United States Patent

Landen et al.

[15] **3,675,265**

[45] **July 11, 1972**

[54] BRUSH CONSTRUCTION

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[21] Appl. No.: **884,723**

Related U.S. Application Data

[62] Division of Ser. No. 692,416, Dec. 21, 1967.

[52] **U.S. Cl.** **15/193**, 401/171

[51] **Int. Cl.** **A46b 3/02**, A46b 11/00

[58] **Field of Search** 15/190, 191, 192, 193, 194, 15/104.92, 104.93; 401/171, 173, 175, 288, 270, 176

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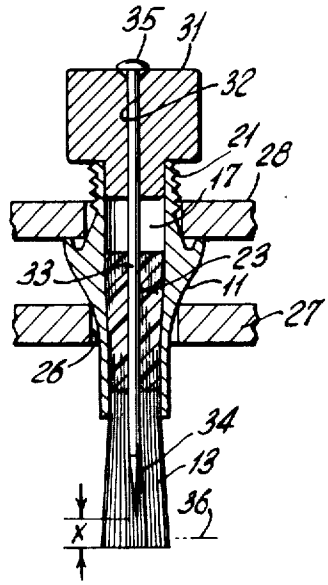
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[57] **ABSTRACT**

The invention contemplates a brush in which a bundle of natural brush bristles is secured to a tubular retaining ferrule having a bore open at both ends. The root ends of the bristles are assembled within the bore, with the tip ends projecting outwardly as the applicator end of the brush. A guided pin is inserted on the central axis of the bundle to radially outwardly further compact the bristles in the bore, and to serve a molding function as a thermosetting resin is cured to hardness; the root ends are thereby bonded to each other and to the ferrule, and a smooth central passage is defined for pomade supply.

5 Claims, 6 Drawing Figures



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Fig. 1.

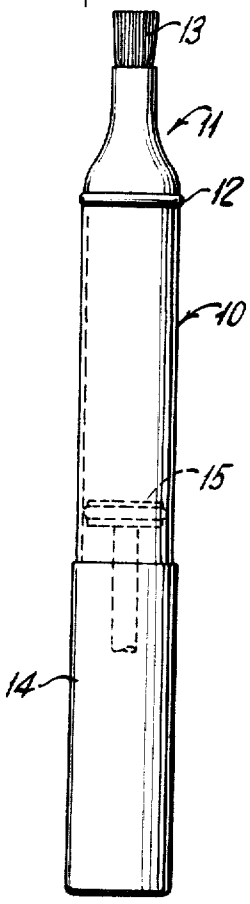


Fig. 2.

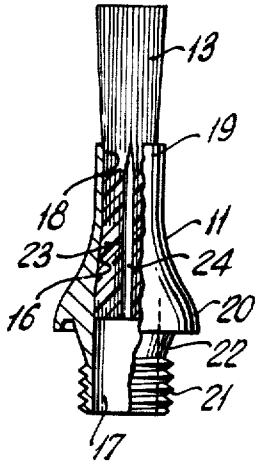


Fig. 3.

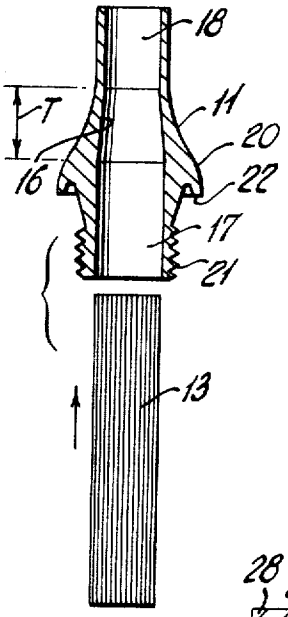


Fig. 4.

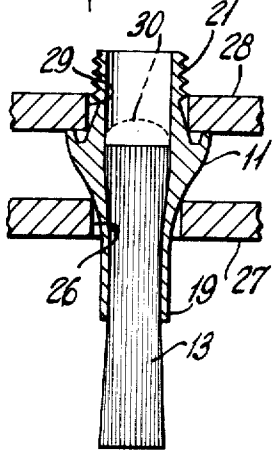


Fig. 5.

