Aug. 4, 1964 A. T. NIELSEN 3,142,854

ROTARY BRUSH COMPRISING AN ANNULAR BRISTLE CARRIER AND A CIRCLE OF BRISTLES

Filed March 12, 1963 2 Sheets-Sheet 1

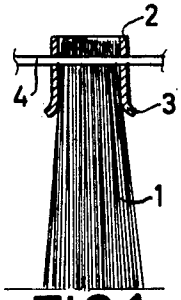


FIG.1



FIG.2

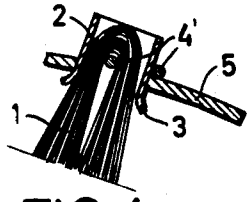


FIG.4

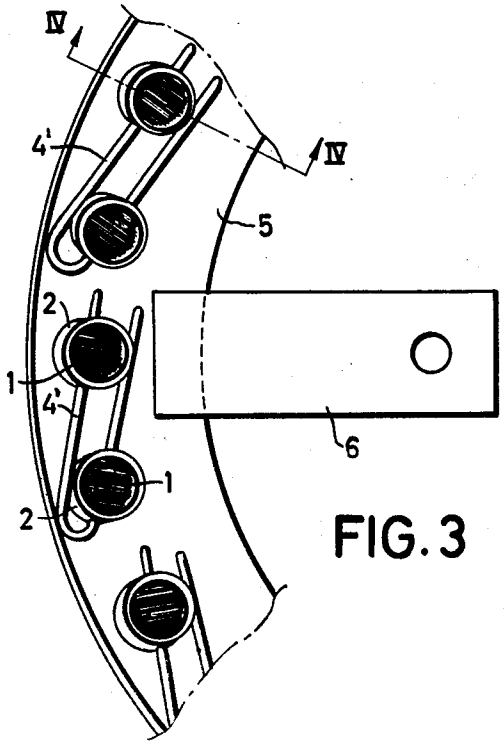


FIG.3

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ROTARY BRUSH COMPRISING AN ANNULAR BRISTLE CARRIER AND A CIRCLE OF BRISTLES

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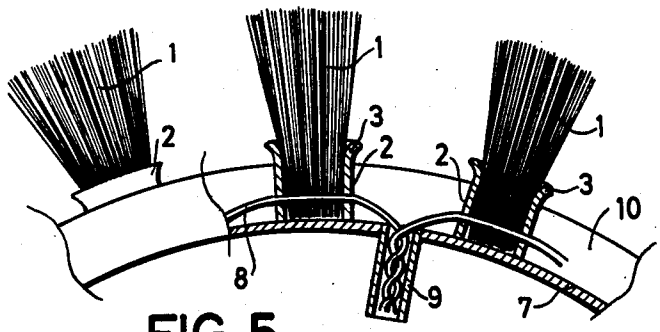


FIG. 5

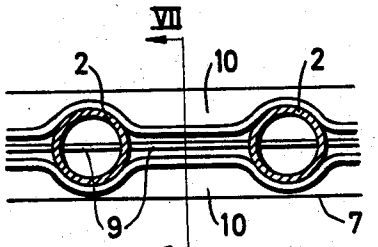


FIG. 6

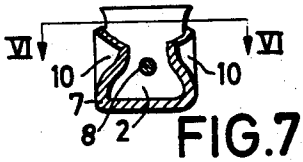


FIG. 7

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ROTARY BRUSH COMPRISING AN ANNULAR BRISTLE CARRIER AND A CIRCLE OF BRISTLES

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In known rotary brushes comprising an annular bristle carrier and a circle of bristles arranged in tufts, these tufts are as a rule inserted into sockets in the bristle carrier and secured by means of staples or a wire in connection with pitch. This method of attachment assumes in practice that the bristle carrier has a considerable thickness, and in great brushes, for example for street sweepers, the carrier will become correspondingly heavy and unhandy. This method is, therefore, not compatible with modern efforts which go in the direction of making the bristle carrier so light and cheap as to make it economically justifiable to discard the bristle carrier when the bristles attached thereto have been worn down.

This invention has for its purpose to provide a rotary brush in which the advantageous tufted arrangement of the bristles can be employed in connection with a light and cheap bristle carrier.

From other brush types, for example hair brushes and tooth brushes, it is known to bend a tuft of bristles into hairpin-shape and insert the bent end of the tuft into a thimble-like holder, and it has been suggested to secure the attachment of the bristles or the brush material to said holder either by means of a staple which with its central portion is disposed internally of the bristle bends, and with its limbs is in frictional engagement with the inner side of the holder, or by means of a cross pin corresponding to the central portion of the staple, this pin being fixedly secured within the holder by means of the free edge thereof which is reduced in diameter after the insertion of the cross pin.

