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(54) **DISPENSING TOOTHBRUSH**

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(57) **ABSTRACT**

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A dispensing toothbrush is capable of storage and dispensing toothpaste and dental floss. The toothbrush includes a handle having a chamber constructed to store toothpaste, a dial, and a floss dispenser having a floss spindle, floss aperture and floss cutter, a neck, and a head having bristles and head apertures. The dial is positioned in the handle between the floss dispenser and the neck and turning the dial causes the toothpaste to be extruded through the head apertures. The toothbrush provides a dispensing toothbrush having a solid core that prevents toothpaste from becoming trapped within and that enables dispensing of toothpaste without unintentional dispensing or retraction of dental floss. Toothbrush can be provided in compact size and is ideal for travel in that it consolidates multiple items such as a toothbrush, toothpaste and dental floss into a single compact device.

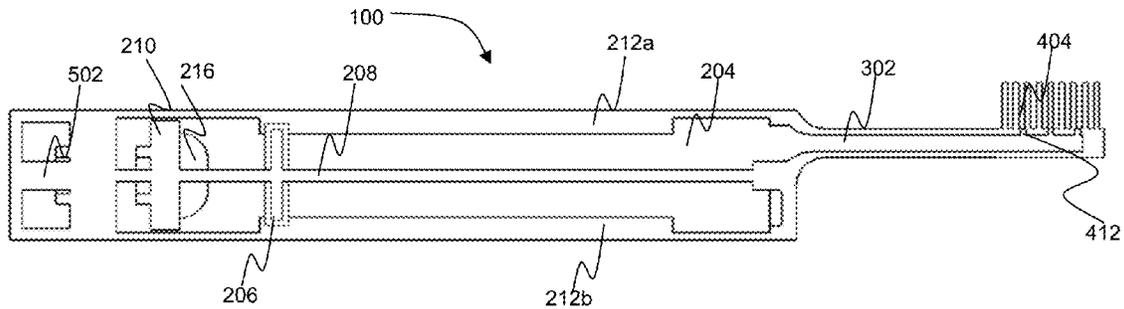
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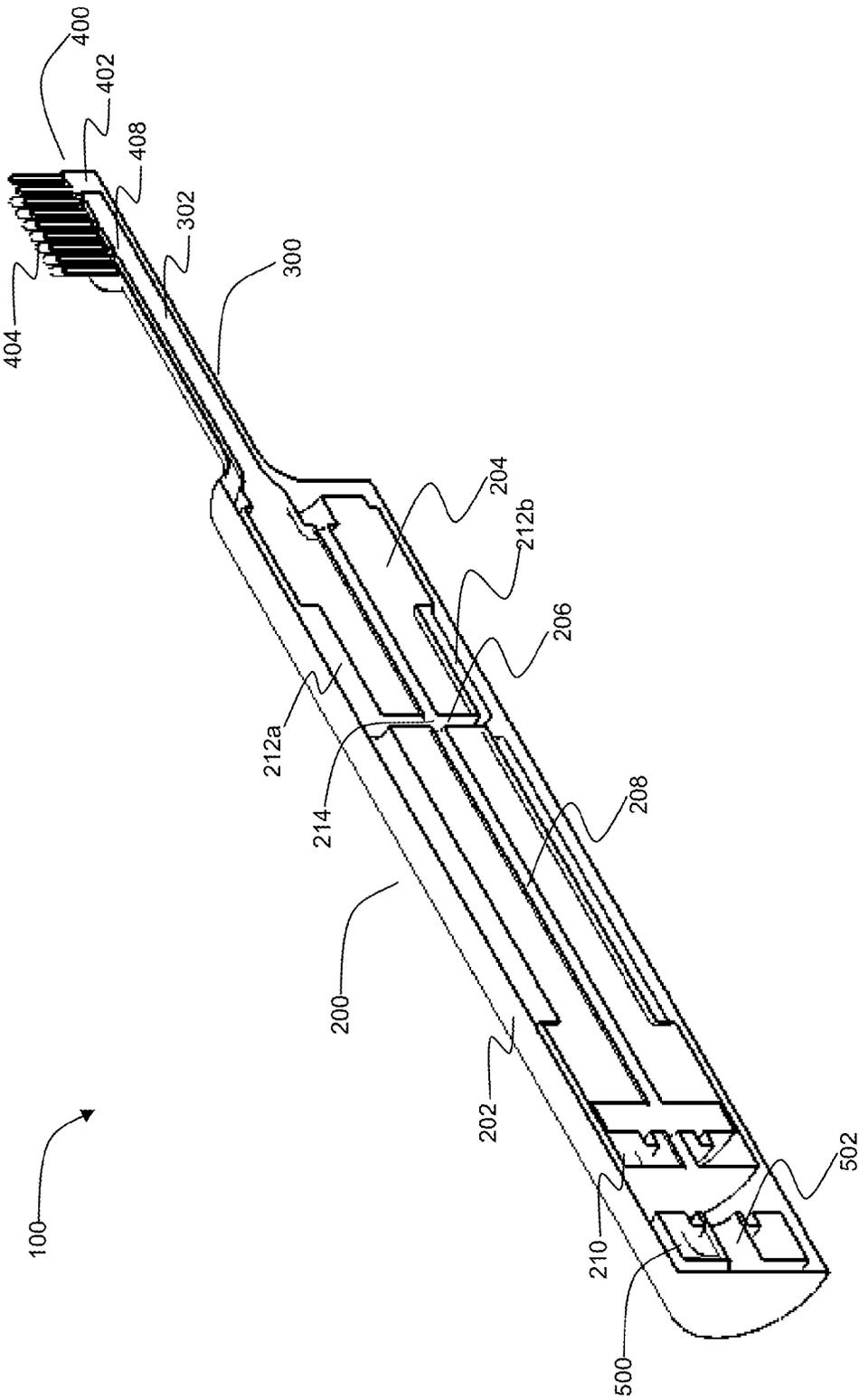


