is delivered to the visible portion **133** of the delivery member **130** (or the applicator **132**), the red color of the indicator fluid **137** may mix with the blue color of the remnants of the oral care fluid **136** to form a purple color. In this example, a user will know that the oral care fluid **136** within the reservoir **135** has been substantially depleted upon seeing the purple color. In another example, the color of the oral care fluid **136** can be yellow and the color of the indicator fluid **137** can be blue. Thus, when the indicator fluid **137** is delivered to the visible portion **133** of the delivery member **130**, a user may see a green color, which is a mixture between the yellow color of the oral care fluid **136** and the blue color of the indicator fluid **137**.

[0057] As discussed above, the particular colors used for the oral care fluid **136** and the indicator fluid **137** are in no way limiting of the present invention. Thus, assuming that the oral care fluid **136** is a first color and the indicator fluid **137** is a second color, the user will know that the oral care fluid **136** is depleted when the visible portion **133** of the delivery member **130** (or the

applicator **132**) takes on either the second color (if, for example, the first color is clear or the capillary material has a holding capacity that releases all of the oral care fluid **136**) or a third color that is a resultant color from the combination of the first and second colors.

[0058] Referring now to FIGS. 6-8, another embodiment of an oral care implement **600** in accordance with the present invention will be described. The oral care implement **600** has many features that are similar to or the same as features of the oral care implement **100**. Thus, similar features will be similarly numbered with the exception that the 600-series of numbers will be used. It should be understood that features and components of the oral care implement **600** that are not described in detail herein are the same as corresponding features and components of the oral care implement **100**. It will become apparent from the description below that the oral care implement **600** is substantially similar to the oral care implement **100** except that the oral care implement **600** does not have a sheath and an oral care fluid **636** floats atop of an indicator fluid **637**.

[0059] The oral care implement **600** comprises a body **605** having a handle **620** and a head **610** coupled to an end of the handle **620**. The head **610** comprises a front surface **611** from which a plurality of tooth cleaning elements **615** extend and an opposed rear surface **612**. Although not illustrated, the rear surface **612** of the head **610** may comprise a soft tissue cleanser, such as was described above with regard to the oral care implement **100**. The body **605** comprises an outer surface **621** and an inner surface **622**. The inner surface **622** of the body **605** defines an open area or internal reservoir **635** containing a fluid composition therein. In the exemplified embodiment, the reservoir **635** is formed within the handle **620** of the body **605**. Of course, the invention is not so limited and the reservoir **635** may be formed in the head **610** or neck of the oral care implement **600** in other embodiments. The reservoir **635** contains the fluid composition, which includes an oral care fluid **636** and an indicator fluid **637**. The oral care fluid **636** can be any one or a combination of the fluids described above that provide a benefit to a user's oral cavity upon application thereto and the indicator fluid **637** merely provides an indication to a user, such as by color, that the oral care fluid **636** has been substantially depleted.

[0060] The oral care implement **600** comprises a channel **640** that extends from the reservoir **635** to an opening **617**. The channel **640** forms a passageway from the reservoir **635** to the opening **617** and the opening **617** forms a passageway from the channel **640** to a depression **616** on the

rear surface **612** of the head **610**. An applicator **632** nests within the depression **616** and is exposed to the external environment on the rear surface **612** of the head **610**.

[0061] A delivery member **630** formed of a capillary material, which may be a porous or fibrous material as discussed above, is disposed within the reservoir **635** and extends from the reservoir **635**, through the channel **640** and the opening **617** and into the depression **616**. The delivery member **630** is unitarily formed with the applicator **632** as a single structural unit. Thus, the delivery member **630** and the applicator **632** are both formed of the capillary material and are in communication such that as fluid flows from the reservoir **635** into the delivery member **630**, the fluid is delivered to the applicator **632** for application to a user's oral surfaces.

[0062] The delivery member **630** extends into the reservoir **635** to near the floor **639** of the reservoir **635**. In certain embodiments, the delivery member **630** may extend to and be in contact with the floor **639** of the reservoir **635**. The delivery member **630** includes a visible portion **633**, which is a portion of the delivery member **630** that can be seen through the outer surface **621** of the body **605** via a window **625** (the applicator **632** can also be considered a visible portion). The reservoir **635** can be conceptually divided into a top portion **646**, a middle portion **647** and a bottom portion **648**. The delivery member **630** is in fluid communication with the fluid composition along the length of the delivery member **630**. Thought of another way, the delivery member **630** is in fluid communication with the fluid composition at the bottom, middle and top portions **646**, **647**, **648** of the reservoir **635**.

[0063] In the exemplified embodiment, the oral care fluid **636** floats atop the indicator fluid **637**. This layering of the oral care fluid **636** and the indicator fluid **637** can be achieved by the indicator fluid **637** being hydrophobic and the oral care fluid **636** being hydrophilic, or vice versa. In other embodiments, differences in densities between the oral care fluid **636** and the indicator fluid **637** can be utilized to achieve the desired layering. For example, without limitation, the indicator fluid **637** can be triacetin, also known as glycerol triacetate, which has a density of 1.16. Thus, if the oral care fluid **636** is water-based, the oral care fluid **636** will float atop of the indicator fluid **637** by virtue of the indicator fluid **637** having a higher density than the oral care fluid **636**. In this example, the indicator fluid **637** will settle at the bottom portion **648** of the reservoir **635** and the oral care fluid **636** will fill the middle portion **647** and the top portion **646** of the reservoir **635**. Other methods of ensuring that the oral care fluid **636** will float atop of the indicator fluid **637** and that the indicator fluid **637** will settle at the bottom portion

648 of the reservoir 635 can be used, including any of the methods discussed above with regard to the oral care implement 100.

[0064] Specific examples of formulations that may be used to form the oral care fluid 636 and the indicator fluid 637, wherein the oral care fluid 636 floats atop of the indicator fluid 637 can be found in Tables 1 and 2 below:

**Table 1** (Top layer (oral care fluid) hydrophobic, bottom layer (indicator fluid) hydrophilic)

**Top layer ingredients**

(about 95% of total formula)	%
Mineral Oil	89.995
Anti-bacterial agent (e.g. magnolia extract)	10
Oil-soluble blue color	0.005
<b>Total</b>	<b>100%</b>

**Bottom layer ingredients**

(about 5% of total formula)  
An aqueous solution of a red dye, e.g. 0.005% Allura Red in water

**Table 2** (Top layer (oral care fluid) hydrophilic, bottom layer (indicator fluid) hydrophobic)

**Top layer ingredients**

(about 95% of total formula)	%
Glycerin	15.00
Propylene Glycol	17.00
Ethyl alcohol	6.25
Trisodium citrate	0.51
Citric Acid	0.06
Saccharin	2.50
Flavor	30.00
CPC	15.00
Blue Dye	0.005
Water	13.675
<b>Total</b>	<b>100%</b>

**Bottom layer ingredients**

(about 5% of total formula)	%
Triacetin	89.995
Anti-bacterial agent	10
Red dye	0.005
<b>Total</b>	<b>100%</b>

[0065] In some embodiments, the oral care fluid **636** has a first color and the indicator fluid **637** has a second color, such that the first color is different than the second color. In one embodiment, the first color can be transparent while the second color is a visible color so that it provides a visual indication to a user. Furthermore, it should be understood that the first color is not limited to being transparent/clear and the first color can be any other visible color, so long as the first color and the second color are distinct from each other.

[0066] The capillary material of the delivery member **630** will adsorb the fluids **636**, **637** and take-on the color of the fluids **636**, **637**. However, because the delivery member **630** is pre-adsorbed with the oral care fluid **636**, which is hydrophilic, and the indicator fluid **637** is hydrophobic, the indicator fluid **637** will be adsorbed by the delivery member **630** only after a substantial amount, if not all, of the oral care fluid **636** has been depleted from the reservoir **635**. The pre-adsorption of the oral care fluid **636** into the delivery member **630** can be achieved by pre-soaking the delivery member **630** in the oral care fluid **636** rather than immersing the delivery member **630** into the composition in a dry-state, which could cause the colors of the fluids **636**, **637** to mix together.

[0067] Because the delivery member **630** is pre-saturated with the oral care fluid **636**, the delivery member **630** appears to take on the color of the oral care fluid **636** (or a derivative thereof). As the oral care fluid **636** is delivered to the applicator **632** via capillary action, the color of the oral care fluid **636** can be seen on the visible portion **633** of the delivery member **630** through the window **625**. During use of the oral care implement **600** to clean a user's teeth or other oral surfaces, the oral care fluid **636** will be expelled from the applicator portion **632** of the delivery member **630** and delivered to a user's oral cavity. As the oral care fluid **636** is adsorbed by the delivery member **630** and delivered to the user's oral cavity, the oral care fluid **636** within the reservoir **635** continues to be adsorbed by the delivery member **630** until the oral care fluid **636** within the reservoir **635** is depleted. The hydrophobic nature of the indicator fluid **637** prohibits the indicator fluid **637** from being transported by the delivery member **630** until the delivery member **630** is sufficiently empty of the oral care fluid **636**, even though the indicator fluid **637** is in fluid communication with the delivery member **630**.

