Nov. 24, 1964 M. KESSLER 3,158,518

METHOD FOR MAKING A PRE-FORMABLE METAL BASE PILE MATERIAL

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FIG. 1.

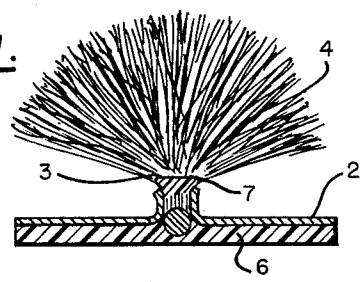


FIG. 2.

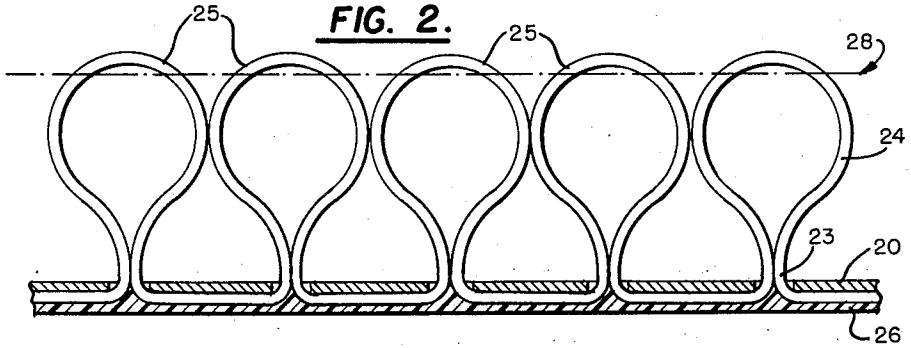


FIG. 3.

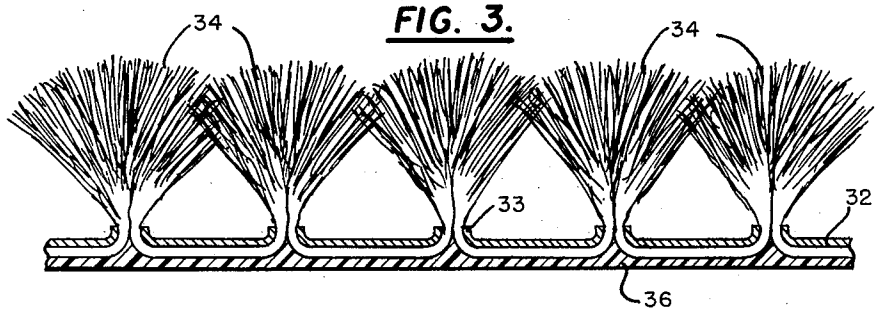


FIG. 5.

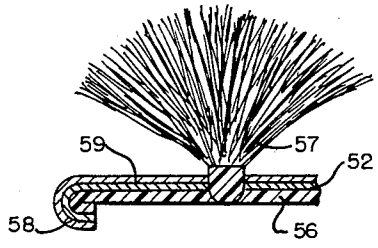
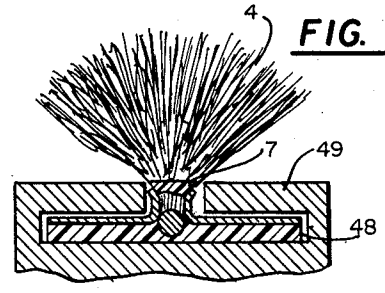


FIG. 4.



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FIG. 6.

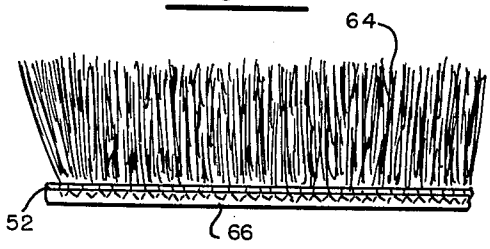


FIG. 7.

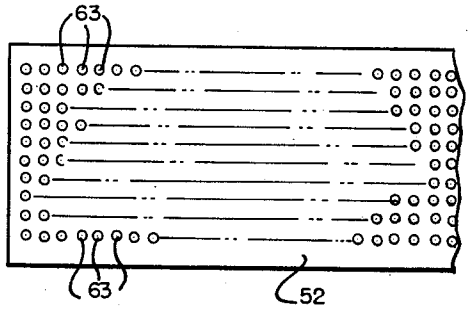


FIG. 8.

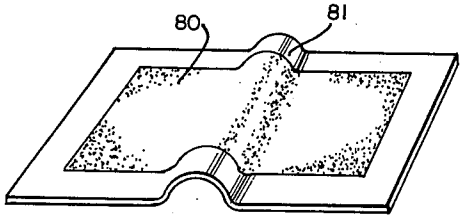


FIG. 9.

