June 3, 1947. R. O. PETERSON 2,421,647

END BRUSH

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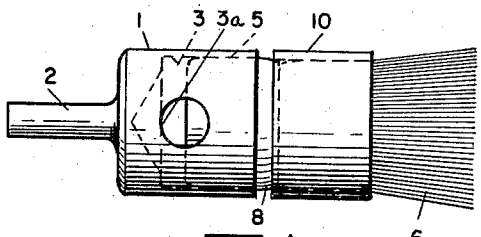


FIG. 1

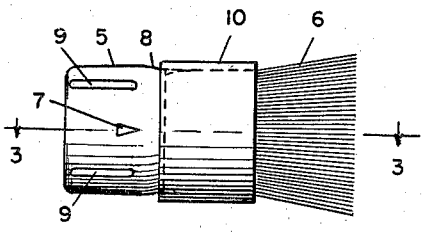


FIG. 2

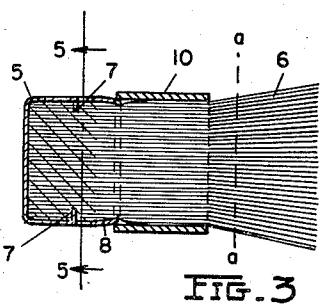


FIG. 3

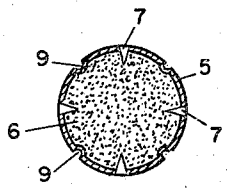


FIG. 5

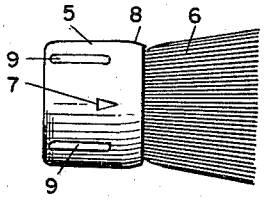


FIG. 4

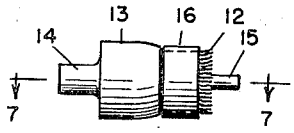


FIG. 6

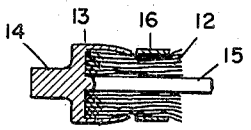


FIG. 7

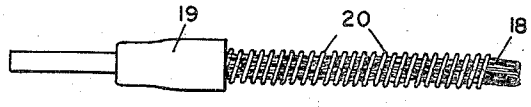


FIG. 8

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END BRUSH

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Application April 22, 1943, Serial No. 483,982

2 Claims. (Cl. 15—180)

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In brushes of the type commonly known as end brushes, characterized by having the brush material disposed in the form of a bundle arranged in substantial parallelism, it has long been recognized as desirable that such brush material should be in the form of a replaceable element in the complete assembly so that the carrier or mounting therefor need not be discarded when the brush material of a particular unit becomes worn out.

One construction for achieving this objective is disclosed in my co-pending application filed August 3, 1940, Serial No. 350,607, now Patent 2,325,629, August 3, 1943, in which application there is further disclosed a bridle in the form of a coil spring about the portion of the bundle of brush material adjacent the base end thereof. One function of such bridle, as pointed out in such co-pending application, is to dampen vibrations of the individual strands of brush material, usually wire, and thus prevent breakage of the latter in the area where they enter the base or holder in which the bundle of brush material is mounted. This not only permits the use of a longer bundle of such brush material than would otherwise be possible, but it has been found that by removing such bridle in whole or in part after the outer projecting portion thereof has been worn off, the brush may be continued in effective service considerably longer than would otherwise be possible.

Based on this discovery I have found that other forms of bridle or brush retaining means may serve the last indicated purpose equally, if not more effectively.

In addition to the foregoing, the present improvements in end brushes comprises an improved form of replaceable mounting or base for the brush material whereby as one becomes worn out another may be readily substituted therefor without trouble or delay.

To the accomplishment of the foregoing and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims.

The annexed drawing and the following description set forth in detail certain structure embodying the invention, such disclosed means constituting, however, but one of various structural forms in which the principle of the invention may be used.

In said annexed drawing:

Fig. 1 is a side elevational view of one form of end brush embodying my present improvements;

Fig. 2 is a similar view of the replaceable component or unit which constitutes the brush element proper;

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Fig. 3 is an axial section of such unit, the plane of the section being indicated by line 3—3 Fig. 2;

Fig. 4 is a view similar to Fig. 2 but showing the brush unit as arranged for further use after the brush material has been worn down to approximately one-half its original length;

Fig. 5 is a transverse section of brush unit, the plane of the section being indicated by the line 5—5 Fig. 3;

Fig. 6 is a side elevational view of a different type of end brush in which certain of the features of improvement are utilized;

Fig. 7 is an axial section of such last mentioned form of brush, the plane of the section being indicated by the line 7—7 Fig. 6; and

Fig. 8 is a side elevational view of still another form of end brush illustrating another adaptation.

