June 22, 1943. H. C. PEASE 2,322,718

SURFACING DEVICE

Filed April 1, 1941

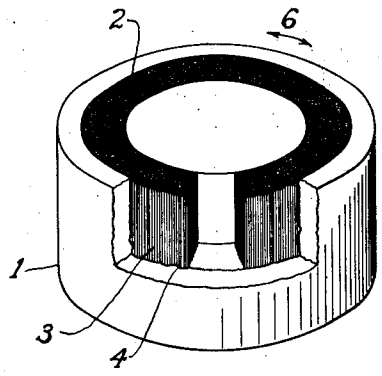


Fig. I

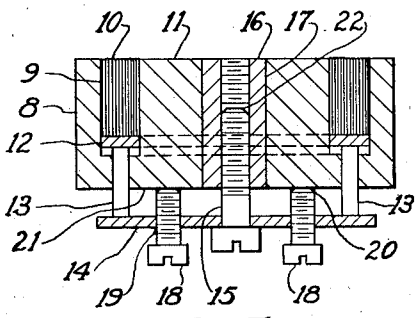


Fig. II

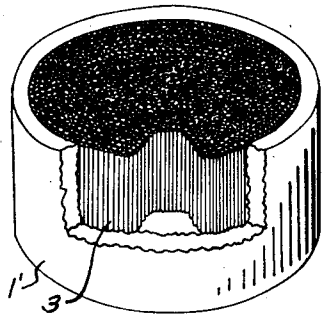


Fig. VII

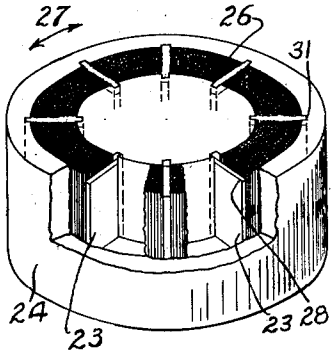


Fig. III

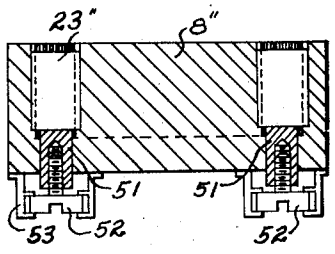


Fig. IX

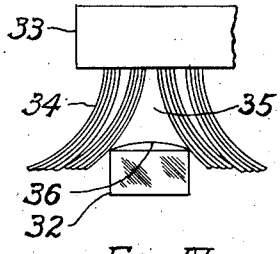


Fig. IV

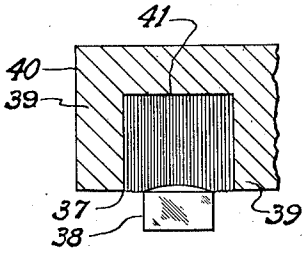


Fig. V

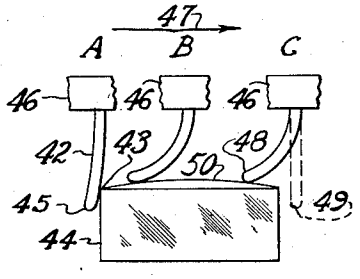


Fig. VI

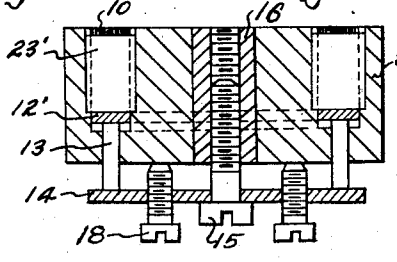


Fig. VIII

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Patented June 22, 1943

2,322,718

UNITED STATES PATENT OFFICE

2,322,718

SURFACING DEVICE

Harold Childs Pease, Lancaster, Pa., assignor to Hamilton Watch Company, Lancaster, Pa.

Application April 1, 1941, Serial No. 386,262

13 Claims. (Cl. 15—201)

The object of this invention is to provide improved means for and method of controlling the surfacing action of surfacing devices.

Another object is to provide brush type surfacing means in which the movement of the bristles of the brush is controlled.

Another object is to provide brush type surfacing means in which the bristles of the brush are adjustably limited in their movement.

Another object is to provide brush type surfacing means in which the bristles of the brush are controlled as to their composition, dimensional characteristics, and position and are limited in their movement.

