United States Patent

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[72] Inventor **Henry J. Rosendall**
Grand Rapids, Mich.

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[73] Assignee **Bissell Inc.**
Grand Rapids, Mich.

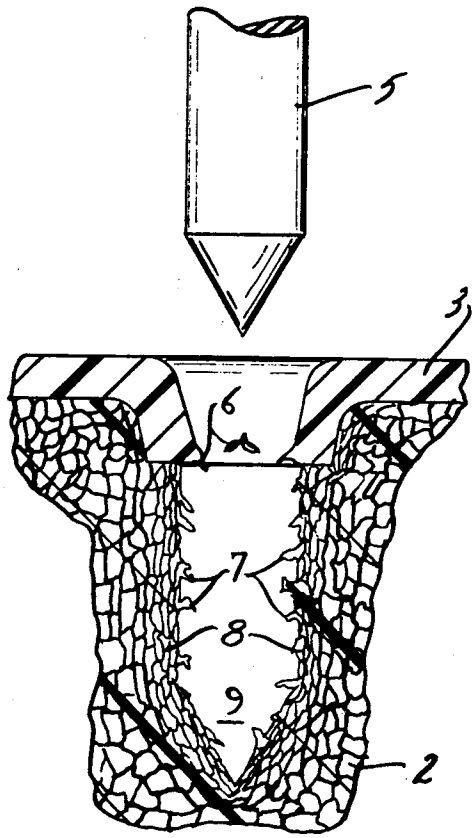
[54] **BRUSH MANUFACTURE**
13 Claims, 4 Drawing Figs.

[52] **U.S. Cl.** **15/179,** 15/195, 15/308, 300/8, 300/21
[51] **Int. Cl.** **A46b 3/16,** A46d 1/08
[50] **Field of Search** 15/195, 179, 114, 308; 300/21, 8

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Primary Examiner—Peter Feldman
Attorney—Andrus, Sceales, Starke & Sawall

ABSTRACT: A brush backing of relatively rigid foamed cellular polyurethane is pierced at a plurality of locations to form openings for receiving unitary bristle tufts. The piercing action creates barbs in the backing which firmly secure the tufts. The pierced openings may be formed to receive circular as well as flat tufts.



