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METHOD OF TREATING BRISTLES

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This invention relates to an improved method for the treatment of bristles for the purpose of rendering the bristles less susceptible of becoming soft and soggy upon exposure to water vapor or contact with water or aqueous solutions. More particularly the invention relates to a method of rendering bristles water repellant or waterproof for use in brushes of various kinds that are intended for use with or in water or are subjected or exposed to water or water vapor in the ordinary course of their use.

This invention has particular reference to the treatment of bristles to render them water repellant and therefore more satisfactory for use in the manufacture of tooth brushes such as are described and claimed in my copending application entitled "Moisture resistant bristles for brushes and the like", Serial No. 580,733, filed December 12, 1931, (now Patent No. 1,953,980) of which application the present constitutes a continuation in part. The method of rendering bristles water repellant, however, is of general application to bristles that are intended for use in the manufacture of various kinds and types of brushes, including nail brushes, brushes for general toilet purposes and certain types of paint brushes.

The better grades of bristles are obtained from wild boars. In preparing the bristles for use in brushes, the hair bulb or root is removed and a portion of the hair immediately above the root is cut off and utilized. This portion is generally solid, but the outer end of the hair is hollow and is undesirable for use as a bristle in the better class of brushes, since the hollow bristles tend to spray and do not stand up well under continued use. Both grades of bristles, when wet, have a natural tendency to absorb considerable percentages of water and to become soft and soggy.

Where the bristles are to be manufactured in brushes that are intended to be used with water, as for instance tooth brushes, the softening effect of the water on the bristles is undesirable because it renders the brushes less efficient in their cleansing or scrubbing action. Particularly in the case of tooth brushes, the bristles are subjected in use to a very drastic wetting action, which is heightened by the presence of soap in the tooth paste and which quickly softens the bristles and renders them less effective in cleansing the teeth.

It is therefore an object of this invention to provide a method for increasing the water repellent character of bristles so as to improve their efficiency and increase their life of usefulness.

It is a further important object of this invention to improve the water resistant characteristics of the cheaper type of bristles which, because of their deficiency in the natural oil content of bristles or because of their hollow character, or both, are unsuited for use in the manufacture of tooth brushes and the like.

Other and further important objects of this invention will become apparent from the following description and appended claims.

Although various substances may be used in the treatment of bristles to increase their water repellant properties, it is important for the purposes of my invention that the substances selected are such as will impart water repellant properties to the bristles without materially increasing the degree of stiffness naturally possessed by the bristles and without materially impairing the natural lustrous sheen of the bristles. For instance, in the manufacture of tooth brushes, the tooth brushes are graded according to the stiffness of the bristles as being soft, medium or hard. Consequently, in order to maintain the same standard grades in the manufacture of tooth brushes from bristles treated in accordance with my invention, the waterproofing treatment must be such as not to substantially change or alter the degree of flexibility or of stiffness originally possessed by the bristles.

The substances which I have found best suited for use in the treatment of bristles for this purpose are water insoluble soaps and waxes, or combinations thereof. By the treatment of bristles with compositions of solutions containing these substances, bristles can be produced which are highly water resistant without impairing their sheen or lustre.

According to one method, the bristles are dipped into a solution of a heavy metal salt, for instance an aluminum salt, and then subsequently into a soap solution. If the treating steps are reversed, the lustre or sheen of the bristles will be largely destroyed.

For purposes of illustration, the following example is given:

Example 1

The bristles to be treated are bleached by any suitable method and then soaked in a solution containing from 1 to 3% by weight of a dissolved aluminum salt, such as aluminum acetate. After soaking the bristles in this solution until thoroughly impregnated, they are transferred to a solution of any suitable soap, such as a 4% solution of a castile soap in water. The bristles are

then removed, the excess solution drained or centrifuged off and the bristles dried.

It will be understood that other proportions than those given for the concentrations of the treating solutions may be used, since there is nothing critical about the strength of the solutions. Likewise, any soluble salts of a metal which will form an insoluble soap may be used so long as the metal selected is such as will form a white, insoluble soap of non-objectionable characteristics. For example, the common, non-poisonous metals occurring in the second, third and fourth groups in Mendelyeev's periodic table may be used for forming an insoluble soap. Although metals can be used which produce a colored, insoluble soap, they are not to be preferred since they color the bristles.