Other objects and advantages of the invention will become apparent from the following description taken in connection with the accompanying drawing. It will be apparent that many changes may be made in the details of construction, arrangement of parts and steps of the method shown and described without departing from the spirit of the invention as expressed in the accompanying claims. I, therefore, do not wish to be limited to the exact details of construction, arrangement of parts and steps of the method shown, as the preferred form only has been shown by way of illustration.

Referring to the drawing:

Fig. I is a perspective view of the device embodying this invention and is partially broken away to illustrate the positioning of the brush fibers;

Fig. II illustrates an alternate structure and represents a section taken substantially centrally and vertically through the device of Fig. I plus the additional elements embodying the alternate structure;

Fig. III is a perspective view similar to that of Fig. I and illustrates a further modification of the invention;

Fig. IV is an elevation illustrating the action of a prior art brush on a device to be surfaced in which the brush is presented as traveling in a direction substantially normal to the illustration;

Fig. V is a sectional and broken view illustrating the action of the brush fibers on the object being surfaced and utilizing a brush embodying this invention with the brush presented as traveling in a direction substantially normal to the illustration;

Fig. VI is an elevation illustrating the action of a single fiber in three positions of its progress over the surface of the object;

Fig. VII is a view similar to Fig. I illustrating an alternate structure;

Fig. VIII illustrates a further alternate structure in which the brush bristles and spacer members are adjustable as a unit; and

Fig. IX illustrates a further alternate structure in which the bristles are fixed and the spacers individually adjustable.

It is desirable in some surfacing processes, to utilize a brush as a surfacing tool. A major disadvantage of using the ordinary type of brush, that is, one in which the fibers are rigidly attached at the base and allowed to flex freely throughout the remainder of their extent, is that when the brush is being passed over the object being surfaced particularly when the object is smaller than the brush, the bristles have a tendency to spread around the object rather than follow directly over the object so that proper control of the surfacing operation is difficult.

Applicant's invention obviates the disadvantages of the prior art devices in that it provides a brush type surfacing device with the movement of the bristles under calculated control so that the brush may be so formed or adjusted as to provide a predetermined surfacing effect on the object being surfaced.

Fig. I illustrates a brush which embodies applicant's invention in that the brush fibers are controlled as to their movement. This brush comprises a base member 1 having a ring shaped depression 2 therein in which are positioned the brush fibers 3. These fibers are rigidly held by cement or other suitable holding arrangement to the bottom 4 of the depression 2 adjacent one of their ends so that the fibers 3 are free to flex throughout their extent from their held ends within the confining limits of the walls of the depression 2. It will readily be seen that if the tool is rotated about its center so that the brush is passed over work in either of the directions of the arrow 6, the fibers 3 may give way before the work in the peripheral directions of the arrows 6 dependent on the rotation of the brush but that they will be restrained in their lateral movement in a direction transversally of the recess or substantially normal to the direction of travel of the brush.

If desired, the brush fibers may be mounted on a base which is separate from the main base of the brush and so formed as to be adjustable in the recess so that the free ends of the fibers may be made to lie substantially flush with the face of brush or they may be made to extend above

or below the brush face an amount determined by the extent of movement desired in the bristle.

Fig. II illustrates an alternate structure of the invention and comprises a block 8 having an annular recess 9 with a group of bristles 10 therein. This alternate structure provides all of the features of the structure of Fig. I and in addition provides an adjustability of the fibers which permits the positioning of their free ends substantially flush with the surface 11 of the block 8 as is the case of the illustration in Fig. I or the brush may be so adjusted as to bring the fibers above this surface or below if and as desired. This adjustability is provided by incorporating means for moving the brush fibers 10 as a whole with respect to the block 8. In order to make this possible an annular member 12 is positioned in the recess 9 and the brush fibers are secured to this member by cement or other suitable means. This ring member is then made adjustable up and down in the recess through its connection members 13 which join it to an adjustment plate 14. The ring 12 and the plate 14 are accordingly held in fixed spaced relation with each other by the connection members 13. Suitable adjustment means is provided for moving the ring 12 and the fibers 10 in the recess 9. This adjustment means is illustrated in the form of a central adjustment screw 15 which is threaded into an internally threaded bushing 16. The bushing 16 is held in substantially forced fitting relation in an opening 17 in the block 8. The screw 15 has an enlarged head portion which bears upon the plate 14 and causes the plate to be moved toward the block 8 through the guiding action of the connecting members 13 when it is threaded into the bushing 16.

