

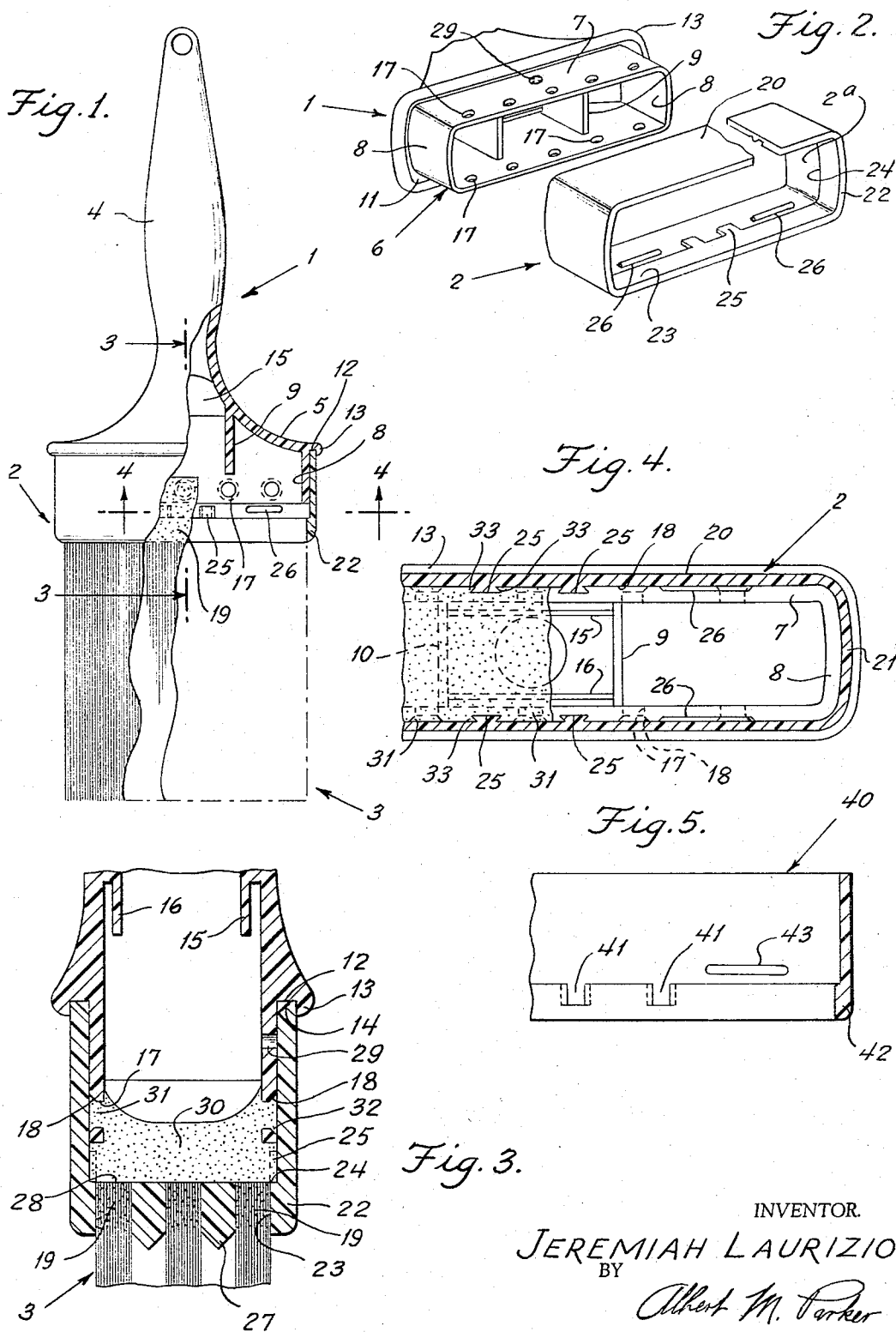
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PLASTIC PAINT BRUSH IMPROVEMENTS

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PLASTIC PAINT BRUSH IMPROVEMENTS

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This invention relates to improvements in paint brushes and is particularly concerned with improvements in paint brushes all of the elements of which; the handle, ferrule, and bristle knot are principally held together by a suitable adhesive.

This application is a continuation-in-part of copending application Serial No. 400,395 filed September 30, 1964, entitled, "Plastic Paint Brushes." Such parent application also discloses a plastic paint brush wherein the handle, ferrule and bristle knot component parts thereof are held together by suitable adhesive, while this application adds features believed to improve upon the interlocking connection between the ferrule and rest of the assembly by the intermediary of the adhesive.

