Aug. 13, 1963 J. K. POLK ETAL 3,100,310

SIMPLIFIED BRUSH CONSTRUCTION

Filed Oct. 26, 1959

FIG. 1

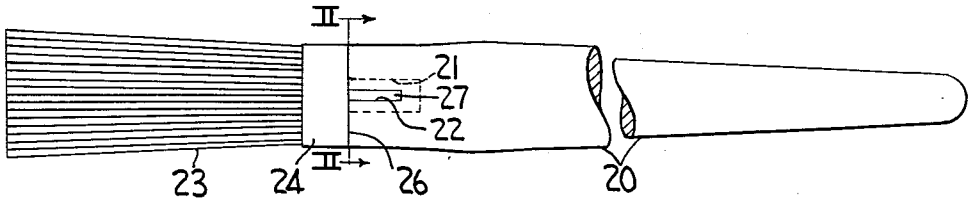


FIG. 2

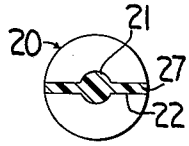


FIG. 3

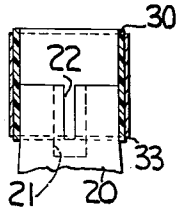


FIG. 4

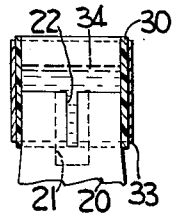


FIG. 5

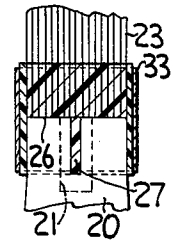


FIG. 6

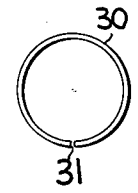


FIG. 9

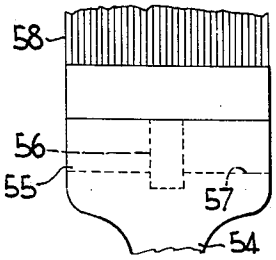


FIG. 10

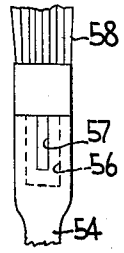


FIG. 8

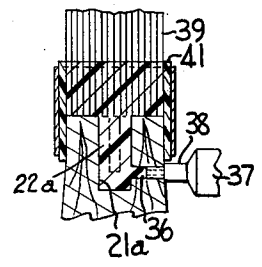


FIG. 7

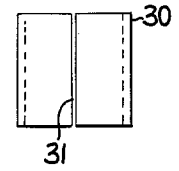
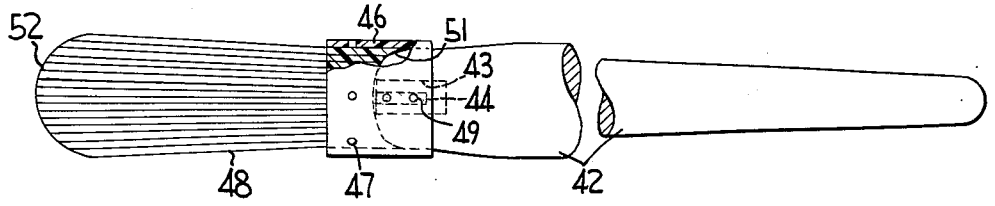


FIG. 11



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SIMPLIFIED BRUSH CONSTRUCTION

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5 Claims. (Cl. 15—193)

This invention relates to a simple brush construction and it has particular relation to brush constructions in which the bristle portions are secured to a handle by means of a cement.

It has heretofore been the practice in the art to construct brushes, such as are employed in painting, stenciling, and in other operations, by disposing a knot of bristles in a metallic band termed "a ferrule," the bristles being secured in place in the ferrule by pouring an appropriate cement, such as rubber, into the ferrule and curing the rubber. Customarily, the bristles and the cement did not completely fill the ferrule, but sufficient space was left for the insertion of a handle which was secured in place, for example, by means of nails or screws extending through the metal of the ferrule into the distal end of the handle. These brushes and the techniques by which they were manufactured were objectionable for a number of reasons. For one thing, the metal ferrules, if struck by a metallic object such as a tool or other form of metal, might emit sparks which could ignite volatile solvents, such as are often present in coating compositions and in removers for such compositions. Instances of disastrous fires attributed to such sparks are on record. It will also be recognized that in the conventional construction in which bristles are inserted in a ferrule, cement, such as rubber, is poured in upon the butt portion of the bristles and the rubber is cured. The brush body thus formed constitutes a separate and distinct unit which, when mounted upon a handle with such conventional fastening as nails or screws, still leaves a cavity between the cement material and the brush knot and the base portion of the brush handle. Solvents and cleaners may get into this cavity and if the brush is to be used over a prolonged period, it may cause the rubber or the handle to swell, thereby producing objectionable distortion of the brush. Needless to say, the operation of forming the brush body and subsequently attaching the handle constitutes an added operation which is time-consuming and tends to increase the cost of manufacture.

