Sept. 22, 1970 G. J. CLARK 3,529,314

ROTARY BRUSH CONSTRUCTION

Filed March 8, 1968 2 Sheets-Sheet 1

FIG. 1

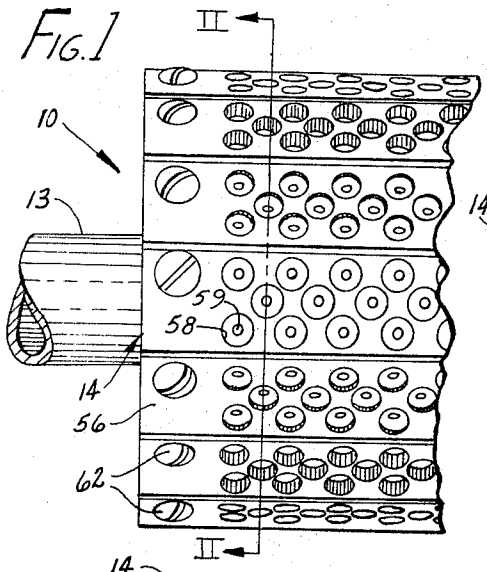
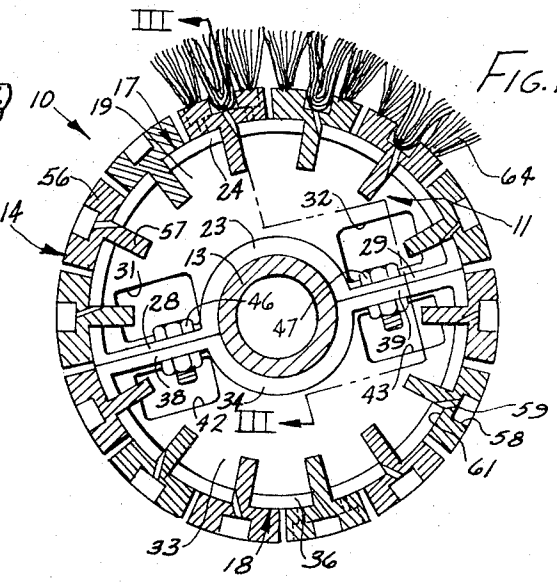


