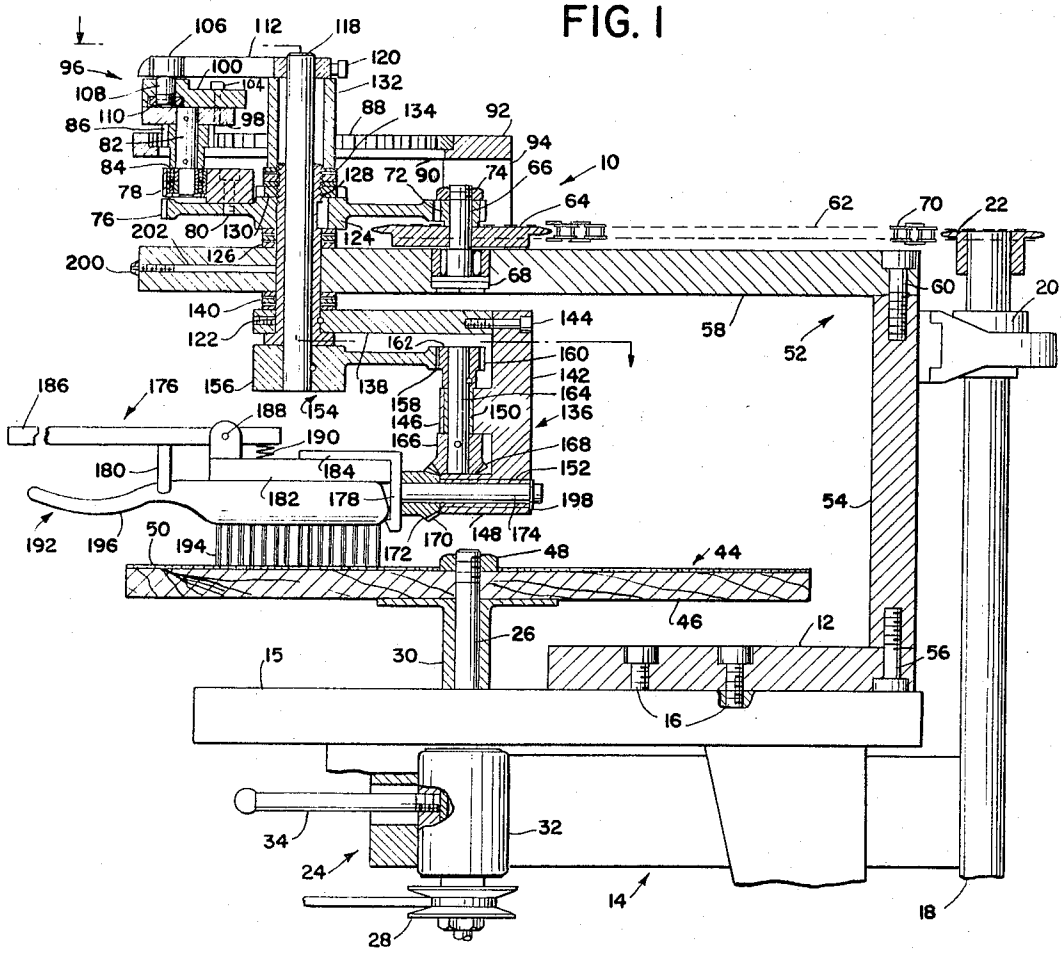
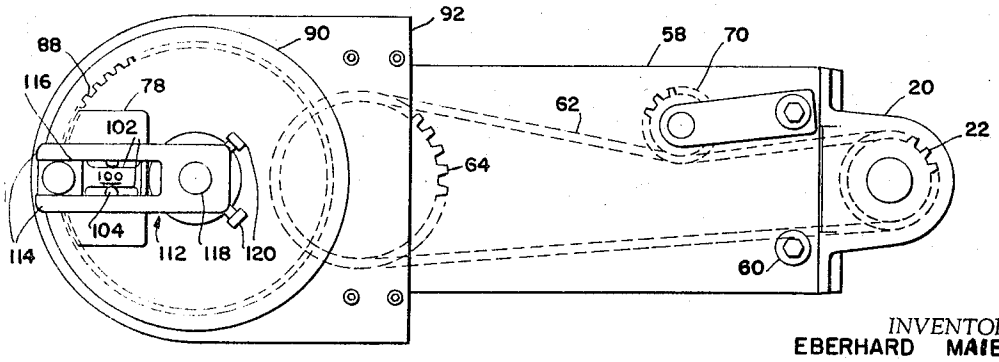
Feb. 28, 1967 E. MAIER 3,305,975

