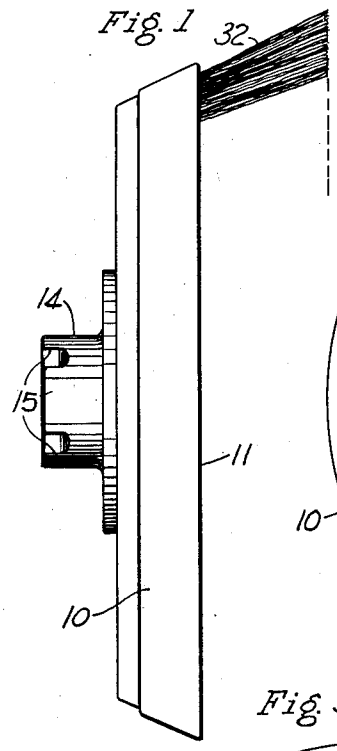
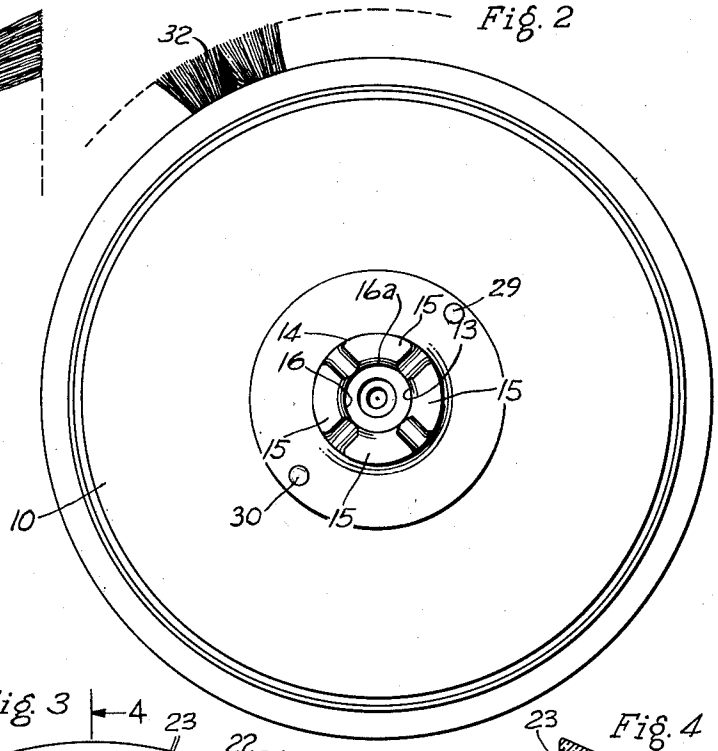
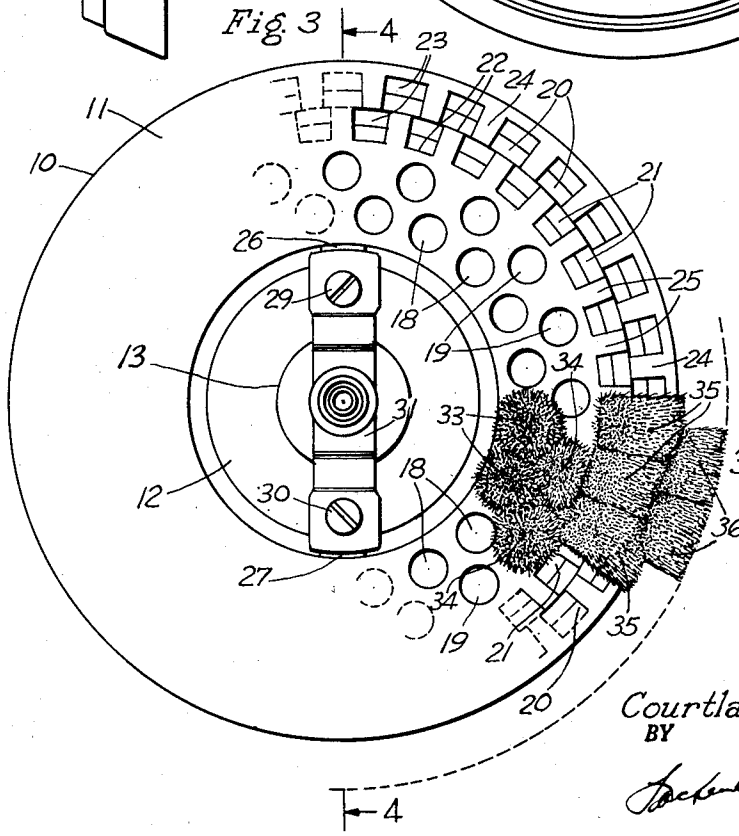
Jan. 23, 1951 C. N. SMITH, JR 2,539,211

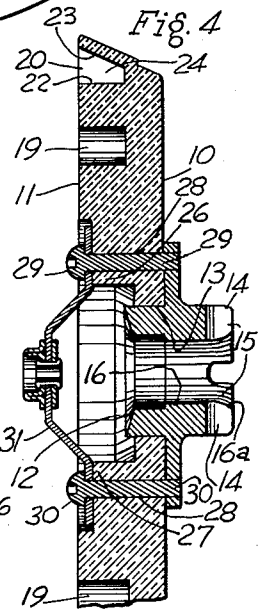
ROTARY DISK BRUSH

Filed Feb. 12, 1949









INVENTOR.