In order to lock the plate 14 in adjusted position the locking screws 18 are provided. These screws pass through and are threaded in openings 19 in the plate 14 so that their ends 20 bear upon the surface 21 of the block 8 so that it will be seen that in order to move the bristles above the surface 11 the screws 18 are first backed partially out of the plate 14, the screw 15 is then threaded into the bushing 16 to bring about the desired position of the bristles and the screws 18 are thereafter turned into the plate 14 until their ends 20 come in contact with the surface 21 in such a manner as to oppose the action of the screw 15. It will be seen that a reverse action may be utilized in order to move the bristles downwardly into the recess by first releasing the screw 15, further threading the screws 18 through the plate 14 and thereafter locking the screw 15 against the action of the screws 18 when the desired position of the bristles has been reached.

It is to be understood that this is only one of several possible constructions which will achieve essentially the same result. For instance, the screw 15 could be provided with a shoulder on and engaging the side of the plate 14 opposed to the head of the screw 15 and in this manner the screws 18 might be dispensed with. The bushing 16 may be formed of metal in order to provide efficient material for forming screw threads into which a screw 15 may be threaded but if desired, the bushing may be dispensed with and the screw 15 may be threaded directly into the block 8 or an opening therein. The block 8 may be made of wood or other suitable supporting material. It will be seen that the screw 15 has its threaded end at 22 but it is to be understood that this screw may be longer or shorter if desired and also that the opening 17 in the block 8 may or may not pass entirely through the block as desired.

It will accordingly be seen that the structure of Fig. II provides means whereby the bristles may be given more or less freedom of movement as is desired to perform a particular job.

A further alternate construction is illustrated in Fig. III. This construction is generally similar to that of Fig. I and in addition comprises spacer plates 23 which extend substantially radially of the block 24 and transversally of the recess having the brush fibers 26 therein. The purpose of these spacer members is to provide, if desired, a control of the possible movement of the brush fibers in a circumferential direction such as is illustrated by the arrows 27. It is to be noted that the spacer plates 23 are so dimensioned that their upper ends 28 lie slightly below the free ends of the bristles 26. The spacer ends 28 are positioned in this manner in order to prevent the work piece being struck by the spacer plates. It is, however, to be understood that these plates may be of greater or less dimensions and spacing from the free ends of the bristles 26 or there may be more or less of them than is shown in Fig. III according to the particular requirements of the job to be done, that is, according to the freedom or lack of freedom of movement desired in the bristles. Thus it will be seen that the movement of the bristles may be controlled both in circumferential and radial directions with respect to the block. It is pointed out, however, that the shape of the block need not necessarily be cylindrical. It may be an oval or even a square or any other suitable formation, the only necessary provision being that the brush and the mechanism for moving the brush be so arranged as to pass the brush over the surface of the work piece without damaging the work piece by causing any of the supporting structure of the brush or any other parts to harmfully come in contact with the work piece. As illustrated in Fig. VII the brush need not include a central member as illustrated at 29 in Fig. III, that is to say, the brush fibers 3 may extend into the center of the block 1' and merely be surrounded by an outer ring of that block. It is pointed out that the spacer members 23 are illustrated as being positioned in slots 31 formed in the central portion 29 and the outer portion of the block 24. The spacer members may be positioned in the slots 31 by means of a force fit or may be held therein by any other suitable holding or locking means. Also the spacer members may be supported in any other suitable manner as long as they provide the function of controlling the possible movement of the fibers in the directions of the arrows 27.

It is to be understood that an adjustment ring such as that illustrated at 12 in Fig. II may readily be incorporated into the structure of Fig. III so that the bristles 26 of the structure of Fig. III may be adjusted in and out of the recess of the block 24 in order to control the possible movement of the bristles. In order to achieve greater variation of control with spacer plates as illustrated at 23' in Fig. VIII, the plates as well as the fibers 10 may be secured to an adjustable ring 12', like that at 12 in Fig. II, so that both the bristles and the spacers are adjustable together as a unit into and out of the bristle recess of the block 8'.

Also, as shown in Fig. IX, the spacer plates 23'' may be made adjustable in and out of the bristle recess of the block 8'' independently of

each other and of the bristles, which, in this instance, are secured to the bottom of the bristle recess and are not adjustable.

