April 5, 1966 O. L. ALLEN ETAL 3,243,832

ROTARY BRUSH

Filed Nov. 15, 1963

Fig. 1

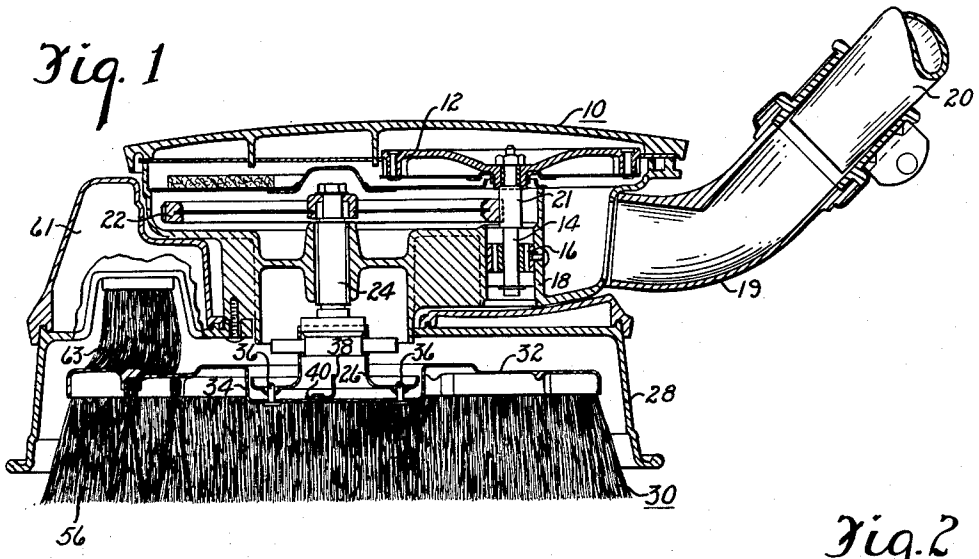
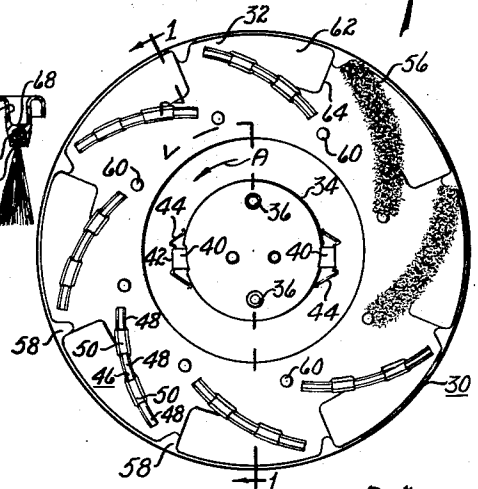


Fig. 2



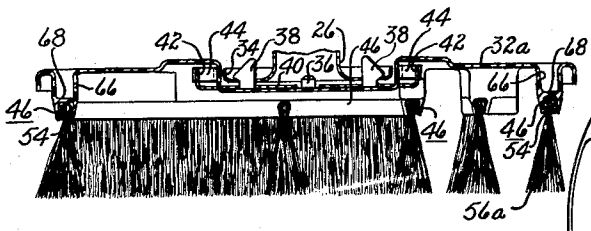


Fig. 7

Fig. 3

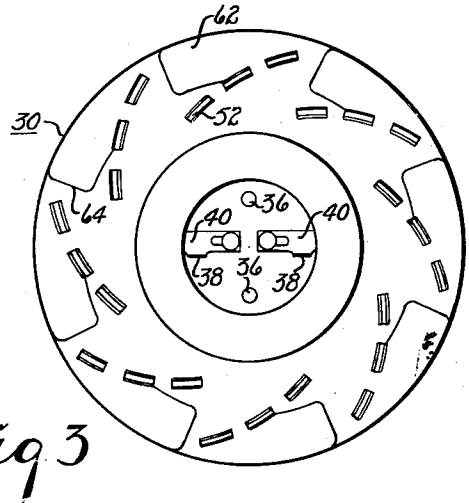


Fig. 4



Fig. 5

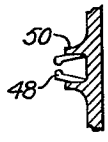
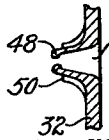


Fig. 6



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3,243,832

ROTARY BRUSH

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8 Claims. (Cl. 15—180)

Our invention relates to surface treating apparatus and more particularly to a rotary brush to be used with a floor polisher or rug scrubbing machine.