APPARATUS FOR FORMING THE BRISTLES OF A BRUSH

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FIG. 1





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FIG. 2

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APPARATUS FOR FORMING THE BRISTLES OF A BRUSH

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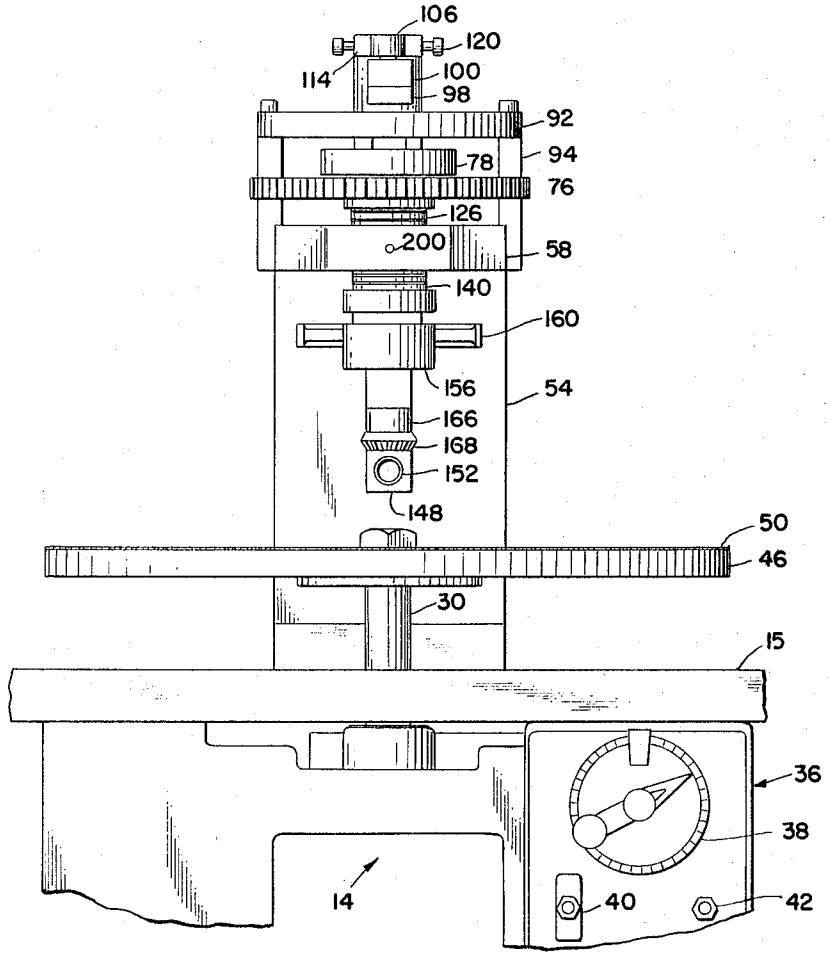


FIG. 3

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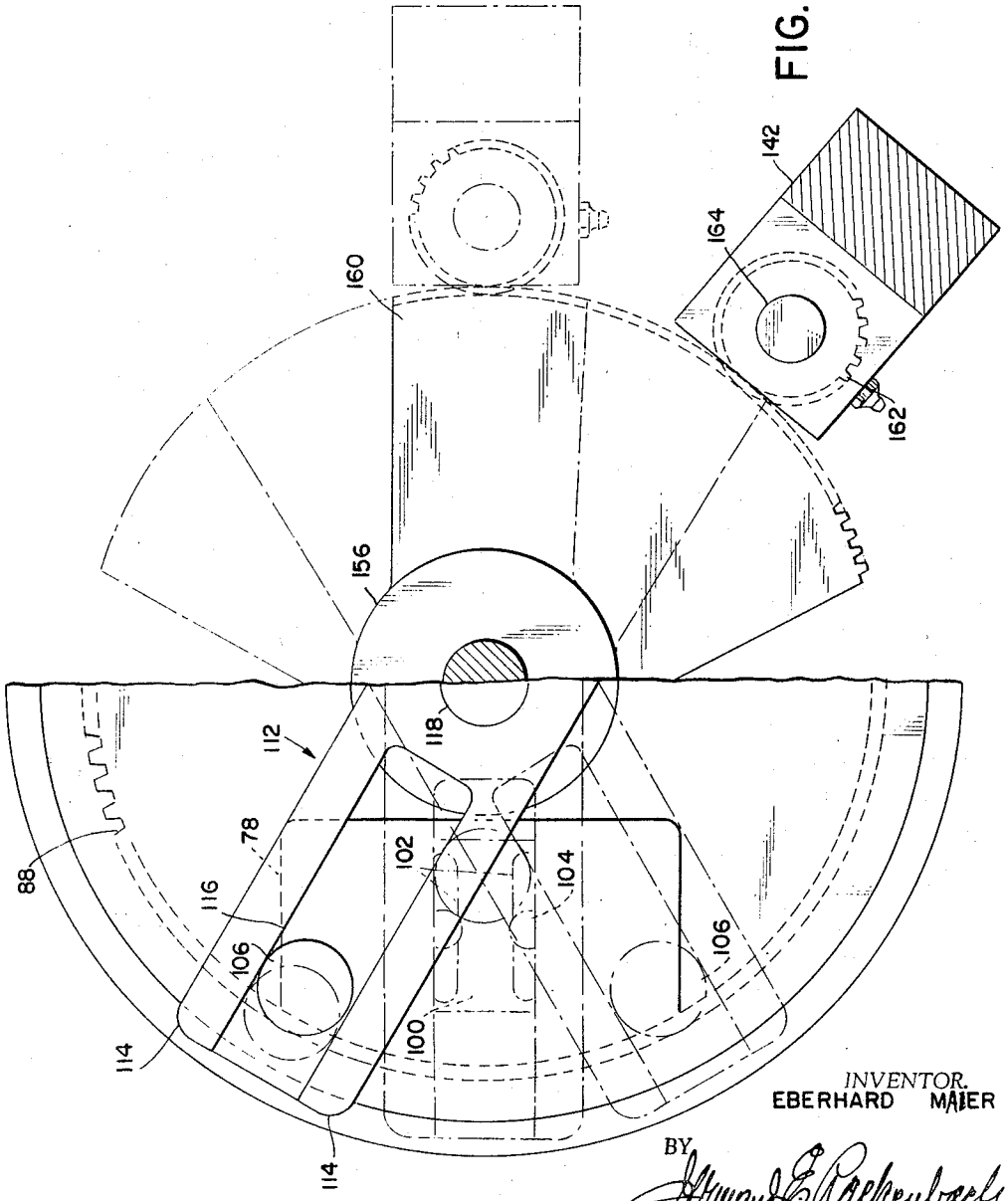
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APPARATUS FOR FORMING THE BRISTLES OF A BRUSH