In accordance with the provisions of the present invention, a brush is formed in which the bristle body is directly secured to the handle by means of a cement so securely that the ferrule element can be entirely dispensed with, leaving the knot free-standing upon the handle, thus obviating the presence of metal and the hazard of sparking in the use of the brush. As a further feature, the invention contemplates the provision of a brush assembly in which the cement employed to secure the bristles is formed into plastic lug or stake elements which, if desired, may be used to secure a ferrule of plastic material to the handle, and also stem portions by means of which the brush body is directly and more firmly secured to the handle itself.

For a better understanding of the invention, reference may now be had to the accompanying drawings, in which like numerals refer to like parts, and in which—

FIG. 1 is a side elevational view of a brush constructed in accordance with the provisions of the invention.

FIG. 2 is a sectional view substantially upon the line II—II of FIG. 1.

FIGS. 3, 4 and 5 are fragmentary views showing in section, stages involved in the construction of a brush.

FIG. 6 is a plan view of a temporary sleeve which may be employed in the assembly of the brush.

FIG. 7 is a side elevational view of the sleeve shown in FIG. 6.

FIG. 8 is a fragmentary sectional view showing one method of applying cement to the brush body of this invention.

FIGS. 9 and 10 are fragmentary views illustrating a modified form of the invention.

FIG. 11 is a view partly in section and partly in elevation of a further modified form of brush.

A brush embodying the principles of the invention as shown in FIGS. 1 and 2, comprises a handle element 20 which may be of appropriate shape and design, but is indicated as being round in section and tapering toward the end thereof.

At its distal end, this brush is axially bored, as indicated at 21 in FIG. 2, and may also be transversely slotted as indicated at 22, the slot being disposed approximately on a diameter of the bore 21. It will be observed that the sides of the slot indicated at 22 lie in substantially parallel planes with respect to each other. The brush bristles as a knot 23 are secured to the handle by means of a cementing material, as indicated at 24, permeating through and between the butts of the bristles so that the latter are fixed in a matrix of cement. The cement also adheres to the end of the handle along the line 26 and further extends into the bore 21 and the slot 22 to provide a central plastic stem having fins, as indicated at 27. The cement portion at 27 in effect constitutes a plastic nail adhering to the wood with which it contacts and which increases the firmness with which the bristle body is secured to the handle. The material is integral with the body of cement 24 in which the bristles are embedded. A very secure structure is thus obtained.

It will be recognized that the bristles 23 may be of any appropriate type, being, for example, hair such as camel hair, badger hair, pig bristles, horsehair, or other types of hair. They may also be synthetic, for example, being spun from nylon or from a cellulose ester such as cellulose acetate. It is not precluded to employ vegetable fibers such as Tampico.

The cementing material at 24 and 27 may be of various types, though presently an epoxy resin is preferred. Various epoxy resins are contemplated, illustrative examples of such resins being the polyether type resins obtained by reaction of epichlorohydrin and a polyhydric phenol such as 2,2-bis(4-hydroxpyhenyl)propane. Conventionally, these resins are formed by reaction of the foregoing reagents in the presence of a halogen acceptor, such as caustic soda or sodium hydroxide. Those epoxy resins which are liquid, or can readily be rendered liquid by application of heat, or by use of solvents, are preferred. Usually, the epoxy resin molecules are terminated by oxirane rings and are of an epoxy number between about 150 and 500. The resins may be cold-curing or may be cured by application of heat. Both types are conventional in the art. Resins such as are disclosed in Bixler Patent 2,512,997 are suitable for the purpose.

