Nov. 22, 1949 C. E. MAYNARD 2,488,873

TOOTHBRUSH AND METHOD OF MAKING

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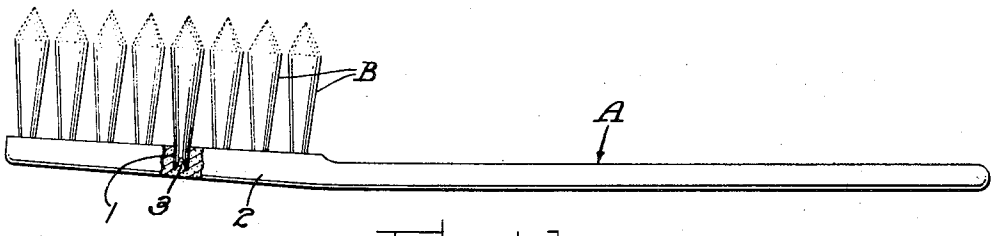


Fig. 1

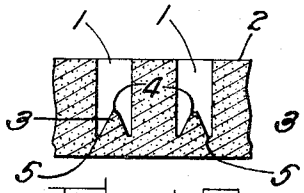


Fig. 2

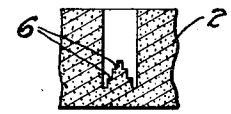


Fig. 3

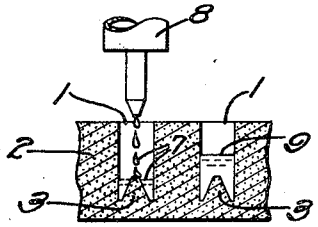


Fig. 4

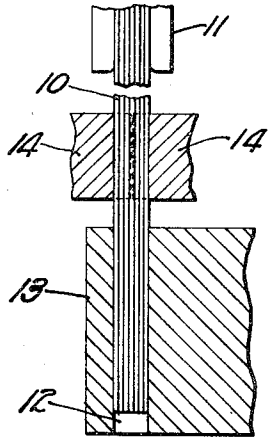


Fig. 5

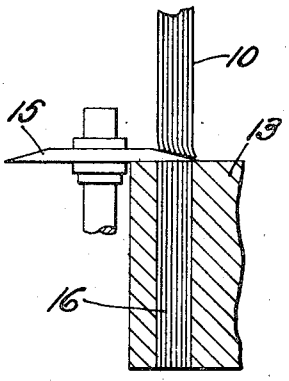


Fig. 6

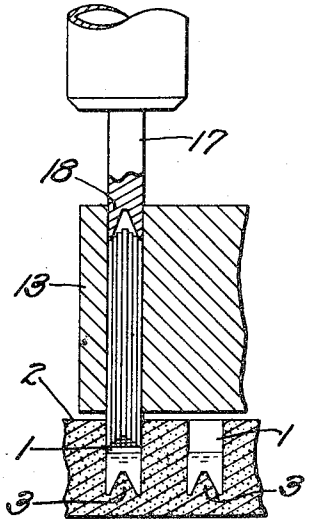
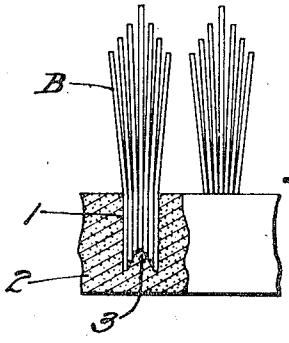


Fig. 7



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TOOTHBRUSH AND METHOD OF MAKING

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10 Claims. (Cl. 300—21)

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My invention relates to an improvement in tooth brushes and the like having a plurality of tufts of bristles, the exposed ends of certain bristles of the respective tufts being higher than other bristles in the same tuft to form points or ridges and a more effective brushing surface. My invention also includes a novel method of making such tooth brushes.

Hitherto in making brushes of this type it has been the practice to drill a series of holes in a brush back and then push into the holes the folded midsection of a group of long bristles and secure the tuft with suitable metal fastening means. The free ends of the doubled knots of bristles form the tufts. The parts of the bristles which extend from the brush back are of irregular length, and are trimmed to give the finished tufts the contour desired. About 16 percent of the bristle material is wasted in trimming a standard 28-knot tufted tooth brush.

