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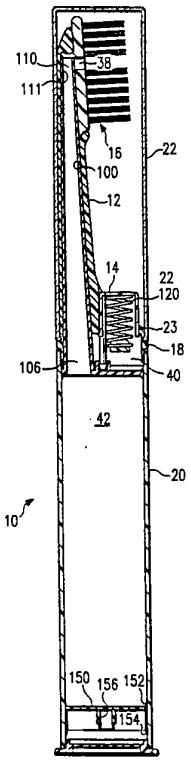
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(54) Title: PASTE DISPENSING BRUSH

(57) Abstract

A toothbrush (10) which dispenses paste has a hollow stem (12) with a bristled head (16), an open bottom, and a discharge aperture (38) at the bristled head (16). A cartridge (20) for containing the paste is attachable to the open bottom. A hollow pump piston (100) is disposed in the hollow stem (12) and is slidable between open and closed positions. A button (40) extends through the stem and engages with the pump piston (100) such that when the button (40) is pressed, the pump piston (100) simultaneously moves to the open position and dispenses paste, and when the button is released, the pump piston simultaneously moves to the closed position and seals the paste inside the toothbrush (10).



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PASTE DISPENSING BRUSH

TECHNICAL FIELD OF THE INVENTION

This invention relates to a paste dispensing brush, and more particularly to a toothbrush with a paste cartridge and a means for dispensing paste from the cartridge onto the brush.

BACKGROUND OF THE INVENTION

Paste dispensing toothbrushes, such as those shown in U.S. Patent No. 4,135,831 to Reitknecht, U.S. Patent No. 4,269,207 to Konrad et al., and U.S. Patent No. 4,201,490 to D'Angelo, are known in the prior art but have experienced only moderate success because of several limitations of their designs. A significant limitation of these designs is that they require, at a minimum, three steps to operate. Before these brushes can be used, the hole(s) opening into the bristles must be opened, a knob at the base of the brush must be turned to dispense toothpaste into the bristles and then finally the hole(s) must be closed again. These steps require multiple manipulations of the toothbrush thus making these brushes commercially undesirable compared to using inexpensive existing toothbrushes with a separate toothpaste container.

The prior paste dispensing toothbrushes generally dispense toothpaste by using a knob at the end of the brush which rotates a cylinder on a threaded shaft. This complicated mechanism consists of several parts, is expensive to manufacture and more prone to breaking. A need exists for a paste dispensing toothbrush which dispenses paste with an inexpensive, simpler, and easier to manufacture mechanism.

In designs which do not have a mechanical means for forcing the toothpaste from the paste container, such as those which have a collapsible paste container, the units do not provide for positive dispensing of the paste and are susceptible to inadvertent dispensing of paste such as when carried during traveling. Thus, a need exists for a

paste dispensing toothbrush which overcomes the limitations found in the prior art designs.

SUMMARY OF THE INVENTION

The present invention provides a paste dispensing toothbrush which is easy to operate and requires fewer steps of operation than the traditional toothbrush or the prior paste dispensing toothbrushes. The toothbrush also dispenses the paste with a simple mechanism that is inexpensive and easy to manufacture. One aspect of the present invention is the combination of a hollow toothbrush and a pumping means to dispense paste onto the toothbrush. The toothbrush comprises a hollow stem with a removable bristled head, a base, and at least one discharge aperture in the bristled head. A cartridge for containing paste is adapted to attach to the base. A pumping means integral with the stem is provided which delivers paste from the cartridge to the bristled head.

In another aspect of the invention, a toothbrush which simultaneously delivers paste and seals the paste in the toothbrush is provided. A pump piston is disposed within the hollow stem and movable between a closed and open position. The pump piston has an upper end that blocks the discharge aperture in the bristled head when in the closed position and slides away from the discharge aperture when in the open position. The pump piston also has a piston disk disposed in the base that has a lower opening. The piston disk protrudes into the cartridge when the pump piston is in the open position. An actuation button extends through the stem and engages the pump piston such that pressing the actuation button moves the pump piston to the open position and extrudes the paste in the cartridge through the orifice of the lower opening of the piston disk, through the upper end and out the discharge aperture. Releasing the actuation button moves the pump piston back to the closed position closing off the discharge aperture.

