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Feuchtwanger, III

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(54) **DEVICE FOR MIXING AND DISPENSING A PERSONALIZED TOOTHPASTE**

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(51) **Int. Cl.**
B65D 81/32 (2006.01)

(52) **U.S. Cl.**
CPC ***B65D 81/325*** (2013.01); ***B65D 81/3288*** (2013.01)

(58) **Field of Classification Search**
CPC B65D 81/325; B65D 81/3288
See application file for complete search history.

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(57) **ABSTRACT**

A device for blending and dispensing a personalized toothpaste includes a housing, including a first retaining chamber and a second retaining chamber, configured to load a primary cartridge and a secondary cartridge respectively therein at a predetermined rotational orientation, to align the cartridges in fluid connection with a nozzle through which the toothpaste is dispensed. The primary cartridge contains base components, and the secondary cartridge includes flavorings and colorings selected by a user to personalize the toothpaste. The housing and cartridges include elements allowing the cartridges to be interchangeable. A system also includes a dispenser, which may be a plunger, to move the contents from the cartridges, blend them in the nozzle and extrude the personalized toothpaste therefrom. A kit also includes a plurality of the interchangeable cartridges with different flavorings and colorings.

21 Claims, 7 Drawing Sheets

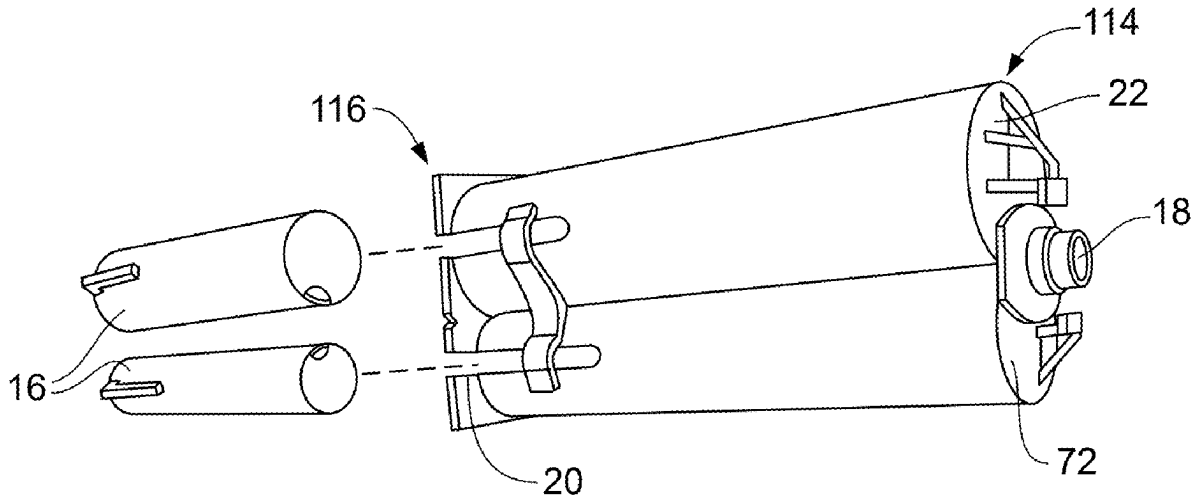

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FIG. 1A

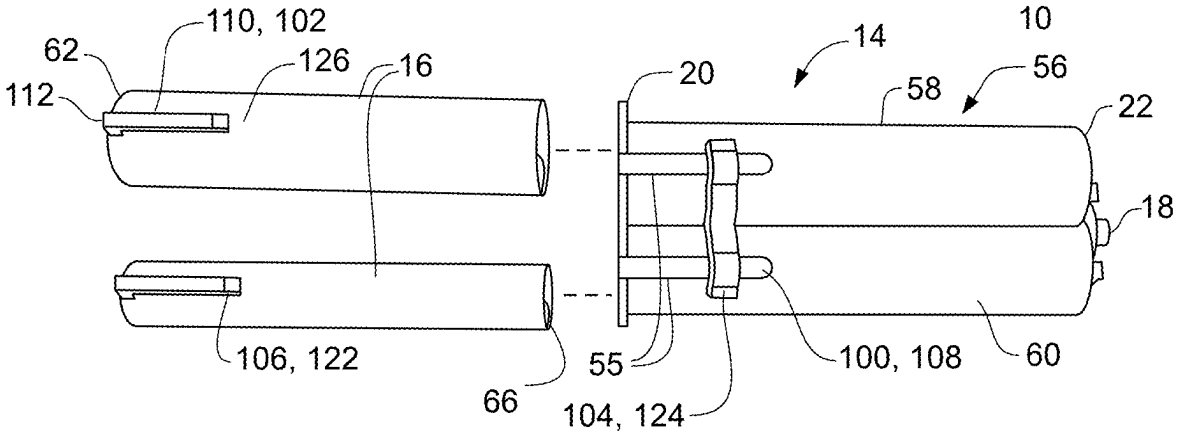


FIG. 1B

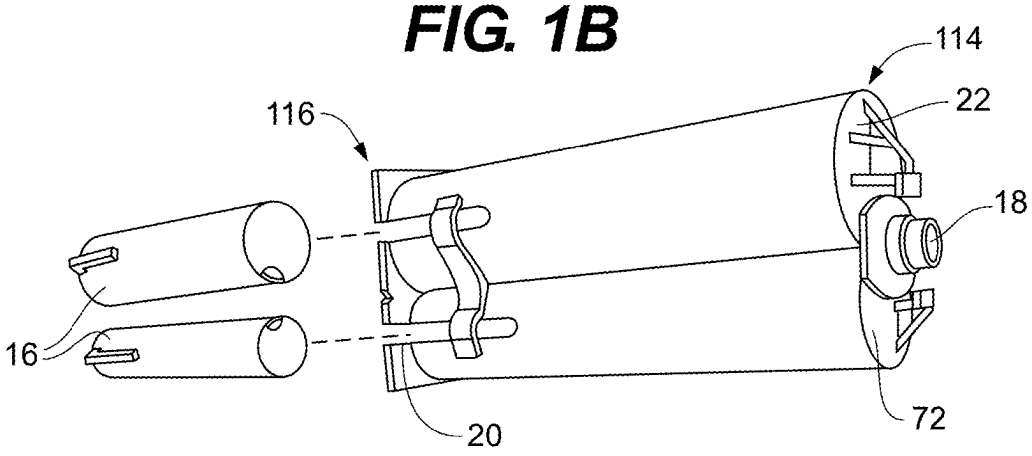
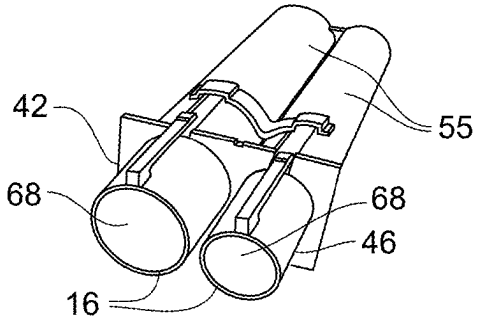