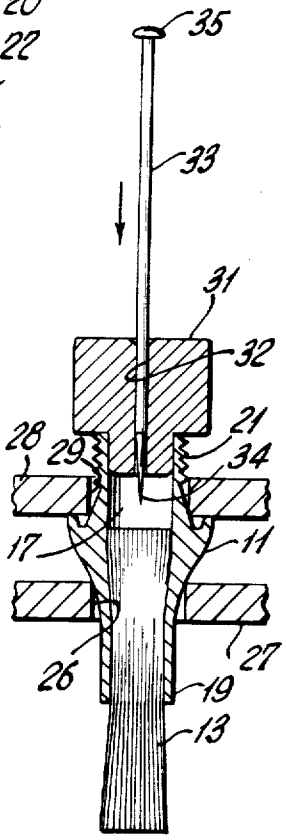
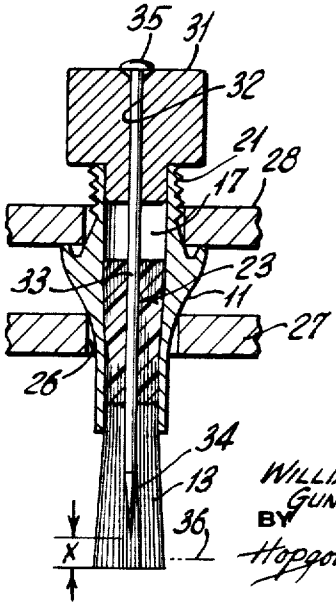


Fig. 6.



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BRUSH CONSTRUCTION

This application is a division of our copending application, Ser. No. 692,416, filed Dec. 21, 1967.

This invention relates to internally fed brushes of natural bristle and, in particular, to such a brush construction.

Feed-through brushes of the character indicated find use in a variety of applications, including cosmetic applicators wherein a reservoir of pomade or the like supplies the brush bristles from the rear, being forced through spaces between bristles. In quality brushes, which employ natural bristle such as pony hair, squirrel or sable, the brush bundles have been assembled to a nose piece or ferrule, with the root ends of the hairs glued to each other and to the bore of the ferrule, the feed-through passage being generated by drilling the glued assembly from the pomade-supply end. This process necessarily destroys and breaks numerous individual bristles, thus inviting the annoyance of bristle fragments, as a contaminant of the applied pomade. Necessarily, a number of the original bristles are completely lost, so that the ability to lay down a uniform pomade application is impaired.

It is, accordingly, an object of the invention to provide an improved applicator brush of the character indicated.

It is a specific object to provide a natural-bristle applicator brush in which all bristle elements are continuous throughout, in which greater compacting of bristles is achieved within the retaining ferrule or nose piece, in which there is absolutely no waste or destruction of the natural bristle assembled in the ferrule, and in which the possibility of dispensing bristle or glue fragments with pomade or the like is reduced to an absolute minimum.

It is another object to achieve the foregoing objects with a structure which is inherently simple, inexpensive, and foolproof, lending the same to mass-production.

Other objects and further features of novelty and invention will be pointed out or will occur to those skilled in the art from a reading of the following specification, in conjunction with the accompanying drawings. In said drawings, which show, for illustrative purposes only, a preferred embodiment of the invention:

FIG. 1 is a view, in side elevation, of a pomade applicator incorporating a feed-through dispensing-brush tip of the invention;

FIG. 2 is an enlarged side elevation of the nose piece of FIG. 1, the view being partly broken-away on a section through the longitudinal axis; and

FIGS. 3, 4, 5 and 6 are sectional views, similar to FIG. 2, to illustrate steps in the method of construction.

Briefly stated, the invention contemplates securing a bundle of natural brush bristles in assembled relation to a tubular retaining ferrule having a bore open at both ends. The root ends of the bristles are assembled within the bore, with the tip ends projecting outwardly as the applicator end of the brush. A guided pin is inserted on the central axis of the bundle to radially outwardly further compact or compress the bristles in the bore, and to serve a molding function as a thermosetting resin is cured to hardness; the root ends are thereby bonded to each other and to the ferrule, and a smooth central passage is defined for pomade supply.

Referring to FIG. 1 of the drawings, the invention is shown in application to a cosmetic pomade-dispensing applicator having a tubular body **10** which serves as the pomade reservoir. At one end, the nose piece or ferrule **11** is secured to body **10**, preferably in connection with a resilient seal ring **12** which may also seal the nose end when a cupped closure cap (not shown) is replaced, after pomade use. Internally fed bristles **13** extend out beyond the tip of the nose piece; and a manual actuator **14** carried at the other end of the body is operable to advance piston means **15** within body **10**, for controlled dispensing supply of pomade or the like from the reservoir to the brush bristles **13**. The piston-actuating mechanism forms no part of the invention and is therefore not further described.

