Oct. 1, 1940. H. C. WHITE ET AL 2,216,333

ANTISEPTICIZED BRUSH

Filed June 13, 1936

Fig. 1.

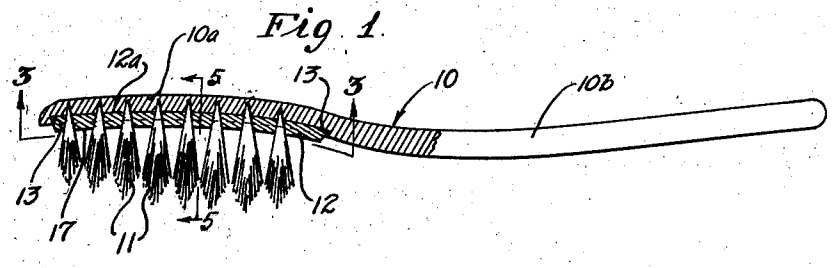


Fig. 2.

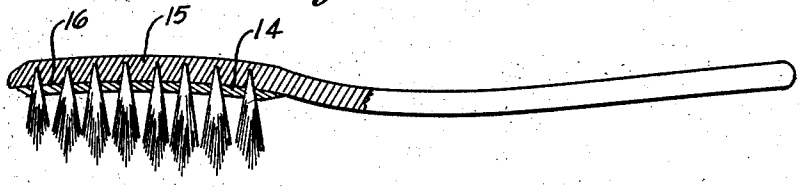


Fig. 3.

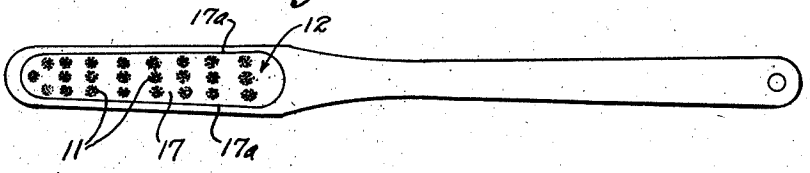


Fig. 4.

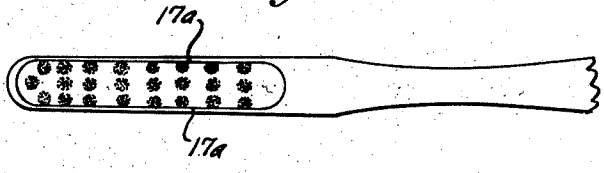
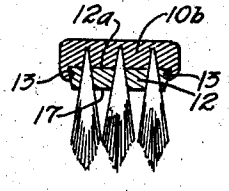


Fig. 5.



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2,216,333

UNITED STATES PATENT OFFICE

2,216,333

ANTISEPTICIZED BRUSH

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Application June 13, 1936, Serial No. 85,068

13 Claims. (Cl. 15—167)

This invention relates to improvements in antisepticized brushes, and has for its general purpose to render brushes self-sterilizing by incorporating in them a bactericidal material that will retain its effectiveness as such throughout the life of the brush, or at least over a prolonged period of time. While the invention is to be regarded as applicable generally to brushes of various types and forms, it is particularly advantageous as applied to tooth brushes, and will therefore be described with reference to certain typical embodiments in that form of brush.

Various means have been proposed for antisepticizing brushes by the use of antiseptic materials carried by the brush itself, but these proposals appear to have met with little success for such reasons as the inability of the antiseptic material to retain its effectiveness over any ascertained period of time, and practical limitations, as from a manufacturing standpoint, upon the form of the antiseptic material and manner of incorporating it in the brush. We have overcome such limitations and disadvantages by providing an antisepticized brush embodying a bactericidal material in a simple form that adapts the brush to economic and practical manufacture, and also by the use of certain types of bactericidal materials possessing characteristics that assure their continued effectiveness over long periods of time.

