Jan. 1, 1963 S. BECK 3,071,415

METHOD AND APPARATUS OF PRODUCING CONVERGING BRISTLE TUFTS

Filed July 5, 1960

FIG. 10

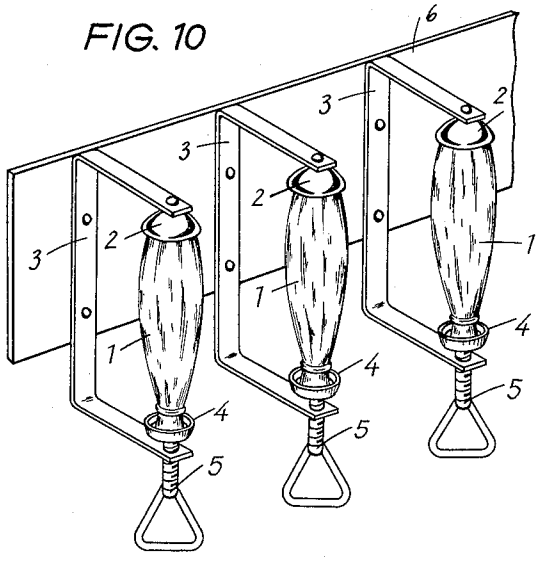


FIG. 1

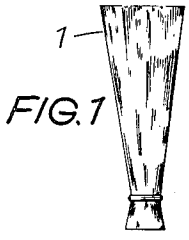


FIG. 2

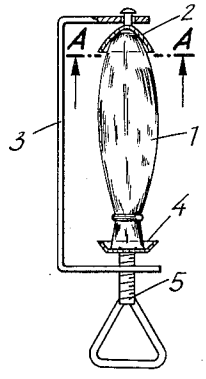


FIG. 7



FIG. 8



FIG. 3

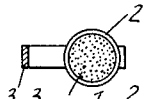


FIG. 4



FIG. 5



FIG. 6

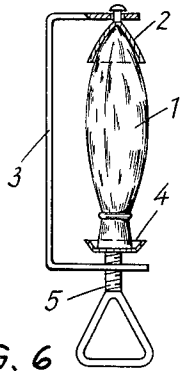


FIG. 9



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3,071,415

METHOD AND APPARATUS OF PRODUCING CONVERGING BRISTLE TUFTS

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The present invention relates to a new method and apparatus of producing brushes with a tuft of bristles which are curved toward the center of the tuft so as to engage with each other at their free ends.

Brushes of this type, also called pointed brushes, in which the bristles have a curved bud-shaped contour terminating into a point or converging toward each other at the tip are especially desired by artists for applying paint with sharp and regular strokes upon a surface, since in contrast with a conventional brush with straight bristles, the bristles of such a brush will barely spread apart when pressed upon the surface to be painted.

Prior to this invention such pointed brushes were produced in such a manner that two or more smaller tufts of curved bristles were combined to form one larger tuft which was then inserted into and clamped by a ferrule or the like. The smaller tufts were produced by selecting the bristles according to their natural curvature and by combining them by hand so that all of them would curve in the same direction. When several of these smaller tufts were combined to form one larger tuft, they were placed next to each other so that all of them curved toward a common center.

It will be quite obvious even from this short description of the prior method of making such brushes that this method was extremely laborious and therefore very expensive. Until the present time pointed brushes have therefore been several times as expensive as conventional brushes.

A further disadvantage of this conventional method of producing the tufts of bristles for a pointed brush is due to the fact that the bristles could then engage with each other only within one plane. For many purposes it is, however, desirable that the bristles converge toward the center of the tuft in all three dimensions.

It is an object of the present invention to provide a method of producing pointed brushes which is much more simple and inexpensive than the conventional method as described above, and results in brushes with much more accurately converging or centered bristles than could be attained by the known method.