Referring to the form of brush illustrated in Figs. 1 to 5 inclusive, the replaceable section or unit to which particular attention is directed is illustrated in the first of such figures as mounted in a cup-shaped or socketed holder 1, which is provided with a central projection 2 at its closed end whereby such holder may be attached to a chuck or the like. The interior wall 3 of said holder tapers slightly from the bottom outwardly, the angle of taper being important, i. e., being between ½° to 1½° from a line parallel with the axis of the holder in counterdistinction to the familiar Morse taper which lies between 2° and 3½°.

The replaceable unit comprises a cup-shaped base 5, in which one end of the bundle 6 of brush material, of general cylindrical form, is inserted. While the base 6 will preferably be made of drawn sheet metal, vulcanized fiber, or like nonmetallic material, molded or otherwise formed, may be satisfactorily used, and thus may be desirable where the intended brushing operation requires the avoidance of metal.

Such bundle may be composed of any of the usual material such as wire strands, either straight, crimped or twisted, tampico fiber, or the like, and the portion of the bundle which is thus inserted in the base 5 will be impregnated and bound together as indicated by the cross-sectional lines in Fig. 3 by a suitable material depending upon the material of which the strands are composed. Thus such binder in the case of tampico fiber may be thermosetting plastic or suitable adhesive, or in the case of wire strands it may solder or a cement that sets by chemical action and the passage of time.

Where such binder is of an adherent character and is applied incidentally to the insertion of the

bundle of brush material in the cup-shaped base 5, it will serve to a degree to secure the bundle against rotative movement within such base. However, a series of inwardly directed circumferentially spaced tongues or lugs 7 are desirably struck up from the side wall of the base so as to form an interlocking engagement between the latter and the adjacent brush material. The outer edge 8 of the base is furthermore bent or crimped inwardly, as by a pressing operation, so as to secure the bundle of brush material against endwise displacement, the internal diameter of such edge being preferably smaller than at the other (inner) end of the base.

The exterior wall of the base has such a diameter and has a taper complementary to that of the interior wall of the holder 1 so that when the base is inserted in the holder under a moderate degree of pressure it will be frictionally secured thereto. As clearly shown in Fig. 1, the diameter of the base at its inner end is such that frictional interlocking engagement with the holder will occur, as described, short of contact of such end with the bottom of the complementary recess in the holder. As further shown in said figure, the side wall 3 of the latter is desirably formed with an opening 3*a* which is so located as to permit insertion of a suitable implement beneath such base, whereby the latter may be pried loose in order to facilitate removal, when desired. Such tapering of the exterior wall of the base may be conveniently accomplished incidentally to stamping therein a series of longitudinal depressions or flutes 9 with formation of a corresponding series of lands lying between such depressions. These flutes not only serve to increase the rigidity of the base, as is desirable where made of light gauge metal, but also serve to resist turning of the brush material in the base.

As shown in Figs. 1, 2 and 3, the bundle 6 of brush material adjacent the outer end of the base 5 is surrounded by a bridle in the form of an endwise removable sleeve 10 which closely fits the corresponding portion of such bundle and which will preferably be formed of fiber or like non-metallic material, particularly where the brush material is composed of tampico or similar non-metallic material. At its inner end this sleeve in normal position will slightly overlap the inturned edge 8 of the cup-shaped base, as best shown in Fig. 3.

The longitudinal extent of the sleeve may vary, but it will ordinarily be equal to something less than half the length of the brush material that projects beyond the base. When after a period of use the brush material which projects beyond the sleeve has become worn down to the point, such as indicated by the broken line *a*—*a* Fig. 3, where its operative efficiency is reduced, the sleeve will be pulled outwardly until it entirely clears such material and will thereupon be discarded. As a result, the material projecting beyond the base 5 will, as shown in Fig. 4, be restored to substantially the condition which the portion of the bundle originally projecting beyond the sleeve presented.

