Nov. 21, 1967 J. P. HORTON ETAL 3,353,201

BROOM CONSTRUCTION

Filed Aug. 5, 1966

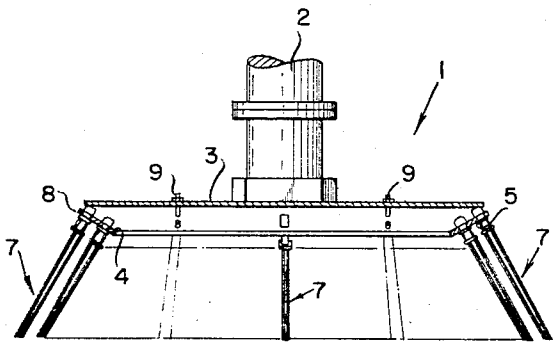



Fig. 1

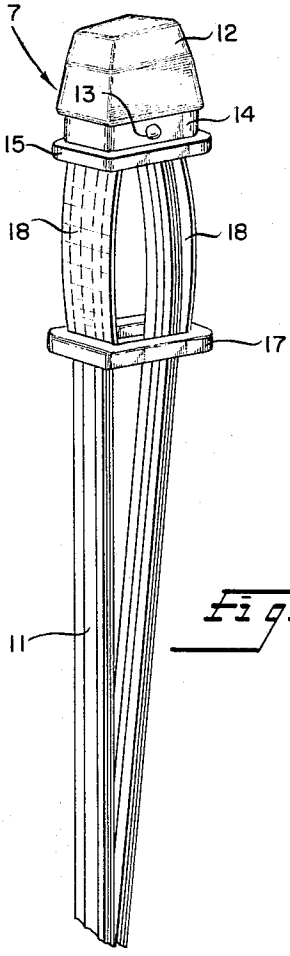



Fig. 3

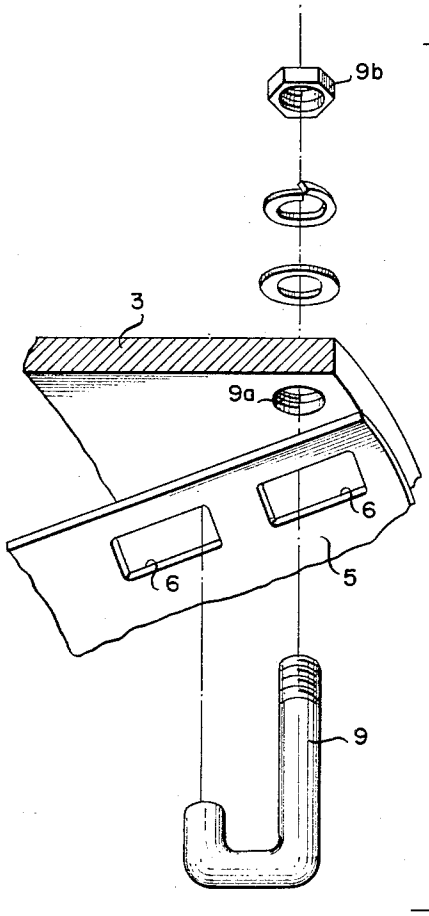



Fig. 2

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# BROOM CONSTRUCTION

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## ABSTRACT OF THE DISCLOSURE

Rotary brush assemblies having hairpin bristles, rectangular grooved and flanged caps with recesses for receiving bent medial portions of the bristles and pins mounted in grooves within the caps for holding the bristles, and having an upwardly flaring annular plate apertured for holding the grooved caps are described herein.

This invention relates to a gutter broom and, more particularly to an assembly of bristles, or bristle tufts, for use in gutter brooms and other types of sweepers.

Rotary brushes are often used on side, or gutter brooms, rotating about a substantially vertical axis in association with a cylindrical brush rotating about a substantially horizontal axis for sweeping streets and the like. Such brushes typically consist of one or more circular rows of bristles having an outward flare, which enables the bristles to contact the side of the curb without interfering with the operation of the gutter broom or other equipment used in the sweeping operation. Such gutter brooms are quite large, often 40" or more in diameter, must function to sweep the gutters clean, must be durable, and should be as inexpensive as possible. The achievement of these desired results, among others, is not easy and a wholly satisfactory gutter broom has not heretofore been achieved. For instance, apparently due to their durability and efficiency, gutter brooms are still widely used having outwardly angled holes in the back of the broom through which tufts of bristles are individually introduced and anchored even though such brooms are expensive due, in part at least, to the time and skill required to make them. Since the bristles in street sweepers are subject to rapid wear and require repeated replacement, the operator of street sweeping equipment using gutter brooms typically are faced either with expensive "down time" or the purchasing of expensive replacement brooms.