[0068] Referring to FIGS. 7 and 8 concurrently, upon depletion of the oral care fluid **636** within the reservoir **635**, the delivery member **630** begins adsorbing the indicator fluid **637** and

transporting the indicator fluid **637** towards the applicator **632** via capillary action. As the indicator fluid **637** is adsorbed by the delivery member **630**, the color of the delivery member **630** changes. Specifically, the color of the delivery member **630** will change from being the color of the oral care fluid **636** to either being the color of the indicator fluid **637** or a color that is the combination of the color of the oral care fluid **636** and the color of the indicator fluid **637** as has been described in detail above with reference to FIGS. 1-5. Specifically, if the capillary material of the delivery member **630** has a holding capacity that releases all of the oral care fluid **636** or if the oral care fluid **636** is colorless (clear), then the delivery member **630** will take on the color of the indicator fluid **637** (or a shade thereof). However, if the oral care fluid **636** is not transparent/clear and the capillary material of the delivery member **630** has a holding capacity that does not release all of the oral care fluid **636**, the delivery member **630** will take on a color that is a resultant of the combination of colors of the oral care fluid **636** and the indicator fluid **637** due to remnants of the oral care fluid **636** remaining within the delivery member **630**.

[0069] The user will continue to use the oral care implement **600** until the indicator fluid **637** is delivered to the visible portion **633** of the delivery member **630** such that the color change described above can be seen on the visible portion **633** of the delivery member **630** via the window **625**. It is preferable that the window **625** is located on the body **605** near or adjacent to the head **610**, such as on a neck portion of the body **605**, so that most, if not all, of the oral care fluid **636** has been depleted by the time the user sees the color change of the visible portion **633** of the delivery member **630**. Of course, in embodiments that omit the window **625**, the user will continue to use the oral care implement **600** until the color change described above can be visually detected on the exposed applicator **632**. When the color of the indicator fluid **637** (or a mixture of the color of the indicator fluid **637** and the color of the oral care fluid **636**) can be seen on the visible portion **633** of the delivery member **630** (or on the applicator **632**), the user will be visually cued that the oral care fluid **636** has been substantially, if not completely, depleted. Thus, the oral care implement **600** delivers the oral care fluid **636** to a user to achieve hygienic benefits and provides a visual indication of depletion of the oral care fluid **636** within the reservoir **635**.

[0070] Referring now to FIGS. 9-11, another embodiment of an oral care implement **900** in accordance with the present invention will be described. The oral care implement **900** has many features that are similar to or the same as features of the oral care implement **100** and the oral

care implement **600**. Thus, similar features will be similarly numbered with the exception that the 900-series of numbers will be used. It should be understood that features and components of the oral care implement **900** that are not described in detail herein are the same as corresponding features and components of the oral care implement **100** and/or the oral care implement **600**. It will become apparent from the description below that the oral care implement **900** is substantially similar to the oral care implement **600** except that the delivery member fills the entirety of the reservoir.

[0071] The oral care implement **900** comprises a body **905** having a handle **920** and a head **910** coupled to an end of the handle **920**. The head **910** comprises a front surface **911** from which a plurality of tooth cleaning elements **915** extend and an opposed rear surface **912**. Although not illustrated, the rear surface **912** of the head **910** may comprise a soft tissue cleanser, such as was described above with regard to the oral care implement **100**. The body **905** comprises an outer surface **921** and an inner surface **922**. The inner surface **922** of the body **905** defines an open area or internal reservoir **935** containing a fluid composition therein. In the exemplified embodiment, the reservoir **935** is formed within the handle **920** of the body **905**. Of course, the invention is not so limited and the reservoir **935** may be formed in the head **910** or neck of the oral care implement **900** in other embodiments.

[0072] The oral care implement **900** comprises a channel **940** that extends from the reservoir **935** to an opening **917**. The channel **940** forms a passageway from the reservoir **935** to the opening **917** and the opening **917** forms a passageway from the channel **940** to a depression **916** on the rear surface **912** of the head **910**. An applicator **932** nests within the depression **916** and is exposed to the external environment on the rear surface **912** of the head **910**.

[0073] A delivery member **930** formed of a capillary material, which may be a porous or fibrous material as discussed above, is disposed within the reservoir **935**. The delivery member **930** is disposed within the reservoir **935** so as to substantially fill the entirety of the reservoir **935**. Furthermore, the delivery member **930** extends from the reservoir **935**, through the channel **940** and the opening **917** and into the depression **916**. The delivery member **930** is unitarily formed with the applicator **932** as a single structural unit. Thus, the delivery member **930** and the applicator **932** are both formed of the capillary material and are in communication such that as fluid flows up the delivery member **930** by capillary action, the fluid is delivered to the applicator **932** for application to a user's oral surfaces.

[0074] The body **905** of the oral care implement **900** comprises a window **925** that enables a user to view a visible portion **933** of the delivery member **930** through the outer surface **921** of the body **905**. The visible portion **933** of the delivery member **930** is disposed within the channel **940** between the reservoir **935** and the applicator **932**. Thus, as will be described in more detail below, a user can determine whether an oral care fluid **936** is substantially depleted based upon the color of the delivery member **930** at the visible portion **933**. In embodiments that omit the window **925**, the applicator **932** can be the visible portion of the delivery member **935**.

[0075] The reservoir **935** can be conceptually divided into a bottom portion **948**, a middle portion **947** and a top portion **946**. The delivery member **930** is adsorbed with the fluid composition. More specifically, a portion of the delivery member **930** that is located at the bottom portion **948** of the reservoir **935** is adsorbed with an indicator fluid **937** and the remaining portion of the delivery member **930**, which includes the portion of the delivery member **930** that is located at the middle and top portions **947**, **946** of the reservoir **935**, is adsorbed with an oral care fluid **936**. The oral care fluid **936** can be any of the oral care fluids discussed above that impart a hygienic benefit to a user upon application to the user's oral cavity.

[0076] During use of the oral care implement **900**, pressure will be applied to the applicator **932** which will cause the oral care fluid **936** to be dispensed from the applicator **932** to the user's oral cavity. As the oral care fluid **936** slowly depletes, the indicator fluid **937** will flow up the delivery member **937** via capillary action and seep into the regions of the delivery member **937** that were previously filled with the oral care fluid **936**.

[0077] As has been discussed in detail above with reference to FIGS. 1-8, the oral care fluid **936** is a first color and the indicator fluid **937** is a second color. The portion of the delivery member **930** that is located at the bottom portion **948** of the reservoir **935** is adsorbed with the indicator fluid **937** and appears the second color. The remainder of the delivery member **930** is adsorbed with the oral care fluid **936** and appears the first color. Thus, prior to use of the oral care implement **900**, the visible portion **933** of the delivery member **930** will be adsorbed with the oral care fluid **936** and will take on the first color. As the oral care fluid **936** depletes as discussed above, the indicator fluid **937** begins to flow to the visible portion **933** of the delivery member **930**. Depending on what the actual first and second colors are, portions of the delivery member **930** may either appear as the second color when adsorbed with the indicator fluid **937** or may appear as a third different color that is a resultant color of the combination of the first and



second colors. Either way, when the visible portion **933** (or the applicator **932**) of the delivery member **930** takes on the second color (or the third resultant color) due to the indicator fluid **937** being transported thereto, the user will have received a visual cue that the oral care fluid **936** has been substantially depleted from the reservoir **935**.

[0078] Referring now to FIGS. 12-14, another embodiment of an oral care implement **1200** in accordance with the present invention will be described. The oral care implement **1200** has many features that are similar to or the same as features of the oral care implements **100**, **600**, **900**. Thus, similar features will be similarly numbered with the exception that the 1200-series of numbers will be used. It should be understood that features and components of the oral care implement **1200** that are not described in detail herein are the same as corresponding features and components of the oral care implement **100** and/or the oral care implement **600** and/or the oral care implement **900**.

[0079] The oral care implement **1200** comprises a body **1205** having a handle **1220** and a head **1210** coupled to an end of the handle **1220**. The head **1210** comprises a front surface **1211** from which a plurality of tooth cleaning elements **1215** extend and an opposed rear surface **1212**. Although not illustrated, the rear surface **1212** of the head **1210** may comprise a soft tissue cleanser, such as was described above with regard to the oral care implement **100**. The body **1205** comprises an outer surface **1221** and an inner surface **1222**. The inner surface **1222** of the body **1205** defines an open area or internal reservoir **1235** containing a fluid composition therein. In the exemplified embodiment, the reservoir **1235** is formed within the handle **1220** of the body **1205**. Of course, the invention is not so limited and the reservoir **1235** may be formed in the head **1210** or neck of the oral care implement **1200** in other embodiments.