FIG. 1

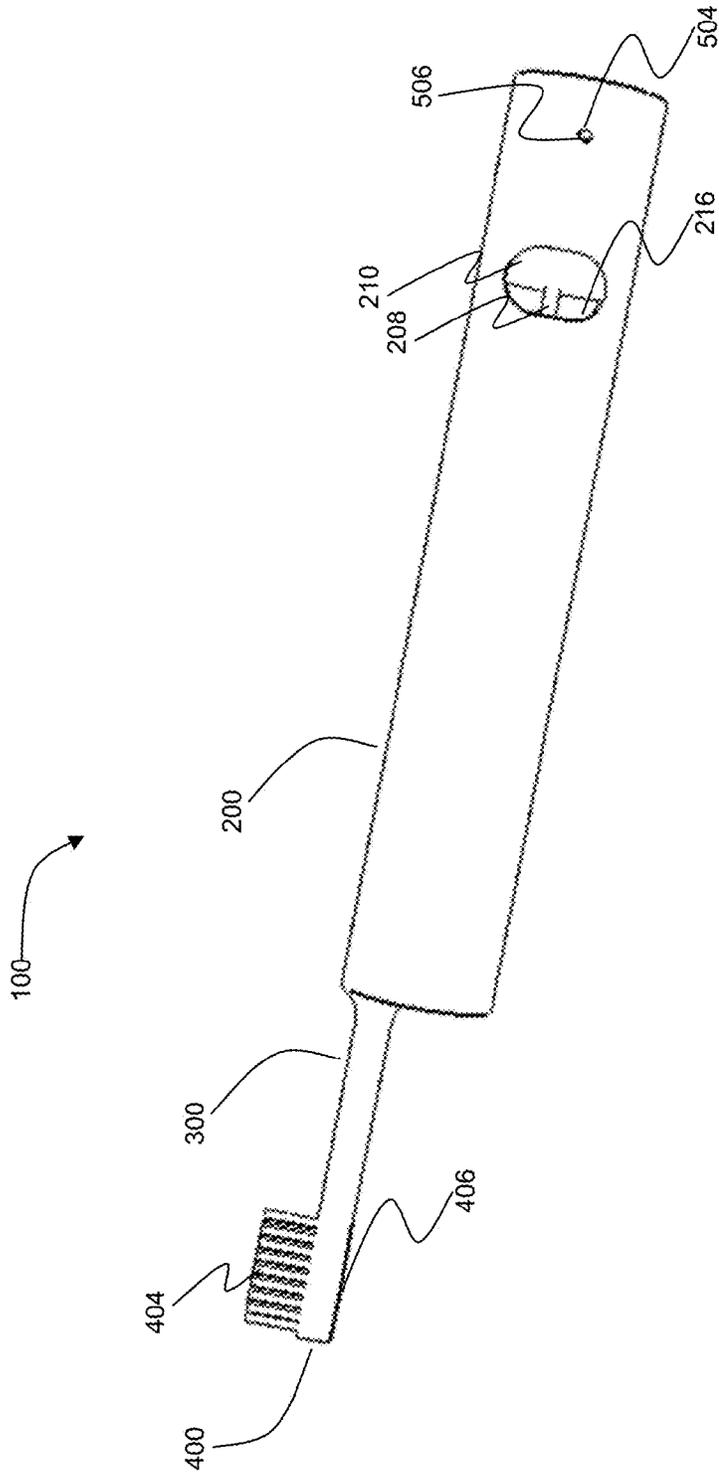


FIG. 2

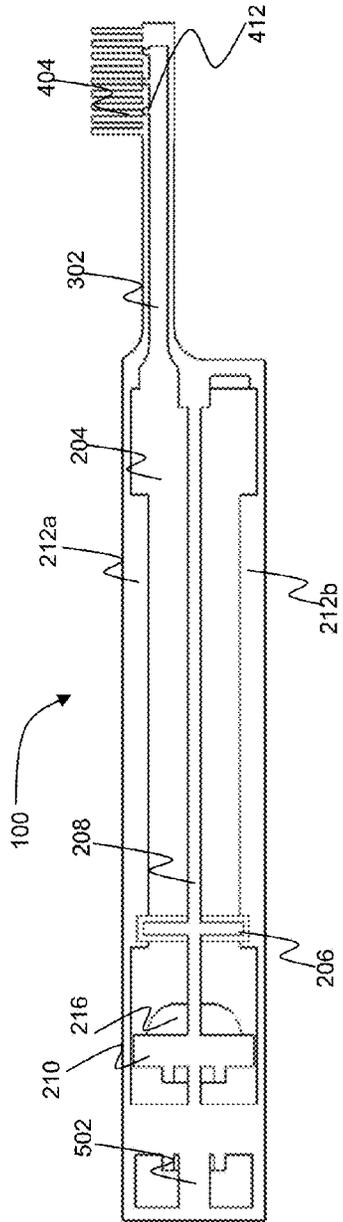


FIG. 3A

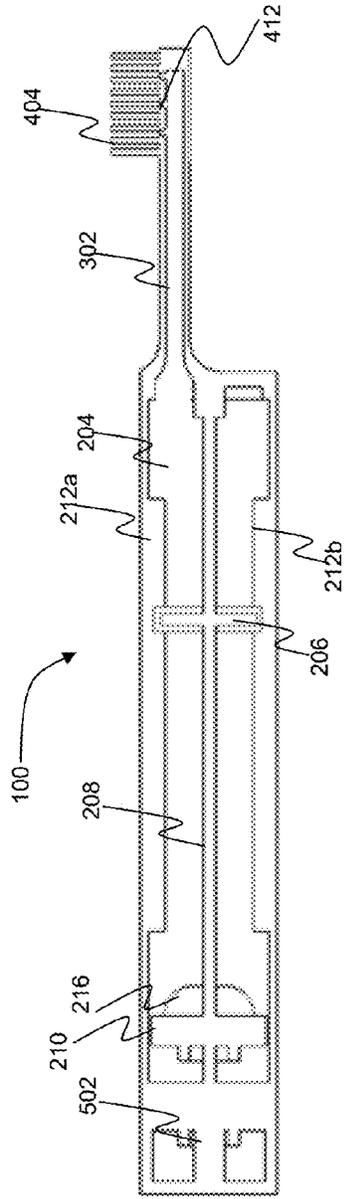


FIG. 3B

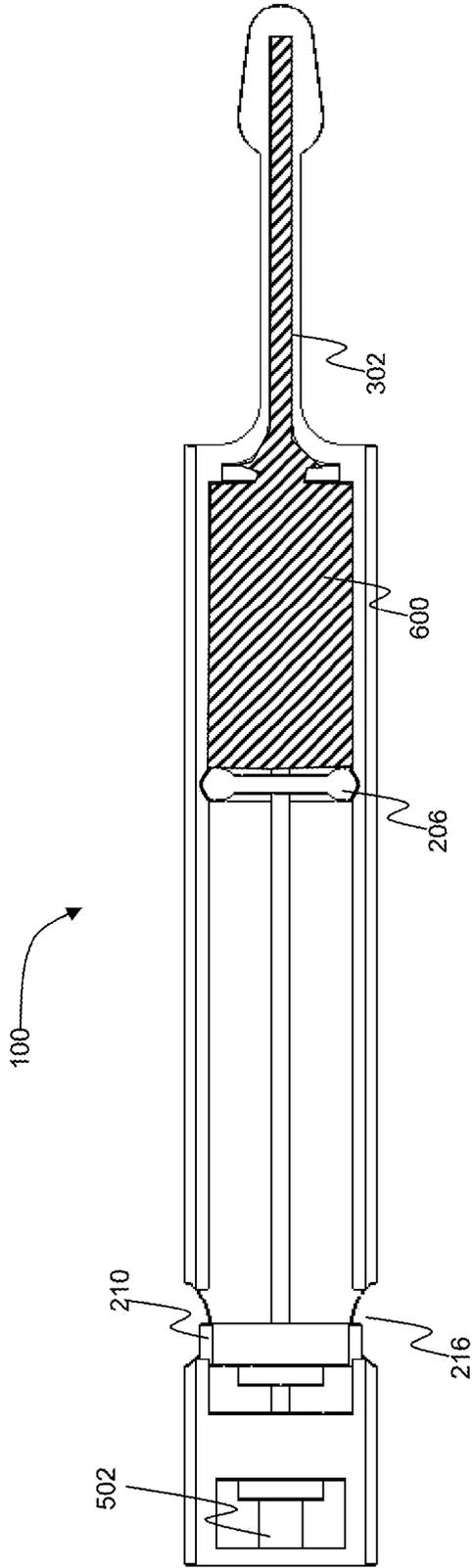


FIG. 4



FIG. 5

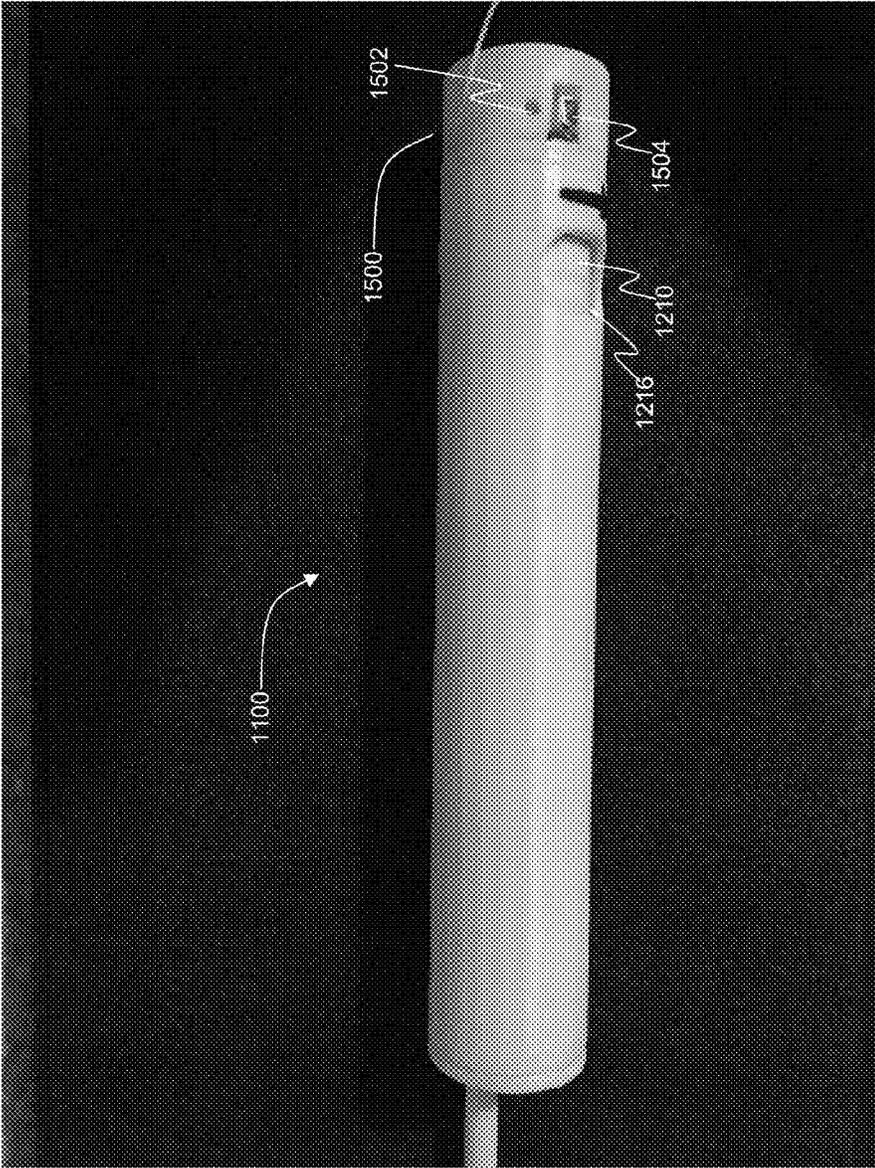


FIG. 6

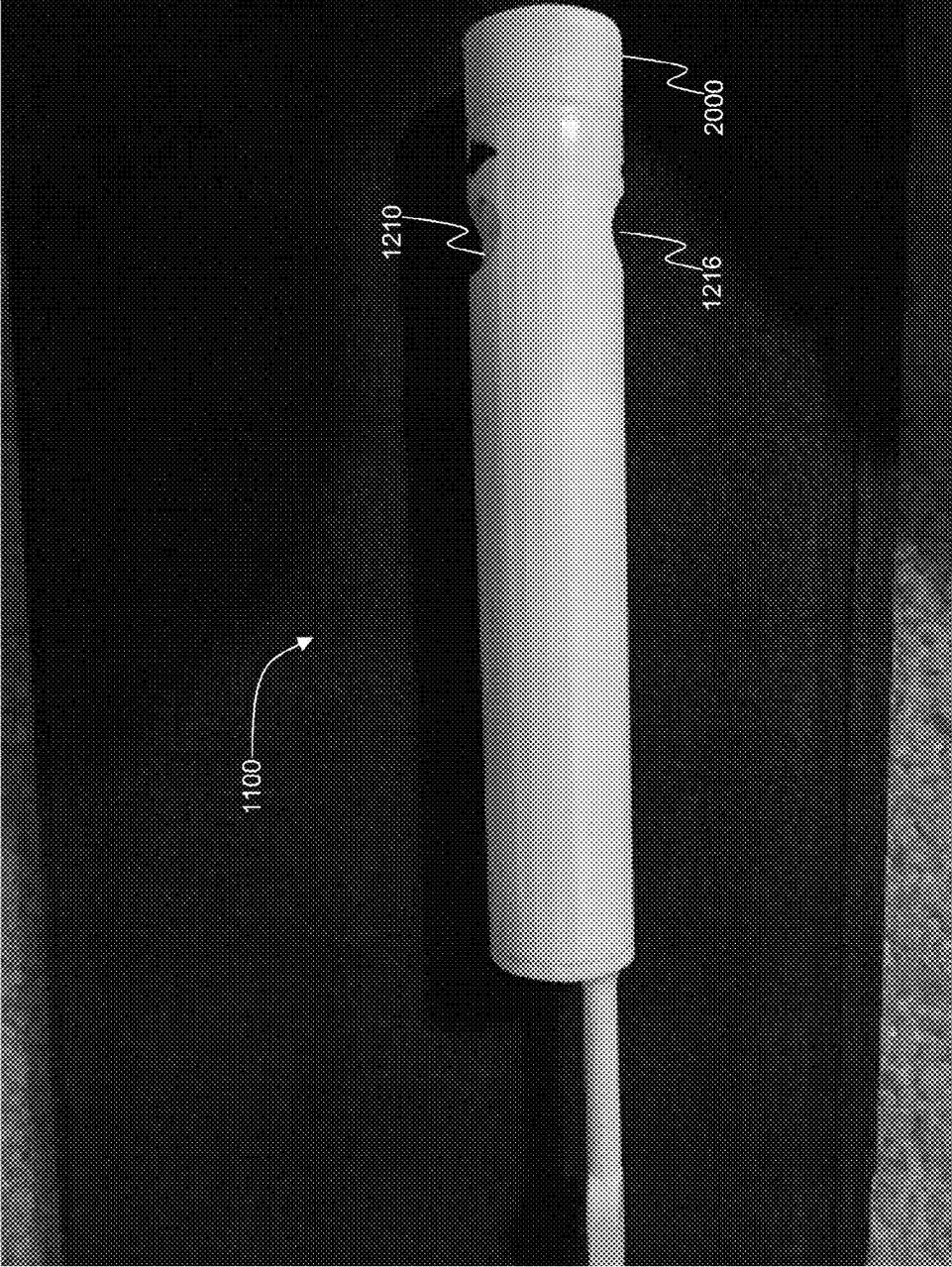


FIG. 7

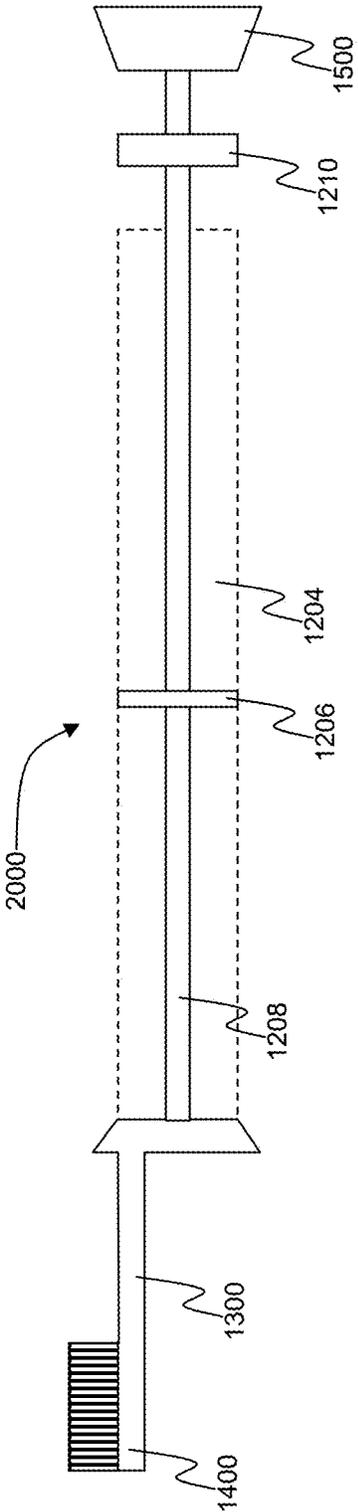


FIG. 8

DISPENSING TOOTHBRUSH

TECHNICAL FIELD

[0001] The present disclosure relates generally to toothbrushes, and more particularly to toothbrushes capable of dispensing oral care products.

BACKGROUND

[0002] Oral care is an important component of overall health. Most daily oral care regimens involve cleaning between the teeth with dental floss, brushing the teeth and gums with a toothbrush and toothpaste (also known as dentifrice) and/or rinsing with an antiseptic mouthwash. Generally, the toothbrush, toothpaste, mouthwash, and floss are separate units, which is not convenient for purchase, storage, or travel purposes.

[0003] Some toothbrushes that have integrated toothpaste and/or floss dispensers have been developed. In such toothbrushes, the toothpaste is pushed up through the head of the toothbrush by the advancement of a pusher along a hollow-core coil, which is rotated by the rotation of the base. The hollow-core mechanism, however, creates an opening where toothpaste can be trapped causing the toothpaste to be unable to be extracted from the toothbrush. In addition, because the base (which contains the floss) must be rotated in order to advance toothpaste, such devices risk inadvertent dispensing or retraction of the dental floss.