The adjustment of the spacer plates 23'' is accomplished through the movement of internally threaded bars 51 fixed to the lower portions of the plates 23'' caused by turning the adjustment screws 52 which are held in position by screw head holding brackets 53.

Referring to Fig. II, in order to provide a greater variation of the adjustability of the bristles it will be seen that the plate 14 may readily be so formed about the screw 15, that is with a larger opening, as to permit tilting of the plate 14 with respect to the surface 21 by means of unequal adjustment of the screws 18 and it will be seen that this tilting will bring about a greater freedom of bristle movement on one side of the brush than on the other. A similar result may be accomplished in the structure of Fig. I and/or Fig. III by so forming the blocks 1 or 24 as to permit the bristles to extend above or below the surface of the blocks a greater or less amount on one side than on the other.

Fig. IV illustrates an object 32, such as a ruby jewel for a watch or other desired object being surfaced by a prior art type brush 33 with its bristles 34 parted as at 35 to illustrate how the bristles part and travel around the edge of the object being surfaced when they are free to move throughout their extent from their attachment to the brush 33. In this instance it may be considered that the brush 33 is traveling in a direction substantially normal to the surface of the illustration. Such an action is undesirable in many instances since it provides no control over the bristle action on the central surface 36 of the jewel 32 and concentrates the surfacing action on the edges of the jewel. In order to achieve a controlled contour and a polishing action throughout the top surface of the jewel, it is necessary to so control the movement of the brush bristles as to cause them to pass over the whole top surface in substantially continuous contact therewith.

This invention provides the desired control, and, as illustrated in Fig. V, the bristles 37 are readily made to pass over the top of the jewel 38, since their movement is controlled by the walls 39 of the block 40. The bristles are secured to the block 40 at their ends 41 by cement or other suitable holding means, and the remainder of their extent is free to move subject to the restraining action of the secured ends, the confining walls and the composition, dimensional characteristics and grouping of the bristles. Thus it will be seen that the bristles of this invention are not permitted to part in the manner illustrated at 35 in Fig. IV so that a control of the travel of the bristles over the jewel is introduced. In Fig. V the brush may be considered to be traveling in a direction substantially normal to the illustration.

The action of a brush bristle forced to travel over the top surface of the object being surfaced is illustrated in Fig. VI by the three progressive positional stages A, B and C. In the position A the bristle 42 has just hit the edge 43 of the jewel 44 and its free end 45 has been bent as is shown. At the brush 46 progresses in the direction of the arrow 47 the fiber is snapped up over the edge 43 and drags across the top surface 50 of the jewel 44 on its side as illustrated. When reaching the further side of the jewel the bristle snaps from its side dragging position 48 to its normal straight position 49. Thus it will be seen that the action of the bristle is to snap over the initial and final edges of the jewel and have its strongest surfacing effect at these points and since, when it is passing over the top of the jewel it has merely a smooth dragging action and does not have the snap or digging action which is present when the bristle hits either edge of the jewel so that there is ordinarily less of a surfacing action on the top of the jewel than there is on the edges. From this action it will be seen that a rounded surface may be obtained if the brush is so brought against the jewel as to cause the fibers to extend normally below the surface of the jewel since they must be snapped up to the top at the leading edge and then down to normal position at the other side and this is broadly the manner in which a calculated curvature may be obtained on the surface of the jewel.

There are several variables which may be adjusted to bring about a desired surface contour on the finished jewel or object being surfaced, and one of the important features of this invention is that the finished contour of the surfaced object may be controlled. This is very important, particularly in the surfacing of jewels for timepieces since it is desirable that the jewel be formed to such a surface curvature as to enable it to relatively closely fit in a curved support.

Three different types of surface contours may be obtained by adjusting the variable features of this invention. They are: 1st, an effectively flat surface, 2nd, a surface of a continuous and substantially uniform single curvature throughout, and 3rd, a surface of a compound curvature with one curve over the central part of the object and a different curve over the edges of the object.

These various curvatures may be obtained by the variation and balancing of the several factors which affect the operation of the brush. These are: the composition and dimensional characteristics of the bristle, the manner in which the bristles are packed, that is, close together or with various degrees of spacing from each other, whether or not they are under compression against each other as may be the case if many bristles are forced into a relatively narrow recess in the brush, the rigidity of the bristles as is obtained through the control of the composition and dimensional characteristics, the speed at which the bristles are passed over the object being surfaced and the depth at which the object is placed with respect to the free ends of the bristles.

