Jan. 25, 1955 S. DREYFUS 2,700,259

PROCESS FOR TREATING BRUSH BRISTLES

Filed Sept. 15, 1950 2 Sheets-Sheet 1

Fig. 1

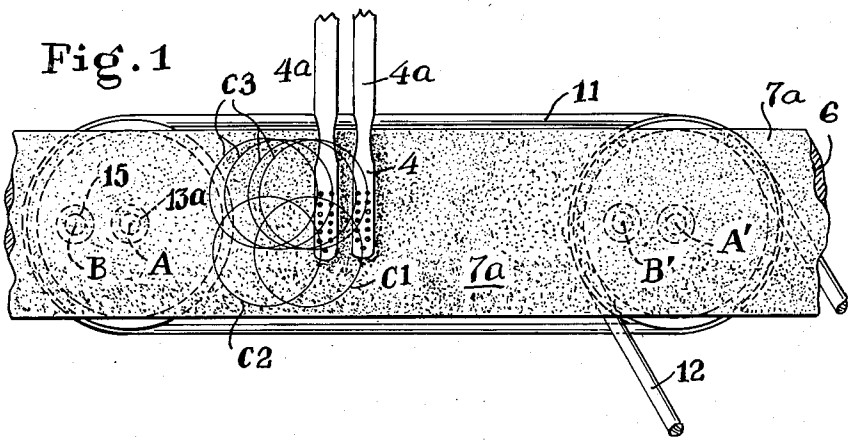
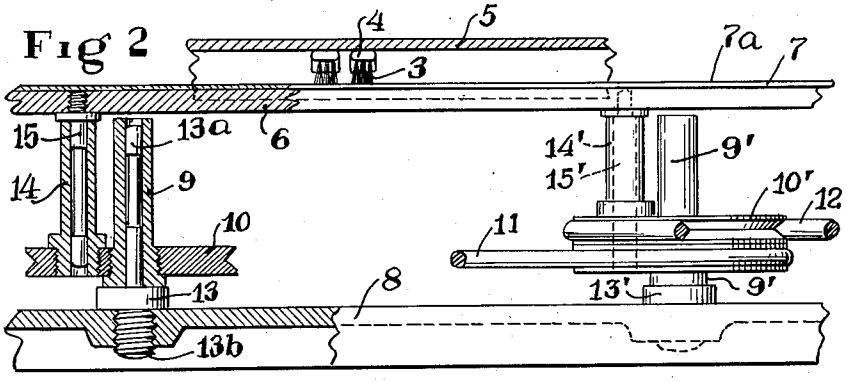


Fig 2



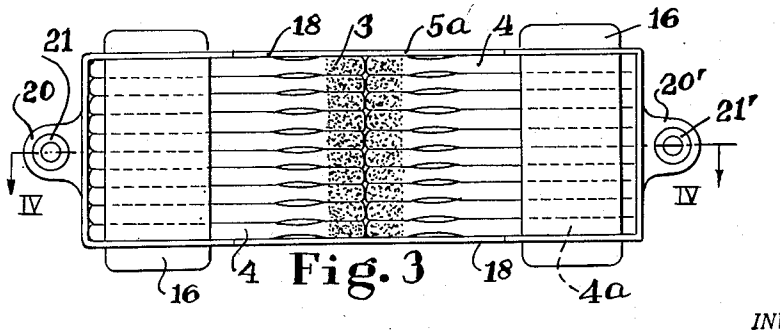


Fig. 3

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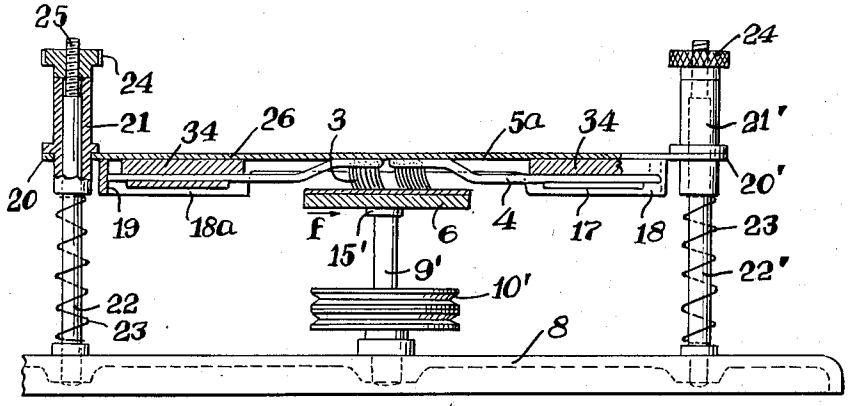