Brushes made all of plastic particularly in the larger sizes ranging up from the four inch size need to be strong and rigid in construction and assembly to withstand the weakening effects of normal use, not to mention the abuse resulting from the common impact method of brush cleaning. One problem to overcome is the tendency of the longer side walls to work laterally away from the bristle knot. This tendency increases as the width of the ferrule increases. It occurs not only during the normal usage of the finished brush but also in the normal handling of bristle trimming and finishing operations employed in the course of completing the brush. The invention construction overcomes this tendency by the provision of novel interlock means integrally formed on the interior surface of the ferrule side walls for interlocking engagement with the mass of adhesive employed for securing the elements of the brush together.

Various interlocking engagements have been attempted between the securing adhesive and the handle, but most of them have suffered from a deficiency of one sort or another. Some provide an engagement of insufficient strength to satisfy the requirements of the larger and heavier brushes. Others involve difficulties in molding or require one or more additional manufacturing steps. Still others call for the use of a greater quantity of adhesive than is economical.

The interlock formation provided between the handle and securing adhesive of the invention brush eliminates the above mentioned and other prior art deficiencies and substantially improves upon existing constructions. It does so by providing a series of locking surfaces, which, even if only partially embedded within the plastic mass, form permanent rigid interlocks with the adhesive and hence also with the bristle knot. This interlock firmly anchors the handle with respect to the adhesive mass not only against forces exerted in a longitudinal direction but also against laterally directed forces which tend to loosen the handle and work or expand the handle laterally away from the bristle knot. Thus a simple easily manufactured brush construction is disclosed wherein longitudinal and lateral movement of both the ferrule and the handle relative to the bristle knot is prevented.

It is accordingly a principal object of this invention to provide new and improved paint brushes.

Another object is to provide a plastic paint brush construction having improved interlocking means between the ferrule and bristle knot.

Another object is to provide a plastic paint brush con-

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struction having improved interlocking means between the bristle knot and handle.

A further object is to provide improved plastic handles for paint brushes.

A still further object is to provide improved plastic ferrules for paint brushes.

A more detailed object is to provide a plastic paint brush construction having an interlocking connection between the handle, ferrule and bristle knot so as to effectively prevent both longitudinal and lateral relative movement of the respective parts.

Other and different objects will in part be obvious and in part pointed out as the description, taken in conjunction with the accompanying drawing, proceeds.

In that drawing:

FIG. 1 is a part sectional part elevational view of the paint brush in accordance with the invention;

FIG. 2 is a perspective exploded view showing the handle and ferrule;

FIG. 3 is a cross-sectional view taken on line 3—3 of FIG. 1 and looking in the direction of the arrows;

FIG. 4 is a cross-sectional view taken on line 4—4 of FIG. 1 and looking in the direction of the arrows; and

FIG. 5 is a cross-sectional view of a modified form of ferrule.

The complete brush assembly as shown in FIG. 1 has as its principal parts a handle 1, a ferrule 2, and bristles 3. The handle 1 is formed of a synthetic plastic material and comprises an elongated hollow hand grip 4 flaring outwardly at one end into a curved base 5, which in turn has extending longitudinally outwardly therefrom a rectangular sleeve 6 having opposed side walls 7 and opposed end walls 8. For additional strength and rigidity a pair of lateral integral cross-members 9 and 10 extend outwardly from the base 5 and interconnect opposing side walls 7. The base of the sleeve 6 is surrounded by a longitudinally outwardly opening channel 11 having a bottom 12 formed as an extension of the base 5 and an outer wall formed by the peripheral lip 13. In order to stiffen the base 5 and in turn insure that the channel bottom 12 remains in a flat plane thus providing a proper seat for the beveled inner edge 14 of the ferrule 2, a pair of reinforcing webs 15 and 16 are formed in the throat of the handle between the cross members 9 and 10. These webs extend outwardly parallel to the side walls 7 of the sleeve 6 and are spaced therefrom as clearly seen in FIG. 3. It has been found that presence of webs 15 and 16 prevents any appreciable deflection of the base 5 which deflection otherwise has a tendency to occur as a result of the shrinkage stresses set up in the part during the molding and subsequent curing thereof.

A plurality of spaced holes 17 are provided extending laterally through the side walls 7 of the sleeve 6 adjacent the outer free edge thereof. In FIG. 3 it can be seen that the holes 17 comprise cylindrical passageways having countersunk portions 18 at their outer ends. The number and the spacing of the holes 17 may be varied as desired but what is important is that the diameter of at least some of the holes 17 be greater at the exterior surface. This prevents the adhesive resin from pulling back out once it flows into the holes, fills them and sets there.

