United States Patent

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[72] Inventor **Robert C. Horton**
Rochester, N.Y.

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[73] Assignee **Kessler Products Co., Inc.**
Youngstown, Ohio

[54] **PILE WEATHERSTRIPPING WITH MONOFILAMENT THERMOPLASTIC BACKING**
4 Claims, 3 Drawing Figs.

[52] **U.S. Cl.** **161/66,** 49/475, 49/489, 156/72, 156/251, 161/86
[51] **Int. Cl.** **D05c 17/02,** E06b 7/16
[50] **Field of Search** 156/72, 251; 161/66, 65, 67, 80, 81, 86; 49/475, 489

[56] **References Cited**

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Primary Examiner—Robert F. Burnett
Assistant Examiner—Raymond O. Linker, Jr.
Attorney—Max L. Libman

ABSTRACT: A pile weather stripping is provided having a tape fabric of monofilament thermoplastic yarn, heat-welded along the tape edges to prevent ravelling. The weatherstrip is of the type having a central longitudinally extending woven pile area and two bare side areas for insertion into slots. The woven pile may also be heat-welded to the fabric on the back side of the tape, and the bare side areas may be formed from originally all-pile material by heat-melting and crushing flat the pile along these side areas to fuse the pile and fabric together.

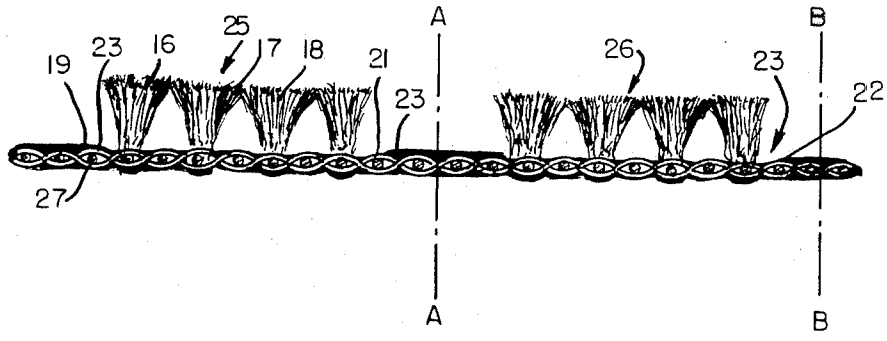

FIG. 1.

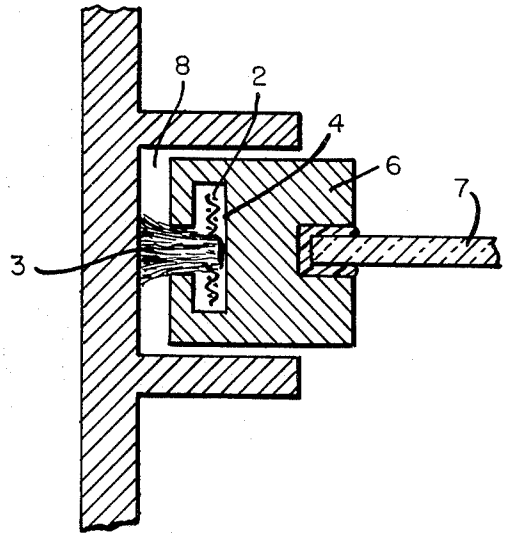

FIG. 2.

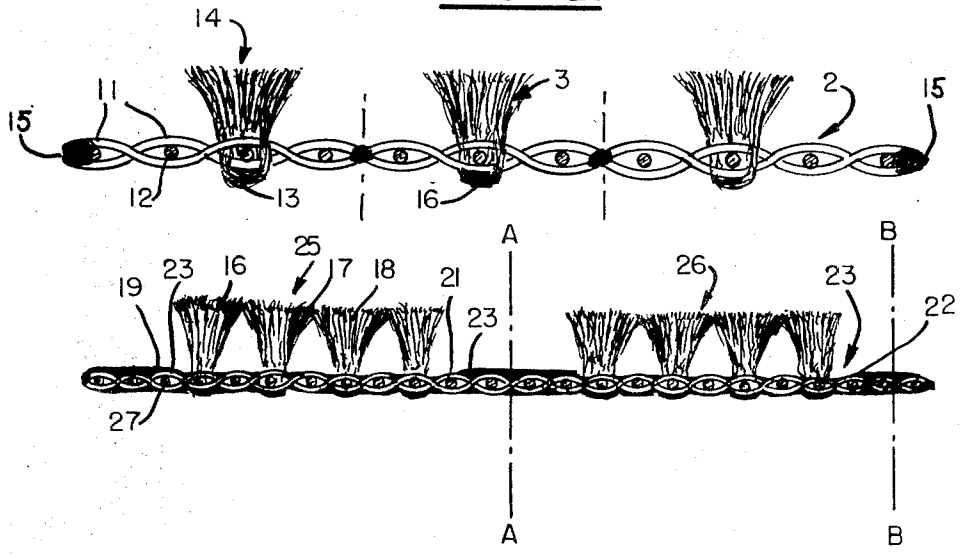

FIG. 3.