Courtland N. Smith, Jr.

BY

Lockwood & Hirschman

ATTORNEYS

Patented Jan. 23, 1951

2,539,211

UNITED STATES PATENT OFFICE

2,539,211

ROTARY DISK BRUSH

Courtland N. Smith, Jr., Glen Ridge, N. J., assignor to The Regina Corporation, Rahway, N. J., a corporation of New York

Application February 12, 1949, Serial No. 76,069

8 Claims. (Cl. 15—180)

1

The invention relates to rotary brushes for sweeping, scouring, and polishing floors and like surfaces.

The general object of the invention is to provide a new, simple, inexpensive and practical rotary brush which may be operated with a minimum of vibration and noise, which embodies an improved distribution of bristle tufts, and which is of light weight and highly resistant to water, detergents, and other common cleaning agents.

A special object is to provide a rotary brush of the class described, the base, or bristle-holding back, of which is a single casting, preferably made of injection molded ethyl cellulose or of another plastic which is of relatively light weight, highly impervious to water and detergents, and of poor sound conductivity, and having formed therein on one face a novel distribution of bristle sockets adapted to hold a plurality of tufts the ends of which are more uniformly distributed over an annular brushing surface. Poor sound conductivity is desirable for the purpose of minimizing operational noise upon incidental contact of the base and a floor, baseboard, or other object. Imperviousness to water and detergents is a manifest advantage, as it is well known in the art that wooden bases for rotary brushes of this class are highly subject to slight changes of size and shape due to absorption of cleaning agents and variations of moisture content and in consequence often become permanently warped and operate with increased vibration and noise.

A further object of the invention is to provide a brush of the class described the base of which is provided with bristle sockets arranged as a plurality of circular series having a common center, those sockets in series nearer said center being of circular cross-section and having axes normal to the plate of the base and those sockets in series farther from said center being of rectangular cross-section and having the shape of truncated wedges so that tufts of bristles held within said last named sockets, and consequently near the periphery of the brush, are so close together as to provide what is substantially an annular tuft of even bristle incidence, with those bristles nearest the center of the brush being more nearly normal to the plane of the base and those bristles farthest therefrom being less normal to said plane and extending centrifugally.

In the drawing:

Fig. 1 is a side view; Fig. 2 is a top view, and Fig. 3 is a bottom view, of the brush of the present invention, each figure being incomplete with

2

respect to the bristles. Only a few bristles are shown in each figure; but the general shape of the tuft arrangement is indicated by dotted lines; and, in Fig. 3, two or more tufts of bristles are shown in each concentric series of bristle sockets in one general angular area so that the structure of the complete brushing surface and the advantages of the novel form of socket arrangement may be fully understood. In Fig. 3, only a portion of the bristle sockets are shown, but the distribution pattern of the entire base is a repetition of the series illustrated.

Fig. 4 is a fragmentary sectional view of the base of the brush in accordance with the index 4—4 of Fig. 3. Here no bristles are shown.

The base, or bristle-holding back, of the brush is designated in its entirety 10. This member is a discoid having a plane lower surface 11 with a countersink therein at 12 which is of circular shape and concentric with the base, and having a central perforation at 13 to accommodate a hub adapted to accommodate a shaft (not shown) for rotating the brush. The base 10 is provided with a hub 14 (preferably metallic) which is castellated at 15, 15, 15, 15, to provide keyways for a suitable member mounted upon said shaft to engage and impart rotary motion to the brush. The bore 16 of the hub 14 is expanded at 16a to facilitate the entry of a shaft into said bore.

The underside of the base 10 is provided with a plurality—here, in Fig. 3, with four—of circularly disposed and concentric series of bristle sockets, the innermost and next series being of sockets of circular cross-section and axially normal to the plane of the base (i. e., to the surface 11); and the outermost and next series being of sockets of rectangular cross-section and shaped like truncated wedges, more particularly described below. See Figs. 3 and 4. Any socket of the innermost series is indexed 18; any socket of its adjacent series, 19. Sockets 18 and 19 may be of the same shape and size, and are preferably of simple cylindrical form, although a slight taper so as to expand the sockets at their mouths may be introduced for the purpose of facilitating separation of dies in injection molding operation; here, in Fig. 3, sockets 18 and 19 are shown to be arranged in staggered angular relationship to each other. Any socket of the outermost series is indexed 20; any socket of its adjacent series, 21. Sockets 18 and 19 are all of the shape of truncated wedges; but sockets 20 are preferably larger than sockets 21 to compensate for the greater centrifugal distance of

the former with respect to the latter and to insure a more uniform incidence of bristles over the peripheral brushing surface.