Fig.4

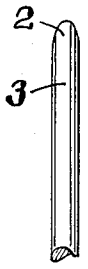


Fig.5

Fig. 6

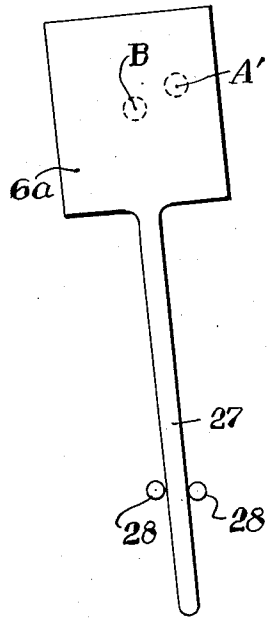
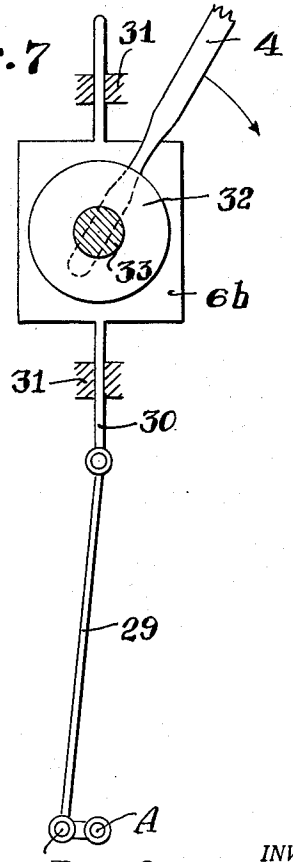


Fig. 7



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PROCESS FOR TREATING BRUSH BRISTLES

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Application September 15, 1950, Serial No. 185,002

Claims priority, application Switzerland October 10, 1949

1 Claim. (Cl. 51—281)

This invention relates to the manufacture of brushes, more particularly tooth brushes, and is especially concerned with a machine for finishing the ends of the bristles of brushes.

In the manufacture of brushes, such as tooth brushes, it is necessary to blunt the free ends of the bristles because these ends, when merely cut, are sharp and would, if not blunted, injure the mouth and gums of the users.

It is the principal object of the presnt invention to provide a device for effectively and efficiently blunting the ends of the bristles of tooth brushes and the like.

It is another object of the invention to provide a device of the character indicated which is adapted to blunt the ends of the bristles in such manner that the lateral surfaces of the bristles are connected to the top surfaces of the bristles, i. e. the free ends of the bristles, by sloping surfaces which form at all points an obtuse angle with the lateral surfaces and with the top surfaces.

Another object of the invention is to provide a device for blunting the free ends of the bristles of a tooth brush or the like which provides on the bristles a sloping surface with a convex curvature connecting the lateral surface and the top surface of each bristle.

The above and other objects and features of the invention will be more readily apparent from the following detailed description thereof when read in connection with the accompanying drawings. It will be understood, however, that the drawings are directed solely to illustrative embodiments of the invention and are not limitative of the invention, the scope of the invention being defined in the appended claim.

In the drawings, wherein like reference characters designate like parts,

Fig. 1 is a top plan view of a device embodying features of the invention, the upper brush holding member being removed to show details of construction;

Fig. 2 is a side elevation, partly in section, of the embodiment shown in Fig. 1, showing the upper brush holding member in position;

Fig. 3 is a plan view of a modified form of the brush holding member;

Fig. 4 is a front elevation, partly in section taken approximately along the line IV—IV of Fig. 3, showing the brush holding member mounted in position;

Fig. 5 is a side elevation, in greatly enlarged scale, of a brush bristle blunted by the device of the invention;

Fig. 6 is a diagrammatic plan view of another embodiment of the invention; and

Fig. 7 is a similar view of a further embodiment of the invention.

