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C. G. ROWLAND

2,754,531

ROTARY BRUSH

Filed June 14, 1950

Fig. 2.

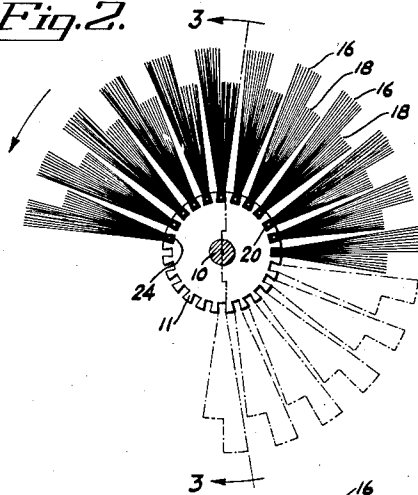


Fig. 1.

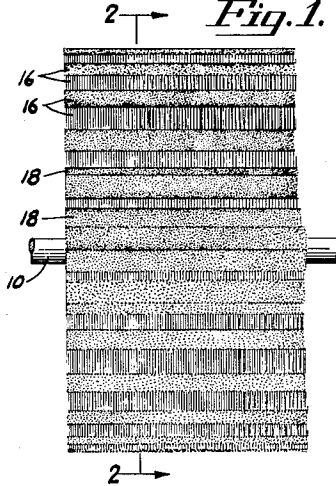


Fig. 3.

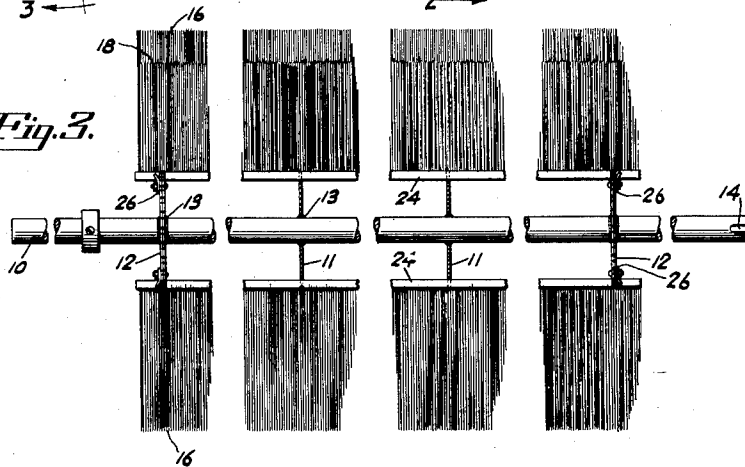


Fig. 4.

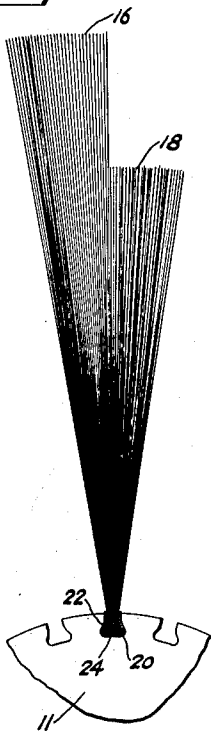


Fig. 5.

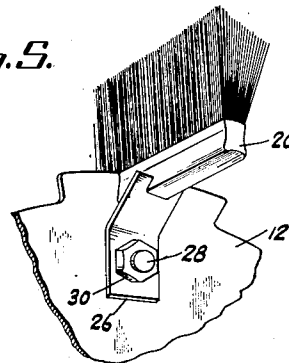
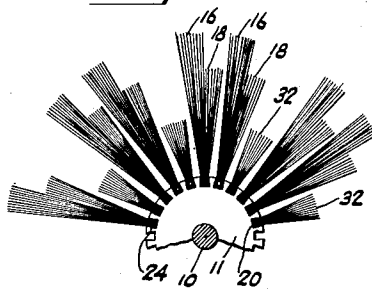


Fig. 6.



