Nov. 24, 1936. F. J. BICKEL ET AL 2,062,047

BRUSH

Filed June 1, 1934

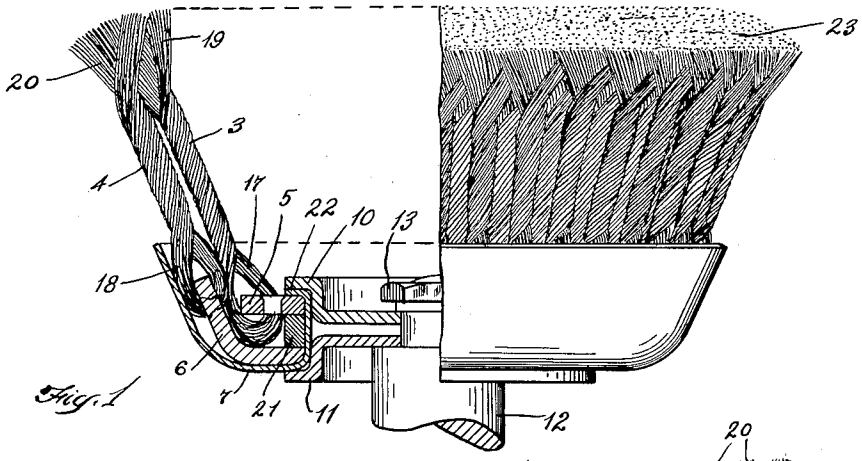



Fig. 1

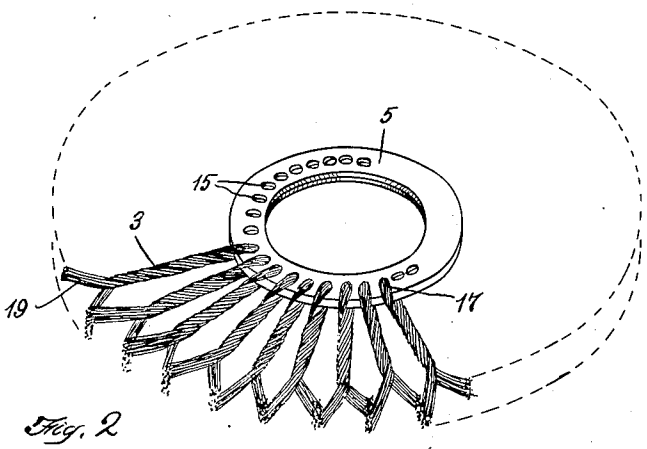



Fig. 2

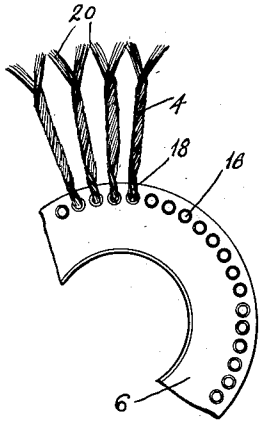



Fig. 3

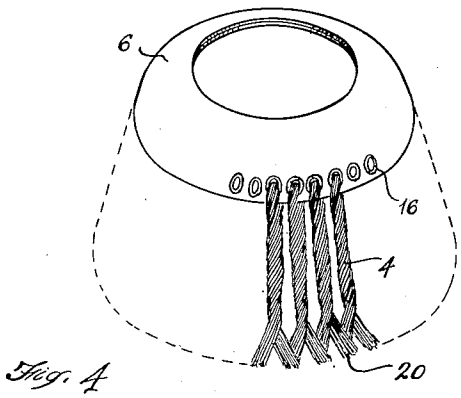



Fig. 4

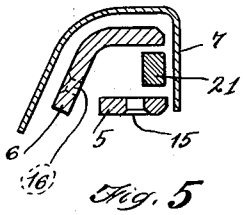



Fig. 5

INVENTOR.
Frederic J. Bickel and
BY Harvey J.C. Oster Jr.
Ralf, Oberlin & Ralf
ATTORNEYS.

Patented Nov. 24, 1936

2,062,047

# UNITED STATES PATENT OFFICE

2,062,047

## BRUSH

Frederic J. Bickel and Harvey J. C. Oster, Jr., Cleveland, Ohio, assignors to The Osborn Manufacturing Company, Cleveland, Ohio, a corporation of Ohio

Application June 1, 1934, Serial No. 728,538

10 Claims. (Cl. 15—180)

This invention relates to what is known in the trade as a "cup brush", particularly one designed for heavy duty with especially rigid bristles, preferably bristles of twisted wire. The present invention is particular directed to the construction of such a brush that will have few and simple parts all assembled into a firm structure not susceptible of weakness, shaking loose or breakage of parts under the most exacting conditions of heavy duty service. Further aims of the invention are an arrangement of the several sets of bristles in the brush for mutual support and rigidity and for furnishing a homogeneous distribution of the exposed working ends of the bristles.