With such a structure, toothpaste is dispensed into the bristles by pushing the actuation button. The actuation button can be located such that it is naturally reached by a user's thumb when the toothbrush is being grasped for normal use. In this way the toothbrush does not need to be manipulated in any way but only need be grasped and pumped by the thumb for use.

BRIEF DESCRIPTION OF THE DRAWINGS

For a more complete understanding of the present invention, and for further details and advantages thereof, reference is now made to the following Detailed Description taken in conjunction with the accompanying drawings, in which:

FIGURE 1 is a perspective view of the preferred embodiment of the paste dispensing brush of the present invention;

FIGURE 2 is a vertical section taken along lines 2-2 of FIGURE 1;

FIGURE 3 is an exploded view of the top half of FIGURE 2;

FIGURE 4 is a partial vertical section showing the paste dispensing brush in the open position during a pump stroke.

DETAILED DESCRIPTION

Referring now to the drawings, wherein like reference numerals designate like or corresponding parts throughout the several views, FIGURE 1 illustrates the preferred embodiment of the paste dispensing brush unit 10 according to the present invention. Brush unit 10 includes a hollow stem 12 with a bristled head 16 removably attached to one end thereof. Stem 12 has an actuation button 14 integrated into its base 18. Base 18 engages and is removably attached to a paste cartridge 20. A transparent cap 22 fits over stem 12 and bristled head 16 and snaps on base 18. Referring to FIGURE 2, cap 22 removably engages lip 23 formed on base 18.

With reference to FIGURES 2 and 3, the preferred construction of the present invention and its components is shown. Base 18 of hollow stem 12 has male threads 32 which are threadedly received into female threads 34 in open top end 30 of cartridge 20. As can be seen in FIGURE 3, stem 12 has a conical bore 36 therein defining a bottom opening 40 in its base which communicates with the paste chamber 42 defined by cartridge 20. Stem 12 has an opening 48 in its upper end for receiving the bristled head 16 and a opening 50 for receiving actuation button 14. A spring support shelf 60 is formed within stem 12 and has a spring alignment shaft 62 extending therefrom.

Referring now to the brush unit 10 and its attachment to stem 12, as is seen in FIGURE 3, bristled head 16 has a base 76 with a discharge aperture 78 therein. Base 76 receives a plurality of brush bristles 80 which are disposed over substantially the entire area of the base. The opening 48 in the upper end of hollow stem 12 is designed to removably receive head 16. This is achieved

by providing a seat 82 for receiving the lower end 84 of base 76. A tab 86 extends from base 76 of head 16 and has a contoured seat 88 which corresponds to and mates with a downwardly protruding contour 90 formed in the upper end 85 of stem 12. Tab 86 is somewhat flexible so as to provide a snap fit of the tab beyond contour 90 and into head 16 as shown in FIGURE 2.

When head 16 is in the attached position as shown in FIGURE 2, it substantially fully covers the opening 48 and its aperture 38 is adjacent the upper extremity of the bore formed in the stem.

As is seen in FIGURE 3, a pump piston 100 is received within stem 12 and has a piston disk 102 with a conical neck 104 extending therefrom. The piston 100 has a lower opening 106 through disk 102 which feeds into neck 104. The neck has an upper opening 110. In its at-rest position, as shown in FIGURE 2, neck 104 has an outer contour which substantially corresponds to the interior contour of stem 12 such that it will nest therein. Upper end 111 of neck 104 also sealingly engages tab 86 in its at-rest position. In the preferred embodiment, pump piston 100 has a circular or oval cross-section to match hollow stem 12. However, pump piston 100 can have a partial cross-section such as semi-circular or semi-oval, and long as upper end 111 is wide enough to seal across opening 48.

In the preferred embodiment, pump piston 100 also has flange 108 around the periphery of piston disk 102 to sealingly contact the inside surfaces of base 18 and cartridge 20.