INVENTOR
Robert C. Horton
BY Max L. Libman
ATTORNEY

PILE WEATHERSTRIPPING WITH MONOFILAMENT THERMOPLASTIC BACKING

This invention relates to weather strip of the pile type, similar to that shown in U.S. Pat. No. 3,002,253, in which the pile material runs longitudinally of a fabric tape by which it is supported and from which it extends on the front side, leaving a substantial area of tape material on either side of the centerline for retention in a channel of wood, metal, or plastic material which forms a support and backing for the weatherstripping. The pile material is a thermoplastic synthetic material, such as a nylon or polypropylene yarn. The pile is woven into the backing much the same way as in a woven rug or velvet material and pile height is determined by cutting and/or shearing by methods common in the art. In prior practice, the back side of the tape is usually impregnated with a suitable sizing such as polyester resin material and also serves to retain the pile fibers firmly locked in position. The above procedure may be carried out in the fabrication of this weatherstripping along a number of parallel lines on a single sheet of material, which is then cut midway between the parallel lines of pile stitching to form the desired strips.

In accordance with the present invention, the tape fabric is made of woven monofilament yarns to achieve stiffness of the backing on pile weatherstripping. Such yarns may be made relatively stiff and rigid, and therefore the usual backing or sizing material can be eliminated, the edges of the tape can be heat-melted to provide a well-defined nonravelling edge and the loops of the tufts may similarly be heat-welded to the thermoplastic fabric material to thus provide a durable, unitary weatherstrip having very desirable characteristics at a very low cost. Alternatively, the weatherstripping may be formed from a sheet of material similar to velvet or other pile fabric, the pile material being also composed of thermoplastic threads, the sheet material being slit into a number of narrow tapes and the pile material being heat-melted and crushed down onto the original fabric material at the edges, leaving a center pile as before, with two edge areas composed of the original fabric material and the flattened and fused pile material used together to form relatively rigid side areas, which is highly desirable when the material is pulled into place in a narrow groove, typically of aluminum or plastic, for use as weatherstripping.

The specific nature of the 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 sectional view of an aluminum window frame provided with a pile weatherstrip;

FIG. 2 is a transverse sectional view of one form of weatherstrip according to the invention; and

FIG. 3 is a transverse sectional view of another form of weatherstrip.

Referring to FIG. 1, a weatherstrip consisting of a fabric strip 2 and a pile 3 supported thereby is shown mounted in a groove 4 in a typical aluminum window frame 6 retaining a glass window 7, and sliding in a groove 8 of a window frame. Since the groove 4 is relatively narrow, in order to engage the weatherstrip, and usually fairly long, it is desirable for the tape material to be somewhat rigid, or at least not too limp, and for it to have a fairly hard surface, so that there is not too much friction when the tape is drawn through the groove in order to assemble it to the window frame 6. Both of these objectives are achieved according to the invention, as shown in FIG. 2, by making the tape material of woven monofilament fibers as shown at 11 for the weft or filler threads and 12 for the warp threads. Since these are monofilaments of thermoplastic material, they are both more rigid and less subject to stretching than the usual threads composed of a plurality of much smaller fibers twisted together. This is an advantage in the present case, as it is desirable to have the tape reasonably nonstretchable; since in assembly weatherstripping is pulled into the groove 4 for the full length of the extrusion with which it is used, and the extrusion is then cut to length with the weatherstripping being severed at the same time. If the weatherstripping is stretchable, it then shrinks a considerable distance into the groove, leaving a portion of the frame unprotected by weatherstripping. Furthermore, the hard smooth surface of the monofilament threads provides lower friction when pulling the weatherstripping into a slot, and thus makes the assembly easier.

The pile 3 is formed from a yarn which is woven into the fabric to form a tight loop or bight on the back side as shown at 13, and is cut flat some distance from the fabric as shown at 14 so that the cut ends of the originally twisted individual fibers of cord 13 fray out to form the desired bushy pile effect. While it is possible for the material to be left in the condition shown at 13, where it is held in place merely by friction, it is preferred that the bight or loop be heat-melted as shown at 16 into a flat mass which is partially fused to the tape fabric and thus retained firmly in place, without adding substantially to the thickness of the tape backing material. The edges of the tape are similarly fused as shown at 15 to form a strong welded edge which will not ravel and which eliminates fraying when the weatherstripping is inserted into the groove 4 by use of an insertion machine, as is often used in this art. The plastic weld can be accomplished in any known way, such as the use of hot wires, hot blades, ultrasonic frictional heat, or any other acceptable production method. The pile yarn is thermoplastic material. The monofilament threads 11 and 12 need not be round as shown, but may be of any useful cross-sectional shape.

