Nov. 11, 1969 O. GREICHGAUER 3,477,763

BRUSH AND METHOD OF PRODUCING THE SAME

Original Filed Sept. 11, 1964 2 Sheets-Sheet 1

FIG. 1

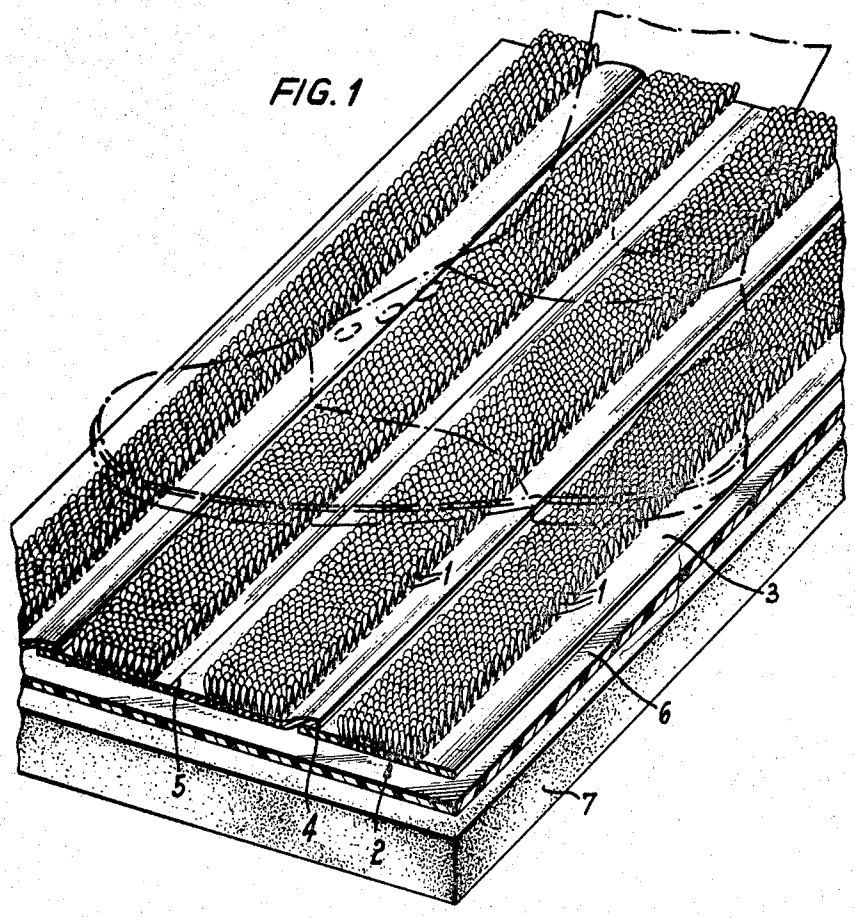
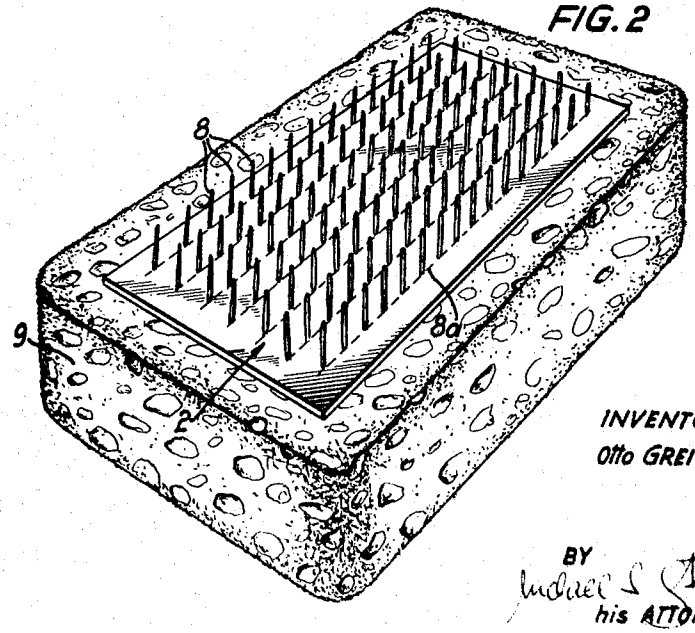


FIG. 2



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Nov. 11, 1969 O. GREICHGAUER 3,477,763