SUMMARY

[0004] A dispensing toothbrush is capable of storage and dispensing toothpaste and dental floss. The toothbrush includes a handle having a chamber constructed to store toothpaste, a dial, and a floss dispenser having a floss spindle, floss aperture and floss cutter, a neck, and a head having bristles and head apertures. The dial is positioned in the handle between the floss dispenser and the neck and turning the dial causes the toothpaste to be extruded through the head apertures. The toothbrush provides a dispensing toothbrush having a solid core that prevents toothpaste from becoming trapped within and that enables dispensing of toothpaste without unintentional dispensing or retraction of dental floss. Toothbrush can be provided in compact size and is ideal for travel in that it consolidates multiple items such as a toothbrush, toothpaste, and dental floss into a single compact device.

[0005] In some embodiments, the handle has a threaded screw rod fixably connected to the dial and a pusher rotatably connected to the screw rod. Rotation of the screw rod via the dial moves the pusher in a direction transverse to the orientation of the handle to cause extrusion of toothpaste.

[0006] In some embodiments, the handle has a circular cross section presenting channels and the pusher has a circular cross section presenting notches adapted to engage with the channels to prevent the pusher from rotating within chamber. This results in linear movement of the pusher as the dial is rotating to advance the toothpaste through the internal chambers of the device to the head of the toothbrush where it is dispensed.

[0007] Certain embodiments are described further in the following description, examples, claims, and drawings. These embodiments will become more apparent from the following detailed description when taken in conjunction with the accompanying exemplary drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] FIG. 1 is a perspective view depicting a cross-section of a dispensing toothbrush according to an embodiment of the present invention;

[0009] FIG. 2 is a perspective view of the dispensing toothbrush of FIG. 1;

[0010] FIG. 3A is a side elevation view depicting a cross-section of the dispensing toothbrush of FIG. 1;

[0011] FIG. 3B is a side elevation view depicting a cross-section of the dispensing toothbrush of FIG. 1;

[0012] FIG. 4 is a rear elevation view depicting a cross-section of the dispensing toothbrush of FIG. 1;

[0013] FIG. 5 is a perspective view depicting the exterior of a dispensing toothbrush according to an embodiment of the present invention;

[0014] FIG. 6 is a perspective view depicting the exterior of the dispensing toothbrush of FIG. 5;

[0015] FIG. 7 is a perspective view depicting the exterior of the dispensing toothbrush of FIG. 5; and

[0016] FIG. 8 is a side elevation view depicting a refill cartridge according to an embodiment of the present invention.

DETAILED DESCRIPTION

[0017] FIGS. 1-4 depict a dispensing toothbrush 100 according to an embodiment of the present invention that includes a handle 200, neck 300, and head 400. In various embodiments, handle 200, neck 300, and head 400 can be composed of plastic, wood, metal, or other material that can be suitably formed and adapted for use in high moisture environments.

[0018] Handle 200 can include outer casing 202. Outer casing 202 can be an elongate cylinder with circular cross-section or be an elongate form having oval, square, hexagonal or other cross-section as necessary. Outer casing 202 can present an outer surface that is smooth, ridged, or faceted.

[0019] A chamber 204 within which toothpaste 600 can be stored can be defined in handle 200. Chamber 204 can be a void within handle 200, or can have walls separating it from the inner surface of handle 200. Chamber 204 can have generally the same cross-section as outer casing 202 with slightly smaller total area such that chamber 204 is defined entirely within outer casing 202. Chamber 204 can narrow at an end proximate to neck 300 in order to enable toothpaste 600 to travel into neck 300.