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2,754,531

ROTARY BRUSH

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4 Claims. (Cl. 15—183)

The invention relates to a rotary brush which is particularly adapted for use on or as a part of a machine for washing automobiles or other vehicles, but the invention is not necessarily so limited. The invention may be advantageously embodied in a brush of the cylindrical type.

A rotary brush for the general purpose stated must have long readily yieldable fibers, partly to avoid scratching the finish of the automobile or other vehicle and partly to enable the brush to conform to and properly engage the different surfaces to be washed. It will be apparent, for instance, that a brush used to wash the side of an automobile must yield to permit the passage of door handles and other projections and must also enter depressions, such as those at windows. In order to be sufficiently yieldable the fibers cannot be closely compacted and spaces must be provided either between individual fibers or at least between groups or layers of fibers.

Fibers sufficiently long to yield, as described, are necessarily very flexible and, in the absence of special provision, the fibers would flex to such an extent as to seriously reduce the washing effectiveness of the brush. In order to provide the desired spacing of the fibers which are primarily effective and in order to properly support the said fibers, a peculiar fiber arrangement or grouping is provided. The fibers are arranged in layers with the fibers in some of the layers extending beyond the rotary supporting or core structure to smaller extents than the fibers in other layers.

The layers of shorter fibers are immediately adjacent the layers of longer fibers, the layers of shorter and longer fibers advantageously being arranged alternately. The fibers in the longer layers are primarily directly effective for engaging the surfaces to be washed, but the fibers in the shorter layers may also directly engage some of the surfaces. The layers of shorter fibers, particularly when arranged alternately with the layers of longer fibers, serve to space the said layers of longer fibers and also serve to support the said layers of longer fibers to give them an effective stiffness which they would not otherwise have.

The general object of the invention is to provide a brush, more particularly a cylindrical brush, having layers of shorter and longer fibers for the purpose which has been stated.

Other objects of the invention will be apparent from the drawing and from the following description and claims.

The drawing shows two embodiments of the invention, but it will be understood that various changes may be made from the constructions shown, and that the drawing is not to be construed as defining or limiting the scope of the invention, the claims forming a part of this specification being relied upon for that purpose.

Of the drawing:

Fig. 1 is a fragmentary side view of a brush embodying the invention.

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Fig. 2 is a transverse sectional view taken along the line 2—2 of Fig. 1.

Fig. 3 is a longitudinal sectional view, the section being taken along the line 3—3 of Fig. 2 and showing only two brush strips.

Fig. 4 is an enlarged transverse sectional view of one brush strip, this view also showing a fragment of one supporting disc.

Fig. 5 is a fragmentary perspective view of one of the brush strip clamping devices.

Fig. 6 is a view similar to Fig. 2 but showing an alternative embodiment of the invention.

A brush embodying the invention is rotatable about a central axis. A generally cylindrical brush has various advantages and such a brush is illustrated in the drawing, but the invention is not necessarily so limited.

The generally cylindrical shape of the brush is shown in Figs. 1 and 2. The brush has a main supporting structure, and for a cylindrical brush the rotatable supporting structure is designated as a core structure. As concerns the broader aspects of the invention, the core structure can be widely varied but it may advantageously be constructed as shown in Figs. 2 and 3. A central longitudinal shaft 10 is provided, the shaft carrying several radially disposed longitudinally spaced discs 11, 11 and 12, 12. The discs are secured to the shaft in any suitable manner, as for instance by welding as indicated at 13, 13. The ends of the shaft project beyond the brush proper and are adapted to be supported in suitable bearings on the machine with which the brush is to be used. As shown, the shaft is provided with a slot 14 at one end for engaging a suitable element on the machine to be rotated thereby.

Carried by the core structure are circumferentially or circumaxially distributed layers of brush fibers, the layers being in uniform relation to the axis of rotation and projecting substantially perpendicularly from the supporting or core structure. When the brush is of the cylindrical type, the layers of brush fibers extend longitudinally and project substantially radially. The term "fibers" is herein used in a generic sense and is intended to include vegetable fibers or synthetic fibers or any other filaments or brush material suitable for the intended purpose.