BRUSH AND METHOD OF PRODUCING THE SAME

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FIG. 3

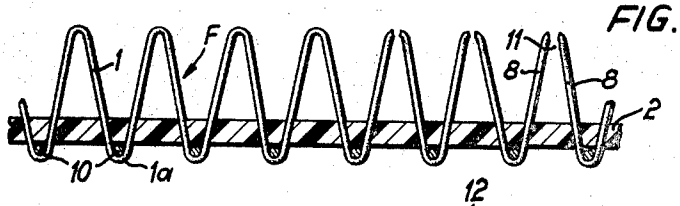


FIG. 4

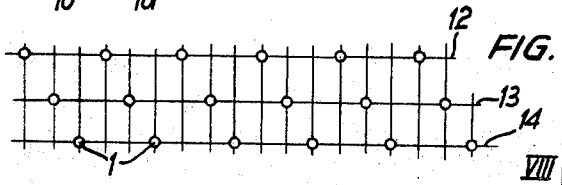


FIG. 5

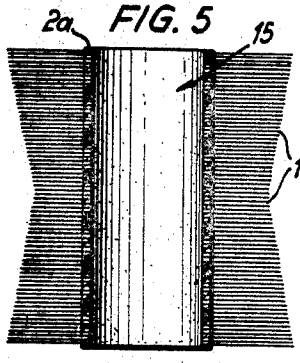


FIG. 6

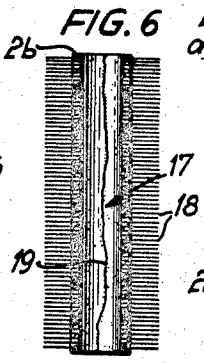


FIG. 7

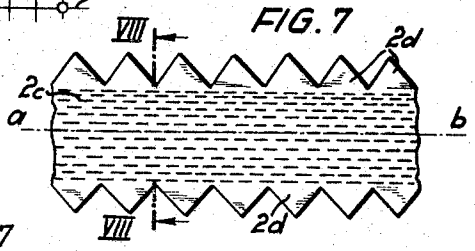


FIG. 8

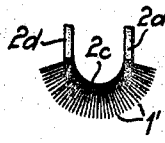


FIG. 9

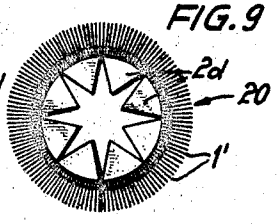


FIG. 10

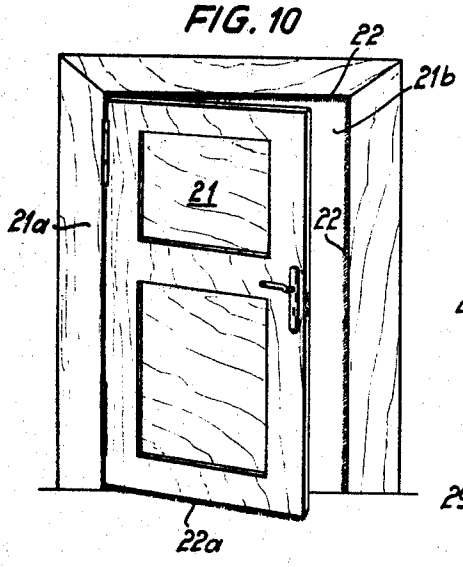


FIG. 11

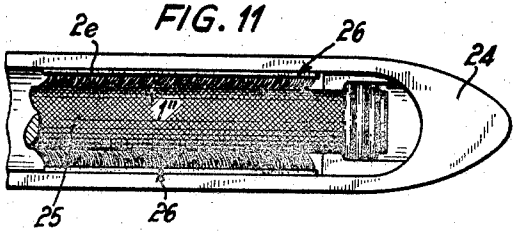


FIG. 12

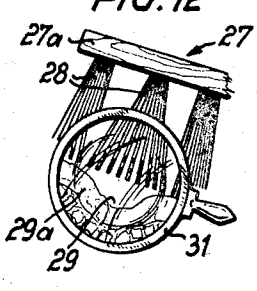
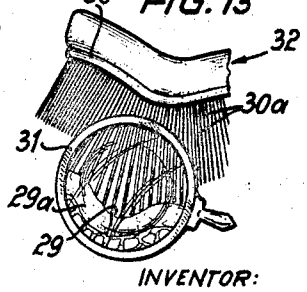