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FIG. 4



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3,305,975

APPARATUS FOR FORMING THE BRISTLES OF A BRUSH

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10 Claims. (Cl. 51—124)

The present invention pertains, generally, to apparatus for forming the bristles of a brush.

More particularly, this invention relates to automatically operable apparatus for forming the bristles of a brush, for example, a hair brush for personal use, and specifically, completely rounding the ends of nylon bristles to present a contour so configured and arranged as to be completely smooth and comfortable in use, eliminating any roughness or irritation caused thereby.

Presently, brushes, for example, hair brushes for personal use, are available in which the bristles thereof are fabricated of nylon. In fabricating the bristles, however, the same are so configured as to cause roughness and irritation to the person of a user during the use thereof.

Accordingly, having in mind the above disadvantages, it is a primary object of the present invention to provide apparatus for forming the bristles of a brush, for example, a hair brush for personal use, in such a manner as to present a contour so configured and arranged as to be completely smooth and comfortable, thus completely eliminating any roughness or irritation to the person of a user during the use thereof.

Another object of this invention is to provide apparatus for forming the bristles of a brush, for example, a hair brush for personal use, which bristles are fabricated of nylon, in such a manner as to present a contour that is so configured and arranged as to be completely smooth and comfortable, thus eliminating any roughness or irritation to the person of a user during the use thereof.

Still, another object of the present invention is to provide apparatus for forming nylon bristles, comprising, at least in part, a brush, for example, a hair brush for personal use, said apparatus comprising means for oscillating a brush about one of a plurality of axes, which axes are angularly disposed relative to one another, abrasive means disposed for rotational movement about another of said plurality of axes, and rotatable support means for rotationally moving said oscillating means and said brush about the other of axes at a rate of rotational movement different than that of said abrasive means, thus presenting a generally rounded bristle contour that is completely smooth and comfortable, and eliminates roughness and irritation to the person of the user during the use thereof.

A still further object of the present invention is to provide apparatus for forming nylon bristles, comprising, at least in part, a hair brush for personal use, said apparatus comprising means for oscillating a brush about one of a plurality of axes, which axes are angularly disposed relative to one another, abrasive means disposed for rotational movement about another of said plurality of axes, rotatable support means for rotationally moving said oscillating means and said brush about the other of axes at a rate of rotational movement different than that of said abrasive means, said oscillating means and said rotatable support means being mutually so constituted

and arranged as to be relatively rotatable with respect to one another, and cam means for intermittently rotating said oscillating means relative to said rotatable support means, thus presenting a generally rounded bristle contour that is completely smooth and comfortable, and eliminates roughness and irritation to the person of the user during the use thereof.

A still further object of the present invention is to provide apparatus for forming nylon bristles, comprising, at least in part, a brush, for example, a hair brush for personal use, said apparatus being so constituted and arranged as to be readily fixedly positionable upon a conventional work or operating table or support and operable by the power component parts thereof.

Other objects and important features of the invention will be apparent from a study of the specification following, taken with the drawing, which together show, illustrate, describe and disclose a preferred embodiment or modification of the invention and what is now considered to be the best mode of practicing the principle thereof.

Other embodiments or modifications may be suggested to those having the benefit of the teachings herein, and such other embodiments or modifications are intended to be reserved especially as they fall within the scope and spirit of the subjoined claims.

In the drawings:

FIG. 1 is an elevational view of an apparatus for forming the bristles of a brush, constructed in accordance with the present invention;

FIG. 2 is a plan view of the apparatus illustrated in FIG. 1, showing certain component parts in phantom;

FIG. 3 is an elevational view of the apparatus illustrated in FIGS. 1 and 2, partially broken away; and

FIG. 4 is an enlarged detailed view, partially in elevation and partially in section, and taken along the line 4—4 of FIG. 1.

Referring now to the drawing, and particularly to FIG. 1, there is illustrated therein an apparatus for forming the bristles of a brush, constructed in accordance with the present invention, and generally designated by the reference character **10**. The apparatus comprises a generally horizontally extending support plate **12**, enabling the apparatus to be relatively fixedly positioned upon and relative to a conventional work or operating bench or support **14**, and, in particular, to the table **15** thereof. This may be accomplished in any suitable manner, for example, by means of conventional fasteners **16**. The work bench **14** may comprise, in addition to the table **15**, a power input shaft **18**, operable by a suitable electric motor (not shown) operable by existing power supplies and presenting desired power requirements.

