March 22, 1960 R. O. PETERSON 2,929,086

ROTARY BRUSH

Filed Jan. 16, 1956 2 Sheets-Sheet 1

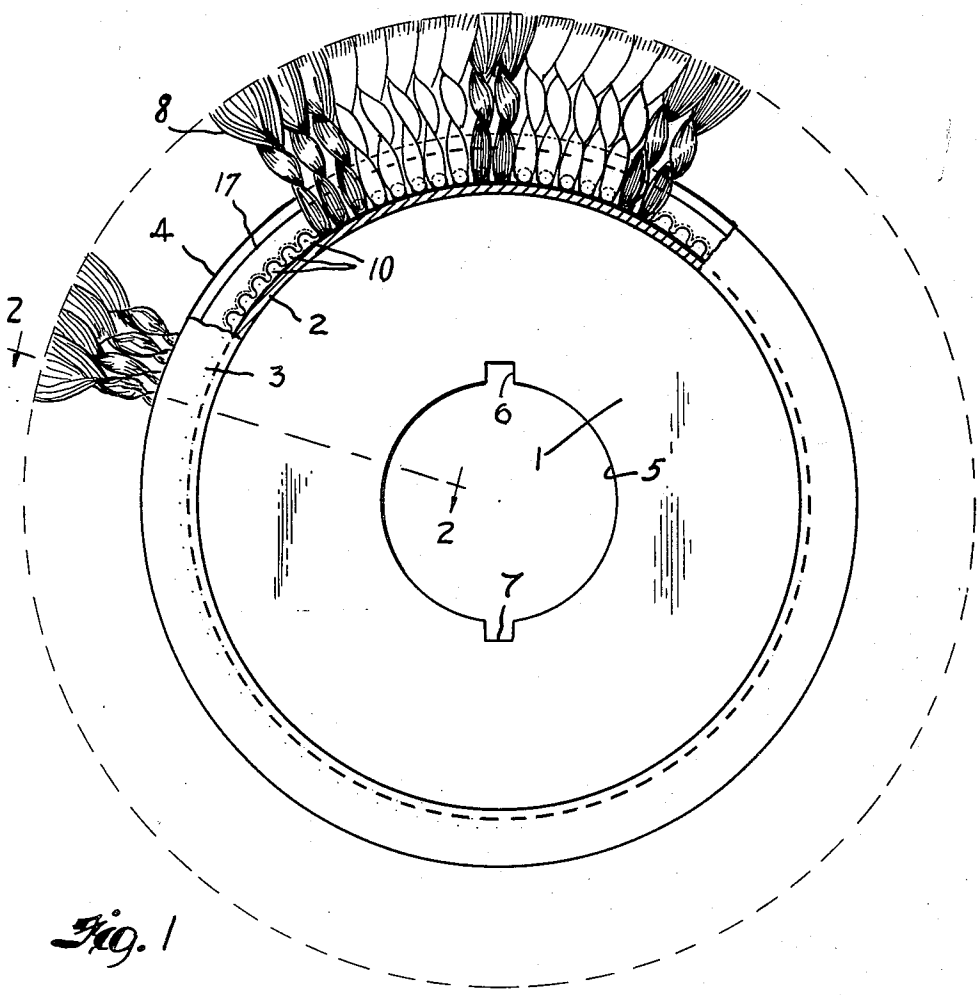


Fig. 1

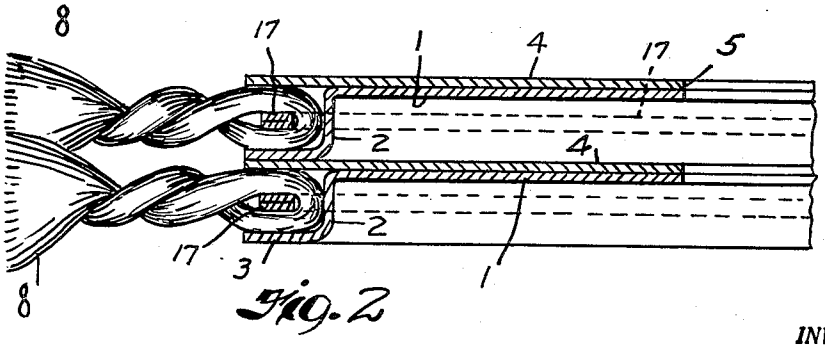


Fig. 2

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ROTARY BRUSH

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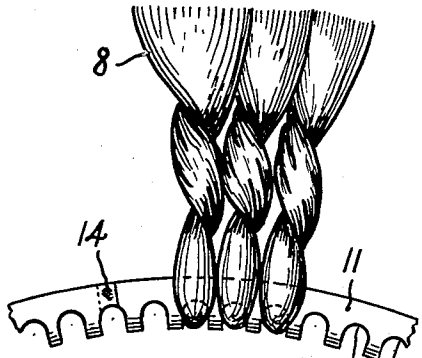