Among the objects of our invention is to provide a brush of this nature which is of lightweight construction while at the same time having ample strength.

Heretofore, such brushes have included a relatively heavy disc in which the brush bristles are mounted. This disc has customarily been made of either wood, a heavy composition material or metal. In accordance with our invention the brush back is formed of a thin walled molded plastic to which bristle strips are secured, preferably by deforming the plastic while the latter is heated and in softened condition.

Further objects and advantages of our invention will be apparent from the following description considered in connection with the accompanying drawings which form part of this specification and of which;

FIG. 1 is a cross-sectional view of a rug scrubbing brush mounted on the drive shaft of an air driven device the section through the brush being taken on the line 1—1 of FIG. 2;

FIG. 2 is a bottom view of the brush shown in FIG. 1, some of the bristle strips having been omitted;

FIG. 3 is a top view of the brush shown in FIGS. 1 and 2;

FIG. 4 is a view on an enlarged scale of a portion of the brush shown in FIG. 2;

FIG. 5 is a cross-sectional view taken on the line 5—5 of FIG. 4;

FIG. 6 is a cross-sectional view taken on the line 6—6 of FIG. 4; and

FIG. 7 is a cross-sectional view of a modified form of brush suitable for polishing floors.

Referring more particularly to FIG. 1, reference character 10 designates generally an air powered unit comprising an air turbine 12 mounted on a shaft 14 which is rotatably supported by means of a bearing 16 in a housing 18. An elbow 19 provides an outlet from the turbine and may be connected by means of a conduit 20 with a vacuum cleaner. The housing 18 is formed with air inlets directed against the blades of turbine 12 so that flow of air produced by operation of the vacuum cleaner causes the turbine to rotate. Shaft 14 carries a pinion 21 which meshes with a gear 22 mounted on a shaft 24 which is likewise journaled in the housing 18. A hub member 26 is secured to the lower end of shaft 24 which is thus driven by turbine 12, but at a reduced speed. A skirt 28 depends from housing 18.

Reference character 30 designates generally a circular brush in accordance with the present invention. This brush includes a circular disc 32 made of thin walled molded plastic. The center of the disc is formed with a depressed or cup-shaped portion 34 within which is received the hub 26 when the brush is mounted. Two pins 36 carried by the cup-shaped portion are received within recesses formed in the hub 26 so as to transmit torque from the hub to the disc. The disc is secured to the hub by a pair of latch members 38, better shown in FIG. 7, which extend upwardly from bars 40. The outer ends of these bars extend through slots formed in the wide walls of the cup-shaped portion 34 and terminate in flanges 42 which may be engaged by a finger and thumb to slide the bars inwardly, thus sliding the latches 38 inwardly through slots formed in the hub 26 to disengage the noses of the latches, thus permitting removal of the brush member from the hub. Normally the bars 40 are held in their outermost positions by means of springs 44 which hold the noses of the latches in engagement with the hub.

The lower face of the disc 32 is formed with a plurality of arcuate channels 46 formed by pairs of parallel walls which are molded integrally with the remainder of the disc. Each pair of walls is composed of several sections in which the walls are alternately closer together and farther apart. As shown each channel is made up of five such sections, and particularly as shown in FIGS. 4, 5 and 6, in the three sections 48 of each channel the walls are closer together. Also, the walls of sections 50 are shorter than those of sections 48. As is clearly shown in FIGS. 5 and 6, the walls of sections 50 are substantially parallel to each other while those of sections 48 converge towards each other. Openings 52 are formed in the disc 30 in alignment with the converging sections 48, the purpose of these openings being to permit the withdrawal of the tapered portion of the die which forms the converging wall sections. Obviously, this portion of the die must be withdrawn towards the right, as viewed in FIG. 6. The portion of the die which forms the channel of the parallel wall sections 50 may be withdrawn towards the left, as viewed in FIG. 5, and hence no opening through the disc at this point is required. The ends of the walls of sections 48 and 50 are molded integral with each other, for reasons which will appear hereinafter.

