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Weiss

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[54] **BRUSH CONSTRUCTION AND METHOD OF MAKING THE SAME**

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[52] **U.S. Cl.** **300/21**
[51] **Int. Cl.** **A46d 1/08**
[58] **Field of Search** 300/21

[56] **References Cited**

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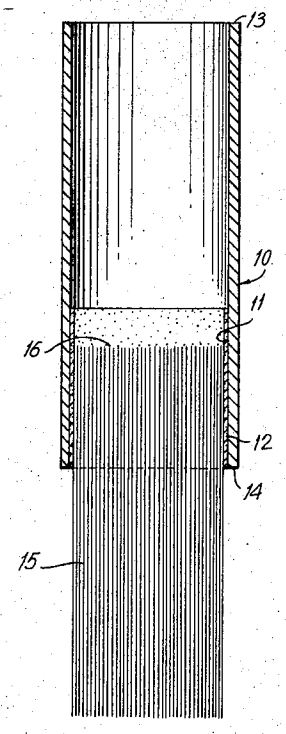
[57] **ABSTRACT**

The present invention is directed to an improved method of making paint brushes or the like employing thermoplastic bristles, and to the resultant improved product.

The article is characterized by improved painting characteristics and particularly bristle flexibility, low manufacturing costs, high resistance to the penetration of solvents and tenacity of connection to the ferrule component of the brush.

In accordance with the invention there is provided a heat resistant ferrule having an adhesive band formed about an internal surface. Thermoplastic bristles are loaded into the ferrule so that the upper bristle edges are aligned with the band, the lower ends of the bristles projecting from the ferrule. Heat is then applied to the upper bristle edges, causing the same to melt, flow into contact with and become securely bonded to the adhesive, which is bonded to the ferrule, securely to unite the bristles and ferrule.