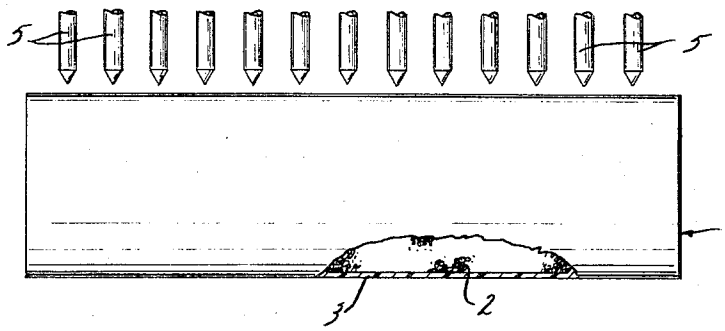


FIG_1

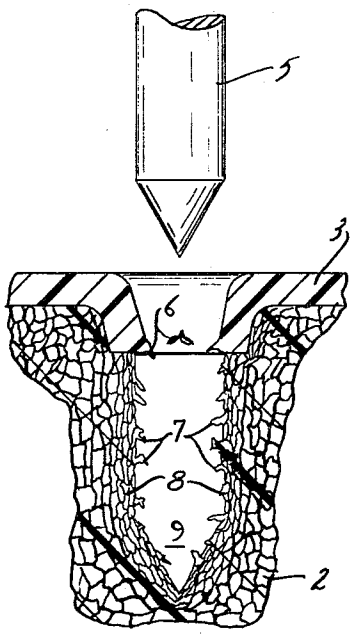


FIG_2

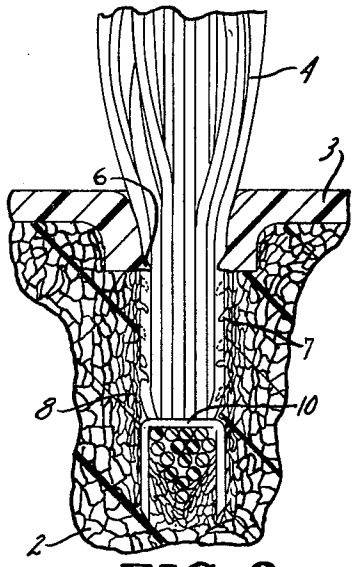


FIG_3

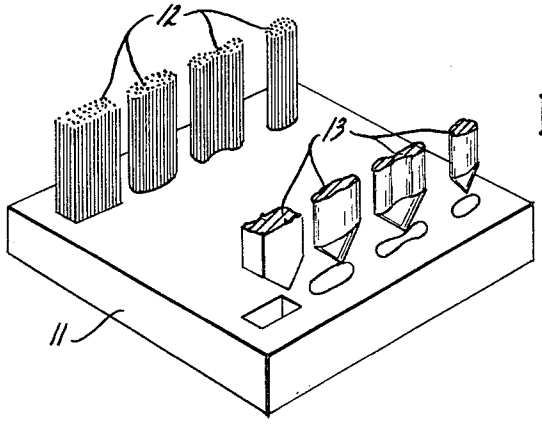


FIG_4

INVENTOR.
HENRY J. ROSENDALL
BY
Andrus, Sceales, Starke & Sawall
Attorneys

BRUSH MANUFACTURE

This invention relates to brush manufacture, and more particularly to the securement of brush bristles to a backing.

In the formation of brushes such as hairbrushes, carpet sweeper brush rolls and the like, the brush backing has usually been of a solid material such as wood or molded plastic. Numerous ways have been utilized over the years to secure bristle tufts to these backings. These have included drilling or molding circular opening in the backing and then securing a tuft into each opening, as by an adhesive, by stapling or the like.

With the advent of more modern synthetics, it has been desired to replace the former brush backings with new materials. One such material has been foamed plastic, such as polyurethane, which is slightly resilient but which has sufficient rigidity to withstand brushing action.

Problems have arisen in firmly securing bristle tufts to such foamed backings, especially where a chemical adhesive connection was not desirable. If the backing was provided with drilled openings, the tufts were easy to pull out. Furthermore, a drilled opening was circular of necessity, limiting the tufts to circular shape.

The present invention solves these problems and provides a concept of brush manufacture wherein the bristle tufts will be firmly held in the backing without the need for additional securing means, such as adhesives.

Generally in accordance with the invention, a cellular foamed backing is pierced to a desired depth and without removing any backing material. The piercing action tears the skin on the backing and also ruptures the cells therebeneath, the latter also being increased in density adjacent the area of rupture. When a unitary bristle tuft assembly is inserted into the pierced area, barbs formed by the torn skin and the edges of the ruptured cells hold the tuft in place and resist its release from the backing. The number and shape of the piercing tools can be varied to permit use of one or more tufts of various shape.

The accompanying drawing illustrates the best mode presently contemplated by the inventor for carrying out the invention.

In the drawing:

FIG. 1 is a side elevation of a foam roller and showing a plurality of piercing tools, and with a portion of the roller broken away;

FIG. 2 is an enlarged fragmentary view showing the piercing step utilizing a single tool;

FIG. 3 is a view similar to FIG. 2 and showing a tuft of brush bristles embedded in the pierced roller; and

FIG. 4 is an illustration of numerous embodiments including a second backing shape as well as several shapes of piercing tools and bristle tufts.

As shown in FIG. 1 of the drawing, the concept of the invention may be utilized in connection with the roller 1 which is to be used as the brush backing in a carpet sweeper or the like. Roller 1 is comprised of a relatively rigid foamed material which has a continuous cellular structure 2 throughout. Roller 1 should be slightly resilient, but should have a relatively high density. For purposes of this invention it has been found that the minimum density should be about 15 pounds per cubic foot. Polyurethane foam of the required density will be very suitable for this purpose. The outer surface of roller 1 is formed to provide a relatively smooth skin 3.

In accordance with the invention, it is desired to imbed a plurality of brush bristle tufts 4 into roller 1 in such a manner that the tufts are firmly held therein. This is accomplished by piercing the previously formed roller at a plurality of locations, and without removing any of the roller material.

As shown in FIGS. 1 and 2, one or more piercing tools 5 of generally conical shape are forced into the roller at a plurality of spaced locations to a depth approximately equal to the desired depth of imbedded tufts. If desired, a single tool may be pierced all of the holes, one at a time; or the plurality of tools may be utilized in sequence, or simultaneously. As a tool 5 passes into roller 1, skin 3 is torn to form an inwardly facing barb means 6. The tool also ruptures the cell walls beneath skin 5 to form a multiplicity of small barbs 7. The piercing action also substantially permanently compresses the roller material to form a portion of dense foam 8 which is disposed immediately surrounding the pierced area and which is of greater density than the portions of the roller spaced from the pierced area. After a tool 5 is removed, a tuft 4 is then inserted into its respective pierced opening 9.