[0020] Toothbrush 100 can further include a toothpaste dispensing mechanism that can include a cylindrical pusher 206, a screw rod 208, and a dial 210. Dial 210 can be fixedly connected to screw rod 208 at an end of screw rod 208 and pusher 206 can be configured to travel along screw rod 208. As dial 210 is turned, screw rod 208 rotates, moving pusher 206 towards head 400 along threads of screw rod 208. As pusher 206 is advanced along screw rod 208 towards head 400, toothpaste 600 is forced out of chamber 204.

[0021] Pusher 206 can have a cross-section that is keyed to inner cross-section of chamber 204 in order to prevent pusher 206 from rotating relative to chamber 204 such that rotation of screw rod 208 causes linear movement of pusher 206 along screw rod 208. In one embodiment, pusher 206 can define notches (not shown) that align with channels 212a and 212b protruding into chamber 204. In another embodiment, pusher 206 and chamber 204 can be shaped such that pusher 206 cannot be rotated relative to chamber

204. For example, pusher **206** and chamber **204** can present an oval or rectangular cross-section that prevents pusher **206** from rotating within chamber **204**, and also can provide a more comfortable grip of outer casing **202**. Pusher **206** can be relatively shortened in a direction longitudinal to handle **200** in order to maximize storage space within chamber **204**. Pusher **206** can fill generally the entire cross-section of chamber **204** such that when pusher **206** travels longitudinally within chamber **204** it prevents flow of toothpaste **600** in a direction distal to head **400**. Pusher **206** can be positioned on screw rod **208** by virtue of a threaded aperture **214** that mates with screw rod **208**.

[**0022**] Screw rod **208** can connect to dial **210** at an end distal to head **400** and connect to interior of chamber **204** at an end proximate to head **400** or can be unconnected and freestanding at the proximal end. Screw rod **208** can be fixedly connected to dial **210** and rotatably connected at the opposite end within chamber such that rotation of dial **210** causes rotation of screw rod **208**. Screw rod **208** can be threaded such that rotation of screw rod **208** within threaded aperture **214** of pusher **206** causes pusher **206** to travel linearly along screw rod **208**.

[**0023**] Dial **210** can be fixably attached to screw rod **208** at an end distal to head **400**. Dial **210** can have a cross-section of a shape and size to fit and rotate radially within chamber **204**. Dial **210** can be relatively shortened in a direction longitudinal to chamber **204**, in order to maximize storage space within handle **200**. The outer surface of dial **210** can be smooth or can present ridges or grips for ease of use. As can be seen in FIG. 2, outer casing **202** can present one or more dial openings **216** located and sized such that dial **210** can be seen and manipulated by the user.

[**0024**] Neck **300** is connected to handle **200** at an end distal to dial **210** and can be unitary formed with handle **200**. Neck **300** can be an elongate cylinder or other elongate form with significantly smaller cross-section than handle **200**. Neck **300** can also taper gradually in cross section from handle **200** to head **300**. Neck **300** presents neck channel **302**. Neck channel **302** provides a passage for flow of toothpaste **600** from chamber **204** to head **400**. Neck channel **302** can be directly, continuously connected and unitarily formed with chamber **204**.

[**0025**] Head **400** is connected to neck **300** and includes base **402** and bristles **404**. Head **400** can be unitary formed with neck **300**. Bristles **404** can protrude from base **402** and can be oriented in a direction perpendicular to longitudinal axis of toothbrush **100** as shown, or can be oriented radially around base **402**, or any other suitable configuration. Base **402** includes head channel **408**. Head channel **408** can be directly and unitarily connected to neck channel **302** in order to enable toothpaste **600** flowing from chamber **204** through neck channel **302** into head channel **408**. Base **402** further includes head apertures **412**. Head apertures **412** connect to head channel **408** to allow toothpaste **600** to flow outwardly from head channel **408** between and/or around bristles **404**. Bristles **404** can be composed of plastic, rubber, metal, wood, fur, or other material suitable for cleaning teeth. In various embodiments, bristles **404** can be plain or can be coated with a material, such as, for example, xylitol that promotes enhanced oral health.

[**0026**] Head **400** can also include a tongue cleaner **406**. Tongue cleaner **406** can be arranged on base **402** on a side opposite bristles **404**. Tongue cleaner **406** can be defined by ridges, bumps, or another textured surface suitable for the

cleaning soft surfaces of a tongue. Tongue cleaner **406** can be molded directly onto base **402**, or can be a separate structure affixed to base **402** via an adhesive or fasteners. Tongue cleaner **410** can be composed of the same material as head **400**, or another material, such as, for example, rubber, plastic, wood, metal, or other suitable material.

[**0027**] Handle **200** can also include floss dispenser **500**. Floss dispenser **500** includes floss spindle **502** around which dental floss **700** or other cording can be wound. Floss dispenser **500** can be arranged within handle **200** at an end distal to head **400**. Floss dispenser **500** can have a circular or other cross section cable of rotational movement within handle **200**. A floss aperture **504** can be disposed through outer casing **202** of handle **200** to enable floss to be pulled out of handle **200**. As seen in, for example, FIG. 2, a floss cutter **506** through which floss aperture **504** extends can also be disposed on outer casing **202** of handle **200**. Alternatively, the floss aperture **504** can be in a separate location on outer casing **202** from floss cutter **506** in order to present a greater length of floss for grasping by the user. Cutter **506** can include a sharp blade, hook or other projection embedded in outer casing **202**. Cutter **506** can be sunken from surface of outer casing **202** such that the cutter **506** is positioned below an outer perimeter of outer casing **202** of handle **200** in order to prevent inadvertent injury to a user grasping handle **200**. Cutter **506** can be composed of plastic, metal, or other material that can be sufficiently sharp to cut dental floss. Floss dispenser **500** is positioned below dial **210** and is not connected to dial **210** or screw rod **208** such that rotation of dial **210** to cause toothpaste to be dispensed does not cause rotation of floss dispenser **500** or floss spindle **502**. Thus, inadvertent dispensation of floss when dispensing toothpaste is prevented.

