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POWER DRIVEN ROTARY END BRUSH

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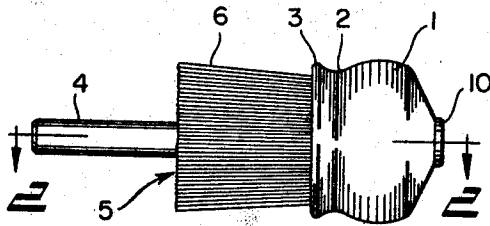


Fig. 1

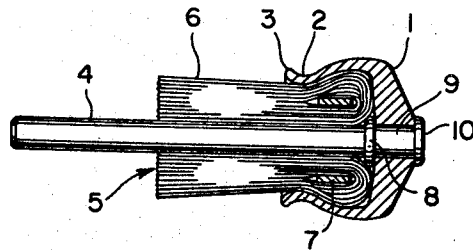


Fig. 2

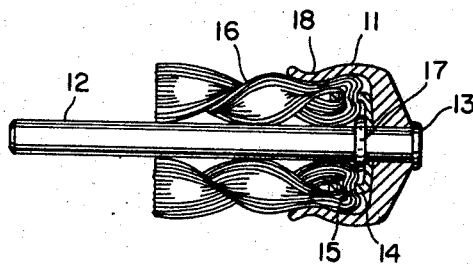


Fig. 3

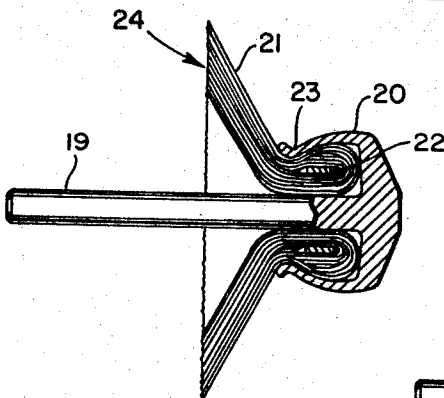


Fig. 4

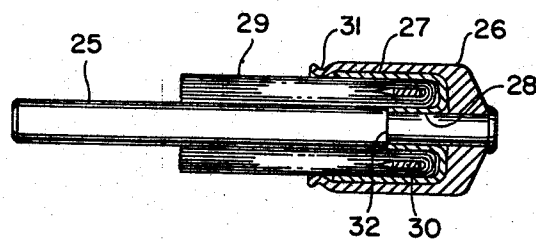


Fig. 5

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POWER DRIVEN ROTARY END BRUSH

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9 Claims

ABSTRACT OF THE DISCLOSURE

A power driven rotary end brush having a cup portion with brush material secured therein and extending therefrom, characterized in that a strong axial brush driving shank is drivingly secured within the cup and protrudes a substantial distance beyond the brush face in the direction such bristles extend sufficiently to enable such shank to be chucked in a power tool.

Power driven rotary end brushes are well known in the brush art and ordinarily comprise a metal cup-shaped holder having an axial stem extending from the bottom thereof for chucking in a power driven rotary tool such as an electric drill, for example. The brush bristles are secured within the cup by a variety of means including solder, adhesive, and various metallic retaining elements, with such bristles extending a substantial distance beyond the cup lip in a direction generally parallel to the axis of rotation of the brush.

When such end brushes are rotated at high speed the bristles tend to flare outwardly to a substantial degree under the influence of centrifugal force, and such brushes may accordingly be utilized and frequently are utilized to brush the inner surfaces of cylindrical openings and the like. A practical operating problem which is encountered by the brush operator engaged in thus brushing a series of such cylindrical openings, for example, is that of withdrawing the brushing tool from one such opening and inserting it into the next of a series. Since the tool is already rotating at high speed, the bristles may flare outwardly to a greater extent than the diameter of the opening as soon as the brush is removed from a first hole and it accordingly becomes impossible or at least very difficult to insert the rotating brush into a second hole without stopping rotation of the brush between each brushing operation. Power driven rotary end brushes are, moreover, frequently damaged by attempts of the operator to force the rotating brush into the opening, appreciable production being lost if it becomes necessary to stop the power driven tool between each successive brushing operation.