FIG. 1C



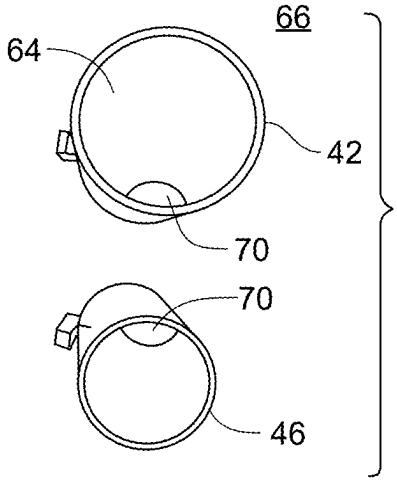


FIG. 2

FIG. 3A

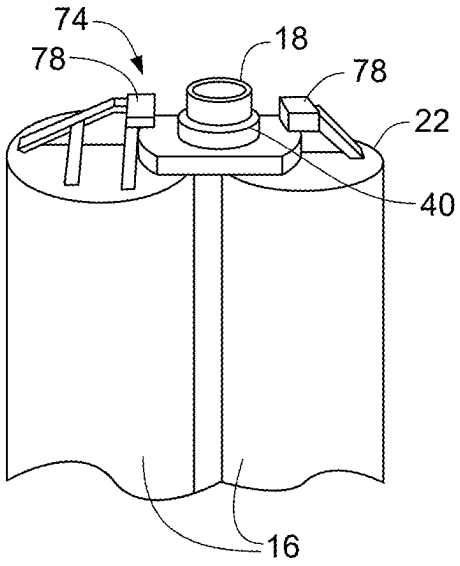


FIG. 3B

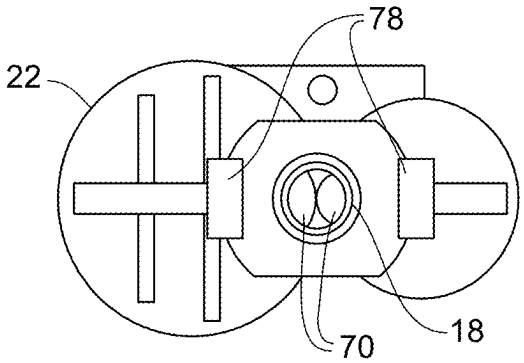


FIG. 4A

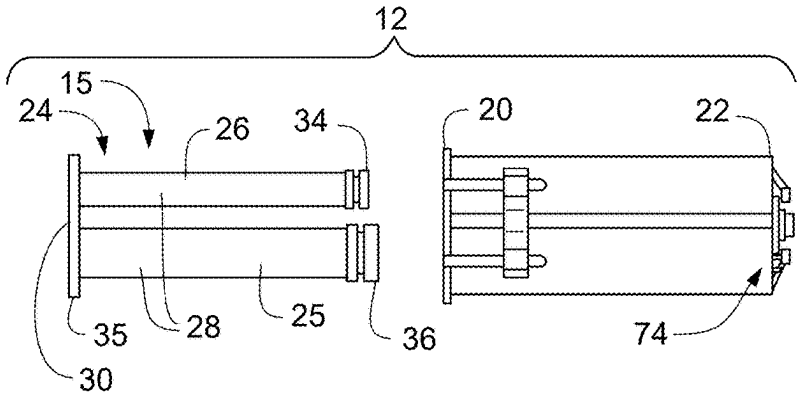


FIG. 4B

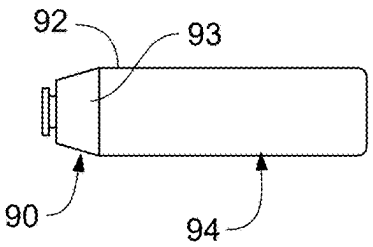


FIG. 4C

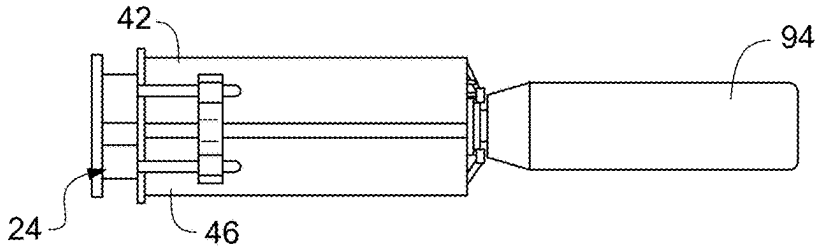


FIG. 4D

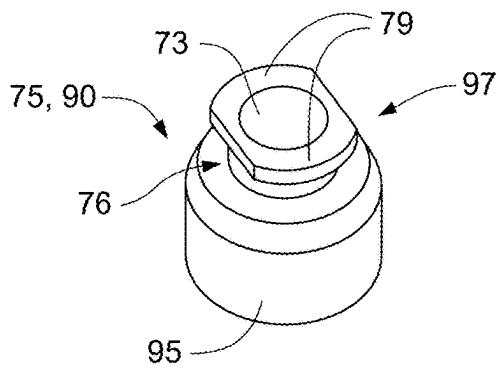


FIG. 5A

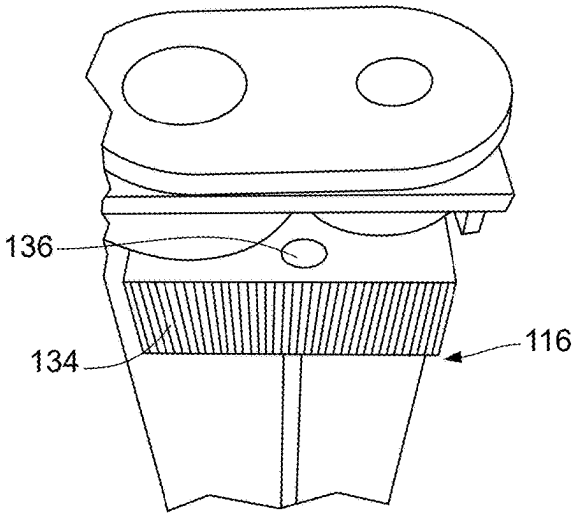


FIG. 5B

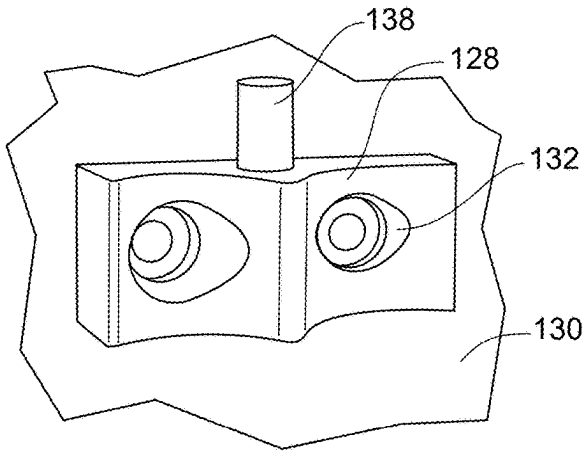


FIG. 5C

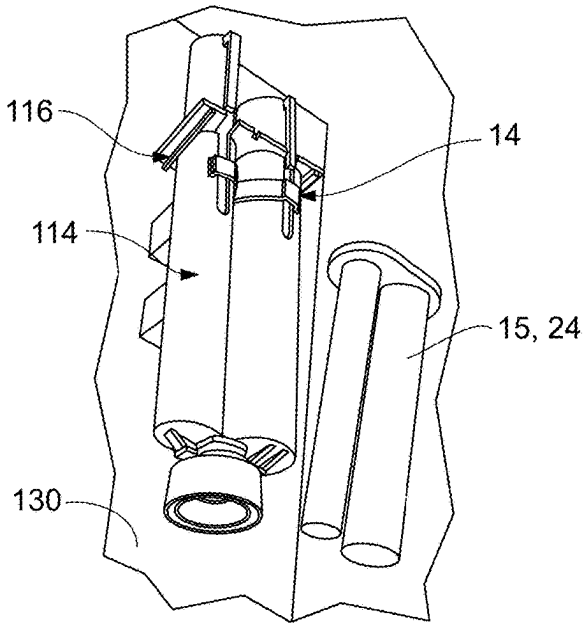
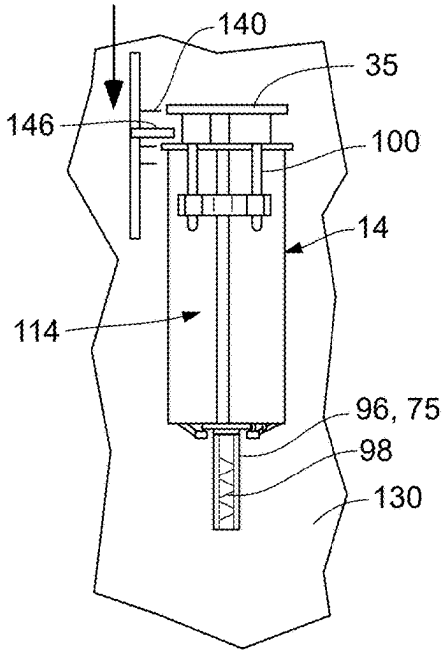
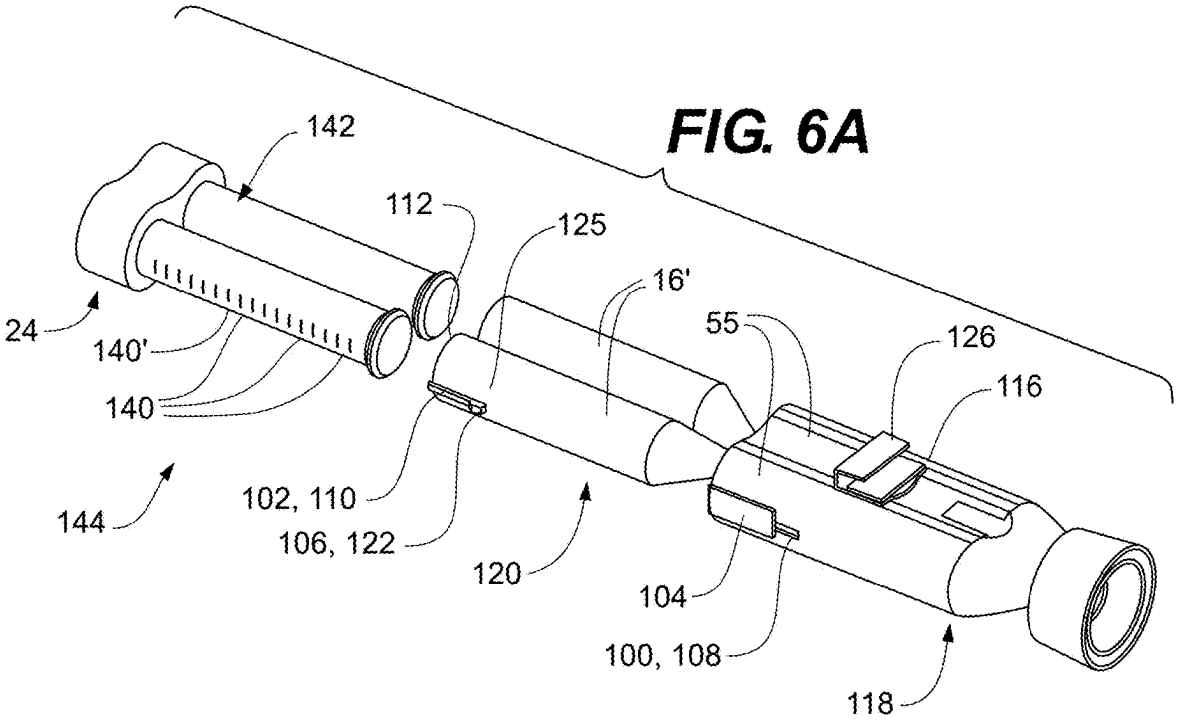


FIG. 5D




142
112
125
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102, 110
106, 122
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100, 108
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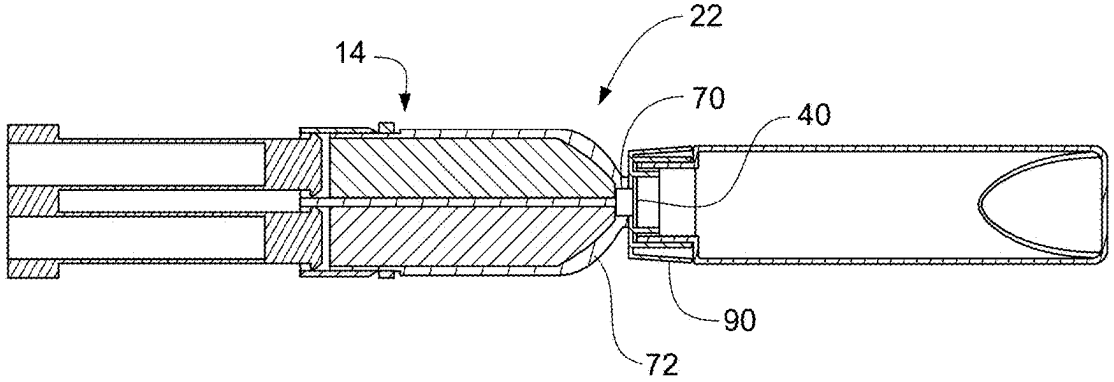
FIG. 6A