With a view to obtaining the above-mentioned purpose, this prior technique is utilized in the rotary brush according to the invention, said brush comprising an annular bristle carrier and a circle of brush material in the form of hairpin-shaped bristles which are gathered in tufts, the bent end of each of which is inserted into a separate tubular holder and secured therein by means of a wire or pin disposed internally of the bristle bends. The characteristic feature of the rotary brush according to the invention is that said wire or pin extends through substantial radial, opposed holes in the wall of the holder and cooperates, outside said holder, with the bristle carrier in such manner as to contribute to locking the holder and, conseqently, the tuft in the bristle carrier.

Such wire or pin extending through holes in the wall of the holder will provide a safer locking of the bristles than the above-mentioned staple, whose effect is dependent on the friction between the limbs of the staple and the inner side of the holder; and in comparison with the other above-mentioned known construction, the invention affords the advantage that the locking of the bristles in the holder does not presuppose any final additional working of said holder, such as the rolling-in of the edge portion thereof. Furthermore, the wire or pin in the rotary brush according to the invention does not only secure the attachment of the brush material in the holder but also locks the holder and, consequently, the tuft in the bristle carrier or at any rate contributes to this locking. The double employment of the wire or pin is of particularly great significance because hereby it is made possible to make the bristle carrier simpler and cheaper, and especially to reduce the required thickness thereof. In this connection it can be mentioned that the above-mentioned known holders comprising a cross pin secured by means of the edge of the holder, are externally threaded for being screwed into a correspondingly threaded hole in the bristle carrier, for which reason said carrier must in practice have a thickness exceeding the length of the holder.

The production of the individual tufts may by way of example be effected by a bunch of rectilinear bristles being so disposed transversely of a ferrule as to allow the central portion of said bunch of being pressed into the ferrule, thus attaining the hairpin-shape. The wire or pin for securing the brush material in the holder need not to be brought into place until later, for example, when the holder with the brush material is mounted in a bristle carrier.

A particular advvantage in using a wire or pin extending through holes in the wall of the holder is that the spreading of the bristles in the individual tufts can be adapted according to wish by choosing an appropriate spacing between the end of the holder where the bristles extend therefrom, and the place where the holes are located. The smaller spacing the greater spreading of material. Particularly when this spacing is small, the tubular holders may according to the invention advantageously be substantially cylindrical over a major part of their lengths and may expand in trumpet-shape at their ends where the bristles project from the holder. This special shape will not complicate the production of the holders, and may afford the advantage that the brush material is protected in the best possible way against breaks within the particularly critical area at the freely-disposed end of the holder.

As emphasized above, the invention affords not only a particularly reliable attachment of the brush material to the bristle carrier but also the possibility of producing the said carrier in a simpler and cheaper way. Thus, in case of a cup-shaped rotary brush, the bristle carrier may expediently consist of a ring shaped as a flat truncated cone and having a circle of through holes for receiving one tubular holder each, the radial holes of which are disposed substantially flush with the side of the ring facing away from the brush material. In this case a wire or pin which is passed through the radial holes in the bristle carrier and, consequently, secures the brush material therein, will prevent the holder and the brush material from being pulled out from the bristle carrier. An oppositely directed displacement of the holder will in advance be precluded if, in the abovementioned manner, the holder is expanded in trumpet-like fashion at the end where the bristles project from the holder.

In a particular embodiment of the cup-shaped brush, two neighbouring holders with associated tufts are secured by means of a single U-shaped wire, the limbs of which are passed through one each of the two holders. Hereby is in a simple manner any turning of the holders in the bristle carrier prevented, whereby such wear might occur that the holders would gradually fit too loosely in the bristle carrier.

The rotary brush may also be in the form of a substantially plane brush ring or brush section, the bristle carrier of which has an outwardly open groove for reception of the brush material. Such rotary brush is according to the invention characteristic in that the cross section of the groove is of the same size as the outer diameter of the holder, and that all holders with associated tufts are secured in the groove by means of a circumferentially disposed clamping wire, the ends of which have been passed through a hole at the bottom of the groove and fixed, for example, by welding.