11 Claims, 5 Drawing Figures



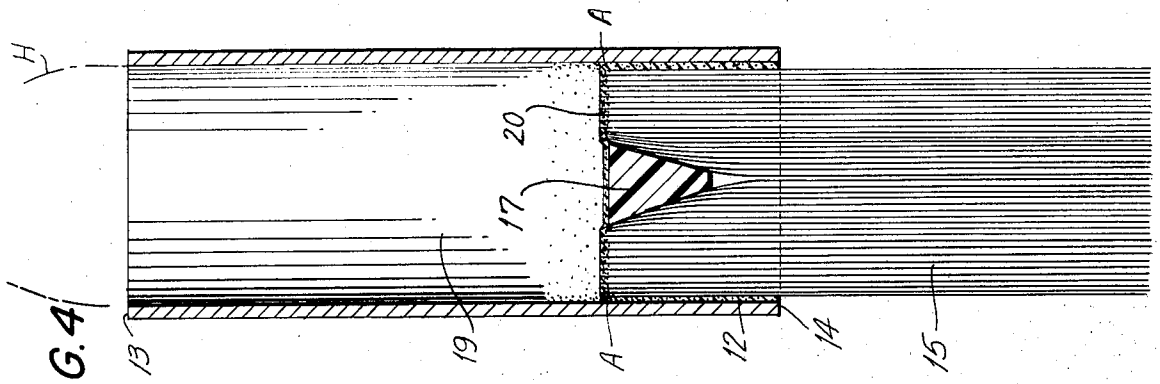


FIG. 4

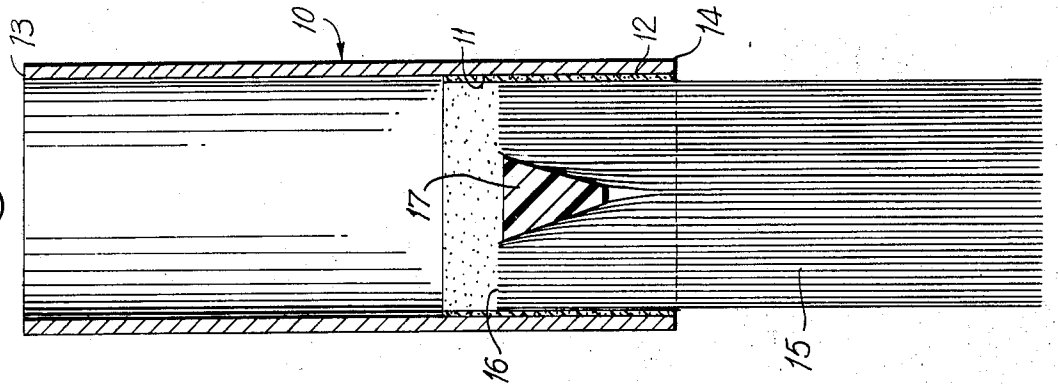


FIG. 3

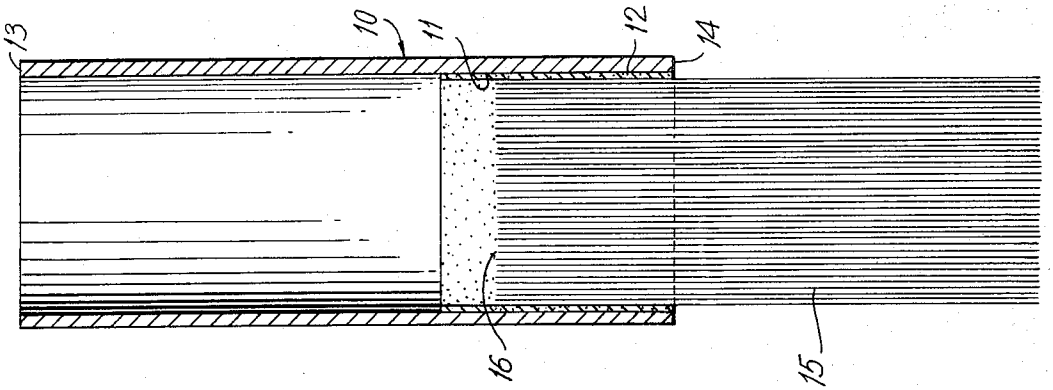


FIG. 2

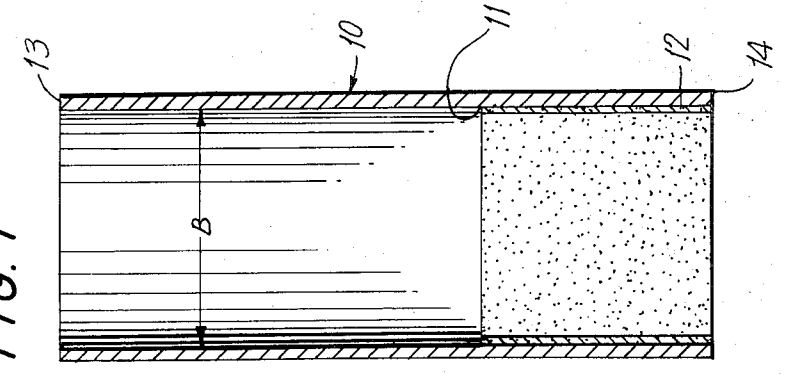


FIG. 1

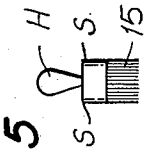


FIG. 5

BRUSH CONSTRUCTION AND METHOD OF MAKING THE SAME

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention is in the field of paint brushes and an improved method of manufacturing the same.

The Prior Art

Early brush manufacturing methods involved the use of mechanical means for integrating the elements of the bristle batch and connecting the same to a handle. As an example of such early use, mention may be made of straw brooms wherein the straw components were united to a handle by a mechanical wrapping.

Subsequently it was common practice to form a brush subcomponent comprising a ferrule having a batch of bristles projecting from one end, the bristles being temporarily frictionally maintained in the ferrule as by a wedge or the like. Thereafter an adhesive composition was poured atop the bristle ends within the ferrule, the intended function of the adhesive being to bond the bristles to each other and to the ferrule.

Numerous types of adhesive have been employed, including most recently epoxy based adhesives.