A further object is to simplify and improve the method of construction of such a brush.

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 mechanism and methods embodying the invention, such disclosed means constituting, however, but one of various mechanical forms and methods of manufacture in which the principle of the invention may be used.

In said annexed drawing:

Fig. 1 is a view partly in section and partly in elevation of our improved brush; Fig. 2 is a perspective of the inner ring of the brush before assembly; Fig. 3 is a perspective of the outer ring as first formed; Fig. 4 is a view of the outer ring ready for assembly; Fig. 5 is an inverted cross section with elements spaced apart and bristles omitted, being a diagrammatic illustration of the assembly and assembly method.

As best seen in Fig. 1, the brush comprises an inner and an outer section, each comprising a plurality of bunches of bristles 3 and 4 fastened respectively in separate foundation rings 5 and 6, the sections being assembled in a cup-like holder which binds the entire structure together and also supports the bunches of bristles inclined toward an axial position, thus giving the brush its characteristic cup shape. The assembled brush is adapted for a conventional mounting such as that shown, consisting of two flanged discs 10 and 11 held together and on the end of a revolving shaft 12 by a nut 13, and clamping the inner ends of the cup 7 firmly between them.

The detailed construction of the brush will be readily understood from the following description which includes a recital of the steps of a preferred method of assembly. It will be understood that the details of construction and assembly herein set out, and illustrated in the drawing, are exemplary and not exclusive.

Each of the rings 5 and 6 is first formed flat, Figs. 2 and 3, each with a row of holes 15 and 16 set a suitable distance in from the outer edge. Tufts of bristles, indicated by the reference character 3 for the inner section and 4 for the outer section, and made preferably of wire of suitable weight, are looped through the holes and twisted for part of their length as shown, thus forming eyes such as 17, 18, at the inner end and leaving spread outer ends 19 and 20 respectively. In the method of construction most frequently used the bristle tufts are in the plane of their respective rings, 5 and 6, as shown in Figs. 2 and 3.

As the next steps of the preferred method of assembly, the section which is shown in flat condition in Fig. 3, is laid on a punch press or other suitable mechanism and bent to the cupped formation of Fig. 4. As a separate operation, the section which is shown in flat condition in Fig. 2, is pressed to the cupped disposition shown in Fig. 1, there being no change in shape of the ring 5, but only a displacement of the bristle tufts 3.

The final assembly of the brush, diagrammatically indicated in Fig. 5, is most conveniently accomplished by laying the cupped inner section downward (that is, inverted from the position of Fig. 1) upon an assembly die, followed by applying, successively, a spacer ring 21, the outer ring 6 with its bristles, cupped as in Fig. 4, and then finally the holding cup 7. All of these are pressed together, thus flanging the cup 7 upon the ring 5 as indicated at 22, Fig. 1. This final operation brings the outer skirt of the cup 7 close up against the loops 18 of the outer bristles 4 and the closing together of the various elements by this last operation brings the inner and outer sets of bristles into a close mutually supporting contact.

The inner and outer tufts of bristles may be staggered in assembly, the loops of one section fitting between the spaces of the loops of another and the tufts thus affording one another a degree of mutual support after the final assembly pressure has been applied. In the complete assembly, the spread ends 19 and 20 of the tufts of the respective sections may also interfit closely, resulting in a uniform effective surface 23, Fig. 1. Ends of the tufts 3 and 4 are here shown as spread, but it will be understood that this end finish is variable according to the service for

which the brush is intended and other circumstances. The tightness of the twist of the main part of the bristle tufts and the length and amount of spread of the ends vary in brushes of different design, all embodying the features of this invention, but intended for different classes of work.

Other forms and methods of construction may be employed embodying the features of our invention instead of those here explained, change being made in the form or construction, provided the elements stated by any of the following claims or the equivalent of such stated elements be employed, whether produced by our preferred method or by others embodying steps equivalent to those stated in the following claims.