It is accordingly a principal object of the present invention to provide a novel power driven rotary end brush which may be inserted into an opening to be brushed while such brush continues to be driven at full speed, and without damage to the brush.

A further object is to provide a method of manufacturing such end brush which is quick and inexpensive, but produces a strong assembly of the several components whereby the stem or shank may be subjected to considerable torque in use and the brush material is securely retained within the cup.

Other objects of the invention will become apparent as the description proceeds.

To the accomplishment of the foregoing and related ends, said invention then comprises the features herein-after fully described and particularly pointed out in the claims, the following description and the annexed drawings setting forth in detail certain illustrative embodiments of the invention, these being indicative, however,

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of but a few of the various ways in which the principle of the invention may be employed.

In said annexed drawings:

FIG. 1 is a side view of one form of end brush embodying the principles of the invention;

FIG. 2 is a longitudinal section taken on the line 2—2 of FIG. 1;

FIG. 3 is a longitudinal cross-section through a generally similar brush utilizing twisted wire knots as the brush material;

FIG. 4 is a longitudinal section through a generally similar brush having preformed flaring brush material; and

FIG. 5 is a longitudinal section through still another form of brush embodying the principles of the invention utilizing a different form of annular brush element secured within the cup-shape holder.

In the embodiment of the invention illustrated in FIGS. 1 and 2 of the application a metal cup-shape holder 1 is provided having a somewhat constricted neck portion 2 and an outwardly flaring lip 3. A strong axial brush driving shank in the form of metal rod or stem 4 is directly drivingly secured to the bottom of such cup and protrudes a substantial distance beyond the brush face 5 formed by bristles 6 which are retained within the cup by means of metal annulus 7. The brush bristles 6 which will usually be of wire are bent around such annulus and the bight portions of the bristles together with the annulus are held against withdrawal from the cup by means of inwardly necked portion 2 which is, of course, formed by a swaging operation following insertion of the annulus and bristles into the cup-shape holder. Shank 4 is provided with an annular shoulder 8 directly engaging the inner bottom of the cup and the portion 9 of such shank may be of square cross-section having a drive fit within the aperture in the cup bottom receiving the same. The end 10 of the shank is swaged to engage the outer bottom of the cup 1 further to secure the shank against withdrawal therefrom. It will thus be seen that the end of shank 4 protruding beyond the brush face 5 may be chucked in a suitable power driven tool for rotation of the brush about its longitudinal axis. When thus rotated, the brush bristles 6 will flex toward a radially outward direction under the influence of centrifugal force and the brush may be utilized to brush the inner surface of a cylindrical opening in a workpiece, for example. When the rotating brush is inserted within such a cylindrical opening, no damage will be occasioned to the brush bristle material inasmuch as the latter will readily yield when engaging the work if brought too close to the latter.

In the embodiment of the invention illustrated in FIG. 3 a generally similar cup 11 and shank 12 are employed, such shank being similarly secured in driving engagement with the bottom of the cup and riveted thereto by means of the upset end portion 13. The brush element within the cup in this case, however, comprises a sheet metal disc 14 which has itself been deformed into general shallow cup-shape and provided with a plurality of circumferentially arranged apertures such as 15 through which twisted tufts or knots of wire brush bristle material 16 are threaded. This inner brush element is retained within the cup by means of annular shoulder 17 on shank 12 which engages disc 14 and clamps the latter tightly against the inner bottom surface of the cup. The inwardly necked portion 18 of the cup further assists in securing the brush element within the cup and in regulating and controlling the action of the twisted wire brush bristle tufts 16.

In the embodiment of the invention shown in FIG. 4 of the drawing the shank 19 is formed integrally with the metal cup-shape holder 20 and the brush bristle material 21 is secured within the holder by means of ring 22 and constricted neck 23 in much the same manner as in the

FIG. 2 form described above. The layers of brush bristle material 21, which will ordinarily be of relatively fine gauge slightly crimped wire may be preformed into outwardly flaring condition as shown, and trimmed to provide a brush face 24 normal to the axis of rotation of the brushing tool defined by shank 19. When this brush is rotated at high speed, there will consequently be relatively little further outward flaring movement of the brush bristles and this tool is especially adapted for the brushing of surfaces which are readily accessible only by insertion of the tool through an opening from the other side of the workpiece.

