United States Patent

Lewis, Jr.

[15] 3,641,610

[45] Feb. 15, 1972

[54] ARTIFICIAL TUFTED SPONGES

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[73] Assignee: Tucel Industries, Inc., Middlebury, Vt.

[22] Filed: Feb. 11, 1970

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[52] U.S. Cl. .....15/114, 15/159 R, 15/223, 156/72, 300/21

[51] Int. Cl. A46b 3/06, A47l 13/12

[58] Field of Search .....15/110, 114, 115; 401/22, 24, 401/27; 128/62 A; 156/72; 161/62, 67; 300/21

[56] References Cited

UNITED STATES PATENTS

2,679,063	5/1954	Hoffmann	15/114 X
2,946,072	7/1960	Filler et al.	15/114 X
3,121,897	2/1964	Lambrich	15/114 UX
3,392,421	7/1968	Mathison	15/114 X
3,403,070	9/1968	Lewis	15/159 A UX
3,491,396	1/1970	Eannarino et al.	15/114 UX

FOREIGN PATENTS OR APPLICATIONS

139,991	12/1934	Austria	15/110
1,014,169	5/1952	France	15/114
1,133,161	11/1956	France	15/114
490,174	8/1938	Great Britain	15/114
1,168,513	10/1969	Great Britain	15/114
207,195	1/1940	Switzerland	15/114

Primary Examiner—Daniel Blum

Attorney—LeBlanc & Shur

[57] ABSTRACT

A tufted sponge construction is presented comprising an artificial sponge having apertures opening through a scrubbing surface and having the prefused end of a synthetic filament tuft received in each aperture before said mass cools so that the prefused mass conforms to the internal confines of the aperture and adheres thereto to support the tuft. Tufted sponge constructions of this invention may be formed from sponge.

12 Claims, 13 Drawing Figures

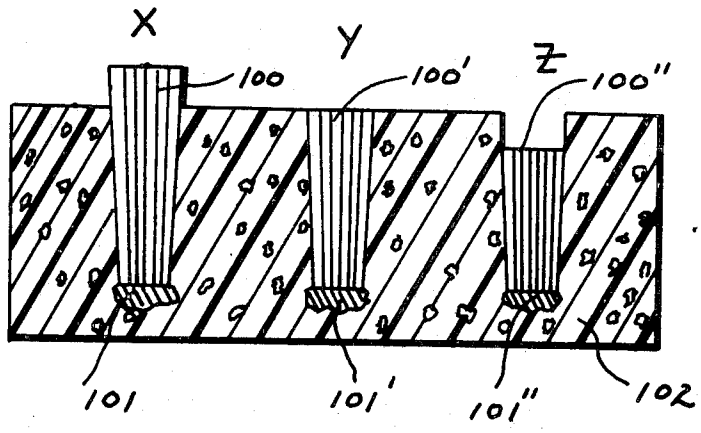


FIG-1

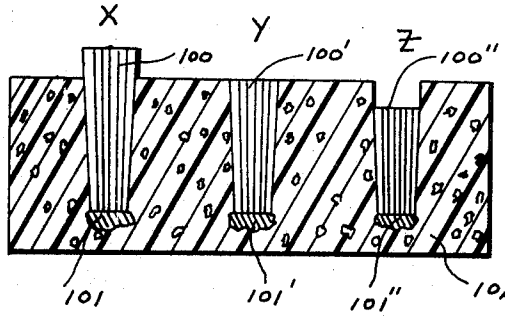
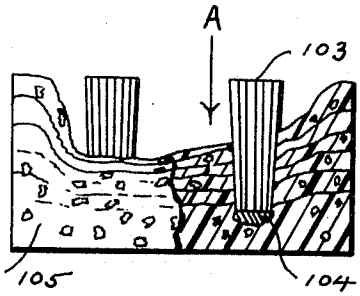


