

[54] **TUFTED STYLE BRUSH**

581,576 7/1933 Germany ..... 15/190

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[57] **ABSTRACT**

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[51] Int. Cl. .... **A46b 3/16**

[58] Field of Search ..... 15/190-205,  
15/179-183; 300/21

Tufted style brushes are herein disclosed which overcome many of the disadvantages associated with the use of stapleset brushes. The brushes of the instant invention include a plate of rigid or semi-rigid material, such as sheet metal or reinforced synthetic material, having a plurality of holes pierced therethrough, said plate being relatively smooth on the obverse side, and having flanged or raised areas circumferentially surrounding each hole on the reverse side. Tufts are secured in the holes of the plate by means of a ring which presses against the flanged area to create a positive locking effect. Finally, the structure can be provided with a securely fastened backing element.

[56] **References Cited**

**UNITED STATES PATENTS**

1,892,926	1/1933	Bilde .....	15/196 X
1,998,562	4/1935	Sturgis .....	15/180 X
2,298,156	10/1942	Person .....	15/193 X
2,371,701	3/1945	Matson .....	15/194 X
3,055,034	9/1962	Halg .....	15/197

**FOREIGN PATENTS OR APPLICATIONS**

696,273 10/1930 France ..... 15/193

**7 Claims, 4 Drawing Figures**

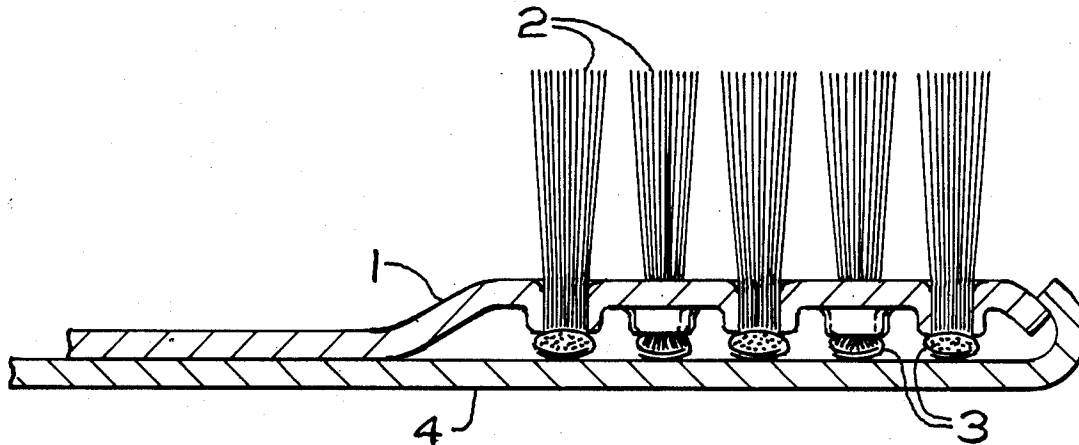


FIG. 1

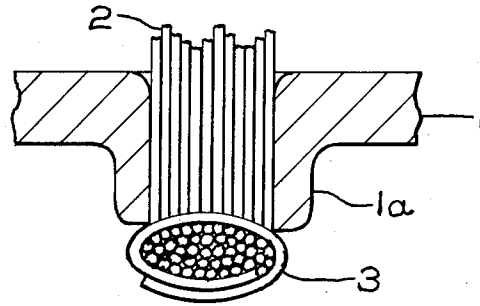


FIG. 2

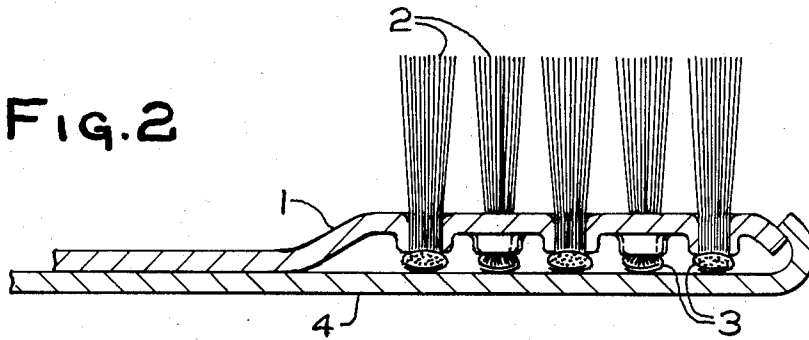


FIG. 3

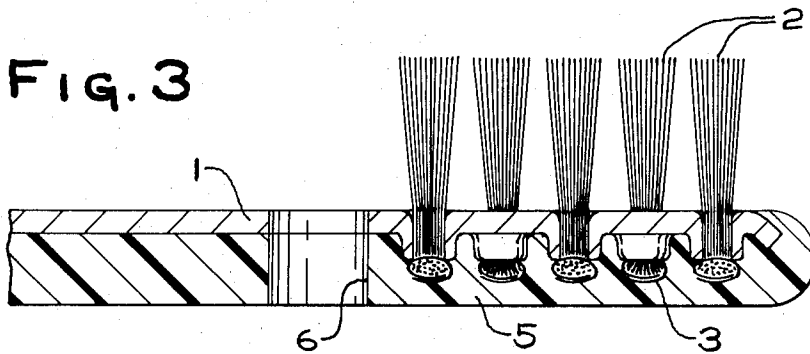
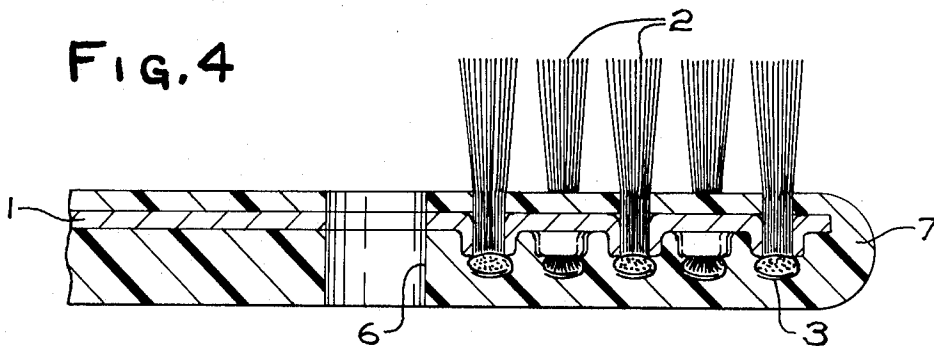


FIG. 4



## TUFTED STYLE BRUSH

## BACKGROUND OF THE INVENTION

Brush blocks and the use of staples to secure tufts to such brush blocks are well-known expedients in the brush industry. Such staple-set brushes are designed for a wide variety of uses, including hand use, hand-operated power tools and automatic power brushing equipment. While such brushes are widely used by the industry, the conventional brush block and staple have several shortcomings. In many instances, particularly where power equipment is concerned, a very definite danger exists when the staple does not hold the tuft sufficiently (or at all) to prevent it from being thrown from the block. Additionally, the primary materials utilized in the manufacture of brush blocks, i.e., beech and maple lumber, have met with increasing demand in this country. Block manufacturers are faced with either having to pay extremely high prices for the lumber or finding substitute block materials. Although plastic blocks have been used, they are still relatively expensive and their performance is not always satisfactory. In any event, regardless of the choice taken, the overall quality and safety of the tufted style brush is in no way improved.