FIG. 6B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40
90
72

FIG. 7A

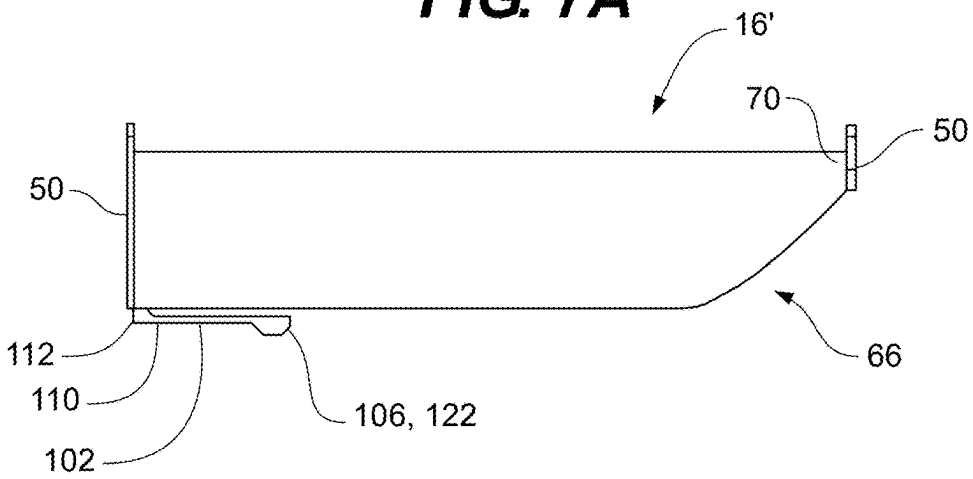


FIG. 7B

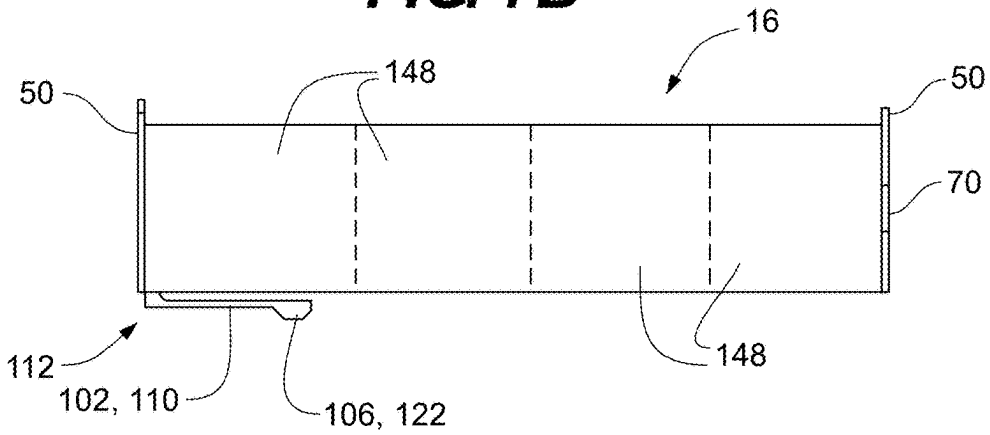


FIG. 7C

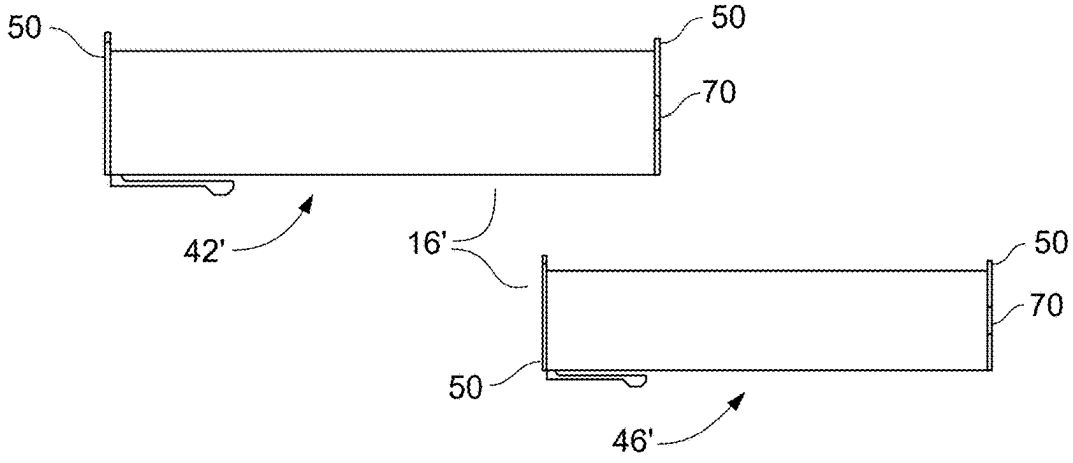
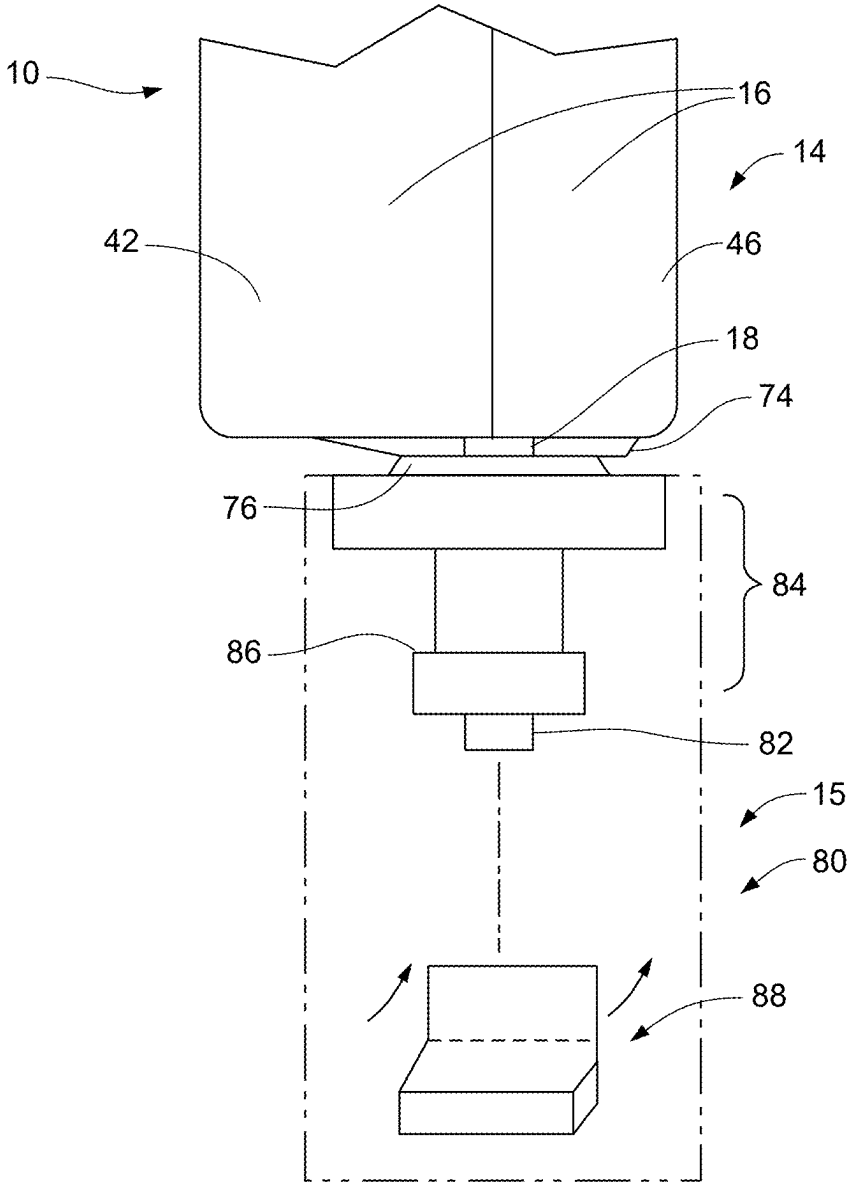


FIG. 8



DEVICE FOR MIXING AND DISPENSING A PERSONALIZED TOOTHPASTE

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of and priority to U.S. Provisional Application Ser. No. 63/675,546 entitled "DEVICE FOR MIXING AND DISPENSING A PERSONALIZED TOOTHPASTE," filed Jul. 25, 2024, the entirety of which is hereby incorporated herein by reference thereto.

FIELD OF DISCLOSURE

The present disclosure relates generally to personalizing toothpaste and, in particular, to an at-home device and kit for personalizing toothpaste.

BACKGROUND

There are numerous educational books and videos available to encourage children to brush daily. Children's toothbrushes are also available that are decorated with festive colors, children's themes, or appealing characters. Children's dental kits are even sold in zippered pouches that include floss, toothpaste, and a colored sand "hourglass" configured to time a 2-minute brushing. While these products may initially help to encourage children to brush, the novelty often wears off too quickly to instill long-term daily dental care habits. Notably, none of the options available give the child a choice of toothpaste flavoring or to be otherwise creatively involved in personalizing the taste or color of the toothpaste.

Accordingly, there is a need for a device, system and kit for mixing and dispensing a personalized toothpaste, for example, for taste and color.