[**0028**] In some embodiments, toothbrush **100** can also dispense antiseptic mouthwash. In such embodiments, handle **200**, neck **300**, or head **400** could include a separate chamber containing mouthwash. Mouthwash can be dispensed as a spray through actuation of a button or other similar means on toothbrush or can be accessible by removing a cap or lid disposed on toothbrush.

[**0029**] In some embodiments, toothbrush **100** can include a sanitary bristle cover. Such a cover can be selectively and removably attachable to head **400** to cover bristles **404** when toothbrush **100** is not in use. Cover therefore helps maintain bristles **404** in a sanitary condition between uses.

[**0030**] In operation, chamber **204** can initially be fully loaded with toothpaste **600** with pusher **206** in a fully retracted position, at an end distal to head **400** as can be seen in FIG. 3A. As dial **210** is turned, screw rod **208** rotates to linearly advance pusher **206** (which cannot rotate) towards head **400** along threads of screw rod **208**. FIG. 3B depicts the pusher **206** after it has advanced partially through chamber **204**. As pusher **206** is advanced, toothpaste **600** is forced out of chamber **204**, into neck channel **302**, head channel **408** and out of head apertures **412**. Thus, as can be seen in FIG. 4, only portions of chamber **204** located proximally of the pusher **206** (towards the head) will contain toothpaste, with areas of chamber **204** distal of pusher being empty. When the desired amount of toothpaste has been extracted, the user can proceed with tooth brushing as desired. Chamber **204** can hold sufficient toothpaste for a number of brushings.

[**0031**] In operation, a small portion of floss **700** can protrude from floss aperture **504**. When floss **700** is pulled,

floss spindle **502** can spin to dispense additional floss. Floss **700** can be cut by stretching over blade of floss cutter **506**. There is sufficient length between floss aperture **504** and floss cutter **506** such that after cutting a length of floss for use, another small portion of floss remains extending from floss aperture **504** for the user to grasp for a future use. Floss spindle **502** can also contain sufficient floss for multiple uses. In one embodiment, the amount of floss on the spindle **502** and toothpaste in the chamber **204** are configured to last approximately the same number of uses.

[0032] In one embodiment, toothbrush **100** is a limited use toothbrush meant to be disposed of when no more toothpaste **600** and/or dental floss **700** can be extracted such that it is a non-refillable product. In another embodiment, toothbrush **100** can be refilled with toothpaste **600** via a syringe or other device capable of insertion into one or more head apertures **412**. In such an embodiment, dial **210** can be rotated to retract pusher **206** in order to expand available space in chamber **204**. As chamber **204** is expanded, toothpaste **600** can be forced through one or more head apertures **412**, and flow into chamber **204** via head channel **408** and neck channel **302**.

[0033] An alternative cartridge refillable toothbrush embodiment is depicted in FIGS. 5-8. As can be seen in FIG. 8, cartridge **2000** can include a toothpaste dispensing mechanism and floss dispenser **1500**. The toothpaste dispensing mechanism can include chamber **1204** (outlined in dashed lines in FIG. 8 for sake of clarity), pusher **1206**, screw rod **1208**, and dial **1210**. Chamber **1204** can contain toothpaste **600** which can be dispensed via operation of dial **1210**, screw rod **1208**, and pusher **1206** as described above. As can be seen in FIGS. 5-7, floss dispenser **1500** includes floss spindle (not shown), floss aperture **1502**, and floss cutter **1504** which can operate in a similar manner to floss dispenser **500** described above. In the depicted embodiment, floss aperture **1502** can be spaced apart from floss cutter **1504**; however, floss cutter **1504** may be integrated into floss aperture **1502** as described above.

[0034] Chamber **1204** has a cross section slightly smaller than that of handle **1200** and floss dispenser **1500** can have a cross section smaller, similarly size, or larger than that of handle **1200**. Cartridge **2000** can therefore be slidably inserted into handle **1200** with chamber **1204** oriented towards neck **1400**. When inserted, chamber **1204** can be completely enclosed by handle **1200**, while floss dispenser **1500** can protrude.

[0035] Handle **1200** and cartridge **2000** can be connected via an engagement mechanism. In some embodiments, the engagement mechanism can include threads on interior of handle **1200** and corresponding threads on exterior of cartridge **2000** (not shown). The engagement mechanism can also include one or more tabs on cartridge **2000** which correspond to and interlock with one or more slots on handle **1200**, or vice versa, or any other engagement mechanism capable of removably holding cartridge **2000** when inserted to handle **1200**.

[0036] Primary operation of dispensing toothbrush **1100** can be similar to that of dispensing toothbrush **100** described above. Dispensing toothbrush **1100** can also be refilled by removal and replacement of cartridge **2000** providing a new and complete supply of both toothpaste **600** and floss **700**.

[0037] Toothbrushes as described herein are ideal for travel due to the consolidation of multiple necessary tooth care items, such as, for example, a toothbrush, toothpaste

and dental floss, into a single item rather than multiple items each needing to be separately carried and stored. In some embodiments, toothbrushes as described herein can be provided in a compact size relative to a standard toothbrush in order to provide even further benefits for travel and storage purposes.

[0038] Many alterations and modifications of the preferred embodiments will no doubt become apparent to a person of ordinary skill in the art after having read the foregoing description, it is to be understood that the particular embodiments depicted and described by way of illustration are in no way intended to be considered limiting. Thus, references to the details of the described embodiments are not intended to limit their scope. For example, persons of ordinary skill in the relevant art will recognize that the various features described for the different embodiments of the inventions can be suitably combined, un-combined, and re-combined with other features, alone, or in different combinations, within the spirit of the invention. Likewise, the various features described above should all be regarded as example embodiments, rather than limitations to the scope or spirit of the inventions. Therefore, the above is not contemplated to limit the scope of the present inventions.