As can be seen in FIGURES 2 and 3, button 14 is connected to piston 100 with a spring 120 trapped between the interior of the button 14 and shelf 60. Spring 120 is aligned along shelf 60 by engagement around shaft 62. Button 14 has a back wall 130 having a conical head 132 for snapping engagement into a receiving bore 134 with inturned ears 136 for engaging the upper flared ends 133 of the conical head 132. As can be seen, this design allows the head 132 to be snapped into and captured by bore 134 on disk 102 to connect the button to the disk 102. At the same time, button 14 has outwardly facing tabs 142 and 144, respectively, on its back wall 130 and front wall 140 which engage the lowermost end 146 of stem 12 and inturned ledge 148, respectively. This structure prevents the button 14 from being forced upwardly and out of opening 50 in stem 12.

This geometrically positions piston 100, at rest, at its uppermost position by the action of spring 120 acting between the interior of button 14 and shelf 60. The connection of button 14 to disk 102 also results in the piston 100 being urged by spring 120 to the up position shown in FIGURE 2.

With reference to FIGURE 2, a backup piston 150 is positioned within the paste cartridge on the side of the paste supply opposite pump piston 100. Backup piston 150 is designed with resilient upper and lower said flanges 152 and 154 extending from a piston body 156. Upper flanges and lower flanges are designed to allow the piston to move upwardly in the cartridge but to resist movement downwardly. This is accomplished by the angle of the flanges and by a very slight tapering of the inside of cartridge 20 such that the diameter of cartridge 20 increases very slightly towards open top end 30. In an

alternative embodiment, a metal ring can be attached about the periphery of one or both flanges that will bite into the inside wall of cartridge 20 to resist downward movement. In the preferred embodiment, these backup piston flanges are made from a polypropylene material.

Referring to FIGURES 2 and 4, the operation of the paste dispensing brush is illustrated. Pump piston 100 is movable between a closed position (FIGURE 2) and an open position (FIGURE 4). Upper end 111 blocks aperture 38 when pump piston 100 is in closed position. In the open position, upper end 111 slides down and exposes aperture 38. Piston disk 102 is at the base 18 while pump piston 100 is in closed position and when the pump piece is moved to the open position, piston disk 102 moves into paste chamber 42 of cartridge 20.

To discharge toothpaste to head 16, button 14 is pressed and moves pump piston 100 downwardly extruding paste through lower opening 106, through upper opening 110 and out aperture 38. When button 14 is released, spring 120 forces button 14 upwardly which moves pump piston 100 back to the closed position to close aperture 38.

Referring to FIGURE 2, as button 14 springs back and moves pump piston 100 to the closed position, paste is drawn up towards base 18 which in turns pulls backup piston 150 upwardly inside cartridge 20. In view of its design, backup piston 150 resists moving downward and thus facilitates extrusion of paste the next time button 14 is pressed by keeping the paste within the area of lower opening 106 of pump piston 100.

It should be noticed that the conical contour of neck 104 and bore 36 also assure a close seal at upper end 111.

Because of the conical nature of the design of these two pieces, as the neck is moved down, more clearance is provided to facilitate this action, and as it moves up, a sealingly engagement is provided.

Another aspect of the invention is the placement of button 14 on brush unit 10. The button 14 is located at base 18 of stem 12 sufficiently away from said bristled head 16 so as to not interfere with brushing. Button 14 is also located on base 18 such that when brush unit 10 is grasped, the user's thumb can be naturally positioned over button 14 before and during brushing.

The present invention provides several advantages. First, the invention provides a toothbrush with its own paste cartridge which can be dispensed by simply depressing a button that is conveniently positioned immediately below the brush unit. This positioning is not only convenient, it allows the unit to have a compact design to facilitate its use not only in the usual course but for travel as well. Additionally, the unit provides a design wherein the paste is extruded upon actuation but where the paste is closed from the atmosphere and other contaminants when in the at-rest position. Thus, there is no possibility for the paste to be contaminated or to dry out as in prior designs. At the same time, use of the product is convenient in that no cap, like on conventional toothpaste tubes, or valve, like on prior art fountain brushes, must be opened or removed before use. Thus, both convenience and hygienic conditions are assured.