FIG. 13



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3,477,763

BRUSH AND METHOD OF PRODUCING THE SAME

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Continuation of application Ser. No. 395,767, Sept. 11, 1964. This application Aug. 24, 1967, Ser. No. 663,169
Claims priority, application Germany, Sept. 12, 1963, G 28,600; Nov. 6, 1963, G 28,938
Int. Cl. A46b 3/04
U.S. Cl. 300—21 2 Claims

ABSTRACT OF THE DISCLOSURE

A method of producing a bristly article comprises successively threading a comparatively stiff elastically deflectable synthetic plastic filament through a back support of solid flexible sheet material from one to the other side thereof. Thereby, first filament portions are removably supported and embedded in the material of the back support and second filament portions are integral with the first filament portions and extend beyond one side of the back support.

This is a continuation of application Ser. No. 395,767, filed Sept. 11, 1964, now abandoned.

The present invention relates to the production of brushes. More particularly, the invention relates to an improved brush and to a novel method of producing the same.

It is an important object of the present invention to provide a very simple, inexpensive, wear-resistant, easy-to-make and easy-to-clean multiple-purpose brush which may be utilized for grooming of human or animal hair, for massaging or other treatment of human or animal skin, as a buff, as a component part of floor mats, as a hair roller, as a brake for threads in textile machines, as a pipe or dish cleaner, as a shoe cleaning pad, as a polishing cloth, as an automobile cleaning pad, as a sealing element in door frames or window frames, as an element of friction generating assemblies, as a brush for application of nail polish or other cosmetics, as an artists' brush, as an implement for cleaning of sensitive instruments in laboratories, as a toothbrush, and for many related purposes.

Another object of the invention is to provide a novel method of producing a brush of the above-outlined characteristics in a time-saving operation and to provide simple machinery for the practice of my method.

A further object of the invention is to provide a brush which is particularly suited for treatment of uneven, rounded and other surfaces which cannot be treated by conventional brushes and to construct the brush in such a way that its bristles will exhibit different degrees of stiffness.

An additional object of the invention is to provide a novel method of attaching bristles to a back support and to provide a novel method of making bristly products which comprise two or more brushes.

A concomitant object of the invention is to provide a method of the just outlined characteristics according to which the brush may be assembled in such a way that the bristles may be made integral with the back support even though the brush need not be produced by molding and similar expensive processes.

Still another object of the invention is to provide a method of producing plastic brushes and of combining such brushes with one or more additional components to form multi-purpose implements which may be used in cleaning, polishing, friction-generating, sealing, curling, dust collecting and analogous devices.

Briefly stated, one features of my invention resides in the provision of a method of producing a brush which comprises the steps of threading a filament of comparatively stiff elastically deformable synthetic plastic material through a flexible sheet-like back support to form a plurality of loops which extend from one side of the back support and constitute dual bristles of the thus obtained brush and, if necessary, severing at least some of the loops at points distant from the back support so that each such loop yields a pair of individual bristles.

If the back support is to be comparatively stiff, it may consist of thermoplastic material which is heated prior to threading of the filament and is thereupon cooled or allowed to cool whereby its material sets and loses some of its flexibility.

The novel features which are considered as characteristic of the invention are set forth in particular in the appended claims. The improved brush itself, however, both as to its construction and the method of producing the same, together with additional features and advantages thereof, will be best understood upon perusal of the following detailed description of certain specific embodiments with reference to the accompanying drawings, in which:

FIG. 1 is a fragmentary perspective view of a composite brush which constitutes a floor mat and is constructed in accordance with a first embodiment of the present invention;

FIG. 2 is a perspective view of a combination brush and sponge;

FIG. 3 is an enlarged section through a portion of a brush;

FIG. 4 is a diagrammatic top plan view of a brush wherein the loops in adjoining parallel rows are staggered with reference to each other;

FIG. 5 is an axial section through a hair roller which constitutes a cylindrical brush and wherein the bristles form a tubular body of a generally dished outline;

FIG. 6 is an axial section through a modified cylindrical brush;

FIG. 7 is a top plan view of a bristly blank which is about to be transformed into a tubular brush with partially or fully sealed ends;

