

Sept. 6, 1949.

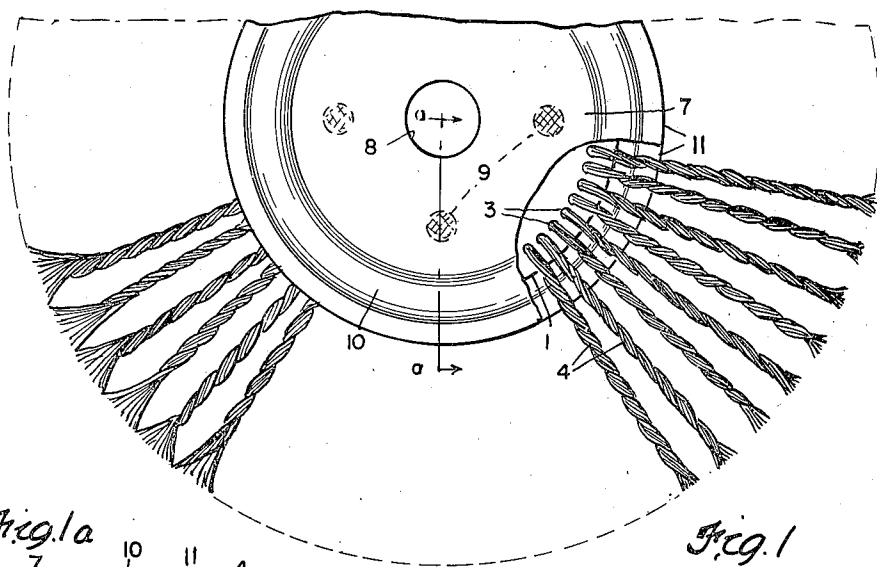
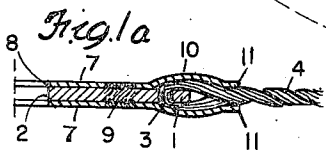
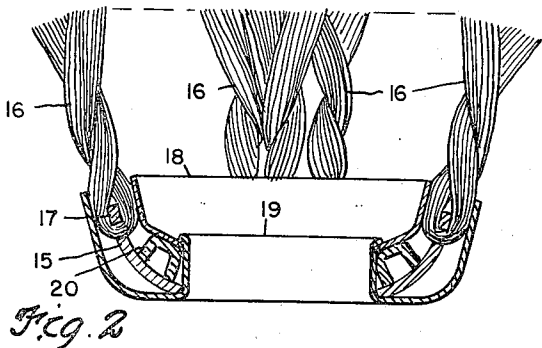
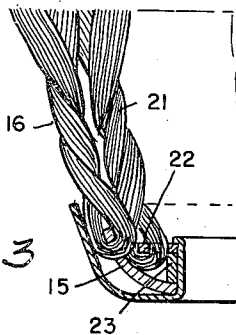
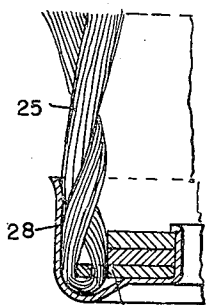
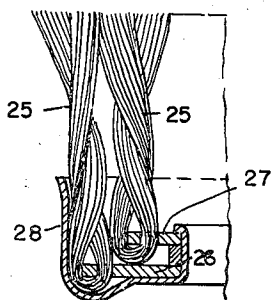
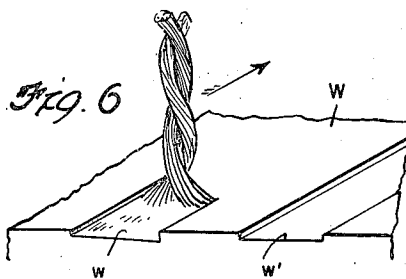
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2,480,877