When brushes are made as above described the bristles are bent sharply in forcing them into the small bristle-holes, and some of them may be cracked. Later, when the brush is used, the cracked bristles break and come out in the mouth of the user. The tops of the bristle-tufts are also apt to be frayed or split during the trimming operation.

In practicing my invention I mold or otherwise form the brush back with the bottoms of the bristle holes shaped according to the contour desired for the exposed ends of the bristle tufts. Then I push endwise into the holes tufts of bristles of uniform length. The inner end of each bristle is seated against the appropriate portion of the bottom of the hole and thus the exposed end of the tuft is given a contour corresponding to the shape of the bottom of the hole. The bristles are secured in the hole by cement, preferably a cement which, when the bristles are of synthetic material, has an affinity for both the material of the brush back and the material of the bristles so that when the cement hardens, the bristles, cement and brush back become a unitary structure.

My present invention eliminates the waste of bristle material resulting from trimming, eliminates the expense of trimming and avoids the danger of cracked bristles. It does away with the expense of staples, the difficulty of getting proper metal for staples, and trouble with the punch mechanism used for stapling. There is no longer any need to have a bristle picker, in order to get uniform tufts. The invention simplifies the whole mechanism used in making brushes

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and makes it possible to manufacture brushes under more sanitary conditions.

Prior to the present invention, the operations of making tooth brushes have been performed in different places by a number of different workers. A typical procedure, which is still in use, is as follows: The blanks for the brush backs are molded in one place. Then they are sent to a room where they are held in the conveyor of a bristle-setting and stapling machine, and are in turn drilled and the holes filled with doubled tufts of bristles. The bristles are supplied from trays that are filled by hand. The brushes are then taken to another place where they are run through a trimming machine, and are thereafter smoothed or buffed. The places where the work is done are necessarily like machine shops. Bits of drilled material and scraps of trimmed bristles fly out and litter the floors. The brushes have to be handled by many different people.

One of the most important advantages of my novel method is that it is now possible to take the molded brush backs as soon as they are finished and perform all of the remaining steps in one place where strict sanitation can be enforced, and the brushes completed without further handling.

Another important advantage is that the tufts can be symetrically pointed. When tooth brushes are trimmed, the tufts are cut transversely to the principal axis of the back, so that transverse ridges are formed. My present method not only makes it possible to provide these ridged tufts without trimming as heretofore explained, but also makes it possible to make tooth brushes with symetrically pointed tufts in which the central bristles are higher than those on the peripheries. As far as I am aware, this is a novel construction, and one which causes a different effect in brushing.

The nature and objects of the invention will best be understood from the following description in conjunction with the accompanying drawings.

In the drawings:

Fig. 1 is a side elevation of a completed tooth brush embodying my invention.

Fig. 2 is an enlarged fragmentary section through the back of a tooth brush showing two of the bristle holes and illustrating one step of the method of the invention.

Fig. 3 shows the step of placing liquid cement in the holes.

Figs. 4 to 6 inclusive illustrate further progressive steps of the method.

Fig. 7 is an enlarged fragmentary view partly in section showing a segment of a tooth brush back provided with two completed bristle-tufts.

Fig. 8 is an enlarged fragmentary view showing a modification embodying the invention.

In the drawings, the tooth brush A shown in Fig. 1 has a plurality of tubts B set in holes 1 in the brush-back 2. The tops of the tufts are ridged or pointed to provide a brushing surface, and the contour of these tufts is determined by the shape of an elevation 3 formed at the base of the holes. An elevation with a raised middle portion or ridge will cause the bristle-tufts to be formed with a ridged brushing surface, while an elevation that is conical will result in a pointed tuft being formed.

In practicing the method of the invention, the following steps are used, although not all of them are necessarily in the order stated.