Fig. 3

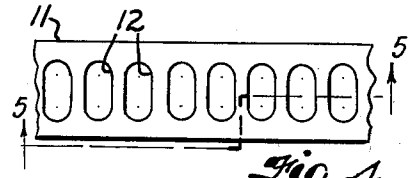


Fig. 4

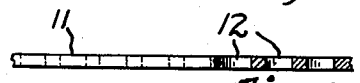


Fig. 5

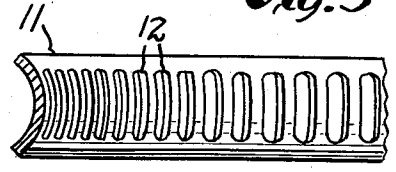


Fig. 6

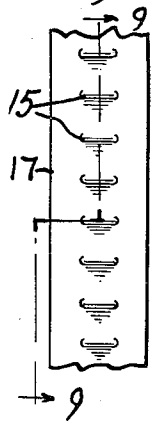


Fig. 8



Fig. 9

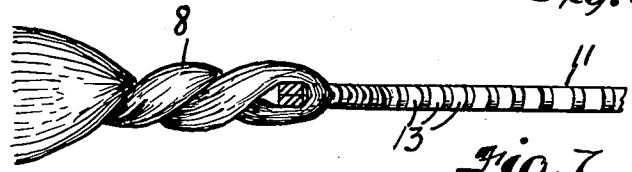


Fig. 7

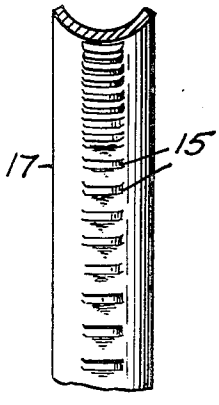


Fig. 10

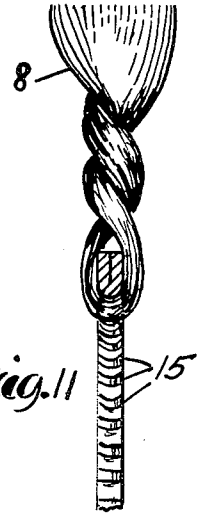


Fig. 11

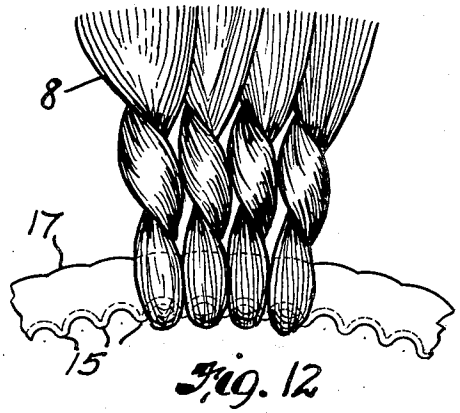


Fig. 12

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United States Patent Office 2,929,086 Patented Mar. 22, 1960

2,929,086

ROTARY BRUSH

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Application January 16, 1956, Serial No. 559,179

7 Claims. (Cl. 15—181)

This invention relates as indicated to a novel rotary brush, and more particularly to a rotary brush of the twisted tuft type in which such tufts are retained in a new and improved manner.

Twisted tuft brushes are well known in the art and are used for a wide variety of purposes including removal of flux and spatter from welded articles and other abrading operations. Such brushes have ordinarily been formed by inserting bundles of wire brush bristle material through apertures in a disc-shaped hub member and then doubling and twisting such tufts upon themselves (see, for example, Bickel et al. Patent 2,062,047). In Peterson Patent 2,480,877 there is also disclosed a modified form of twisted tuft brush in which such tufts are threaded on a wire ring or annulus. The apertured disc hub has certain advantages in that the tufts are very permanently secured and spaced. The manufacturing process is, however, rather slow and tedious. When the tufts are threaded on a smooth wire annulus, on the other hand it is difficult to keep them properly uniformly distributed circumferentially of the tool without local bunching. This construction, however, lends itself to more rapid and convenient manufacture.

It is accordingly an important object of my invention to provide a novel rotary brush of the twisted tuft type in which the tufts are firmly secured in properly oriented relationship.

Another object is to provide such brush of a design adapted for rapid and convenient assembly.

A still further object is to provide such brush in which the entire hub assembly may be constructed of relatively lightweight sheet metal.

Other objects of the invention will appear as the description proceeds.