The techniques of assembling the foregoing brushes are illustrated in FIGS. 3, 4 and 5. In accordance with such techniques, a handle 20 is provided upon its distal end with a temporary ferrule-like sleeve or cuff 30, which is shown in detail in FIGS. 6 and 7. This ferrule usually is attached only temporarily as a receptacle for the cement while it is in fluid state and to assist in the positioning of the bristles. It may be a material, such as polyethylene or Teflon, which has but little adhesion with respect to epoxy resins. For many brushes, pieces of polyethylene tubing or hose may be used. Other materials which are non-adhesive with respect to epoxy resins may also be used in forming the sleeve. Preferably, the sleeve is split, as indicated at 31, to facilitate

application to the handle and also to facilitate removal after the cementing material bonding the bristles and handle together as a unit has been cured. The sleeve as shown in FIG. 3 is clipped around the distal end of the handle and is secured in place by appropriate means, e.g. by wrapping a strip 33 of pressure-sensitive tape, such as friction tape or cellophane tape such as so-called Scotch tape, about the same. Split sleeve 30 when so attached provides a cup into which cementing material, such as a liquid epoxy resin, is poured as indicated at 34, sufficient amount being introduced to fill the bore 21, the slot 27 and to extend up into the cup formed by the sleeve to a sufficient distance adequately to permeate the body of bristles and thus to provide a matrix about the butts thereof.

As shown in FIG. 5, the bristles 23 are inserted with their butts downwardly in the body of cement 34, and the latter readily rises between the bristles to embed the same.

If the cementing material is of the so-called cold-curing type, the brushes may merely be set aside with the sleeves in place, for a period sufficient to allow the cement to cure to a hard, thermoset state in which it adheres strongly both to the bristles and to the handle. If the sleeve 30 is of non-adherent material such as polyethylene, the cement does not appreciably bond to the same. While it is often advantageous to employ cold-curing cements, it is not precluded to employ cements the cure of which is promoted by application of heat. The brushes with the sleeves in place, may then be disposed in an oven and heated moderately in accordance with the curing schedule of the specific resin employed, for a sufficient period of time to effect hardening and bonding of the resin.

At the conclusion of the cure of the bonding resin, the sleeve 30 may be removed, for example, by splitting the pressure-sensitive tape 33 and peeling back the ends of the sleeve. The latter may then be used again, though, of course, since it is a relatively inexpensive article, it is not precluded to discard it after a single use.

In the method of fabrication illustrated in FIGS. 3, 4 and 5, the cement is poured into a cup formed in the sleeve. In the modification of technique as illustrated in FIG. 8, a transverse duct 36 is bored into the side of the handle element and communicates with the axial bore 21. The transverse duct provides a channel for the entrance of the cementing material from below the bristles. For purposes of injecting the material, a tube 37 having a nozzle 38 is provided. The tube may be of common gun type having a piston therein, or it may be merely a collapsible foil tube from which the contents may be expelled by application of pressure upon the sides. In the assembly of the brush, a bunch of bristles 39 is inserted into a sleeve element 41 mounted upon the brush handle in the manner already described. This operation may be performed either before or after the injection of the cement. The nozzle 38 is then inserted in the duct 36 and a quantity of cement sufficient to fill the bore 21*a*, the transverse slot 22*a* and to embed the butt portions of the bristles is injected. At the conclusion of the operation, the cement is cured cold or hot, as may be required, and the sleeve providing the cup may be removed in the manner described in connection with the preceding figures. The cement in the duct provides a rivet which further mechanically secures the cement body in bore 21.

It is not precluded to provide brushes with permanently attached ferrules of a plastic, such as polyethylene, which are secured to the handle and the plastic matrix embedding the butts of the bristles by means of the plastic cement. Such construction is illustrated in FIGURE 11. In this embodiment of the invention, the handle 42 is shown as being axially bored as at 43 and as being transversely slotted as at 44. The ferrule element 46 is a continuous sleeve or cuff and may be formed of plastic, such as polyethylene, nylon, or any other appropriate plastic material. This ferrule is mounted upon the handle and cement is disposed therein in the manner illustrated in connection with the preceding figures, for example, FIG. 4. It will be observed that the ferrule is also formed with a series of holes, as at 47, through which the cementing material can flow when the bristles 48 are inserted within the cup formed by the handle and the ferrule. Also, holes 49 may be provided in the lower portions of the ferrule to match with the slots 22 so that the cementing material therein can project through these holes to provide integral plastic lugs or stakes which bond the ferrule more securely to the handle. This construction is especially desirable if the bond between the plastic forming the ferrule and the cementing material tends to be weak. The holes 49 may be used for injection of cement, as is the duct 36 shown in FIG. 8.

In this construction, the plastic lugs or stakes in holes 47 and 49, being non-metallic, cannot produce a sparking effect even if they are sharply struck against a metallic surface.