The use of the adhesive connection method above described, although widespread, was attended by a great many shortcomings, including specifically high material and manufacturing costs due to the fact that substantial quantities of epoxy were required, protracted time of manufacture due to the extended setting time, poor bonding between the bristles inter se and the bristle block to the ferrule, and perhaps most importantly, high incidence of variability in paint applying quantities from brush to brush.

In explanation of the last mentioned shortcoming, it should be noted that the degree of flexibility of the bristles of a brush is a function, inter alia, of the effective length of the bristles, i.e., the bristle length between the free or working end thereof and the bristle portion which is connected to the adjacent bristles. Obviously, greater flexibility may be provided by utilizing greater lengths of bristles in the manufacture of the brush. Resort to such increased length of bristles as the means for increasing flexibility manifestly increases the cost of the brush.

Another method for increasing the flexibility per given length of bristle is to attempt to connect together only a minimal portion of the upper ends of the bristles within the ferrule, whereby a maximum unattached bristle length is provided. However, in the cement brush manufacturing technique described above, it is difficult, if not impossible, accurately to control the effective length of the bristles whereby a maximum unattached bristle length is consistently achieved without weakening the brush structure. This difficulty is engendered in part by varying characteristics of the adhesives used.

By way of example, the popularly employed epoxy cements vary in viscosity from batch to batch, the viscosity and cure time being also affected by the temperature. Obviously, the lower the viscosity the greater penetration of epoxy into the bristle ends, the greater penetration of epoxy resulting in decreased flexibility of the bristles, due again to reduced length of untreated bristles. The use of higher viscosity epoxys will reduce penetration into the bristle mass and provide a more flexible brush per unit length of bristle, at the cost of compromising the connection between the bristles, and the anchorage of the connected bristles to the ferrule.

Additionally, the cement fabricating method above described often leaves voids between the ferrule and the bristle mass, due to the high viscosity epoxy necessarily used, with the result that when such a brush is employed, paint and paint solvents may be free to pass to the interior of the ferrule, only to escape and foul the paint upon subsequent usage.

With the increased use of snythetic bristle materials, e.g. nylon, attempts have been made to interconnect the bristles through the application of heat to one end of the bristles, thus inducing interfusion and providing a connection between the bristles. By way of example of such integrating step, the following U.S. Pats. may be noted:

Nos. 2576,546 Starr; 2672,640 Peterson; 2794,201 Kutik; 3186,018 Shaw; 3604,043 Lewis; 3471,202 Lewis.

Prior manufacturing procedures utilizing a fusion step, while effective to interconnect the bristles and maintain a maximum free length of bristle for added flexibility, involve still other deficiencies. Specifically, if only a short length of bristle is melted consonant with economical bristle utilization, there is formed only a narrow peripheral band of fused materials to which anchorage to the ferrule may be effected, thereby complicating the task of securing the band in a ferrule or like holder. In addition to the difficulties inhering in the formation of a mechanically secure ferrule to bristle block connection, further problems have been encountered in assuring that such connection is resistant to the passage of solvents.

While it is, of course, possible to melt a substantial length of the bristles, thereby providing an extended anchorage area for attachment to the ferrule, such procedure is wasteful of the expensive bristle material.

SUMMARY OF THE INVENTION

The present invention is predicated upon the invention or discovery of the fact that an improved brush may be formed by the steps of loading thermoplastic bristle material in an essentially conventional manner into the interior of a ferrule, the inner periphery of which ferrule has been coated with an adhesive substance which, under heat, is reactive with, or susceptible of forming a tenacious bond to molten thermoplastic material forming the bristles. The bristles are melted in situ in the ferrule, preferably by exposure to radiant heat, until a thin skin or layer of the uppermost ends of the bristles is formed and caused to flow into contact with the coating on the inner periphery of the ferrule. Upon contact with the coating, a tenacious bond is defined between the coating and the outermost face of the pool of molten material. It will be discovered that the bristle mass, upon cooling, is rigidly supported within the ferrule and the bristles are strongly united to each other, notwithstanding only a minimal increment of the bristle length has been melted.