SUMMARY

Features of the disclosure will become apparent from the following detailed description considered in conjunction with the accompanying drawings. It is to be understood, however, that the drawings are designed as an illustration only and not as a definition of the limits of this disclosure.

The present disclosure is directed to a device for mixing or blending a personalized toothpaste, and a system including the device and a dispenser for dispensing the personalized toothpaste.

The present disclosure is also directed to a kit which includes at least any of the embodiments of the device of the present disclosure and a variety of interchangeable cartridges including components, for example, for personalizing taste and color, for forming the personalized toothpaste.

The present disclosure is also directed to methods for forming and dispensing a personalized toothpaste using the device of the present disclosure.

The present disclosure is also directed to a device for blending and dispensing a personalized toothpaste. The device includes a housing including a first end and a second end, and a first retaining chamber and a second retaining chamber parallel to the first retaining chamber and positioned perpendicularly between the first end and the second end. Each of the first retaining chamber and the second retaining chamber is sized and shaped to receive therein and remove therefrom, respectively, a primary cartridge and a secondary cartridge, which are configured to be interchangeable with other primary cartridges and secondary cartridges, respectively, wherein contents of each of the primary cartridge and the secondary cartridge include components of a personalized toothpaste. The device also includes a nozzle extending from the second end of the housing and aligned in fluid connection with both the primary cartridge and the secondary cartridge to receive the components therefrom. The housing is operably connectable with a dispenser that is operable to move the components from each of the primary and the secondary cartridge into, through, and out of the nozzle to dispense the personalized toothpaste in use, such that the personalized toothpaste exiting the nozzle is a blend of the components from the primary cartridge and the secondary cartridge.

The first and the second retaining chamber, in embodiments, each includes an alignment element positioned to receive the primary cartridge and the secondary cartridge, respectively, in a predetermined rotational orientation. Each of the primary cartridge and the secondary cartridge also includes a mating alignment element that cooperates with the alignment element to seat each of the primary cartridge and the secondary cartridge in the predetermined rotational orientation.

In embodiments, the contents of the primary cartridge may include at least one or more of a fluoride, abrasive, humectant, and detergent. In addition, the contents of the secondary cartridge may include at least flavorings and food colorings.

The contents of each of the primary cartridge and the secondary cartridge may be in the form of a gel or a paste.

In embodiments, the primary cartridge and the secondary cartridge may be sized to dispense through the nozzle no more than a predetermined volume of the components that equals a single use dollop of the personalized toothpaste.

In other embodiments, the device is configured, in cooperation with the dispenser, to dispense a predetermined single use dollop of the personalized toothpaste.

In further embodiments, the contents of the secondary cartridge may be arranged in vertically ordered columns, each vertically ordered column including a different flavoring, and wherein each different flavoring has a different color.

The housing of the device includes a front side and a back side, and in embodiments, further includes a mounting component positioned on the back side, wherein the mounting component is configured to attach to or hang from a mating mounting component that is fixed to a vertical surface, with the nozzle of the housing facing downward.

The device may include the dispenser operably connected to the housing for use.

The present disclosure is also directed to a system including any of the embodiments of the device, and further including, in embodiments, the dispenser operably connected with the housing in use.

The system may further include an external component connectable to the nozzle, and a connector fixedly positioned on the second end of the housing, wherein the external component includes a complementary connector configured to removably attach the external component to the housing via the connector and to be in fluid connection with the nozzle.

The external component may include an attachable adaptor configured to attach the nozzle to an open end of a toothpaste tube for dispensing the personalized toothpaste into the toothpaste tube.

In embodiments, the dispenser of the system includes a plunger insertable into the first end of the housing and alignable in fluid connection with each of the primary

cartridge and the secondary cartridge, wherein in use, the personalized toothpaste is dispensed by a user applying a force on the plunger to move the components from each of the primary and the secondary cartridge into, through, and out of the nozzle.

In other embodiments, the dispenser of the system includes a vacuum-operable dispenser including a second nozzle in fluid connection with an output end of the nozzle, wherein the vacuum-operable dispenser includes a vacuum extrusion pump that forms a vacuum seal at the exit end of the nozzle, a valve operable to release the vacuum seal, and a depressible tab operably connected to the valve. In use, the personalized toothpaste is dispensed by a user pushing a toothbrush against the depressible tab thereby opening the valve and releasing the vacuum seal to move the components from each of the primary and the secondary cartridge into, through, and out of the nozzle and the second nozzle.

The present disclosure is also directed to a kit for creating, storing, and dispensing a personalized toothpaste. The kit includes a device for blending and dispensing a personalized toothpaste, a primary cartridge filled with at least one or more of a fluoride, abrasive, humectant, and detergent; and at least one of a secondary cartridge, wherein the at least one of the secondary cartridge includes at least one of a flavoring and a food coloring. The device includes a housing, which includes a first end and a second end, and a first retaining chamber and a second retaining chamber parallel to the first retaining chamber and positioned perpendicularly between the first end and the second end. Each of the first retaining chamber and the second retaining chamber is sized and shaped to receive therein and remove therefrom, respectively, one of the primary cartridges and one of the secondary cartridges provided in the kit, which are configured to be interchangeable with other primary cartridges and secondary cartridges in the kit. The device also includes a nozzle extending from the second end of the housing and aligned in fluid connection with both the primary cartridge and the secondary cartridge to receive the components therefrom. The housing is operably connectable with a dispenser that is operable to move the components from each of the primary and the secondary cartridge into, through, and out of the nozzle to dispense the personalized toothpaste in use, wherein the personalized toothpaste exiting the nozzle is a blend of the components from the primary cartridge and the secondary cartridge.

The housing of the device provided in the kit includes a front side and a back side, and may include a mounting component positioned on the back side, which is configured to attach to, or hang from, a complementary mounting component that is fixed to a vertical surface, with the nozzle of the housing facing downward. The kit further includes, in embodiments, a mounting assembly that includes the complementary mounting component and may also include mounting hardware.

The kit may also include at least one external component configured to connect to the second end of the housing in fluid connection with the nozzle. The device of embodiments of the kit may further include a connector fixedly positioned on the second end of the housing. The at least one external component includes a complementary connector configured to removably attach the at least one external component to the housing via the connector and to be in fluid connection with the nozzle.

In embodiments, the kit further includes at least one toothpaste tube, and wherein the at least one external component includes an attachable adaptor configured to attach the nozzle to an open end of the at least one toothpaste tube for dispensing the personalized toothpaste into the toothpaste tube. The attachable adaptor, in embodiments, includes the complementary connector, a bore hole that fluidly connects the nozzle to an interior of the toothpaste tube in use, and threads on an interior diameter for threadedly engaging the attachable adaptor to the toothpaste tube via its outer diameter, such that operation of the dispenser with the attachable adaptor positioned on the toothpaste tube and connected via the connector and the complementary connector to the housing dispenses the personalized toothpaste into the toothpaste tube.

The kit may include a plurality of the secondary cartridges, each filled with a different flavoring.

In further embodiments, each primary cartridge and secondary cartridge includes a peel-off covering on at least one of its ends, the peel-off covering being removed prior to installation in the cartridges.

In embodiments of the device of the kit, the first and the second retaining chamber each include an alignment element positioned to receive the primary cartridge and the secondary cartridge in a predetermined rotational orientation, and each of the primary cartridge and the secondary cartridge includes a complementary alignment element that cooperates with the alignment element to seat each of the primary cartridge and the secondary cartridge in the predetermined rotational orientation.

The kit may further include the dispenser.

In embodiments, the dispenser includes a plunger insertable into the first end of the housing and alignable in fluid connection with each of the primary cartridge and the secondary cartridge, wherein in use, the personalized toothpaste is dispensed by a user applying a force on the plunger to move the components from each of the primary and the secondary cartridge into, through, and out of the nozzle.

In further embodiments, the dispenser may include a vacuum-operable dispenser in fluid connection with an output end of the nozzle, wherein the vacuum-operable dispenser includes a vacuum chamber that forms a vacuum seal at the exit end of the nozzle, a valve operable to release the vacuum seal, and a depressible tab operably connected to the valve, wherein in use, the personalized toothpaste is dispensed by a user pushing a toothbrush against the depressible tab thereby opening the valve and releasing the vacuum seal to move the components from each of the primary and the secondary cartridge into, through, and out of the nozzle.

In addition to the above aspects of the present disclosure, additional aspects, objects, features and advantages will be apparent from the embodiments presented in the following description and in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

The drawings constitute a part of this disclosure and include examples, which may be implemented in various forms. It is to be understood that in some instances, various aspects of the disclosure may be shown exaggerated or enlarged to facilitate understanding. The teaching of the disclosure can be readily understood by considering the detailed description in conjunction with the accompanying drawings, which are briefly described below.

FIG. **1**A is a pictorial representation of an exploded front view of component parts of an embodiment of a device for blending a personalized toothpaste of the present disclosure, the component parts including a housing and interchange-

able cartridges insertable therein, which are filled, in use, with components of a toothpaste.

FIG. **1**B is an exploded perspective front view of the component parts of FIG. **1**A.

FIG. **1**C is a perspective first (input) end view of the component parts of FIG. **1**A, with the interchangeable cartridges partially assembled in the housing.

FIG. **2** is a pictorial representation of a second (exit) end view of the interchangeable cartridges shown in the embodiment in FIG. **1**A.

FIG. **3**A is a pictorial representation of a perspective side view of a second (exit) end of an embodiment of a housing and a nozzle extending therefrom of the present disclosure.

FIG. **3**B is a pictorial representation of an end view of the second (exit) end of the housing of FIG. **3**A.

FIG. **4**A is a pictorial representation of an exploded front view of an embodiment of a system for dispensing personalized toothpaste including the assembled device of FIG. **1**A and an embodiment of a dispenser, in this case, a plunger, connectable thereto for moving components of a toothpaste from the interchangeable cartridges out through the nozzle of the housing.

FIG. **4**B is a pictorial representation of an external component, in this case, a toothpaste tube including a complementary connector assembled on an input end of the toothpaste tube for connecting to a second (dispensing) end of the housing.