In accordance with the invention, we incorporate in the brush a bactericidal material presenting at the base of the bristles a surface in direct and open exposure to the bristles, so that that surface, which ordinarily is subject to bacterial contamination, as well as the bristles themselves, are kept properly antisepticized. In our preferred form of the invention, the bactericidal material is incorporated in the brush in the form of a body or layer through or within which the bristles extend, and having an exposed surface that preferably is at least as great as the area of the brush surface at the base of the bristles. This base layer is in effect integrated with the body of the brush, and may be incorporated in the brush by various methods all of which lend themselves to simple and economic manufacturing processes. We utilize as the antiseptic material, a bactericidal substance or composition possessing as a characteristic property, the ability to retain its effectiveness despite daily or repeated wettings of the brush, for a length of time corresponding to the normal life of a tooth brush. In certain of its aspects, the invention contemplates the use of a bactericidal material whose life may be controlled or predetermined by adjustment of its composition, as will later appear.

Our preferred type of bactericidal material is a substance or composition that has only limited solubility in water and which, even with daily or frequent wettings of the brush, will dissolve at such a slow rate that an effective amount of the substance will remain throughout the life of the brush. The invention also contemplates the use of other types of bactericides which may or may not be soluble and whose activity as bactericides results from the emanation of rays which destroy the micro-organisms. Such bactericides may be classed generally as photo-active or radio-active substances, as for example certain salts that normally or when activated, emanate bactericidal rays.

All the various features and objects of the invention, as well as the details of certain typical and illustrative forms thereof, will be more fully understood from the following detailed description. Reference is had throughout the description to the accompanying drawing, in which:

Fig. 1 is a longitudinal section showing the head portion of a tooth brush embodying a typical form of the invention;

Fig. 2 is a view similar to Fig. 1, showing a variant form of the invention;

Fig. 3 is a view looking upward from line 3—3 of Fig. 1;

Fig. 4 is a view similar to Fig. 3, and illustrating a further variation; and

Fig. 5 is a section on line 5—5 of Fig. 1.

In the drawing, the brush is shown to comprise a body 10 including the head and handle portions 10*a* and 10*b*, and bristles assembled in spaced tufts 11 arranged in rows extending longitudinally of the head. Preferably the bactericidal material is incorporated in the head of the brush in the form of a layer of solid material secured to or in effect integrated with the head 10*a* at the base of the bristles. It is to be understood however that the bactericidal material may be secured to the brush head or incorporated in the brush body in any suitable manner. In the form of the invention shown in Fig. 1, the base layer is secured to the brush head by casting or molding the substance, for example Celluloid or pyroxylin, of which the body 10 is formed, about the layer 12 so that the latter is keyed to the brush head between shoulders 13. The bond between the layer and the body of the brush may be strengthened and protected by first applying to the layer surface 12*a* a suitable

water-proof cement, and molding the brush head against the cement coated layer. To illustrate one of several possible variant forms of the invention and means for securing the bactericidal substance to the brush head, I show the base layer 14 in Fig. 2 to be applied to the under surface of the brush head 15 without, in effect, recessing or undercutting the latter, there being applied to the inner surface 16 of the base layer a cement or suitable bonding substance that will securely attach the layer to the brush head. To improve the bond, the inner surfaces 12a and 16 of the bactericidal substances may be roughened or given any suitable irregular form.

Referring to Fig. 1, the bristles 11 extend within the layer 12 and preferably, as the drawing shows, the area of the exposed surface 17 of the layer is made sufficiently large to include all the bristle tufts, so that each is surrounded at its base by the bactericidal substance. Thus as shown in Fig. 3 the base layer extends somewhat beyond the rows of bristle tufts, both along the sides and at the ends of the head. The side edges 17a of the base layer may not necessarily extend beyond the outer rows of bristle tufts, but may, as shown in Fig. 4, extend only to the outside of the tufts, thereby enabling the width of the brush head to be somewhat reduced.

As a typical means of securing the bristles to the body of the brush, the tufts 11 may be extended through the layer 12 into the head 10a, within which they are held in the usual manner by the head forming material being molded around the inner ends of the bristles. In forming the brush, the base layer 12 may be molded or otherwise formed around the bristle tufts 11, leaving the inner ends of the tufts projecting beyond the layer, and the head 10a then cast or molded around the layer to embed the bristles and integrate the layer 12 with the body of the brush. If desired the bristle tufts may be inserted through holes formed in the base layer, instead of casting the latter around the bristles.