Disposed in each of the channels 46 is a bristle strip consisting of a metal back 54 from which extend bristles 56. These strips are introduced into the channels by being slid longitudinally from the inner end of each channel, there being abutments 58 molded in the disc 32 at the outer ends of the channels. These abutments limit outward movement of the bristle strips and assure that they will not be moved further under the action of centrifugal force when the brush is in operation. Smaller abutments 60 are formed in the disc 32 adjacent the inner ends of the channels, their purpose being to resist any tendency of the bristles to be moved inwardly as a result of the drag of the bristles against the floor when the brush is rotated in the direction of the arrow A, in FIG. 2.

After the bristle strips have been inserted in the channels the wall sections 48 are heated sufficiently to soften the plastic material and these sections are forced inwardly against the metal strips, which process is termed hot staking. By dividing the walls forming the channels into the several sections, it is assured that each bristle strip will be tightly clamped by the walls of sections 48 with at least 3 points on each side of the strip, whereas if uninterrupted walls were employed each strip might be clamped at only one point on each side. The provision of the shorter and farther apart wall sections 50 integral with the wall sections 48 adds strength to the latter sections and reinforces them against deformation caused by forces produced during operation of the device.

The length of bristles 56 is such that they extend below the edge of skirt 28 so as to contact the rug for the purpose of scrubbing the latter.

As is shown in copending application Serial No. 199,407 filed June 1, 1962, now Patent No. 3,121,896 issued Feb. 25, 1964, space 61 in housing 18 constitutes a reservoir for rug shampoo and a valved opening is provided for discharging the liquid shampoo onto the upper surface of the disc 32. A stationary brush 63 is carried by

the casing 18 and frictionally engages the upper surface of the disc. As is shown and explained in the above-identified application, it is desirable to provide this face of the disc with a series of inclined surfaces, designated by reference character 62 in FIG. 3 which terminate at their raised ends in abrupt shoulders 64. Inasmuch as these surfaces are molded in the thin walled disc 32, it is preferable that they not be located directly opposite the channels 46. As is shown in both FIGS. 2 and 3 an inclined surface is disposed between each channel and the periphery of the disc.

During operation, the interaction of the brush 63 and the stepped upper surface of disc 32 causes the liquid shampoo to be converted into foam in the space above the disc, from where the foam flows down to the rug through the annular space between the skirt 28 and the bristles 56.

The brush shown in FIG. 7 is similar to that previously described, except that it is intended for polishing floors. For this purpose stiffer bristles are desirable and this stiffness is obtained, in part at least, by making the bristles 56*a* shorter than bristles 56 in the first embodiment. In order that these shorter bristles will extend beyond the lower edge of skirt 28 when the brush is mounted on the hub 26, it is necessary that the disc 32*a* in FIG. 7 have a greater effective thickness than the disc 32 in FIG. 1. This is accomplished by molding the disc 32*a* with a plurality of downwardly extending arcuate hollow ribs 66. The parallel walls forming the channels 46 extend downwardly from the lower surfaces 68 of these ribs.

Consequently, the channels 46 which receive the brush strips are below the main portion of disc 32*a* by a distance equal to the depth of the ribs 66 and therefore the shorter bristles 56*a* are able to extend below the edge of skirt 28. This increase in the effective thickness of the disc is accomplished without materially increasing its weight.

While we have shown and described two more or less specific embodiments of our invention it is to be understood that this has been done for the purpose of illustration only and the scope of our invention is not to be limited thereby, but is to be determined from the appended claims.

What we claim is:

1. In a floor polisher brush, a circular disc of molded plastic having a relatively thin wall section, a plurality of channels formed on one face of said disc by pairs of continuous parallel walls integral with said disc and extending outwardly from said face, the walls of each pair having sections which are alternately closer together and farther apart, and strips of bristles including elongated metal backs received in said channels and clamped between the wall sections which are closer together, the wall sections which are farther apart being integral with the adjacent sections which are closer together in order that the former will resist spreading apart of the latter to thereby increase the clamping of the latter against the metal back of said strip.

