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METHOD OF AND APPARATUS FOR THE MANUFACTURE OF BRUSHES

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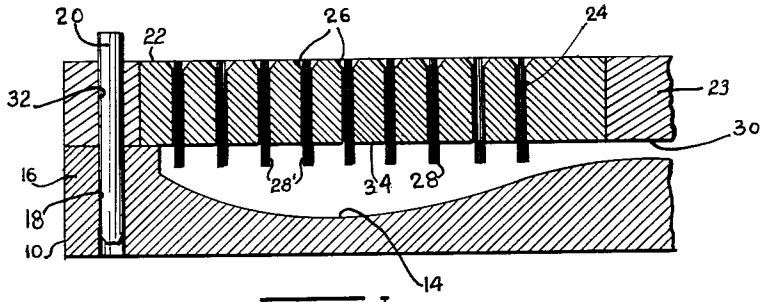


Fig. 1.

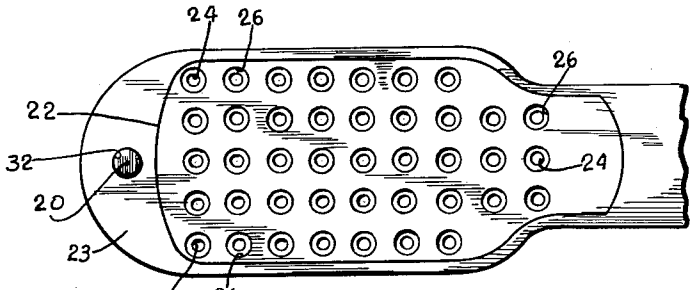


Fig. 2.

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METHOD OF AND APPARATUS FOR THE MANUFACTURE OF BRUSHES

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This invention relates to the manufacture of brushes and particularly to small brushes and similar articles by casting wherein a die is provided into which bristles extend and a liquid plastic material is poured into the die so that the bristles are sealed into the brush. This invention is an improvement over the invention disclosed in Patent No. 2,298,156.

The tufts of bristles used in brushes are round in cross section and in the ordinary manufacture of brushes small cavities, channels or grooves are left around the tufts and between the tufts into which water and dirt find their way during the use of the brush. Such tufts are ordinarily fastened in the brush by extraneous fastening elements such as metal wires and staples.

In the manufacture of brushes by the injection method, the shaking of the bristles into the die takes place directly on the injecting machine which makes this method too slow. In some of such injecting methods, inserts are used to support the bristles while the material is injected, but such inserts cannot be used in the manufacture of small thin brushes. Further, in some injecting methods, it is necessary to employ pressing elements in order to prevent separation of the die parts which adds to the cost of the apparatus.

It is the primary object of the present invention to provide a novel method of manufacturing small brushes by casting that eliminates the foregoing objectionable practices and provides a sanitary brush.

Another object of the invention is to provide a process of manufacturing small brushes whereby the brush back and bristles are formed into a homogeneous solid mass.

It is also an object of the invention to provide a method for the manufacture of small brushes in mass production quantities at small cost.

A further object of the invention is to provide a method of manufacturing a brush wherein the necessity of extraneous elements for fastening the bristles in place is eliminated.

It is also an object of the invention to provide dies for holding the bristles so the bristle ends evenly extend part way into the die cavity in position for being sealed by plastic material poured into the die.

Still another object is to provide a novel method of manufacturing brushes by casting.

For further comprehension of the invention, and of the objects and advantages thereof, reference will be had to the following description and accompanying drawings, and to the appended claims in which the various novel features of the invention are more particularly set forth.

In the accompanying drawings forming a material part of this disclosure:

FIG. 1 is a sectional view through a die embodying the present invention and showing the bristles in preset condition ready for the molding step.

FIG. 2 is a top plan view of the shaking mold.

Referring in detail to the drawings, in FIG. 1 there is shown a die part constituting a casting mold **10** having a plane surface at the top and a cavity **14** of the desired form of the brush back. The cavity **14** may be of any conformation desired without affecting the present invention. A raised boss **16** is provided integral with the mold **10**, and this boss is bored at **18** to receive an aligning dowel pin **20**. The casting mold **10** is preferably formed of metal, plastic, glass or plaster.