Where the bundle of brush material is exceptionally long, and such bridle is of correspondingly increased length, instead of removing the same in its entirety, as just described, it can be displaced sufficiently to permit an outer section thereof to be cut off and the remaining section then seated as before against the outer edge of the cup-base.

Where the sleeve 10 is made of fiber it will

be less wear resistant than the brush material, particularly where the latter is composed of wire. Its action accordingly will be to wear down ahead of such brush material, thus effecting the removal of the sleeve gradually instead of in one or more pieces. In any event, the sleeve when in place constitutes a rigid support for that portion of the bundle of brush material that extends beyond the base 5, which support is removable when the outer projecting portion of such bundle has been worn down to the point where it no longer has the desired brushing action. Thus the useful life of any given brush element may be doubled or more.

The modified construction of end brush illustrated in Figs. 6 and 7 differs from that just described in that instead of comprising a separate replaceable cup-shaped base for the brush material such material, here shown as consisting of twisted wire strands 12, is secured at one end directly in a cup-shaped holder 13 which corresponds with the holder 1 of such first described form, and like the latter is provided with a central projection 14 for the purpose of attachment to a chuck or the like. This projection may be integral as shown, or it may be welded or riveted to the base 13. Said holder is furthermore provided with an oppositely extending central projection 15, the outer end of which lies some distance beyond the outer end of the bundle of brush material and is designed to serve as a pilot where as intended the brush is used for cleaning or polishing a surface surrounding a hole in the part being operated on.

The brush material 12 will be secured in the cup-shaped holder 13 in the same manner as previously described in connection with brush material 6 and the replaceable base 5 and surrounding such brush material adjacent the outer end of holder 13 is a sleeve 16 corresponding in all respects with previously described sleeve 10.

In the modified construction of end brush illustrated in Fig. 8, the bundle 18 of brush material is made up of wire strands in the form of a twisted cable secured at one end in a holder 19 similar to holder 13 of the previously described construction except that the pilot extension 15 is omitted. Such bundle is of relatively greater length, and in place of a bridle in the form of a sleeve a coil spring 20 attached at one end to said holder surrounds the bundle throughout its greater extent. Such brush is designed and adapted to operate at the bottom of a constricted space such as a bore into which the elongated bundle of brush material will just fit. After it has been worn down to the point where no longer suitable for such use, an outer section of the coil spring thus constituting the bridle may be cut off and the brush thus rendered capable of further use, if not in such particular situation, then as an end brush for some other polishing or cleaning operation.

From the foregoing description it will be seen that my improved end brush presents a number of advantageous features over those currently in use, and particularly when in the form of a replaceable component which may be removably secured in a holder or shank part whereby the brush as a whole is adapted to be attached to a chuck in the usual manner. Not only may the cup-base of such component be thus secured in the holder without the use of screws, nuts, or other parts which require special tools for their manipulation, but the base itself even where made of relatively inexpensive light gauge

material is nevertheless so formed as to be extremely rigid and capable of withstanding the hardest service. Furthermore, the brush material is held in such base with great firmness against both relative rotative and endwise movement; in effect an integral structure is presented. Finally, the employment of a bridle, particularly in the form of an endwise removable sleeve, presents numerous advantages not heretofore realizable in an end brush. Not only does such bridle during the initial period of use of the brush confine such brush material by giving it proper support and thereby permit increasing the distance from the working end of the brush to the holder and tool that operates the same, but by removing such bridle either in its entirety or in sections the brush material may be utilized completely, i. e., worn down quite close to the holder so that there is practically no wastage of material involved.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the structure herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:

1. As a new article of manufacture, an end brush component comprising a cup-shaped base, a bundle of brush material, arranged in substantial parallelism, secured at one end in said base, the outer edge of the latter being turned inwardly, and a removable bridle enclosing the portion of such bundle adjacent said base and constituting a rigid support for such portion said bridle being formed to slightly overlap such inturned edge of said base.

2. As a new article of manufacture, an end brush component comprising a cup-shaped base, a bundle of brush material, arranged in substantial parallelism, secured at one end in said base, the outer edge of the latter being turned inwardly, and a bridle enclosing the portion of such bundle adjacent said base and constituting a rigid support for such portion, said bridle being formed to slightly overlap such inturned edge of said base and being composed of a material substantially less wear-resistant than such brush material.

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