To the accomplishment of the foregoing and related ends, said invention then comprises the features hereinafter fully described and particularly pointed out in the claims, the following description and the annexed drawing setting forth in detail certain illustrative embodiments of the invention, these being indicative, however, of but a few of the various ways in which the principle of the invention may be employed.

In said annexed drawing:

Fig. 1 is an end elevational view of a rotary brush constructed in accordance with my invention;

Fig. 2 is a transverse section through such brush assembly on an enlarged scale taken on the line 2—2 on Fig. 1;

Fig. 3 is a fragmentary view showing tufts of brush material secured to a non-elected form of retaining element;

Fig. 4 is a plan view of a sheet metal strip suitable for use in forming the retaining element of Fig. 3;

Fig. 5 is an edgewise view taken on the line 5—5 on Fig. 4;

Fig. 6 shows such retaining element transversely arcuately curved as a step in its deformation for employment as the retaining element in accordance with Fig. 3;

Fig. 7 is a transverse section of the Fig. 3 assembly;

Fig. 8 is a plan view of the preferred form of sheet metal strip deformed for employment in accordance with my invention;

Fig. 9 is a view taken on the line 9—9 on Fig. 8;

Fig. 10 shows a step in the folding of the strip along its longitudinal center line, the strip first being circularized into general cylindrical form;

Fig. 11 is a fragmentary transverse section through the circularized fully deformed strip with the ridges defining notches therebetween adapted to receive the respective twisted tufts; and

Fig. 12 is a fragmentary side view of such assembly.

Referring now more particularly to said drawing and especially Figs. 1, 2 and 8–12 thereof, the novel brush of my invention may comprise a sheet metal hub member in the form of a stamping 1 having a cylindrical axially offset portion 2 adapted to seat the brush elements and a further radially extending flange portion 3. An opposed sheet metal disc 4 may be secured thereto as by spot welding, riveting or the like. These two disc or hub members are provided with aligned central openings 5 for mounting upon an arbor or the like and keyways 6 and 7 may be provided therein. The twisted tufts 8 of wire brush bristle material are secured to an annular sheet metal brush material retaining ring 9 having a series of arcuate notches or scallops 10 formed by intervening ridges 15 in its inner peripheral edge portion, the ring lying in a plane normal to the axis of the brush. An individual tuft 8 in each of such notches encircles ring 9, being secured thereto by twisting and held against shifting by the notches. A ring bearing its full complement of twisted tufts may thus first be prepared and then axially press-fitted on a cylindrical hub as shown in Figs. 1 and 2. Of course, such hub may be of as much axial extent as desired and a plurality of such rings mounted thereon in side-by-side relationship. While the tufts will normally be twisted as indicated, it will be obvious that brush material in general hairpin form may similarly be secured in the notches 9 if adequately laterally supported by the hub members, as shown.

As shown in Figs. 3–6 inclusive, a relatively thin sheet metal strip 11 may have a series of transversely oblong apertures 12 punched therein and then be folded along its longitudinal center line so that such oblong apertures produce notches 13 in one edge of the folded strip (Fig. 3). The tufts of twisted brush material are secured to strip 11 in notches 13 as generally explained above, such strip first being circularized and the opposed ends secured together as by welding at 14.

Instead of punching holes in the thin sheet metal strip, such strip may merely be deformed as shown in Figs. 8–12 inclusive, a series of spaced ridges 15 being produced with corresponding dimples or depressions 16 in the other side of the strip 17. When such strip is then folded along its longitudinal center line as shown in Fig. 11, such ridges 15 produce intervening notches or scallops adapted to receive the twisted tufts 8.

The notch forming configurations which are formed in the central area of the metal strip from which the unitary rings are produced naturally facilitate circularization of portions of the strip into such rings. A length of the relatively thin sheet metal strip is in each case circularized into a cylindrical annulus and the opposed ends joined as by spot welding prior to folding along the longitudinal center line of the strip. A sheet metal ring is thus produced which is folded outwardly along its peripheral or circumferential center line. Such ring is then filled with self-sustaining tufts of brush material aligned in closely packed side-by-side relationship and extending radially outwardly. Then such ring and the tufts as-

sembled thereon are press-fitted on the outer periphery of a hub member. Not only do the ridges or protuberances intermediate the notches serve to secure the twisted tufts of brush material in proper orientation relative to one another even before mounting of the retaining ring on the central hub elements, but also such ridges or protuberances are adapted greatly to increase the tightness of the engagement of the cylindrical surface of the hub with the brush material retaining ring and tuft assembly. Such surface may be slightly roughened if desired to enhance this gripping action and thereby prevent relative rotation of the hub (through which the tool is driven) and the brush bristle carrying element. In the Figs. 8–12 embodiment, it will be noted that the notches are formed without actually rupturing or removing any of the sheet metal, thereby permitting a relatively thin strip of metal to be employed without sacrifice of strength. As previously indicated, a plurality of such retaining rings with the twisted tufts assembled thereon may be mounted in side-by-side relationship upon a single hub if a brush having a relatively wide brush face is desired.

