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MACHINE FOR BLUNTING THE ENDS OF BRUSH BRISTLES

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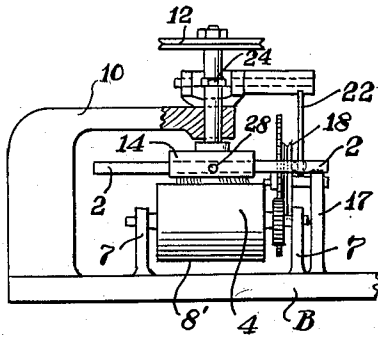


Fig. 1

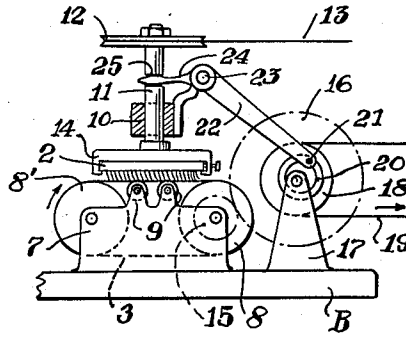


Fig. 2

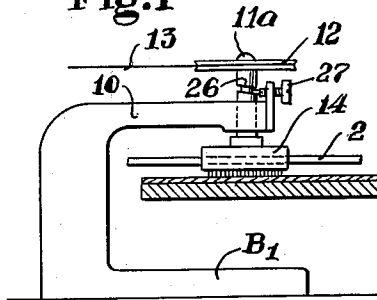


Fig. 3

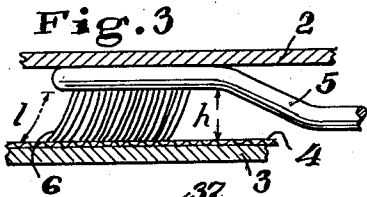


Fig. 6

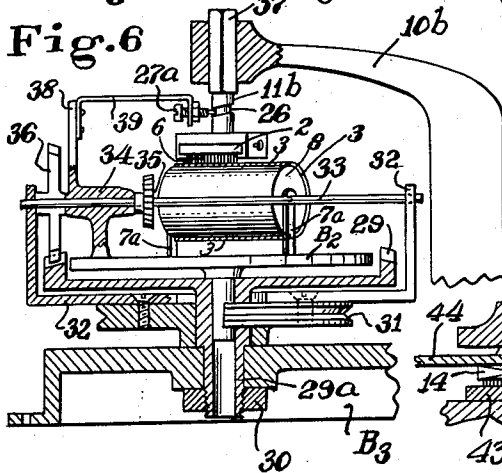
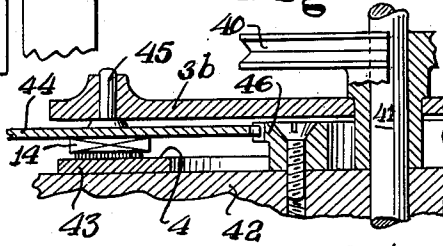


Fig. 5

Fig. 7



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MACHINE FOR BLUNTING THE ENDS OF
BRUSH BRISTLES

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Application September 15, 1950, Serial No. 185,003

Claims priority, application Switzerland
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6 Claims. (Cl. 51-145)

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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 present 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 claims.

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

Fig. 1 is an elevational view of one embodiment of the invention;

Fig. 2 is an elevational view of this embodiment as seen from the right of Fig. 1;

Fig. 3 is a side elevation of a portion of the device on an enlarged scale in order to show details of construction;

Fig. 4 is an elevational view partly in section of another embodiment of the invention;

Fig. 5 is a plan view of a third embodiment;

Fig. 6 is a partial sectional view taken approximately along the line VI-VI of Fig. 5, and

Fig. 7 is a fragmentary sectional view of a fourth embodiment of the invention.

All of the illustrated embodiments comprise a dish 2 which defines a support adapted to hold two rows of tooth brushes and analogous in

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structure to the support disclosed and claimed in my copending application Serial No. 185,002, filed September 15, 1950. The dish 2 is suitably provided with means (not shown) for securing the brushes to it and can be mounted in a slideway 14 by means of a set screw 28.