It is an important object of this invention to provide an inexpensive, durable and efficient sweeping element for a gutter broom.

It is another important object of the invention to provide an assembly of bristles, or tufts of bristles, which are inexpensive and may be inexpensively assembled into a sweeping element, or broom, which is durable and may be used efficiently in gutter brooms and other types of sweepers such as the cylindrical sweepers mentioned above.

Another object of this invention is to provide a bristle plug-in unit that operates effectively and which will withstand long use.

A further object of this invention is to provide improved bristle mounting means for rotary brooms.

A still further object of the invention is to provide a bristle plug-in unit which permits one to use easily fabricated and inexpensive brush elements which may be readily assembled by unskilled artisans.

Other objects and advantages of the invention will become apparent upon reading the following disclosure and claims in conjunction with the accompanying drawings in which

FIGURE 1 is a view, partly in cross section and partly



in elevation, of a gutter broom utilizing the bristle plugs hereof;

FIGURE 2 is an exploded fragmentary view of the manner of assembling the sweeping element of the rotary broom.

FIGURE 3 is a perspective view showing one embodiment of the bristle plug unit of this invention.

As shown in FIGURES 1, 2, and 3, the broom assembly of this invention generally identified by numeral **1**, includes a central rotary shaft **2**, a mounting hub **3**, a dish-shaped annular piece of plate metal **4** which has a lower surface **5** that slants upward on each side of its center and a plurality of retaining sockets **6** (FIGURE 2) that are shaped to retain and support with an outward flare a plurality of bristle plugs **7**. It will be understood that most of the bristle plugs are not shown mounted in plate **4** for ease of illustration.

In FIGURE 2, it will be apparent that annular plate **4** shown in FIGURE 1 can be mounted on mounting plate **3** by merely inserting the two legs of J-bolt **9** through two adjacent retaining sockets **6** and the longer leg thereof through the bolt hole **9***a* in mounting plate **3** and then tightening the nut **9***b* onto the threads of bolt **9**. The opposite procedure is followed when disassembling the broom.

The bristle plug **7** of this invention is shown in perspective in FIGURE 3. The bristle plug has bristles **11** that are held in position in a rectangular shaped flexible bristle retaining cap **12** by retaining pin **13** terminating in groove **14**. A flange **15** is provided adjacent groove **13** to facilitate the positioning of groove **13** in socket **6**, in which it fits smugly. Flange **15**, also prevents plug **7** being pushed through socket **6** during the use of the broom. It will be apparent that upon mounting plug **7**, socket **6** will serve to retain pin **13** in position during use. Likewise, it will be apparent the rectilinear socket **6** and the mating rectilinear groove **13** serve to keep the plug **7** in a predetermined and desired orientation. In the illustrative embodiment, the bristles **11** constitute superimposed layers of rectangularly shaped flexible steel. In such an embodiment both the flare of the bristles and the manner in which the bristles contact the surface to be cleaned are important, when used in a gutter broom. Where round bristles, such as plastics, are used, the flare of the bristles is the primary consideration in gutter brooms.

Cap **12** (FIGURE 3) is shown with a damper ring **17** held in position by a pair of flexible damper ring retaining and positioning strips **18** or similar damper ring retaining means; use of these preferred features is optional. The damper ring **17** prevents excess vibration and increases the wear life and cleaning efficiency of the bristles. Retaining strips **18** hold the damper ring **17** to cap **12** to form a single integrated unit and prevent the damper ring from slipping downward, or upward, on the bristle. The cap retaining means, and the shape of socket **6** and the shape of retaining cap **12** may be modified in any desired manner as long as the cap is adequately held and retained in its corresponding socket. In a less desirable embodiment, the groove may be eliminated leaving only a retaining flange or vice versa. Any plug-socket retention mating structural arrangement may be used in place of the structure shown. The shape of the damper ring may be modified in a similar manner. The cap can be, and is, a resilient material, such as a resilient plastic, but other materials could be used. The annular member **4** may be made of plastic, wood or metal, and the socket wall could be lined with a resilient plastic to increase the flexibility of the socket wall and the frictional engagement between the socket and the plug cap. The bristles may be composed of any standard bristle material, such as metal, plastic, natural bristle, etc. The specific materials used are optional.