In the construction as illustrated in FIG. 11, it will also be observed that the upper extremity of the handle 42 is rounded or domed to a hemispherical longitudinal section as indicated at 51. This rounding is often desirable because the butts of the bristles as shown are abutted thereagainst and thus tend to produce a corresponding rounding or doming effect, as indicated at 52, at the tips of the bristles. It therefore is possible to obtain a brush having a rounded or domed tip portion with a minimum of trimming. In event that the bristles employed are tapered as are pig bristles or as synthetic plastic bristles often are, a saving of the tapered tip portions is thus obtained. The construction also permits shorter bristles to be used in a brush of given length.

In the form of brush as illustrated in FIGS. 9 and 10, the principles of the invention are applied to a conventional paint-type of brush in which a handle 54 is provided with a spatulate distal end portion 55. In forming this type of brush, the axial bore 56 is provided and the handle is also slotted, as indicated at 57, usually in a plane extending the width of the spatulate portion of the brush handle. It is not precluded, however, to form the slot in a plane at right angles to the width of the spatulate portion.

To apply a knot of bristles to such handle, a band, for example, of sheet metal such as tin plate, corresponding to a conventional brush ferrule is disposed upon the end of the handle. Cement is then poured into the resultant cup and a bunch of bristles 58 is inserted. The cement in the resultant assembly may be cold-cured or may be cured by application of heat in the manner already described.

It will be apparent to those skilled in the art that numerous modifications of the construction employed herein may be made without departure from the spirit of the invention or the scope of the appended claims.

We claim:

1. A brush comprising a knot of bristles and a handle, the butt portion of the knot and the distal end of the handle being of circular section and being of substantially the same diameter, the distal end of the handle being axially bored and being provided with a diametrically, transversely disposed slot wherein the side walls are parallel to each other and are parallel to the axis of the brush, the butt portions of the bristles in the knot being embedded in epoxy resin cement, the cement further adhering directly to the distal end of the handle and filling and adhering to the sides of the bore and the slot to provide an integral stem portion having fins projecting into the slot whereby firmly to anchor the knot on the handle, the butts of the bristles being in substantial contact with the distal end of the handle.

2. A brush comprising a knot of bristles and a handle,

both being of substantially circular section, the butt portion of the knot and the distal end of the handle being of substantially the same diameter, the face of the distal end of the handle being of substantially hemispherical shape and further being bored axially of the handle, the butt portions of the bristles being embedded in epoxy resin cement, the cement further adhering directly to the contiguous hemispherical end of the handle and the cement filling the axial bore in the handle to provide an integral stem of epoxy resin cement projecting into the bore, the butt portions of the bristles being substantially abutted against the hemispherical face of said distal end of the handle whereby the tips of the bristles are caused to assume a hemispherical outline approximately corresponding to that of said face.

3. A brush comprising a knot of bristles and a handle, both being of substantially circular section, the butt portion of the knot and the distal end of the handle being of circular section and of substantially the same diameter, the distal end of the handle also having a substantially hemispherical face and further being bored axially of the handle, the butt portions of the bristles being embedded in epoxy resin cement, the cement further adhering directly to the contiguous hemispherical end of the handle and the cement further filling the axial bore in the handle to provide an integral stem of epoxy resin cement projecting into the bore, the distal end of the handle and the butt portion of the knot further being encased in a ferrule of plastic material, the ferrule having holes bored in the side walls thereof and integral lugs from the epoxy resin cement projecting into the holes whereby to hold the ferrule in place.

4. A brush comprising a knot of bristles and a handle, the butt portion of the knot and the distal end of the handle being of circular section and being of substantially the same diameter, the distal end of the handle being axially bored and being provided with a diametrically transversely disposed slot wherein the side walls are parallel to each other and are parallel to the axis of the brush, the butt portions of the bristles in the knot being embedded in cement, the cement further adhering directly to the distal end of the handle and filling and adhering to

the sides of the bore and the slot to provide an integral stem portion having fins projecting into the slot whereby firmly to anchor the knot on the handle, the butt portions of the bristles being in substantial contact with the distal end of the handle.

5. A brush comprising a knot of bristles and a handle, the butt portion of the knot and the distal end of the handle being of substantially the same sectional dimensions, and the distal end of the handle being axially bored and being provided with a diametrically transversely disposed slot wherein the side walls are parallel to each other and are parallel to the axis of the brush, the butt portions of the bristles in the knot being embedded in cement, the cement further adhering directly to the distal end of the handle and filling and adhering to the sides of the bore and the slot to provide an integral stem portion having fins projecting into the slot whereby firmly to anchor the knot on the handle, the butt portions of the bristles being in substantial contact with the distal end of the handle.

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