FIG. **4**C is a pictorial representation of an embodiment of a system including the system of FIG. **4**A, assembled with the toothpaste tube of FIG. **4**B.

FIG. **4**D is a pictorial representation of a connector configured to removably attach the housing to the toothpaste tube of FIG. **4**B.

FIG. **5**A is a pictorial representation of a portion of a back of an embodiment of a housing of the present disclosure, showing an embodiment of a mounting component.

FIG. **5**B is a pictorial representation of an embodiment of a complementary mounting component assembled on a vertical surface configured for mounting the housing of FIG. **5**A thereto via the mounting component.

FIG. **5**C is a pictorial representation of an embodiment of a device of the present disclosure partially assembled and aligned for mounting to a vertical surface via embodiments of the mounting component and the complementary mounting component.

FIG. **5**D is a pictorial representation of another embodiment of a device of the present disclosure mounted on a vertical surface, and including a mixing nozzle interchangeably connected to the nozzle of the housing.

FIG. **6**A is a pictorial representation of an exploded side view of another embodiment of a system, for dispensing personalized toothpaste into, for example, a toothpaste tube, including another embodiment of a housing and interchangeable cartridges, and an embodiment of a dispenser, in this case, a plunger, connectable thereto for moving components of a toothpaste from the interchangeable cartridges out through the nozzle of the housing.

FIG. **6**B is a pictorial representation of the system of FIG. **6**A, assembled with the dispenser and toothpaste tube.

FIG. **7**A is a pictorial representation of a side view of an embodiment of the interchangeable cartridges for assembling in the system of FIG. **6**A.

FIG. **7**B is a pictorial representation of a side view of an embodiment of the interchangeable cartridges for assembling in the system of FIG. **4**A.

FIG. **7**C is a pictorial representation of additional, different primary and secondary cartridges that are interchangeable with the primary and secondary cartridges provided with the device.

FIG. **8** is a pictorial representation of a front view of another embodiment of a system, for dispensing personalized toothpaste in this case, directly onto a toothbrush, including any of the embodiments of a housing and interchangeable cartridges of the present disclosure, and an embodiment of a dispenser, in this case, a vacuum-operable dispenser, connectable to the nozzle of the housing for moving components of a toothpaste from the interchangeable cartridges out through the nozzle of the housing.

The various aspects of the present disclosure mentioned above are described in further detail with reference to the aforementioned figures and the following detailed description of exemplary embodiments.

DETAILED DESCRIPTION

Particular illustrative embodiments of the present disclosure are described hereinbelow with reference to the accompanying drawings; however, the disclosed embodiments are merely examples of the disclosure, which may be embodied in various forms. It should be apparent to those skilled in the art that the described embodiments provided herein are illustrative only and not limiting, having been presented by way of example only. All features disclosed in this description may be replaced by alternative features serving the same or similar purpose, unless expressly stated otherwise. Therefore, numerous other embodiments of the modifications thereof are contemplated as falling within the scope of the present disclosure of a device and system for mixing and dispensing a personalized toothpaste as defined herein and equivalents thereto. Well-known functions or constructions and repetitive matter are not described in detail to avoid obscuring the present disclosure in unnecessary or redundant detail. Therefore, specific structural and functional details disclosed herein are not to be interpreted as limiting. In this description, as well as in the drawings, like-referenced numbers represent elements which may perform the same, similar, or equivalent functions.

Throughout the description, where items are described as having, including, or comprising one or more specific components or features, or where methods are described as having, including, or comprising one or more specific steps, it is contemplated that, additionally, there are items of the present disclosure that consist essentially of, or consist of, the one or more recited components or features, and that there are methods according to the present disclosure that consist essentially of, or consist of, the one or more recited processing steps.

The present disclosure is directed to a device and a system for personalizing a toothpaste. The present disclosure is also directed to a device and system for personalizing a toothpaste that may be attractive for use by children, with the advantageous effect of encouraging children to brush their teeth on a daily basis.

The terms "mating" and "complementary" are used interchangeably to refer to one half of a connector assembly, for example, a connector assembly may include a (e.g., male) connector of the connector assembly which fits or interconnects with a "complementary" or "mating" (e.g., female) connector. For example, an "alignment element" and a "mating alignment element" on two different interconnecting parts of the device of the present disclosure together form a connector assembly for connecting the two parts

together in a predetermined rotational orientation. The phrase "alignment element" is used as a naming convention for the connector assembly on those particular parts of the device and is not intended to invoke a means-plus-function interpretation. Likewise a "connector" on one component and a "complementary" or "mating connector" on another interconnecting component of the system of the present disclosure

Referring to FIGS. **1**A-**1**C, an embodiment of a device **10** for personalizing a toothpaste includes a housing **14** configured to retain at least two cartridges **16** (FIG. **1**), which may be in the shape of tubes or cylinders in embodiments. Each cartridge **16**, which may be referred to as a tube or cylinder in regard to the embodiments shown in the figures, contains, and particularly for the kits of the present disclosure is preferably prefilled with, one or more components of a toothpaste, which when mixed or blended form a personalized toothpaste of the present disclosure. In embodiments, each of the cartridges **16** is separately insertable, removable, and replaceable with a different cartridge **16'**, i.e., interchangeable. In other embodiments, the cartridges **16** may form a single unit that is interchangeable with another unit comprising the two cartridges. Referring to FIGS. **1**A, **1**B, **3**A and **3**B, for example, the housing **14** includes a nozzle **18**, a first (insertion) end **20** and a second (extrusion) end **22**. In embodiments, the nozzle **18** is a hollow cylinder that extends from the second end **22** of the housing. When the cartridges **16** are installed in the housing **14** for use, an entrance port **40** of the nozzle **18** is aligned in fluid connection with both cartridges **16** to receive and blend together the components therefrom within the nozzle **18** for extrusion directly onto a user's toothbrush, or in embodiments, into a toothpaste tube for later use. Referring to FIGS. **4**A and **8**, for example, the housing **14** is connectable to, and in embodiments, is configured to fluidly connect the components of the two cartridges **16** to, a dispenser **15** (FIG. **4**A), **15'** (FIG. **8**) that is operable to move the components from each of the cartridges **16** into, through, and out of the nozzle **18** to dispense the personalized toothpaste in use, wherein the personalized toothpaste exiting the nozzle **18** is a blend of the components from the cartridges **16**.

Referring again to FIG. **4**A and FIG. **8**, for example, an embodiment of a system **12** and **32**, respectively, may include an embodiment of the device **10** of the present disclosure and at least an embodiment of the dispenser **15**, **15'**, for example.

In an embodiment of the system **12**, referring to FIGS. **4**A, the dispenser **15** includes a plunger **24**. The plunger **24** may be formed of two connected plungers **28** slidably insertable via the first end **20** of the housing **14** into each cartridge **16** retained in the housing **14** and each of the connected plungers **28** is configured to move the contents or components of each cartridge **16** toward the second end **22** of the housing **14**. In the embodiments shown, the two connected plungers **28**, a first plunger **25** and second plunger **26**, are cylinders that fit into cartridges **16**, which in embodiments, are of a tubular shape. The connected plungers **28** are connected together, in embodiments, at an outer end **30** of the plunger **24**, which may include a protruding rim **35**, in embodiments, to ensure the contents in each cartridge **16**, which form the components of the toothpaste, are moved simultaneously, at the same rate, toward the second end **22** of the housing **14**. In embodiments, an inner end **34** of each of the connected plungers **28**, which is slidably inserted into each cartridge **16**, has a flat, solid end surface **36**, for moving, or pushing, the contents of each cartridge **16** toward the second end **22** of the housing **14** and into the nozzle **18**.

In embodiments, such as the device shown in FIG. **4**A, the two connected plungers **28** may be in the shape of two cylinders. In further embodiments, the plunger **24** may be any suitable plunger **24** that is appropriately sized and shaped for the cartridges **16** used. It should be apparent to one of ordinary skill in the art that cartridges **16** in the shape of a rectangular prism, or any other suitable shape, are within the scope of the present invention, together with a suitably shaped plunger **24** and housing **14** to accommodate the shape of the cartridges **16**.

In embodiments of the device **10**, the cartridges **16** may each have the same diameter, with each of the two connected plungers also having the same diameter, such that equal amounts of the contents of each are blended together to form the personalized toothpaste extruded from the nozzle **18**.

Referring still to FIG. **4**A, the cartridges **16**, in embodiments, may be referred to as a primary cartridge **42** and a secondary cartridge **46**, and are also referred to herein as an interchangeable primary cartridge **42** and interchangeable secondary cartridge **46** for emphasis. The primary cartridge **42** contains components found in most commercial toothpastes, and may include at least one or more of a fluoride, abrasive, humectant, and detergent, and may be, in embodiments, in the form of a paste. In other embodiments, the components or contents are in the form of a gel. The components of the secondary cartridge **46** of the at least two cartridges **16**, in embodiments, include flavorings and food colorings, and may additionally include, in embodiments, some or all of the components contained in the primary cartridge **42**. The personalized toothpaste is formed by insertion of a user's choice of a secondary cartridge **46** in the housing **14**, based on which flavorings and colorings are included in the secondary cartridge **46** that is chosen.

In embodiments, one of the cartridges **16**, in one embodiment, the primary cartridge **42**, has a diameter that is larger than that of the other, in one embodiment, the secondary cartridge, such that more of the contents of the larger cartridge are extruded out through the nozzle **18** than the contents of the smaller cartridge, which may be the flavorings and colorings in the secondary cartridge **46**. In particular embodiments, the diameter of one of the cartridges **16**, in embodiments, the primary cartridge **42**, is two times, and in further embodiments, four times, larger that the diameter of the other cartridge **16**, in embodiments, the secondary cartridge **46**. In the system **12** shown in FIG. **4**A, wherein the dispenser **15** includes connected plungers **28**, each of the connected plungers **28** is sized to fit into the diameter of each of the primary **42** and secondary cartridges **46**.