By way of example, secure interconnection of the bristles and connection between the bristle mass and a metallic ferrule has been achieved where the depth of the fused mass of bristle material is only in the order of one-eighth inch. Further, and surprisingly, a brush

formed by the above described method has been found to have a high degree of integrity against the passage of solvents, paint increments, etc. beyond the interfusion of the pool and coating.

Preferably the thermoplastic bristle material incorporates a colorant or pigmentation or like ingredient (the terms being used interchangeably hereinafter) which renders the same heat absorptive, and the heat is generated by a radiant source, such as an infra red source.

It should be further noted that notwithstanding the application of substantial heat to the upper end of the bristles, of a magnitude which may be effective to destroy the adhesive coating material above the bristles, the components of the coating which will ultimately form the principal bond between the fused material and the ferrule are shielded by the bristles themselves until the same melt, whereby the connective effectiveness of the portions of the coating which contact molten bristle components is preserved.

It is accordingly an object of the present invention to provide an improved method of manufacturing brushes incorporating thermoplastic bristles.

It is a further object of the invention to provide an improved method of the type described wherein the operation of uniting the bristles and joining the bristles to the ferrule is simultaneously effected.

A further object of the invention is the provision of a method of the type described wherein the operation of integrating the bristles is performed in situ within the ferrule.

It is a still further object of the invention to provide an improved brush device wherein only a minimal length of the bristles within the ferrule is interconnected, and wherein a tenacious connection, resistant to solvent migration, is effected between the integrated portions of the bristles and the ferrule.

To attain these objects and such further objects as may appear herein or be hereinafter pointed out, reference is made to the accompanying drawings, forming a part hereof, in which:

FIG. **1** is a vertical sectional view through a coated ferrule in accordance with the invention;

FIG. **2** is a view similar to FIG. **1** showing the bristles positioned within the ferrule;

FIG. **3** is a view similar to FIG. **2,** with the addition of a retaining wedge;

FIG. **4** is a view similar to FIG. **3,** showing the position of the parts following the fusion step;

FIG. **5** is a perspective view, on a reduced scale, of the completed brush in accordance with the invention.

Turning now to the drawings, there is shown in FIG. **1** a ferrule **10** which comprises a tubular element, preferably of thin reflective metallic material, the ferrule itself being of essentially conventional construction. As is known, the shape of the ferrule, in horizontal section, may be circular, generally rectangular, etc., depending upon the desired brush configuration. The internal surface **11** of the ferrule **10,** throughout all or part of the height of the ferrule, is provided with a continuous band, layer or coating of adhesive material **12.** The ferrule is open at its upper end **13** and at its lower end **14,** the ends **13** and **14** defining open mouth portions.

The adhesive layer **12** may consist or be comprised of any of a selected number of substances susceptible of being adhesively bonded to the material of the ferrule, and heat bonded to molten bristle material. The adhesive composition, preferably thinned by a liquid solvent, may typically be applied in liquid phase to the appropriate portions of the ferrule interior, the material, after solvent evaporation, drying to define a thin layer or band. Depending upon the selected material, as fully set forth hereinafter, the band may exhibit a slight tackiness or may, after storage, be substantially tack free.

Alternatively, the adhesive may comprise a resinous band, web or the like which may be transferred to the ferrule material (either before or after fabrication of the ferrule) as by a hot roller, transfer process or like known method.

It should be understood that the term "adhesive" as employed herein should not be construed as limited to conventional compositions applied between parts to be connected but, rather, is to be broadly interpreted to relate to materials capable of adhering to the metal ferrule and thereafter, when heated and contacted with the molten bristle components, of forming a strong bond therewith.

Bristles **15** are loaded into the interior of the ferrule in conventional manner, the uppermost ends **16** of the bristles **15** lying essentially in a plane coincident with the band **12** of adhesive material.