The completed nose assembly of the invention is shown in FIG. 2, wherein the ferrule **11** is seen as a single piece which

may be die-cast or formed on a screw machine. The body of ferrule **11** surrounds a continuous bore, characterized by an inner reducing taper **16** of length T, between a larger cross-sectional area at the liquid-receiving end **17** and a smaller cross-sectional area at the brush-projecting end **18**. The ferrule body expands, from a minimum radial thickness near the tip end **19**, to a size at **20** consistent with that of body **10**; a threaded projecting end **21** engages the body **10**, enabling the seal ring **12** to be compressed and located against a shoulder **22**.

As previously explained, the bristles **13** are of straight natural hair, oriented to outwardly project the tip ends, and to contain the root ends within the bore of ferrule **11**. The root ends are shown near the base end of taper **16**, and a region **23** with the bore is sectioned for plastic to show the employment of thermosetting resin to consolidate into a single unit a substantial length of all bristles within the bore and near the root ends. Preferably, this consolidated region terminates short of the smaller or tip end of the bore. Additionally, a smooth-bore central passage **24** is provided, free of bristles, and lined by continuous bristle and cured resin, throughout the region **23**.

FIGS. **3** to **6** illustrate successive steps in the preferred method of making the structure of FIG. **2**. FIG. **3** shows the ferrule **11**, just prior to insertion of the bundle of bristles **13** at the tail end **17**. The orientation is such that the smaller (tip) ends of the bristles are inserted first, with the base or root ends at the rear. The tapered region **16** is in the order of 10° included angle and is smoothly formed with the adjacent bore ends **17–18**, so that smooth loading of the bundle **13** may proceed, using known techniques. The tip ends of bristles **13** are then drawn out the tip of the ferrule, until the root ends are at or near the base region of taper **16**. Preferably, the compliment of bristles thus loaded into the ferrule is essentially the same as if the bristle density were to be uniform throughout the dispensing section, i.e., just as many bristles as if there were to be no passage **24**.

Having thus loaded the bristles **13** into ferrule **11**, this partial assembly is placed, inverted, in a locating aperture **26** of a support member or plate **27**, allowing for free downwardly projecting suspension of bristles **13**, as shown in FIG. **4**. A second plate **28**, having apertures as at **29**, is then set against shoulder **22** to assure precise vertical orientation of the loaded ferrule. It will be appreciated that for quantity production, plural loaded ferrules may be similarly accommodated at registering further apertures (not shown) in plates **27–28**. The assembly is now ready for molding.

Molding proceeds by first applying a predetermined quantity of liquid thermosetting resin (e.g., phenolformaldehyde) to the upwardly open end of the ferrule. This is suggested in FIG. **4** by the dashed outline **30** for the measured drop or drops of resin. A jig or guide member **31** (FIG. **5**) is then located against the open end of the ferrule so as to align its guide bore **32** with the bore of the ferrule. Jig **31** is shown with a reduced end located in the bore section **17** and with a shoulder seated on the upper exposed edge of ferrule **11**. An elongated pin **33** is reciprocably guided at **32**, with a sharply pointed tip **34** poised for clean entry into the root end of the bristles **13**. Depression of pin **33** is suggested by an arrow, the full extent being limited by head **35** abutting the upper surface of jig **31**.

At this juncture, the parts relationship is that shown in FIG. **6**, wherein the pointed tip **34** extends beyond the ferrule but short of the bristle ends, and wherein the cylindrical body of the pin also extends beyond the ferrule. The rack **27–28** of ferrules **11** is then placed in an oven to cure the resin to final hardness. In the heating involved in curing, the resin **30** flows by gravity and by capillary action to permeate all interstices between bristles, for a longitudinal extent reflecting the controlled quantity injected at **30**. As previously indicated this quantity, which must be determined by experiment for the particular conditions of bristle nature, bristle density, bore size, etc. is nevertheless chosen to accomplish bonding in region **23** to a longitudinal extent which is short of the ferrule-tip end. The nature of resin flow during curing will be understood

to define a smooth continuous passage **24** within ferrule **11** and to bond the bristles to each other and to the bore of the ferrule.