FIG. 8 is a transverse section as seen in the direction of arrows from the line VIII—VIII of FIG. 7 and illustrates the blank in partially rolled condition;

FIG. 9 is an end elevational view of a cylindrical brush which is obtained from the blank of FIG. 7 to be utilized as a pipe cleaner;

FIG. 10 is a front elevational view of a door frame whose opening is surrounded by a setose sealing strip produced in accordance with the present invention;

FIG. 11 is a front elevational view of a shuttle which is provided with a thread brake consisting of a flexible brush produced in accordance with the present invention;

FIG. 12 is a somewhat schematic view showing a portion of human skin as seen through a magnifying lens and while the skin is being treated by a conventional brush having a rigid back support; and

FIG. 13 is a similar view showing a portion of human skin as seen through the magnifying lens during treatment with a brush which is produced in accordance with the method of my invention.

Referring to FIG. 1, there is shown a portion of a floor mat which includes a floor-contacting pad 7 of foam rubber or similar friction generating antiskid material. The pad 7 is bonded to the underside of a sheet-like intermediate layer or carrier 6 which constitutes a stiffener for sheet-like back supports 2.

These back supports are elongated strips of flexible material whose undersides are bonded to the upper side of the stiffener 6. Each back support is provided with a

large number of regularly distributed loops **1** which constitute dual bristles and are formed by threading filaments of comparatively stiff but elastically deformable synthetic plastic material through the respective back supports so that the thus obtained loops extend upwardly and beyond the upper sides of the back supports. Each back support **2** comprises two longitudinally extending marginal portions **3** which are free of loops. One marginal portion **3** of each back support **2** may overlap the adjoining marginal portion **3** of an adjacent back support in a manner as indicated at **4** in the lower right-hand portion of FIG. 1. Alternatively, and as shown at **5**, the end faces of the adjoining marginal portions **3** on two adjacent back supports **2** may simply abut each other. Of course, the adjoining groups of loops **1** need not be as widely spaced as shown in FIG. 1, i.e., the width of the portions **3** may be negligible or such portions may be omitted if the loops **1** are to form a continuous uninterrupted bristly body at one side of the composite back support. The back supports may be welded, glued or otherwise bonded to the carrier **6**. The manner in which portions of the loops may be permanently secured to the respective back supports will be described in connection with FIGS. 3 and 4.

The mat of FIG. 1 may be easily cleaned, either by shaking or by immersion in water. The spaces between the adjoining bristles can accumulate large quantities of dust and will keep such dust from spreading. The layer **6** may be rather rigid though it is preferably at least slightly flexible. As a rule, the flexibility of the layer **6** will be less than that of the back supports **2**.

FIG. 2 illustrates a combination brush and sponge which may be used in bathrooms and kitchens. The loops are severed at points distant from the back support **2** to yield pairs of individual bristles **8** which may but need not be of identical length. It will be noted that the bristles **8** are distributed regularly and are arranged in parallel rows **8***a*, and that the bristles in adjoining rows are traversely aligned with each other. The underside of the back support **2** is bonded to the upper side of a body **9** consisting of spongy material which constitutes a base of the multi-purpose implement. The bristles **8** are sufficiently stiff to support a piece of soap (not shown) so that the soap may be kept out of contact with the surface of a sink and remains dry.

The implement of FIG. 2 may be used as a fingernail brush, as a massaging brush for human or animal skin, as a hair brush and for many analogous purposes. The sponge **9** serves as a means for facilitating the application of soap to human or animal skin, as a means for cleaning the sink or bath tub, or simply as a convenient yieldable handgrip device when the implement is used as a brush. If the implement of FIG. 2 is used as a fingernail brush, the loops **1** may be clipped to form rows of individual bristles wherein longer bristles alternate with shorter bristles. Such bristles will be flexed when the brush is put to actual use to penetrate beneath the fingernails.

FIG. 3 illustrates a portion of a back support **2** which consists of a sheet of synthetic thermoplastic material and serves as a carrier for a comparatively stiff, self-supporting but elastically deformable filament F of synthetic plastic material. This filament may consist of polyvinyl chloride, polyvinyl acetate, polyethylene, polypropylene, polystyrene, nylon or other suitable plastic material. Spaced portions of the filament F extend threadedly through the back support **2** and the remainder of the filament forms a row of substantially V-shaped loops **1** which extend from the upper side of the back support to constitute a series of V-shaped dual bristles. Some or all of the loops **1** may be severed, as indicated at **11**, so that each thereof yields a pair of individual bristles **8**. The portions **1***a* which extend beyond the underside of the back support **2** are interlaced with one or more retaining threads **10** to insure that the loops remain safely anchored in the back support. Alternatively, the underside of the back support **2** may be coated with a layer of suitable bonding material to unite the threaded portions **1***a* with the back support and to form a one-piece brush.