While it is not necessary for the band **12** of adhesive to extend all the way downwardly to the lower mouth portion **14** of the ferrule, it is necessary that the band extend at least a distance below the plane of the upper ends **16** of the bristles **15.**

The bristles **15** must be thermoplastic, a preferred example of such plastic being nylon, said material comprising a long chain polyamide. Optionally but preferably, the bristle material should incorporate a pigmentation, colorant or like substance which will render the same absorptive of radiant heat energy. It is to be understood that materials other than nylon may be employed for forming the bristles, the selection of bristle material requiring that:

1 - the bristle material be suitable for the application of paint or like selected end use;

2 - the bristle material be thermoplastic;

3 - the particular adhesive or coating material selected for treatment of the ferrule and the molten bristle material, when contacted and thereafter permitted to cool, form a strong bond at the interface between the adhesive and the molten bristle components.

After or during positioning of the bristles, a retainer wedge or wedges **17** are preferably driven into position within the bristle mass, the wedges functioning, as is conventional, to temporarily frictionally retain the components in the desired spacial relation until final bonding.

While the wedge **17** in the illustrated embodiment is shown to have been driven from the top downwardly through the upper ends **16** of the bristles, it will be appreciated that the wedge may be formed upwardly through the bottom mouth portion **14** of the ferrule, or introduced into the bristle mass and thereafter drawn into the ferrule with the mass. The illustrated downward positioning of the wedge is preferred since, as will be understood from the succeeding description, this manner of application of the wedge concentrates or increases the density of the bristle ends in the area adjacent the inner periphery of the ferrule.

It will further be understood that in certain instances the wedge **17** may be dispensed with entirely, the bristles and ferrule being maintained in the desired aligned position until final bonding through the use of an appropriate jig or like mechanism.

With the components positioned in the manner shown in FIG. **3,** the upper surfaces **16** of the bristles and the interior of the ferrule **10** are subjected to a heating step, preferably through the use of a radiant heat lamp **18** for a time sufficient to induce melting of the upper ends of the bristles, the adhesive coating material, and lateral flow of components of the molten bristle material into contact with the heated coating. Some auxiliary heating of the sides of the ferrule may be used.

As a result of the heating step, and as diagrammatically shown in FIG. **4,** the upper ends **16** of the bristles will have melted and interfused, to unite the bristles and prevent individual bristles from escaping from the bristle mass. Additionally, the laterally outward flow of molten bristle maerial will bring a thin, annular surrounding band of the molten material into contact with the heated coating components of the ferrule whereby there is formed a strong annular anchoring area at A between the molten mass and coating which functions rigidly to integrate the bristle mass to the ferrule.

Additionally, the continuous annular band A defines an effective seal against passage of solvents, paints, etc. into the interior portion **19** of the ferrule.

In explaining the importance of such seal, it should be appreciated that the working ends of the bristles will be dipped into a paint composition and may be tipped upwardly in such manner that the level of the ferrule is below the level of the bristles. In other instances, the entire ferrule may be submerged. In the absence of the seal area A, it would be possible, by reason of the presence of voids of capillary size or larger, for the paint material to pass between the ferrule and bristle block.

It will be further apparent that the heating step has caused the formation of a skin, surface layer or fused area **20** comprised of molten bristle material at the upper edge of the bristles.

The principal contributions of the instant application was considered to reside in the method steps and the resultant article set forth above rather than in the selection of specific materials useful in effecting the desired results. A variety of thermoplastic bristle elements and adhesive coating compositions have been tested and found suitable. Thus, while there is hereinafter described specific bristle and coating compositions, heating parameters, heating equipment, etc. it should be understood that the smae are set forth by way of illustration for purposes of compliance with the patent statutes and are not to be taken in a limitative sense except as set forth in the appended claims.

EXAMPLE I

There is provided a ferrule **10** which is essentially rectangular in horizontal section, the side portions S, S (see FIG. **5**) of the selected ferrule being rounded, as is conventional. Although the ferrule may be made of a section of a continuous tubular member, the selected ferrule is defined of a band of metal bent into the desired configuration, the edges of the band being crimped and overlapped to complete the tubular conformation.

