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METHOD OF MAKING PILE WEATHERSTRIPPING

Filed July 6, 1970

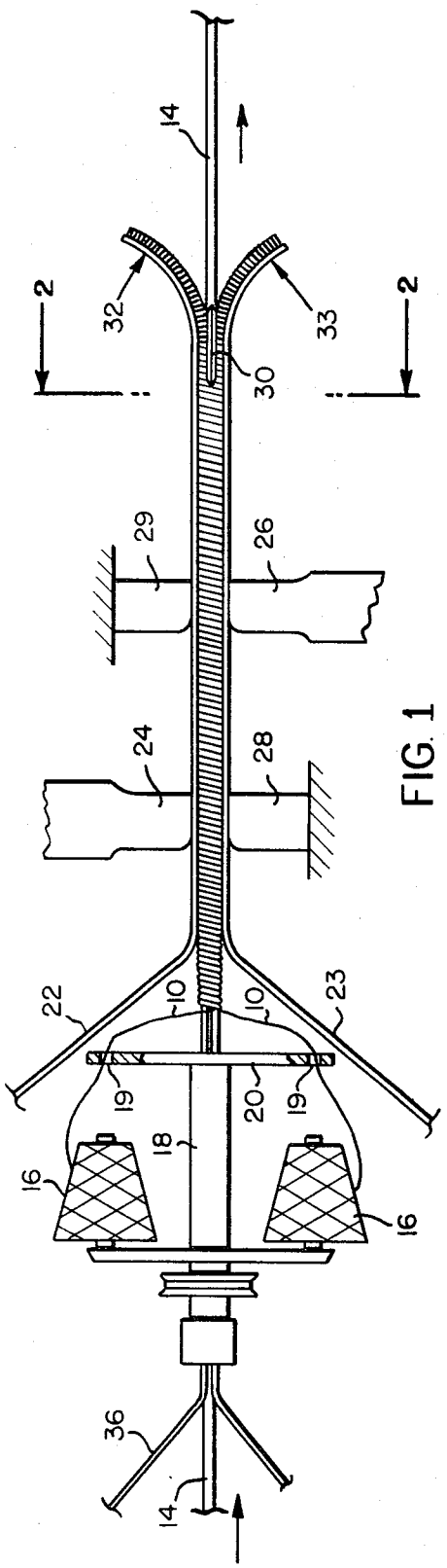


FIG. 1

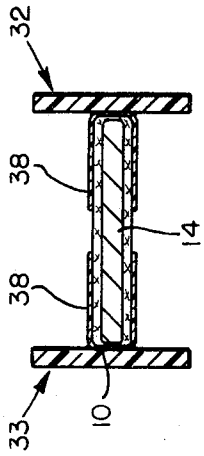


FIG. 3

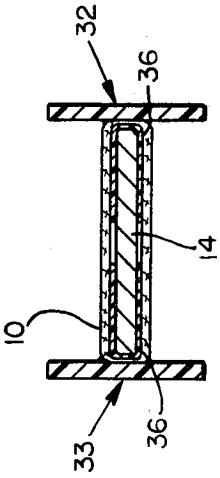


FIG. 2

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METHOD OF MAKING PILE WEATHERSTRIPPING

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ABSTRACT OF THE DISCLOSURE

Pile type weatherstripping is made by winding yarn on a traveling mandrel, bonding strips of backing material to the yarn along opposite sides of the mandrel, and then parting the yarn at points between the backing strips. Two weatherstrips are produced simultaneously. An insert such as a longitudinal fin may be fed between the yarn and the mandrel to produce a combination strip including both pile and an auxiliary sealing member.

BRIEF DESCRIPTION

This invention relates to a novel method of making weatherstripping of the pile type, including, if desired, an auxiliary sealing member such as a longitudinal fin.

Pile weatherstripping is in widespread use in both the automotive and building products industries. Heretofore, weatherstrip of this type has usually been made by forming strips of pile on a backing sheet, either by weaving or by flocking, then applying a resin upon the reverse side of the backing sheet, and then slitting the backing sheet between the strips of pile. The resin has been applied in liquid form, and cooled or cured before the slitting step.

The present invention contemplates making pile type weatherstripping without first weaving a pile fabric, without flocking, and without the application of a liquid resin. Briefly, according to the invention, yarn to form a pile is wound on a traveling mandrel and is welded while still on the mandrel to backing strips, preferably two in number, aligned on opposite sides of the mandrel. The yarn is then parted at points between the backing strips to form two continuous weatherstrips. If desired, supplemental devices such as fins may be included, and welded in place simultaneously with the backing strips to form combination weatherstrips.

DETAILED DESCRIPTION

The presently preferred embodiment of the invention will now be described in detail in connection with the accompanying drawing, wherein:

FIG. 1 is a longitudinal, elevational view, partly in section, and largely schematic in form, illustrating the practice of the presently preferred method of the invention;

FIG. 2 is a cross-sectional view taken along the line 2—2 of FIG. 1; and

FIG. 3 is a cross-sectional view generally similar to the view of FIG. 2, but illustrating a modified form of the invention.