From actual experience it has been found that a relatively flat surface may be achieved by making the bristle very rigid radially of the brush, that is in close confinement in the brush recess, utilizing bristles of relatively large diameter, moving the brush over the work at a relatively high rate of speed and positioning the work at a minimum active depth in the brush so that there will be a minimum of the snap up and down edge action as described above.

A substantially uniform continuous single curvature may be achieved by mounting the bristles less rigidly radially either by using a smaller diameter bristle or by more loosely packing the bristles and by moving the brush over the work relatively slowly with the work at a pronounced active depth in the brush.

A compound curvature which is different over the edge and over the central top surface of the work may be achieved by forming or adjusting the brush so as to have very little radial rigidity

of the bristles, by the use of even smaller diameter bristles or loose packing thereof with the work positioned at an even greater active depth than that necessary to produce the single curve referred to above.

Thus it will be seen that by the calculated variation of the different variables mentioned above a finished surface on the work may be obtained which is of a predetermined contour and this is accomplished by the control of the factors which limit the movement of the brush bristles. These factors comprise any means of varying the composition or dimensional characteristics or cross-sectional density of the bristles as well as the confinement or lack of confinement of the bristles and their grouping or positional relation with respect to each other.

It is to be understood that the method and means of confinement of the bristles may be varied from the particular arrangements illustrated in the drawing in order to accomplish a particular brush control and that the spacer members 23 of Fig. III may be rigid or flexible as desired to achieve a particular effect, and that they may be so mounted as to be adjustable with respect to the brush base and/or the bristles so that the free ends thereof may be positioned in flush relation with or above the outer edges of the spacer members in accordance with the effect desired.

It is often desirable to surface more than one object at a time, particularly in the case of watch jewels where several are surfaced together and it will readily be understood that when a brush is passing over a plurality of pieces the pieces normally should be so spaced as to give the bristles time and opportunity to return to their normal position after having passed over one jewel before encountering the next in order that uniform operation may be maintained.

In regard to the control factor in which the movement of the bristle is controlled or limited in certain specified directions when a plurality of jewels are surfaced together it will be seen that in some instances with one jewel following another there may be a sort of a back wash in the spacing of the bristle between the jewels so that the compression or limitation of movement of the bristles about the second jewel may be less, or not as well controlled, as in the case when there is but a single jewel. In such an instance or in any other special instance in which a particular job is to be done, it is to be understood that the movement of the bristles may be controlled by prearrangement to meet that particular job. In the case of the following jewel mentioned above one way of achieving the desired control would be to assemble the bristles in greater density or in more closely packed relation than they would normally be for a single jewel so that even though a back wash may occur, the bristles still maintain a sufficient density or closeness of grouping and directional control of movement, to properly carry them over the jewel surface in the desired manner.

The relative size of the brush and the work may be varied so that the work is larger than the brush, and the brush control will still be operable with results substantially similar to those obtained with the brush larger than the work.

What I claim is:

1. In a device of the character described, a supporting member having an annular recess therein, and a continuous band of bristles in said recess secured only at their inner ends and to the bottom of said recess with the length of said bristles and the depth of said recess being substantially equal, and the walls of said recess adapted to laterally support said bristles substantially uniformly throughout the depth extent of said bristles in said recess.

2. In a device of the character described, a supporting member having an annular recess therein, groups of bristles secured in said recess with free ends in predetermined positions with respect to the mouth of said recess, spacer members in said recess and separating said groups of bristles, and means for adjusting said spacer members lengthwise of said bristles while maintaining said free ends in said predetermined positions.

3. In a device of the character described, a cylindrically shaped supporting block having an annular recess in one end thereof so formed as to provide a peripheral wall of substantially uniform thickness throughout and a central cylindrical portion substantially axially concentric with said block and having its outer end substantially flush with the end portion of said wall, a group of bristles mounted in said recess and secured only at their inner ends and to the bottom of said recess and with their longitudinal axes in substantial parallelism with the longitudinal axis of said block, said bristles being so packed as to receive such support from said peripheral wall and central portion and from their contact with each other as to permit greater freedom of movement of the unsecured ends of said bristles peripherally than radially of said block.