It is desirable that the shaft **18** be maintained in an exact vertically disposed position, and, to this end, the same is rotatably journalled relative to the apparatus **10** by a journal **20**, which may be of any suitable construction. The shaft **18** is particularly adapted to cause rotational movement of a driving sprocket wheel **22**, the purpose of which will be described more fully hereinafter, which wheel is non-rotatably connected to the shaft **18** in any suitable manner. Further, the bench **14** comprises a manually operable means, generally designated by the reference character **24**, for vertically adjusting the height of a rotatably operable abrasive disc, to be described more fully hereinafter. To this end, the means **24** comprises, in turn, a rotatable shaft **26**, extending vertically through the table **15**, which shaft is particularly adapted to be ro-

tatably operated by a belt drive 28, of any suitable construction, said belt drive being powered by a suitable power source (not shown), such as an electric motor. The shaft 26 is fixedly disposed within, and, therefore, vertically movable with a bearing sleeve 30, the latter, in turn, extending vertically through the table 15 and through a journal 32, with respect to which the sleeve and shaft are vertically movable.

A handle 34 extends generally horizontally through the journal 32 and is particularly adapted to be positioned in abutting relationship with respect to the bearing sleeve 30, and, accordingly, is of the set-screw type, enabling the sleeve and shaft assembly to be fixedly positioned in any one of a plurality of positions relative to the bench 14 and the table 15 thereof.

With particular reference now to FIG. 3, the work or operating support 14 comprises, further, a suitable control box, generally designated by the reference character 36, of any suitable construction, and having a manually operable variable control 38 for varying the speed of operation of the apparatus 10. Additionally, the control box 36 may be provided with a suitable on-off control 40, and a suitable indicating assembly 42 for indicating when the apparatus 10 is on or off. This may be accomplished in any suitable manner, as is considered readily apparent to those skilled in the art. Since the manner in which this is accomplished forms no part of the present invention, further description thereof is not deemed necessary.

With particular reference again to FIG. 1 and, additionally, FIG. 2, the apparatus 10 comprises, further a rotatable abrasive means 44 comprising, in turn, an annular disc 46 positioned upon the bearing sleeve 30 and about the shaft 26. The disc 46 is particularly adapted to be rotated by the shaft and, to this end, a conventional fastener 48 non-rotatably fixes the disc thereto. A layer or piece of abrasive material 50, such as sandpaper or other similar material, is fixedly positioned upon the disc 46 in any suitable manner, the same being removable therefrom for purposes of replacement when necessary.

The apparatus 10 comprises, further a frame, generally designated by the reference character 52, which frame comprises, in turn, a generally vertically extending support plate 54. The bearing 20 is fixedly positioned to this support plate, which, in turn, is fixedly positioned relative to the support plate 12, in any suitable manner, as by means of a conventional fastener 56. Another horizontally extending support plate 58 is fixedly positioned relative to the support plate 54, in any suitable manner, as by means of a conventional fastener 60, and is disposed and spaced in generally parallel relationship relative to the support plate 12.

The driving sprocket wheel 22 is particularly adapted to cause the operation of an endless driving sprocket chain 62 which chain, in turn, is particularly adapted to drive a driven sprocket wheel 64. The driven sprocket wheel 64 is non-rotatably journalled upon and relative to a rotatable shaft 66, the latter being rotatably journalled within and relative to the support plate 58 in any suiltable manner, as by means of a suitable journal bearing 68. The driven wheel 64 is of greater diameter than the driving wheel 22 as a result of which relationship the rotational velocity of the former is less than that of the latter. A guiding and adjustable tension sprocket wheel 70 is angularly adjustably positioned upon the support plate 58, and is mutually cooperatively engageable with the driving chain 62 for adjusting and maintaining the tension thereof, in a manner considered readily apparent to those skilled in the art.

A pinion gear 72 is non-rotatably positioned upon and about the shaft 66, in any suitable manner as by means of a conventional fastener 74, and is particularly adapted to be mutually cooperatively engageable with and to drive a ring gear 76. A driving block 78 is fixedly positioned upon the ring gear 76, in any suitable manner, as by means of a conventional fastener 80, and, accordingly, in particularly adapted to be rotatably movable therewith. A generally vertically extending shaft 82 is rotatably journalled relative to the driving block 78, in any suitable manner, as by means of a journal bearing 84. In turn, a spur gear 86 is non-rotatably positioned upon and relative to the shaft 82, which spur gear is particularly adapted to be mutually cooperatively engageable with the gear teeth of an internal ring gear 88. As a result of this arrangement, the spur gear 86 is rotatable about a vertical axis defined by the shaft 82 as the driving block 78 moves about an annulus defined, in turn, by the rotational movement of the ring gear 76.

The internal ring gear 88 is fixedly disposed within an aperture 90 extending through a platform 92, the latter being disposed in fixed spaced parallel relationship relative to the support plate 58, in any suitable manner, as by means of a plurality of generally vertically extending stanchions 94.

Rotation of the shaft 82, caused by rotation of the spur gear 86, actuates an eccentrically disposed rotatable cam means, generally designated by the reference character 96, the purpose of which will be more fully described hereinafter. The cam means 96 comprises a plurality of adjustable fastening blocks 98 and 100, the former of which is fixedly positioned upon and about the shaft 82 in any suitable manner. The fastening block 100, in turn, is generally horizontally adjustably positioned upon and relative to the block 98. To this end, the block 100 is provided with a plurality of apertures 102, through which suitable fasteners 104 extend, the latter being threadably engageable with the block 98. As will be described more fully hereinafter, this adjustability presents a cam means 96 having an adjustable throw.