The process of the invention as illustrated in the drawing starts with the winding of plastic yarn **10** on an endless, traveling mandrel **14**. The yarn **10** is drawn from cones **16** carried by a revolving spindle **18**. The yarn **10** passes through guide apertures **19** in a disc **20**, which is also fixed to the spindle **18**. As shown, the mandrel **14** is simply a flat strip of metal. Its width determines the height of the pile of the weatherstrip. The mandrel **14** passes axially through the spindle **18** and receives the yarn **10** as it emerges to the right as viewed in FIG. 1.

Backing strips **22** and **23** are fed by any desired guide means (not shown) against the yarn **10** along opposite

sides of the mandrel **14** synchronously with the travel of the mandrel. The backing strips **22** and **23** are welded to the yarn **10** by ultrasonic tools **24** and **26**, respectively. Anvils **28** and **29** are preferably mounted in opposition to the ultrasonic tools **24** and **26** to support the mandrel **14** and prevent its deflection under the force applied by the ultrasonic tools.

In welding it is important to apply enough energy to impart a set to the yarn **10**, conforming it to the shape of the mandrel **14** so that in the finished weatherstrip the pile will stand upright from the backing strips **22** and **23** and not tend to lie flat.

Following the welding step, the yarn **10** is parted at points between the backing strips by severing devices **30**, and the resulting weatherstrips **32** and **33** are delivered to take-up spools (not shown), or otherwise packaged.

The yarn **10** and the backing strips **32** and **33** are preferably of the same, or at least of compatible plastics selected in view of the welding requirements. In some cases, plastics of different respective compositions can be welded together satisfactorily, but the surest procedure is to use the same basic thermoplastic composition, such as, for example, nylon, polyester, or polypropylene for both the yarn **10** and the backing strips **22** and **23**.

The drawing also shows the inclusion of longitudinal fins **36** and **38** in the weatherstrips. As shown in FIG. 2, the fins **36** may be fed onto the mandrel **14** ahead of the yarn **10** so they will be along the center lines of the finished weatherstrips. Alternatively, as shown in FIG. 3, the fins **38** may be fed onto the mandrel after the yarn **10** has been applied so that in the finished weatherstrip they will lie along the sides of the weatherstrips with the pile at the center. In both cases, the fins **36** and **38** are welded to the yarn **10** and the backing strips **32** and **33** in the single-pass welding steps illustrated.

When the fin **36** or **38** is included in the construction, greater welding energy should be applied than otherwise to impart the desired set to the fin **36** or **38** also, as well as to the yarn **10**.

The invention also contemplates making a single weatherstrip by simply eliminating one of the backing strips **32** and **33**, and parting the yarn **10** at a single point opposite from the remaining backing strip. The double arrangement illustrated is preferred, however, because of its greater efficiency.

The practice of the invention enables a substantial reduction in cost relative to the heretofore conventional method of making pile weatherstripping. Forming the pile by winding is quicker and cheaper than weaving or flocking, and heavier gauge yarn, or even roving may be used. Welding of the backing strips is also advantageous in that it avoids the need to handle a liquid resin. The traveling mandrel is of uniform cross-sectional shape and size throughout its length, thus insuring that the yarn is firmly positioned and properly tensioned for the welding operation.

The only significant limitation on the speed of production appears at present to lie in the winding step. Centrifugal force limits the rotational speed of the spindle **18**, but the supports for the cones of yarn can be made strong enough to sustain fairly high speed winding, and experience indicates that overall production time in the practice of the invention is very significantly shorter than the time heretofore required to convert yarn and backing strips into pile type weatherstripping.

What is claimed is:

1. Method of making weatherstripping of the pile type comprising winding yarn on a traveling endless mandrel, welding a backing strip to the yarn while it is on and supported by the mandrel applying enough welding energy to impart a set to the yarn conforming to the shape of

the mandrel, and thereafter parting the yarn to release it with the backing strip from the mandrel.

2. Method according to claim 1 including the step of inserting a longitudinal fin between the mandrel and the yarn so that the fin is welded to the yarn simultaneously with the backing strips.

3. Method according to claim 1 including the steps of placing a longitudinal fin between the yarn wound on the mandrel and the backing strip and welding the fin simultaneously to the yarn and the backing strip.

4. Method of making weatherstripping of the pile type comprising winding yarn on a traveling endless mandrel, welding two backing strips to the yarn along opposite sides of the mandrel while the yarn is on and supported by the mandrel applying enough welding energy to impart a set to the yarn conforming to the shape of the mandrel, and thereafter parting the yarn to release it along with the backing strips from the mandrel.

5. Method according to claim 4 in which the yarn and the backing strips are of selected thermoplastic materials,

and the welding is done by the application of ultrasonic vibratory energy.

6. Method according to claim 5 in which the yarn and the backing strips are of essentially the same thermoplastic composition.

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