As shown in Figs. 1 and 2, a flat endless belt 3 passes over two drums 8 and 8' on which it is stretched sufficiently to transmit motion from drum 8 to drum 8' and not to yield to any appreciable extent under the pressure of the bristles 6 mounted in the series of brushes 5 which are disposed in the dish 2 above the belt 3. The drums 8, 8' are journaled in bearings 7 mounted on a base B and bearings 7 carry rollers 9 which serve to support the belt between the drums 8, 8'. The outer face of the belt 3 is covered with an abrasive varnish or with a sheet of paper or cloth impregnated or covered with such a varnish and abrasive to provide an abrasive face 4 against which the bristles 6 are pressed. The holder 14 is mounted at the end of a shaft 11 which is vertically adjustable in a frame 10, the axis of shaft 11 being perpendicular to the horizontal run of the belt 3. The shaft 11 is free to rotate and to slide axially in the frame member 10 and is provided with a pulley 12 which is driven by a belt 13 connected to a suitable power source (not shown).

The drum 8 is integral with a toothed wheel 15 which is in meshing engagement with a larger toothed wheel 16 mounted in a bearing 17 and integral with a pulley 18 which is driven by a belt 19. The pulley 18 carries a groove-cam, the groove 20 of which is eccentric. A pin 21 which is carried by an arm 22 articulated about a fixed axis 23 is engaged in the groove 20. A forked arm 24 rigidly connected to the arm 22 is engaged in a peripheral groove 25 in shaft 11. When the apparatus is operated, the pulley 12 is given an angular velocity such that the circumferential velocity of the bristles 6 which are the furthest from its axis are only a fraction of the linear speed of belt 3. The cam 20 determines the shortest distance h (Fig. 3) measured between the abrasive surface 4 and the handle 5 of the brush. This distance is less than the length l of the bristles. The forked arm 24 holds the shaft 11 in a position relative to the belt 3 which causes the bristles to flex as shown in Fig. 2.

It will be understood that the movement of the surface 4 for blunting the end edges of the bristles will produce first a dragging effect on the bristle ends toward the right if the movement is in the direction of the arrow. This movement will impart parallel orientations to all the flexing planes

of the various bristles and these planes will be perpendicular to the surface 4. Consequently, all the bristles would be blunted on the same side if the pulley 12 were at rest. In practice, however, slow movement is imparted to the pulley 12 in order that the ends of the bristles will be blunted all along their peripheries.

It will be seen that if the distance h were constant and if the above-described operation were continued a sufficient time with the same brushes, all the bristles would finally have the same length and would all have ends in the form of points of small cones, the sides of the cones joining the points to the lateral surfaces of the bristles. This would not be desirable since the object of the blunting of the bristles is to prevent injury to the mouth and gums. The pointing of the bristles could be avoided by limiting the duration of the blunting operation, assuming that all the bristles have initially an equal length, which is ordinarily not the case. This shows the necessity of insuring that the axial movement resulting from the cam 20 shall have a magnitude corresponding to a major portion of the complement of the fraction h/l . This magnitude could be greater than the complement if it were not useless for the bristles to be lifted up so high that they are no longer in contact with the surface 4. With this arrangement, the relative axial movement permits the ends of the bristles to be formed as rounded caps, forming at their junction lines with the lateral surfaces of the bristles obtuse angles which are more obtuse the smaller the distance h relative to the length l of the bristles.

In the embodiment of Fig. 4 the belt 3 is substituted by disc 3a turning about an axis A which is parallel to the shaft 11a which carries the dish 2 and is driven by pulley 12. Along its rim the disc 3a carries an annular sheet 4 of abrasive material. The arms 10 of the frame B₁ in which the shaft 11a is rotatably mounted are provided with a screw 27 the end of which is engaged in a groove 26 cut obliquely in the shaft 11a. The shaft 11a is thus capable of axial movement to obtain the effect realized by axial movement of the shaft 11 in the embodiment of Fig. 2.