That surface of any socket 20 or 21 nearest to the center of the brush is designated 22 and is substantially normal to the surface 11, or general bottom of the base 10. That surface of any socket 20 or 21 farthest from the center of the brush is designated 23 and is inclined with respect to the surface 11 so that the mouth of any socket 20 or 21 is larger than the bottom thereof.

The sockets 20 and 21, each kind in its series, are separated by narrow septa so that the bristles may be as close together as desired throughout the peripheral series of tufts as a whole. Those septa between sockets 20 within the related series are designated 24, and those between the sockets 21 are designated 25. See Fig. 3.

The purpose of forming the sockets of the peripheral series substantially in the shape of truncated wedges is of course obvious (and is clearly illustrated in Fig. 3): provision is made for mounting bristle tufts so as to form a practically uniform annular brushing means. Areas of the brushing surface near the periphery of the brush having a considerably reduced incidence of bristle ends are thereby avoided. An approximation of rectangular cross-section for the sockets of the outer series is sufficient for practical purposes. It will be evident that the outer bristle sockets may be of truly rectangular cross-section and the separating septa of rhomboid cross-section; that the outer sockets may be of rhomboid cross-section and the septa of rectangular section; and that the radial surfaces of the sockets normal to surface 11 of the base may be planes and the near and distant sides of the sockets, with respect to the center of the brush, may be cylindrical. The gist of the pattern of the peripheral series is that of a closely positioned assembly of sockets of truncated-wedge-shape having substantially quadrilateral cross-section greater at the mouth than at the bottom, it being immaterial for the purposes of the present invention that the centripetal and centrifugal sides of the sockets are planar or cylindrical to accord with the discoid formation of the base 10, so that each tuft of bristles may be mounted, and also may be formed by the socket in which it is received, so as to have a roughly quadrilateral cross-section to the end that adjacent tufts are so close together as to present the appearance of a single annular tuft of uniform bristle incidence.

Fig. 3 shows, mounted on two shoulders 26 and 27 provided within the countersink at 12 within the base 10 and secured by means of two cap screws 28 and 29 a bearing structure 31 aligned with the perforation at 13. This structure, usual in the art, provides means for aligning a ferrule or the like on the bottom of a shaft provided for rotating the brush.

In Fig. 3, tufts of bristles are shown mounted in several of the sockets of the base 10. The bristles, generally are indexed 32 in Figs. 1 and 2, wherein only a few are shown. These few shown in these figures and in Fig. 3, together with the dotted margin lines of the three figures, clearly indicate the general disposition of the bristles in the aggregate with respect to the base 10. In Fig. 3, two tufts 33, 33 are shown mounted in adjacent sockets 18, 18 (obscured) of the innermost series of sockets; adjacent thereto two other tufts 34, 34 are shown mounted in adjacent sockets 19, 19 (obscured) of the next series; adjacent to these last mentioned tufts three other tufts 35, 35, 35 are shown mounted in consecutive sockets 21, 21, 21 (obscured) of the next but outermost series; and adjacent to tufts 35 two further tufts 36, 36 are shown mounted in adjacent sockets 20, 20 (obscured) of the outermost series. The nine tufts shown occupy a more or less common angular position with respect to the base 10 for the purpose of illustrating thereby the general pattern of the bristle ends at the brushing surface of the device.

It will be noted that tufts 33, 33 and 34, 34 are of the ordinary roughly circular cross-section type and are set in staggered formation in the common manner. This arrangement of tufts is satisfactory for the inner part of the brushing surface. However, near the periphery it is desirable that the high incidence of bristle ends be preserved and for this reason sockets and tufts of roughly quadrilateral cross-section are provided, and Fig. 3 shows how the incidence of bristle ends is thereby maintained in substantial uniformity over the entire annular brushing surface. This arrangement of bristle ends provides a brush having a greater sweeping, brushing and polishing efficiency than that of a brush whose bristles are arranged so as to have a decreasing incidence of ends in accordance with the radial distance from the brush center.

It will be understood that in making the base 10 by molding the same, one operation suffices to form the entire brush back with the sockets for the bristles complete in such operation, and avoids the turning and drilling operations necessary in preparing wooden brush backs. Also in a molded base of the kind described the edges of the bristle sockets are not sharp and interfere less with the operation of inserting the various tufts. In the base 10, it will be understood that a simple two-part die may be employed in injection-molding the same as the configuration of the sockets and other parts of the base are such that a simple two-part die may be separated by movement along a common axis (note that a socket 20, for example, in Fig. 4, which is generally like a socket 21, is shaped so that the male portion of a die part employed to form the socket may be withdrawn along a direction parallel to the axis of the base itself).