Although not illustrated in the accompanying drawings, the ferrule may include corrugations or ridges for increasing rigidity and augmenting the bond between the bristle block and the ferrule by the entry of adhesive and molten material into the ridges.

The ferrule of the illustrated example is intended to form a so-called "2 inch" brush, the width of the ferrule section in the direction B of FIG. **1** being approximately one-half inch, the length of the ferrule being 2 inches.

An adhesive coating **12** is applied to the interior of the ferrule in an area extending upwardly into the interior of the ferrule from the bottom mouth portion **14** of the ferrule. The adhesive material employed is identified as Pliobond No. 40 as manufactured by Goodyear Tire & Rubber Company, Inc. of Ashland, Ohio, the material comprising a modified acrylonitrile-butadiene resin based adhesive maintained in liquid phase by methyl-ethyl ketone solvent. The material was applied by brush, although equally satisfactory results have been achieved by spray applications. For spray application the use of a lower viscosity adhesive is preferred, i.e., Pliobond 30 or 20, the number signifying percentage of solids.

The ferrule material employed was thin sheet steel.

The solvent of the adhesive carrier was permitted to evaporate by storage at room temperature for a period of time (approximately 10 minutes), at which point the coating was slightly tacky to the touch. Preferably the drying period is sufficiently long to permit evaporation of substantially all of the solvents. Longer drying periods have been satisfactorily employed, and drying under moderate heat to accelerate evaporation has been likewise successfully accomplished.

A bristle mass comprising approximately five-eighths of an ounce of monofilament nylon material was inserted into the interior of the ferrule through the open mouth **14,** and frictionally cinched into position by insertion of a wedge **17.** The nylon material comprised a conventional black nylon bristle material as supplied by Dupont Chemical Corp. of Wilmington, Del., under the trademark TYNEX.

The ferrule and temporarily secured nylon bristles were thereafter subjected to a heating step. In the instant example, the heat was supplied by infra red radiation, the lamp being a conventional 1,600 watt, mercury vapor, tungsten filament lamp as supplied by General Electric. The lamp used was in the form of an elongated cylindrical member, the upper edges of the bristles being aligned in parallel with the lamp **18,** the lowermost edge of the lamp being spaced from the uppermost edge of the bristle mass a distance of about 1½inches.

The operational area of the infra red source employed was approximately 16 inches, whereby the intensity of the lamp, as derived, was approximately **100** watts per inch.

The components were maintained under the lamp for 90 seconds, thereafter removed from proximity to the lamp and permitted to cool.

Preferably the bristle components outside the ferrule are surrounded by metallic or like shields to avoid overheating, with possible consequent warping of the bristles.

The cooled composite was found to display a smooth, continuous skin or coating at the upper edges of the bristles of about one-sixteenth inch in depth.

In practice, it has been determined that the depth of coating need not be more than one to two times the diameter of the bristles employed.

The coating or fusion effected at the ends of the bristles was ample to unite the individual bristles against removal from the mass.

The unit, when subjected to destructive testing, disclosed the formation of an intimate bond between the adhesive coating and the molten mass at the periphery of the upper ends of the bristles beginning at, and extending from, about one-eighth inch to about three-sixteenths inch below the upper edges of the fused bristles. The bond was found to be very tenacious and to have effected an intimate annular seal at the interface of the bristles and the coating.

Examination of the coating portions disposed above the level of the bristles showed some evidence of discoloration and the formation of carbonaceous residues, the residues, in some instances, having slight adherence to the material of the ferrule. Below the level of the bristles, however, there was no evidence of such degration of the adhesive material.

The bond between the bristle block and ferrule, although formed by only a thin annular band, as above noted, was found to be more tenacious and more effective to retain the bristle block within the ferrule than was the case with similar sized ferrules utilizing similar bristle materials manufactured in accordance with the epoxy pouring method.

Additionally, the bond was found to prevent any relative rocking, shifting or like movements between the bristle block and ferrule, and to provide a complete seal in the area between the outer surface of the bristles and the inner surface of the ferrule.