In Figs. 5 to 7 are shown further embodiments of the invention in which the supports for the brushes or the support for the abrasive material, or both, can have simultaneously rotational movement and lateral movement. In the embodiment of Figs. 5 and 6 it is the support of the abrasive material which has these movements, the brush support having only a slight axial movement. A frame plate B₂ is substituted for the base B of Fig. 1 as a support for the bearings 7a in which are rotatably journaled the drums 8 and 8'. Plate B₂ is circular and is journaled centrally in a tubular nave of a toothed crown or conical wheel 29 which surrounds it and is secured by means of the nave 29a to a frame B₃ by means of a nut 30. Around the nave 29a is freely mounted a pulley 31 on which is secured a stirrup 32. The branches of the stirrup 32 extend upwardly from the crown 29. A frame member 34 of the plate B₂ forms a head stock having a horizontal axis which intersects the geometrical axis of the shaft 11b to which is secured the holder 14. The upper portion 37 of the shaft 11b has a square cross-section and is freely adjustable in a square aperture in the arm 10b above the belt 3.

A rotatable shaft 33 is mounted in the head stock 34 and in both branches of the stirrup 32 and thus provides a coupling means between the driving pulley 31 and the movable frame plate B₂.

In addition, it supports a conical wheel 35 which is in meshing engagement with a wheel 15a integral with the drum 8 and it also supports a wheel 36 which is in meshing engagement with the teeth of the crown 29 which, being non-rotatable, causes the shaft 33 to turn when the pulley 31 is driven. This movement is communicated by the wheels 35 and 15a to the drums and to the belt 3 relative to the plate B₂, while the plate B₂ receives rotational movement as a result of the planetary movement of the wheel 36.

The headstock 34 is provided with a vertical arm 38 to which is secured a bracket 39 extending toward the center and supporting a screw 27a, the end of which is engaged in an oblique groove 26 in the shaft 11b as in Fig. 4. The shaft 11b is, however, non-rotatable. The rotation of the screw 27a in this groove determines the axial alternating movement of the shaft. The transmission radius of the wheels 35 and 15a should preferably be greater than that shown in the drawing. The stirrup 32 could be reduced to comprise only its left portion and the shaft 33 could, in that case, be cut out of the wheel 35.

In Fig. 7, it is the brush support which is given both rotational movement and lateral movement, the abrasive face support being fixed. The driving pulley 40 is rotatably mounted on a shaft 41 secured to a support 42 upon which is secured a flat ring 43 having an abrasive upper face 4. The bristles of the brushes are held against this face in the support 14. The support 14 is secured to a planetary toothed wheel 44 having a pivot shaft 45 freely received in a hole in the disc 3b, which is secured to the tubular nave of the pulley 40. A solar wheel 46, coaxial with pulley 40 and secured by screws to the support 42, is engaged by the teeth of the planetary wheel 44. Thus, the pivot shaft 45 is subjected to a lateral motion along a circular path and the brushes are drawn along the circumference of the ring 4. It will be seen that their rotation around the pivot 45 may be slower than that of the pivot 45 about the shaft 41, owing to the fact that the distance between the shafts 41 and 45 is several times greater than the greatest distance between the bristle and the shaft 45. The lateral speed is easily eight times greater than the greatest absolute circumferential speed of a bristle, as in the embodiment of Fig. 4. Axial movement of the brushes can be effected by any device suitable for periodically lifting the pulley 40 and holding it in an elevated position in the support 42 in order to adjust the height h to the particular type of brush being treated.

Both of the above-mentioned movements, viz. the lateral movement and the rotational movement, take place in parallel planes and could be of an intermediate type rather than continuous. For example, when the rectilinear movement is not that of a belt but that of the table of a planing machine which is necessarily reversed at the end of each base. This would not exclude the use of a planetary wheel similar to the wheel 44 but engaging a straight fixed rack disposed parallel to such a table. A gear train having a reduced ratio could connect the rack to the wheel.

The apparatus of the invention could be used for the blunting of brushes other than tooth brushes, e. g. hand brushes, and for such use could be provided with supports of appropriate form for the brushes being treated.

I claim:

1. A machine for blunting the ends of brush bristles comprising, in combination, support

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means for at least one brush, means for securing at least one brush to said support, at least one support adapted to carry an abrasive surface, means for rotating said brush carrying support, means for displacing the brush carrying support along the axis of rotation whereby to vary the distance between said brush carrying support and said abrasive surface, and means for moving said abrasive surface at right angles to the axis of rotation of said brush carrying support whereby to effect a dragging action upon the ends of the bristles held in said brush carrying support in contact with said abrasive surface.