In the device **10** shown in the accompanying figures, the housing **14** has a substantially oval cross-sectional profile due to the configuration of the cartridges **16** being positioned side by side and parallel to one another, and due to the cylindrical shape of the cartridges **16** shown in the embodiment. In other embodiments, the cross-sectional profile may be rectangular.

It should be noted that plungers are known in the prior art for mixing two-component adhesives, but these are configured with the components already loaded into each side of a dual cartridge unit, into which the plunger is directly inserted. A mixing nozzle is also required to be attached to the output spout of the cartridge unit for mixing the two-component epoxy, and the output spout of the commercial systems require a divider to prevent mixing of the components within the output spout. In contrast, the nozzle **18** of the device of the present disclosure is hollow, such that the components from each of the two cartridges **16** mix or blend together within the nozzle **18**. There is no known structure

which includes a housing which allows each cartridge **16** individually, or in embodiments as a unit including two cartridges, filled with the components or not, to be inserted, and removed, and replaced with another, as is the case with the interchangeable cartridges **16** and housing **14** of the present disclosure. There is likewise nothing in the prior art that contemplates the device of the present disclosure for personalizing toothpaste.

The interchangeability of the cartridges **16** in embodiments is facilitated in part by the construction of the housing **14**, which includes retaining chambers **55**, e.g., a first retaining chamber **58** and a second retaining chamber **60**, as best shown in FIGS. **1**A-**1**C, configured for positioning the cartridges **16**, e.g., the primary cartridge **42** and the secondary cartridge **46**, in a predetermined rotational orientation (also referred to herein as "predetermined orientation") in the housing **14**, such that the contents of each of the cartridges **16** are in fluid communication with the entrance port **40** of the mixing nozzle **38**. The second retaining chamber **60** is parallel to the first retaining chamber **58** and positioned perpendicularly between the first end **20** and the second end **22** of the housing **14**. Each of the first **58** and the second retaining chamber **60** is sized and shaped to receive therein and remove therefrom, respectively, the interchangeable primary cartridge **42** and the interchangeable secondary cartridge **46**.

In embodiments, referring to FIGS. **1**A, **1**C, for example, each retaining chamber **55** is formed in a body **56** of the housing **14**, and in further embodiments, is formed as a hollow cylinder bored into the body **56**.

Embodiments of the housing **14** and the cartridges **16** as shown in the figures are configured to individually install each cartridge **16** in the housing **14** in a predetermined orientation for fluid communication with the nozzle **18** and to individually remove each cartridge **16** for replacement. It should be understood that the same features for aligning, and, optionally, locking the cartridges **16** in a predetermined orientation may be positioned on a unit (not shown) that includes both cartridges **16** for aligning and locking the unit and thereby the cartridges **16** in the predetermined orientation.

Referring to FIGS. **1**A and **1**B, each cartridge **16** has a first (input) end **62** and, referring also to FIG. **2**, a second (output) end **66** and, an interior **68** (FIG. **1**C), which in embodiments is formed as the interior **68** of a hollow cylinder for holding the components of the toothpaste. In embodiments, the cartridges **16** are pre-filled with the components.

In embodiments, as shown in FIG. **2**, each cartridge **16** has an end surface **64**, which is solid, except for an opening, or cutout **70**, and in embodiments, flat. An interior surface **72** of the second end **22** of the housing is preferably shaped to the contour of the end surface **64**. In the embodiments shown in FIGS. **1**A-**5**D, as inferred, for example, from FIGS. **1**A, **3**A, **3**B, the interior surface **72** of the housing **14** is also flat, so that the end surface **64** of each cartridge **16** abuts the interior surface **72** of the housing **14**.

In a different embodiment shown in FIGS. **6**A, **6**B, **7**A the end surface **64** of each cartridge **16'** is solid, except for the opening **70**, and is tapered inward. The interior surface **72** of the housing **14** is likewise tapered to follow the contour of the second end **66** of the cartridge **16'** (see FIG. **7**A). For use as installed, the cartridges **16** are oriented in the housing **14** (the orientation of the openings **70** is best shown in FIG. **2** and in FIG. **3**B) such that the openings **70** are adjacent to each other and aligned within the inner diameter of the entrance port **40** of the nozzle **18**, such that each is in fluid communication with the entrance port **40** of the nozzle **18**.

Referring to FIGS. **7**A, **7**B, the cartridges **16**, **16'** may be provided pre-filled with the components of a toothpaste as an after-market product or with a kit formed in accordance with the present disclosure. In embodiments, each pre-filled cartridge **16**, **16'** may include a pull-off tab **50** over at least the first end **62**, and in further embodiments, likewise over the opening **70** in the second end **66**.

As described herein, the components, or contents, of each one of the cartridges **16**, once the cartridges **16** are loaded and aligned in the proper predetermined orientation for use in the housing **14**, are moved from each of the primary and the secondary cartridge into, through, and out of the nozzle to dispense the personalized toothpaste in use, wherein the personalized toothpaste exiting the nozzle is a blend of the components from the primary cartridge and the secondary cartridge. In embodiments, wherein the dispenser **15** includes plungers **28**, the contents may be pushed down and out of the cartridge **16** by a user applying a pushing force, in embodiments, on the outer end **30**, such that the flat, solid end surface **36** of each of the connected plungers **28** is translated to move the contents through the nozzle **18**.

However, any dispenser **15** may be configured with a device formed in accordance with the present disclosure to move the components from the cartridges **16** into, through, and out of the nozzle **18** to dispense the personalized toothpaste in use. The personalized toothpaste may be dispensed directly onto a user's toothbrush or into a toothpaste tube for later use.

For example, another embodiment of a dispenser **15** may include an automated vacuum extrusion dispenser **80**, represented in FIG. **8**. The vacuum extrusion dispenser **80** includes a second (output) nozzle **82** of the vacuum extrusion dispenser **80**, which is aligned in fluid communication with the nozzle **18** of the device **10**, which in turn is aligned in fluid connection with both the primary cartridge **42** and the secondary cartridge **46** to receive the components therefrom. The vacuum-operable dispenser **80** includes a vacuum extrusion pump **84** that forms a vacuum seal at the end of the second nozzle **82**, a valve **86** operable to release the vacuum seal, and a depressible tab **88** operably connected to the valve **86**, wherein in use, the personalized toothpaste is dispensed by a user pushing a toothbrush against the depressible tab **88** thereby opening the valve **86** and releasing the vacuum seal to move the components from each of the primary **42** and the secondary cartridge **46** into, through, and out of the nozzle **18** and the second nozzle **82** to dispense the personalized toothpaste directly onto a toothbrush.

In embodiments, still referring to FIG. **8** and to FIGS. **3**A, **3**B, **4**A, **4**D, for example, the housing **14** may include a connector **74** fixedly positioned on the second end **22** of the housing **14** for connecting an external component **75** thereto. The external component **75** may be a component of the vacuum extrusion pump **84**, for example. In other embodiments of the system represented in FIGS. **4**A-**4**D, the external component **75** may include an attachable adaptor **90** configured to attach the nozzle **18** to an open end, and in fluid communication with the interior **92**, of a toothpaste tube **94**, via a bore hole **73** though the attachable adaptor **90** for dispensing the personalized toothpaste into the toothpaste tube **94**, as shown in FIG. **4**C. The connector **74** is configured, in embodiments, to removably attach to a complementary connector **76** on the external component **75**.

In embodiments, the connector **74** and the complementary connector **76** may form any suitable connector assembly known in the prior art, and may include, but are not limited to, snap-fit connectors, and twist and lock connectors.

To connect the external component **75** to the housing **14** without interfering with the flow through the nozzle **18**, the connector **74** may include, in embodiments, connecting elements **78** positioned on either side of the nozzle **18**, and the external component **75** may include complementary connecting elements **79** (see FIG. **4**D) positioned on either side of the bore hole **73** through the external component **75** for interconnecting with the connecting elements **78** and fluidly connecting the toothpaste tube **94** with the nozzle **18**.

In other embodiments, the external component **75** may be an attachable ring including the complementary connector **76**, e.g., as shown on the attachable adaptor **90** in FIG. **4**D, configured to interchangeably attach the attachable ring to the nozzle **18**, wherein the attachable ring is shaped and configured to alter the perimetral shape of the personalized toothpaste dispensed in use from the device from its otherwise circular shape.

In still other embodiments, referring to FIG. **5**D, the external component **75** may be an extended nozzle **96**, which may include baffles **98** for static mixing of the components from the primary cartridge **42** and secondary cartridge **46** as they move from the nozzle **18** through the extended nozzle **96**.

In embodiments, methods for personalizing toothpaste in accordance with the present disclosure includes providing any of the embodiments of the device of the present disclosure. The method may further include loading the primary cartridge **42** and the choice of the secondary cartridge **46** from a variety of cartridges **16** provided, for example, in a kit, in the housing **14** of the device **10**. The method additionally includes providing a dispenser, connecting the dispenser **15** to the housing **14** and in fluid connection with the contents of the cartridges **16**, and operating the dispenser to move the components from each of the primary **42** and the secondary cartridge **46** into, through, and out of the nozzle **18** to dispense the personalized toothpaste in use. The personalized toothpaste exiting the nozzle **18** is a blend of the components from the primary cartridge **42** and the secondary cartridge **46**. In embodiments, the dispenser **15** includes a plunger **24**, the method including depressing a plunger **24** into a first (input) end of the cartridges **16** to move the components from each of the primary **42** and the secondary cartridge **46** into, through, and out of the nozzle **18** to dispense the personalized toothpaste in use directly onto a brush for immediate use.

In other embodiments, the dispenser **15** is the vacuum extrusion dispenser **80**, the method including a user pushing the depressible tab **88** with a toothbrush thereby opening a valve **86** that releases the vacuum seal at the nozzle **18** to move, e.g., extrude, the components from each of the primary **42** and the secondary cartridge **46** into, through, and out of the nozzle **18** and the second nozzle **82** to dispense the personalized toothpaste directly onto the toothbrush for immediate use.