Moreover, in destructively removing the ferrule from the bristle mass, the connection band area described was found to exhibit a resiliency which is considered to be responsible for the effective sealing phenomenon above referred to. In contra-distinction, the ferrule of an epoxy connected brush of similar size was far more easily removed and substantial embrittlement, voids, etc. were disclosed at the interface.

Whereas in the brush formed by epoxy pouring it was discovered that the epoxy had penetrated a substantial distance along the length of the bristles, thereby reducing flexibility, the brush formed by the method of the instant invention evinced a connection between the bristles of significantly shorter extent.

The brush produced in accordance with the instant invention was considered to be equal or superior to the epoxy formed brush in every operating characteristic. In addition, the bond between the ferrule and the bristles was found highly resistant to organic solvents, such high solvent resistance being attributed to the result of a chemical cross linking between the compositions of the coating and the nylon, although no testing to establish the presence of such cross linking has been conducted.

As a control, the heat forming method recited above was carried out eliminating the resinous layer on the ferrule. The resultant product was found significantly inferior to the product of Example I. The connection permitted mechanical movement between bristles and ferrule, attributed to shrinkage and non-bonding of the molten material. Additionally, the essentially impervious seal between bristles and ferrule observed in Example I was absent from the control product.

EXAMPLE II

The procedure of Example I was carried out with the exception that the coating of the interior of the ferrule was formed of a modified acrylic adhesive, a specific example of which may be identified as RD2132-49, as manufactured by Houston Chemical Co., Erie, Pa.

The resultant brush construction, although somewhat inferior to the brush of Example I, was found to provide a commercially satisfactory product. The connection between the ferrule and the bristle block was found to be slightly more brittle than that of Example I and the solvent resistance of such connection was likewise somewhat less.

EXAMPLE III

The procedure of Example I was repeated with the use of polyester resin based adhesives, specifically the resins identified as 46060 and 46971 as manufactured by Dupont Chemical Corp. The resultant brush products were found commercially satisfactory, although the bond between the ferrule and the bristle block evinced slight solubility in ketones, toluene and chlorinated solvents, suggesting that brushes manufactured with the use of polyester adhesives not be employed where contact with such solvents is anticipated. The brushes were found to be eminently suitable for application of water based latex paints, for example.

As will be readily appreciated from the foregoing, it is anticipated that the method of the present invention may be successfully practiced with the use of a wide variety or different adhesives, both those currently available and others which may be developed.

As noted, the term "adhesive" is used in a sense somewhat different from usual, to connote a resinous layer mechanically and/or chemically bonded to the ferrule and capable of being bonded to the molten bristle material when the elements are contacted under heat.

In the light of the above disclosures, the skilled worker, following manufacturing instructions and with a minimum of trial and error, may readily test alternative adhesives to evaluate their suitability for the practice of the process.

Similarly, the invention should not be taken as restricted to the use of nylon bristles, alternative thermoplastic bristle compositions being subject to satisfactory employment in the procedure provided they are fusible under heat and a satisfactory heat bonding resin liner is employed within the ferrule.

It will be readily recognized that the times and heat sources suggested above may be varied in accordance with variations in material, brush sizes, and like parameters. For example, where it is desired to make a larger brush than the one described above, it may be desirable to increase the heating time, reduce the spacing of the bristle ends from the heating element, etc.

The method of the present invention is ideally suited to a production line procedure whereby ferrules may sequentially be coated, dried, filled with bristles and heated, all as the same are advanced beneath apparatus adapted to perform the steps.

Further, the invention has been successfully practiced by application of the adhesive coating material

after the bristles have been introduced into the ferrule by applying limited quantities of the adhesive composition to the sides of the ferrule directly above the bristles and permitting the adhesive to drain into the interface between the bristles and ferrule. After the solvents have been driven off, the material may be treated in the manner described in Example I. The application of adhesive after bristle filling is considered an inferior procedure due to the difficulty of localizing the application of adhesive, inability to assure continuous ferrule coating and penetration of resin into the bristle mass.