It will be noted that the loops **1** and bristles **8** extend substantially normally with reference to the upper side of the back support **2**. If the filament F which forms the loops **1** is rather stiff, i.e., if it exhibits the tendency to flex the material of the back support **2** because the threaded portions **1***a* tend to straighten out, one may proceed as follows: The back support **2** is heated prior to or during threading of the filament F so that its flexibility increases. The filament F is also made of thermoplastic material and its portions **1***a* are softened by heat so that they lose the tendency to flex the back support. Once the filament is deformed in a manner as shown in FIG. 3, the back support is cooled whereby the portions **1***a* are stabilized in deformed condition and lose the tendency to flex the back support. As a rule, the thickness of the back support **2** will exceed the diameter of the filament; for example, the thickness of the back support may be about three times the diameter of the filament.

The filament F may be threaded in a conventional sewing machine, for example, by resorting to a double chain-stitch sewing machine. Also, the loops **1** in adjoining parallel or substantially parallel rows **12, 13, 14** (see FIG. 4) may be staggered with reference to each other, as seen in the longitudinal direction of such rows. Thus, the distance between two staggered loops **1** (as seen in the longitudinal direction of a row **12, 13** or **14**) may approximate the length of a stitch. FIG. 4 shows that the loops **1** in adjoining rows are distributed in staggered fashion.

It is also possible to alternate rows of staggered loops with rows wherein the loops are transversely aligned with each other.

The filament F of FIG. 3 may also be applied in a specially constructed sewing machine. For example, the sewing machine may include a suitable lever over which the filament is alternatively drawn in opposite directions to form the loops. The stitching may be similar to that used for securing cotton pads to the shoulder portions of jackets. At the same time, the sewing machine interlaces the filament F with the reinforcing thread **10** in accordance with the so-called chain-stitching or a similar method.

The lever may be kept at a distance of 10–15 mm. above the back support, and one of its ends is adjustably secured to the sewing machine so that, and since the filament F is led through or around the lever, the sewing machine will produce the loops **1** which extend substantially normally from the exposed side of the back support. The lever may be moved with reference to the machine to form loops of requisite length. When the advancing mechanism of the sewing machine transports the back support with reference to the needle, each freshly formed loop is slid off the lever and forms a dual bristle of the type shown in FIG. 3. As stated above, the loops in adjoining rows may but need not be in transverse alignment with each other. For example, the loops may be staggered by a full length of a stitch, by a fraction (one-half or one-fourth) of a stitch, or by two or more full lengths of a stitch. The length of stitches will depend on the intended use of the brush. If the brush is to be used as a buff, the loops may be formed in concentric circles or in the form of a helix. The back support may constitute a continuous web of textile, flexible synthetic plastic, rubber or other sheet-like material which is severed into sections of requisite size subsequent to the formation of loops. The web may be stored on reels or in folded form.

The reinforcing threads **10** may be omitted, particularly if the underside of the back support **2** is coated with a layer of bonding material which unites the threaded portions **1***a* with the material of the back support. Of course, it is equally possible to simply heat the portions **1***a* so that such portions melt and are thereby united with the material of the back support **2**.

It is clear that the brush of my invention may be produced by utilizing differently colored back supports and/or filaments so that the ultimate product will be one of eye-pleasing appearance and of greater sales appeal. For example, the filament F which forms the loops **1** may be of a color which is different from the color of the back support **2** or, alternatively, two or more types of filaments may be used.

The loops may be disposed in bunches or at a uniform distance from each other, and, if desired, bunches of unsevered loops may alternate with bunches of individual bristles.

When used as a brush for massaging of human skin, the back support may be made in lengths of 4–6 inches and in widths of 3–4 inches to be used with or without a spongy carrier as a highly flexible cleaning implement which can be readily wrapped around the hand. Such implements are equally useful as cleaning pads for dishes, for cleaning of sinks and the like.

