

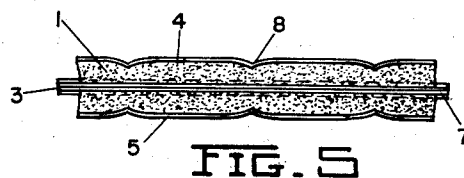
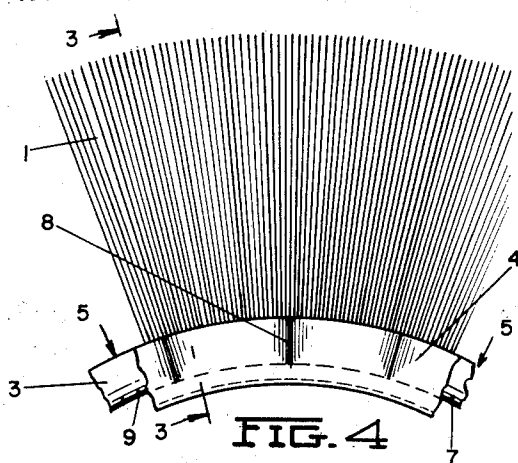
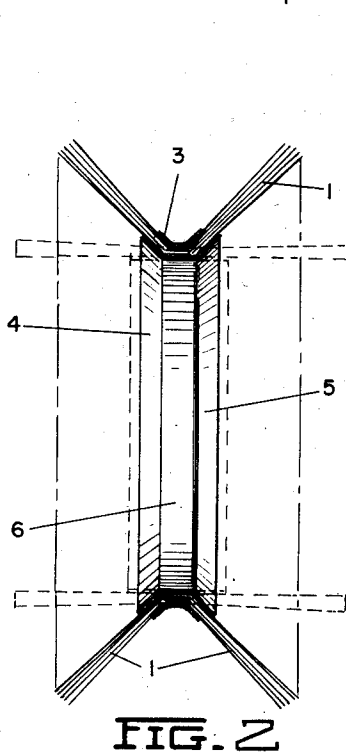
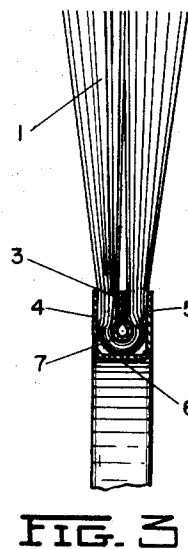
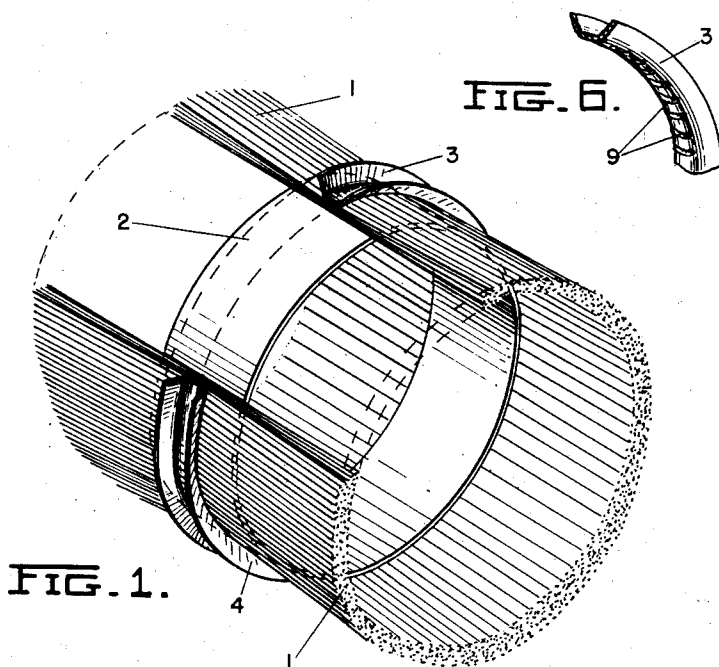
June 30, 1942.