A cam 106 is fixedly positioned relative to the fastener block 100 for rotation therewith, and, to this end, a shaft 108 thereof is fixedly connected thereto and therewithin by a fastener 110. The cam 106, as a result of being rotatable about a vetrical axis defined by the vertically extending shaft 82, is particularly adapted to cause the intermittent rotational movement of a bifurcated arm 112. This arm comprises a plurality of generally horizontally extending legs 114 defining therebetween a slot 116. The arm 112 is non-rotatably positioned relative to a generally vertically extending shaft 118, in any suitable manner, as by means of at least one conventional fastener 120. The shaft 118 is rotatably disposed within and relative to a rotatable bearing sleeve 122. The sleeve 122, while being rotatable relative to the shaft 118, is non-rotatably disposed relative or connected to the ring gear 76. To this end, the sleeve and ring gear are splined, as at 124. Additionally, the ring gear is maintained in the plane of the spur gear 72, and, to this end, suitable bearings 126 are positioned between the ring gear and the support plate 58.

The bearings are so constituted and arranged as to enable the ring gear to smoothly and efficiently rotate relative to the support plate. The upper end 128 of the bearing sleeve is threaded, and a collar 130 is threadably engaged therewith. This collar maintains the ring gear in position relative to the bearing 126. The upper end 128 is enclosed by a tubular sleeve 132, particularly adapted to be rotatably disposed about and relative to the shaft 118, and, to this end, suitable bearings 134 are positioned between the sleeve and the collar 130.

The bearing sleeve 122, which is non-rotatably disposed relative to the ring gear 76, is particularly adapted to cause the rotational movement therewith of a rotatable support or support means, generally designated by the reference character 136. This support means comprises a generally horizontally extending bar 138 which is non-rotatably structurally associated with or connected to the bearing sleeve 122, in any suitable manner. Suitable bearings 140 are positioned between the bar 138 and the plate 58 to provide smooth relative rotation therebetween. The bar 138, in turn, is connected to a generally verti-

cally extending support plate **142**, in any suitable manner, as by means of a conventional fastener **144**, and is provided with an upper or first generally horizontally extending boss **146** extending therefrom and a lower or second generally horizontally extending boss **148**, also extending therefrom.

The boss **146** is provided with a generally vertically disposed bore **150** extending therethrough, and the boss **148** is provided with a generally horizontally disposed bore **152** extending therethrough, the purpose of each of which will subsequently be described.

A means of oscillating the brush holder to be described hereinafter, about an axis angularly disposed relative to the axis extending through the shaft **118**, and, in particular, about an axis extending generally horizontally through the bore **152**, is disposed in non-rotatable relationship relative to the shaft **118**, and in rotational relationship with respect to the support means **136**. The oscillating means, generally designated by the reference character **154**, comprises a generally horizontally disposed segmental driving spur gear **156**, which is non-rotatably connected to the shaft **118** for rotation therewith, in any suitable manner. The teeth **158** of the segmental gear are particularly adapted to mesh with the teeth **160** of a driven spur gear **162**, the latter being non-rotatably connected to a generally vertically extending shaft **164**. The shaft is rotatably disposed within and extends through the bore **150**, and is, additionally, non-rotatably connected to a beveled driving gear **166**, in any suitable manner. The teeth **168** of the gear **166** are particularly adapted to mesh with the teeth **170** of a driven bevel gear **172**, to translate vertical rotational motion of the shaft **164** to horizontal rotational motion of a generally horizontally extending shaft **174**. The gear **172** and the shaft **174** comprise, at least in part, a brush holder to be more fully described hereinafter.

Since the support means **136** is non-rotatably connected to the bearing sleeve **122**, and the oscillating means **154** is non-rotatably connected to the shaft **118**, one is rotatable relative to the other. More particularly, and as will subsequently be described, the action of the cam **106** relative to the bifurcated arm **112**, causes an oscillating movement of the oscillating means **154**, relative to the supporting means **136**, as the latter rotates about a vertical axis defined by and extending through the bearing sleeve **122**. The oscillation or oscillation motion of the means **154** is a horizontal one, occurring about a vertical axis defined by the shaft **118**, and is translated to a vertical oscillating movement or motion of the driven gear **172**, about a horizontal axis defined by and extending through the shaft **174**.

As pointed out above, the gear **172** and the shaft **174** comprise, at least in part, a brush holder or brush holding means, generally designated by the reference character **176**. The brush holder may take any desired and suitable form and, for example, may comprise, in addition to the gear **172** and shaft **174**, a seat **178** and a clamp **180**. The seat is fixedly associated with or connected to a bar **182**, as by providing the seat with a generally horizontally extending extension **184**, and fixedly connecting the same in any suitable manner. The clamp **180** is of bifurcated configuration and is fixedly connected to a pivoted handle **186**, the latter being pivoted about the fulcrum **188**. A spring **190** biases the handle **186** to the position thereof illustrated in FIG. 1, wherein the same is slightly acutely angularly disposed relative to the horizontal and the clamp **180** is slightly acutely angularly disposed relative to the vertical.