Although preferred embodiments of the invention have been described in the foregoing detailed description and illustrated in the accompanying drawings, it will be understood that the invention is not limited to the

embodiments disclosed, but is capable of numerous rearrangements, modifications and substitutions of parts and elements without departing from the spirit of the invention. Accordingly, the present invention is intended to encompass such rearrangements, modifications and substitutions of parts and elements as fall within the spirit and scope of the invention.

CLAIMS:

1. A toothbrush that dispenses paste, comprising:

(a) a hollow stem with a bristled head, an open base, and at least one discharge aperture in said bristled head;

(b) a cartridge for containing paste attachable to said open base of said hollow stem;

(c) a pump means for delivery of the paste in said cartridge through said at least one discharge aperture.

2. The toothbrush of Claim 1 wherein said pump mechanism is integral with said hollow stem.

3. The toothbrush of Claim 1 wherein said pump means is located on said stem such that when said toothbrush is grasped, the thumb of a user can easily be positioned over said pump means before and during brushing to operate said pump means.

4. The toothbrush of Claim 3 wherein said pump means is located at a point on said stem sufficiently away from said bristled head so as to not interfere with brushing.

5. The toothbrush of Claim 4 wherein said pump means comprises:

(a) a hollow pump piston disposed within said hollow stem and movable between a closed and open position, said pump piston having an upper end that blocks said at least one discharge aperture when in said closed position and slides away from said at least one discharge aperture when in said open position, said pump piston having attached at its bottom a piston disk with an orifice that moves into said cartridge when in said open position; and

(b) a button extending through said stem in engagement with said pump piston such that pressing said button moves said pump piston to said open position and extrudes the paste in said cartridge through said orifice of said piston disk, through said upper end and out said at least one discharge aperture, and releasing said button moves said pump piston to said closed position.

6. The toothbrush of Claim 5 further comprising a backup piston slidably disposed in the bottom of said cartridge with circumferential flanges which permit said backup piston to slide towards said openable top as paste is dispensed and resists movement in the opposite direction.

7. The toothbrush of Claim 5 wherein said bristled head is removably attachable to said hollow stem.

8. The toothbrush of Claim 4 wherein said pump piston has a larger cross-section at its bottom than at its said upper end.

9. The toothbrush of Claim 5 wherein said pump piston conforms to the inside of said hollow stem.

10. The toothbrush of Claim 9 wherein said pump piston has a cross-section that only partially conforms to the inside of said hollow stem.

11. The toothbrush of Claim 5 further comprising a spring disposed between said stem and the underside of said button such that said spring acts to return said button when said button is released.

12. A toothbrush that dispenses paste comprising:

(a) a hollow stem with a bristled head, an open base, and at least one discharge aperture at said bristled head;

(b) a cartridge for containing the paste that is attachable to said open base;

(c) a hollow pump piston disposed within said hollow stem and movable between a closed and open position, said pump piston having an upper end that blocks said at least one discharge aperture when in said closed position and slides away from said at least one discharge aperture when in said open position, said pump piston having attached at its bottom a piston disk with an orifice that moves into said cartridge when in said open position; and

(d) a button extending through said stem in engagement with said pump piston such that pressing said button moves said pump piston to said open position and extrudes the paste in said cartridge through said orifice of said piston disk, through said upper end and out said at least one discharge aperture, and releasing said button moves said pump piston to said closed position.

13. The toothbrush of Claim 12 further comprising a backup piston slidably disposed in the bottom of said cartridge with circumferential flanges which permit said backup piston to slide towards said open base as paste is dispensed and resists movement in the opposite direction.

14. The toothbrush of Claim 12 wherein said bristled head is removably attachable to said hollow stem.

15. The toothbrush of Claim 12 wherein said button is located on said stem such that when said toothbrush is grasped the thumb of a user can easily be positioned over said button before and during brushing.

16. The toothbrush of Claim 15 wherein said button is located at a point on said stem sufficiently away from said bristled head so as to not interfere with brushing.

17. The toothbrush of Claim 12 wherein said pump piston has a larger cross-section at its bottom than at its said upper end.

18. The toothbrush of Claim 13 wherein said pump piston conforms to the inside of said hollow stem.

19. The toothbrush of Claim 18 wherein said pump piston has a cross-section that only partially conforms to the inside of said hollow stem.