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ROTARY BRUSH SECTION

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2 Sheets-Sheet 1



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2 Sheets-Sheet 2

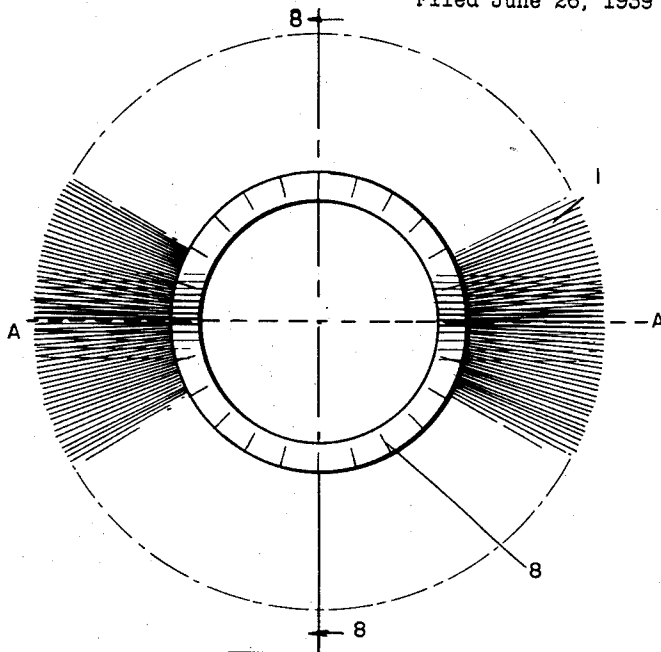


FIG. 7.

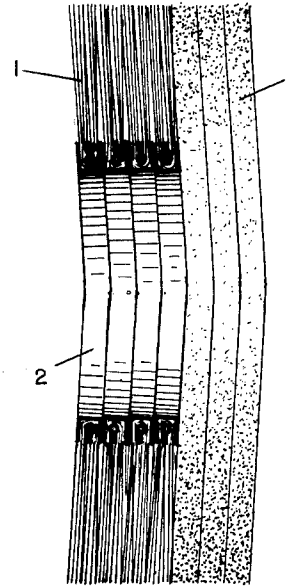


FIG. 8.

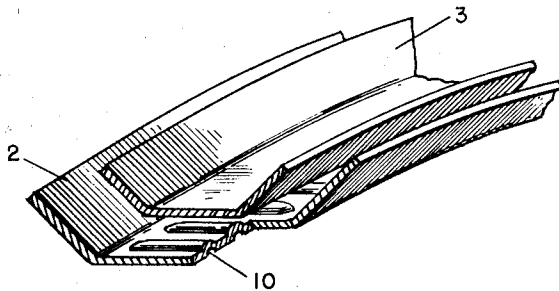


FIG. 9.

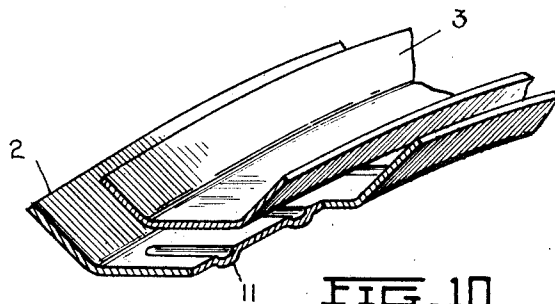


FIG. 10.

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ROTARY BRUSH SECTION

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14 Claims. (Cl. 300—21)

This invention relates, as indicated, to rotary brush sections and more particularly to a new and improved section so formed that the bristles, or other brush materials, are much more tightly held, and hence, longer retained in the brush.

Rotary brush sections have long been made in which the brush material is held in an annular brush-back of U-shaped cross-section by means of a retaining ring either stamped or formed of wire. With all such sections, difficulty has been experienced under severe usage. The brush materials have proved to be insecurely held, resulting in too rapid deterioration of the brush due to shedding.

It is, therefore, a primary object of this invention to provide a rotary brush section in which the brush materials are held securely enough to prevent loss of said brush materials under severe usage.

Further objects are to provide a rotary brush section of improved mechanical construction which will withstand high operating speeds; one that may be employed for longer periods of time due to longer retention of brush material; one which has improved radial distribution of the brush material; and one of such simple construction as to be adaptable to various application requirements.

Still another object is to provide rotary brush sections which, when assembled on a mandrel to form a brush, will not cause streaking on the work.

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

To the accomplishment of the foregoing and related ends, said invention, then, consists of the means and elements hereinafter fully described and particularly pointed out in the claims.

Fig. 1 is a perspective view of the first stage in the assembly of my new brush section with a portion of the outer ring, hereafter referred to as the "retaining ring," and brush material cut away to show the inner ring, hereafter referred to as the "brush-back."