A second die part constituting a shaking mold **22** is provided in the form of an insert fitted in an opening in a larger die **23** and this mold is formed with elongated perforations or openings **24** extending therethrough, with countersunk ends **26**. The perforations or openings are arranged in a desired tuft pattern as shown in FIG. 2 so as to admit and hold a plurality of tufts **28**. Mold **22** is formed with a plane bottom surface **30**. The dowel pin **20** extends through a bore **32** in the end of the die **23** to ensure against any transverse or angular relative movements of the die parts and to guide the die **23** to position on the mold **10**.

In the practice of our invention, tufts **28** are inserted by the shaking insert machine (not shown) directly into the shaking mold **22**, which mold had previously been shaped and perforated to receive the tufts. The countersunk ends **26** of the perforations form tunnels for the bristles to enter easily and become packed in the perforaitons, with the ends depending from the mold **22**. When the shaking mold **22** is positioned on the casting mold **10** with the bristles immersed in the liquid plastic material, the plastic material is cured by heating. Upon hardening of the material the shaking mold **22** is removed.

The liquid plastic casting material used may be a formaldehyde, phenol or cresol basic resin or any of the different polyester resins or other suitable plastic materials suitable for casting. This plastic material serves as the adhesive for fastening the bristles in the brush and at the same time serves as the material of the body of the brush, that is, the brush back, and the handle, and since the liquid plastic material fills every space, gap and cavity there is no possibility of a cavity, channel or groove forming around or between the tufts.

One suitable hardening chemical for plastic material is sulfuric acid.

The present invention is an improvement over the invention disclosed in Patent No. 2,298,156. According to Patent No. 2,298,156, the parts numbered 7, 20, 40 and 44 shown therein are filled by the shaking process directly on the molding machine during the molding operation. This makes the manufacturing of the brush too slow. According to the present invention, the injection molding die **23** is to be formed with changeable or removable perforated parts **22** as inserts to deposit the bristles in the plastic liquid material. It is accordingly possible to shake the bristles in the shaking machine simultaneously into a number of such inserts **22** so that the injection machine can work with a large die having many openings. By this improved process, the change of the molds is much faster because the shaking of the bristles is done separately remote from and not in the injection machine.

In Patent No. 2,298,156 in FIG. 8 means is provided in the form of an insert to resist bending of the bristles under the pressure of the injected hot plastic material during the injection operation. In a small and thin brush however, it is not possible to place an insert therein. Instead of an insert, according to the present invention, the ends of the bristles are secured together by the use of glue or by the use of a solvent or by heat, as indicated at **28'**.

The plastic casting operation of the present invention ensures a large production of brushes with a small investment. The essence of the present invention is that we shake the bristles in the shaking machine into molds that have the shape and construction of the brush to be molded, the shaking machine being remote from the injection machine.

Our invention contemplates making under the same system brushes having preformed brush backs having hollow compartments about one-eighth inch deep into which the plastic liquid material is poured and into which material the ends of the bristles are immersed.

While we have illustrated and described the preferred embodiment of our invention, it is to be understood that we do not limit ourselves to the precise construction herein disclosed and that various changes and modifications may be made within the scope of the invention as defined in the appended claims.

Having thus described our invention, what we claim as new, and desire to secure by United States Letters Patent is:

1. The method of making a brush which comprises placing one die member over another die member, the bottom die member having a cavity shaped to conform to the shape of the back of the brush, the top die member having an opening therein above the cavity, shaking bristles into a perforated insert mold so that the bristles project outwardly of the perforations, solidifying the projecting ends of the bristles by heat, inserting the insert mold with the solidified bristle ends therein into the opening in the top die member with the solidified ends of the bristles projecting into the cavity, pouring liquid plastic material into the cavity over the solidified ends of the bristles, curing the liquid plastic material, and finally removing the insert mold from the opening in the die member.

2. In an apparatus of the class described, a die member having a cavity shaped to conform to the shape of the back of the brush to be molded, another die member superimposed on the first die member and having an opening over and in line with the cavity, and a removable insert mold in the opening in the superimposed die member, shaped to fit therein and supported along its edge on the first-named die member, said insert mold having a plurality of spaced openings extending therethrough to receive tufts of bristles in said openings.

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