The tufts of brush material 8 will ordinarily be of steel wire but various other metals such as brass, stainless steel and the like may also be employed as well as certain plastic filaments and plastic coated metal wire. The hub elements will ordinarily be of sheet steel but may be of vulcanized fiber, die cast metal, or other suitable material. Retaining ring 9, ordinarily of steel, may likewise be of such other materials when conditions of use will permit.

It will be apparent that in my new brush construction a large number of twisted tufts may be assembled close together as in prior art brushes where such tufts have been strung on wire retaining rings, thereby affording a relatively dense brush face. On the other hand, each tuft is definitely and precisely located (as in the prior art apertured disc form). Assembly is much facilitated, material is conserved (in contrast to blanking out the tuft retaining means from a flat disc of sheet material), and relatively thin metal strip may be employed which is much rigidified by being folded as shown and described. Teeth may be punched in from the side plate stampings such as 1 and 4 (Figs. 1 and 2) to overlie and reinforce rings 9, if desired.

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 rotary brush assembly comprising a cylindrical hub portion, and an assembly of a sheet metal retaining ring and a large number of self-sustaining tufts of brush material doubled thereabout in close side-by-side relationship extending outwardly therefrom very tightly fitted on the outer periphery of said hub portion, said sheet metal ring being of U-shaped cross-section with the legs of the U abutting each other and extending outwardly and said ring having a large number of equally spaced notches in its inner periphery defined by protuberances deformed therein, the sheet metal being unruptured by such notches, and said doubled self-sustaining tufts of brush material extending through such notches.

2. The method of forming a rotary brush assembly which comprises deforming an elongated sheet metal strip to produce a series of uniformly spaced protuberances on one face thereof without rupturing the metal, circularizing such strip to cylindrical form with such protuberances projecting radially inwardly, joining the opposed ends of such circularized strip, flaring the edges of such strip face to face radially outwardly to fold such strip into a plane perpendicular to the axis of such circularized strip at the axial midpoint thereof with such protuberances defining intervening notches in its inner periphery, twisting tufts of wire brush material about such folded strip through such notches, and axially press-fitting such circularized strip on a cylindrical hub with such tufts extending radially outwardly.

3. A rotary brush assembly comprising a central hub portion, a sheet metal ring of U-shaped cross-section with the legs of the U abutting each other and extending outwardly mounted tightly on said hub portion, said ring having notches formed in its inner periphery without rupturing the metal, and tufts of brush material extending through such notches with their respective end portions extending generally radially outwardly therefrom.

4. A rotary brush assembly comprising a sheet metal ring of U-shaped cross-section with the legs of the U abutting each other and extending outwardly, the outer periphery of said ring comprising the end edges of said legs, the base of the U forming the inner periphery of said ring being provided with a plurality of uniformly circumferentially spaced protuberances without rupturing the metal, and tufts of brush material looped and secured about said ring and extending generally radially outwardly therefrom held against circumferential shifting by firm engagement with said protuberances.

5. A rotary brush assembly comprising a cylindrical hub member, a sheet metal ring of U-shaped cross-section with the legs of the U abutting each other and extending outwardly, said ring having a large number of equally spaced notches provided in its inner periphery without cutting or breaking the metal, and individual tufts of brush material passing about said ring, portions of said tufts extending through such notches, with the end portions of said tufts being intertwined to secure said tufts to said ring in a close circumferential alignment extending radially outwardly from said ring, said ring and tuft assembly being very tightly fitted on the outer periphery of said hub member.

6. The method of forming a rotary brush assembly which comprises the sequential steps of forming a cylindrical sheet metal ring having a large number of uniformly spaced inwardly projecting protuberances along a circumferential line lying in a plane perpendicular to the axis of such ring at the axial midpoint thereof folding such ring outwardly along such line to produce a flat rigid ring having alternate protuberances and notches at its inner periphery, doubling a large number of individual tufts of brush material about such ring in close side-by-side radially outwardly extending circumferential alignment, twisting the outer end portons of each tuft upon each other tightly to secure such tufts assembled on such ring, and then axially press-fitting such ring and tuft assembly upon a circular hub.

7. The method of claim 6, wherein such hub is a sheet metal cylinder, and the alignment of tufts is laterally compressed between radial flange portions.

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