For attaining this object, according to the invention a tuft of uncurved bristles while still in a condition to be deformed is molded into the desired shape by mechanical means and is thereafter subjected to a heat treatment at approximately 100° C. When applying the method according to the invention, it is no longer necessary to lay the loose bristles side-by-side and to subject them to a mild preliminary heat treatment. For the reasons indicated above, it is, however, imperative that this preliminary heat treatment is not carried out to such an extent that the bristles will lose their ability of being further shaped. It is therefore an essential feature of the invention that the tuft of bristles to be used for making a pointed brush consists of bristles which are still in a moldable condition.

This mild preliminary heat treatment of the bristles to eliminate their natural curvature may be carried out by means of warm water. Thereafter the bristles are also dried under mild conditions.

Another important feature of the invention consists in the mechanical process of molding the uncurved bristles while they are still in a moldable condition and are combined into tufts, and in the particular manner of carrying

out this process by means of mechanical molding elements. As will be subsequently described in greater detail, the tip of each tuft of bristles is for this purpose inserted into a conically shaped cap whereupon the desired shaping of the bristles and especially the central engagement thereof at the tip of the tuft will be automatically achieved without requiring any additional manual operation.

In order to fix the bristles in the curved and centrally converging and engaging position into which they had previously been placed by the mechanical molding operation, they may be subjected to the required amount of heat by a treatment of the individual tufts of bristles in boiling water for a period of several hours, for example, two hours. At the completion of this hot-water treatment, the tufts are dried at a temperature of about 90° C.

By use of molding elements of different shapes, for example, of a round or oval cross section, it is also possible according to the invention to attain brushes with tufts of different shapes. Molding elements of a round cross section are preferably to be used if the individual bristles of the tuft are to be in engagement with each other at the tip. In accordance with the particular shape of the molding elements it is also possible to produce tufts of bristles which terminate either in a point or in a blunt end.

According to another feature of the invention, the tuft of bristles, the tip of which is inserted into and held by the molding element, is supported at its base on a suitable adjustable pressure-applying device, for example, a spindle or the like, which acts upon the tuft in the longitudinal direction thereof. When this device is tightened, the tuft of bristles will be pressed into the funnel-shaped molding element so that the tuft will be upset to a certain degree, whereby the desired curvature of the bristles will be attained.

According to a preferred embodiment of the invention, the molding element and the adjustable pressure-applying device are secured to the opposite arms of a U-shaped bracket and thus together form a clamp. A plurality of such clamps may be mounted on a common support which for the hot-water treatment of the mechanically shaped tufts may be immersed in a bath of boiling water.

In order to prevent the bristles of the tuft from being twisted together within the molding element when the pressure applying device is being tightened by being turned, it is advisable to mount the molding element on the upper arm of the bracket so as to be freely rotatable about its longitudinal axis.

These objects, features, and advantages of the present invention will become further apparent from the following description of the accompanying drawings of some of the many possible embodiments of the invention. In these drawings—

FIGURE 1 shows a side view of a tuft of bristles as it is first produced for carrying out the method according to the invention;

FIGURE 2 shows a side view, partly in section, of the tuft of bristles according to FIGURE 1 after being inserted in the device according to the invention;

FIGURES 3 to 5 show cross sections taken along line A—A of FIGURE 2 with molding elements of different cross-sectional shapes;

FIGURE 6 shows a side view, partly in section, of the device according to the invention with a different molding element;

FIGURE 7 shows a side view of a finished tuft of bristles;

FIGURE 8 shows a side view of a finished brush according to the invention;

FIGURE 9 shows a side view of a finished brush with a tuft of bristles of a different shape; while

FIGURE 10 shows a perspective view of a support on

which several devices according to the invention are mounted.

Referring to the drawings, the method according to the invention proceeds from a tuft **1** of straight bristles, as shown in FIGURE 1, which must still be in a moldable condition. The tip of the tuft **1** is inserted into a funnel- or hoodlike molding element **2** which may be of many different shapes, as shown, for example, in FIGURES 2 to 6, and which is mounted on the upper arm of a U-shaped bracket **3** so as to be rotatable about its longitudinal axis. At its base, the tuft of bristles rests on a cup-shaped member **4** which is mounted on a threaded spindle **5** which is adjustable on the lower arm of bracket **3**. When spindle **5** is tightened, tuft **1** will be pressed into the molding element **2** and thereby be given a shape in accordance with the cross-sectional shape of the latter, as illustrated, for example, in FIGURES 3 to 5.