[0080] The oral care implement **1200** comprises a channel **1240** that extends from the reservoir **1235** to an opening **1217**. The channel **1240** forms a passageway from the reservoir **1235** to the opening **1217** and the opening **1217** forms a passageway from the channel **1240** to a depression **1216** on the rear surface **1212** of the head **1210**. An applicator **1232** nests within the depression **1216** and is exposed to the external environment on the rear surface **1212** of the head **1210**.

[0081] A delivery member **1230** formed of a capillary material, which may be any of the capillary materials discussed above, is disposed within the reservoir **1235**. The delivery member **1230** is disposed within the reservoir **1235** so as to substantially fill the entirety of the reservoir **1235**. Furthermore, the delivery member **1230** extends from the reservoir **1235**, through the

channel 1240 and the opening 1217 and into the depression 1216. The delivery member 1230 is unitarily formed with the applicator 1232 as a single structural unit. Thus, the delivery member 1230 and the applicator 1232 are both formed of the capillary material and are in communication such that as fluid flows up the delivery member 1230 by capillary action, the fluid is delivered to the applicator 1232 for application to a user's oral surfaces.

[0082] The body 1205 of the oral care implement 1200 comprises a window 1225 that enables a user to view a visible portion 1233 of the delivery member 1230 through the outer surface 1221 of the body 1205. The visible portion 1233 of the delivery member 1230 is disposed within the channel 1240 between the reservoir 1235 and the applicator 1232. Thus, as will be described in more detail below, a user can determine whether an oral care fluid 1236 disposed within the reservoir 1235 is substantially depleted based upon the color of the delivery member 1230 at the visible portion 1233. In embodiments that omit the window 1225, the applicator 1232 can be the visible portion of the delivery member 1235.

[0083] The oral care fluid 1236 is contained within the reservoir 1235. The oral care fluid 1236 is a fluid that has a first color. The oral care fluid 1236 can be any of one or a combination of the oral care fluids discussed above with reference to FIGS. 1-5. As discussed above, the delivery member 1230 is formed of a capillary material and is disposed within the reservoir 1235. Thus, the oral care fluid 1236 is able to flow up the delivery member 1230 from the reservoir 1235 to the applicator 1232 for application to a user's oral cavity. The delivery member 1233 (including the visible portion 1233) is formed of a capillary material that has a second color that is different than the first color. For ease of example, the first color will be described as being blue and the second color will be described as being yellow. However, the invention is not to be so limited and in other embodiments the first and second colors can be any other color and/or switched.

[0084] As can be seen in FIG. 12, as the oral care fluid 1236 becomes adsorbed into the capillary material of the delivery member 1230 in sufficient quantity (for example saturation), the delivery member 1230 takes on the color (i.e., blue) of the oral care fluid 1236. As such, the delivery member 1230 appears blue to a user. This is due to the large concentration of the oral care fluid 1236 being adsorbed into the delivery member 1230 and over-taking the natural color of the capillary material of the delivery member 1230.

[0085] Referring to FIG. 13, as the oral care material 1236 continues to flow up the delivery member 1230 during use of the oral care implement 1200 as has been described in detail above,

the entirety of the delivery member **1230** takes on the first color (i.e., blue) of the oral care fluid **1236** due to the high concentration of the oral care fluid **1236** within the delivery member **1230**. [0086] Referring now to FIG. 14, as the oral care fluid **1236** flows further up the capillary material of the delivery member **1230** and the oral care fluid **1236** becomes depleted from the reservoir **1235**, the concentration of the oral care fluid **1236** within the delivery member **1230** decreases. As a result, the delivery member **1230** begins to turn a third color **1237**, the third color **1237** being different than both of the first and second colors. In one embodiment, the third color **1237** is a resultant color of the combination of the first and second colors. In the example, as the oral care fluid **1236** flows up towards the applicator **1232**, a residual amount of the blue coloring of the oral care fluid **1236** will remain within the delivery member **1230** after depletion. As a result, the natural color (i.e., yellow) of the capillary material of the delivery member **1230** begins to combine with the residual color (i.e., blue) of the oral care fluid **1236** so that the delivery member **1230** appears to take on the third color **1237** (i.e., green). In certain embodiments, the first and second colors are primary colors and the third color **1237** is a secondary color.

[0087] Thus, over time the visible portion **1233** of the delivery member **1230** turns to the third color **1237**. When the user views the visible portion **1233** of the delivery member **1230** through the window **1225** and sees the third color **1237**, the user thereby receives a visual cue that the oral care fluid **1236** is substantially depleted and that the oral care implement **1200** should be replaced.

[0088] While the foregoing description discusses the oral care fluid **136**, **636**, **936**, **1236** as a single oral care fluid, in certain embodiments, the oral care fluid **136**, **636**, **936**, **1236** can include more than one oral care fluid. For example, the oral care fluid **136**, **636**, **936**, **1236** can be a mixture of two or more oral care fluid. For another example, the oral care fluid **136**, **636**, **936**, **1236** can include two immiscible oral care fluids. In this example, the user of the oral care implement **100**, **600**, **900**, **1200** may use one of the oral care fluids during a first time period and use the other one of the oral care fluids during a second time period after the first time period has elapsed.

[0089] As used throughout, ranges are used as shorthand for describing each and every value that is within the range. Any value within the range can be selected as the terminus of the range. Furthermore, it should be understood that the different components and elements described in the

different embodiments herein can be combined to create a desired effect. In addition, all references cited herein are hereby incorporated by referenced in their entireties. In the event of a conflict in a definition in the present disclosure and that of a cited reference, the present disclosure controls.

## CLAIMS

## WHAT IS CLAIMED IS:

1. An oral care implement comprising:
  - a body comprising a reservoir containing a composition including an oral care fluid and an indicator fluid, the oral care fluid being a different color than the indicator fluid and immiscible with respect to the indicator fluid;
  - a delivery member formed of a capillary material; and
  - the oral care fluid and the indicator fluid arranged within the reservoir so that when the oral care fluid within the reservoir is substantially depleted, the indicator fluid is delivered to a visible portion of the delivery member by capillary action.
2. The oral care implement according to claim 1 wherein the visible portion of the delivery member is aligned with a window in the body.
3. The oral care implement according to claim 1 wherein the visible portion of the delivery member is an applicator.
4. The oral care implement according to any one of claims 1 to 3 wherein one of the oral care fluid or the indicator fluid is hydrophobic and the other one of the oral care fluid or the indicator fluid is hydrophilic.
5. The oral care implement according to any one of claims 1 to 4 wherein the oral care fluid and the indicator fluid have different densities.
6. The oral care implement according to any one of claims 1 to 5 wherein the delivery member transports the oral care fluid and the indicator fluid solely by capillary action of the capillary material.
7. The oral care implement according to any one of claims 1 to 6 wherein the visible portion of the delivery member changes color upon delivery of the indicator fluid to the visible portion.
8. The oral care implement according to any one of claims 1 to 7 wherein the delivery member is in fluid communication with the composition only at a bottom portion of the

- reservoir, the oral care fluid having a density that is greater than a density of the indicator fluid.
9. The oral care implement according to claim 8 wherein the indicator fluid floats atop the oral care fluid to form a fluid-to-fluid interface, and wherein the fluid-to-fluid interface moves toward the bottom portion of the reservoir as the oral care fluid is used.
  10. The oral care implement according to any one of claims 8 to 9 wherein the delivery member extends through a top portion and a middle portion of the reservoir within a fluid-impermeable sheath.
  11. The oral care implement according to any one of claims 1 to 7 wherein the indicator fluid has a density that is greater than a density of the oral care fluid, the indicator fluid settling at a bottom portion of the reservoir, the oral care fluid floating atop the indicator fluid and filling a middle and a top portion of the reservoir, the delivery member in fluid communication with the composition at the bottom, middle and top portions of the reservoir.
  12. The oral care implement according to any one of claims 1 to 7 wherein the delivery member fills the reservoir, a portion of the delivery member located at a bottom portion of the reservoir adsorbed with the indicator fluid, and the remaining portion of the delivery member within the reservoir adsorbed with the oral care fluid.
  13. The oral care implement according to any of claims 1 to 12 wherein the body comprises a handle and a head.
  14. The oral care implement according to claim 13 further comprising a plurality of tooth cleaning elements extending from the head.
  15. The oral care implement according to any one of claims 13 to 14 wherein the reservoir is located within the handle of the body.
  16. The oral care implement according to any of claims 1 to 15 wherein the capillary material of the delivery member is selected from a group consisting of a porous material and a fibrous material.
  17. The oral care implement according to any of claims 1 to 16 wherein the visible portion of the delivery member appears a first color when adsorbed with the oral care fluid and a

- second color when adsorbed with the indicator fluid, the first color being different than the second color.
18. An oral care implement comprising:
- a body comprising a reservoir containing a composition including an oral care fluid, the oral care fluid being a first color;
  - a delivery member formed of a capillary material having a second color; and
  - a visible portion of the delivery member appearing the first color when fully adsorbed with the oral care fluid and a third color upon depletion of the oral care fluid within the reservoir, wherein the first, second and third colors are different from one another.
19. The oral care implement according to claim 18 wherein the third color is a resultant color of the combination of the first and second colors.
20. The oral care implement according to any one of claims 18 to 19 wherein the visible portion of the delivery member is aligned with a window in the body.
21. The oral care implement according to any one of claims 18 to 19 wherein the visible portion of the delivery member is an applicator.
22. The oral care implement according to any one of claims 18 to 21 wherein the delivery member transports the oral care fluid solely by capillary action of the capillary material.
23. The oral care implement according to any one of claims 18 to 22 wherein the visible portion of the delivery member changes from the second color to the first color upon delivery of the oral care fluid to the visible portion.
24. The oral care implement according to any one of claims 18 to 23 wherein the delivery member fills the reservoir.
25. The oral care implement according to any one of claims 18 to 24 wherein the body comprises a head including a plurality of tooth cleaning elements extending therefrom.
26. The oral care implement according to claim 25 the body further comprises a handle and wherein the reservoir is located within the handle of the body.