Fig. 2 is a transverse cross-sectional view of the brush section in an intermediate stage of its manufacture;

Fig. 3 is a transverse cross-sectional view of a portion of the completed brush section taken along the line 3—3 on Fig. 4;

Fig. 4 is a side elevational view of a portion of the completed brush section;

Fig. 5 is a cross-sectional view taken along the line 5—5 on Fig. 4;

Fig. 6 shows a portion of the retaining ring with indentations on its inner surface;

Fig. 7 is a side elevational view of a brush section bent along a diameter causing the two halves of the section to lie in slightly different planes;

Fig. 8 is an edgewise view of a number of such brush sections assembled, a portion of such assembly being shown in cross-section along the line 8—8 on Fig. 7;

Fig. 9 is a fragmentary view of the brush-back and retaining ring in the second stage of manufacture of the brush section, the brush material being omitted to show the manner in which the inner periphery of the brush-back may be indented; and

Fig. 10 is a fragmentary view similar to Fig. 9, but showing indentations in the outer surface of the inner ring or brush-back.

The chief aspect of this invention comprises a new method and means for securing brush material in a rotary brush section comprising placing brush material between a brush-back and a retaining ring and deforming one or both such members to lessen the difference between their respective diameters and optionally deforming said rings in other ways to obtain other desired effects. More particularly, this invention contemplates shrinking the inner diameter of said retaining ring by compressing its sides to form a thinner U-shaped cross-section. This and other aspects of the invention are described below.

Referring now more specifically to the drawings and especially to Figs. 1 and 2, brush material 1 is placed about a sheet-metal brush-back 2 and a sheet-metal retaining ring 3 of substantially U-shaped cross-section is slipped over the brush material so as to encircle the material and hold it between itself and said brush-back. The edges of said brush-back 2 are then outwardly flared so as to form side walls 4 and 5, as shown in Fig. 2, the brush material being bent up from the position indicated by the dotted lines. A flat or curved base, as desired, may be formed on the brush-back 6 as a result of further compression of the brush section from the intermediate stage (Fig. 2) to the final state (Fig. 3). During this same period of compression, the retaining ring 3 is further formed to a smoothly rounded surface 7 along its inner periphery, and at the same time, an active pressure is exerted on the brush material due to a contracting or shrinking of the inner diameter of the retaining ring as a result of said forming.

During the foregoing forming operation, to which the brush-back and retaining ring are subjected, and particularly during such final period of compression, the brush-back 2 will be solidly supported upon a suitable mandrel (not shown), whereby its internal diameter is retained substantially unchanged and radially inward pressure produced by the shrinking of the inner diameter of the retaining ring 3 is resisted.

It has been found that by using methods described herein, the inner diameter of a ring originally $5\frac{3}{4}$ inches in diameter can be shrunk as much as $\frac{1}{8}$ of an inch. With the brush material in place, varying amounts of shrinkage will be obtained according to the compressibility of the brush materials used; also the size, form, nature, etc. of the ring causes variation in the degree of shrinkage obtainable. In a $5\frac{1}{4}$ " I. D. brush section filled with Tampico fiber, a shrinkage of $\frac{1}{8}$ of an inch of the retaining ring was observed and found to be satisfactory. This contraction serves to provide a securing pressure on the brush material sufficient to give a substantial increase in brush performance as shown by test results given below.

If desired, an adhesive material such as one of the synthetic resins may be employed to further secure the brush material and to inhibit rot in certain types of material.

To ensure that the brush material does not move circumferentially within the brush section, as well as to reinforce the sides of the brush-back 4 and 5, it may be desirable, in some cases, to impress indentations 8 in the sides of the brush-back. Indentations 10 may also be applied to the central part of the ring 2 in such a position that they will be located on the inner surface 6 of the brush-back in its completed form. Similarly, in some cases, indentations 9, notches, or perforations may be formed in the retaining ring 3 to help guide and to further secure some types of brush material in its desired position. Indentations 8, 9 and 10 also guide the brush material into a more radial position in the final brush form.

The rounded inner surface 7 which is formed on the retaining ring 3, eliminates the sharp corners found in the usual flat stamped rings employed in some rotary brush sections of the prior art and prevents damage to the brush material which would ordinarily be caused by sharp cutting edges.

An additional clamping effect may be obtained by expanding the brush-back so as to hold the brush material yet more tightly, such expansion being obtained by making indentations 10 (Fig. 9) in said brush-back, usually at the stage of manufacture shown in said figure. In brushes employing other types of retaining rings, the stated deformation of the brush-back may of itself be sufficient to greatly improve the bristle-retentive power of the brush. It will be seen that such deformation reduces the space between the two rings by causing protuberances on the outer surface of said inner ring and hence, reducing the space available for the brush material.

As shown in Fig. 10, indentations 11 may also be formed in the outer surface of the inner ring or brush-back 2 causing an embossed effect on the inner surface of such ring. Then, with the brush material in place, said embossed portions may be reshaped or flattened to expand the

inner ring and firmly secure the brush material.