A brush, generally designated by the reference character **192**, having a plurality of groups of bristles **194** extending therefrom, and comprising a tapered handle **196**, is fixedly positioned relative to the holding means **176**, by positioning and end of the brush against the seat **178**, pivoting the handle generally clockwise about the fulcrum **188** against the bias of the spring **190**, thus enabling a thinner portion of the tapered handle **196** to be inserted within the bifurcated clamp **180**. The handle **186** is then released, enabling the clamp to pivot generally counter-clockwise and grip a thicker portion of the tapered handle **196**, while simultaneously pushing the brush against and into abutting engagement with the seat **178**.

The shaft **174** is fixedly associated with the seat **178** in any suitable manner, and extends through the bore **152**, so that the teeth **170** are disposed in meshed relationship with respect to the teeth **168**. This positions the holder **176** and, therefore, the brush **192** in operable relationship relative to the apparatus **10**. A split ring or collar **198** can be disposed about the shaft **174** to hold the same in position and preclude inadvertent disengagement of the teeth **168** and **170**. Once the brush **192** has been disposed in position, the vertical adjusting means may be invoked for bringing the abrasive means **44** to the correct height relative to the ends of the bristles **194**.

Suitable lubricant fittings may be provided, where desired, for lubricating the apparatus **10** and insuring the smooth, and efficient operation thereof. For example, a suitable lubricant fitting **200** may be positioned upon the plate **58**, enabling a suitable lubricant to be introduced into a bore **202** leading to the bearing sleeve **122**, and the bearings **126** and **140**.

The operation of the appartus **10** is considered readily apparent to those skilled in the art, in view of the above description when taken in conjunction with the accompanying drawings.

In the use of the apparatus **10**, the brush **192** is fixedly associated with the brush holding means **176** by pivoting the handle **186** in a generally counter-clockwise direction against the bias of the spring **190**, positioning the end of the brush against the seat **178**, and thence permitting the spring to bias the handle so that the clamp **180** thereof clamps the handle **196** of the brush in position relative to the holder **176**, against the seat thereof. The shaft **174** is disposed within the bore **152**, and maintained therewithin by means of the ring **198**. This positions the beveled driven gear **172** in mutual cooperative engagement with the beveled driving gear **166**.

The groups of bristles **194** extend generally vertically downwardly from the brush and are particularly adapted to be contacted by the abrasive material **50**. To this end, the vertical adjustment means **24** is manually operated to vertically adjust the abrasive means **44** to the proper height.

At this time, the control **36** places the apparatus **10** into operation. Through the medium of the power input shaft **18**, the sprocket wheels **22** and **64**, by means of the chain **62**, effect rotational operation of the pinion gear **72**, the ring gear **76**, and the driving block **78**. This, in turn, effects rotational operation of the driving means comprising the spur gear **86** and the internal ring gear **88**. As is considered readily apparent, due to the rotatably movable relationship of the shaft **82** within the bearing **84**, the gear **86** is disposed for multiple rotational movements: one rotational movement about an axis defined by the shaft **118**, and another rotational movement about a vertical axis defined by the shaft **82** itself.

Sequentially, then, the cam means **96** rotatably moves about each of the vertical axes defined by the shafts **82** and **118**. The cam means comprises the eccentrically disposed cam **106** which, accordingly, rotates about each of the just mentioned axes. As a result, the cam is caused to reciprocate within the slot **116**.

With particular reference now to FIG. 4, the cam **106** is illustrated in solid lines in its dead-center position longitudinally of the slot **116**. As the cam means **96** rotates, and the cam moves radially outwardly of the slot, the arm **112** remains in the solid-line position of that figure. This causes the shaft **164** to rotate about its own vertical axis in one direction, since the support means **136** is continuously rotatable with the sleeve **122** about the shaft **118**, while the oscillating means **154** remains stationary,

the same being non-rotatably connected to the shaft **118** which, in turn, is non-rotatably connected to the cam means. Accordingly, by means of the mutual cooperative engagement between the beveled gears **166** and **172**, the brush holder **176** is caused to oscillate to one side of a vertical plane extending therethrough.

However, after the cam moves back to the solid-line dead-center position of FIG. 4, and longitudinally reciprocally moves radially inwardly to the next adjacent phantom-line position, the arm **112** is cammed to the position in phantom next adjacent its solid-line position. Since the segmental gear **156** of the oscillating means **154** is non-rotatably connected to the arm **112** through the medium of the shaft **118**, this causes the gear to move from its solid-line position of FIG. 4 to the phantom-line position next adjacent thereto. This simultaneous rotation of the cam means **96** and the oscillating means **154** continues as the cam **106** longitudinally reciprocally moves radially outwardly of the slot **116** and returns to the dead-center phantom-line position of FIG. 4 remotely adjacent its solid-line position, as illustrated therein.