## SUMMARY OF THE INVENTION

It has now been found that it is possible to manufacture tufted style brushes without the need for wood or plastic block constructions in which to secure the tufts. In addition, a more durable and versatile tufted brush construction has been provided which avoids shortcomings of the prior art staple-set brushes.

The brush of the instant invention comprises a plate of a rigid or semi-rigid material, formed to the desired shape of the finished brush, having a plurality of holes therethrough. The holes are provided such that the obverse side of the plate is relatively smooth, while the reverse side of the plate has flanged or raised areas circumferentially surrounding each hole. The contours of the plate itself can be varied to meet the desired application. Thus, for example, the plate may be planar, convex, concave, angled or curved.

Tufts are located in each hole and extend from below the flanged or raised areas to above the relatively smooth surface. Rings of relatively stiff material (e.g., metal) secure the tufts in place and press against the flanged or raised areas. The rings have a diameter greater than the diameter of the holes, thus providing a locking effect which will prevent both the tufts and the ring from being thrown from the plate. A backing element can be securely fastened to the plate and will sandwich the securing rings therebetween.

Because the plate can be formed, welded or swaged to conform to the needs of any brush application, this type of construction is easily adaptable to either hand or power brush applications. The plate also cooperates with the stiff rings to securely hold the tufts in place. Finally, this construction can be made to resist scuffs, sparks, rust or moisture, shedding and loss of fill material by using the proper material for the plate and the ring, or with the use of a coating and/or encapsulating resin to protect any metal components.

## DESCRIPTION OF THE DRAWINGS

FIG. 1 is an expanded view of one section of a brush structure, including the plate, the tuft and the securing ring, embodying the principles of this invention.

FIG. 2 is a view illustrating one embodiment of the instant invention wherein a metal backing element is used.

FIG. 3 is a view illustrating another embodiment of the instant invention wherein a resinous backing element is used.

FIG. 4 is a view illustrating another embodiment of the instant invention wherein the plate, and the securing ring, are encapsulated in a resinous material.