The impregnation of the bristles with an insoluble soap may be accelerated and the water repellant qualities of the bristles improved by an electrolytic method, according to which the bristles are first loosely matted, the mat of bristles wetted with a saponaceous compound and then passed through roller electrodes, while spraying the matted bristles with an aqueous solution of a heavy metal salt during their passage through the roller electrodes. In this way an insoluble, water repellant precipitate is formed by the uniting of the reacting constituents simultaneously with the action of the electric current on the matted bristles.

The following example illustrates a preferred embodiment of my invention:

Example 2

1600 parts by weight of aluminum palmitate are dissolved, with the aid of gentle heat, in about 7200 parts by weight of cyclohexanol (hexahydro phenol).

In a separate step, 800 parts by weight of white ceresin wax are melted and added to 5400 parts by weight of carbon tetrachloride. The aluminum palmitate solution in cyclohexanol is then added to the ceresin wax solution, together with 20,000 parts by weight of carbon tetrachloride and 7,000 parts by weight of V. M. & P. naphtha. The mixed solutions are heated on a steam bath or steam plate with continuous stirring until a fairly thin solution results. This solution may be advantageously left over night or for an equivalent period before using. Upon standing, the solution becomes more fluid and therefore more satisfactory for impregnating purposes.

In treating bristles with the foregoing solution of aluminum palmitate and ceresin wax, bundles of the bristles are immersed and soaked in the solution for approximately 30 minutes. The bundles of bristles are then removed and drained for not over 5 minutes and subsequently are whirled very slightly in a centrifugal extractor. They are then removed to a drier and dried at between 100 and 110° F. for 4 or 5 hours.

The bristles so treated exhibit not only a surface coating of the mixture of aluminum palmitate and ceresin wax, but a thorough impregnation of these substances into hollow portions of the bristles and pores thereof. Where the cheaper type of bristles are treated in accordance with my method, the pithy centers and central cavities of the bristles are substantially filled with the water repellant mixture of aluminum palmitate and paraffin wax. Owing, however, to the natural flexibility or plasticity of such a mixture of metallic soap and wax, the original degree of flexibility or stiffness of the bristle is not materially altered or changed.

It will be understood that other metallic soaps of an insoluble, water repellant character, and other waxes may be employed in a similer treatment, either separately or in combination. For instance, the bristles may be treated with a solution of Chinese, Japan, beeswax or other suitable wax, dissolved in xylene or other light organic solvent and the solvent allowed to evaporate.

My method of treating the bristles greatly improves their quality. Working tests have shown that brushes having bristles treated in accordance with the method herein disclosed stand up much better than brushes the bristles of which have not been so treated. For example, bristles treated with Chinese wax and xylene stood up under a test consisting of 50,000 strokes under water, while untreated bristles did not.

Bristles treated with insoluble metallic soap and waxes in accordance with my invention are less capable of absorbing water largely because of the water repellant properties possessed by the soaps and waxes employed. It is this property of the treating agent that prevents or retards the wetting action of water on the bristles when the bristles are immersed in water or subjected to water vapor. In the case of tooth brushes, the treated bristles resist the action of the saliva of the mouth and also the wetting out action of the soaps contained in the usual tooth paste.

At the same time, the impregnating or coating agents employed for waterproofing the bristles do not materially change or affect the degree of flexibility or rigidity originally possessed by the bristles. In other words, soft bristles will still be soft after being subjected to the waterproofing treatment herein described. This is an important feature of my invention, inasmuch as soft or medium hard bristles are in widespread use in tooth brushes and it is desirable to waterproof these types of bristles as well as the harder type.

I am aware that numerous details of the process may be varied through a wide range without departing from the principles of this invention, and I, therefore, do not purpose limiting the patent granted hereon otherwise than necessitated by the prior art.

I claim as my invention:

1. The method of increasing the water resistance of animal bristles suitable for use in brushes, which comprises impregnating said bristles with a mixture of a waxy substance and a water insoluble soap of a non-poisonous metal of the second, third and fourth groups of the periodic table.

2. The method of increasing the water resistance of animal bristles suitable for use in brushes, which comprises impregnating said bristles with a mixture of a water insoluble aluminum soap and a wax.

3. The method of increasing the water resistance of animal bristles suitable for use in brushes, which comprises impregnating said bristles with a mixture of aluminum palmitate and ceresin wax.

4. The method of increasing the water resistance of animal bristles suitable for use in brushes, which comprises immersing said bristles in a thin solution of a wax and a water insoluble metallic soap, removing excess solution from said bristles and drying the thus impregnated bristles.

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