4. In a device of the character described, a cylindrically shaped supporting block having an annular recess in one end thereof so formed as to provide a peripheral wall of substantially uniform thickness throughout and a central cylindrical portion substantially axially concentric with said block and having its outer end substantially flush with the end portion of said wall, a group of bristles mounted in said recess and secured only at their inner ends and to the bottom of said recess and with their longitudinal axes in substantial parallelism with the longitudinal axis of said block, spacer members substantially equal in length to said bristles carried in said recess at regular intervals thereof and extending from adjacent the mouth of said recess to its bottom and in directions radially of said block, said bristles being so packed as to receive such support from said peripheral wall, central portion and spacer members and from their contact with each other as to permit greater freedom of movement of the unsecured ends of said bristles peripherally than radially of said block.

5. In a device of the character described, a cylindrically shaped supporting block having an annular recess in one end thereof so formed as to provide a peripheral wall of substantially uniform thickness throughout and a central cylindrical portion substantially axially concentric with said block and having its outer end substantially flush with the end portion of said wall, an annular plate in said recess and adjustable therein toward and away from the bottom of said recess, a group of bristles mounted in said recess and secured only at their inner ends and to said annular plate and with their longitudinal axes in substantial parallelism with the longitudinal axis of said block, said bristles being so packed as to receive such support from said peripheral wall and central portion and from their contact with

each other as to permit greater freedom of movement of the unsecured ends of said bristles peripherally than radially of said block.

6. A polishing brush for jewels comprising a base member having an annular recess formed therein, a continuous band of parallel bristles carried in said recess and means for adjustably supporting said bristles to control the end movement of all bristles while contacting the jewel.

7. In a polishing brush for jewels, means for controlling the movement of the ends of the bristles while contacting the jewel consisting of a base formed with a recess, bristles arranged in parallel formation and adjustably carried in said recess, the sides of the recess being nearly equal in length to the bristles and supporting means extending substantially the length of and parallel to the bristles, said supporting means contacting the opposite sides of the recess.

8. In a polishing brush for jewels, means for controlling the movement of the ends of the bristles while contacting the jewel consisting of a base formed with a recess, bristles arranged in parallel formation and carried in said recess, the sides of the recess being substantially the length of the bristles, and supporting means extending substantially the length of and parallel to the bristles, the sides of the recess having diametrically aligned opposing grooves, said supporting means being adjustable in said grooves.

9. In a polishing brush for jewels, a base, bristles arranged in parallel relation and mounted in said base, spacer members arranged parallel to said bristles and substantially equal in length thereto, said members supporting the bristles substantially throughout the entire length of said bristles and means for adjusting said spacer members with respect to said bristles to control the end movement of said bristles while contacting said jewels.

10. In a polishing brush, a base having a recess therein, bristles arranged in parallel formation in said base and cemented thereto, said bristles being in length substantially equal but not exactly equal to the depth of the recess, the difference between the length of said bristles and the depth of the recess controlling the flexing of the bristle ends while polishing.

11. In a polishing brush, a base having an annular recess therein, an adjustable annular ring carried in said recess, bristles having a length substantially equal to the depth of said recess cemented on said ring and means for locking said ring in adjusted position.

12. In a polishing brush, a base having an annular recess therein, an adjustable annular ring carried in said recess, bristles having a length substantially equal to the depth of said recess cemented on said ring and means for locking said ring and set screws to lock said ring in adjusted position.

13. A polishing brush comprising a circular base member having an annular recess formed therein, a central portion, a rim portion, said central portion and said rim portion being formed on their opposed concentric faces with spaced parallel grooves, the grooves of the central portion being in diametrical alignment with corresponding grooves of the rim portion, an annular ring carried in said recess, guide rods connected to said ring and extending through holes in said base, a circular plate secured to the free ends of said guide rods and formed with a center hole and spaced threaded holes equally distant from said center hole, an adjusting screw passing through said center hole of the circular plate and threaded into a central threaded bore of the circular base to provide vertical adjustment of said annular ring, a plurality of set screws carried by the threaded holes of the circular plate and adapted to engage the bottom of said base to lock the circular plate and its connected annular ring in predetermined desired position, bristles arranged in parallel relation and secured to said annular ring and adapted to be partially housed in said annular recess, spacer plates secured to and movable with said annular ring and slidable in said diametrically aligned grooves of the center and rim portions whereby said bristles may be micrometrically adjusted with relation to said rim and center portion.

HAROLD CHILDS PEASE.