The outer ends of the fibers in all of a plurality of equally spaced layers 16, 16 are in a surface of revolution concentric with the axis of rotation, and as shown the outer ends of the said fibers are at a common uniform distance from the supporting or core structure or from the axis of rotation and the outer ends of the fibers in other layers are at a substantially smaller common uniform distance from the supporting or core structure or from the axis of rotation. An equal plurality of equally spaced layers 18, 18 is provided, each of the last said layers being between two immediately adjacent layers 16, 16. The outer ends of the fibers in all of the second said layers 18, 18 are spaced inwardly and to a substantial extent from the said surface of revolution. The longer layers 16, 16 and the shorter layers 18, 18 are arranged alternately. The alternately disposed fiber layers 16, 16 and 18, 18 are immediately adjacent each other, being in contact or approximately in contact. As shown, the several layers 16, 16 and 18, 18 are arranged in pairs with the two layers of each pair in actual contact. Very small spaces are shown between the layers of each pair and the layers of the next adjacent pairs.

The brush is rotatable in a selected direction, as for instance in the counterclockwise direction indicated by the arrow in Fig. 2. When the brush is rotatable as stated, some of the fibers at the leading side of each shorter fiber layer 18 are approximately in contact with some of the fibers at the trailing side of the adjacent

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longer layer 16. Thus the fibers in each shorter layer 18 support the fibers in the adjacent longer layer 16.

The fibers of the brush are preferably arranged in brush strips which are detachably connected with the supporting or core structure. When the brush is of the cylindrical type, the brush strips extend generally longitudinally in parallelism with the axis and are circumferentially or circumaxially spaced. Each individual strip may be provided with one of the longer layers 16 and also with one of the shorter layers 18. The strips are so positioned that the longer and shorter layers are arranged alternately, which layers constitute one of the before-mentioned pairs.

Each brush strip may advantageously be of the type shown in detail in Fig. 4. The strip comprises an elongated channel-shaped metallic holder 20 having a wider portion near the rear, and the strip also comprises fibers 22 looped within the holder which fibers extend around a longitudinal retaining wire 24. The looped fibers 22 provide the two separate fiber layers 16 and 18, the fibers in the layer 16 being relatively long with their outer ends at a uniform distance from the holder and the fibers in the layer 18 being relatively short with their outer ends at a substantially smaller distance from the holder.

When the core structure includes discs such as 12, 12, the said discs are provided with circumferentially spaced notches which are shaped to receive and fit the holders 20 of the several brush strips. The notches in the several discs are in longitudinal alignment and the holder of each brush strip can be moved longitudinally into or out of the corresponding notches. Inasmuch as the notches fit the holders, the brush strips are firmly held in their proper positions with the fiber layers substantially radial.

Suitable means are provided for preventing longitudinal movement of the brush strips with respect to the core structure. While the invention is not so limited, each brush strip may be held by two clamping clips 26, 26, as shown in Fig. 3, and as more clearly shown in Fig. 5. Each clip 26 has a notch in which the holder of the corresponding strip is entered and each clip has a hole for receiving a stud 28 carried by the corresponding disc 12. A nut 30 is threaded on each stud 28 and when the nut is tightened, the clip 26 is forced into clamping engagement with the holder of the corresponding strip. When a brush strip is to be removed the clamping clips therefor are loosened by backing off the corresponding nuts.

Under some circumstances it may be desirable to provide a brush having layers of fibers with their outer ends at three different distances from the supporting or core structure or from the axis of rotation. Such a brush is shown in Fig. 6, and the construction is or may be similar to that shown in Figs. 1 to 5. The brush shown in Fig. 6 has brush strips similar to those previously described and having fiber layers 16, 16 and 18, 18. Interposed between some of the said brush strips are other brush strips having fiber layers 32, 32 substantially shorter than the layers 16, 16, that is, the outer ends of the fibers in the layers 32, 32 are at a uniform distance from the supporting or core structure or from the axis of rotation which is substantially smaller than the corresponding distance of the outer ends of the fibers in the layers 16, 16. The strips provided with the layers 32, 32 may be otherwise similar to the first said strips and they may be similarly connected with the core structure. Preferably the several strips are positioned, as shown, with the first said strips in pairs and with the second said strips between adjacent pairs.

