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BRISTLES FOR ABRADING SURFACES

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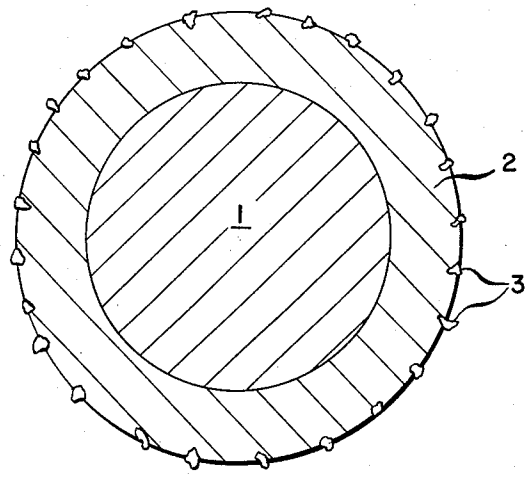

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BRISTLES FOR ABRADING SURFACES

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This invention relates to synthetic linear polyamide bristles and brushes containing the same, said bristles having adhering abrasive particles attached thereto. The invention also relates to methods for making such bristles.

Heretofore industrial brushes have been used extensively for polishing or otherwise abrading various surfaces, including metals, glass, etc. Such brushes have been, for the most part, of the rotary type, and have contained bristles composed of synthetic fibers, animal hair, wire, or vegetable fibers. In combination with such brushes abrasives (including polishing aids) such as jeweler's rouge have been rather widely applied. While in these applications synthetic bristles, especially those composed of synthetic linear polyamides, have been quite satisfactory from the standpoint of bristle life, the synthetic bristles have not been entirely satisfactory with respect to retention of the particles of abrasive or polishing aid. Various proposals have been made to overcome this difficulty. For example, imparting irregularities of various shapes in the surface of the bristle has been known in this art. Another method has been to incorporate the added abrasive material into the melt prior to extrusion of the bristle. Both of these methods involve departures from standard synthetic bristle manufacture, hence are somewhat costly; moreover, such methods are not outstandingly effective and give rise to extrusion problems.

It has been discovered in accordance with this invention that a useful method for attaching abrasive materials to synthetic linear polyamide bristles is to employ a dispersion or solution of polyamide at the bristle surface, thus providing a surface in which, or to which, the particles of solid can adhere. One way of accomplishing this result is to coat said bristles with an aqueous or non-aqueous dispersion of synthetic linear polyamide containing finely powdered abrasive, e.g. silicon carbide, and to bake said dispersed polyamide on said bristles. This coating operation is preferably conducted by partially immersing the bristles of a rotary brush in the dispersion and thereafter evaporating the liquid medium of the dispersion from the bristles and heating the resulting article at a temperature above about 100° C., but not in excess of the melting temperature of the bristle, to improve the adhesion of the coating to the bristle.

Another way of causing the solid particles to adhere to the bristle in accordance with the invention is to provide a coating of polyamide solution at the surface of the bristle and to apply the solid particles thereto. This can be achieved by using a polyamide which is soluble in alcohol or other organic solvent as the coating resin, and applying the solid as a dispersed phase in said coating solution. The N-alkoxymethyl hexamethylene polyadipamides can be used in this manner. A simpler procedure is to employ a solvent which wets and slightly dissolves the polyamide in the bristle itself and to apply pumice or other like material to the thus treated bristle. In certain industrial operations a periodic moistening

of the bristle surface with dimethyl formamide or phenol suffices for this purpose.

The solid additives which can be applied to the bristle surface according to the present invention include silica, pumice, silicon carbide, aluminum oxide, jeweler's rouge and the like. The quantity of said additive may be varied widely, a suitable amount being about 5 to 50% of the weight of binder, i.e. polyamide in the coating composition.

The polyamide used as binder can be any synthetic linear polyamide (including interpolyamides) which is capable of existing in a dissolved or dispersed form. Examples of dispersible polyamides are the alcohol-soluble polyamides which can be brought into solution in alcohol and precipitated in dispersed form by addition of water. Such dispersions can be concentrated by removal of water and/or alcohol. Dispersing agents may, of course, be used. Excellent dispersions are obtainable in this manner from polyhexamethylene adipamide-polyhexamethylene sebacamide-polycaprolactam, or other similar interpolyamides.