As pointed out above, the oscillating means **154** and the support means **136** are relatively rotatably mutually cooperatively engageable with respect to one another. As is evident from FIG. 4, when the oscillating means **154** rotates, it rotates in the same direction as the support means **136**, but at a greater rotational velocity. Accordingly, each increment of rotation of the oscillating means **154** is greater than the support means. This is particularly illustrated by the angular distance between the solid-line and phantom-line positions of the plate **142** of the support means **136**, corresponding respectively with the solid-line position and the remotely adjacent phantom-line position of the segmental gear **156** of the oscillating means **154**. This is achieved by the mutual cooperative engagement of the gears **156** and **162**, and by predetermining the pitch and other requisite characteristics of the teeth **158** and **160** thereof, respectively.

When the oscillating means **154** is caused to rotate, due to the relative rotation between it and the support means **136**, the direction of rotation of the shaft **164** is reversed. This oscillates the brush holder **176** to the other side of a vertical plane therethrough, as above described.

It can be seen, therefore, that while the support means **136** is continuously rotatable about a vertical axis defined by the shaft **118**, the oscillating means **154** is only intermittently rotatable about the same axis, and in the same direction. However, the rotational velocity of the oscillating means, when it rotates, is greater than that of the support means, as a result of which each increment of rotational movement of the former is greater than that of the latter. Moreover, as a result of this arrangement, and the mutual cooperative engagement between the gears **156** and **162**, the shaft **164** is reversibly rotatable about an axis defined thereby. Still further, the particular arrangement of and between the beveled gears **166** and **172** translates the reversible rotational movements of the shaft **164** to oscillating movements of the brush holder **176** and the brush **192** on either side of and relative to a vertical plane therethrough.

As pointed out above, the throw of the cam means **96**, that is, the extent of each increment of rotational movement about the vertical axis defined by the shaft **118**, caused by the longitudinal reciprocal movements of the cam **106** within the slot **116** radially inwardly of its dead-center position with respect thereto, is variable or adjustable. To accomplish any desired adjustment of such throw, it is merely necessary to longitudinally adjust one of the fastening blocks **98** and **100** relative to one another, enabling the cam shaft **108** and the cam **106** to be positioned further radially outwardly relative to the shaft **82**, or closer radially inwardly with respect thereto. As is considered readily apparent, positioning the cam **106** further radially outwardly increases its throw and, accordingly, increases each increment of rotational movement of the cam means **96** and the oscillating means **154** which is, as pointed out above, non-rotatably associated relative to the cam means. Correspondingly, the length of time the cam means remains stationary is decreased. Conversely, positioning the cam **106** radially inwardly closer to the shaft **82** decreases the throw of the cam and, correspondingly, increases the length of time the cam means **96** remains stationary.

The abrasive means **44** rotates preferably in the same direction as the brush holder **176** and the brush **192** fixedly positioned relative thereto, each of the latter rotating with, and, accordingly, in the same direction as the support means **136**. In addition, the rotational velocity of the abrasive means **44** is different than that of the support means **136**, and therefore, the brush holder **176**, and preferably is greater. In this manner, there is achieved the primary object of the present invention regarding the complete rounding of the ends of the groups of bristles **194**. Thus, the oscillations of the brush holder **176** enables the abrasive means to act upon at least two of the sides of the groups of bristles. In addition, when the bristle groups contact the abrasive means, and since the latter rotates at a greater rate than the former, a torque is created causing slight rotational movement of the bristle groups about their own generally vertically extending axis, enabling the abrasive means to act upon any and all of the remaining sides thereof. Accordingly, it is assured that all of the sides of the bristle groups **194** will be acted upon by the abrasive means **44**, thus completely rounding the same to provide complete comfort and eliminate any roughness and irritation in use.

While the invention has been shown, illustrated, described and disclosed in terms of an embodiment or modification which it has assumed in practice, the scope of the invention should not be deemed to be limited by the precise embodiment or modification herein shown, illustrated, described or disclosed, such other embodiments or modifications intended to be reserved especially as they fall within the scope of the claims here appended.

I claim:

1. Apparatus for forming the bristles of a brush comprising, in combination:

means for oscillating a brush about one of a plurality of axes angularly disposed relative to one another;

rotatable support means continuously rotatable about another of said plurality of axes for intermittently rotatably moving said oscillating means thereabout;

said oscillating means being relatively rotatably positioned with respect to said continuously rotatable support means;

cam means for causing the intermittent rotational movements of said oscillating means about said one axis as said support continuously rotatably moves about said other axis;

means for driving and causing the operation of said cam means; and

abrasive means disposed for rotational movement about said other axis at ar rotational velocity different than that of said intermittently rotatably movable oscillating means and said continuously rotatable support means for rounding the ends of the bristles of a brush so as to be completely smooth and comfortable, thereby eliminating any roughness or irritation to the person of a user during use.

2. An apparatus for forming the bristles of a brush as defined in claim **1**, wherein:

said cam means comprises:

an eccentric cam positioned for multiple rotational movements about said one axis and about an axis disposed in spaced parallel relationship relative thereto, and

an arm having:

a slot within which said cam is particularly adapted to reciprocate for causing the intermittent rotational movements of said arm and said oscillating means;

said cam having a dead-center position along said slot to one side of which, as said cam reciprocates therewithin, said arm remains relatively stationary, and to the other side of which, as said cam reciprocates, said arm is caused to rotate about said one axis affecting the intermittent rotation of said oscillating means.

3. An apparatus for forming the bristles of a brush as defined in claim 2, wherein:

said cam means comprises, in addition:

a plurality of fastening blocks longitudinally structurally operatively associated with one another;

longitudinal adjustment of one of said blocks relative to the other effecting a variation in the throw of said eccentrically positioned cam.