27. The oral care implement according to any of claims 18 to 26 wherein the capillary material of the delivery member is selected from a group consisting of a porous material and a fibrous material.
28. A dispenser comprising:
- a reservoir containing a composition including a first fluid and a second fluid, the first fluid being a different color than the second fluid and immiscible with respect to the first fluid;
  - a delivery member formed of a capillary material; and
  - the first and second fluids arranged within the reservoir so that upon the first fluid within the reservoir being substantially depleted, the second fluid is delivered to a visible portion of the delivery member by capillary action.
29. The dispenser according to claim 28 wherein the visible portion of the delivery member appears a first color when adsorbed with the first fluid and a second color when adsorbed with the second fluid, the first color being different than the second color.
30. The dispenser according to any one of claims 28 to 29 wherein one of the first or second fluids is hydrophobic and the other one of the first and second fluids is hydrophilic.
31. The dispenser according to any one of claims 28 to 30 wherein the first and second fluids have different densities.
32. The oral care implement according to any one of claim 28 to 31 wherein the delivery member transports the first and second fluids solely by capillary action of the capillary material.
33. A dispenser comprising:
- a reservoir containing a composition including a first fluid, the first fluid being a first color;
  - a delivery member formed of a capillary material having a second color; and
  - a visible portion of the delivery member appearing the first color when fully adsorbed with the first fluid and a third color upon depletion of the first fluid within the reservoir, wherein the first, second and third colors are different from one another.



34. The dispenser according to claim 33 wherein the third color is a resultant color of the combination of the first and second colors.
35. The dispenser according to any one of claims 33 to 34 wherein the third color is a secondary color and the first and second colors are primary colors.
36. A method of providing a visual indication of depletion of an oral care fluid contained within a reservoir of an oral care implement having a delivery member formed of a capillary material, the method comprising:
  - a) providing an indicator fluid in the reservoir with the oral care fluid, the oral care fluid being a different color than the indicator fluid and immiscible with respect to the indicator fluid; and
  - b) upon depletion of the oral care fluid from the reservoir, delivering the indicator fluid to a visible portion of the deliver member.
37. The method according to claim 36 wherein one of the oral care fluid or the indicator fluid is hydrophobic and the other one of the oral care fluid or the indicator fluid is hydrophilic.
38. The method according to any one of claims 36 to 37 wherein the oral care fluid and the indicator fluid have different densities.
39. The method according to any one of claims 36 to 38 wherein the indicator fluid is delivered to the visible portion of the delivery member solely by capillary action of the capillary material.
40. The method according to any one of claims 36 to 39 wherein the visible portion of the delivery member changes color upon delivery of the indicator fluid to the visible portion.
41. The method according to any of claims 36 to 40 wherein the oral care implement is a toothbrush.
42. The method according to any of claims 36 to 41 wherein the visible portion of the delivery member appears a first color when adsorbed with the oral care fluid and a second color when adsorbed with the indicator fluid, the first color being different than the second color.

43. The method according to any one of claims 36 to 42 wherein a substantial amount of the indicator fluid is not delivered to the visible portion of the delivery member until the oral care fluid within the reservoir is substantially depleted.
44. A method of providing a visual indication of depletion of an oral care fluid of a first color contained within a reservoir of an oral care implement having a delivery member formed of a capillary material of a second color, the method comprising:
  - a) changing the appearance of the visible portion of the delivery member from the second color to the first color by adsorbing the oral care fluid into a visible portion of the delivery member; and
  - b) upon depletion of the oral care fluid from the reservoir, changing the appearance of the visible portion of the delivery member from the first color to a third color, wherein the first, second and third colors are different from one another.
45. The method according to claim 44 wherein the third color is a resultant color of the combination of the first and second colors.
46. The method according to any one of claims 44 to 45 wherein the third color is a secondary color and the first and second colors are primary colors.