FIG. 5 illustrates another form of tool in accordance with the invention wherein the axial shank 25 is drivingly interengaged with the bottom of cup 26 in a manner generally similar to that employed in the FIG. 2 and FIG. 3 forms. The inner brush element comprises an annular sheet metal channel having an outer relatively long side 27 and a relatively short radially inner side 28. The brush bristle material 29 is retained within such channel by means of annulus 30 about which the bristle material is bent in general hairpin form. The constricted neck 31 of cup 26 overlies the edge of channel side 27, and the edge of channel side 28 is engaged by shoulder 32 of shank 25, thereby firmly to lock the brush element within the cup-shape holder.

It will, of course, be appreciated that various other methods may be employed of firmly drivingly securing the axial shank to the bottom of the cup-shape holder, as by welding the shank to the holder or providing threaded interengagement of the two parts. The outer bottom surface of the cup should, of course, be free of substantial projections which might interfere with proper employment of the brushing tool and which would more especially limit insertion of such tool into a blind opening in the workpiece, for example. While the brush bristle material will usually be of steel wire, it will likewise be understood that a variety of different brush fill materials may be employed for special purposes including Tampico fiber, nylon monofilaments, and the like.

In the case of the FIG. 3 and FIG. 5 embodiments the brush bristle retaining elements may first be mounted upon the respective shank members and the latter utilized forcibly to insert such elements into the holder thereby obtaining a very tightly fitted assembly. Inasmuch as the shank and brush bristles thus protrude beyond the cup in one direction only the novel brushing tool of this invention may be repeatedly inserted in and removed from a series of openings in one or more workpieces without the necessity of stopping rotation of the brush between each brushing operation. The brush driving shank also cooperates in securing the inner brush elements within the cup-shape holder and must protrude a substantial distance beyond the bristle ends to enable chucking in the usual power-driven tool.

Other modes of applying the principle of the invention may be employed, change being made as regards the details described, provided the features stated in any of the following claims or the equivalent of such be employed.

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

1. A power driven rotary end brush having a metal cup portion with bristle material secured therein and extending therefrom, characterized in that a strong axial brush driving shank within said cup is directly drivingly secured to the bottom of said cup and protrudes a substantial distance beyond the brush face in the direction said bristles extend sufficient to enable said shank to be chucked in a power tool, the outer bottom surface of said cup being free of substantial projections.

2. The brush of claim 1, in which such bristles are of wire.

3. The brush of claim 1, in which such bristles are secured to an annular member encircling said shank and retained within said cup.

4. The brush of claim 3, in which the cup lip portion projects slightly radially inwardly thus to retain said annular member and bristles in place.

5. A power driven rotary end brush having a cup portion with brush material secured therein and extending therefrom, characterized in that a strong axial brush driving shank is drivingly secured within said cup and protrudes a substantial distance beyond the brush face in the direction said brush material extends sufficient to enable said shank to be chucked in a power tool, said shank and brush material thus extending beyond said cup in such one direction only.

6. The brush of claim 5, including a retaining element to which said brush material is secured within said cup, and an abutment on said shank engaging said element to assist in preventing withdrawal of said element and brush material from said cup.

7. The brush of claim 6, in which said retaining element is a sheet metal disc having a plurality of circumferentially disposed apertures therethrough, and twisted tufts of wire brush bristle material threaded through such apertures.

8. The brush of claim 6, in which said retaining element is an annular channel member opening in a direction parallel to said shank with said brush material secured therein, said abutment on said shank engaging the edge of the radially inner side of said channel, and the lip portion of said cup having a constricted neck overlying the edge of the radially outer side of said channel.

9. The brush of claim 5, in which said brush material is in the form of a radially outwardly flaring layer, the brush face provided by said layer being generally normal to the longitudinal axis of said shank.

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