The bristle blunting machine of the invention comprises at least one support means, means for securing at least one brush on the support means, a second support means adapted to hold a sheet of material having at least one abrasive face, a frame, at least one rotatable shaft mounted on the frame, a crank pin eccentrically supported by the shaft, and at least one member movable in a plane perpendicular to said shaft and crank pin and connected to said crank pin, one of said above-mentioned supports being rigidly connected to said movable member, while the other of said supports is positioned adjacent the support connected to the movable member in such manner that the ends of the bristles of the brush held in the first support touches the abrasive face of the sheet held by the other support.

In Figures 2 to 4 there is shown a support **5** or **5***a* upon which are mounted a plurality of tooth brushes **4**. A rigid platform **6** carries a sheet of emery paper or emery cloth **7**, the abrasive surface **7***a* of which is turned upwards. The platform **6** provides a connecting element between two rotatably mounted parallel axles B, B′ which are positioned to rotate about two parallel axles A, A′. The axles A, A′ thus define two cranks having the same radius, as shown in Fig. 2.

On a frame plate **8** are mounted the two axles A, A′ having bases **13** and **13′** and pins **13***a* on which shafts **9** and **9′** are rotatably mounted. The axles A, A′ have threaded ends **13***b* which are securely screwed in plate **8**. The rotatable shafts **9** and **9′** carry pulleys **10** and **10′**. The pulley **10′** is double and has two parallel grooves around one of which passes a belt **11** connecting the pulley **10′** to the pulley **10** on shaft **9**, and the other groove of the pulley **10′** carries a belt **12** connecting the pulley **10′** to the power source, such as a motor (not shown). The axles B and B′ are formed by two bases **15** and **15′** similar in construction to bases **13** and **13′** and secured firmly into platform **6** and rotatably mounted in hollow shafts **14** and **14′** which are fastened to pulleys **10** and **10′**. As shown in Fig. 2, the groove of pulley **10** and the groove of pulley **10′** which carries the belt **11** are of equal diameters so that the belt **11** merely serves to insure that the dead point of the cranks will be passed at all times. By reference to the drawings it will be seen that, when the pulleys **10** and **10′** are rotated, all points of the abrasive surface **7***a* are moved along identical circumferences, the radii of which correspond to the distance between the axles A and B. Thus, referring to Fig. 1, if the bristles of a tooth brush **4** were mounted to engage the abrasive surface **7***a*, each bristle of the end tuft of brush **4** would slide along a circumference C_1. A bristle of the end tuft of the brush at the left in Fig. 1 would be rubbed along a circumference C_2, whereas the rearward bristles of the brushes **4** would be moved along one of the circumference C_3. In the foregoing, it will be understood that the support **5** holding the brushes **4** is stationary and disposed in such manner that the ends of the bristles touch the abrasive surface **7***a*.

In Fig. 3 is shown a brush support **5***a* comprising at least two sections to permit one of the sections to be filled with brushes while the other holds the brushes in active position against the abrasive surface **7***a*. Support **5***a* is in the form of a rectangular frame, the sides **18** of which are sufficiently long to permit two rows of brushes to be placed therein, the brushes in the rows being parallel to the sides **18** and in head abutting relationship. The frame is provided with a rigid base **26** upon which the heads of the brushes press. The handles of the brushes engage blocks **34** so that the bristles are maintained in the proper position relative to the surface **7***a*. As shown in Fig. 3, the heads of the brushes are directed toward the center of the frame. The brushes of each row are pressed against the rigid base **26** by a resilient blade **16** which normally has a convex cross-section but which, however, is flattened when the blade **16** is passed through apertures **17** in portions **18***a* of the edges **18** of the frame. The inner portions of the edges **18** are of lesser width to avoid contact with the platform **6**. The apertures **17** are positioned at the level of the brush handles or slightly lower and are of a sufficient height to receive the blades **16**.

The end walls of the frame, which are designated **19**, are perpendicular to the plane in which the brushes lie and are provided with external ears **20**, **20′** having apertures in which are received cylindrical sleeves **21**, **21′** perpendicular to the rigid base **26**. These sleeves are slidably adjustable on cylindrical stems **22**, **22′** which are fixedly mounted in the plate **8** parallel to the axles A and B.