The position of the socket in the broom wheel may be varied. The bristles may be outwardly flared due to an upwardly flaring angle as shown in the drawings or they may be in a vertical position. Offsetting the bristles at an angle to the surface that is to be cleaned reduces the strain of centrifugal force on the bristles as the brush wheel is rotated; this in turn reduced vibration, brush wear, and bristle breakage. In the same respect, the brush mounting annular ring, shown in the drawings, may be modified and any standard brush backing shape could be used. It is readily seen that if the lower brush surface **5** were a flat horizontal surface, the sockets **6** could be offset at an angle from the vertical axis to offset the bristles. In this latter embodiment, if the sockets are not offset, the bristles will be in a vertical position.

The specific brush backing, or mounting member **4**, shown in FIGURE 2, consists of a dish-shaped metal ring **8** having a plurality of sockets **6** which are countersunk holes. Cap **12** fits into the countersunk holes of socket **6** and both groove **14** and the socket **6** are proportioned so that groove **14** is encircled by the corresponding narrow diameter portion of the countersunk hole to prevent cap **12** from rotating and slipping out of the socket. Due to the fact cap **12** is made of an elastic plastic (elastomer), the cap may be compressed enough for mounting and will then spring back so that groove **14** fits smugly into socket **6**. Other elastic material could be used in a like manner. In this way, one may use quite inexpensive tufts of bristles and inexpensive holders for the tufts. One may use a thicker, more expensive structure for holding the tufts if one wished, but the simple structure discussed above and shown in FIGURE 2 is adequate.

As pointed out above, the tufts of brush material, or bristle plug **7**, could be used in other types of sweepers. For example, they could be used in the longitudinal plates of the type shown in U.S. Patent 3,228,053 although, in that case, the holes in the plates preferably would be "bore holes" rather than "punch holes."

In addition to the advantages mentioned above, it has been found that gutter brooms assembled in the manner described possess superior cleaning characteristics, and wear on the bristles compares most favorably with the wear on the bristles of known gutter brooms. For instance, these attributes have been proven under field conditions using a plate having two rows of holes each containing 40 holes, or a total of 80. Sixteen of the holes were used for 8 mounting bolts so that the gutter broom contained 74 tufts. The tufts were flared at an angle of about 34° to the horizontal and had an outside diameter at the wire ends of 43½". Both the diameter and flare angle are conventional.

The present invention is not limited to use with street sweepers or gutter brooms since both vertical axis and horizontal axis type rotary brooms may employ the bristle plug features of this invention. From the illustrative embodiments set out above, use of the composite of bristle tufts and plugs in other types of brooms and other types of mounting elements, or backings, will occur to one skilled in the art without departing from the spirit or scope of the invention.



What is claimed is:

1. Brush apparatus comprising a bristle plug having a plurality of hairpin shaped bristles aligned with medial bends in parallel planes; a bristle cap having first and second ends and having a central recess extending from the first end to an area near the second end, the recess receiving bent portions of the bristles, which are abutted against the area near the second end, the cap further comprising a flange extending outward in continuation of the first end and a groove depressed in the cap adjacent the flange; the plug further comprising a pin extending through said cap at said groove and extending through said bristles transverse to aligned planes of the bends of the bristles, whereby the bends of the bristles are anchored against movement between the pin and an area of the cap near the second end.

2. The apparatus of claim **1** wherein the cap, recess flange and groove define rectangular cross sections.

3. The apparatus of claim **2** further comprising first and second flat retaining strips extending outward from the first end of said cap adjacent opposite edges of the recess, extending along the bristles, and a rectangular damping ring fixed to outer ends of the strips and surrounding the bristles.

4. The apparatus of claim **2** wherein the cap further comprises an inward tapered rectangular portion extending from a maximum at a side of the groove remote from the flange to a minimum at the second end of the cap.

5. The brush apparatus of claim **2** further comprising a rotatable dish-shaped plate having an upwardly slanted peripheral portion and having at least one aperture in the peripheral portion commensurate with the groove in the cap, whereby when the bristle plug is inserted in the plate the groove is held within the aperture in the plate, locking the pin against translation, and whereby the flange prevents further advancing of the plug into the plate when the assembly is in use.


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