In order for the concept of the invention to work properly, tufts 4 must be of a unitary type. That is, the bristles of a tuft must be secured together, as by a staple 10, to substantially prevent slipping of each bristle relative to adjacent bristles.

As shown in FIG. 3, the unitary tuft 4 will be anchored and retained in position by barbs 6 and 7, assisted by portion 8 of increased density. The barbs will engage the outer tuft bristles and frictionally resist forces tending to pull a tuft from its hole.

While FIGS. 1—3 have shown the invention as related to a roller-type brush backing with circular pierced holes, the invention may also be utilized in connection with backings of other shapes and/or wherein the pierced openings are noncircular. FIG. 4 shows a flat backing 11, as well as tufts 12 of oval, rectangular and other elongated shapes, and the similarly shaped piercing tools 13 to create the necessary tuft-receiving opening. Tufts 12 are generally elongated and of relatively flat shape which, when the brush is to perform a sweeping action, will assist the bristles to flick material from the swept surface.

Various modes of carrying out the invention are contemplated by the inventor.

The following claims particularly point out and distinctly claim the subject matter which is regarded as the invention.

I claim:

1. A method of manufacturing a carpet sweeper brush roll from a relatively rigid foamed cellular roller backing and a plurality of unitary bristle tufts, comprising the steps of:
   a. piercing said backing at a plurality of spaced locations to form elongated noncircular openings having barbs therein,
   b. and subsequently inserting tufts into said pierced openings so that said tufts take the noncircular shape of said openings and so that said barbs engage the tufts and firmly hold the latter against release from the backing.

2. The method of claim 1 wherein the said roller backing includes a relatively smooth skin, and wherein said piercing step tears said skin to form barb means on the edges of the torn skin portions.

3. The method of claim 1 wherein said piercing step ruptures the cells beneath the skin of said roller backing to form a plurality of barbs.

4. The method of claim 1 wherein said piercing step substantially permanently compresses said roller backing surrounding said opening.

5. The method of claim 1 wherein said roller backing has a minimum density of about 15 pounds per cubic foot.

6. The method of claim 5 wherein said roller backing is comprised of a resilient polyurethane.

7. A carpet sweeper brush roll comprising:
   a. a relatively rigid foamed cellular roller backing having a plurality of elongated noncircular pierced openings therein, with the walls of said openings forming a plurality of barbs.
   b. and a unitary bristle tuft disposed in and taking the noncircular shape of each said opening and anchored therein by frictional engagement by said barbs with the tuft.

8. The brush of claim 7 wherein said roller backing is formed of a continuous cellular structure having a relatively smooth skin forming the surface thereof, and wherein at least a portion of said barbs are formed by the edges of a torn skin portion.

9. The brush of claim 7 wherein said roller backing is formed of a continuous cellular structure having a relatively smooth skin forming the surface thereof, and wherein at least a portion of said barbs are formed by ruptured cells in said continuous cellular structure.

10. The brush of claim 7 wherein said roller backing is formed of a continuous cellular structure having a relatively smooth skin forming the surface thereof, and wherein said barbs are formed by the edges of a torn skin portion and by ruptured cells in said continuous cellular structure.

11. The brush of claim 7 wherein the continuous cellular structure immediately surrounding the pierced opening is of greater density than the density of the portions of the backing spaced further from said opening.

12. The brush of claim 7 wherein said roller backing has a minimum density of about 15 pounds per cubic foot.

13. A carpet sweeper brush roll comprising:

a. a slightly resilient relatively rigid polyurethane foam cellular roller backing having a minimum density of about 15 pounds per cubic foot,

b. said roller backing being formed of a continuous cellular structure having a relatively smooth skin forming the surface thereof,

c. said backing having a plurality of elongated noncircular pierced openings therein with the walls of said openings having barbs formed by the edges of a torn skin portion and by ruptured cells in said continuous cellular structure.

d. The continuous cellular structure immediately surrounding said pierced openings being of greater density than the density of the portions of the roller backing spaced farther from said openings.

e. and a unitary bristle tuft disposed in and taking the noncircular shape of each said opening and anchored therein by frictional engagement with said barbs.