In order to be able to fix a plurality of tufts **1** simultaneously in the desired curved shape produced in the clamp defined by elements **2** to **5**, any desired number of such clamps may be mounted on a common support **6** which, with the tufts in their respective clamps, may then be inserted into a bath of boiling water to carry out the heat treatment of the bristles. After being immersed in the hot-water bath for a few hours, the support **6** is removed therefrom and the tufts are subsequently dried thereon at a temperature of about 90° C. Thereafter the spindles **5** on brackets **3** are loosened and the finished tufts **1**, as shown, for example, in FIGURE 7, are removed, whereupon each of these tufts is mounted in the usual manner on a ferrule on the brush handle to complete the centered or pointed brush, as shown, for example, in FIGURES 8 and 9, in which the bristles firmly engage with each other at the tip.

Although my invention has been illustrated and described with reference to the preferred embodiments thereof, I wish to have it understood that it is in no way limited to the details of such embodiments, but is capable of numerous modifications within the scope of the appended claims.

Having thus fully disclosed my invention, what I claim is:

1. A method of producing tufts of bristles for pointed brushes comprising the steps of mechanically molding a tuft of substantially straight bristles which are still in a moldable condition into the desired shape, said molding being effected by applying axial pressure to the bristles while the bristle ends are confined in a shaping zone, whereby the bristles bulge freely between their ends, and then subjecting said molded tuft to a heat treatment at a temperature of approximately 100° C.

2. A method as defined in claim 1, in which for attaining said straight bristles, natural bristles are subjected to a mild heat treatment and straightening treatment to eliminate the natural curvature of said bristles.

3. A method as defined in claim 2, in which said mild heat treatment is carried out in warm water.

4. A method as defined in claim 3, in which subsequent to said warm-water treatment, said bristles are dried under mild conditions.

5. A method as defined in claim 1, in which said shaping zone is provided by applying a hollow mechanical molding element to the tip portion of the tuft.

6. A method as defined in claim 1, in which said heat treatment consists of immersing said tuft for several hours in boiling water.

7. A method as defined in claim 6, in which subsequent to said hot-water treatment, the tuft is dried at a temperature of approximately 90° C.

8. A device for producing tufts of bristles for pointed brushes comprising a hood-like molding element having an inner recess substantially corresponding with the desired shape of the tip of a tuft and adapted to receive said tip to mold said tip to said shape, and an opposite adjustable pressure-applying member, said element and said member being mounted on the arms of a U-shaped bracket.

9. A device as defined in claim 8, wherein both said member and said element are rotatable in relation to said arms of said bracket.

10. A device for producing tufts of bristles for pointed brushes comprising a clamp consisting of a substantially U-shaped bracket, a hood-like molding element mounted on one arm of said bracket and having an inner recess substantially corresponding with the desired shape of the tip of a tuft, a threaded spindle in the other arm of said bracket extending coaxially to said molding element and having a cup-like member on one end facing toward said molding element and a handle on the other end, said cup-like member being adapted to receive the lower end of the tuft to press the tip of the tuft into and against said molding element and to bulge the central part of said tuft uniformly outwardly.

11. A device as defined in claim 10, in which said hood-like molding element is mounted on the upper arm of said bracket so as to be freely rotatable about its axis.

12. A device as defined in claim 8, wherein said pressure-applying member is a plate secured to a spindle which is threaded into one of the arms of the bracket, said plate being positioned to bear against the rearward end of the tuft of bristles to be shaped.

13. A device for producing tufts of bristles for pointed brushes comprising a support, a plurality of U-shaped brackets secured in laterally-spaced apart relationship to said support, one arm of each bracket supporting a hood-like molding element having an inner recess substantially corresponding with the desired shape of the tip of a tuft of bristles to be shaped, and the other arm of each bracket supporting a pressure-applying member axially opposite said molding element.

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