ROTARY BRUSH

Filed Nov. 6, 1943

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

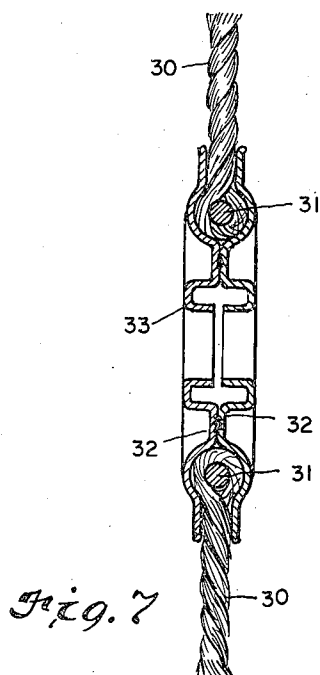
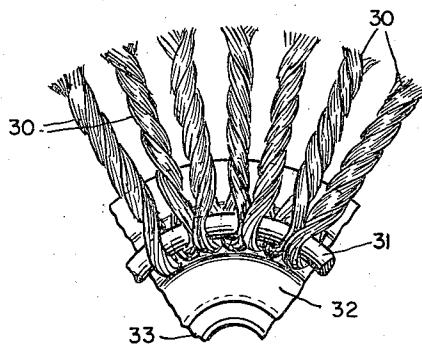
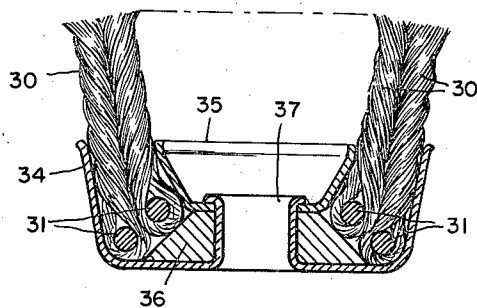
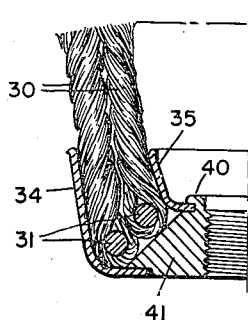


Fig. 9.

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ROTARY BRUSH

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4 Claims. (Cl. 15—180)

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The present improvements, relating as indicated to rotary brushes, have more particular regard to brushes of the coil knot or twisted tuft type in which the brush material comprises a series of twisted tufts formed by doubling and then twisting a bundle of stranded brush material, usually wire, such tufts being secured at the point where doubled by being passed through apertures in a suitable support such as a disk in the case of a rotary brush. One form of such twisted tuft type of brush which has been extensively marketed is disclosed in Patent No. 1,493,670 to C. E. Galvin, dated May 13, 1924. The brush illustrated in this patent is specifically designed for use as a rotary brush composed of one or more disks from which the twisted tufts of brush material extend radially. An adaptation of the same construction to what is known in the trade as a cup brush is shown in Patent No. 2,062,047 to F. J. Bickel et al., dated November 24, 1936.

One objection which has heretofore been encountered in the use of brushes of the foregoing construction, whatever the type, has been the uneven wiping or digging action of the ends of the twisted tufts, which constitute the brushing elements. In other words, when a bundle of stranded brush material is formed into a tuft in the manner described above, the outer ends of one-half of the strands will obviously project in one direction and the other half in a substantially opposite direction. Even where such ends are not spread apart or crimped as in the above cited Galvin patent, this difference in angularity presented by the outer ends of the strands results in a markedly different action on the work-piece, the sides of the tufts that tend to dig into the work producing a much harsher cutting effect and greatly increasing wire breakage. In other words, as the brush is held in place against the work-piece, the side of the tuft that tends to dig into the work cuts a deep groove while the other side merely wipes or burnishes the surface.

One principal object of the present invention is to overcome this asymmetrical effect in brushes composed of tufts made from twisted bundles of wire or like strands.

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 drawings and the following description set forth in detail one method and one product exemplifying my invention, such disclosed procedure and product constituting, how-

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ever, but one of various applications of the principle of my invention.

In said annexed drawings:

Fig. 1 is a side elevation of a circular brush section embodying my present improvements, such section being suitable for use in a rotary brush either singly or in plural assembly;

Fig. 1a is a sectional detail on plane a--a Fig. 1;

Fig. 2 is a central section through a cup brush illustrating the manner in which a section as shown in Fig. 1 may be adapted for use in this type of brush;

Fig. 3 is a broken sectional view of a modified form of such cup brush;

Figs. 4 and 5 respectively illustrate two other modifications in construction of such cup brush;

Fig. 6 is a view more or less diagrammatic in character illustrating the action on the work-piece of a twisted brush tuft such as is utilized in my improved brush assembly;

Fig. 7 shows an axial section of a modified circular brush on the order of that shown in Figs. 1 and 1a;

Fig. 7a is a side elevation of a portion of the brush element proper in such modified construction; and

Figs. 8 and 9 are central sectional views of further modified forms of cup brushes.

The rotary brush section illustrated in Fig. 1 comprises a support in the form of a metal disk 1 to which the brush elements, of particular interest herewith, are designed to be attached. Such support may of course take various forms depending upon the particular type of brush involved and the manner in which the latter requires to be mounted for use. Said disk 1 will ordinarily be provided, as shown, with a central opening adapting the same to be mounted either on a supplemental hub or directly on an arbor or like driving member. Said disk is further provided about its periphery with a series of smaller apertures 3 which are equidistantly spaced and which form the means whereby the individual brush elements or tufts 4 are attached to said disk.