I claim:

1. A rotary brush having a brushing surface substantially normal to the axis of rotation of said brush, comprising a discoid base, having a plurality of concentric series of sockets therein, bristles secured within said sockets, said bristles forming a substantially planar brushing surface, one series of sockets, near the periphery of said base, being substantially quadrilateral in cross-section in a plane parallel to said brushing surface, and a second series of sockets adjacent to said first-mentioned series, also substantially quadrilateral in cross-section in a plane parallel to said brushing surface, and staggered angularly relative to said first-mentioned series.

2. A rotary brush having a brushing surface substantially normal to the axis of rotation of said brush comprising a discoid base, said base being composed of a moldable material and having a plurality of concentric series of sockets therein, bristles secured within said sockets, said bristles forming a substantially planar brushing surface, one series of sockets near the periphery of said base, being substantially quadrilateral in cross-section in a plane parallel to said brushing surface, and a second series of sockets adjacent

to said first-mentioned series, also substantially quadrilateral in cross-section in a plane parallel to said brushing surface, and separated from said first-mentioned series only by a thin wall of said moldable material.

3. A rotary brush having a brushing surface substantially normal to the axis of rotation of said brush comprising a discoid base, having a plurality of sockets therein, a series of said sockets near the peripheral edge of said base being arranged in a circle about the axis of rotation, a second series of said sockets being arranged in a smaller circle adjacent to and concentric with said first-mentioned series, the first-mentioned series of sockets having the edges at the mouths thereof which are adjacent to said second-mentioned series of sockets forming substantially straight lines and said second-mentioned series of sockets having the edges at the mouths thereof which are adjacent to said first-mentioned series of sockets forming substantially straight lines, and said last-mentioned edges being substantially parallel to said first-mentioned edges.

4. A rotary brush as claimed in claim 1 wherein said series of sockets of substantially quadrilateral cross-section are the series nearest the outer periphery of said base.

5. A rotary brush having a brushing surface substantially normal to the axis of rotation of said brush comprising a base having a plurality of sockets therein, bristles secured within said sockets, said bristles forming a substantially planar brushing surface, a series of said sockets near the peripheral edge of said base positioned in a circle, the edges at the mouths of said series of sockets forming substantially straight lines and adjacent edges of adjacent sockets of said series being substantially parallel, a second series of sockets adjacent to said first-mentioned series of sockets and positioned in a circle smaller than and concentric with said first-mentioned series of sockets, the edges of said second-mentioned series of sockets at the mouths of said second-mentioned series of sockets forming substantially straight lines, said first-mentioned series of sockets having those edges of said first-mentioned edges which are furthest from the outer peripheral edge of said brush substantially parallel to the adjacent edges of said second-mentioned series of sockets.

6. A cylindrical rotary brush as claimed in claim 5 wherein said second-mentioned series of sockets are staggered angularly relative to said first-mentioned series of sockets.

7. A rotary brush having a brushing surface substantially normal to the axis of rotation of said brush, comprising a discoid base having a plurality of sockets therein, bristles secured within said sockets, said bristles forming a substantially planar brushing surface, the sockets nearest the outer peripheral edge of said brush being substantially quadrilateral in cross-section in a plane parallel to said brushing surface and said last-mentioned sockets having the side walls nearest the outer peripheral edge of said brush disposed so that the edges of said side walls at the mouths of the said last-mentioned sockets are nearer the outer peripheral edge of said brush than the edges of said side walls at the bases of said last-mentioned sockets, and said last-mentioned sockets having the walls furthest from the peripheral edge of the brush disposed so that the edges of said last-mentioned walls at the mouth of said last-mentioned sockets are substantially the same distance from the outer peripheral edge of said brush as the edges of said last-mentioned walls at the base of said last-mentioned sockets.

8. A rotary brush as claimed in claim 7 in which the sockets adjacent to said sockets nearest the outer peripheral edge of said brush are shaped similarly to said sockets nearest the outer peripheral edge of said brush.

COURTLAND N. SMITH, JR.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,009,335	Olson	Nov. 21, 1911
1,452,307	Martin	Apr. 17, 1923
1,792,363	Dehuff	Feb. 10, 1931
1,950,379	Angell	Mar. 13, 1934
2,156,514	Sassano	May 2, 1939
2,295,687	Ponselle	Sept. 15, 1942
2,306,389	Jorgensen	Dec. 29, 1942
2,355,744	Myers	Aug. 15, 1944
2,397,471	Cox	Apr. 2, 1946
2,398,570	Wildhaber	Apr. 16, 1946