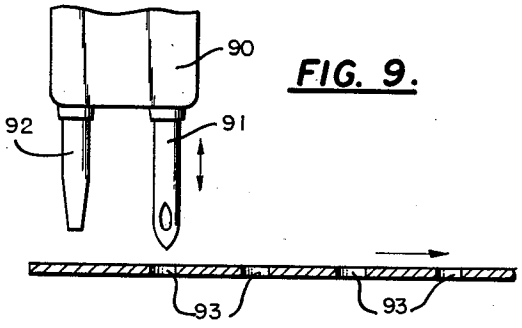
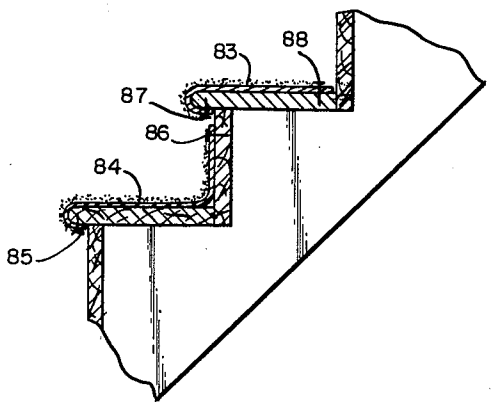


FIG. 10.



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3,158,518

METHOD FOR MAKING A PRE-FORMABLE METAL BASE PILE MATERIAL

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Filed Mar. 17, 1961, Ser. No. 96,551
3 Claims. (Cl. 156—72)

This invention relates to pre-formable pile material and to a method of making same.

The present application is a continuation-in-part of my copending application Serial No. 737,427, filed May 23, 1958, now U.S. Patent No. 2,994,929, entitled "Metal-Base Pile Weatherstrip and Method of Making It."

Pile matting is widely used for many purposes, in the form of floor rugs, automobile floor mats, stair tread covering, etc. Weatherstripping made of pile fabric is also widely used, such stripping consisting of narrow strips of pile fabric similar to what would be formed by cutting up a large sheet of velvet plush or a pile rug into narrow strips. Since this material is not sufficiently rigid by itself, it is commonly provided with a backing of metal having suitable rigidity, to which it is fastened in any suitable manner, such as laying it along a narrow strip of thin metal somewhat wider than the fabric strip, and turning over the edges of the metal to form a bead which both retains the fabric strip, and in some cases also provides an ornamental appearance. For use in sealing window frames, particularly in the case of automobile windows, the pile weatherstripping is also used in conjunction with a U-shaped metal channel, in which it is suitably secured.

Prior art pile matting or sheeting has been made by threading the pile material through a sheet of conventional woven fabric in the well-known manner employed for many centuries in the weaving of rugs. This produces a flexible sheet of pile material having the well-known characteristics of ordinary rug material.

It is a major object of the present invention to provide an improved pre-formable pile matting and a method of making this new pile material, having the major advantages and characteristics of ordinary fabric-backed pile material, but having many advantages and improvements thereover, including economy and ease of fabrication, resistance to moisture, pre-formability to any desired surface configuration, and adaptability to many uses and purposes.

Another object is to improve weatherstripping of the above-described type by eliminating the fabric backing and fastening the pile or plush material directly to a thin metal strip of sufficient rigidity to form a complete weatherstrip unit without the need for any further reinforcing. To firmly retain the pile in place, a backing of plastic is sprayed, brushed, or otherwise applied to the metal strip and preferably to the backside thereof, which firmly retains the pile in place, and also offers other advantages, as will be explained below. By using a heavy needle and fairly soft metal, such as aluminum, the pile may be sewn directly onto the metal strip. However, heavier grades of metal backing may be employed by pre-punching holes therein so that the needle carrying the pile yarn can be passed through these pre-punched holes, suitable indexing means being provided to insure alignment of the needle with the perforations.

The specific nature of my invention, as well as other objects and advantages thereof, will clearly appear from a description of a preferred embodiment, as shown in the accompanying drawings, in which:

FIG. 1 is a transverse cross sectional view of a metal weatherstrip according to the invention, in the case where the pile is stitched directly through the metal;

FIG. 2 is a longitudinal cross section of a weatherstrip in the process of application, showing the manner of forming the pile from loops of yarn;

FIG. 3 is also a longitudinal cross section of a piece of weatherstrip, showing the appearance of the pile after the loops have been cut;

FIG. 4 is a schematic sectional view of a door edge, showing the manner in which the weatherstrip of FIG. 1 may be employed;

FIG. 5 is a cross section of a modified form of weatherstripping having one beaded edge;

FIG. 6 shows a weatherstripping according to the invention, using a plush pile instead of a pile emanating from a single tuft;

FIG. 7 is a plan view of a piece of metal backing for the weatherstripping of FIG. 6, showing the pre-formed perforations;

FIG. 8 is a perspective view of an automobile floor mat made according to the invention;

FIG. 9 is a schematic view showing one manner in which the apertures may be pre-formed on the metal backing strip; and

FIG. 10 is a sectional view showing the matting of the invention adapted for use as stair-tread covering.