FIG. 2



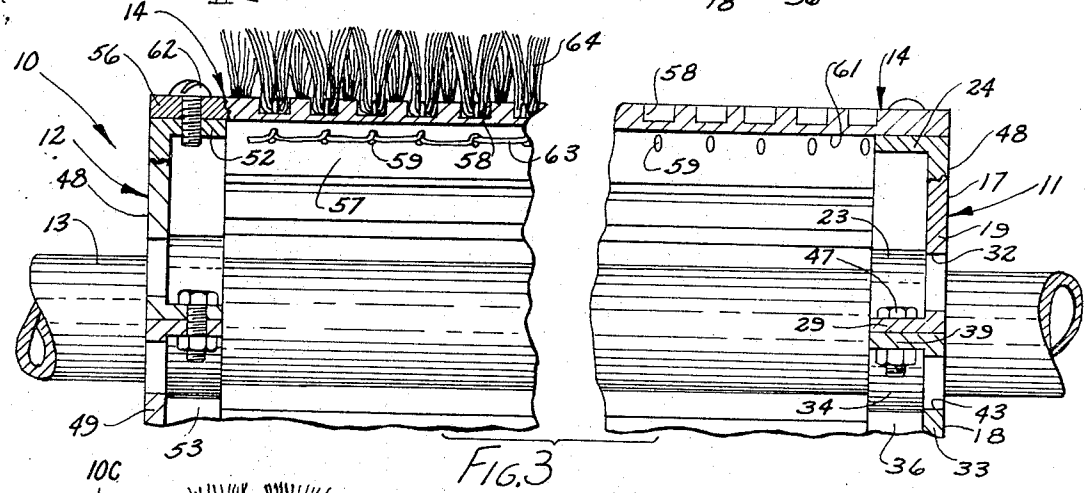


FIG. 3

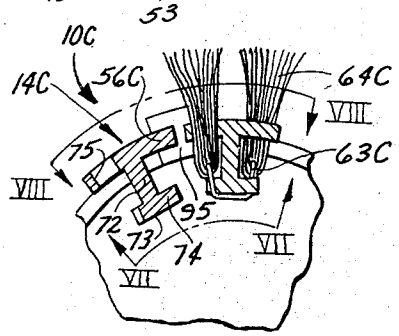


FIG. 6

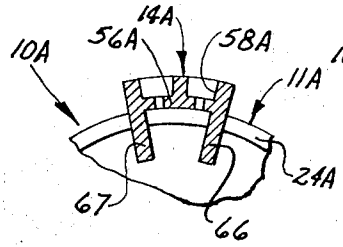


FIG. 4

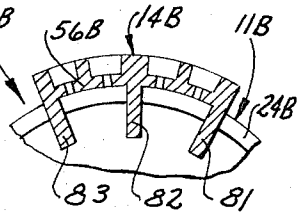


FIG. 5

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ROTARY BRUSH CONSTRUCTION

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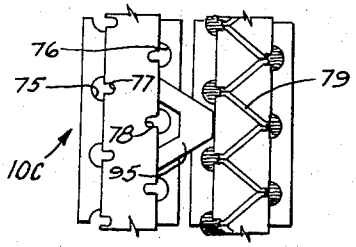


FIG. 7

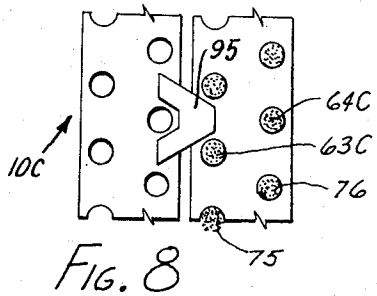


FIG. 8

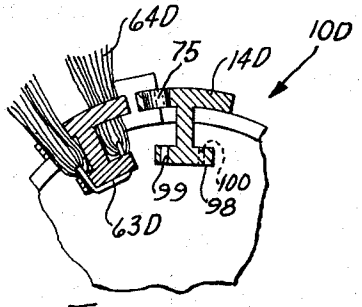


FIG. 9

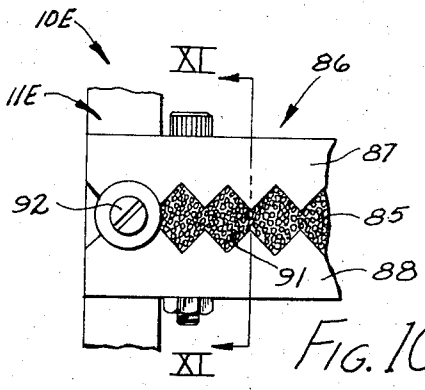


FIG. 10

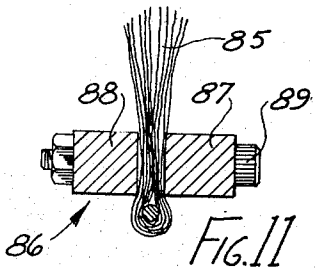


FIG. 11

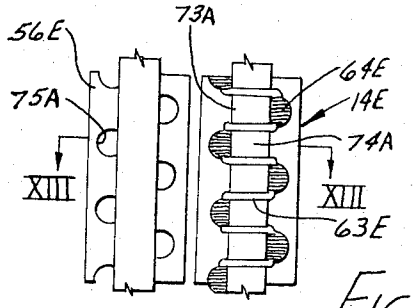


FIG. 12

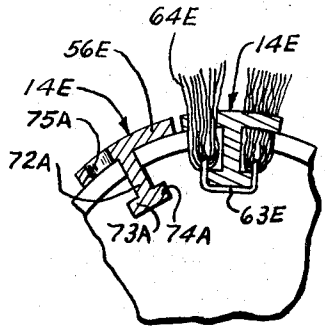


FIG. 13

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3,529,314

ROTARY BRUSH CONSTRUCTION

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Int. Cl. A46b 3/16, 7/10, 13/00
U.S. Cl. 15—183 12 Claims

ABSTRACT OF THE DISCLOSURE

A cylindrical brush construction having a pair of spaced end bells mounted upon shaft means and supporting a plurality of elongated and parallel bristle-holding members arranged in a cylindrical pattern concentric with the shaft means.