We therefore particularly point out and distinctly claim as our invention:

1. A cup brush combining in combination inner and outer sets of bristles, each set being in cup-shaped disposition, an annulus of concave cross-section, said annulus including an outer rim forwardly and outwardly inclined, said annulus in its entirety constituting a support for both sets of bristles, and said rim constituting a support acting on the bristle bases to prevent the bristles from spreading into a plane transverse to the brush axis, and a pair of rings each perforated near its circumference, each ring holding by its perforations one of said sets of bristles, said concave annulus also serving to hold said rings.

2. A cup brush comprising inner and outer sections, each section comprising a perforated bristle holding element and bristles looped therethrough, the bristle holding element of the outer of said sections being cupped about the inner element, means axially spacing said elements, but leaving a central axial passage, and an assembly member clamping said holding elements in axially fixed relation and leaving a central axial passage and exteriorly engaging the bristles of the outer section.

3. A cup brush comprising inner and outer sections, each section comprising a ring perforated adjacent its circumference and bristles looped therethrough, the outer ring being cupped about the inner ring, a spacer axially spacing said rings but leaving a central axial passage, and an assembly member clamping said rings in axially fixed relation and leaving a central axial passage and exteriorly supporting the bristles of the outer ring.

4. A cup brush comprising in combination inner and outer sections, said sections each consisting of a ring, a circumferentially disposed series of paraxially-directed perforations through one of said rings and axially-directed perforations through the other, bristles looped through said perforations, said bristles being disposed upon their respective rings in a direction having a radial component and diverging from the brush axis, said rings being axially spaced, one of said rings extending beyond the other both radially and axially, and a surrounding member engaging the inner edges of both said rings and also engaging the loops of the bristles of the outer section.

5. A cup brush comprising a plurality of successively overlapping sections, each section including a support and a plurality of tufts of bristles therein, said supports each consisting of a ring with bristle-holding means disposed adjacent the outer circumference, each of said rings being of greater outside diameter than the one in front of it, the larger of said rings being cupped over the smaller, and means holding said rings in axial concentric alignment, bristles in the bristle-holding means of both sections disposed in substantially the same cup-shaped arrangement.

6. A cup brush comprising two sections one of which overlaps the other, each section including a support and a plurality of tufts of bristles therein, said supports each consisting of a ring with bristle-holding means disposed adjacent the outer circumference, said rings having the same inside diameter but differing from one another in outside diameter, the inner circumferential portion of the larger ring being parallel to and behind the smaller ring, and concentric with the smaller ring and the outer portion of the larger ring passing through the plane in which the smaller ring lies, bristles in the bristle-holding means of both sections disposed in substantially the same cup-shaped arrangement, axial spacing means between the inner circumferential portions of the two rings, and an element engaging the inner parts of both rings in both an axial and a radial direction, and engaging the bristles of the outer section.

7. A cup brush comprising a plurality of sets of bristles, inner and outer, bristle holding means, said bristles being arranged in tufts looped through said holding means, said tufts of bristles being twisted throughout their intermediate length, and splayed at their free ends, each tuft having a straight axis, the loops of said tufts being disposed in interposed engagement, the twisted portions being in staggered adjacent juxtaposition, and the splayed ends being intermingled to form a substantially uniform working surface.

8. A method of making a cup brush which comprises forming a plurality of annular sections each by fastening bristles in disk-like arrangement to an annular holder, cupping the bristles only of one of said sections, applying an annular spacer, applying the next section, cupping the annulus of said next section and its bristles, flanging and cupping a sleeve upon the inner edges of said sections and said spacer.

9. A cup brush comprising in combination two sections, each section consisting of a ring having perforations arranged within its outer edge in a pattern concentric therewith, and tufts of bristles looped at the base through said perforations, one of said rings being of greater diameter than the other, each of said tufts being inclined as a unit with respect to the axis of rotation of the brush, said rings being spaced at axial intervals along a support.

10. A cup brush comprising a plurality of sections, one following another upon a common axis, each section including bristles in cupped arrangement and an annulus upon which said bristles are secured, maintaining elements for the bristles of said sections to prevent such bristles from spreading, each of said maintaining elements including a portion surrounding the base of the bristles in the annulus next forward, and each except the last of said maintaining elements also constituting one of said bristle-carrying annuli.

FREDERIC J. BICKEL.
HARVEY J. C. OSTER, JR.

CERTIFICATE OF CORRECTION. 3

Patent No. 2,062,047. November 24, 1936.

FREDERIC J. BICKEL, ET AL.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, second column, line 1, claim 5, after the word "rings" insert except the first; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 2nd day of February, A. D. 1937.

Leslie Frazer
Acting Commissioner of Patents.

(Seal)