The polyamide in the bristle prior to coating may be any suitable fiber-forming synthetic linear polycarbonamide, such as the polycarbonamides of U.S. patents to Carothers 2,071,250, February 16, 1937; 2,071,253, February 16, 1937; 2,130,523, September 20, 1938; 2,130,948, September 20, 1938; and 2,214,402, September 10, 1940. Polyhexamethylene sebacamide is an example of a polyamide which has been successfully used as a bristle component, and the brushes employed in the examples which follow contained bristles composed of polyhexamethylene sebacamide.

It is, of course, to be understood that the polyamide which is present in the coating may be the same as, or different from the polyamide in the bristle prior to coating. When the polyamide in the coating is chemically different from that of the bristle prior to coating, the coating is nevertheless distinguishable especially since the state of orientation of the molecules would generally be different in the coating, as compared with the orientation of the molecules in the original bristle. While the invention is most effective when the molecules in the coating differ in orientation and/or in chemical structure from the molecules within the bristle prior to coating, the invention is also practicable in the absence of such a difference.

The invention is further illustrated by means of the following examples.

Example 1

To an aqueous dispersion containing 10% by weight of dispersed polyhexamethylene adipamide-polyhexamethylene sebacamide-polycaprolactam interpolyamide is added 10%, based on the weight of said interpolyamide, of fine pumice, and the resulting mixture is stirred. Into this is dipped, by use of a rotary motion, the bristles of a wheel type brush, said bristles being composed of synthetic linear polyamide. The brush is placed on a rack and dried overnight, after which it is heated in an air circulating oven for 12 minutes at 210° C. Another brush is treated in the same manner except that silicon carbide is employed in place of pumice. In each instance, the brush is found to be effective for abrading the surface of metals, and retains the abrasive far better than in similar service when no binder is present. The silicon carbide is retained even better than the pumice.

Example 2

The surface of synthetic linear polyamide bristles on a rotary brush is coated with the aqueous dispersion of interpolyamide described in Example 1. After drying overnight the brush is placed in an oven and heated at

210° C. for about 10 minutes. The bristles are then contacted with jeweler's rouge, so as to apply the jeweler's rouge to the bristles. The brush retains the rouge in polishing operations better than brushes having untreated bristles.

Example 3

The polyamide bristles of a rotary disc brush suitable for polishing flat glass surfaces is dipped in liquid phenol. Rouge is placed on the glass surface, and the polishing is performed with rouge adhering better to the bristle, thus producing more rapid polishing than in the absence of the phenol.

It is to be understood that many other embodiments of the invention, in addition to those specifically described hereinabove, will occur to those who are skilled in the art. For example, the type of brush can be varied rather widely. The shape of the bristle can, of course, also be varied, and bristles of non-circular cross-section or tapered contour may be employed if desired.

The invention is further illustrated by means of the accompanying drawing which is a cross-section view of a bristle (1) having a surface area (2) composed of a synthetic linear polyamide into which exposed solid particles (3) of abrasive are embedded, said particles being held in position by adhesion to said polyamide.

The present invention is not concerned with bristles or other structures having fillers, delustering agents or the like distributed throughout the entire resin mass. In the latter compositions the solid particles are not sufficiently exposed at the surface to perform the functions of an abrasive. When the solid particles are embedded in a surface area, the strength of the bristle is not seriously affected, as it generally would be if the same solid were distributed throughout the mass in the same concentration. One of the advantages of the present invention lies in preserving the desirable properties of the synthetic bristles while at the same time improving their effectiveness when used in connection with the solid abrasive.

We claim:

1. A synthetic linear polyamide bristle having a surface coating of synthetic linear polyamide in which exposed solid abrasive particles are embedded, said particles being held in position by adhesion.

2. A synthetic linear polyhexamethylene sebacamide bristle having a surface coating of synthetic linear polyamide in which exposed solid abrasive particles are embedded, said particles being held in position by adhesion.

3. A synthetic linear polyhexamethylene sebacamide bristle having a surface coating of polyhexamethylene adipamide - polyhexamethylene sebacamide - polycaprolactam interpolymer in which exposed solid abrasive particles are embedded, said particles being held in position by said interpolymer.

4. A method for preparing a synthetic linear polyamide bristle having abrasive particles embedded in the surface thereof which comprises coating a synthetic linear polyamide bristle with an aqueous dispersion of synthetic linear polyamide, said dispersion containing from 5 to 50%, based on the weight of dispersed polyamide, of said abrasive in finely particulate form, drying the said coating and heating the dried coating to a temperature between 100° C. and the softening temperature of the polyamide in said bristle.

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