Aug. 8, 1961 M. KESSLER 2,994,929

METAL-BASE PILE WEATHERSTRIP AND METHOD OF MAKING IT

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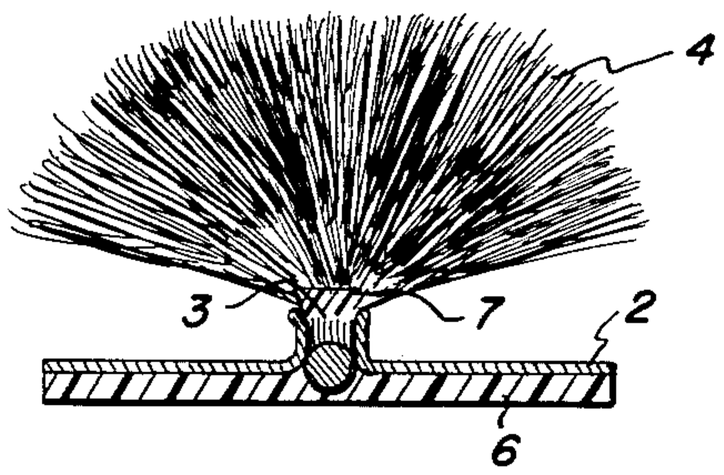

FIG. 1

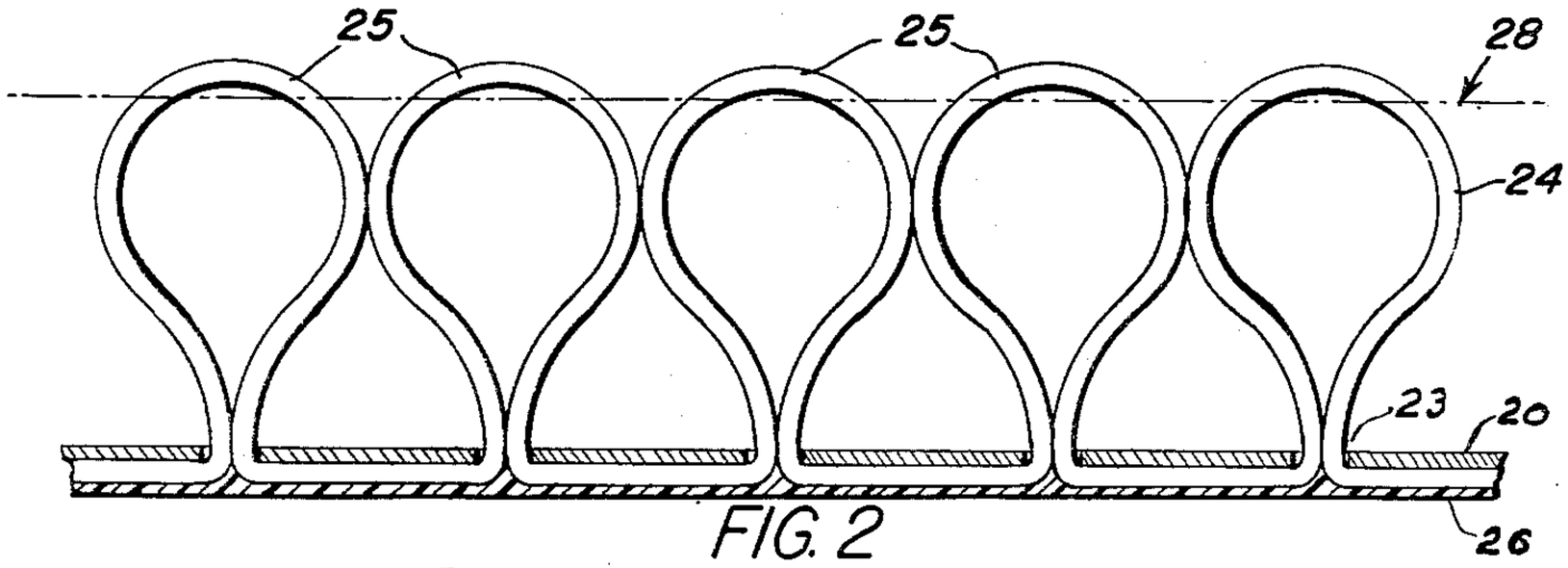

FIG. 2

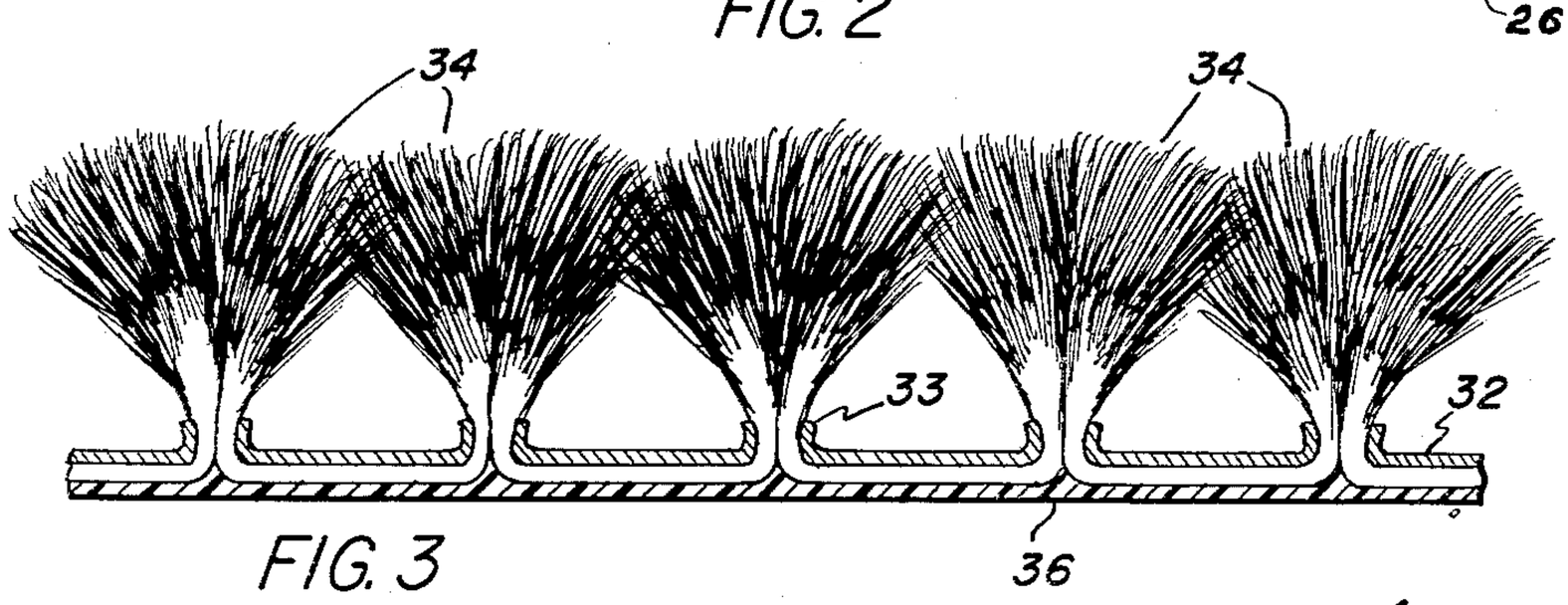

FIG. 3

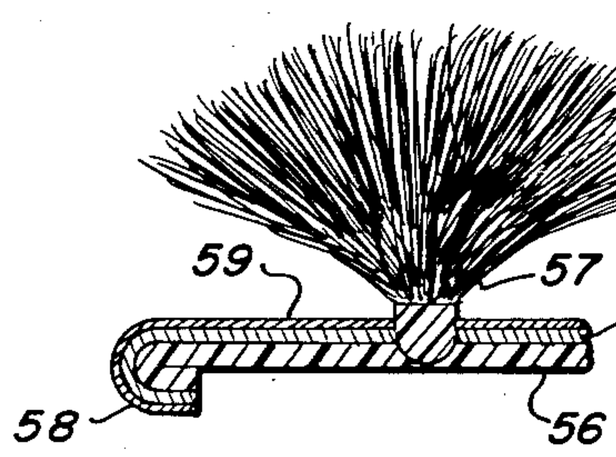

FIG. 5