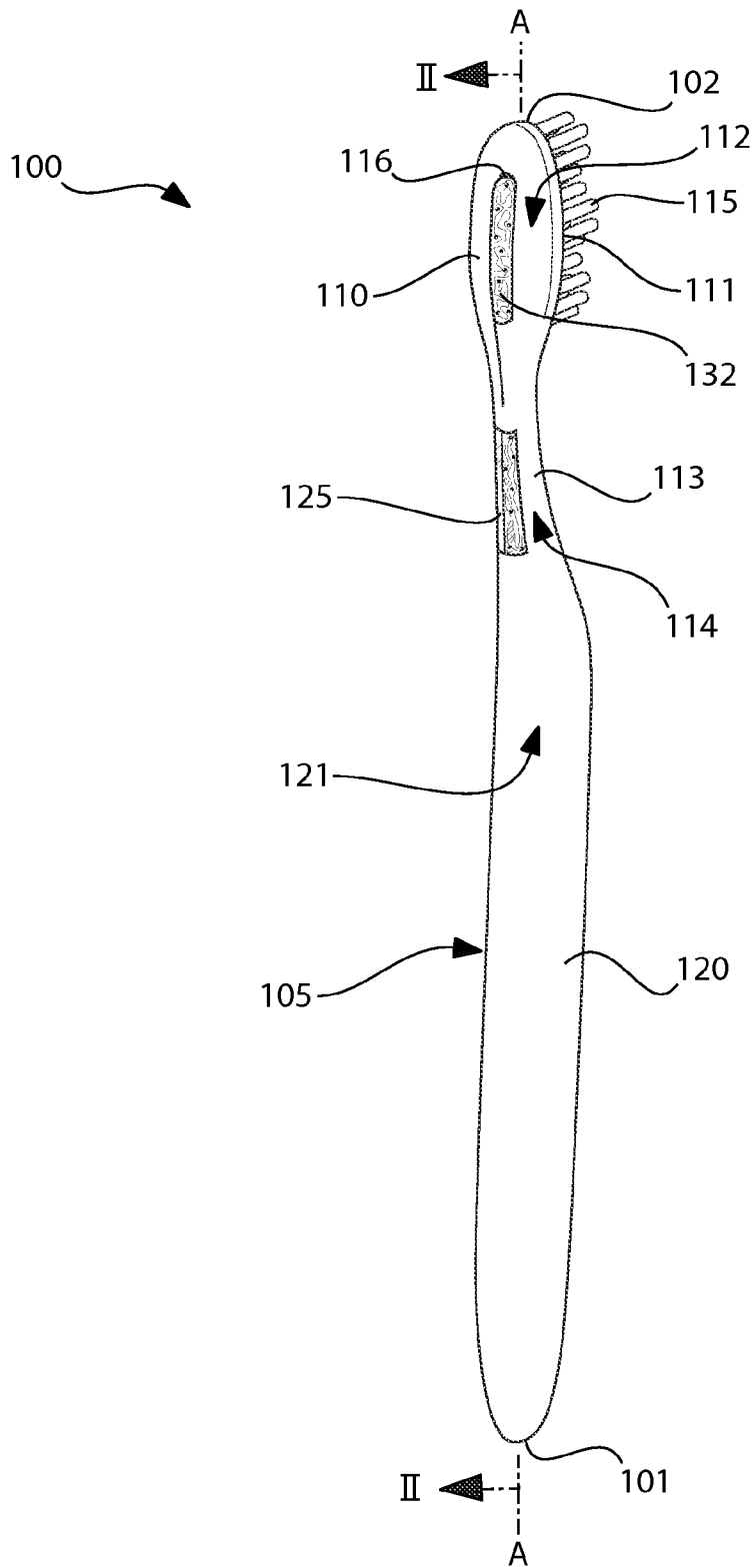


FIG. 1

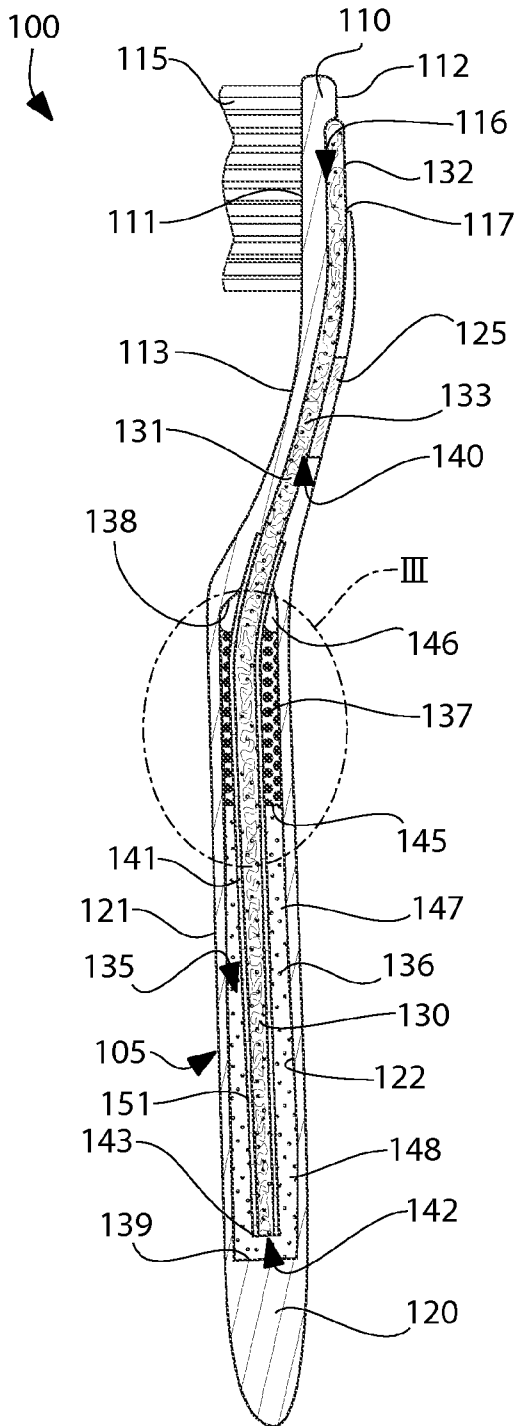


FIG. 2

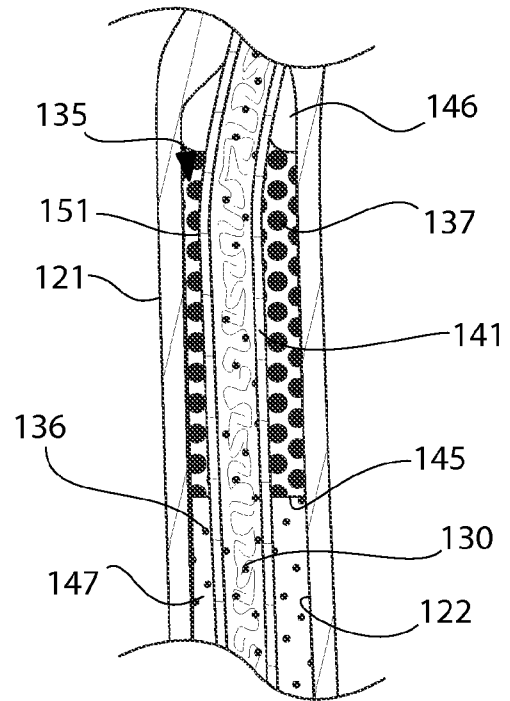


FIG. 3

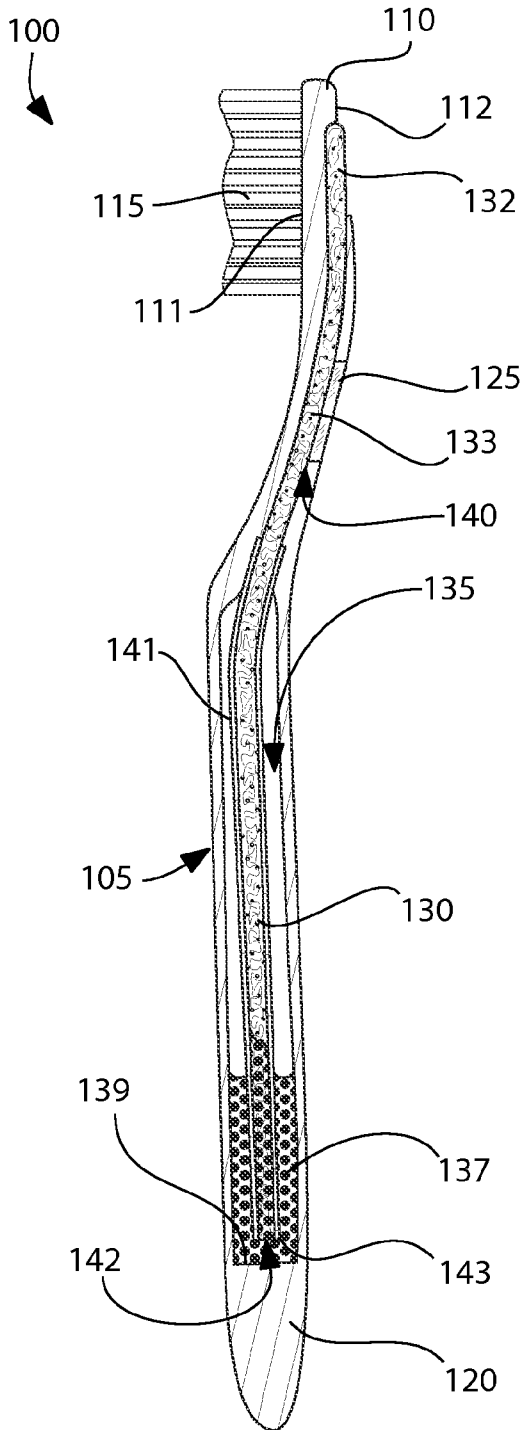


FIG. 4

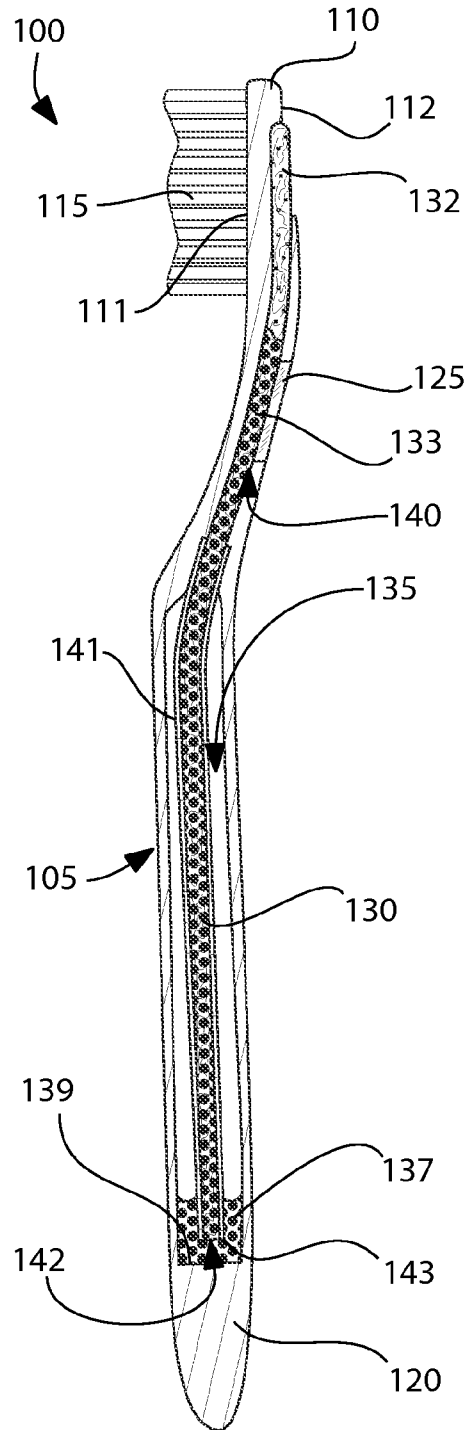


FIG. 5

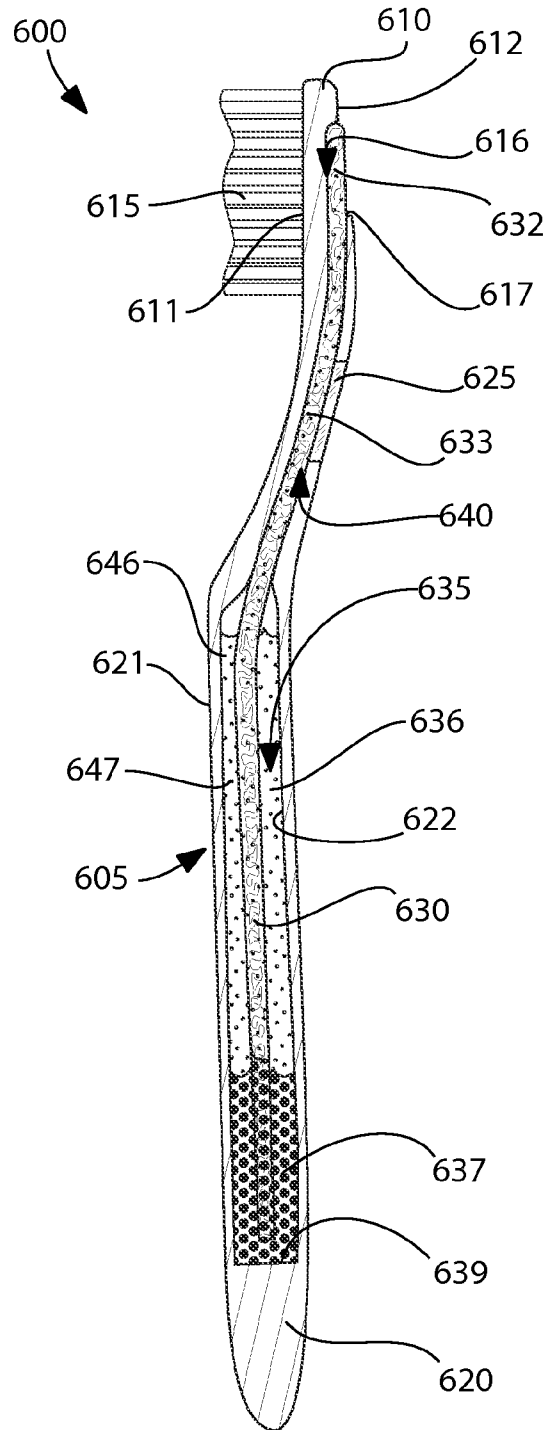


FIG. 6

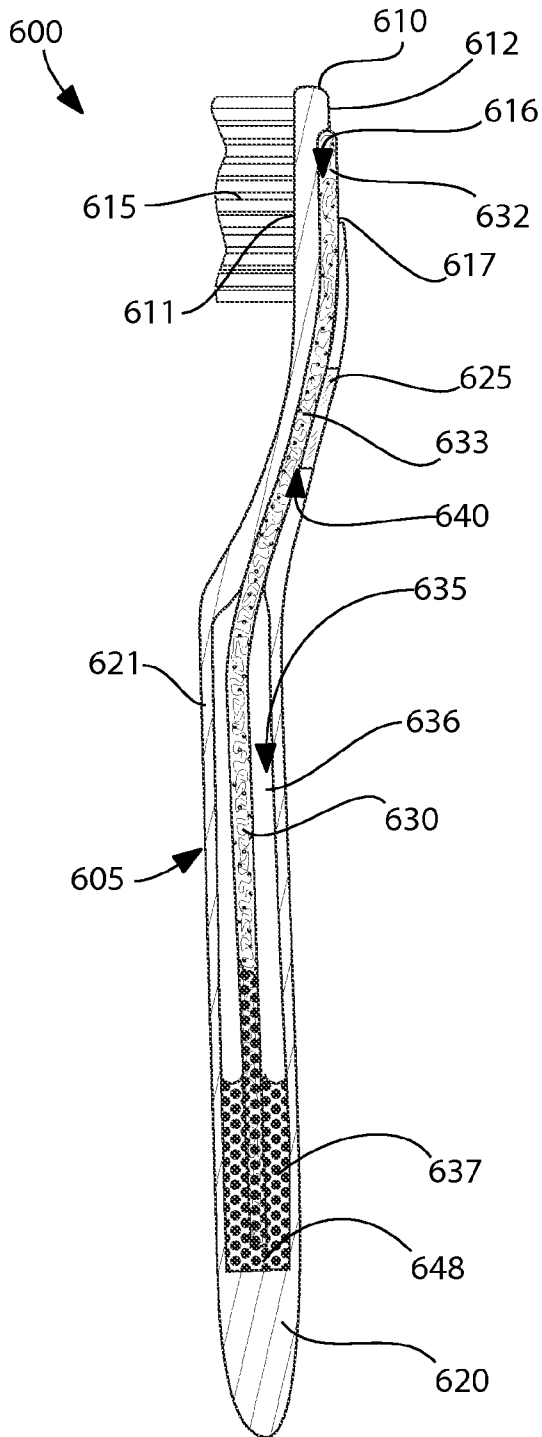


FIG. 7

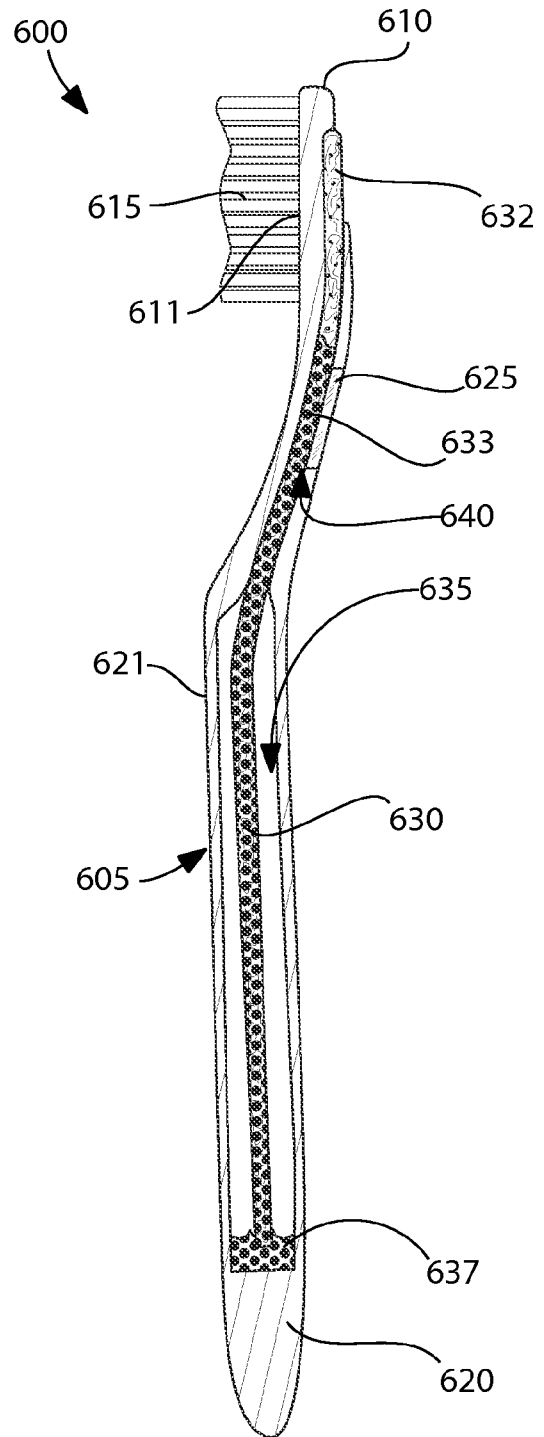


FIG. 8

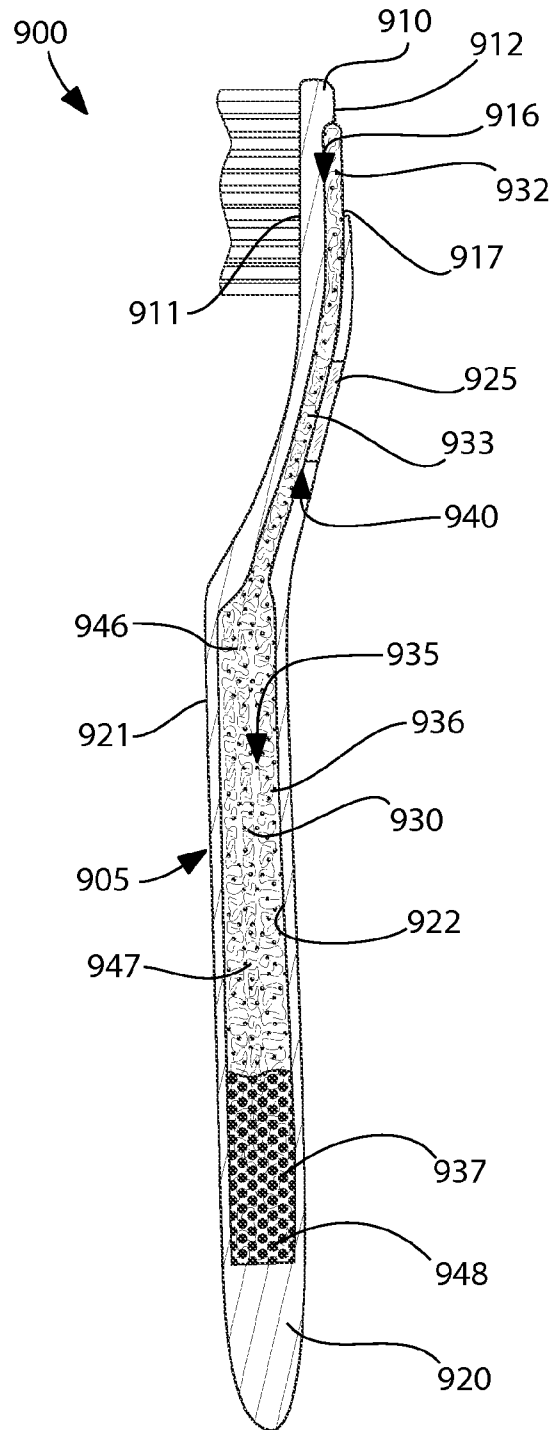


FIG. 9



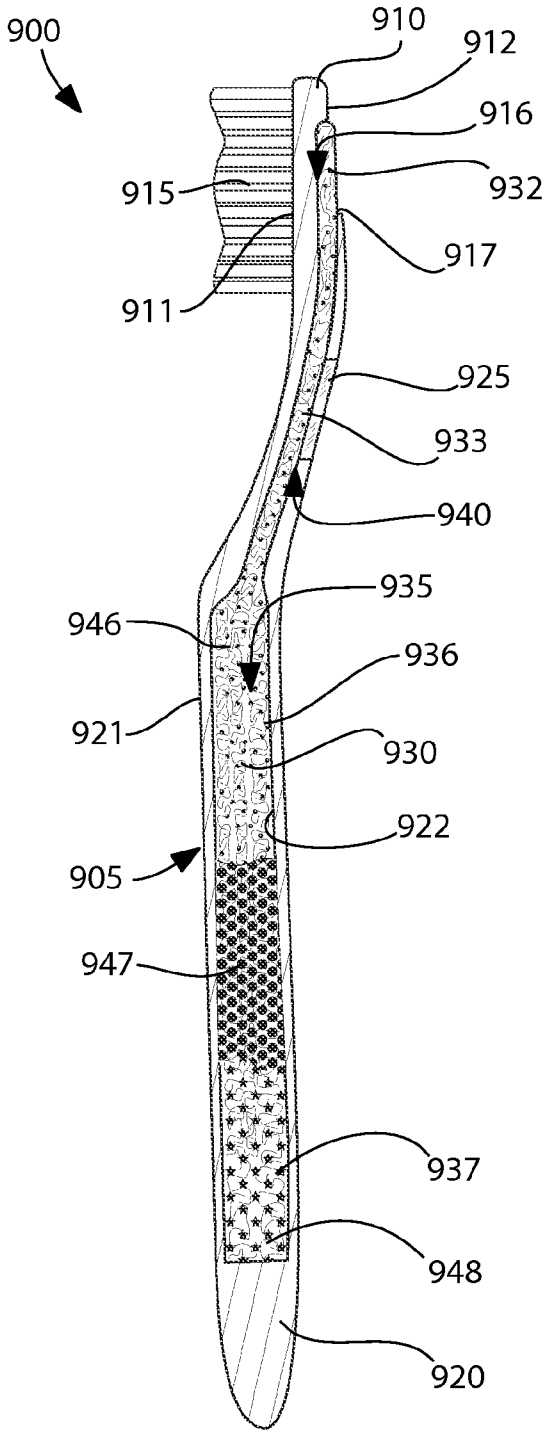


FIG. 10

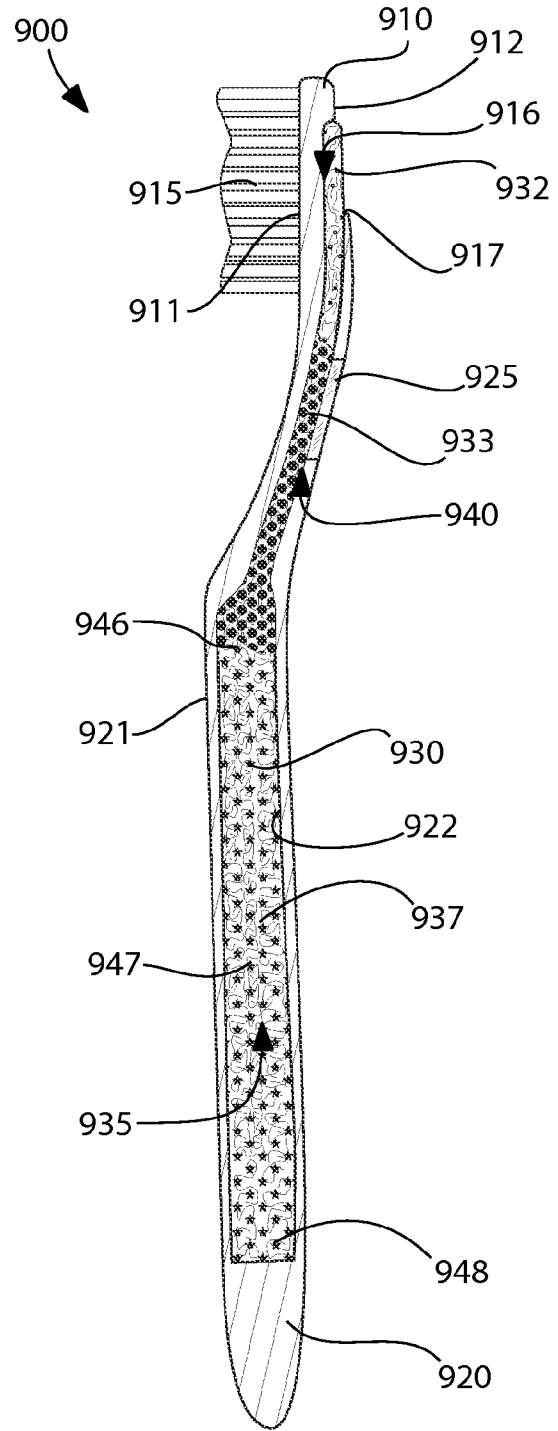


FIG. 11

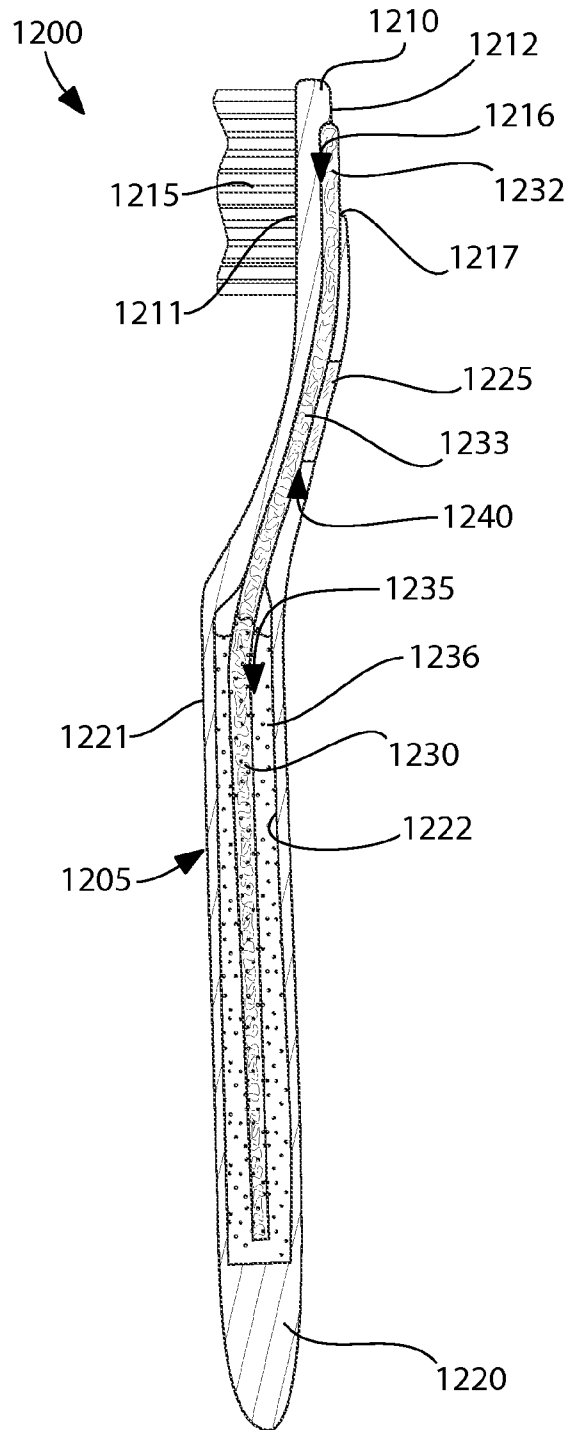


FIG. 12

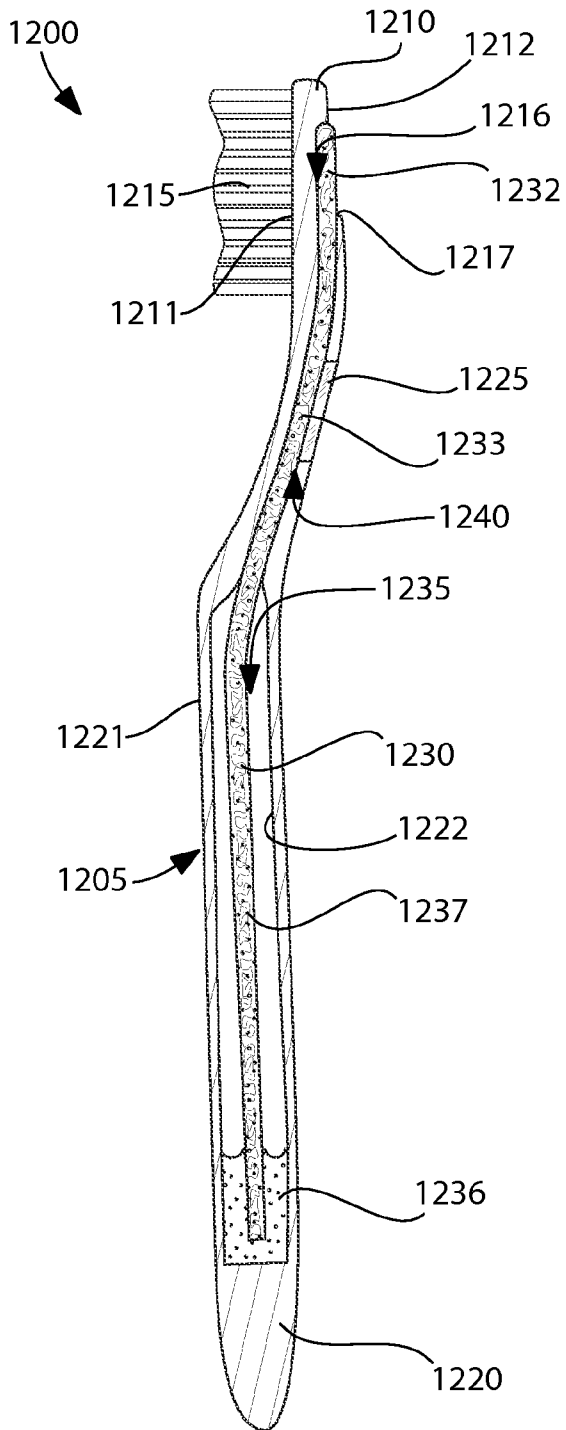


FIG. 13

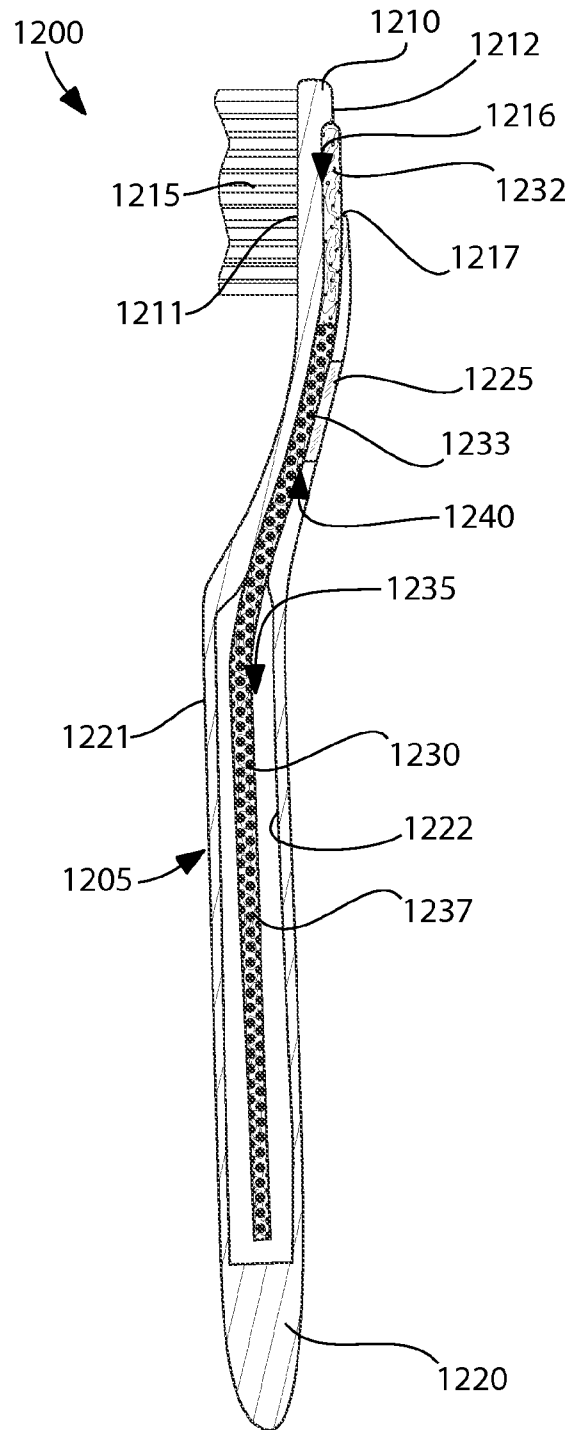


FIG. 14

## INTERNATIONAL SEARCH REPORT

International application No  
PCT/US2011/034583A. CLASSIFICATION OF SUBJECT MATTER  
INV. A46B11/00  
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
A46B B43K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2008/176183 A1 (GATZEMEYER JOHN J [US] ET AL) 24 July 2008 (2008-07-24) paragraphs [0019] - [0021]; figure 1 -----	1-27, 36-46