2. In a floor polisher brush, a circular disc of molded plastic adapted for rotation about a central vertical axis and having a relatively thin thickness dimension, a plurality of channels each defined by a pair of opposing spaced-apart continuous walls formed on one face of said disc integral with said one face and extending outwardly therefrom, each wall of said pair having a plurality of integral wall sections arranged in series, the height of the wall sections of said series being alternately higher and lower with the higher and lower wall sections of one of the walls of each channel being disposed opposite to the higher and lower wall sections, respectively, of the other wall of the channel, said oppositely disposed higher wall sections of each channel being closer to each other than are said oppositely disposed lower wall sections of the same channel, and a plurality of strips of bristles, each strip having an elongated metal back which is received in a different one of said channels and clamped between all of the oppositely disposed higher wall sections, said lower wall sections resisting the tendency of the oppositely disposed higher wall sections to spread apart as said bristles on the rotating disc contact the floor.

3. In a floor polisher brush, a circular disc of molded plastic adapted for rotation about a central vertical axis and having a relatively thin thickness dimension, a plurality of channels each defined by a pair of opposing spaced-apart continuous walls formed on one face of said disc integral with said one face and extending outwardly therefrom, each wall of said pair having a plurality of integral wall sections arranged in series, the height of the wall sections of said series being alternately higher and lower with the higher and lower wall sections of one of the walls of each channel being disposed opposite to the higher and lower wall sections, respectively, of the other wall of the channel, said oppositely disposed higher wall sections of each channel being closer to each other than are said oppositely disposed lower wall sections of the same channel, said higher and closer oppositely disposed wall sections converging toward each other as they recede from said one face of the disc, and a plurality of strips of bristles, each strip having an elongated metal back which is received in a different one of said channels and clamped between all of the oppositely disposed converging higher wall sections, said lower wall sections resisting the tendency of the oppositely disposed converging higher wall sections to spread apart as said bristles on the rotating disc contact the floor.

4. In a floor polisher brush, a circular disc of molded plastic adapted for rotation about a central vertical axis and having a relatively thin thickness dimension, a plurality of channels each defined by a pair of opposing spaced-apart continuous walls formed on one face of said disc integral with said one face and extending outwardly therefrom, each wall of said pair having a plurality of integral wall sections arranged in series, the height of the wall sections of said series being alternately higher and lower with the higher and lower wall sections of one of the walls of each channel being disposed opposite to the higher and lower wall sections, respectively, of the other wall of the channel, said oppositely disposed higher wall sections of each channel being closer to each other than are said oppositely disposed lower wall sections of the same channel, said higher and closer oppositely disposed wall sections converging toward each other as they recede from said one face of the disc, said disc being formed with openings therethrough at the bottoms of said channels between said oppositely disposed converging higher wall sections and defining in said disc separate floor sections between each of the oppositely disposed lower wall sections, and a plurality of strips of bristles, each strip having an elongated metal back which is received in a different one of said channels and clamped between all of the oppositely disposed converging higher wall sections, said lower wall sections together with said floor sections therebetween resisting the tendency of the oppositely disposed converging higher wall sections to spread apart as said bristles on the rotating disc contact the floor.

5. In a floor polisher brush, a circular disc of molded plastic adapted for rotation about a central vertical axis and having a relatively thin thickness dimension, said disc having a plurality of hollow ribs formed on one face of said disc and integral with said disc, said ribs extending outwardly from said one face and terminating in a crest, a plurality of channels each defined by a pair of opposing spaced-apart continuous walls formed on said one face, each pair of walls being integral with a different one of said ribs and extending further outwardly from the crest of said rib, each wall of said pair having a plurality of integral wall sections arranged in series, the height of the wall sections of said series being alter-

nately higher and lower with the higher and lower wall sections of one of the walls of each channel being disposed opposite to the higher and lower wall sections, respectively, of the other wall of the channel, said oppositely disposed higher wall sections of each channel being closer to each other than are said oppositely disposed lower wall sections of the same channel, and a plurality of strips of bristles, each strip having an elongated metal back which is received in a different one of said channels and clamped between all of the oppositely disposed higher wall sections, said lower wall sections resisting the tendency of the oppositely disposed higher wall sections to spread apart as said bristles on the rotating disc contact the floor.