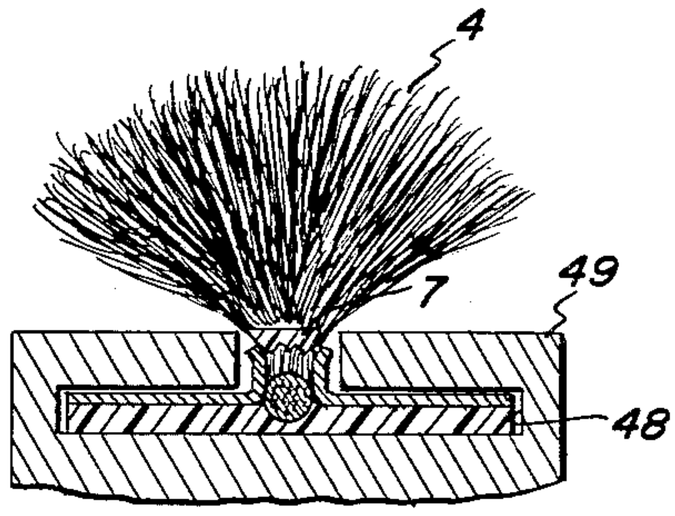

FIG. 4

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FIG. 6

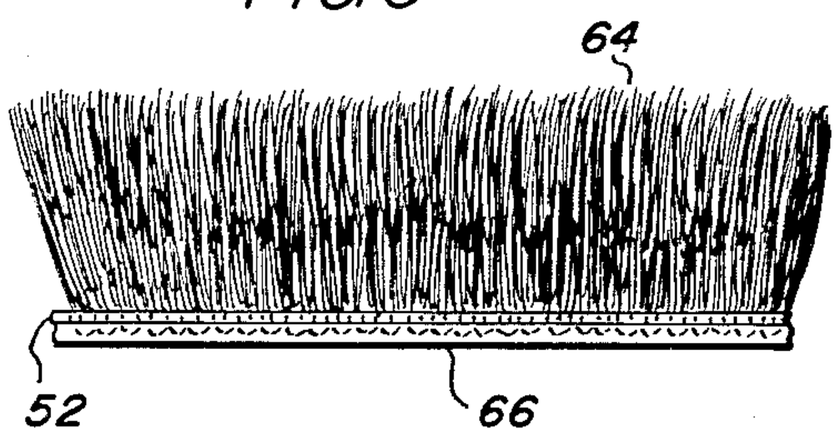


FIG. 7