[0039] Persons of ordinary skill in the relevant arts will recognize that the inventions may include fewer features than illustrated in any individual embodiment described above. The embodiments described herein are not meant to be an exhaustive presentation of the ways in which the various features of the inventions may be combined. Accordingly, the embodiments are not mutually exclusive combinations of features; rather, the inventions may include a combination of different individual features selected from different individual embodiments, as understood by persons of ordinary skill in the art.

1. A multi-purpose toothbrush, comprising:

- a handle including a dentifrice chamber configured to contain dentifrice and a floss chamber configured to store dental floss;
- a brushing head having bristles extending outwardly therefrom and including a head chamber contained within the brushing head and apertures extending between the head chamber and an exterior of the brushing head, the apertures disposed adjacent the bristles;
- a neck disposed between the handle and the brushing head, the neck defining a neck chamber therein in communication at one end with the dentifrice chamber and at an opposing end with the head chamber; and
- a dial configured such that when dentifrice is contained within the dentifrice chamber, rotation of the dial in a first direction causes the dentifrice to be forced from the dentifrice chamber, through the neck chamber and head chamber, and out the apertures adjacent the bristles, wherein rotation of the dial does not cause rotation of the floss chamber.

2. The multi-purpose toothbrush of claim 1, wherein the handle, brushing head, and neck form a one-piece unitary construct.

3. The multi-purpose toothbrush of claim 1, further comprising a floss aperture disposed in the handle configured to enable dental floss to extend from the floss chamber to an exterior of the handle and a floss cutter configured to cut a length of floss disposed on the handle.

4. The multi-purpose toothbrush of claim 1, wherein the handle defines an outer perimeter, and wherein the floss cutter is positioned inwardly of the outer perimeter of the handle.

5. The multi-purpose toothbrush of claim 1, wherein the dial is positioned along the handle between the brushing head and the floss chamber.

6. The multi-purpose toothbrush of claim 1, further comprising a threaded rod attached to the dial and extending through the dentifrice chamber towards the head chamber and a push cylinder carried by the threaded rod, such that rotation of the dial in the first direction causes the push cylinder to advance along the threaded rod towards the head.

7. The multi-purpose toothbrush of claim 6, wherein the push cylinder cannot rotate as the threaded rod is rotated via the dial.

8. The multi-purpose toothbrush of claim 1, further comprising a tongue cleaner comprising a textured surface.

9. The multi-purpose toothbrush of claim 8, wherein the textured surface is disposed on an exterior surface of the brushing head opposite of the bristles.

10. A multi-purpose toothbrush capable of storing and dispensing dentifrice and dental floss, comprising:

- a handle comprising a chamber configured to store dentifrice, the handle including a dial and a floss dispenser having a floss spindle, floss aperture and floss cutter;
 - a head comprising bristles and head apertures;
 - a neck connecting the handle and the head; and
- wherein the dial is positioned in the handle between the floss dispenser and the neck and when dentifrice is contained within the chamber turning the dial causes the toothpaste to be extruded through the head apertures of the head.

11. The multi-purpose toothbrush of claim 10, wherein the handle further comprises a threaded screw rod fixably connected to the dial and a pusher connected to the screw rod, and wherein rotation of the screw rod via rotation of the dial moves the pusher in a direction transverse to the orientation of the handle.

12. The multi-purpose toothbrush of claim 11, wherein the handle has a circular cross section presenting channels and the pusher has a circular cross section presenting notches, and wherein the channels are adapted to engage with the notches to prevent the pusher from rotating within the chamber.

13. The multi-purpose toothbrush of claim 10, wherein the head further comprises a tongue cleaner comprising a textured surface.

14. The multi-purpose toothbrush of claim 10, wherein the floss cutter is recessed into the handle.

15. A multi-purpose toothbrush, comprising:

- a handle including a dentifrice chamber configured to contain dentifrice and a floss chamber configured to store dental floss;
- a brushing head having bristles extending outwardly therefrom and including a head chamber contained within the brushing head and apertures extending between the head chamber and an exterior of the brushing head, the apertures disposed adjacent the bristles;
- a neck disposed between the handle and the brushing head, the neck defining a neck chamber therein in communication at one end with the dentifrice chamber and at an opposing end with the head chamber;
- a floss aperture disposed in the handle configured to enable dental floss to extend from the floss chamber to an exterior of the handle;
- a floss cutter configured to cut a length of floss disposed on the handle;
- a threaded rod extending longitudinally through the dentifrice chamber towards the head chamber; and
- a push cylinder rotatably attached to the threaded rod such that when dentifrice is contained within the dentifrice chamber rotation of the threaded rod in a first direction causes the push cylinder to advance along the threaded rod through the dentifrice chamber to force the dentifrice from the dentifrice chamber, through the neck chamber and head chamber, and out the apertures adjacent the bristles, wherein when the screw rod is rotated the floss chamber is not rotated.

16. The multi-purpose toothbrush of claim 15, further comprising a dial fixedly attached to the threaded rod and accessible through an opening in the handle, wherein rotation of the dial causes rotation of the threaded rod.

17. The multi-purpose toothbrush of claim 16, wherein the dial is positioned along the handle between the brushing head and the floss chamber.

18. The multi-purpose toothbrush of claim 15, wherein the push cylinder cannot rotate as the threaded rod is rotated.

19. The multi-purpose toothbrush of claim 15, wherein the handle, brushing head, and neck form a one-piece unitary construct.

20. The multi-purpose toothbrush of claim 15, wherein the handle defines an outer perimeter, and wherein the floss cutter is positioned inwardly of the outer perimeter of the handle.

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