FIG-2



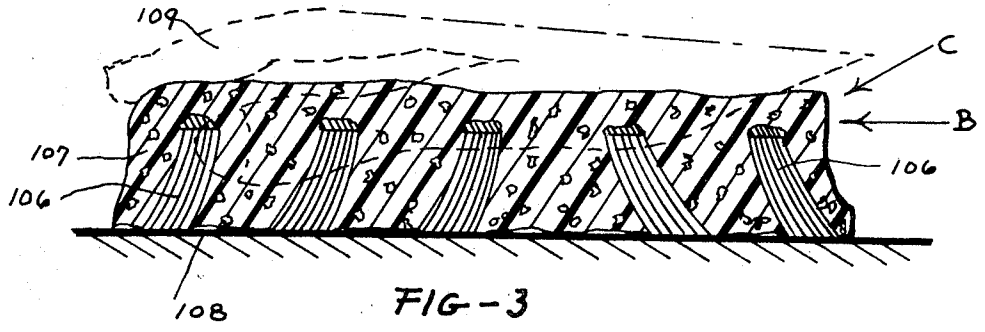


FIG-3

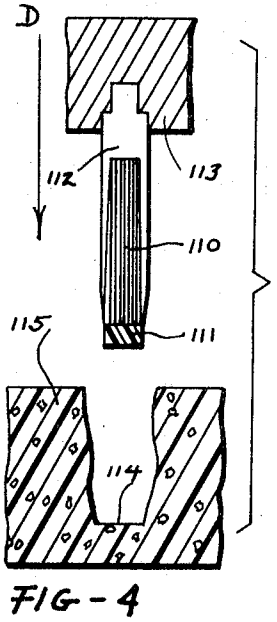


FIG-4

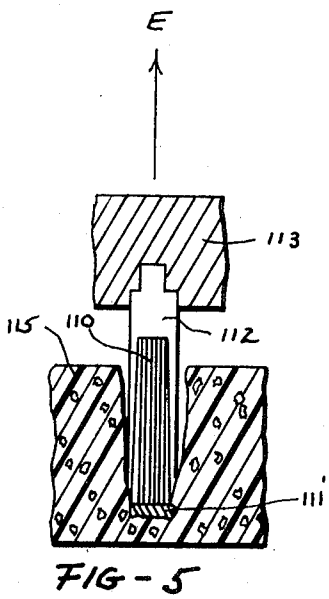


FIG-5

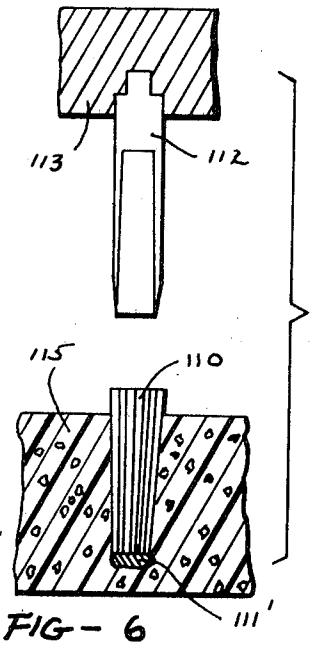


FIG-6

INVENTOR.

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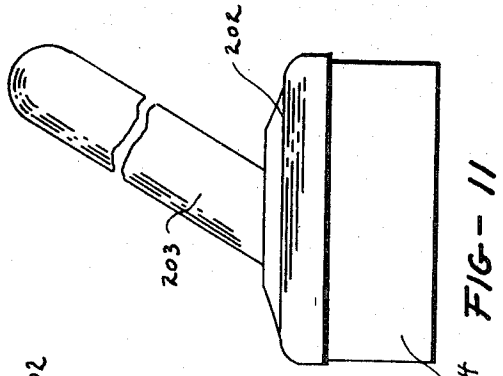