BACKGROUND OF THE INVENTION

This invention relates in general to rotary brushes and, more particularly, to a type thereof having a plurality of elongated, bristle-holding members which are removably secured to a pair of end bells so that the members define a cylinder from which the brush bristles can extend radially outwardly.

Persons acquainted with the manufacture and operation of rotary brushes, and particularly those used in car-washing operations, realize that the cost of such rotary brushes has steadily increased both in original purchase price as well as the price of replacement parts. During the last 15 or 20 years, it has become increasingly difficult to obtain workmen skilled in the art of mounting the bristles on the brush core, and many of these brush constructions do not lend themselves readily to manufacture by automatic equipment. In fact, some manufacturers have found it both economical and advantageous, particularly in areas where the available labor market has been scarce, to subcontract certain types of piecework to housewives, for example, who do the work in their homes. It is common knowledge that the mounting of brush bristles on cores is often accomplished by women and it is also recognized that large cores cannot be easily handled by such women in their homes. However, by breaking the brush core into a plurality of relatively small and lightweight members, the mounting of the brush bristles on these members could be efficiently and economically performed by women in their homes.

It has also become increasingly difficult to obtain the required personnel to operate the fast-growing number of car-washing operations. Thus, such car-washing operations are being converted in an increasing number to either semiautomatic operations or self-help operations. As a result, the incidence of damage to the rotary brushes has increased, thereby not only creating losses for the operators of the equipment but also increasing the demands for repairs.

While repairs due to "fair wear and tear" are to be expected and can usually be anticipated, it is the repairs which are caused by accidents, such as a car bumping into a rotary brush, that create the biggest problem in car-washing operations. Often, such damage results in the loss of an entire day or more for the owner of the operation unless he has a spare brush available.

Accordingly, a primary object of this invention is the provision of a relatively inexpensive, rotary brush construction wherein both the cost of initial manufacture and the cost of repairing a damaged brush can be held to an absolute minimum by fabricating the brush from a pair of end bells and a plurality of identical, elongated bristle-holding members which can be easily mounted upon and removed from the end bells for replacement and/or repair.

A further object of the invention is the provision of a brush construction, as aforesaid, which can be mounted upon or removed from a supporting shaft without dismantling the shaft, and which is constructed so that replacement bristle-holding members which occupy a relatively small amount of space, can be stocked for emergency repairs and which can be applied to a damaged brush by any person capable of handling ordinary tools, such as a screwdriver and a wrench.

Other objects and purposes of this invention will become apparent to persons familiar with brush constructions of this general character when reading the following descriptive material and examining the accompanying drawings, in which:

FIG. 1 is a fragmentary, side elevational view of a rotary brush embodying the invention.

FIG. 2 is a sectional view taken along the line II—II in FIG. 1.

FIG. 3 is a broken, sectional view taken along the line III—III in FIG. 2.

FIG. 4 is a fragment of a cross-sectional view similar to that shown in FIG. 2, but disclosing a different type of bristle-holding member.

FIG. 5 is a sectional view similar to FIG. 4 and showing another type of bristle-holding member.

FIG. 6 is a sectional view similar to FIG. 4 and showing a further type of modified bristle-holding member.

FIG. 7 is a sectional view taken along the line VII—VII in FIG. 6.

FIG. 8 is a sectional view taken along the line VIII—VIII in FIG. 6.

FIG. 9 is a sectional view similar to that appearing in FIG. 6 and showing a modification thereof.

FIG. 10 is a fragmentary view of a modified bristle-holding member.

FIG. 11 is a sectional view taken along the line XI—XI in FIG. 10.

FIG. 12 shows a modification of the structure appearing in FIG. 7.

FIG. 13 is a sectional view taken along the line XIII—XIII in FIG. 12.

For convenience in description, the terms "upper," "lower" and words of similar import will have reference to said bristle-holding members as appearing in FIGS. 4 and 8, for example. The terms "inner," "outer" and derivatives thereof will have reference to the central axis of the rotary brush construction.

