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54 **Method of manufacturing brush components.**

57 A method of manufacturing brush components and the brushes themselves is disclosed, wherein the wefts are provided by tows made up of a plurality of filament ends, for example polypropylene mono-filaments, and the warps are made up of polyester yarn, the woven material subsequently having beads of molten polymeric material extruded therein, preferably transverse to the wefts and being slit transverse to the wefts, either before or after the extrusion operation, thus providing a plurality of brush tapes or components which can then be assembled into a holder either on their own or together with other strips, preferably using the extruded polymeric material as a locking bead engaging in a groove in the holder.

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"Brushes and their manufacture"

This invention relates to an improved method of manufacturing brushes and to brushes and the brush components made by the improved method.

5 In our U.K. Patent No.1457074 a method of manufacturing brush components is disclosed wherein a knitted tape of yarn folded upon itself into a zig-zag is converted into brush components by having a locking element secured to an edge thereof either before or after
10 a slitting operation. In our co-pending British Application No.7901230, further methods of brush manufacture are disclosed wherein bristle elements are advanced through endless draw-off belts, locking beads are extruded on the bristle elements and a folding or slitting
15 operation is performed. We have now developed a further method of brush manufacture employing a weaving operation.

According to the present invention, we provide a method of manufacturing brush components comprising
20 forming a multi-filament tow from bristle filament, feeding the tow to a loom as the weft and weaving a bristle fabric using traditional warp yarns and subsequently extruding onto the fabric across the bristle wefts a polymeric material either before or after the material has been slit across the wefts.

25 Preferably, the multi-filament tow is formed from a plurality of synthetic resinous mono-filaments such as polypropylene filaments and the warp yarns are formed from a polyester material.

According to one embodiment of the invention, after
30 the weaving operation, the woven material is slit transverse to the wefts and molten plastics material is then extruded onto one or both ends of the severed wefts, the shape of the extrusion being such as to provide a locking bead which can subsequently be located in a groove
35 in a brush head. If the molten material is extruded down both end edges of the severed wefts then a further severing operation between the two extrusions must be performed.



In an alternative method, after the slitting operation the slit strip of woven material can be folded upon itself about its central line running transverse to the wefts, thus presenting a double row of weft ends side by side and the material may be held in this doubled over configuration by extruding a bead of polymeric material along the fold line.

In a yet further alternative method, the woven material may have deposited on one or both faces thereof strips of molten polymer at selected points across the width of the woven tape, i.e. transverse to the wefts, to form brush beads. These strips of molten polymer may be equally spaced and the woven material can then be slit either between the strips of molten material and/or down the centre of the strips of molten material so as to provide several single or double brush components either of the same or different widths. If slitting occurs to either side of the molten strips, the slit strips of material can be bent upon themselves through 180° along the centre line of the strips of molten material so as to provide brush components of double thickness.

The brush components of the present invention can be manufactured on any suitable loom capable of handling tows or wefts of considerable bulk and a machine employing a single rapier which carries the weft across the full width of the loom may be used or, alternatively, the weaving machine may be provided with two rapiers which transfer the weft from one to the other in the centre of the machine.

In one particular example of the invention, we manufactured brush components using a tow made up of 100 ends of 8 thou (.20 mm) polypropylene filaments or weft yarns and a plurality of polyester warps, for example of Craven's 1000 denier 1½ twist/inch polyester.

The resultant woven material was then subsequently processed by carrying out one of the extrusions and slitting operations and, if necessary, a folding operation as described above to provide a plurality of lengths or strips

of brush component having a length corresponding to that of the woven material. These brush components can then be incorporated into a brush by locating the plastics beading in a suitable re-entrant groove. If desired, several components could be used side by side and these several components could be of different densities. If desired, the plurality of side by side components could be connected together by fusing their beads prior to assembly in the brush head.

By manufacturing brushes and their components using the above described weaving process, less twisting of the tow or weft occurs than if the components are manufactured by the knitting process described in our U.K. Patent No.1457074. Furthermore, good bristle density is achieved due to the action of the reed on the loom.

Also, there is less wastage from woven strips or tapes of brush component than some knitted tapes because often with knitted tapes the edges of the tape, where the yarn bundles at the ends of zig-zags are bent upon themselves, have to be slit. Furthermore, less deformation of the tows from the warp yarns occurs than with knitted brush components. It will also be appreciated that by using a weaving process there is considerable flexibility in the end product. For example, the thickness of the woven material can be altered merely by altering the characteristics of the wefts. What is more, the number of tows per ~~weft~~^{weft} can be adjusted to change thickness.