FIG - 11

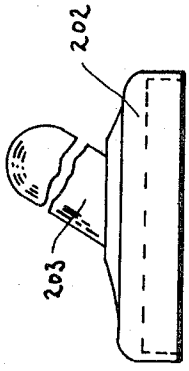

FIG - 10

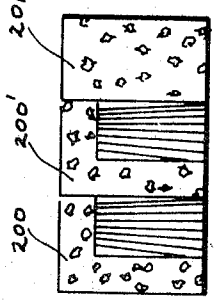

FIG - 9

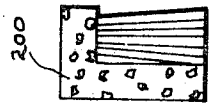

FIG - 8

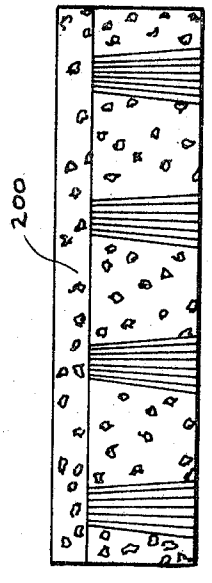

FIG - 7

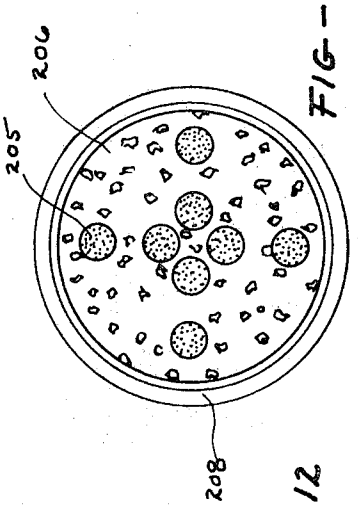

FIG - 13

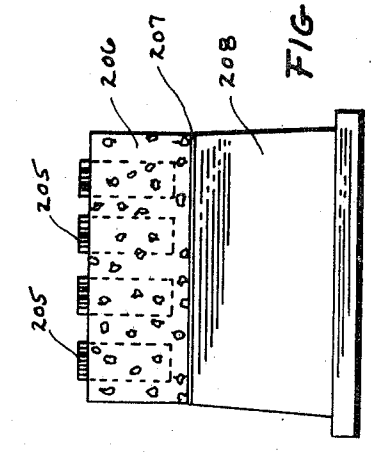

FIG - 12

INVENTOR.

BY John C. Lewis, Jr.

ARTIFICIAL TUFTED SPONGES

This application is related to my copending patent application Ser. No. 841,160, a divisional application of parent application Ser. No. 578,840, now U.S. Pat. No. 3,471,202; and related to my copending patent application Ser. No. 800,330, a divisional application of parent application Ser. No. 578,840, now U.S. Pat. No. 3,471,202.

The improved characteristics of the sponges of this invention are attained by providing novel tufts within the framework of the sponge, and so located at or near the working surface in order that the working tips of each tuft operate as effective brush working ends.

Prior to this invention, synthetic sponges having brush tufts therein to improve their utility, although known, were not practical for many reasons. The insufficiencies of prior articles stem from the lack of a satisfactory method for constructing tufted synthetic sponges. The most common tufting method, the staple-set method, is unacceptable for setting synthetic fiber tufts in foam or synthetic sponge substrate. Synthetic sponges do not possess the mechanical ability to hold an anchor or staple during prolonged used. Therefore, U-shaped tufts normally employed in brush making cannot be durably attached in flexible or cellular substrates.

It will be apparent in the discussion which follows wherein the novel spongelike products of the invention differ from prior sponges and it should be apparent why the improved tufted sponge offers superior cleaning qualities among other advantages.

Objects and advantages of this invention will be set forth in part hereinafter and in part will be obvious herefrom, or may be learned by practice with the invention, the same being realized and attained by means of the steps, methods, combinations and improvements pointed out in the appended claims.

This invention consists in the novel steps, combinations, and improvements herein shown and described.

The objects of this invention will now be described. While the invention is primarily concerned with new and novel sponge-type cleaning tools, it should be realized that the principles of this invention are attained only through the novel method of picking and forming synthetic filament tufts, and these principles are applicable to situations wherein: (1) multiple filament single tufts are formed, (2) multiple tufts of multiple filaments are formed, (3) complete tufted arrangements are formed, and (4) continuous modular tufted arrangements and components are formed.

It is therefore an object of this invention to provide new and useful tufted sponge cleaning tools. Another object of this invention is to provide a tufted sponge having improved cleaning qualities by having placed near or at the working surface synthetic filament tufts.

Yet another object of this invention is to provide a brushing tool having the ability to retain liquid cleaners during usage. Still another object of this invention is to provide novel brush constructions employing the tufted sponge units having the qualities heretofore mentioned in the foregoing objects.

In the drawings:

FIG. 1 is a cross-sectional view of a sponge showing tufts in accordance with this invention.

FIG. 2 is a fragmentary side view partly in cross section showing one arrangement of tufts integrally attached to a sponge substrate.

FIG. 3 is a cross-sectional view of a sponge illustrating the working ends of each tuft.

FIGS. 4–6 illustrate a method of inserting synthetic filament tufts in a sponge substrate in accordance with this invention.