Additionally, a brush produced by such method is somewhat more likely to evidence voids, permitting solvent penetration. Such a brush, nonetheless, has been found to be commercially satisfactory and less expensive to produce than epoxy poured brushes.

The ability to provide a secure anchoring of the bristle back to the ferrule in accordance with the method of the present invention has enabled the use of ferrules of lesser heightwise extent than heretofore required, owing to the fact that, because of the tenacity of connection, merely a narrow heightwise band provides adequate anchorage. In contrast, epoxy poured brushes require a ferrule of substantial height to provide sufficient contact area between ferrule and epoxy to provide the necessary anchoring forces.

A unique aspect of the present invention is considered to reside in the concept of forming the fused connection between the bristle ends in situ, i.e., within the ferrule, in the concept of using bristles which extend above the prime anchoring area as a means of shielding from direct heat the elements of the adhesive which will provide the principal anchorage to the fused bristle components, of the use of a pigmented or colored and, hence, absorptive bristle material in combination with a reflective, heat conductive ferrule, which combination permits melting of the bristle material without overheating and consequent destruction of the anchoring components of the adhesive coating.

It will be readily recognized, as shown in FIG. **5**, that a suitable handle H may, if desired, be mounted within the upper end **13** of the ferrule by any suitable mounting mechanism.

Having thus described the invention and illustrated its use, what is claimed as new and is desired to be secured by Letters Patent is:

1. The method of manufacturing a paint brush which comprises the steps of:

a. providing a heat resistant ferrule, open at both ends;

b. forming on the internal surface of said ferrule an adhesive band securely connected to said ferrule;

c. positioning a batch of thermoplastic bristle members in said ferrule, with the lower ends of said bristle members projecting from one end of said ferrule and the upper ends of said bristles in heightwise alignment with said band of adhesive;

d. and thereafter subjecting said upper ends of said bristles and said ferrule to heat applied from the direction of said other end of said ferrule for a time sufficient to melt and, hence, interfuse, said upper ends of said bristles and induce said molten bristle material to contact said heated adhesive, thereby to bond said molten material to said adhesive.

2. The method in accordance with claim **1** wherein said molten material is bonded to said adhesive at a position between said one end of said ferrule and the original position of the upper ends of said bristles.

3. The method in accordance with claim **1** wherein said thermoplastic bristle members incorporate pigmentation rendering the same heat absorptive, and said upper ends of said bristles and said ferrule are subjected to radiant heat.

4. The method in accordance with claim **3** wherein said ferrule is comprised of reflective metal.

5. The method in accordance with claim **1** wherein said adhesive band is comprised of thermoplastic material.

6. The method in accordance with claim **1** wherein said adhesive is thermoplastic, said adhesive and said bristle materials being inter-reactive to define a cross linked, thermoset composition at the area of said bond.

7. The method in accordance with claim **1** wherein said bond between said molten material and said adhesive is continuous, said bond being substantially insoluble in organic paint solvents.

8. The method of claim **1** wherein said adhesive is of the modified acryonitrile-butadiene resin type, said material being converted from the thermoplastic to the thermoset condition responsive to said heating step.

9. The method of manufacturing a paint brush or the like comprising the steps of providing a ferrule open at both ends, forming on the internal surface of said ferrule an adhesive band having substantial bonding characteristics to said ferrule, thereafter positioning a batch of thermoplastic bristle members in said ferrule, with the lower ends of said bristle members projecting through one end of said ferrule and the other ends of said bristles in substantial heightwise alignment with said band of adhesive, said bristles being of a dark color whereby the same are rendered heat absorptive, thereafter exposing said upper ends of said bristles and said ferrule to a radiant heat source applied from the direction of said other end of said ferrule to induce melting and consequent interfusion of said upper ends, and flow of said molten material into contact with said adhesive band to define a continuous bond area between said band and molten material.

10. The method in accordance with claim **9** wherein said adhesive band is converted to the thermoset condition following said heating step.

11. The method in accordance with claim **9** wherein said ferrule is comprised of reflective metal.

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