The ferrule 2, also molded of synthetic plastic material, is a hollow member having a generally rectangular cross-sectional configuration corresponding to the cross-sectional configuration of the handle sleeve 6 and having side walls 20 and end walls 21. The upper portion 2a of the interior surface of the ferrule is so dimensioned as to tightly surround the outer surface of the sleeve 6 without any more clearance therebetween than is necessary for fitting the parts together. The ferrule 2 is substantially

longer than the sleeve 6 and terminates at its outer or bristle end in a cross-sectionally inwardly thickened lip 22 having an elongated interior surface 23 and an inner edge 24. A pair of short ribs 25 having their sides under cut in dovetail formation are positioned centrally on the interior surface of each ferrule side wall 20 and extend inwardly from the inner lip edge 24. A pair of ribs 26 is also formed on the interior surface of each ferrule side wall in spaced relationship with respect to the lip 22. In FIG. 2 the ribs 26 can be seen protruding from the interior surface of the side walls 20, one on either side of the centrally positioned dovetail shaped ribs 25. The upper portion of the bristles 3 is embedded in suitable resin such as epoxy, to form the bristle knot 19. This knot also secures the spacer strips 27 in place at the upper end of the bristles.

The assembling of the various components into a finished brush construction is carried out by first inserting the bristle knot 19, carrying the spacer strips 27 as shown in FIG. 3, into the ferrule 2 so that the upper ends 28 of the bristles are positioned in alignment with the edge 24 of the lip 22. A quantity of adhesive in liquid form, a non-limiting example of which is an epoxy resin, is then injected into the open end of the ferrule on top of the bristle ends 28. The sleeve 6 of the handle 1 is then inserted in the ferrule and the respective parts moved together longitudinally. As the sleeve 6 is slid into the ferrule 2, the air confined within the handle is compressed, and in order to avoid the detrimental effects of this compression, a relief vent hole 29 is provided in the sleeve. Continued movement of the parts brings the inner end of the ferrule to rest upon the bottom 12 of the channel 11. Here it can be seen that any appreciable deflection of the opposite longitudinal end portions of the base wall 5 toward the handle 4 would move the portions of the channel bottom 12 carried by those end portions of the base wall 5 out of a flat plane. In fact it has been found that the magnitude of such deflection, if left unchecked, can be such that the elongated side central portions of the ferrule when assembled with a handle may well seat upon the groove bottom wall 12 while the ends of the ferrule will be spaced from the lip 13. However provision of the reinforcing webs 15 and 16 effectively solves this problem by tying the end portions of the handle base together so as to prevent any undesirable warping of the handle base.

In order to form a permanent rigid, interlocking engagement between the bristle knot and the handle, the liquid adhesive flows through the holes 17 so that upon subsequent curing of the adhesive into a hardened mass 30, laterally extending portions thereof, indicated by numeral 31, protrude through the holes 17 so as to firmly anchor the handle within the adhesive mass. Although the provision of straight cylindrical laterally extending portions is quite effective to prevent longitudinal separation of the handle and bristle knot under ordinary conditions, it has been found that in actual practice the severe abuse to which paint brushes are frequently subjected, may cause a straight cylindrical portion of hardened adhesive mass to work loose and eventually pull out of a straight cylindrical hole. To overcome this the invention provides countersunk enlargements 18 at the outer ends of the holes 17 in the side walls 7 so that the laterally extending portions 31 of the hardened adhesive mass flare outwardly as shown at 32. Withdrawal of the laterally extending portions 31 from the holes 17 is thus prevented since neither the dimensional changes caused by the swelling action of commonly used commercial solvents nor the severest mechanical action imposed by extended hard use, will cause the enlarged adhesive mass portions 32 to be worked out of the holes 17. It should also be noted here that although the holes 17 in both of the sleeve side walls 7 are shown as provided with countersunk portions 18, it has been found

sufficiently advantageous to form the countersunk portions around the holes in one side of the sleeve only where simplicity of mold design and economy of manufacture requires it.

In addition to the provision of a strong secure joint between the handle 1 and the bristle knot 19, it is essential that the ferrule 2 be permanently secured to the handle so the dislodgement in a longitudinal direction is prevented. At the same time the ferrule must be securely interlocked to the bristle knot itself so that lateral outward movement of any portion of the walls of the ferrule is prevented. It has heretofore been found that in the use of plastic ferrules the interlocking portion of the ferrule has been particularly susceptible to the swelling effects of the commercial solvents to which paint brushes are commonly subjected. The resulting reaction of the plastic ferrule submerged in such solvents is to swell thus growing in internal dimension so as to pull laterally away from the sides of the adhesive mass 30. Subsequent use of such brushes causes the ferrule to be worked away from the handle in a longitudinal direction and of course eventually to be completely separated therefrom. The degree of adhesion found to exist between the mass 30 and the interior surface of the plastic ferrule 2 is wholly inadequate to prevent this separation. Thus it can be seen that the problem is to secure the ferrule to the handle and to the bristle knot in such manner as to preclude both lateral and longitudinal movement of the ferrule with respect to the handle sleeve and maintain it secured regardless of swelling.