20. The toothbrush of Claim 12 further comprising a spring disposed between said stem and the underside of said button such that said spring acts to return said button when said button is released.

21. A toothbrush that dispenses paste, comprising:

(a) a hollow stem having an open base, a head, and an opening at said head;

(b) a bristle pad with at least one discharge aperture, said bristle pad mountable to said head such that said at least one aperture is aligned with said opening;

(c) a cartridge attachable to said open base and having a backup piston slidably disposed within said cartridge and slidable towards said open base as paste is dispensed;

(d) a piston disk having substantially the same cross-section as the inside of said cartridge and having an orifice, said piston disk slidably disposed in said open base;

(e) a pump piston disposed through said hollow stem having a bottom end fixed to said piston disk around said orifice and an upper end closable across said discharge aperture;

(f) a spring loaded button extending through said stem and in engagement with said piston disk such that when said button is pushed, said pump piston slides down to open said discharge aperture and said piston disk presses against the paste in said cartridge extruding said paste through said orifice, through said hollow pump piston, and out said discharge aperture; and when said button is released, said button springs back closing said upper end across said discharge aperture and pulling said piston disk, paste and said backup cylinder towards said top of said cartridge.

22. The toothbrush of Claim 21 wherein said button is located on said stem such that when said toothbrush is grasped a user's thumb can be positioned over said button before and during brushing.

23. The toothbrush of Claim 22 wherein said button is located at a point on said stem sufficiently away from said bristled head so as to not interfere with brushing.

24. The toothbrush of Claim 21 wherein said pump piston has a larger cross-section at said bottom end than at said upper end.

25. The toothbrush of Claim 21 wherein said pump piston conforms to the inside of said hollow stem.

26. The toothbrush of Claim 25 wherein said pump piston has a cross-section that only partially conforms to the inside of said hollow stem.

27. A toothbrush that dispenses paste and is attachable to a paste cartridge which has an openable top and a backup piston slidably disposed therein, the piston being slidably movable toward the top of the cartridge but resisting movement in the opposite direction, comprising:

(a) a hollow stem with a bristled head, an open base, and at least one discharge aperture at said bristled head;

(b) a hollow pump piston disposed within said hollow stem and movable between a closed and open position, said pump piston having an upper end that blocks said at least one discharge aperture when in said closed position and opens to said at least one discharge aperture when in said open position, said pump piston having attached at its bottom a piston disk with an orifice that protrudes into said cartridge when in said open position; and

(c) a button extending through said stem in engagement with said pump piston such that pressing said button moves said pump piston to said open position and extrudes the paste in said cartridge through said orifice of said piston disk, through said upper end and out said at least one discharge aperture, and releasing said button moves said pump piston to said closed position.