FIGS. 7–11 illustrate a method of assembling a tufted sponge employing the sections of FIG. 7. FIG. 7 is a front view of a section comprising a multiplicity of filament tufts attached to and supported by a sponge. FIG. 8 is an end view of FIG. 7. FIG. 9 is an end view of two sections aligned side by side and next to an untufted section of sponge. FIG. 10 is an end view of a cap adapted to be placed over the aligned segments of FIG. 9 in the manner shown in end view FIG. 11 which shows a finished sponge mop construction with the sections held by the cap.

FIG. 12 is a side view of a tufted sponge mounted on the top of an aerosol can cap.

FIG. 13 is a top view of the tufted sponge shown in FIG. 12 illustrating the tuft arrangement.

In order to describe the invention more fully, reference is now made to specific embodiments illustrated in the drawings. The invention is directed to brush making wherein tufted sponges are formed employing tuft-picking devices, filling the said tuft-picking devices with synthetic filament, heating the nonworking end of said tuft and inserting same into a sponge substrate, allowing the heated end to fuse as it cools, to the sponge, and upon removal of the picking device, leaving the tuft attached to the substrate.

When the prefused end of the tuft is inserted into an aperture on the scrubbing or working surface of the sponge substrate, the prefused end conforms to the internal confines at the base of the aperture. The heat-softened filamentary material then enters the porous surface at the base of the aperture. When the prefused end of the tuft cools, the mass of material conforms and adheres to the internal confines at the base of the aperture to hold the tuft in the sponge.

In FIG. 1, a sponge substrate **102** is shown containing tufts of synthetic filament having different trim lengths. Filament tufts **100**, **100'** and **100''**, designated as X, Y, and Z respectively, are attached to the substrate and their nonworking end **101**, **101'** and **101''**. The filament portion of tuft X is completely free of substrate **102** excepting at the point of joining **101**. The fused portion of filament actually is hardened to and attached to the sections of substrate **102** in such a manner as to allow a bond between the sponge and the tuft. For purposes of explanation, the sponge section **102** of FIG. 1 is in the wet state, and shows different tuft arrangements. The tuft X protrudes beyond the surface of sponge **102**, and would act more like a conventional tuft in a tufted brush during usage. The tuft Y is trimmed in such a manner that when the sponge is wet, the working tip of the filament tuft is level with the surface of the sponge. The tuft Z is trimmed in such a manner that the working tip of the filament tuft **100''** never extends to or beyond the surface of the sponge **102**. However, when the wet sponge is compressed in direction A as shown in FIG. 2, tufts **103** are exposed. Tufts **103** are held firmly in the sponge substrate **105** by the heat fused portion **104**.

The sponge **107** of FIG. 3 demonstrates how the tufts can be effective in cleaning. Tufts **106** are deflected in various directions, as shown, when pressure from hand **109** pushes down and forward along direction B and C, thus exposing the working tips of filament tufts **106**. In turn, the tips are in contact with the surface **108**, and subsequently, work similar to brush tufts in removing unwanted material. The sponge portion **107** retains solvent and chemicals when needed.

While the invention is susceptible of embodiment in many different forms, there is shown now in FIGS. **4**, **5** and **6** specific embodiments with the understanding that the present disclosure is to be considered as an exemplification of the principle of the invention and is not intended in any way to limit the invention to the embodiments illustrated.

Particular attention is now given to FIG. 4 wherein there is shown the tuft-picking device **112** containing filament **110** fused and still in the semimelt state **111**, said tuft-picking device held in support **113**. Prior to the picking device indexing in direction D, a punched hole with bottom **114** in sponge **115** is provided for. The hole is formed by inserting a probe through the cell structure of the sponge, thus tearing and widening an opening. The fused end portion **111** is then indexed in direction D allowing the fused portion to fuse and cool around the sponge substrate as shown in FIG. **5**. When the tuft-picking device is indexed in direction E as shown in FIG. **5**, there results a pretrimmed synthetic filament tuft **110** securely fastened to the sponge **115** as shown in FIG. **6**. This type of construction is not possible by employing conventional methods for stapling filament tufts.

FIGS. **7–11** show how segments with synthetic filament tufts may be assembled into a finished sponge mop. More particularly, as shown in FIG. **7**, the segment **200** is comprised of

tufted sponge. An end view of this segment is shown in FIG. 8. In FIG. 9 two similar segments, 200 and 200' are placed next to an untufted section of sponge 201 and are so aligned that by providing a cap 202, as shown in FIG. 10, there results a tufted sponge mop having handle 203. The finished mop of FIG. 11 is comprised of handle 203, cap section 202, and tufted sponge section 204.