As previously mentioned, we preferably form the base layer 12 of a suitable bactericidal material or composition that has limited solubility in water. By limited solubility we mean such slight solubility that, assuming the brush to be wetted once or twice each day, the layer 12 will not have completely dissolved over a period of say at least two months, and preferably longer. We may control or predetermine the solubility of the bactericidal material by combining in predetermined proportions, two or more materials, at least one of which is water soluble and at least one of which is a bactericide, in such proportions as will regulate and determine the rate of solubility of the layer 12 as a whole. Thus we may combine with a substance having desired bactericidal properties but too rapid or too slow solubility, another substance, bactericidal or not, which will have the effect of reducing or increasing, as the case may be, the solubility of the composite substances to the desired extent, but without impairing its bactericidal qualities.

Typically, the material 12 may comprise a mixture of sulphur and sodium carbonate fused together to form a solid and fairly hard body. The sulphur is a highly effective bactericide, but has such limited solubility in water that if used alone, it would not have the desired effectiveness. Sulphur, however, is soluble in alkaline solutions such as, for example, an aqueous solution of sodium carbonate or other alkaline metal salts. By combining (physically) the sulphur with a predetermined percentage of sodium carbonate, the latter dissolves to a limited degree when the brush is wetted, forming a dilute alkaline solution which in turn causes a limited amount of the sulphur to go into solution. The use of sulphur together with sodium carbonate is particularly advantageous because of the tendency of the sodium carbonate to take up slight amounts of moisture when exposed to the air. The result is that there is always present a moist condition in the layer tending to activate the sulphur in the sence that it will inhibit or prevent bacterial growth on the surface of the layer. The sulphur and sodium carbonate may be mixed in any suitable proportions depending upon the rate of solubility desired in the composite material. A mixture containing about 7% sodium carbonate may be cited as typical. In forming the base layer 12, the mixture of materials is pulverized and then heated to a temperature of about 160 to 165° C. at which the sulphur fuses and, upon cooling, bonds the sodium carbonate particles into a solid mass.

As another example of a bactericidal material having limited solubility, we may use water soluble para-toluol-sulphochloramin in compressed or other solid form in which the substance is suitable for formation in the solid base layer. For example, the para-toluol may be mixed with a suitable binder, such as gums or resins, or very small amounts of a shellac, for the dual purpose of putting the material in the form of a solid body, and, in effect, of controlling the solubility rate of the para-toluol. That is to say, by varying the proportion of the binder, the solubility rate of the para-toluol containing body may be controlled. In forming the base layer, the mixture may be subjected to a low temperature bake to volatilize the solvent. We may also use as the binder such substances as thymol, camphor or beta napthol, which are bactericidal in themselves, so that the composite body will consist entirely of substances that are bactericidal.

Instead of using substances that are dependent upon their solubility in water for their bactericidal effect, we may also use substances of a radio-active or photo-active nature, which may be incorporated in a base layer, as described, or in the body of the brush as a whole. For example, the layer 12 may be formed of or include such substances as radium activated uranium salts which will continue to emanate bactericidal rays over an extended period of time. To make a photo-active bactericide, we utilize a suitable alkaline earth salt or oxide, for example thorium oxide, together with such other substances as chlorophyll (1-2%) and quinine (under 1%), which mixture may be activated to emanate ultra violet rays over an extended period of time. A pulverized mixture of the oxide, chlorophyll and quinine, may first be subjected to ultra violet light over a period of time and the mixture then mixed with a suitable binder, such as a glyceride, and allowed to set and harden into a solid body. The latter may be made soluble or insoluble in water. Preferably it is made slightly soluble, as by the addtion of salts containing a sulphur radical, e. g. sodium sulphite, sodium bisulphite, and ammonium sulpho compounds, so that a fresh surface of the activated material will always be exposed.

The bactericidal material, whichever of the described types may be used, is rendered particularly effective by its being incorporated in the brush in a manner such that the material

presents a large area surface in direct and open exposure to the bristles, and within which preferably all or at least most of the bristles extend. In this way, the bactericide is placed so that it surrounds and applies directly to the bristles. Where a soluble bactericidal substance is used, the base layer presents an exposed surface from which the solution may readily be drawn into the tufts by capillarity between the bristles.

It will be understood that the drawing is to be regarded merely as illustrative of the invention in certain of its typical and preferred forms, and that various changes and modifications may be made without departure from the invention in its intended spirit and scope.