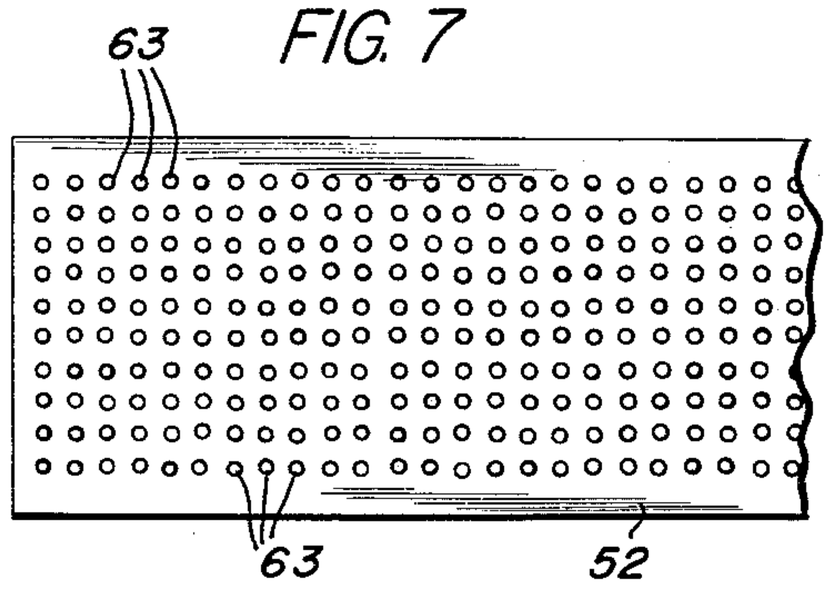


FIG. 8

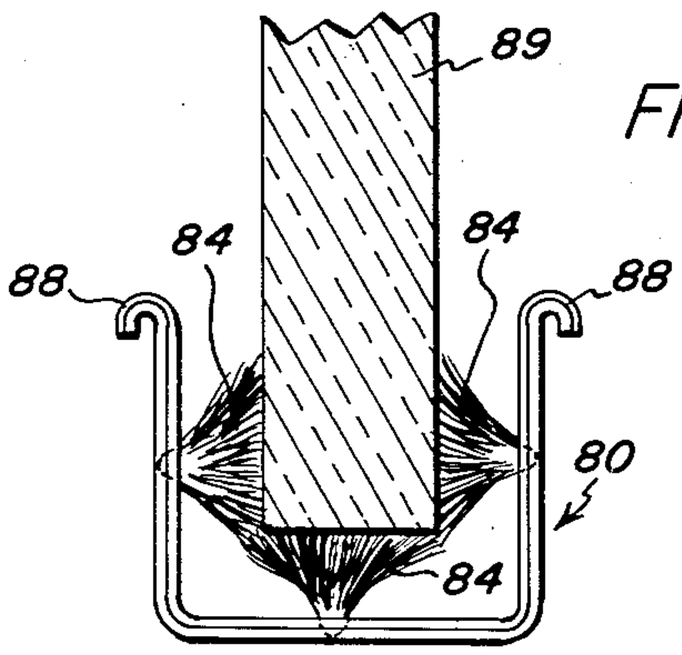


FIG. 9

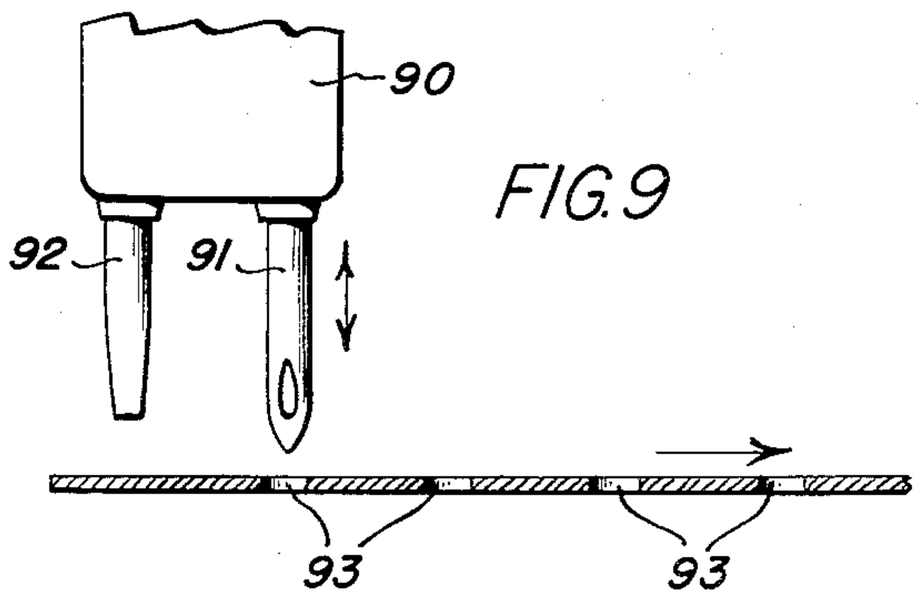
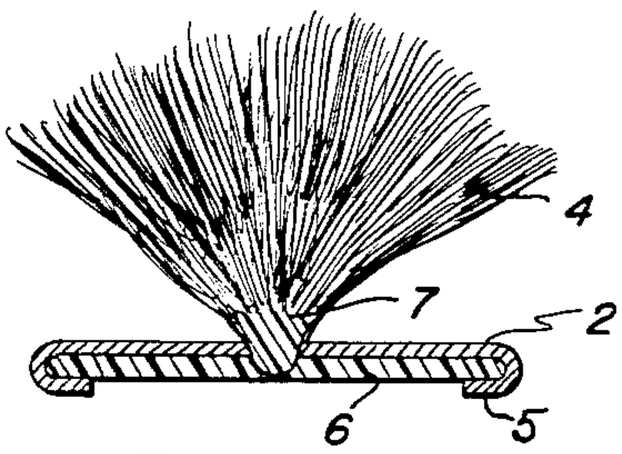