Referring to FIG. 1, the base of the weatherstrip is formed of a strip of thin, relatively soft metal 2, such as aluminum. For most purposes, this strip is in the order of ¼ inch in width and may be of any suitable thickness, although stock of 0.010" thickness has been found satisfactory. A series of apertures 3 extends along the center line of the strip 2, and through each of these apertures projects a brush 4 of pile, which may be of any suitable material such as wool, nylon threads, etc. A backing of plastic material 6 is firmly adhered to the rear side of strip 2. This plastic material is applied initially in a liquid condition, so that a certain amount of it is drawn up by "wicking" action of the fibers 4, through the aperture 3, as shown at 7. After the plastic material has "set," which may be as a result of heating, or simply by evaporation of the solvent, it will be seen that the base of the tuft of pile 4 is rigidly embedded in plastic, which extends through the aperture and along the back side of the strip as shown at 6. This forms a unitary, tightly bonded structure, from which the pile threads cannot be dislodged or removed without actually tearing them. The wicking action previously described also provides another advantage. When the yarn is sewn directly through the tape to provide the structure shown in FIG. 1, the needle leaves a sharp burr as indicated at 3. This could cut the threads of the fabric when they are pressed down against the sharp edges, but such cutting action is prevented by the body of plastic material, as shown at 7, which becomes rigid after the plastic has set. Thus the wicking action not only provides an extremely firm base for each tuft of pile, but also prevents the cutting action which might otherwise occur.

FIG. 2 shows the manner in which the individual tufts are formed. In this case, and purely by way of example, the apertures in the metal backing strip 20 are shown as pre-punched as indicated at 23. Thus there is no sharp burr as shown in FIG. 1, but otherwise the strips are exactly the same, and the method of forming the tufts is the same in either case. The tufts are formed from a strand 24 which is passed by means of a conventional sewing needle, well-known in the art, through the apertures in the material to form a series of loops or bights 25, the tops of which are then cut off along line 28, whereupon the individual fibers of the yarn 24 unravel and bunch out to form individual tufts as shown in FIG. 1.

Alternatively, the loops may be cut immediately after formation by the follower tool which follows the needle

which forms the loops, or by a similar separate tool, after the fashion described in U.S. patent to Miller, No. 2,486,963. The metal strip 20 may be provided with a plastic backing 26 prior to the sewing operation which is particularly desirable in the case where pre-punched metal stock is used, since in this case the plastic backing will also fill the apertures 23, whereby the strands of yarn 24 may be better retained. A second coat of plastic backing is then applied after the loops are formed, to firmly bond the loops or tufts in place.

FIG. 3 is a view similar to FIG. 2, after the loops have been cut, but showing the appearance in this case where pre-formed apertures are not used, but where the apertures are formed as in FIG. 1 by the needle which threads the pile material onto the metal strips. The reference characters in FIG. 3 conform to those in FIG. 1, except that they are preceded by a number "3," that is, element 32 of FIG. 3 corresponds to element 2 of FIG. 1, etc.

FIG. 4 shows one manner in which the weatherstripping of FIG. 1 is commonly used. The stripping is retained in any suitable manner which is to be used, as shown at 49, which may be the edge of a door or portion of window frame of extruded aluminum, as is well-known in the art, and which is provided with a suitable slot as shown at 48 for receiving the weatherstripping. It will be noted that the pile 4 extends above the surface of the retaining material 49, and the rigid supporting portions including the plastic material 7 extend no further than substantially flush with the surface of the retaining member 49, whereby the pile is perfectly resilient and can be compressed to its maximum extent against the surface from which it protrudes.

FIG. 5 shows, in self-explanatory form, the manner in which a bead may be formed at one edge of the weatherstrip of FIG. 1, which is often required for ornamental purposes, particularly for use in automobiles, where one edge is to be exposed. Although the metal strip 52 may have a bright finish, the requirements for automobile use often specify a chrome plating, in which case the base metal may be suitably chrome plated as indicated at 59, prior to fabrication, whereby the bead 58 presents the desired finished appearance.