In use the brush as shown in Figs. 1 to 5 is rotated, preferably in the counterclockwise direction as indicated, and the ends of at least some of the fibers engage all the immediately adjacent surfaces of the automobile or other vehicle to be washed. The longer flexible fibers in the layers 16, 16 yield to pass over projecting portions but they have substantially endwise engagement with surfaces

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within depressions, as for instance at windows. The said longer fibers in the layers 16, 16 flex to also engage other surfaces. The shorter fibers in the layers 18, 18 serve to circumferentially space the layers of the longer fibers and they also serve at all times to partly support the said longer fibers.

The alternative brush shown in Fig. 6 is particularly useful when the innermost surfaces to be washed are relatively widely spaced inwardly from the outermost surfaces to be washed. The action is substantially the same as already described, but the shortest fibers in the layers 32, 32 serve to additionally circumferentially space the longest fibers in the layers 16, 16 and they also serve to partly support the immediately adjacent fibers of intermediate length in the layers 18, 18.

With either the brush shown in Figs. 1 to 5 or the brush shown in Fig. 6, the several brush strips can be readily removed and replaced after wear, it not being necessary to replace the core structure.

The invention claimed is:

1. In a rotary brush, the combination of a supporting structure rotatable about a central axis, and a plurality of circumaxially spaced brush strips carried by the supporting structure in uniform relation to the axis thereof each of which includes a metallic holder distinct from the supporting structure and extending longitudinally of the strip and also includes at least one longitudinally extending layer of brush fibers connected with the holder and projecting perpendicularly therefrom and from the supporting structure, a plurality of the said fiber layers being equally spaced circumaxially and all of the last said layers having the outer ends of their fibers in a single surface of revolution concentric with the axis of rotation and a second equal plurality of the said fiber layers being equally spaced circumaxially and all of the last said layers having the outer ends of their fibers spaced inwardly and to a substantial extent from the said surface of revolution each of which last said layers is located between two immediately adjacent layers of the first said plurality and has some of the fibers thereof approximately in contact with some of the fibers in each of said two immediately adjacent layers of said first plurality.

2. In a rotary brush, the combination of a supporting structure rotatable in a selected direction about a central axis, and a plurality of circumferentially distributed similar brush strips carried by the supporting structure in uniform relation to the axis thereof each of which brush strips has two layers of brush fibers extending longitudinally of the strip and projecting perpendicularly from the supporting structure, the outer ends of the fibers in the leading layer of each strip of the said plurality being at a substantially uniform distance from the supporting structure and the outer ends of the fibers in the trailing layer of the strip of the said plurality being at a substantially uniform smaller distance from the said supporting structure and some of the fibers in each said trailing layer being approximately in contact with some of the fibers in the leading layer of the same strip.

3. In a rotary brush, the combination of a core structure rotatable about a central longitudinal axis, and a plurality of generally longitudinal circumferentially distributed similar brush strips carried by the core structure each of which brush strips has two longitudinal layers of radially projecting brush fibers, the said strips being so related that the fiber layers of each strip are approximately in contact with the fiber layers of the next adjacent strips, and the outer ends of the fibers in one layer of each strip being at a substantially uniform distance from the axis of rotation and the outer ends of the fibers in the other layer of the strip being at a substantially uniform smaller distance from the axis of rotation.

4. In a rotary brush, the combination of a core structure rotatable about a central longitudinal axis, and a plurality of generally longitudinal circumferentially distributed

similar brush strips carried by the core structure each of which brush strips comprises a channel shaped holder and fibers looped within the holder and projecting radially therefrom in two longitudinal layers, the said strips being so related that the fiber layers of each strip are approximately in contact with the fiber layers of the next adjacent strips, and the outer ends of the fibers in one layer of each strip being at a substantially uniform distance from the holder and the outer ends of the fibers in the other layer of the strip being at a substantially uniform smaller distance from the said holder.

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