Also this rotary brush will be simple and cheap in

production and can in spite of low costs of material be produced with fully sufficient strength. The circumferential clamping wire will together with the side walls of the groove normally be capable of retaining the bristle tufts with required safety but, according to the invention, the holders may further be fixed in the bristle carrier by squeezing the parts of the groove walls disposed between the holders. Hereby any displacement of the individual bristle tufts in the circumferential direction of the bristle carrier is counter-acted, and furthermore the inclination on part of the tufts to tilt in the groove is counter-acted.

Brush rings or brush sections of the said type are often internally provided with a driving stud to ensure the transmission of the rotary motion from a driving shaft. According to the invention, the ends of the clamping wire may expediently be passed into a tubing located internally of the groove bottom, which tubing serves as such driving stud for the brush section.

The invention will in the following be explained in detail through some embodiments with reference to the accompanying drawing, where:

FIGS. 1 and 2 show two sections, at right angles to one another, of a bristle tuft comprising holder and locking wire,

FIG. 3 is a section of a cup-shaped brush, viewed from the rear or the top,

FIG. 4 is a section along line IV—IV in FIG. 3,

FIG. 5 is a section of a plane brush ring or brush section comprising a circumferentially disposed locking wire,

FIG. 6 is an edge-view, corresponding to FIG. 5, comprising two holders without brush material, shown in section along line VI—VI in FIG. 7, and

FIG. 7 is a section at right angles to the section in FIG. 5 and made between two holders as indicated by line VII—VII in FIG. 6.

The bristle tuft shown in FIGS. 1 and 2 consists of a plurality of hairpin-shaped bristles 1 which may be smooth or crimped steel wires, the bent ends of which have been inserted into a tubular holder in the form of a substantially cylindrical ferrule 2, the lower edge portion of which expands in trumpet-like fashion. A wire or pin 4 is passed through radial holes in the holder 2 and serve for retaining the bristles 1 in said holder such as will most clearly appear from FIG. 2.

FIGS. 3 and 4 show a bristle carrier in the form of steel ring 5 shaped as a flat circular truncated cone and having a circle of through holes which each receive a tubular holder 2 with brush material 1. As will appear from FIG. 4, the tufts consisting of the brush material 1 and the holders 2 have been pushed into the ring 5 from the underside thereof until the expanded lower edge 3 of the holders engage the underside of the ring 5. Now, the radial holes through the holder 2 flush with the upper side of the ring 5, and wires 4' have been passed through these holes, which wires in the embodiment shown are U-shaped and have their limbs passed through one each of two neighbouring holders 2. These wires 4' will prevent the holders 2 from being downwardly pulled out from the ring 5 and, moreover, secure the bristles 1 in the holder 2.

A number of flaps 6, FIG. 3, which make it possible

to mount the cup-shaped brush in, for example, a street sweeper, may by welding or otherwise be secured to the upper side of the ring 5.

FIGS. 5, 6 and 7 show a brush ring or brush section comprising a circular bristle carrier 7 of U-cross-sectional shape, the bottom of said U-facing the centre of the ring, so that the ring forms an outwardly open groove for receiving the brush material. This material is like in the preceding embodiment constituted of a plurality of tufts in holders 2, 3. The cross section of the groove is of the same size as the outer diameter of the holders 2, and these holders are located, appropriately interspaced, in the groove of the bristle carrier 7 so that the rear edges of the holders rest against the bottom of said groove. Through radial holes in all holders 2 there is passed a clamping wire 8, the ends of which are inserted into a tubing 9 located internally of the groove bottom and serving as driving stud for the brush section, and to which the wire ends may be fixed by welding or otherwise.

For the purpose of further securing the bristle tufts in the bristle carrier 7, the parts of its side walls disposed between the holders 2 may be squeezed such as it is indicated in FIGS. 6 and 7. This has for its particular purpose to ensure that the bristle tufts shall not be displaced in the circumferential direction of the bristle carrier 7, and at the same time the inclination on part of the bristle tufts for "tilting" during use is counter-acted.

A number of brush rings or brush sections of this type may be combined on a suitable shaft so as to form a drum-shaped brush for use in, for example, a street sweeper.

What is claimed is:

A rotary brush comprising an annular disc shaped brush back member having a circular series of circumferentially spaced holes therein, a plurality of tubular holders inserted through said holes from the external surface thereof, said holders having opposed holes therein, a plurality of tufts consisting of bristles of hairpin shape mounted in said tubular holders, a cross pin extending completely through each of said holders and its opposed openings and extending through the bend of the hairpin bristles therein to secure said bristles in said holders and said holders in said sockets, said opposed holes being disposed flush with the internal surface of said annular disc, and wherein the cross pins of two adjacent bristle tuft holders are formed by the limbs of a generally U-shaped wire.

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