## DETAILED DESCRIPTION OF THE INVENTION

Referring to the drawings, where like numerals represent the same elements in each figure, the brushes of the present invention comprise a plate of rigid or semi-rigid material 1, which is formed into the desired shape of the finished brush by techniques well-known in the art. Holes are then pierced through the plate 1, forming flanged or raised areas 1a circumferentially surrounding each hole on the reverse side of the plate 1. The obverse side of the plate 1 is relatively smooth.

The holes can be arranged in any pattern desired or necessary to meet the particular application. For example, the holes may be formed in straight lines or in staggered configuration. Regardless of the particular pattern chosen, the important factor is that each hole be provided with a flanged or raised area.

Once the above-described holes are formed in the plate 1, tufts 2 can be inserted through each hole. While the tufts 2 may be inserted in the holes in a wide variety of different ways, it is preferred that the tufts be in a substantially U-shaped configuration to facilitate such insertion.

The apices of the U-shape can then be readily pulled through the flanged or raised areas 1a. In one especially preferred embodiment, U-shaped, relatively stiff components, e.g., metal wires, are placed over the center of the tufts. The U-shaped components, when pulled through the holes in the plate 1, form the tufts in the desired U-shape. The U-shaped component is then bent into a ring form 3 to securely lock the tufts in place. To obtain the requisite locking effect, the components are bent such that the diameter of the so-formed rings exceeds that of the holes, thus preventing the tufts from being pulled through the holes from the obverse side of the plate.

In order to prevent the tufts from being pulled through the holes from the reverse side of the plate, the plate 1, with the tufts inserted therein, can then be matched, in one embodiment, with a second plate formed to lock the two plates together. This backing element 4, when locked in place, provides, with the plate 1, a finished brush that, if desired or necessary, then needs only to be trimmed to length. If desired, handle or arbor holes 6 may be provided.

In a still further embodiment, the reverse side of the plate 1 is provided with a resinous backing element 5. This resinous element is provided by encapsulating techniques well-known in the art. If desired, the entire plate 1 may be encapsulated with resinous material 7 in the same manner, thus providing a means of preventing the loss of brush filaments. Alternatively, the rings may be secured to the plate 1 through the use of a suit-

able adhesive, e.g., epoxy or vinyl resin, applied to those areas where the rings come into contact with the plate.

The materials useful in the instant invention can be widely varied. The plate and backing element are preferably fabricated from such materials as aluminum, copper, steel and reinforced synthetic resinous materials. Similarly, the securing ring may be of any of the above described metals or of any other material which would possess the requisite stiffness. The tufts themselves may be composed of any stranded material desired, available and/or known in the art, including synthetics, such as acrylics, polyesters, nylon and other polyamides, polystyrene, polyvinylchlorides and polyolefins; vegetable fibers; metal wires and plastic coated metal wires; plastic coated glass fibers; or combinations thereof. Finally, suitable resinous encapsulating materials include substantially any of the known encapsulating resins, such as polyvinylchloride, polyurethane, polymethylmethacrylates, and the like. Additionally, any of the known rigid structural foams may be used as the encapsulating component, including polypropylene, polyethylene, polyvinylchloride, polyurethane, and the like.

In one especially preferred embodiment, the plate and backing element are fabricated of stainless steel, with the locking rings being made of steel wire and the tufts being made of nylon coated glass fibers.

According to the provisions of the Patent Statutes, there are described above the invention and what are now considered to be its best embodiments. However, within the scope of the appended claims, it is to be understood that the invention can be practiced otherwise than as specifically described.

I claim:

1. A brush comprising:

A. a plate having a plurality of holes pierced there-through, said plate being relatively smooth on the obverse side thereof, and having flanged or raised areas circumferentially surrounding each of said

holes on the reverse side thereof;

B. substantially U-shaped tufts located in each of said holes and extending from below the flanged or raised areas to above said relatively smooth obverse side, wherein the apices of said U-shaped tufts extend completely through said flanged or raised areas;

C. a first means for preventing said tufts from being pulled through said holes from the obverse side of said plate, said means pressing against said flanged or raised areas and extending through the apices of said U-shaped tufts, said means comprising substantially U-shaped, relatively stiff components which have been formed into generally ring-shaped configurations and wherein the diameters of said configurations are greater than the diameters of said holes; and

D. a second means for preventing said tufts from being pulled through said holes from the reverse side of the plate.

2. A brush according to claim 1, wherein said plate is metal.

3. A brush according to claim 1, wherein said relatively stiff components are metal wires.

4. A brush according to claim 1, wherein said second means comprises a backing element securely fastened to the reverse side of said plate and being substantially coextensive therewith; said first means being located between said plate and said backing element.

5. A brush according to claim 4, wherein said backing element is a metal plate.

6. A brush according to claim 4, wherein said backing element is a resinous material.

7. A brush according to claim 6, wherein said backing element includes a portion which substantially covers the obverse side of said plate, said backing element, and said covering portion comprising a resinous material.

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