Although the weatherstrip thus far has been shown with a tufted pile construction, similar to that shown in my copending application Serial No. 723,992, filed March 26, 1958, now U.S. Patent No. 3,002,253, for "Flexible Weatherstrip Means and Method of Making It," the present invention is not restricted to use with this form of pile material. As shown in FIG. 6, the ordinary velvet pile construction may also be employed. In this case, the velvet pile 64 is again stitched directly through a metal backing strip 52. Since with this construction finer needles must be used, it is usually not practical to pierce the metal strip with the needles, so the metal strip is instead pre-pierced with the necessary plurality of apertures 63, as shown in FIG. 7. It is, of course, necessary to accurately index the movements of the needle with the apertures, but means for accomplishing this are readily available, and form no part of the present invention. Except for the use of the metal strip with the pre-formed apertures 63, the operation is performed in the usual way to produce a plush weatherstripping material generally similar to the well-known "Schelegel" pile, except that in this case the pile material is sewn directly to the metal backing and adhered thereto by plastic material 66 very similar to the case shown in FIG. 1.

It will be understood that although FIG. 7 shows the product in the form of a relatively narrow strip, there is actually no limitation on the width and length of the plush material produced in this manner. It may be made of sufficient area and extent to provide a large

plush surface, which may be shipped rolled up, and can be installed as a wall or floor covering, similar in surface appearance to any ordinary rug, but completely waterproof and not subject to rot or fungus attack. For example, it can be cemented down on any suitable surface, with pile (e.g., of nylon threads) of any desired length or color. The plastic base and support feature, as shown in FIG. 1, renders the rug so formed effective as a moisture or vapor barrier, so that it can be used in damp locations. It is also an excellent insulator because of the reflective aluminum surface combined with the thick pile and can be used for decorative effects, sound proofing, and many other purposes.

FIG. 8 shows an automobile floor mat 80, made of the above material. Most modern automobiles have a longitudinal hump 81 on the floor to provide a housing for the drive shaft between the transmission and the differential. Automobile floor mats are generally pre-molded to fit this hump, and therefore must be made different for each model. The present matting, being semi-rigid, can easily be pre-molded to fit the more popular cars, or alternatively, can be made sufficiently yieldable so that it can be sold in flat sheets for replacement floor mats, which sheets can be readily cut to the proper size with a pair of tin snips or even ordinary heavy kitchen shears, and can be pressed by hand into the desired shape to fit various humps and protrusions on any automobile floor, as required. It therefore becomes unnecessary for the retailer to stock a large number of different mats; furthermore, the mats can be shipped stacked flat, with consequent great savings in handling and storage costs. The material itself is ideally suited for floor mat use, as it is not affected by dampness or moisture from wet shoes, etc.

FIG. 9 shows one manner in which the desired apertures in the metal backing may be pre-formed. The sewing head 90 which carries needle 91 in a reciprocating manner, as shown by the vertical double-headed arrow, is arranged to also carry a punch 92, so that at each reciprocation of the needle, the punch forms a hole as shown at 93, in the metal tape. The spacing between punch 92 and needle 91 is exactly the same as the distance between successive stitches of the needle, so that at each reciprocation the needle 91 enters the aperture formed at the preceding reciprocation by punch 92. While only one punch-and-needle set is shown, it will be apparent that a number of these could be operated simultaneously in side-by-side relation to form a row of pile each time the head 90 is operated.

FIG. 10 shows the material fabricated into inexpensive and durable stair tread coverings, to either cover the stair tread alone, as shown at 83, or the tread and riser, as shown at 84. These can be inconspicuously tacked or nailed down as shown at 85–88, the pile serving to conceal the nail heads, which should preferably be small, so as to be inconspicuous. In this case, too, the treads may either be pre-fabricated, in which case a fairly heavy metal base is used, or else may be formed by the user to fit, in which case the metal base is made softer and of more readily deformable material.

It will be apparent that the embodiments shown are only exemplary and that various modifications can be made in construction and arrangement within the scope of my invention as defined in the appended claims.

I claim:

1. The method of making metal-backed pile material comprising the steps of punching a number of spaced apertures one after another in a solid sheet of semi-rigid deformable metal, threading a yarn of loose threads through each of said apertures immediately after it is made and punching the next aperture during said threading step, to form a series of loops one after another on one side of said metal sheet, and cutting each of said

loops to form a pile of individual threads on said one side of the sheet.

2. The invention according to claim 1, and the additional step of applying a coating of fluent settable adherent material to the opposite side of said sheet, said adherent material being sufficiently fluent when applied to impregnate said threads for a short distance through said apertures.

3. The invention according to claim 1, including the step of making a row of said apertures simultaneously at each punching operation, and threading the preceding row simultaneously while each said row is being made.

References Cited by the Examiner

UNITED STATES PATENTS

2,480,984	9/49	Van Issum	156—72
2,495,666	1/50	Taubert	156—72
2,636,460	4/53	Seiderman	156—72 X
2,638,427	5/53	Roberts	156—72 X
2,725,835	12/55	Mather	154—49.29
2,726,977	12/55	See et al.	154—44
2,809,909	10/57	Chatanay	156—72 X
2,994,929	8/61	Kessler	20—69

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