

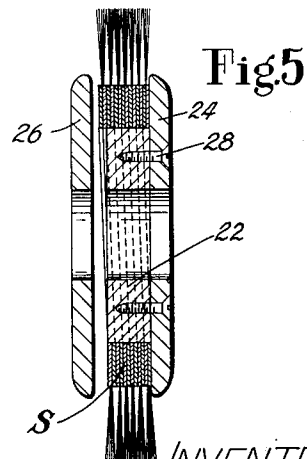
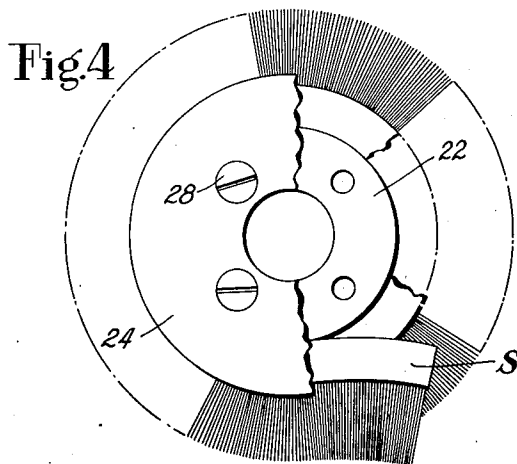
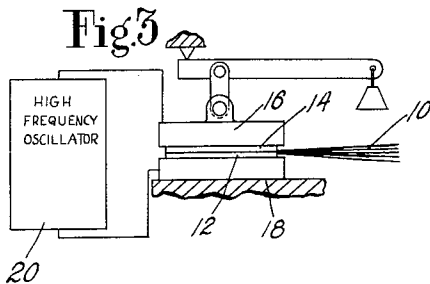
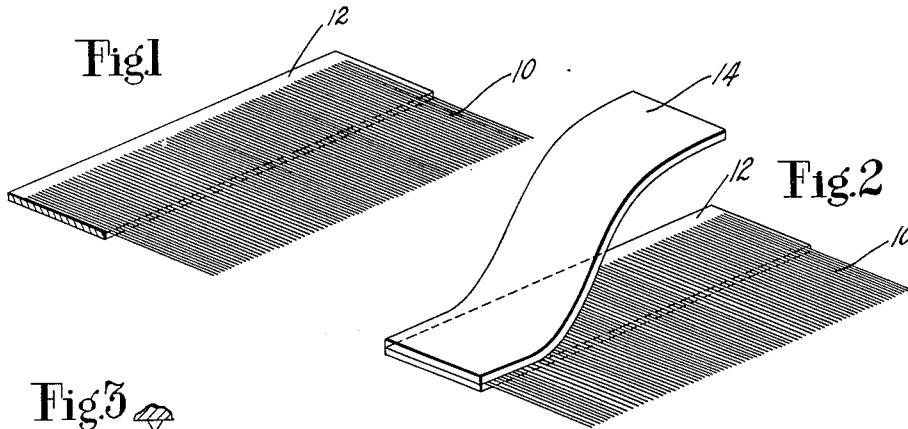
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MAKING BRUSH STRIPS

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MAKING BRUSH STRIPS

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4 Claims. (Cl. 300—21)

This invention relates to the formation of strips of brush material in which the bristles which will constitute the body of the brush are supported in a layer by means of a carrier strip adapted to be coiled or otherwise formed to make a brush of the desired shape.

Brush strips which, for example, are intended to be wound edgewise around a hub to form a cylindrical rotary brush have long been manufactured by using a narrow strip of cloth or paper as the carrier. The bristles, which may be true bristles derived from an animal or which may be so-called bristles formed of a vegetable fiber or the like, are spread in parallel positions to form a row with their butt ends overlying the carrier strip. Commonly, these bristles are then secured in place by stitching together this and another carrier strip laid on opposite sides of the layer of bristles with or without the help of an adhesive. One customary procedure is to coat the stitched cloth carrier strips with a Bakelite varnish before the assemblage is wound upon a hub to form a brush. After the strip has been made into a brush, it becomes necessary to evaporate the solvent and this operation is usually expedited by the application of heat. This must be done, however, at a sufficiently moderate temperature so that the bristles are not injured by the heat and, as a consequence, the time involved is considerable, thus delaying production and increasing the cost of the brush.

We have discovered that this drying period may be eliminated and the stitching avoided, and the object of our invention is to provide a method of forming brush strips which will secure these results.

From one viewpoint, the invention consists in the substitution of thermoplastic material for the cloth or paper carrier strips which have previously been employed, and we have found that the bristles may be secured firmly upon such a carrier by fusing two such strips with a layer of bristles interposed, conveniently by means of the heat set up in a high-frequency electrostatic field in which the double carrier strip is positioned and preferably is held under pressure.

In order better to describe the invention from this and other aspects, we have illustrated certain steps of the method in the accompanying drawing, in which—

Fig. 1 shows a layer of bristles with their butt ends overlapping a carrier strip of thermoplastic material;

Fig. 2 shows the superposing of another carrier strip in register with the first;

Fig. 3 illustrates the application of heat by means of a high-frequency electrostatic field;

Fig. 4 shows the winding of an assembled strip edgewise upon a cylindrical core; and

Fig. 5 illustrates the application of suitable end flanges to complete a brush.