Springs **23** are mounted on the stems **22**, **22′** and exert an upward pressure upon the frame to maintain it in raised position on the stems. The upper ends of the stems **22**, **22′** are threaded as indicated at **25** and are engaged by nuts **24** which permit the frame to be moved downwardly against the force of the springs **23** to adjust the distance between the brush bristles and the abrasive surface **7***a* and thereby to adjust the degree of flexing imparted to the bristles **3** as they are pressed against the abrasive surface. The direction of flexing of the bristles when the platform is moved in the direction of the arrow *f* is shown in Fig. 4.

It will be understood that the sliding of the bristles over the abrasive surface due to the relative motion of the two supports **5***a* and **6** (Figs. 3 and 4) is not exactly the same as the relative circular motion of the supports. Owing to the fact that this latter motion is changed at each instant, the angle at which each filament is flexed turns about an axis which is perpendicular to the surface **7***a* while the end of each bristle describes, relatively to the surface **7***a*, a circumference which by reason of the flexion between the bristles and the surface **7***a* is smaller than the circumference C_1, C_2. The flexion causes a delay in the rotation of the angle of flexing and this effect is greater, the greater the coefficient of friction between the abrasive surface and the bristle. Thus, the sliding of the bristle ends could be substantially annulled if the radius of the cranks were not greater than the length of the normal projection of the flexed bristle on the surface **7***a*. For this reason and in order to increase the speed of the abrasive action with a reasonable angular speed of the cranks, the radius of the cranks is a matter of a few centimeters when the device is adapted for the processing of tooth brushes. Because the ends of the bristles must be blunted along their entire periphery, the greatest radius that can be given to the cranks is that in which the abrasive action is sufficient after a single rotation, increased by the value of the angle of friction the tangent of which is equal to the coefficient of friction between the bristles and the abrasive surface.

In using the device one may start by first giving the bristles their greatest flexion and then gradually diminishing it by turning the nuts **24** to allow the support **26** to be raised by the springs **23**, or one may proceed in the opposite manner by gradually increasing the flexion of the bristles.

The embodiments of Figs. 6 and 7 permit substantially the same results to be obtained as are obtainable in the embodiments of Figs. 1 to 4. In Fig. 6 there is obtained a relative movement of the two supports which is as close as desired to the circumference C_1, C_2 of Fig. 1 by means of a single crank. A platform **6***a* having a stem **27** forms a connecting rod articulated at B, the axis of the crank pin turning around the axis A' and the platform is guided by its stem **27** at a distance several times greater than the crank radius, the stem **27** extending between two fixed pins **28**. This connecting rod may carry either the abrasive material or the brush support and these are carried nearer the axis B than to the portion of the stem **27** extending between the pins **28**, in order that the movement path of the moving surface relative to a fixed point will be as near as possible to a circle for a given distance between the pins **28** and the axis A'.

In Fig. 7 a connecting rod **29** is articulated at one end about an axis B of a crank pin turning about an axis A and at its other end to sliding block **30** carried in a rectangular slideway **31**. The connecting rod imparts an alternating motion to the block **30** which may, for example, be transferred to the abrasive surface. The sliding block forms an integral part of the platform or support **6***b*.

As in the case of Fig. 4, one can impart to the brush, by movement of the shaft **33**, a slow small vertical motion in order to shape the filaments as rounded off points rather than cones. The breadth of the platform **6** is not limited provided the pins **13***a* and **15** are long enough to avoid a seesawing action caused by the pressure of the brushes.

The device could be adapted for blunting the bristles of brushes other than tooth brushes, e. g. hand brushes, and the device is particularly suitable for treatment of nylon bristles. Finally, the desired relative movement of the surfaces could be obtained by other forms of the embodiments illustrated, using one or several cranks.

What I claim is:

A process for blunting and rounding the ends of brush bristles having the bristle ends lying in a common plane which comprises, bringing the brush bristle ends into engagement with an abrasive surface, effecting relative movement between the abrasive surface and the brush bristle ends in a transverse and in a longitudinal direction to cause each brush bristle end to describe a predetermined closed path, the path described by each bristle being eccentric with respect to the path described by each other bristle, pressing the brush bristles against the abrasive surface to cause the brush bristle ends to be flexibly bent during said relative movement, and gradually relieving the pressure of the bristle ends upon the abrasive surface while continuously effecting said relative movement, whereby to effect controlled rounding of the bristle ends to provide a convex sloped surface connecting the end of the bristle with the lateral surface of the bristle.

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