Furthermore, the characteristics of the wefts can be changed at will, e.g. the dimensions of the filaments making up the wefts can be changed or the number of filaments per weft can be altered. Likewise, a combination of different wefts can be woven into the same fabric.

In most instances, it is envisaged that more than

one strip of tape or brush component would be required per brush and normally speaking at least two tapes would be used together to increase bristle density. By off-setting these laterally with respect to each other, a uniform
5 bristle density throughout the length of the brush can be achieved. It is envisaged, for example, that a single brush component could be doubled over lengthwise so that the bristles overlap to create a brush of half the width of the tape but twice the density.

10 A further advantage of weaving over knitting brush components is that in a loom, higher tension can be applied to the warps than in a knitting machine. This means that the warp yarns can be kept parallel and misalignment is less likely to occur.

15 It is envisaged that the extrusion and/or slitting and/or folding operations could be performed on the woven material soon after it emerges from the loom and before the material is reeled or stored on spools. To enable such operations to be performed, it is envisaged that the extrusion
20 and/or slitting and/or folding equipment would be mounted on suitable slides over the material emerging from the loom. Instead of using traditional polymeric material for the extrusion operations, in which a die is attached to the extruder, it is envisaged that hot melt adhesive could be
25 used and in the appended claims the expression "extruded" and similar expressions relating to extrusion operations should be interpreted accordingly.

It is envisaged that in certain circumstances it may be desirable to reinforce the woven brush component. This
30 can be done by incorporating a strengthening member or carrier within the extrusion. This carrier may be in the form of a thread or wire either coated or uncoated. If a wire is used, this will enable the component to maintain any position into which it is bent.

CLAIMS

1. A method of manufacturing brush components comprising forming a multi-filament tow from bristle filament, feeding the tow to a loom as the weft and
5 weaving a bristle fabric using traditional warp yarns, and subsequently extruding onto the fabric across the bristle wefts a polymeric material either before or after the material has been slit across the wefts.
2. A method according to claim 1 wherein the multi-
10 filament tow is formed from a plurality of synthetic resinous mono-filaments.
3. A method according to claim 1 or 2 wherein the warp yarns are formed from a polyester material.
4. A method according to any one of claims 1-3
15 wherein, after the weaving operation, the woven material is slit transverse to the wefts and molten plastics material is then extruded onto one or both ends of the severed wefts, the shape of the extrusion being such as to provide a locking bead which can subsequently be located
20 in a groove in a brush head.
5. A method according to claim 4 wherein the molten material is extruded down both end edges of the severed wefts, and then a further severing operation between the two extrusions is performed.
- 25 6. A method according to claim 1, 2 or 3 wherein, after the slitting operation, the slit strip of woven material is folded upon itself about its central line running transverse to the wefts, thus presenting a double row of weft ends side by side, the material then being held in
30 this doubled over configuration by extruding a bead of polymeric material along the fold line.
7. A method according to claim 1, 2 or 3 wherein the woven material has deposited onto one or both faces thereof strips of molten polymer at selected points across the
35 width of the woven tape to form brush beads, whereupon the woven material is then slit between the strips of molten material so as to provide several single brush components either of the same or different widths.

8. A method according to claim 7 wherein the slit strips of material are bent upon themselves through 180° along the centre line of the strips of molten material so as to provide brush components of double thickness.
- 5 9. A method according to claim 7 or 8 wherein the woven material is slit down the centre of each strip of polymer.
10. A method according to any one of claims 4-9 wherein the slits and strips of polymer are transverse to the wefts.





| DOCUMENTS CONSIDERED TO BE RELEVANT | | | CLASSIFICATION OF THE APPLICATION (Int. Cl. 3) |
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| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | |
| | FR - A - 2 392 297 (SOCIETE INDUSTRIELLE ET FINANCIERE LE PROFIL) * Claims 1 to 18; figures 1,4 * -- | 1-3; 7-10 | A 46 D 1/00 |
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| <input checked="" type="checkbox"/> The present search report has been drawn up for all claims | | | &: member of the same patent family, corresponding document |
| Place of search The Hague | | Date of completion of the search 14.08.1980 | Examiner AUER |