Many types of cleaning tools can be manufactured employing this tufted sponge concept, that heretofore were not possible. For instance, the tufted sponge rug cleaner shown in FIGS. 12 and 13 is constructed in such a manner that allows one to hold on to aerosol cap 208 while cleaning. The sponge section 206 containing tufts 205 is attached by means of an adhesive 207 to the cap.

The preferred sponge compositions for making the tufted articles of this invention are cellulose, polyurethane and foamed polyolefins. The tufts of this invention can be composed of any thermoplastic composition such as polyamides, polyolefins, polyvinyl chloride and the like. Colorants, extenders, plasticizers and modifiers may be added to these materials as practice dictates.

The cell structure is not limited in any way, and can be fine or coarse. Also, orientation of the sponge structure can be varied, and is not limiting. The magnitude of the filaments described in the invention is in the range of 0.006 to 0.200 inch.

The tufted sponge construction of this invention can be employed to prepare improved products such as: mops, polishing brushes, abrasive strip brushes, rotary brushes, liquid-retention brushes, auto cleaning sponges, kitchen sponges, and the like.

The foregoing considerations conclusively demonstrate the advantages to be gained by providing tufted sponge constructions hereinbefore described. When such constructions are incorporated into brushing tools, there is attained new and novel products heretofore not known.

The invention in its broader aspects is not limited to the specific steps, methods, compositions, combinations and improvements described but departures may be made therefrom in the scope of the accompanying claims without departing from the principles of the invention and without sacrificing its chief advantages.

I claim:

1. In a tufted sponge construction having a plurality of mutually spaced filamentary tufts mounted in a porous scrub sponge, the improvement comprising:

a plurality of tuft-receiving blind apertures opening through a scrub surface of said sponge, each aperture receiving a prefused mass of said filamentary material with an integral filament tuft extending therefrom so that when the mass of material cools, the said mass conforms and adheres to the internal confines at the base of the aperture to hold the tuft in the sponge.

2. The tufted sponge of claim 1 wherein the working end of each of said tufts, received in said apertures, is disposed within the aperture below the scrub surface of said sponge.

3. The tufted sponge of claim 1 wherein the working end of each of said tufts is disposed adjacent the opening of each of said apertures at the scrub surface of said sponge.

4. The tufted sponge of claim 1 wherein the working end of each of said tufts received in said apertures and the terminal portion of said tufts extends from said aperture.

5. A tufted scrub sponge comprising:

a sponge having at least one tuft-receiving blind aperture opening through a scrub surface thereof;

at least one tuft comprising a plurality of cut-to-length synthetic filaments extending from a prefused mass of said filamentary material, said prefused mass and at least a portion of the tuft extending therefrom received in the aperture in said sponge so that when the mass of material cools, the said mass conforms and adheres to the internal confines at the base of the aperture to hold said tuft in said sponge.

6. The tufted sponge of claim 5 further comprising a plurality of mutually spaced tuft-receiving blind apertures opening through a scrub surface of said sponge, each of said apertures receiving at least one of said tufts having a prefused homogenous mass of filamentary material with a plurality of synthetic filaments extending therefrom, said mass received in said apertures and conforming and adhering to the internal confines at the base of said aperture to hold said tuft in said sponge when said mass cools.

7. The tufted sponge of claim 6 wherein the working end of each of said filament tufts received in said apertures is disposed within said aperture below the scrub surface of said sponge.

8. The tufted sponge construction of claim 6 wherein the working end of each of said tufts is disposed adjacent the opening of each of said apertures at the scrub surface of said sponge.

9. The tufted sponge construction of claim 6 wherein the working end of each of said tufts received in said apertures and the terminal portion of each of said tufts extend from said apertures.

10. The tufted sponge of claim 6 wherein the apertured surface of said tufted sponge forms a scrub surface thereof, said sponge further comprising a rigid support, said support mounting said tufted sponge at a surface other than the scrub surface to support the surface for scrubbing.

11. The tufted sponge construction of claim 5 wherein the sponge is formed of a material selected from the group consisting of cellulose, polyurethane and a foamed thermoplastic olefin.

12. The tufted sponge construction of claim 5 wherein the synthetic filament tufts are formed of a material selected from the group consisting of polyethylene, polypropylene, and polyamide.

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