These tufts are respectively formed of doubled and twisted bundles of parallel arranged, stranded brush material which will ordinarily consist of wires 5 drawn to various degrees of fineness depending upon the character of the operation to be performed by the brush. The diameter of such bundles of brush material is such as to permit the same to be inserted through the apertures 3 in the disk, whereupon the bundle is bent double upon itself and the two extending

portions are twisted together. Preferably such twisting is rather tightly done and is carried out uniformly to the end of the element or tuft as illustrated in the lower right hand portion of Fig. 1. However, as illustrated in the lower left hand portion of the same figure the outer ends of the brush elements may be left less tightly twisted so that the ends of the component strands will spread apart at a greater angle than in the body of the element.

In any case, i. e. as illustrated in the brush elements shown in the respective lower corners of Fig. 1, the bundles of re-bent twisted brush material which constitute the brush elements are alternately twisted in opposite directions. In other words, the direction of twist is reversed in successive elements or tufts. As a result of the reversal in direction of twist in successive elements or tufts, the two sides of the completed brush section will present an approximately equal number of strand ends which project forwardly, i. e. in the direction in which the section may be rotated, and which project rearwardly or in a direction reverse to that in which the strand ends travel. In this manner the action of the two sides of the brush face may be rendered substantially uniform and it is rendered possible to control the harshness of the brush. When a very harsh brush is desired, even though it involves increased wire breakage, the tufts can be so coiled that one has the outside half in a position to dig into the work while the adjacent tuft, being coiled in the reverse direction, has its other half tending to dig into the work, thus making the brush symmetrical with respect to its two sides. By varying the angle at which the forwardly projecting strand ends incline to the body of the brush element or tuft, the angle of dig and thus the harshness of the brush can be controlled. The strand ends which incline in the opposite or wiping direction serve to support the others as well as to produce a complementary light brushing effect.

In order to retain the radially extending brush element or tufts 4 in circular alignment, as well as to laterally support the same adjacent their points of attachment to disk 1, circular disks or plates 7 of somewhat larger diameter than said supporting disk 1 are attached to the respective sides of the latter. Said disks 7 have central apertures 8 corresponding with aperture 2 in said supporting disk, and except for their outer portions closely contact the latter, the three disks being firmly secured together as by spot welding at points 9. The outer peripheral portions of disks 7 are formed with circular beads 10 which fit over the looped or re-bent inner ends of the brush elements 4, and with lips or flanges 11 which are disposed so as to closely and more or less resiliently press against the sides of such elements just beyond their points of attachment to the central or supporting disk. The complete brush section thus provided is adapted for use either individually where a brush of only relatively narrow working face is required, or a series of such sections may be assembled side-by-side to provide a cylindrical brush of any desired longitudinal extent.

The action just described may be better understood by reference to Fig. 6 which illustrates in an exaggerated manner the effect of a single brush element composed of twisted strands such as described above. As shown in such figure, the forwardly inclining strand ends 6 will cut into the work-piece W more deeply than the re-

versely inclined or trailing strand ends. However, if the next succeeding element is oppositely twisted so that such strand ends will engage the work in opposite fashion to that just described, the cutting effect will be balanced on both sides of the brush face and instead of having the cut w of varying depth, a cut w' of uniform depth will be produced.

A brush section comprising a central supporting disk with radially disposed brush elements carried thereby substantially as illustrated in Fig. 1 may be readily adapted for use in a cup type brush as illustrated in Figs. 2 to 5 inc.

In Fig. 2 a single such supporting disk 15, with a corresponding series of twisted tufts 16 carried thereby, is utilized. Such disk in this case instead of being flat is transversely curved so as to be concave in cross section, and is mounted between two annuli 17 and 18 of corresponding concave section. The inner edge of the outermost annulus 15 is formed with an axially projecting flange 19, the inner edge of which is flared outwardly so as to engage the inner edge of the inner annulus 18. In order securely to clamp disk 15 which carries the brush elements between said annuli 17 and 18 a spacing ring 20 is interposed between the inner edges of said disk and the inner annulus, i. e. adjacent flange 19 on the outer annulus.

It will be observed that the upper edges or lips of the cupped annuli 17 and 18 extend into contact with the bases of the series of brush elements carried by disk 15 so as to support such elements at desired angle to the axis of the brush as a whole. Successive tufts 16, as in the case of the circular section illustrated in Fig. 1, will be twisted in reverse directions so that the strand ends thereof will incline oppositely as shown in the case of the tufts illustrated in the central portion of Fig. 2.