4. An apparatus for forming the bristles of a brush as defined in claim 3, wherein:

said oscillating means comprises:

a segmental spur gear structurally operatively associated with the arm of said cam means, and

a driven spur gear;

said driven spur gear being rotatably positioned relative to said continuously rotatable support means for effecting reversible rotational movements of said spur gear relative thereto and enabling said oscillating means to intermittently rotatably move about said one axis.

5. An apparatus for forming the bristles of a brush as defined in claim 4, wherein:

said driving means comprises:

a driving means spur gear non-rotatably fixedly associated with said cam,

an internal ring gear;

said driving means spur gear and said ring gear being particularly adapted to mesh with respect to one another, affecting multiple rotational movement of said driving means spur gear about said one axis and said spaced parallel axis, and, in turn, affecting multiple rotational movements of said cam.

6. An apparatus for forming the bristles of a brush as defined in claim 5, wherein there is provided:

brush holding means for positioning a brush relative to said oscillating means enabling the latter to cause vertical oscillating movement thereof.

7. An apparatus for forming the bristles of a brush as defined in claim 6, wherein:

said brush holding means comprises:

a shaft;

a bevelled driven gear fixedly structurally associated with said shaft for reversible rotational movement therewith;

a bevelled driving gear structurally associated with said driven spur gear for rotation therewith,

said bevelled driven gear being particularly adapted to mesh with said bevelled driving gear to translate the reversible rotational movements thereof to reversible rotational movements of said bevelled driven gear about said one axis defined by said shaft, effecting the vertical oscillating movements thereof;

a seat structurally associated with said shaft for movement therewith; and

a pivotally movable biased handle for positioning a brush relative to said seat.

8. An apparatus for forming the bristles of a brush as defined in claim 7, wherein:

said pivotable handle comprises:

a clamp for positioning a brush relative to said holding means and against the seat thereof.

9. An apparatus for forming the bristles of a brush as defined in claim 8, wherein:

the rotational velocity of said abrasive means is greater than that of said oscillating means.

10. An apparatus for forming the bristles of a brush comprising, in combination:

means for oscillating a brush about one of a plurality of axes angularly disposed relative to one another, said oscillating means comprising, in turn:

a segmental spur gear, and

a driven spur gear;

rotatable support means continuously rotatable about another of said plurality of axes for intermittently rotatably moving said oscillating means thereabout;

the segmental spur gear of said oscillating means being rotatably positioned relative to said support means for effecting reversible rotational movements of said driven spur gear relative thereto positioning said oscillating means relatively rotatably with respect to said support means and enabling said oscillating means to intermittently rotatably move about said one axis;

cam means for causing the intermittent rotational movements of said oscillating means about said other axis as said support means continuously rotatably moves thereabout, said cam means comprising, in turn:

an eccentric cam positioned for multiple rotational movements about said one axis and about an axis disposed in spaced parallel relationship relative thereto,

an arm structurally operatively associated with the segmental spur gear of said oscillating means and having:

a slot within which said cam is particularly adapted to reciprocate for causing the intermittent rotational movements of said arm and said oscillating means, and

a plurality of fastening blocks longitudinally structurally operatively associated with one another;

longitudinal adjustment of one of said blocks relative to the other effecting a variation in the throw of said cam reciprocally within and relative to said slot;

said cam having a dead-center position to one side of which, as said cam reciprocates therewithin, said arm remains relatively stationary, and to the other side of which, as said cam reciprocates, said arm is caused to rotate about said one axis effecting the intermittent rotation of said oscillating means;

means for driving and causing the operation of said cam means, said driving means comprising, in turn:

a driving means spur gear non-rotatably fixedly associated with said cam, and

an internal ring gear;

said driving means spur gear and said ring gear being particularly adapted to mesh with respect to one another, effecting multiple rotational movements of said driving means spur gear about said one axis and said spaced parallel axis, and, in turn, effecting the multiple rotational movements of said cam;

abrasive means disposed for rotational movement about said other axis at a rotational velocity different than that of said intermittently rotatably moveable oscillating means and said continuously rotatable support means; and

brush holding means for positioning a brush relative to said oscillating means enabling the latter to cause vertical oscillating movements thereof, said holding means comprising, in turn:

a bevelled driven gear,

a seat, and

a pivotally movable biased handle having:

a clamp for positioning a brush relative to said holding means and against the seat thereof;

the rotational velocity of said abrasive means being greater than that of said oscillating means for rounding the ends of the bristles of a brush so as to be completely smooth and comfortable, thereby eliminating any roughness or irritation to the person of a user during use.

(References on following page)

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References Cited by the Examiner

UNITED STATES PATENTS

928,254	7/1909	Gail	51—97
1,289,924	12/1918	Sanford	51—97
1,871,494	8/1932	Carlson	51—97
1,929,117	10/1933	Leyner et al.	51—281
2,105,634	1/1938	Brendel	51—209
2,291,000	7/1942	Simpson	51—124

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2,669,075	2/1954	Dreyfus	51—145
2,700,259	1/1955	Dreyfus	51—281
2,754,591	7/1956	Schweizer	269—254
3,013,364	12/1961	Hovorka	51—76

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