FIG. 3 shows a weatherstrip made by an alternate method. In this case, a sheet of material is used which is originally entirely pile material over its entire face area, the pile being formed of closely spaced rows as shown at 16, 17 and 18, etc., of thermoplastic yarn similar to that described in FIG. 2, except that the entire surface of the material is initially covered with such yarn. In other words, the material employed is a pile fabric having an appearance on the pile side similar to velvet. The material is then subjected to heat and pressure along parallel lines at areas such as 19, 21 and 22 to melt and flatten the pile so that it forms a thin layer of flattened crushed pile material as shown at 23 in parallel spaced rows along the fabric, leaving spaced parallel lines of uncrushed pile as shown at 25 and 26. Although only two such lines are shown in FIG. 3, it will be understood that this can be applied to a fairly large sheet and a large number of tapes can be made simultaneously. On the bottom side of the tape, the looped portions are also melted by this treatment to form in effect, a thin layer of crushed and melted pile material as shown at 27, both layers 23 and 27 being fusably adhered to the original pile fabric 2', which may be the same as fabric 2 shown in FIG. 2. The sheet is then cut along the center lines of the crushed areas as indicated by lines A—A and B—B, and in this case the use of hot knives is not necessary, because the crushed and melted pile welded the backing monofilaments together, preventing the possibility of fraying.

This type of tape is generally similar to that shown in FIG. 2, except that it tends to be thicker and stiffer, which is an advantage where these qualities are required. Another advantage is that for a given pile height, it is common for two or more widths of stripping to be required. The present construction allows widths to be determined after weaving, thus decreasing the woven product inventory. Furthermore, accurate slitting into individual strips from a wide width is possible because the distance from one pile row to the next is more uniform than that obtained when pile rows are woven in and further affected by the application of a stiffening resin, as in the prior art construction.

Both of the above types of construction provide a tape which is lighter in weight than the prior art construction with its relatively thick and heavy backing, so that in addition to being less expensive to ship, the lower weight also reduces damage to the pile area when the weatherstrip is scatter-packed into boxes rather than put up on reels. The tape thickness is less than a spun yarn backing, permitting a smaller aluminum groove.

It will be understood that the invention is not limited to the exact embodiment shown and that various modifications can be made in construction and arrangement within the scope of the invention.

I claim:

1.

a. A weatherstrip comprising

b. a narrow tape fabric backing of monofilament thermoplastic threads, some extending longitudinally of the tape in the warp direction and some extending transversely of the tape in the weft or filler direction,

c. and at least one longitudinally extending continuous row of bushy tufts running along the central area of the length of the tape,

d. each said tuft comprising a bunch of short individual fibers looped through said tape to form a bight at the back side of the weatherstrip and frayed out to form a bushy tuft at the front side of the weatherstrip,

e. each said tuft touching the adjacent tufts to from a continuous longitudinally extending mat along the center area of the front side of the tape, leaving two longitudinally extending bare side areas of the tape fabric,

f. said tuft fibers being in the form of individual thermoplastic fiber threads,

g. the bight of said tufts on the back side of the tape being heat-welded to each other and the tape fibers to form an adherent mass on the bottom of the weatherstrip, which mass is flattened out against the tape fabric,

h. the threads at the side edges of the tape being welded together to form nonravelling edges.

2. The invention according to claim 1, said bare side areas being composed of the tape fabric with crushed and melted tuft fibers adhered to said fabric on the top side, and crushed and melted loop fibers adhered to the fabric on the bottom side to form a unitary tape mass.

3. Method of making weatherstrip comprising:

a. providing a sheet of tufted pile material consisting of a base fabric comprised of monofilament thermoplastic threads, some lying in the warp direction and some in a weft direction, and a tufted pile of material of thermoplastic threads looped through said base fabric,

b. melting and crushing parallel, spaced elongated areas of said pile in the warp direction, leaving longitudinal rows of uncrushed pile material between said elongated areas,

c. cutting said sheet longitudinally along at least some of said spaced areas to make a plurality of individual weatherstrips each having a tufted central portion and bare edge portions of the original tape fabric with crushed and melted tuft fibers adhered thereto.

4. The invention according to claim 3, including melting and crushing the loop or bight portions of the pile on the back side of the weatherstrip so as to adhere to the base fabric.