6. In a floor polisher brush, a circular disc of molded plastic adapted for rotation about a central vertical axis and having a relatively thin thickness dimension, a plurality of channels each defined by a pair of opposing spaced-apart continuous walls formed on one face of said disc integral with said one face and extending outwardly therefrom, each wall of said pair having a plurality of integral wall sections arranged in series, the height of the wall sections of said series being alternately higher and lower with the higher and lower wall sections of one of the walls of each channel being dsiposed opposite to the higher and lower wall sections, respectively, of the other wall of the channel, said oppositely disposed higher wall sections of each channel being closer to each other than are said oppositely disposed lower wall sections of the same channel, a plurality of strips of bristles, each strip having an elongated metal back which is received in a different one of said channels and clamped between all of the oppositely disposed higher wall sections, said lower wall sections resisting the tendency of the oppositely disposed higher wall sections to spread apart as said bristles on the rotating disc contact the floor, and a plurality of pairs of projections integrally formed in said one face of the disc, each pair of said projections being located at opposing ends of a different channel to restrain lengthwise displacement of the strips of bristles clamped in said channel.

7. In a floor polisher brush, a circular disc of molded plastic adapted for rotation about a central vertical axis and having a relatively thin thickness dimension, a plurality of channels each defined by a pair of opposing spaced-apart continuous walls formed on one face of said disc integral with said one face and extending outwardly therefrom, each wall of said pair having a plurality of integral wall sections arranged in series, the height of the wall sections of said series being alternately higher and lower with the higher and lower wall sections of one of the walls of each channel being disposed opposite to the higher and lower wall sections, respectively, of the other wall of the channel, said oppositely disposed higher wall sections of each channel being closer to each other than are said oppositely disposed lower wall sections of the same channel, said one face of the disc having a plurality of inclined depressions formed therein

at locations other than at the locations of said channels on said one face, each said inclined depression on said one face forming a raised inclined surface on the opposite face of said disc, and a plurality of strips of bristles, each strip having an elongated metal back which is received in a different one of said channels and clamped between all of the oppositely disposed higher wall sections, said wall sections resisting the tendency of the oppositely disposed higher wall sections to spread apart as said bristles on the rotating disc contact the floor.

8. In a floor polisher brush, a circular disc of molded plastic adapted for rotation about a central vertical axis and having a relatively thin thickness dimension, said disc having a plurality of hollow ribs formed on one face of said disc and integral with said disc, a plurality of channels each defined by a pair of opposing spaced-apart continuous walls formed on said one face, each pair of walls being integral with a different one of said ribs and extending outwardly from the crest of said rib, each wall of said pair having a plurality of integral wall sections arranged in series, the height of the wall sections of said series being alternately higher and lower with the higher and lower wall sections of one of the walls of each channel being disposed opposite to the higher and lower wall sections, respectively, of the other wall of the channel, said oppositely disposed higher wall sections of each channel being closer to each other than are said oppositely disposed lower wall sections of the same channel, said one face of the disc having a plurality of inclined depressions formed therein at locations other than at the locations of said hollow ribs and channels thereon, each said inclined depression on said one face forming a raised inclined surface on the opposite face of said disc, and a plurality of strips of bristles, each strip having an elongated metal back which is received in a different one of said channels and clamped between all of the oppositely disposed higher wall sections, said lower wall sections resisting the tendency of the oppositely disposed higher wall sections to spread apart as said bristles on the rotating disc contact the floor.

References Cited by the Examiner

UNITED STATES PATENTS

2,242,577	5/1941	Finnell	15—180
2,605,490	10/1948	Dolan	15—180
2,820,235	5/1954	Nelson	15—181
2,921,329	9/1955	Peterson	15—183 X
2,967,314	1/1961	Kowalewski	15—28
3,013,288	12/1961	Lappin	15—50
3,019,465	2/1962	Bayless	15—49 X
3,121,896	2/1964	Allen et al.	15—50

FOREIGN PATENTS

493,141	5/1950	Belgium.
708,183	4/1954	Great Britain.
818,804	8/1959	Great Britain.

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