Bristle holes 1 are formed in the brush back 2, which is preferably made of a suitable plastic material. These holes may be drilled, but are preferably molded at the time of molding the back. The bottom surfaces of these holes are shaped according to the shape desired for the tops of the tufts in the completed brush, usually either wedge-shaped or pointed. In Fig. 2, the central portion 3 of the bottom parts of the holes rises toward the center. This central portion 3 may, as shown, be in the form of a truncated cone. The top is preferably flattened, as at 4, and a flat surface 5 may, if desired, be left surrounding the base of the cone, instead of having the base of the cone coextensive with the hole. The modified form shown in Fig. 8 is somewhat the same in general outline, but has steps 6 cut into the central portions. In the modified form, the lowermost recess and each of the steps 6 are approximately the width of the diameter of the bristles used, and provide a firm base for the lower ends of the bristles. In either form, the raised portion is so formed that the bottom ends of some of the bristles are held at a definnite higher lever than those of some of the adjacent bristles. When the conical form is used, the incline of the cone is such that bristles of a given diameter will be held the proper vertical distance with respect to each other, so that the bristle tufts of the finished brush will have the desired contour. As shown in Fig. 7, each bristle is held a definite predetermined distance from the lowermost part of the hole.

A predetermined measured quantity of liquid plastic cement is placed in each hole before the bristles are put in. The cement 7 is shown being dropped into one of the holes by a dropper 8. Another of the holes, as shown at 9, has already received its quota of cement.

Parallel bristle filaments or monofils 10 are unwound from a reel 11 and shoved into bores 12 in a holding block 13. These filaments are made of a suitable water-insoluble synthetic material, and are provided in long lengths capable of furnishing so many tufts that they may be considered practically continuous. A predetermined number of the parallel monofils are fed forward by a pair of feed clamps or jaws 14. As the jaws are brought together the filaments are held against relative movement, and as the jaws are lowered, they are fed into the bores in the block 13. In practice several such bores may be used. The block 13 may conveniently be formed like the cylinder of a revolver with a plurality of bores that may successively be brought into position beneath the feed jaws. The jaws feed the filaments into the bores until their lower ends reach the lower ends of the bores as shown in Fig. 5, and then release them and return to starting position. The bores confine the filaments into close-packed bunches, and prevent lateral expansion both prior to and after the cutting operation. After the bunched filaments have reached the position shown in Fig. 5 they are cut level with the top of the holding block by a knife 15. This operation leaves a bunch of measured bristles 16 of uniform length in the block. These bristles are not subsequently cut or trimmed, and the length of the bristles in the tufts of the finished brush will therefore depend solely on the amount measured off and cut while in the block 13.

The straight lengths are then pushed endwise into the holes 1 of the back 2 until the lower ends of the bristles cannot move downwardly any farther. When the conical form of base is used, the shape or angle of the sides of the base determine the shape of the tufts in the manner previously explained. When the modified form is used, the bristle ends are seated firmly on the steps. The pushing operation is done with a bristle-setter 17 having an operating head 18 shaped like the bottoms of the holes, i. e. the lower surface of the head and the bottoms of the holes are practically complementary. When the modified form of Fig. 8 is used, the bristle setter also has corresponding steps formed in the head 18. As indicated in Fig. 7, the bristles are pushed down through the bores and into the holes 1 of the back 2 until the lower ends of the bristles fit over the central elevation in the bottom of the holes. The outside bristles will go into the deepest part of the recess, which is approximately the width of the bristles. The inside bristles will become seated on the raised central section when they strike the sides, as sidewise displacement of the bristles is prevented. As the bristles are pushed into place, they will partly displace the cement 7, which rises approximately to the level of the face of the brush back. The cement subsequently hardens and holds the bristles firmly in the holes, and also seals the holes and lower parts of the bristles against dirt, food and bacteria.

When the block 13 is withdrawn, the bristles are left lodged in the holes in the brush back. As soon as the block is removed, the outer ends of the bristle-strands spread as shown in Fig. 7 to form the pointed or ridged tufts.

As far as I am now aware, the brush and method embodying my invention are entirely new and have a revolutionary effect on the condition of manufacture. Consequently, I do not intend to limit my invention except as indicated in the claims, or beyond the requirements of the prior art.

I claim:

1. The method of making tooth brushes and the like comprising the steps of forming holes with mounded bottom surfaces in a brush back, placing a liquid cementitious substance in the holes, placing long lengths of bristles parallel to each other, confining the strands in close bunches, cutting off predetermined lengths of the bristles of uniform length for each hole, and forcing the bunched uniform lengths endwise into the holes in the brush back until they are seated upon said bottom surfaces, and the cement has been forced upwardly in the holes throughout the spaces between the bristles to

form a protective seal against dirt and bacteria.