2. A machine for blunting the ends of brush bristles comprising, in combination, a support for at least one brush, a frame, two drums rotatably mounted in said frame, a belt having an abrasive surface mounted for rotation around said drums and positioned to move in a plane parallel to the plane of the bristle ends held in said brush support, a rotatable shaft perpendicular to the brush engaging run of the belt, guide means for said shaft, a support for said guide means, a pulley at the end of said shaft, driving means for rotating said pulley, a guide carried by the other end of said shaft, said brush carrying support being carried in said guide means, means securing said support to said guide means, a gear train comprising a toothed wheel in meshing engagement with a toothed wheel secured to one of said drums, an eccentric groove cam on one of the wheels of said gear train, a cam lever engageable in said groove cam, a circular groove cut in the shaft supporting said guide means, a forked lever arm engageable in said circular groove, means supporting said forked arm lever, and driving means for said gear train.

3. A machine for blunting the ends of brush bristles comprising, in combination, a dish for supporting a plurality of brushes, a rotatable disk having a radius several times greater than the radius of said dish, a sheet of abrasive material secured to the face of said disk and defining an annular abrasive surface along the periphery of said face, a rotatable shaft perpendicular to said annular abrasive surface, guide means for said support, a frame member supporting said guide means, a pulley secured to the end of said shaft, driving means for rotating said pulley, a guide carried by the other end of said shaft, said dish being secured in said guide, a groove cut obliquely around said shaft, and groove follower means secured to said frame arm and engageable in said groove whereby to effect axial movement of said shaft during rotation thereof.

4. A machine for blunting the ends of brush bristles comprising, in combination, a frame, a frame arm, an aperture in said frame, a support having an aperture in axial alignment with the aperture in said frame arm, a conical toothed crown wheel having a tubular nave secured in said support aperture, a platform member having a pivot shaft axially adjustable in said nave, a pulley rotatably mounted on said tubular nave between said support and said crown wheel, a stirrup secured to said pulley and having its branches extending outwardly and upwardly around said crown wheel, a headstock above said

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platform, a shaft parallel to said platform extending through said platform and journaled in said stirrup, a toothed conical wheel secured to said shaft and in meshing engagement with said crown wheel, a second toothed conical wheel secured to said shaft, two rotatable drums journaled in said frame, a belt having an abrasive surface carried by said rotatable drums, a conical toothed wheel secured to one of said drums and in meshing engagement with the second-named conical wheel on said shaft, a support for brushes having a stem slidably received in the aperture in said frame arm and having a cylindrical portion formed with an oblique groove, a vertical arm extending upwardly from said headstock having an extension extending toward the stem, and groove follower means secured by said extension engaged in the oblique groove of said stem.

5. A machine for blunting the ends of brush bristles comprising, in combination, a support member having a horizontal face, a rotatable driving pulley having a vertical axis, a flat ring having an abrasive surface and a solar toothed wheel secured to said support coaxially with said pulley, the solar wheel being disposed inside said ring, a radially extending member secured to said driving pulley, an aperture in said member parallel to the axis of rotation, a planetary wheel in meshing engagement with said solar wheel, the pivot of said planetary wheel being freely adjustable in the aperture in said radially extending member, a guide opposite said pivot secured to the planetary wheel, and a dish forming a brush support mounted in said guide, said dish being disposed in such manner that the bristles of the brushes carried thereby extend outwardly and lie against said abrasive ring, the mean radius of said abrasive ring being several times greater than the radius of said dish.

6. A machine for blunting the ends of brush bristles comprising, in combination, a support for at least one brush, means for securing at least one brush to said support, at least one support adapted to carry a substantially planar abrasive surface movable in a plane substantially perpendicular to the plane of the brush bristles, means for rotating one of said supports about an axis perpendicular to said abrasive surface, means for displacing the brush-carrying support along the axis of rotation whereby to vary the distance between said brush-carrying support and said abrasive surface, and means for moving one of said supports at right angles to the said axis of rotation whereby to effect a dragging action upon the ends of all of the bristles held in said first-named support in co-planar contact with said abrasive surface.

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