When brushes are built up of rotary sections, such as those of this invention, there are generally slight differences in bristle density at points along the brush, such differences causing "streaking" on the object being brushed. This difficulty may be obviated by bending each section along a diameter such as A—A, as shown in Figs. 7 and 8, so that the two halves of the section lie in slightly different planes. As a result, somewhat the same effect is obtained as in a spirally wound brush, since the dividing lines between the sections no longer lie directly transversely of the brush.

As employed in the specification and claims, the term "U-shaped cross-section" is intended to indicate a concave curvature which may vary greatly in degree, including that in which the two walls are in contact. Furthermore, it will be understood that the principle of the invention is applicable to brush sections holding other materials than bristles, such as buffing cloth and the like, and hence, the terms "bristles" and "brush material," as employed in the claims, are intended to include all such materials adapted to be used in the rotary sections of this invention. The size and shape of the indentations 8, 9 and 10 may also be greatly varied or they may be omitted entirely if their additional strengthening and holding effect is not required.

Using brushes of the same type of material tested under comparable conditions, it was found that a brush section constructed in accordance with my invention gave satisfactory performance from twice to several times as long as all other available comparable types of brushes. Thus, an improved economy of use is made of the given materials.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the structure 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 an annular brush section the combination of a sheet metal brush-back of U-shaped cross-section, brush material, and a retaining ring comprising a metal band of substantially U-shaped cross-section, the inner periphery of which bears indentations.

2. In an annular rotary brush section, the combination of an annular brush back of U-shaped cross-section, an annular retaining ring comprising a metal band of substantially U-shaped cross-section, and brush material held therebetween.

3. In a rotary brush section, the combination of an annular brush-back of U-shaped cross-section having indented side walls, bristles in said back, and an annular retaining ring operative to hold said bristles tightly in said brushback, said retaining ring comprising a metal band of substantially U-shaped cross-section bearing indentations on its inner periphery.

4. The method of securing brush material in a rotary brush section comprising placing such material between an inner and an outer ring and lessening the inner diameter of said outer ring by forming it to a U-shaped cross-section and compressing the sides of said U.

5. The method of constructing a rotary brush section comprising placing bristles transversely

of the exterior surface of a flat ring, slipping a retaining ring of substantially U-shaped cross-section over said bristles and thereby encircling said flat ring, flanging up the edges of said flat ring and compressing the sides of said retaining ring.

6. The method of constructing a rotary brush section comprising placing bristles transversely of the exterior surface of a flat ring, slipping a retaining ring of U-shaped cross-section over said bristles and thereby encircling said flat ring, flanging up the edges of said flat ring and thereby compressing the sides of said retaining ring.

7. The method of constructing a rotary brush section comprising placing bristles transversely of the exterior surface of a flat ring, slipping a retaining ring of U-shaped cross-section over said bristles and thereby encircling said flat ring, flanging up the edges of said flat ring and thereby compressing the sides of said retaining ring, but retaining at flat seat on said flat ring.

8. The method of constructing a rotary brush section comprising placing bristles transversely of the exterior surface of a flat ring, slipping a retaining ring of U-shaped cross-section over said bristles and thereby encircling said flat ring, flanging up the edges of said flat ring and thereby compressing the sides of said retaining ring until they contact.

9. The method of securing brush material in an annular rotary brush section comprising placing such material between an inner and an outer ring and expanding the diameter of said inner ring.

10. The method of securing brush material in a rotary brush section comprising placing such material between an inner and an outer ring and

reducing the space therebetween available for such brush material by forming indentations in the inner periphery of said inner ring, said indentations causing protuberances on the outer surface of said ring.

11. The method of securing brush material in a rotary brush section comprising placing such material between an inner and an outer ring and expanding said inner ring by reshaping previously formed embossed portions located along the inner circumference of said inner ring.

12. In an annular rotary brush section, the combination of an annular brush-back of substantially U-shaped cross-section with the sides of such back extending radially outward, brush material in said brush-back, and an annular retaining ring of metal sheet material, having portions thereof parallel to said radially extending sides, operative to engage said brush material with its inner periphery and thereby tightly clamp said material against said brush-back.

13. A cylindrical rotary brush comprising a plurality of annular brush sections having annular backs with brushing material extending substantially radially therefrom, said sections being slightly bent along a diameter and closely assembled in interlocking engagement with the brushing material of said sections in close lateral contact to present a continuous brushing surface.

14. The method of securing brush material about a central annular support having flanges defining a channel which comprises placing such brush material between such support and a radially outer channelled ring of sheet metal and then shrinking such outer ring.

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