Fig. 3 illustrates another form of cup brush in which in addition to a series of twisted brush elements or tufts 16 carried by a concave disk 15 a second series 21 of such elements carried by a ring 22 is disposed inside the first so that the face of the brush will present two rows of twisted strand ends. The brush supporting disks or rings 15 and 22 are mounted in a holder of substantially the same construction as in Fig. 2 except that ring 22 takes the place of the inner annulus 18 and the spacing ring 23 is of slightly different form from spacing ring 20.

Figs. 4 and 5 illustrate a form of cup brush in which the twisted brush elements or tufts 25, one series of which is shown in Fig. 4 and a double series in Fig. 5, are supported so as to lie in substantially parallel relation instead of at an angle to the axis of the brush as a whole. Except for the fact that the disks 26 and 27 which carry such brush elements are in both cases flat and that the outer annulus 28 is of somewhat different contour, the construction of the two forms of cup brush illustrated in Figs. 4 and 5 respectively is substantially the same as that illustrated in Fig. 3.

In the double cup brushes illustrated in Figs. 3 and 5, where two sets of twisted brush elements or tufts are utilized, the ring that carries the inner series of such elements may be regarded as the equivalent of the inner annulus in the simpler form of the brush in which a single series of brush elements is utilized. In other words, such inner annulus merely becomes the supporting means for the inner series of brush elements. While the manner in which a cup brush is em-

ployed is different from that of the rotary brush illustrated in Fig. 1, the action of the twisted tufts of brush material will be the same in that the forwardly directed ends of the twisted strands tend to dig or bite into the work more than do the trailing strand ends.

This action is equalized and the brushing effect rendered symmetrical throughout the extent of the brush face just the same in the case of such cup brush as described above in connection with a rotary or cylindrical brush. Furthermore, the principle involved may obviously be applied to other types of brushes, even brushes having flat faces and designed for reciprocatory rather than rotative movement.

The modifications in construction illustrated in Figs. 7-9 inclusive involve the substitution of a simple ring for a disk with peripheral apertures as the tuft carrying element in the brush. Such substitution permits the tufts to be crowded more closely together so that more brush material can be employed in a brush of given size. Accordingly the modification will be especially desirable in small annular or cup brushes.

As indicated in the general description of the drawings, the brush shown in Figs. 7 and 7a is of circular type and in general similar to that shown in Figs. 1 and 1a. However, the twisted tufts 30 of brush material instead of being inserted through apertures in a supporting disk are passed around an annulus or ring member 31 preferably of circular cross section. Thus the bases of the tufts may be crowded into close contact with each other; in fact in the case of a brush of small diameter the tufts will be substantially in contact throughout their length.

The support for the annulus which thus carries the tufted brush material is likewise modified in the construction thus illustrated in Figs. 7 and 7a in that the opposed circular disks or plates 32 between which the brush element is clamped have their inner edges oppositely re-bent to form a hub 33 whereby the brush as a whole may be mounted on its arbor.

In the modified cup brushes illustrated in Figs. 8 and 9, two series of tufts 30 of brush material closely mounted on annuli 31 are utilized as in the construction just described. However, incidentally to placing such brush elements in the cup-shaped holder 34, the tufts instead of being radially disposed with respect to such annuli are turned at an angle to the plane of the latter. The concentric rows of tufts are held in place and further supported by an inner cone-shaped member 35 and a filler 36 of oppositely conical shape, these parts being secured together either by a flanged annular projection 37 rising from the base of cup member 34, as shown in Fig. 8, or by flange 40 integral with the filler 36, as illustrated in Fig. 9, the base of the cup being simply brazed to such filler. In the latter case the bore of such filler may be threaded as de-

sired to permit mounting of the brush directly onto a threaded arbor.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the mechanism 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. In a brush, the combination of a support and a plurality of twisted brushing elements carried thereby, such elements being aligned in the direction of their active movement in use, and certain of such elements being twisted in one direction and a substantially equal number of such elements substantially uniformly distributed in such alignment being twisted in the opposite direction.

2. In a rotary brush, the combination of a support of generally circular form and a plurality of twisted stranded tufts carried by said support in a circumferentially aligned series, certain of said tufts being twisted in one direction and a substantially equal number of such tufts substantially uniformly distributed in such series being twisted in the opposite direction.

3. In a rotary brush, the combination of a support of generally circular form and a plurality of twisted stranded tufts carried by said support in a circumferentially aligned series, alternate tufts in such series being twisted in opposite directions.

4. In a rotary brush, the combination of a support of generally circular form including a brush material retaining element adjacent the periphery thereof and a plurality of tufts of stranded brush material looped around said element in a circumferentially aligned series, and doubled back on themselves, and the doubled portions of each tuft being twisted upon each other, the direction of such twist being reversed in successive tufts, whereby widthwise symmetry of the brush face is attained and preserved as it is worn down in use.

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