SUMMARY OF THE INVENTION

The objects and purposes of the invention, including those set forth above, have been met by providing a rotary brush device having two axially spaced, split end bells mounted upon a shaft. A plurality of elongated, bristle-holding members are mounted on the end bells parallel with the shaft and each member has radially inwardly extending flange means.

DETAILED DESCRIPTION

The rotary brush construction of the invention, a preferred embodiment of which is illustrated at **10** in FIGS. 1, 2 and 3 is comprised of a pair of circular, preferably identical, split end bells **11** and **12** which can be mounted in axially spaced relationship upon a shaft **13**. The end bells **11** and **12** support a plurality of parallel, elongated, bristle-holding members **14**.

The end bell **11**, by way of example and as shown in FIGS. 2 and 3, is comprised of a pair of mating, semicircular sections **17** and **18**. The section **17** has a radial wall **19** which is integral at its inner end with a hub portion **23**. A circumferential flange **24** is integral with and extends axially from the radial wall **19** near its outer

edge. Section 17 has a pair of flanges 28 and 29 which extend radially between the hub portion 23 and the circumferential flange 24. A pair of openings 31 and 32 are provided in wall 19 adjacent to but spaced from flanges 28 and 29 to minimize weakening of the flanges 28 and 29.

The semicircular section 18, which is preferably identical with the section 17, has a radial wall 33, a hub portion 34 and a circumferential flange 36. A pair of flanges 38 and 39 extend radially from the hub portion 34 to the circumferential flange 36 and a pair of openings 42 and 43 are provided in the radial wall 33.

The end bell 11 is mounted upon a shaft 13 so that the hub portions 23 and 34 snugly engage the shaft 13 on opposite diametrical sides thereof. The flanges 28 and 38 and flanges 29 and 39 are drawn tightly together by bolts 46 and 47 which extend through appropriate aligned openings in the flanges 28, 29, 38 and 39.

The end bell 12, which may be constructed and mounted in a manner identical to end bell 11, has a pair of semicircular sections 48 and 49 with circumferential flanges 52 and 53, respectively. The end bells 11 and 12 may be fabricated from metal, such as aluminum, or a suitable plastic material, for example.

The end bells 11 and 12 support a plurality of elongated, bristle-holding members 14, each of which has a relatively flat bar 56 and a radially-inwardly projecting rib 57 defining a T-shaped cross section. The opposite ends of the bar 56 extend beyond the rib 57 so that they can overlay the circumferential flanges 24 and 52, for example, of the end bells 11 and 12, respectively, to which they may be attached by screws 62. The radially inwardly projecting rib 57 gives strength and rigidity to bar 56. The opposite ends of the bristle-holding members 14 are similarly attached to the sections 36 and 53 of the end bells 11 and 12, respectively.

Although the ribs 57 in the present embodiment terminate adjacent the circumferential flanges 24, 36, 52 and 53, they may extend to the ends of the members 14. In such case, the said circumferential flanges are provided with slots (not shown) for reception of and driving engagement with the ribs 57.

The flat plate or bar 56 of bristle-holding member 14 has a plurality of outwardly opening recesses 58, here shown as being cylindrical in shape and uniformly distributed along its outer surface. A small, preferably coaxial opening 59 extends between the inner end of each of the recesses 58 and the inner surface 61 of the bristle-holding member 14. Means, such as a wire 63 (not shown), extends through opening 59 to engage the bristles 64 and retain them securely in recesses 58, in a conventional manner.

In the fabrication of the rotary brush 10, the bristles 64 are attached to the unassembled, bristle-holding members 14 which can be used at once or inventoried. When assembled, the members 14 are attached to the semi-circular sections 17 and 48 of the end bells 11 and 12, respectively, by screws 62. In a similar manner, other bristle-holding members 14 may be attached to the lower semicircular sections 18 and 49 of end bells 11 and 12, respectively. The end bells 11 and 12 are then mounted upon the shaft 13 and frictionally engaged therewith by tightening the bolts 46 and 47, access to said bolts being had (for example) through the opening 31, 32, 42 and 43.