FIG. 5 illustrates a hair roller **15** having a tubular (preferably cylindrical) back support **2***a* and radially outwardly extending individual bristles **16**. The bristles **16** form a tubular body of a generally dished outline. Such hair rollers are very practical because the outline of the bristles may follow the curvature of a human head. The tubular back support **2***a* is obtained by rolling a flat rectangular strip of the type shown in FIG. 3 or 4 into the form of a tube to form a bristly blank of cylindrical shape, and the adjoining longitudinal edge portions of the back support are then sewed to each other or are provided with a longitudinally extending welded seam to transform the blank into a circumferentially complete tubular brush **15**. If the back support consists of thermoplastic sheet material, it may be heated prior to rolling and is then cooled to be stabilized in the final form.

FIG. 6 shows a similar tubular brush **17** wherein the bristles **18** form a tubular body of cylindrical outline. The bristles are obtained by severing each of the loops **1**, and the dished outline is obtained by suitable trimming of the thus obtained individual bristles. Such trimming may be carried out in conventional machines which may be used to simply sever the loops and/or to actually remove a portion of each loop. In FIG. 6, the brush **17** is an elongated cylinder which may be subdivided to yield two or more shorter tubular brushes. The line **19** indicates a welded seam which bonds the longitudinal edge portions of the back support **2***b* to each other so that the thus deformed back support forms a cylindrical carrier for the bristles **18** which extend radially outwardly from the outer side thereof. The brush **17** may also be used as a hair roller.

Of course, the tubular brushes shown in FIGS. 5 and 6 may be obtained by threading one or more comparatively stiff filaments through a prefabricated back support of cylindrical shape. In such instances, the brush is finished following the application of one or more filaments and eventual clipping of some or all of the loops. If the back support is of tubular shape, the loops may form rows which extend axially or circumferentially thereof.

Once the tubular brush is clipped to transform each loop into a pair of individual bristles **16** or **18**, the bristles extend from the back support in the same way as the hair extends from the head of a human being. This enables the user to curl the locks onto the back support **2***a* or **2***b* whereby the bristles **16** or **18** keep the locks from uncurling.

Referring now to FIGS. 7 to 9 there is illustrated a method of producing a tubular brush of the type which may be utilized for cleaning of pipes, sewers and similar tubular bodies. The finished brush **20** is shown in FIG. 9. One starts with a flexible back support **2***c* which is provided with bristles **1'** in a manner as described in connection with FIG. 3 or 4 whereby such bristles may form parallel rows in which the bristles are transversely aligned or staggered with reference to each other. Also, each bristle **1'** may consist of a loop or of an individual wire-like body which is obtained by severing a loop in two halves. The longitudinal edge portions of the back support **2***c* are provided with triangular flaps **2***d* which will seal or partially seal the axial ends of the finished brush **20**. Also, the provision of such flaps **2***d* enables the major portion of the back support **2***c* to be rolled into a tubular shape whereby the rolling step may be completed in several stages one of which is illustrated in FIG. 8. The back support is rolled about its transverse axis which interests the axis *a–b* shown in FIG. 7.

The brush **20** may be secured to a cable, rope, chain or another flexible body to be drawn through a canal, tunnel, pipe or similar tubular structure which requires cleaning. Two or more brushes **20** may be arranged end-to-end or at regular intervals to form a composite brush which will be capable of properly cleaning a pipe in a single sweep. Also, the brush of FIG. 9 is sufficiently deformable to be capable of passing through meandering pipes. Furthermore, the brush of FIG. 9 may be used for cleaning of flues and the like. If the brush is flattened out, its bristles may penetrate into narrow slots to remove soot, dust and other impurities.

Instead of rolling the back support **2***c* in a manner as shown in FIGS. 7 to 9, a strip-shaped back support may be convoluted around a flexible or rigid tubular or solid rod-shaped carrier to form a tubular brush. The back support may be welded, glued, stapled or otherwise secured to the carrier.

FIG. 10 illustrates a door frame **21***a* whose opening **21***b* is surrounded by an elongated bristly sealing strip **22** consisting of a flexible back support and of bristles formed in a manner as described in connection with FIG. 3 or 4. When the door **21** is closed, its marginal portions bear against and deform the bristles whereby the bristles and the flexible back support of the strip **22** form an airtight seal around the door. Similar sealing strips may be used in window frames and the like. Even if the strip **22** does not provide a perfect airtight seal around the door opening **21***b*, it prevents dust from entering the room and reduces the draft. It will be noted that a similar sealing strip **22***a* may be provided along the lower edge of the door **21**. The strips **22**, **22***a* may be secured by stapling, by an adhesive, by nails or in any other suitable fashion.