The solution to this problem lies in the novel construction of the invention herein disclosed wherein the adhesive mass 30 completely encases the ribs 26 which protrude from the interior surface of the ferrule walls 7 so that longitudinal movement of the ferrule with respect to the mass 29 is prevented. However in order for the ribs 26 to be effective, it is essential that the sides 7 of the ferrule be firmly held against any lateral expansion which, if permitted, would unseat the ribs from their encased position in the adhesive mass. This holding is effected by the dovetail ribs 25 which, as seen in FIG. 4, also become embedded in the adhesive mass 30 with portions of the adhesive mass indicated at 33 interlockingly engaged under the inclined sides of the dovetail sections. Although it is considered within the scope of the invention to vary the number and spacing of the dovetail sections 25 as described depending upon the size of the brush, it is advisable to have the distance between adjacent dovetail portions greater than the thickness of the adhesive mass portions 33 as viewed in FIG. 4. This relationship is important to form an interlocking engagement with maximum strength in view of the fact that the presently preferred epoxy resin has much greater shear strength than tensile strength. From the foregoing it can be seen that lateral outward expansion of the ferrule is prevented at its inner edge by the peripheral lip 13 surrounding the base of the sleeve 6 and expansion of the sides of the ferrule toward the outer or bristle end is prevented by the interlocking engagement with the adhesive mass effected by the dovetail ribs 25. With lateral movement being thus restrained, the ribs 26 are held securely in their encased position with the result that any longitudinal separating movement of the ferrule is also prevented.

A modified ferrule 40 is shown in FIG. 5 which is similar in all respects to the ferrule 2 of the preferred embodiment with the exception that recesses of dovetail form 41 are formed into the material of the lip 42. Here also the dovetail recesses are arranged between a pair of the elongated ribs comparable to the ribs 26 one of which is indicated by numeral 43. It should be noted however that any suitable arrangement embodying both the longitudinal and lateral interlocking means of the invention could be devised while remaining within the spirit and scope of the invention.

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Since further variations and modifications in the brush construction as described in the foregoing specification and shown in the accompanying drawing may readily suggest themselves to those skilled in the art, it is to be understood that the same can be made without departing from the spirit and scope of the invention. It is accordingly intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted in an illustrative and not a limiting sense.

Having described my invention what I claim as new and desire to secure by Letters Patent is:

1. In brush construction, a handle member molded of synthetic plastic material having an elongated hand grip portion terminating in a peripheral laterally outwardly flaring base, a hollow sleeve extending longitudinally outwardly from said base and terminating in an outer free end portion, bristles adhesively bound together adjacent one end in an adhesive mass and extending longitudinally outwardly of said sleeve, a plurality of holes extending laterally through said sleeve end portion for effecting interlocking engagement between said sleeve and said adhesive mass, said holes forming a larger opening at the exterior surface of said sleeve than at the interior surface, and a tubular ferrule tightly engaged about said sleeve in surface contact with said end portion and extending longitudinally outwardly thereof so as to encircle said bound end of said bristles.

2. In brush construction as in claim 1, said holes having a countersunk portion at their juncture with the exterior surface of said sleeve and said adhesive mass forming an interlocking engagement with said holes and said countersunk portions.

3. In brush construction, a handle member molded of synthetic plastic material having an elongated hand grip portion terminating in a peripheral laterally outwardly flaring base, a hollow sleeve extending longitudinally outwardly from said base and terminating in an outer free end portion, bristles adhesively bound together adjacent one end in an adhesive mass and extending longitudinally outwardly of said sleeve, a plurality of lateral surface forming means spaced about said free end por-

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tion for effecting interlocking engagement between said sleeve and said adhesive mass, a portion of said adhesive mass interposed between the end of said bristles and said surface forming means and extending laterally outwardly of said bristles adjacent said bound end, a tubular ferrule engaged about said sleeve and extending longitudinally outwardly thereof so as to encircle said bound end of said bristles, the outer end of said ferrule terminating in a laterally inwardly extending lip having an interior surface bearing against the adhesively bound end portion of said bristles and an inner edge surface joining said interior lip surface and the interior surface of said ferrule, interlocking means formed within said ferrule including a pair of undercut surfaces extending longitudinally from said lip inner edge surface and longitudinally extending locking portions of said adhesive mass extending laterally behind said undercut surfaces whereby the interlocking engagement between said ferrule and said adhesive mass is uniform in cross section throughout a longitudinally extending zone.

4. In brush construction as in claim 3, said adhesive interlocking means forming a dovetail configuration.

5. In brush construction as in claim 3, said undercut surfaces extending longitudinally inwardly from said lip inner edge surface.

6. In brush construction as in claim 3, said undercut surfaces extending longitudinally outwardly from said lip inner edge surface.

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