Alternatively, and particularly where several brush assemblies are mounted adjacent each other on the same shaft, access to the bolts 46 and 47 may be effected by removing one or two members 14 until the bolts are loosened or tightened, as required. In a modified embodiment, the hub portions on one end bell, such as portions 23 and 34 on end bell 11, can be arranged to extend away from the end bell 12 so that the bolts 46 and 47 are located externally of the assembly where they are readily accessible.

The rotary brush 10 can be readily adjusted longitudinally and appropriately positioned on shaft 13 by loosening the bolts 46 and 47 and sliding the bells 11 and 12 along the shaft 13 into the desired positions and then tightening the bolts 46 and 47. The bristle-holding members 14 can be individually removed, should they become worn or damaged, simply by removing the screws 62 at the opposite ends thereof. A replacement member 14 can then be attached and secured in place by reinserting the screws 62. The worn or damaged member 14 can then be returned to the manufacturer for repair and subsequent use as a replacement part. Where the member 14 is made of costly lightweight materials, such reuse is particularly advantageous.

The rotary brush 10A (FIG. 4) is similar in structure to the rotary brush 10 and the parts thereof will be referred to by the same reference numerals designating corresponding parts of the rotary brush 10, but with the suffix A added thereto.

The rotary brush 10A has a plurality of channel-shaped bristle-holding members 14A which are secured to and extend between a pair of end bells, such as the bell 11A. The member 14A has an elongated, substantially flat web 56A with a plurality or uniformly arranged bristle recesses 58A in its outer surface. The member 14A also has a pair of ribs or flanges 66 and 67 which extend radially inwardly from the lengthwise edges of the web 56A. However, as in the member 14, the web 56A of the member 14A extends beyond the ribs 66 and 67, so that the extensions may be secured to the flange 24A by screw means (not shown).

The rotary brush 10C, a fragment of which appears in FIGS. 6, 7 and 8, has structure similar to that of rotary brush 10 and parts thereof will be referred to by the same reference numerals designating corresponding parts of rotary brush 10, but with the suffix C added thereto. Said brush 10C has a plurality of bristle-holding members 14C, each including an elongated bar 56C and a strengthening rib 72 which extends radially inwardly from the central portion of the bar 56C. The rib 72 has a pair of lengthwise, laterally projecting flanges 73 and 74 remote from the bar 56C for additional strength, thereby giving the member 14C a substantially H-shaped cross section. The bar 56C has a plurality of bristle openings 75 and 76 arranged in two rows on opposite sides of the rib 72 and located to form a zigzag pattern, as shown in FIG. 7. The flanges 73 and 74 (FIG. 7) have openings or notches 77 and 78, respectively, in their remote edges and substantially aligned axially with the openings 75 and 76.

A group of bristles 64C (FIG. 6) are engaged intermediate their ends by a wire 63C and pulled through the opening 75, for example, preferably until at least some of the bristles bear against the flange 73.

A loop of the wire 63C is then urged upwardly through the opening 76 (FIG. 8), for example, and engaged with another group of bristles 64C which are pulled through said opening 76 until at least some of them engage the flange 76. The portion 79 (FIG. 7) of the wire 63C extending between the two groups of bristles in openings 75 and 76 is held firmly against the flanges 73 and 74 within the notches 77 and 78. Thus, the bristles cannot be accidentally dislodged from their FIG. 6 positions.

In order to protect vehicles or other objects from accidental and possibly damaging engagement by the bristle-holding members 14C, for example, a plurality of preferably elastomeric bumpers 95 (FIG. 6) mounted upon and between each pair of adjacent members 14C. In this embodiment, the bumpers have H-shaped cross sections so that the adjacent edges of the bars 56C can be gripped by said bumpers. Also, the bumpers are V-shaped in plan view (FIGS. 7 and 8) to extend on opposite sides of a group of bristles. The bumpers 95 also serve to transfer loads of impact from one member 14C to the next, thereby increasing the resistance of any one member to damage.