Y	EP 0 381 818 A1 (SANCHEZ MULITERNO EDUARDO SANCHEZ MULITERNO EDUARDO [ES]) 16 August 1990 (1990-08-16) column 2, line 39 - column 3, line 10; figures 1-3 -----	1-17, 36-43
X	WO 92/07487 A1 (WARNER LAMBERT CO [US]) 14 May 1992 (1992-05-14)  page 5, line 32 - page 7, line 8 page 8, lines 13-34 claims 10, 21; figures 2-4 -----  -/--	18,19, 21-27, 44-46

 Further documents are listed in the continuation of Box C. See patent family annex.

\* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&amp;" document member of the same patent family

Date of the actual completion of the international search

27 April 2012

Date of mailing of the international search report

08/05/2012

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040,  
Fax: (+31-70) 340-3016

Authorized officer

Chabus, Hervé

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US2011/034583

## Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.  Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2.  Claims Nos.: 28-35  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:  
see FURTHER INFORMATION sheet PCT/ISA/210
  
3.  Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1.  As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
  
2.  As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
  
3.  As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
  
4.  No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

### Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

**FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210**

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-17, 36-43

Oral care implement indicating substantial depletion of an oral care fluid by using an indicating fluid of a different color

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2. claims: 18-27, 44-46

Oral care implement indicating substantial depletion of an oral care fluid by changing the color of a visible portion

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**FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210**

Continuation of Box II.2

Claims Nos.: 28-35

Claims 28-35 are not supported by the description (Article 6 PCT) to such an extent that a meaningful search for these claims could not be carried out. Claims 28-35 refer to dispensers in general without specifying the nature or the application of the dispenser. Since the word dispenser encompasses a large variety of devices from different technical fields and of different structure such as oral care implements, pens, ink cartridges, beverage dispensers, syringes, dispenser for air fresheners etc., it is particularly burdensome for a skilled person to establish the subject-matter for which protection is sought.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guideline C-VI, 8.2), should the problems which led to the Article 17(2) declaration be overcome.

## INTERNATIONAL SEARCH REPORT

International application No  
PCT/US2011/034583

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	----- US 5 346 324 A (KUO YOUTI [US]) 13 September 1994 (1994-09-13) column 1, lines 1-19 figure 2	1,36
A	----- US 2005/238412 A1 (JACOBS ERIN J [US] ET AL) 27 October 2005 (2005-10-27) paragraph [0043]; figure 2a	1,36
A	----- WO 2007/008908 A1 (COLGATE PALMOLIVE CO [US]; CAI HENG [US]; BOYD THOMAS [US]) 18 January 2007 (2007-01-18) paragraph [0021] figure 1	18,44
A	----- DE 202 15 859 U1 (GREDNER UTA [DE]; NEBEL JESSICA [DE]; SALOMON ANKE [DE]) 26 February 2004 (2004-02-26) paragraph [0020] figure 1 -----	18,44



# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2011/034583

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