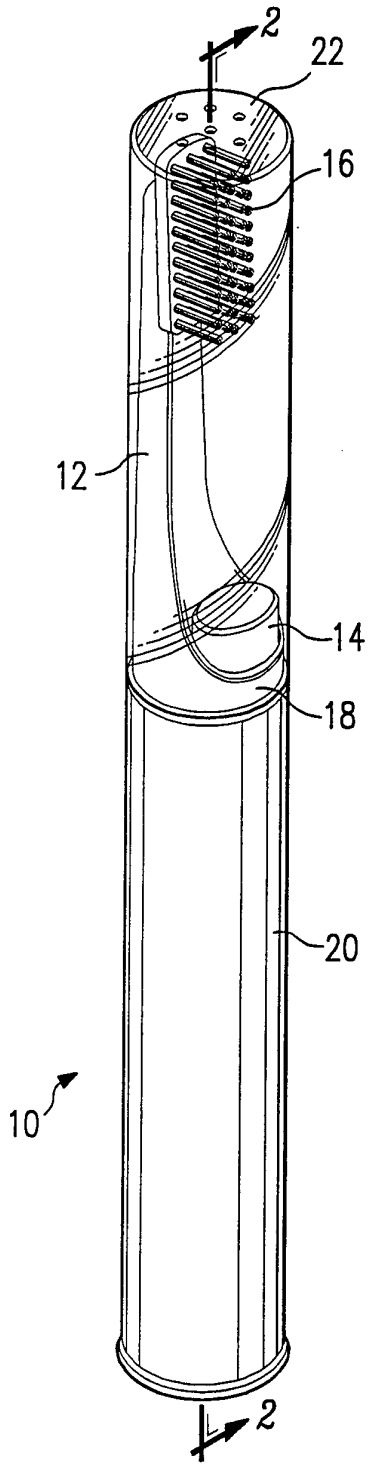

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FIG. 1

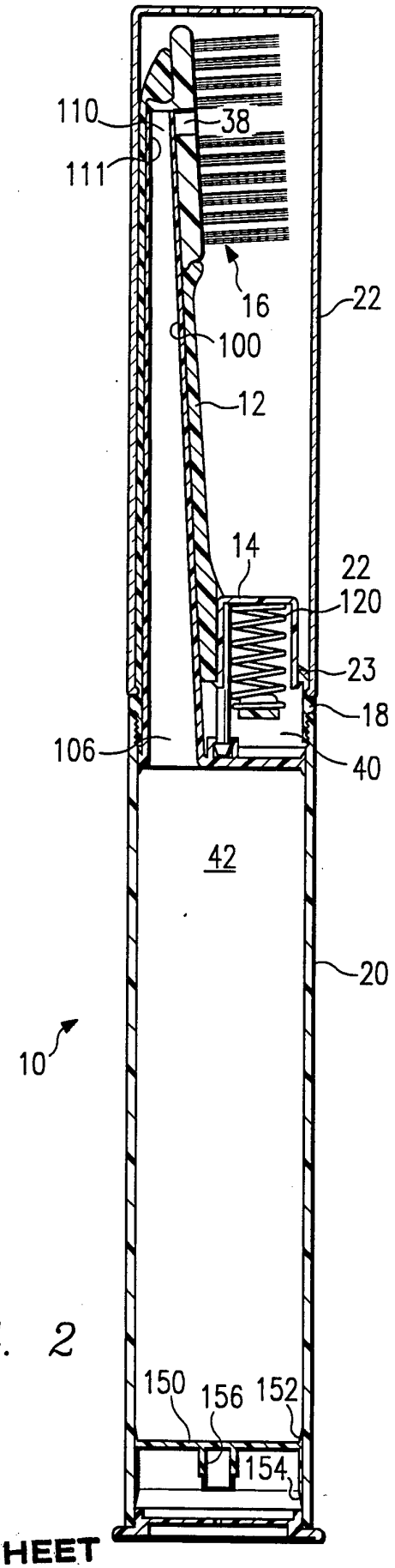

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FIG. 2

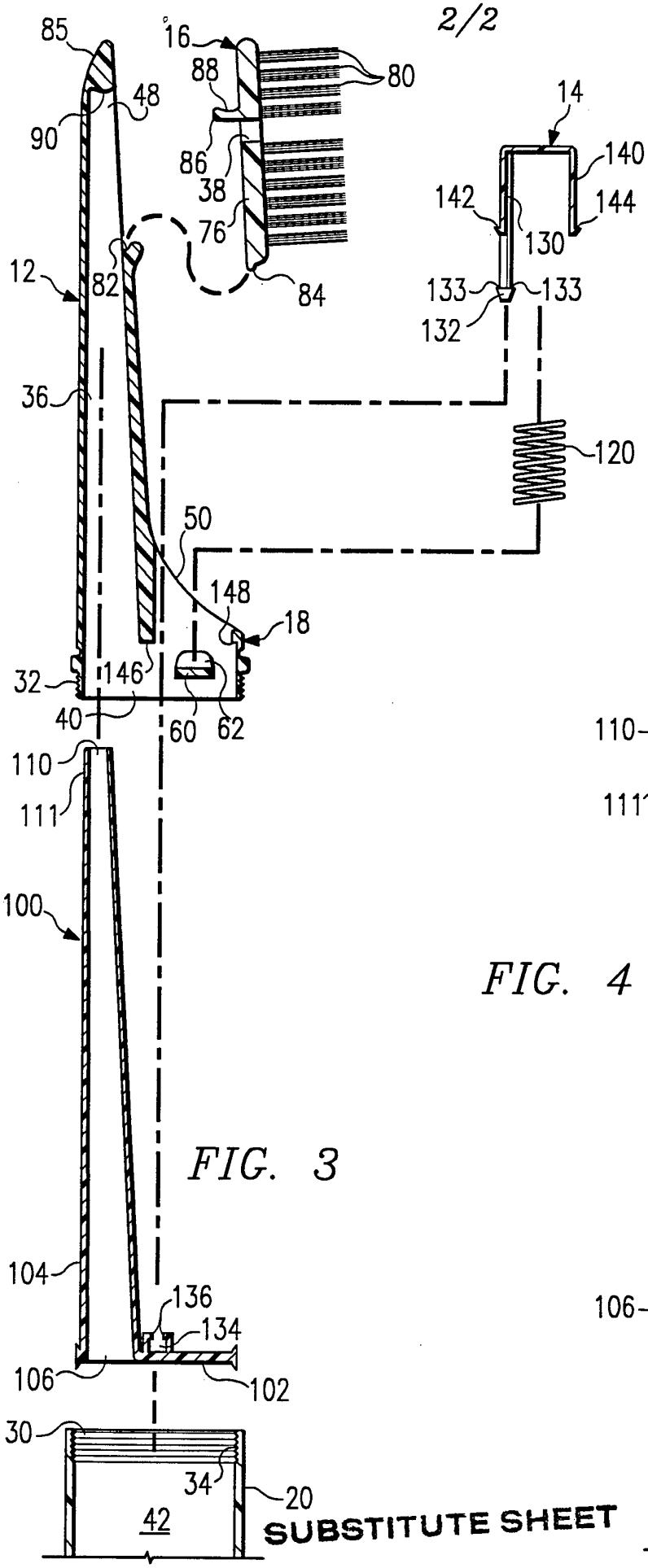

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FIG. 3

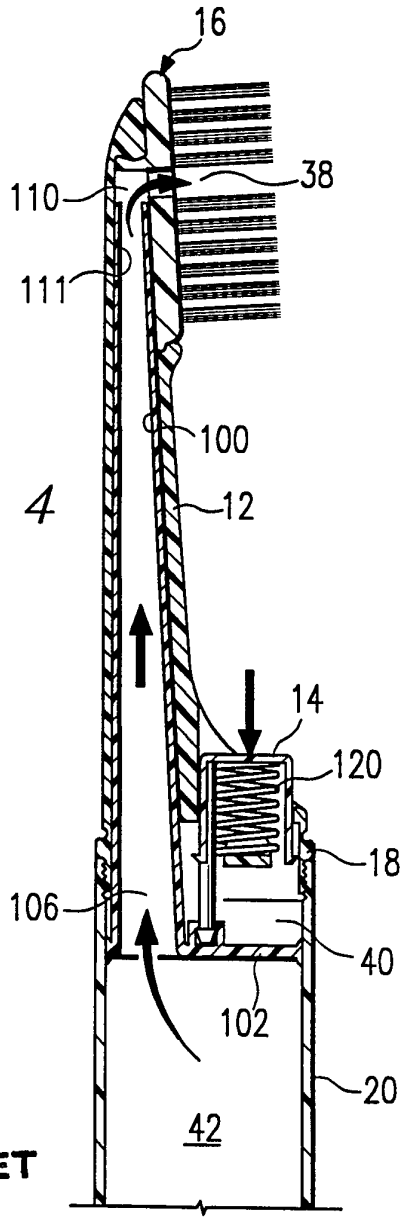

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FIG. 4

INTERNATIONAL SEARCH REPORT

PCT/US92/09081

A. CLASSIFICATION OF SUBJECT MATTER

IPC(5) :A46B 11/02

US CL :401/150, 176, 279, 280

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 401/146, 149

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

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	DE, A, 3,514,600 (Mauerloff) 14 August 1986, See entire document.	1-27
Y	US, A, 4,787,765 (Kuo) 29 November 1988, See entire document.	1-27
A	US, A, 4,068,974 (Meyer et al.) 17 January 1978.	

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

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