FIG. 10



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METAL-BASE PILE WEATHERSTRIP AND METHOD OF MAKING IT

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Filed May 23, 1958, Ser. No. 737,427
11 Claims. (Cl. 20—69)

This invention relates to weatherstripping and to a method of making same.

Weatherstripping utilizing pile fabric is well known and 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.

It is a major object of the present invention 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 sectional view showing the weatherstripping of the invention formed into a U-shaped channel for retaining a glass window;

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 transverse sectional view of a weatherstrip having two beaded edges.

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 quite 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 tools, 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 a 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, 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 "Schlegel" 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 (i.e., 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 the manner in which a U-channel **80** may be formed of weatherstripping according to the invention. Three parallel rows of tufts **84** are stitched on a strip of metal backing, in the same manner as described in connection with FIG. 1, and the strip is then bent into the desired U-shaped form, with the edges turned over to provide the desired ornamental beading as shown at **88**. Such channels are then typically used to guide glass panes **89** in automobile windows.

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**.

FIG. 10 shows a weatherstrip similar to that shown in FIG. 5, except that it has two beaded edges, which form is often used where the weatherstrip is entirely exposed and fastened to the surface on which it is used, as by nailing, etc. In this case, to minimize the thickness, the plastic coating **6** is not extended all the way to the original edge, but the underside of the turned-over portion **5** is left bare, so that at most only one thickness of plastic **6** is left in the fold of the bead.

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. A weatherstrip comprising a backing strip of thin solid metal plate material in sheet form, said strip having a number of apertures therein, and a pile of short threads extending away from one side of said plate, the threads of said pile extending through the apertures of said plate to form individual bundles of pile threads on said one side.

2. The invention according to claim 1, each of said threads extending through at least two of said apertures, whereby the threads are positioned and retained on said strip.

3. The invention according to claim 2, said strip comprising a narrow tape, there being a single row of apertures extending axially along said tape.

4. The invention according to claim 1, and a coating of plastic adherent material on the opposite side of said strip from said pile, comprising plastic material extending into said apertures and impregnating said threads at the point where they pass through said apertures to firmly retain said pile on said strip.

5. The invention according to claim 4, comprising plastic material extending a short distance through said apertures to support and retain each of said bundles of pile threads at its base.

6. The invention according to claim 5, at least one edge of said metal tape extending laterally beyond said pile, the metal at said edge being folded back upon itself a produce a beaded edge.

7. The invention according to claim 6, said metal being folded away from the pile side.

8. A pile material comprising a flexible backing sheet of thin metal plate having a number of apertures therein, and a pile on one side of said sheet consisting of a plurality of short threads threaded through said apertures, there being a plurality of closely spaced rows of said aper-

tures, each containing a bundle of pile threads to form a uniform pile surface on said one side of said tape.

9. The invention according to claim 8, each of said threads extending through at least two apertures whereby the threads are positioned and retained on said sheet.

10. The invention according to claim 8, and a coating of plastic adherent material on the opposite side of said strip from said pile, there being plastic material extending into said apertures and impregnating said threads at the point where they pass through said apertures to firmly retain said pile.

11. The invention according to claim 10, comprising plastic material extending a short distance through said apertures to support and retain each said bundle of pile threads at its base.

References Cited in the file of this patent

UNITED STATES PATENTS

Re. 20,904	Schlegel	Nov. 1, 1938
2,508,852	Blumfield	May 23, 1950
2,725,835	Mather	Dec. 6, 1955