After curing, plate **28** and jig **31** (with pin **33**) are removed, and the finished sub-assembly (nose piece with bristles) is ready for use, as shown in FIG. **2**. For certain precision uses, it may be desired to have all projecting bristles trimmed to the same projected length. The clearance between pin tip **34** and the bristle tips at X (FIG. **6**) permits a suitable trimming cut to be taken, as on alignment **36**, before plates **27–28** are disassembled.

In a highly satisfactory employment of this invention, a nose piece of ⅛-inch diameter outer-end bore has been packed with sable bristle. The bristle length contained within the ferrule **11** has been substantially ½ inch, about one-half of which was anchored in the tapered region **16**, which reduced the area of bore section by about 3 percent in a distance T (FIG. **3**) of ¼ inch. The diameter of pin **33** serves to further reduce, by substantially 4 percent, the cross-sectional area at **18**, so that pin-insertion radially outwardly displaced and compressed the bristles (at **18**) to that extent. To provide clean separation at the molded passage **24**, pin **33** was pre-treated with a fluorocarbon releasing agent; a single such coating is found to serve repeated recycling of the molding operation on successive pieces. The guide bushing or jig **31** is also preferably similarly treated with a fluorocarbon releasing agent, to avoid bonding the bushing to the ferrule, should the resin spill or be carelessly applied. Curing of the resin to complete bonding and molding was accomplished at an oven temperature of 275° F. for 4 hours, following instructions given for the particular commercially available liquid resin which was employed. Upon removal from the oven, the entire unit was left to assume room temperature, over a period of hours. Clean pin removal, without damaging the brush or the passage **24**, was then accomplished.

It will be seen that we have provided an improved brush of the character indicated, wherein a precision bore for pomade or the like may be molded on the brush axis without breakage or loss of bristles. Pomade or the like application, using such a brush, is found to be remarkably smooth, uniform, and free of contamination, either by bristle fragments or by resin fragments.

Although the invention has been described in detail for the preferred form and method, it will be understood that modifications may be made without departing from the scope of the invention as defined in the claims which follow.

What is claimed is:

1. As an article of manufacture, a brush comprising an elongated tubular ferrule with a radially compressed packed bundle of bristles in part contained by said ferrule and in part projecting beyond one end of said ferrule, all said bristles being continuously elongated in substantial overlap with each other at least within the ferrule, the portion of said bristles within said ferrule including the base ends of said bristles, and a hardened bonding material radially permeating said bundle near the base ends and bonding said bristles to each other and into an effectively solid end secured to said ferrule, the bonding material and adjacent central continuous bristles defining a smooth continuously walled central passage for liquid, said passage extending at least for the length of the bonded region.

2. As an article of manufacture, a brush comprising an elongated tubular ferrule having a bore open at an inlet liquid-receiving end of larger cross-sectional area than the opposite outlet end, there being a tapered portion of the bore connecting said larger and smaller areas, a radially compressed packed bundle of natural bristles in part contained by said ferrule and in part projecting beyond said opposite end of the bore, all said bristles being continuously elongated in substantial overlap with each other with the root ends at substantially the tapered region of the bore, and a hardened bonding material radially permeating said bundle from the root ends to said smaller area and bonding said bristles to said ferrule and to each other in an effectively solid annular root end, the bonding material and adjacent central bristles of said annulus defining a central liquid-supply passage extending at least for the bonded length of those bristles which surround the passage.

3. As an article of manufacture, a brush comprising an elongated tubular ferrule having a bore open at both ends, a radially compressed packed bundle of natural bristles in part contained by said ferrule and in part projecting beyond one end of said ferrule, all said bristles being continuously elongated in substantial overlap with each other at least within said ferrule, the portion of said bristles within said ferrule including the root ends of said bristles, a hardened bonding material radially permeating said bundle near the root ends and bonding said bristles to each other in a radially outwardly packed annulus terminated by and bonded to the bore of said ferrule, the bonded length of said bristles being essentially fully contained within said ferrule, the bonding material and adjacent continuous central bristles of said annulus defining a continuous passage through the bonded region of said bristles for central liquid supply from the other end of said ferrule to the unbonded projecting ends of said bristles.

4. The article of claim **3**, in which the bore of said annulus at the bonded region thereof is smooth and continuously cylindrical, being defined by bristles and by bonding material.

5. The article of claim **4**, in which said ferrule is generally cylindrical about a central axis with which the bore of said annulus is coaxial.

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