The bristles on the sealing strips **22**, **22***a* are sufficiently flexible to avoid scratching of the door. In addition, the door need not be fitted with utmost precision so that it may be opened or shut with little effort. The bristles will take care of the sealing action even if the door and the frame would form rather wide gaps in the absence of the sealing strip **22**.

Referring now to FIG. 11, there is shown a holder **24** which constitutes the shuttle in a weaving or other textile machine and contains a spool **25** of filamentary material which is to pay out the thread at a constant rate. The interior of the shuttle **24** is lined with a bristly back support **2***e* of flexible material which constitutes a thread brake **26**. The bristles **1''** of the back support engage the thread on the spool **25** to prevent the formation of knots and to insure gradual and uniform unwinding of the threads when the machine is in actual use.

The bristles **1''** are sufficiently flexible to avoid tearing of or other damage to the thread.

FIG. 12 illustrates a portion **29***a* of human skin which is formed with a pore **29**. The brush **27** is of conventional construction and comprises a rigid back support **27***a* for a series of bunched bristles **28**. The tips of the bristles **28** are observable through a magnifying lens **31**, and it will be noted that the bristles are unable to penetrate into the pore **29**, mainly because the back support **27***a* is rigid. As shown in FIG. 13, the same pore **29** may be cleaned by the bristles **32** which is produced in accordance with my

invention and comprises a flexible back support **30**. The bristles **30***a* will be flexed to enter the pore **29**, and such penetration of bristles **30***a* is facilitated by the back support **30** which is also flexed so that it promotes entry of bristle tips into the pore. While FIG. 13 shows a brush **32** with individual bristles, very satisfactory results can be obtained by using a brush wherein the loops are not severed so that each thereof forms a dual bristle.

In general, a brush which is used for treatment of human or animal skin will be provided with bristles which are obtained by severing some or all of the loops so that each bristle forms an individual wire-like cleaning element. When the brush is used for polishing, cleaning or otherwise treating of smooth surfaces, the loops need not be severed. For example, a sheet-like carrier of the type shown at **2** in FIG. 3 may be used as a buff in a buffing wheel for polishing of metallic or other surfaces. Such buff may be obtained by threading one or more filaments through a comparatively large sheet of flexible back support material, and the resulting bristly blank is then clipped to form a rounded, oval or otherwise configurated buff.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can, by applying current knowledge, readily adapt it for various applications without omitting features which fairly constitute essential characteristics of the generic and specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. A method of producing a bristly article, comprising the steps of heating a back support of solid flexible plastic sheet material to increase the flexibility thereof; successively threading a comparatively stiff elastically deflectable synthetic plastic filament in predetermined direction through the thus heated back support from one to the other side thereof so as to embed in the material of said back support a plurality of elongated first filament portions which are immovably supported therein while providing a plurality of second filament portions integral with said first filament portions and extending beyond said other side substantially normal thereto; and cooling said back support to reduce the flexibility of the material thereof, bending pressure applied to said second filament portion during use of the thus obtained article resulting in elastic deflection of said second filament portions with reference to the embedded and immovably supported first filament portions transversely of the elongation thereof.

2. A method of producing a bristly article, comprising the steps of successively threading a comparatively stiff elastically deflectable synthetic plastic filament in predetermined direction through a back support of solid flexible plastic sheet material from one to the other side thereof so as to embed in the material of said back support a plurality of elongated first filament portions which are immovably supported therein while providing a plurality of loop-shaped second filament portions integral with said first filament portions extending beyond said other side substantially normal thereto and having a tendency to straighten out and thereby flex said back support; and heating said second filament portions to reduce the stiffness thereof, and thereupon cooling said second filament portions so that the same are stabilized and lose their tendency to flex the back support, bending pressure applied to said second filament portions during use of the thus obtained article resulting in elastic deflection of said second filament portions with reference to the embedded and immovably supported first filament portions transversely of the elongation thereof.

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HORACE M. CULVER, Assistant Examiner

U.S. Cl. X.R.

156—178; 161—66