The rotary brush 10D (FIG. 9) and parts thereof will be referred to by the same reference numerals designating

corresponding parts of the rotary brush **10C**, but with the suffix D used in place of C. The bristle-holding member **14D** (FIG. 9) may be substantially identical with the member **14C**, except that the flanges **97** and **98** of member **14D** are slightly wider than the flanges **73** and **74** to receive complete wire openings **99** and **100**, respectively, instead of notches. Thus, the bristles **64D** can be held on the member **14D** by the wire **63D** in about the same manner as the bristles **64C** are held by wire **63C**.

The openings **75** and **76** in member **14C** and the openings **75A**, **99** and **100** in the member **14D** can be punched or drilled as desired.

A modified embodiment **10B**, shown in FIG. 5, and the parts thereof will be referred to by the same reference numerals designating corresponding parts of the rotary brush **10**, with the suffix B added thereto. Said modified embodiment **10B** has a plurality of bristle-holding members **14B**, each of which has three radially inwardly extending strengthening ribs **81**, **82** and **83**. The plate **56B** projects beyond the ribs **81**, **82** and **83** so that it can be secured to the flange **24B** of end bell **11B** by screw means (not shown).

FIGS. 10 and 11 show an alternate structure for mounting a plurality of bristles **85** upon a pair of end bells. The member **86** has a pair of parallel side elements **87** and **88** which are interconnected at their opposite ends by bolts **89**. The adjacent edges of elements **87** and **88** are provided with a plurality of notches which define bristle-receiving recesses **91** through which the bristles **86** may extend. The bolts **89** are then tightened until elements **87** and **88** grip the bristles **86**. The bristle-holding members **86** may be attached to the end bells, such as **11E**, by screws **92**.

FIGS. 12 and 13 illustrate modified bristle-holding members **14E** which are essentially similar to the members **14C**, for example, except that the flanges **73A** and **74A** are unbroken by openings or notches. Thus, the wire **63E** merely passes around and beneath the flanges **73A** and **74A** as it extends from a group of bristles **64E** on one side of the rib **72A** to a group of bristles on the opposite side.

Especially where the bristles **64E** are snugly held within the opening **75A** in the plate **56E**, which is customary, there is little likelihood that the bristles will become unseated from the position against the flanges **73A** and **74A**. Moreover, centrifugal force will tend to hold the bristles in their FIG. 13 positions during normal operation.

In the foregoing description, the end bells **11** and **12** are disclosed with two semicircular sections. Under some circumstances, it may be desirable to provide end bells which have three or more sections which are less than semicircular. Such an arrangement could simplify maintenance.

Although particular preferred embodiments of the invention have been disclosed above for illustrative purposes, it will be understood that variations or modifications thereof, which lie within the scope of the appended claims, are fully contemplated.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A rotary brush structure removably mounted upon shaft means, comprising:

a pair of substantially circular end bells having concentric openings into which said shaft means is snugly receivable, each end bell having an axially extending, circumferential flange, and each end bell comprising plural arcuate sections having adjacent flange means;

holding means adapted to clamp said adjacent flange means together, whereby said end bells are secured upon said shaft means;

a plurality of elongated, bristle-holding members extending axially between said end bells, and means for securing said bristle-holding members to the circumferential flanges of said end bells, each of said bristle-holding members having a plurality of substantially radial openings;

each bristle-holding member comprising a circumferentially disposed bar means and elongated rib means extending lengthwise of and projecting radially inwardly from said bar means from a line midway between the lateral edges of said bar means, whereby said bristle-holding member is strengthened, said radial openings extending through said bar means;

flange means parallel with and spaced from said bar means, said flange means extending lengthwise of, and from opposite sides of, said rib means;

plural groups of elongated brush bristles with one of said groups being disposed in each of said openings; and

wire means engaging each of said groups of bristles for holding same within its respective opening and against one of said flange means, said wire means extending around said rib means between said groups.

2. A rotary brush structure as defined in claim **1**, wherein said flange means have wire openings substantially aligned with and smaller than said radial openings for reception of said wire means.