In additional embodiments, referring again to FIGS. **4**A-**4**D, the personalized toothpaste may be dispensed into a toothpaste tube **94** for later use. Embodiments of a method for dispensing a personalized toothpaste into the toothpaste tube **94** may include providing a toothpaste tube **94**, removing a cap from the toothpaste tube **94** and replacing it with the attachable adaptor **90** shown in FIG. **4**D, for example, which includes a threaded inner diameter **95** for threadedly connecting the attachable adaptor **90** to the toothpaste tube **94**, via threads **93** on the outer diameter of the open end **92** of the toothpaste tube **94**, and connecting a proximal end **97** of the attachable adaptor **90**, in embodiments, via the complementary connector **76**, to the nozzle **18** of the device **10**. The method further includes operating the dispenser **15** to move the components from each of the primary **42** and the secondary cartridge **46** into, through, and out of the nozzle **18** and into the toothpaste tube **94** via the attachable adaptor **90** to dispense the personalized toothpaste into the toothpaste tube **94** for later use. Once an acceptable amount of the personalized toothpaste is dispensed into the toothpaste tube **94**, the method may include detaching the attachable adaptor **90** from the toothpaste tube **94** and reattaching the cap provided with the toothpaste tube **94** to store for later use.

In embodiments of the devices, systems, and methods of the present disclosure, the cartridges **16** are preferably installed or loaded in a predetermined orientation in the housing **14**, as described herein, for fluidly connecting the nozzle **18** to the contents of the cartridges **16** via the openings **70**, and the cartridges **16** and the housing **14** are configured to insure the installation in the predetermined orientation. In embodiments of the method and device of the present disclosure, before the step of loading or installing the cartridges **16**, the tab(s) **50**, if provided on the cartridges **16**, are first removed from the ends of each of the primary **42** and secondary cartridges **46** chosen by the user to obtain the desired qualities of the personalized toothpaste. Each of the primary **42** and secondary cartridges **46**, in embodiments, is then loaded, in embodiments, into a corresponding one of the retaining chambers **55** of the housing **14** that the cartridge **16** fits into, in a predetermined rotational orientation, and with the output end **66** of the cartridge **16** inserted first so that it is adjacent the nozzle **18** upon installation. In embodiments, the cartridges **16** are loaded prior to coupling, or operably connecting, the housing **14** with the dispenser **15**.

Referring to FIGS. **1**A, **6**A, and **7**A, **7**B, for example, at least one of the retaining chambers **55** and at least one of the cartridges **16** is preferably configured with an alignment element **100**, **102**, respectively, for positioning the cartridges **16** in fluid connection with the nozzle **18**. In embodiments, the first **58** and the second retaining chamber **60** each includes an alignment element **100** positioned to receive the primary cartridge **42** and the secondary cartridge **46**, respectively, in a predetermined rotational orientation, and each of the primary cartridge **42** and secondary cartridge **46** includes a mating alignment element **102** that cooperates with the alignment element **100** to seat each of the primary cartridge **42** and secondary cartridge **46** in the predetermined rotational orientation. In embodiments in which each cartridge **16** is independently insertable in the housing **14**, each retaining chamber **55** and each cartridge **16** includes an alignment element **100** and mating alignment element **102**. In embodiments in which the cartridges **16** are connected to form a single unit, either one or both cartridges **16** and the corresponding one or both retaining chambers **55** may include alignment and mating alignment elements **100**, **102**.

In further embodiments, the alignment and mating alignment elements **100**, **102** may further include a reversible locking element and mating locking element **104**, **106**, respectively, for retaining the cartridges **16** in the retaining chambers **55** until the reversible locking elements **104**, **106** are disengaged by a user.

The alignment and mating alignment elements **100**, **102** with reversible locking elements **104**, **106** may include, but are not limited to, any suitable reversible locking connector, such as a clip-type connector assembly, or a snap-fit connector assembly.

In embodiments, the alignment element **100** on the retaining chamber **55** may be a groove, depression, or a cutout and the alignment element **102** on the cartridge **16** may be an

arm, pin, or any protrusion **110** attached at least to a proximal end **112** to the cartridge **16**, wherein the alignment elements **100**, **102** are positioned such that sliding the arm **110** along the groove **108** to install the cartridge **16** orients the opening **80** of the cartridge **16** in fluid connection with the nozzle **18**. In the embodiment of FIGS. **1**A-**1**C, for example, the alignment elements **102** are positioned on a front side **114** of the housing **14**, and the openings **70** are rotationally oriented inward by ninety degrees, in opposite directions, so that the openings **70** in the cartridges are adjacently positioned when the cartridges **16** are assembled via the alignment elements **100**, **102**. In the embodiment of FIGS. **6**A, **6**B, the alignment elements **100**, **102** are positioned on an outer side **118** of each of the retaining chambers **55**, and an outer side **120** of the cartridges **16**, when installed, so that the openings **70** are rotationally aligned 180 degrees from the alignment elements **100**, **102**. As one of skill in the art will appreciate, any number of possible positions of the alignment elements **100**, **102** is feasible, as long as the correct relative orientation of the openings **70** in the cartridges **16** is maintained.

Still referring to FIGS. **1**A, **6**A, and **7**A, **7**B, in embodiments, the arm **110** on the cartridges **16** may be a deflectable arm **110**, and the reversible locking element **104** on the retaining chamber **55** may include a catch **124**, which may be a bar **124** over a central portion of the groove **108**. The mating reversible locking element **106** then preferably includes a protrusion **122** on a distal end **125** of the deflectable arm **110**. In use, the deflectable arm **110** deflects downward as the protrusion **122** slides under the catch **124**, and deflects upward once the protrusion **122** passes the catch **124** and clicks into position for use. The cartridge **16** remains in that position until a user pushes down on the protrusion **122** and slides the deflectable arm **110** back past the catch **124** to remove the cartridge **16**.

In embodiments, the reversible locking elements **104**, **106** may include any suitable connector and mating connector for interlocking the cartridges **16** in the predetermined orientation to the housing **14**, including, but not limited to, a clip, snap-fit, or detent connector.

Referring now to FIGS. **5**A-**5**D, the housing **14** includes the front side **114**, as also referenced in FIG. **1**A, and a back side **116** opposite the front side **114**. In embodiments, a mounting component **126** is positioned on the back side **116**, wherein the mounting component **126** is configured to attach to or hang from a mating mounting component **128** that is fixed to a vertical surface **130**, which may be a wall in embodiments, via mounting hardware **132**, for example, such as screws, nails, and so on, with the nozzle of the housing facing downward. The mounting component **126** and mating mounting component **128** may comprise two parts that together form any suitable mounting assembly, including, but not limited to, two parts of a French cleat system. In the embodiment of FIG. **6**A, for example, the mounting component **126** is a part of a French cleat system configured to hang from an appropriately shaped mating mounting component **128**. In the embodiment shown in FIGS. **5**A-**5**D, the mounting component **126** includes a protruding bar **134** with a vertical borehole **136** therethrough, and the mating mounting component **128** includes a dowel **138** vertically positioned to accept the borehole **136** for mounting the housing **14** to the vertical surface **130**.

The present invention is intended to encourage a child to adapt good daily dental hygiene habits by engaging the child in the process of flavoring, coloring, and personalizing the toothpaste the child will use. It is also a goal of the present invention to teach the child what is a suitable amount of toothpaste to use, referred to herein as a single use dollop of toothpaste.

Referring still to FIG. **6**A, in a system in which the dispenser **15** is the plunger **24**, the plunger **24** may include demarcations **140** on at least one of a front **142** and a side **144** of the plunger **24**, wherein depressing the plunger **24** a distance into the primary **42** and the secondary cartridges **46** equal to the distance between a demarcation **140** and its neighboring demarcation **140'** will dispense a predetermined volume of the personalized toothpaste suitable for a single use dollop. The child may line up one of the demarcations **140** with a top of the housing **14**, for example, and with each use, depress the plunger **24** until the neighboring demarcation **140'** is aligned with the top of the housing **14** or with another indicator provided on the housing **14**. The demarcations **140**, in embodiments, may be color coded to more easily identify how far to push the plunger **24** for a single use.

In other embodiments, referring to FIG. **5**D, the demarcations **140** may be provided on the vertical surface **130** or on an overlay positioned on the vertical surface **130**, e.g., a wall. In still further embodiments, referring to FIG. **5**D, a slidable stop **146** may be provided on the vertical surface **130**, wherein the slidable stop **144** is configured to allow a user to vertically slide it down from its initial position right below the rim **35** of the outer end **30** of the plunger **24**, which also corresponds to a demarcation **140** to a predetermined locked position corresponding to the next demarcation **140'**. In this way, the user can only push the plunger **24** until the rim **35** hits the properly positioned slidable stop **144**. The slidable stop **144** would then need to be positioned downward to the next demarcation **140** for the next use.

In other embodiments, the dispenser **15** may be configured to dispense a single use dollop, for example, wherein the dispenser **15** is a vacuum extrusion dispenser **80**.

In other embodiments, each of the interchangeable primary cartridge **42** and the interchangeable secondary cartridge **46** provided, in a kit, for example, is sized to dispense through the nozzle **18** no more than a predetermined volume of the components that equals a single use dollop of the personalized toothpaste.

In still other embodiments, each of the interchangeable primary cartridge **42** and the interchangeable secondary cartridge **46** provided, in a kit, for example, is sized to dispense through the nozzle **18** a plurality of single use dollops. In still other embodiments, referring, for example, to FIG. **7**B, the contents of at least one of the secondary cartridges **46** provided, for example, in a kit, are arranged in vertically ordered columns **148**, each vertically ordered column **148** including a different flavoring, and wherein each different flavoring has a different color, a volume of the contents in each of the vertically ordered columns **148** together with the contents of the primary cartridge **42** that will be simultaneously dispensed equals a single use dollop. Accordingly, dispensing only an amount of the personalized toothpaste of the same color will equal a single use dollop.