2. A brush comprising, in combination, a brush back having a plurality of bristle holes having shaped bottoms provided with horizontal surfaces at different levels with respect to said back adapted to serve as seats for the ends of bristles, and a tuft of bristles for each hole comprising a plurality of straight bristles of uniform length seated on said horizontal surfaces.

3. A brush having, in combination, a brush back, a plurality of bristle holes in said back, a tuft comprising a plurality of bristles for each of said holes, and a plurality of horizontal surfaces formed at different levels in the bottom of said holes adapted to serve as seats for the ends of said bristles, said horizontal surfaces approximating the diameter of the bristles seated in said holes.

4. A brush comprising, in combination, a brush back, a plurality of bristle holes having shaped bottoms with raised central portions formed in said back, substantially horizontal bristle-seating surfaces formed on said raised central portions, and a tuft of bristles for each hole comprising a plurality of bristles of uniform length seated on said horizontal surfaces.

5. A brush comprising, in combination, a back, a plurality of holes formed in the back having shaped bottom surfaces at least some of which are higher in the middle of the hole and form seats for the ends of bristles but none of which extend to the top of said holes, straight unbent lengths of tightly packed bristles that are equal in length for each tuft placed endwise in said holes and on said shaped surfaces and held thereby against lateral displacement so that each bristle is held at a predetermined level with respect to said back to give said tuft an external contour determined by said shaped surfaces, and a cement in said holes that is forced between the spaces between said bristles to form a seal against dirt and bacteria.

6. A brush of the character defined in claim 5 in which the shaped portions of the bottoms of the holes are smooth wedges extending from a lower margin of the hole to the opposite lower margin.

7. In the process of making brushes and the like having shaped tufts of bristles, the steps of forming in a brush back a plurality of bristle holes with integrally formed elevated bottom portions adapted to position at varying levels with respect to the brush back the ends of bristles placed therein, grouping straight unbent bristles to form tufts with their ends even, and pushing equal lengths of said grouped bristles endwise without lateral displacement into each hole to varying depths as determined by said elevated portions to form shaped tufts of individually disposed bristles on said back.

8. In making brushes having separate shaped tufts of bristles in holes therein, said holes having centrally raised bottoms, the steps of grouping a plurality of strands of bristle material in parallel relation in a confined space with their lower ends even, severing them to form straight unbent tufts in which all of the bristles are of the same length, pushing the said unbent tufts endwise into holes in the back by relative longitudinal movement and tightly holding the bristles in said holes against lateral displacement, moving some of the bristles deeper than others into the holes in the brush back to engage their inner ends with said bottoms so that the ultimate relative position of the bristles in each tuft and the shape of each tuft is determined by the extent of said relative longitudinal movement.

9. In making toothbrushes and the like having separate tufts of bristles, the steps of grouping a plurality of unbent bristle strands in parallel relation, cutting uniform lengths of said grouped strands, forming bristle holes in a brush back with shaped bottom surfaces having elevated portions adapted to seat some of the bristles in each tuft at a higher level than other bristles of the same tuft, applying force successively to a plurality of the unbent bristles in each group, and then simultaneously applying force thereto until the lower ends of said bristles become seated on the shaped bottom surfaces and tightly packed in said holes against lateral displacement.

10. A toothbrush made of three kinds of plastic material, one for the back, a second for the bristles, and a third for binding the three materials together and forming a solid brush back with embedded bristles, said back having holes having plural internal contours of stepped form, each hole corresponding to one tuft of bristles, where the inner ends of the bristle material of one tuft meet the internal material of the back, each contour being a substantial replica of that contour over the outer ends of the bristles in the corresponding tuft, said bristles being all in substantially straight unbent form and closely held against lateral displacement in said holes, and with respect to the bristles of a particular tuft all of the same length, with their inner ends positioned on said internal contours, the plastic material for binding the back and bristles internally surrounding each of said stepped contours and the bristles embedded at their inner portions and filling up the spaces between the bristles in said back to form the sole attachment of the bristles to the brush back.

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