3. A rotary brush structure removably mounted upon shaft means, comprising:

a pair of substantially circular end bells having concentric openings into which said shaft means is snugly receivable, each end bell comprising plural arcuate sections having adjacent flange means;

holding means adapted to clamp said adjacent flange means together, whereby said end bells are secured upon said shaft means;

a plurality of elongated, bristle-holding members extending axially between said end bells, and means for securing said bristle-holding members to said end bells around the circumference thereof;

each bristle-holding member comprising an elongated and circumferentially disposed bar means and elongated rib means extending lengthwise of and projecting radially inwardly from said bar means;

said bar means having a plurality of substantially radial openings extending therethrough, said openings being arranged in at least two rows disposed on opposite sides of said rib means and extending lengthwise of said bar means;

plural groups of elongated brush bristles, one of said groups being positioned in each of said openings; and

means including an elongated flexible wire means cooperating with said groups of bristles for holding said groups in their respective openings, said wire means having portions thereof extending laterally back and forth across said rib means between said two rows for holding adjacent groups of bristles in said two rows within their respective openings.

4. A rotary brush structure as defined in claim **3**, wherein said means for securing said bristle-holding member includes axially extending circumferential flanges on said end bells, said flanges having a plurality of slots arranged therein for snug reception of said rib means.

5. A rotary brush structure as defined in claim **3**, wherein the openings in one of said rows are axially offset relative to the openings in the other of said rows, and said wire means being alternatively engaged with a group of bristles of said one row and a group of bristles of said other row whereby said wire means extends in a zig-zag manner throughout the lengthwise direction of said bar means.

6. A rotary brush structure as defined in claim **3**, wherein the adjacent bristle-holding members are circumferentially separated by a small space, and resilient bumper means disposed within said space and fixedly connected between adjacent bristle-holding members, said resilient bumper means having a radially outermost surface which

is disposed radially outwardly from the radially outermost surface of said bar means.

7. A rotary brush structure as defined in claim 6, wherein said bumper means has an H-shaped cross section whereby the adjacent lateral edges of the bar means can be gripped between the legs of the bumper means.

8. A rotary brush structure as defined in claim 3, wherein said elongated rib means project radially inwardly from a line midway between the lateral edges of said bar means, and said wire means engaging each of said groups of bristles and holding same within its respective opening, said wire means extending around the radially inner end of said rib means as said wire means extends between adjacent groups.

9. A rotary brush structure removably mounted upon shaft means, comprising:

a pair of substantially circular end bells having concentric openings into which said shaft means is snugly receivable, each end bell comprising plural arcuate sections having adjacent flange means;

holding means adapted to clamp said adjacent flange means together, whereby said end bells are secured upon said shaft means;

a plurality of elongated, open channel-shaped, bristle-holding members extending axially between said end bells, said bristle-holding members being disposed circumferentially of said end bells in side-by-side relation, and means for securing said bristle-holding members to said end bells;

each channel-shaped, bristle-holding member including an elongated web portion extending between said end bells and a pair of spaced and elongated rib members fixedly secured to and projecting radially inwardly from the lateral edges of said web portion, the radially inner ends of said rib members being free of direct interconnection whereby opposed surfaces of said rib members and the inner surface of said web portion define a radially inwardly directed clearance space;

said web portion further including a plurality of substantially radial openings extending therethrough with said radial openings being arranged in at least two rows disposed adjacent one another and extending lengthwise of said web portion;

a plurality of groups of elongated brush bristles with

one of said groups being disposed in each of said openings; and

means for holding one of said groups of brush bristles in each of said openings, said means including elongated flexible wire means engaging each of said groups of bristles for maintaining said groups of bristles within the radial openings, said wire means being disposed at least in part in said clearance space.

10. A rotary brush structure as defined in claim 9, wherein said openings have radially inner and outer portions in communication with one another, the radially inner portion being of a substantially smaller diameter than the radially outer portion, said groups of bristles being disposed in the radially outer portions and portions of said wire means extending through the radially inner portions for holding the groups of bristles in the radially outer portions of said openings.

11. A rotary brush structure as defined in claim 10, wherein said wire means has portions thereof extending back and forth across the inner surface of said web portion between said two rows for holding adjacent groups of bristles in said two rows within their respective openings.

12. A rotary brush structure as defined in claim 9, including a third elongated rib member extending lengthwise of said web portion and projecting radially inwardly therefrom between and spaced from said pair of rib members.

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PETER FELDMAN, Primary Examiner

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