Embodiments of a kit of the present disclosure may include any of the embodiments of the device **10** of the present disclosure and may further include the primary cartridge **42**, and in embodiments, at least one different cartridge **42'** interchangeable therewith, referring to FIG. **7**C, for example, filled with at least one or more of a fluoride, abrasive, humectant, and detergent. The kit may also include the secondary cartridge **46**, and, in embodiments, at least one different secondary cartridge **46'** replaceable therewith, wherein the secondary cartridge **46** and the at least one

different secondary cartridge **46'** includes at least one of a flavoring and a food coloring. In further embodiments, a plurality of the secondary cartridges **46**, **46'** is provided, each filled with at least one different flavoring, and/or at least one different coloring.

In embodiments, the kit may further include an embodiment of the mounting component **126**, and in embodiments, also the mating mounting component **128**, and in further embodiments, suitable hardware for mounting.

In further embodiments, the kit may include an embodiment of the dispenser **15**. In further embodiment, the kit may include at least one toothpaste tube **94**, and the attachable adaptor **90**.

While particular embodiments of the present disclosure have been particularly shown and described with reference to specific embodiments, it should be apparent to those skilled in the art that the foregoing is illustrative only and not limiting, having been presented by way of example only. It is to be understood that the disclosed embodiments are merely examples of the disclosure, which may be embodied in various forms and detail without departing from the spirit and scope of the disclosure. Therefore, specific structural and functional details disclosed herein are not to be interpreted as limiting. Numerous other embodiments may fall within the scope of the accompanying claims and equivalents thereto.

What is claimed is:

1. A device for blending and dispensing a personalized toothpaste, comprising:

a housing including a first end and a second end, and a first retaining chamber and a second retaining chamber parallel to the first retaining chamber and positioned perpendicularly between the first end and the second end, and wherein each of the first retaining chamber and the second retaining chamber is sized and shaped to receive therein and remove therefrom, respectively, a primary cartridge and a secondary cartridge, which are configured to be interchangeable with different primary cartridges and secondary cartridges, respectively, wherein contents of each of the primary cartridge and the secondary cartridge include components of a personalized toothpaste; and

a nozzle extending from the second end of the housing and aligned in fluid connection with both the primary cartridge and the secondary cartridge to receive the components therefrom;

wherein the housing is operably connectable with a dispenser that is operable to move the components from each of the primary and the secondary cartridge into, through, and out of the nozzle to dispense the personalized toothpaste in use, wherein the personalized toothpaste exiting the nozzle is a blend of the components from the primary cartridge and the secondary cartridge; and

wherein the first and the second retaining chamber each includes an alignment element positioned to receive the primary cartridge and the secondary cartridge, respectively, in a predetermined rotational orientation, and each of the primary cartridge and the secondary cartridge includes a mating alignment element that cooperates with the alignment element to seat each of the primary cartridge and the secondary cartridge in the predetermined rotational orientation.

2. The device of claim **1**, wherein the contents of the primary cartridge include at least one or more of a fluoride, abrasive, humectant, and detergent, and the contents of the secondary cartridge include at least flavorings and food colorings.

3. The device of claim **1**, wherein the contents of each of the primary cartridge and the secondary cartridge are in the form of a gel.

4. The device of claim **1**, wherein the contents of each of the primary cartridge and the secondary cartridge are in the form of a paste.

5. The device of claim **1**, further including the dispenser operably connected with the housing in use.

6. The device of claim **1**, wherein the primary cartridge and the secondary cartridge are sized to dispense through the nozzle no more than a predetermined volume of the components that equals a single use dollop of the personalized toothpaste.

7. The device of claim **1**, wherein the device is configured, in cooperation with the dispenser, to dispense a predetermined single use dollop of the personalized toothpaste.

8. The device of claim **2**, wherein the contents of the secondary cartridge are arranged in vertically ordered columns, each vertically ordered column including a different flavoring, and wherein each different flavoring has a different color.

9. The device of claim **1**, wherein the housing includes a front side and a back side, and a mounting component positioned on the back side, wherein the mounting component is configured to attach to or hang from a mating mounting component that is fixed to a vertical surface, with the nozzle of the housing facing downward.

10. A system including the device of claim **1**, the system further including the dispenser operably connected with the housing in use, and an external component connectable to the nozzle, and a connector fixedly positioned on the second end of the housing, wherein the external component includes a complementary connector configured to removably attach the external component to the housing via the connector and to be in fluid connection with the nozzle.

11. The system of claim **10**, wherein the external component is an attachable adaptor configured to attach the nozzle to an open end of a toothpaste tube for dispensing the personalized toothpaste into the toothpaste tube in use.

12. The system of claim **10**, wherein the dispenser includes a plunger insertable into the first end of the housing and alignable in fluid connection with each of the primary cartridge and the secondary cartridge, wherein in use, the personalized toothpaste is dispensed by a user applying a force on the plunger to move the components from each of the primary and the secondary cartridge into, through, and out of the nozzle.

13. The system of claim **10**, wherein the dispenser includes a vacuum-operable dispenser including a second nozzle in fluid connection with an output end of the nozzle, wherein the vacuum-operable dispenser includes a vacuum extrusion pump that forms a vacuum seal at the exit end of the nozzle, a valve operable to release the vacuum seal, and a depressible tab operably connected to the valve, wherein in use, the personalized toothpaste is dispensed by a user pushing a toothbrush against the depressible tab thereby opening the valve and releasing the vacuum seal to move the components from each of the primary and the secondary cartridge into, through, and out of the nozzle and the second nozzle.

14. A kit for creating, storing, and dispensing a personalized toothpaste, comprising:

a device for blending and dispensing a personalized toothpaste, the device including:

a housing including a first end and a second end, and a first retaining chamber and a second retaining chamber parallel to the first retaining chamber and positioned perpendicularly between the first end and the second end, and wherein each of the first retaining chamber and the second retaining chamber is sized and shaped to receive therein and remove therefrom, respectively, a primary cartridge and a secondary cartridge, which are configured to be interchangeable with a different primary cartridge and a different secondary cartridge, respectively, wherein contents of each of the primary cartridge and the secondary cartridge and the different primary cartridge and the different secondary cartridge include components of a personalized toothpaste; and

a nozzle extending from the second end of the housing and aligned in fluid connection with both the primary cartridge and the secondary cartridge to receive the components therefrom; and

wherein the housing is operably connectable with a dispenser that is operable to move the components from each of the primary and the secondary cartridge into, through, and out of the nozzle to dispense the personalized toothpaste in use, wherein the personalized toothpaste exiting the nozzle is a blend of the components from the primary cartridge and the secondary cartridge; and

wherein the first and the second retaining chamber of the device each include an alignment element positioned to receive the primary cartridge and the secondary cartridge in a predetermined rotational orientation, and each of the primary cartridge and the secondary cartridge includes a complementary alignment element that cooperates with the alignment element to seat each of the primary cartridge and the secondary cartridge in the predetermined rotational orientation:

the kit further including the primary cartridge filled with at least one or more of a fluoride, abrasive, humectant, and detergent; and at least one of the secondary cartridge and the different secondary cartridge, wherein the at least one of the secondary cartridge and the different secondary cartridge includes at least one of a flavoring and a food coloring.

15. The kit of claim **14**, wherein the housing of the device includes a front side and a back side, and a mounting component positioned on the back side, wherein the mounting component is configured to attach to or hang from a complementary mounting component that is fixed to a vertical surface, with the nozzle of the housing facing downward, the kit further including a mounting assembly including the complementary mounting component.

16. The kit of claim **14**, wherein the device further includes at least one external component connectable to the nozzle, and a connector fixedly positioned on the second end of the housing, wherein the at least one external component includes a complementary connector configured to removably attach the at least one external component to the housing via the connector and to be in fluid connection with the nozzle.

17. The kit of claim **16**, further including at least one toothpaste tube, and wherein the at least one external component includes an attachable adaptor configured to attach the nozzle to an open end of the at least one toothpaste tube for dispensing the personalized toothpaste into the at least one toothpaste tube, the attachable adaptor including the complementary connector, a bore hole that fluidly connects the nozzle to an interior of the at least one toothpaste tube in use, and threads on an interior diameter for threadedly engaging the attachable adaptor to the toothpaste tube via its outer diameter, such that operation of the dispenser with the attachable adaptor positioned on the toothpaste tube and connected via the connector and the complementary connector to the housing dispenses the personalized toothpaste into the toothpaste tube.

18. The kit of claim **14**, wherein the at least one of the secondary cartridge is a plurality of the secondary cartridges, each filled with a different flavoring.

19. The kit of claim **14**, wherein each of the primary cartridge and the secondary cartridge includes a peel-off covering on at least one end of each of the primary cartridge and the secondary cartridge, the peel-off covering being removed in use.

20. The kit of claim **14**, further including the dispenser, wherein the dispenser includes a plunger insertable into the first end of the housing and alignable in fluid connection with each of the primary cartridge and the secondary cartridge, wherein in use, the personalized toothpaste is dispensed by a user applying a force on the plunger to move the components from each of the primary and the secondary cartridge into, through, and out of the nozzle.

21. The kit of claim **14**, further including the dispenser for operably connected with the housing in use, wherein the dispenser includes a vacuum-operable dispenser in fluid connection with an output end of the nozzle, wherein the vacuum-operable dispenser includes a vacuum chamber that forms a vacuum seal at the exit end of the nozzle, a valve operable to release the vacuum seal, and a depressible tab operably connected to the valve, wherein in use, the personalized toothpaste is dispensed by a user pushing a toothbrush against the depressible tab thereby opening the valve and releasing the vacuum seal to move the components from each of the primary and the secondary cartridge into, through, and out of the nozzle.

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