We claim:

1. In a tooth brush comprising a head and bristles terminating in said head, a solid body of bactericidal material at the base of said bristles and within which the bristles extend, said material having predetermined slight water solubility, the surface of said body of material being openly exposed to the bristles, and a handle extending beyond one end of said material.

2. In a tooth brush comprising a head and bristles terminating in said head, a solid body of bactericidal material at the base of said bristles and within which the bristles are imbedded, said material having predetermined slight water solubility, the surface of said body of material being openly exposed to the bristles, and a handle extending beyond one end of said material.

3. In a tooth brush comprising a head and bristles terminating in said head, a solid body of bactericidal material at the base of said bristles and within which the bristles extend, said material having predetermined slight water solubility, and a handle extending beyond one end of said material, the surface of said body of material being openly exposed to the bristles and said material extending beyond the surface of the brush head toward the outer ends of the bristles.

4. In a tooth brush comprising a head and bristles terminating in said head, an elongated and relatively thin layer of solid bactericidal material substantially integrated with said body at the base of said bristles and having a surface through which the bristles extend, said surface being openly exposed to the bristles and set within an elongated recess in said head, and a handle extending beyond one end of said material.

5. In a tooth brush, the combination comprising a head, a layer of solid bactericidal material having its inner surface bonded to the head, bristles extending through said layer of material and secured within said head, said material having predetermined limited water solubility, the outer surface of said material being openly exposed to the bristles and extending beyond the surface of the brush head toward the outer end of the bristles, and a handle extending beyond one end of said material.

6. In a tooth brush, the combination comprising a head, a layer of solid bactericidal material having its inner surface bonded to the head and set within an elongated recess in said head, bristles extending through said layer of material and terminating within said head, the outer surface of said material being openly exposed to the bristles and extending beyond the surface of the brush head toward the outer ends of the bristles, and a handle extending beyond one end of said material.

7. In a tooth brush comprising a head and bristles terminating in said head, a solid body of bactericidal material at the base of said bristles and within which the bristles extend, and a handle extending beyond one end of said material, the surface of said body of material being openly exposed to the bristles and extending beyond the surface of said head toward the outer ends of the bristles, said material being capable of retaining its bactericidal effectiveness with daily wettings over an extended period of time.

8. In a tooth brush comprising a head and bristles terminating in said head, a solid body of bactericidal material at the base of said bristles and within which the bristles extend, and a handle extending beyond one end of said material, the surface of said body of material being openly exposed to the bristles, and said material having a predetermined slow solubility rate such that an effective amount of said material will remain on the head after daily wetting over an extended period.

9. In a tooth brush comprising a head and bristles terminating in said head, a solid body of material at the base of said bristles and within which the bristles extend, the bulk of said material consisting of a bactericide and the surface of said body of material being openly exposed to the bristles, said material being capable of retaining its bactericidal effectiveness after daily wetting over a period of at least one month.

10. In a tooth brush comprising a head and bristles terminating in said head, a body of material at the base of said bristles and openly exposed thereto, the bulk of said material consisting of a bactericide and said body being adapted to slowly dissolve in water but having such slight solubility that an effective portion of the material will remain after daily wetting over a period of at least one month.

11. In a tooth brush comprising a head and bristles terminating in said head, a body of bactericidal material at the base of said bristles, said material having predetermined limited solubility in water and containing a combination of substances, at least one of which is a bactericide, proportioned to predetermine the solubility rate of said body of material.

12. In a tooth brush comprising a head and bristles terminating in said head, a solid body of bactericidal material at the base of said bristles and within which the bristles extend, and a handle extending beyond one end of said material, the surface of said body of material being openly exposed to the bristles and extending beyond the surface of said head toward the outer ends of the bristles, said material emanating bactericidal rays and being capable of retaining its bactericidal effectiveness with daily wettings over an extended period of time.

13. In a tooth brush comprising a head and bristles terminating in said head, a solid body of material at the base of said bristles and within which the bristles extend, the bulk of said material consisting of a bactericide and the surface of said body of material being openly exposed to the bristles, said material emanating bactericidal rays and being capable of retaining its bactericidal effectiveness after daily wetting over a period of at least one month.

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