One particular form of carrier strip which has been found highly desirable is a vinyl resin film having a thickness, for example, of approximately five-thousandths of an inch. This vinyl resin may be that known as "Vinylite XYSG," which is manufactured by the Carbide and Carbon Chemicals Corporation, and which is a vinyl acetal. Such a film is transparent and slightly elastic and when the bristles are forced against it in the presence of heat they will adhere thereto, thereby avoiding the use of an adhesive the solvent of which must be later removed. When a series of bristles 10 which have been distributed in a thin layer in which they occupy approximately parallel positions, as in Fig. 1, have been laid upon a carrier strip 12 with the butt ends of the bristles overlapping a major portion of the width of such a strip and preferably substantially normal thereto, another carrier strip 14 of suitable material is laid on top of this assemblage and a portion of the length of the two strips with the bristles interposed is placed between electrodes 16 and 18 where it may be subjected to pressure of the order of 100 pounds to the square inch and the carrier strips caused to fuse or weld by means of heat supplied by a high-frequency electrostatic field set up between these electrodes when the latter are supplied with high-frequency current from a suitable source such as an oscillator 20, as illustrated in Fig. 3. The amount of power applied and the particular characteristics thereof depend both upon the nature of the material and its thickness. They are, however, not critical and the fusing of the two carrier strips to grip the interposed bristles may usually be accomplished in a few seconds after which the pressure may be promptly released and the strip allowed to cool, which occurs within a very brief time. Having completed this treatment, an adjacent succeeding portion of the assembled strip and bristles will be gripped between the electrodes and the process repeated. One of these strips may be omitted, if desired, and the bristles pressed into or caused to adhere to the body of the strip as heat is supplied.

Such brush strips may be then utilized in a variety of fashions. One common manner is illustrated in Figs. 4 and 5 in which the brush strip S is wound edgewise upon a cylindrical hub

22, the strip thus forming a helical coil with its adjacent layers in close lateral contact. Any suitable means may be utilized for attaching the ends of the strip to the hub, and the brush will then usually be completed by the application of end flanges 24 and 26 which may be held to the hub 22 by any suitable fastenings such as the screws 28.

If, in the preparation of the strips, it is found convenient, a thermoplastic cement may be utilized to hold the bristles temporarily in place, and this cement ordinarily will be applied to the bristle-contacting surfaces of the carrier strips. One particular thermoplastic cement which is known to activate readily in a high-frequency field is made by the Carbide and Carbon Chemicals Corporation and is designated as "XL5041." This cement is said by them to be a solution of modified polyvinyl acetate resin in toluol.

If the nature of the bristles, for example, is such that an oily surface thereof renders prompt adhesion of the bristles to the carrier strips more difficult, then it may be found desirable to pre-cement the butt ends of the bristles by dipping them in a solution of such a cement as that just mentioned and allowing them to dry before they are distributed and placed upon the carrier strip.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent of the United States is:

1. That method of preparing a strip of brush material which consists in bringing together a series of distributed, substantially parallel, bristle-like elements and superposed carrier strips of relatively thin, normally non-tacky thermoplastic sheet material outside of the bristle-like elements, the length of said strip being substantially normal to the length of the bristles, said bristles having their butt ends overlapping a major portion of the width of the carrier strip, and applying a localized heat directly to successive portions of the assembled strip to fuse the carrier strips to one another thereby to grip the interposed bristles.

2. That method of preparing a strip of brush material which consists in distributing bristle-

like elements in a thin layer with the elements in parallel relation and with the butt ends of such bristles overlapping a carrier strip of thermoplastic, resinous material, superposing another carrier strip of similar material, pressing said strips and the bristles together within a high-frequency electrostatic field thereby producing heat in the strips and welding them by the action of such a field.

3. That method of preparing a strip of brush material which consists in applying a thermoplastic, resinous cement to the butt ends of the bristle elements which are to be used, allowing the cement to dry to a non-tacky condition, distributing such butt ends in overlapping relation upon a carrier strip of thermoplastic, vinyl resin film, pressing said bristles in position on such a carrier strip by electrodes, and applying a high-frequency current to said electrodes to set up an electrostatic field traversing the bristle strip to cause the bristles to adhere to the strip, shutting off the current, relieving such pressure, withdrawing the strip, and forming it into a brush.

4. That method of preparing a strip of brush material, for use upon a support, which consists in placing the butt ends of distributed bristle elements in overlapping relation upon a carrier strip of thermoplastic, synthetic-resin film having sufficient mechanical strength to serve as a support for the bristles, bringing said bristle strip and a pair of electrodes into coacting relation, pressing said electrodes toward each other to bring together a portion of said strip and said bristles thereby to force the bristles against the strip, applying a high-frequency current to said electrodes to set up an electrostatic field traversing the bristle strip to cause the bristles to adhere to the strip, shutting off the current, relieving the pressure, bringing another portion of said bristle-carrying strip and the electrodes into coacting relation, and repeating the process to form a brush strip which may be caused to assume the shape of said support.

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