April 22, 1947. W. R. MATHENY 2,419,322

COMPOSITE WEATHERSTRIP

Filed March 27, 1944

Fig. 1.

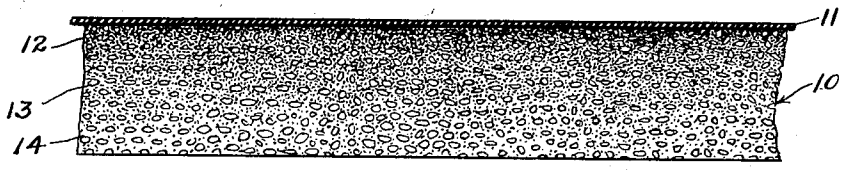


Fig. 2.

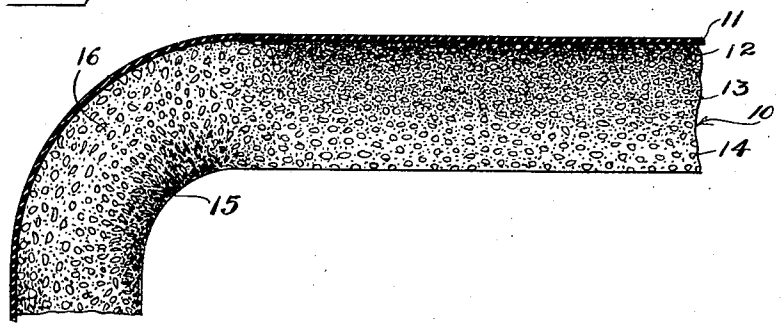


Fig. 3.

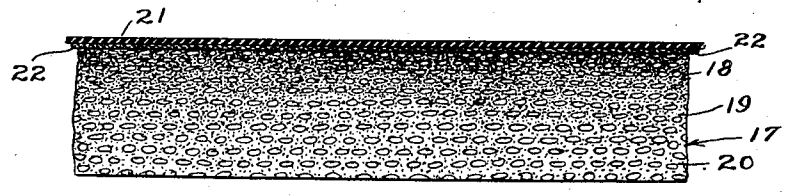


Fig. 5.

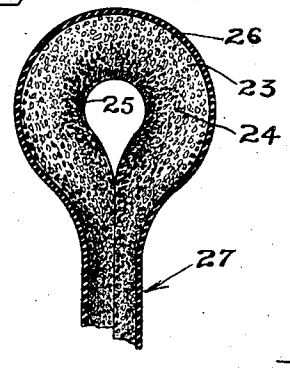
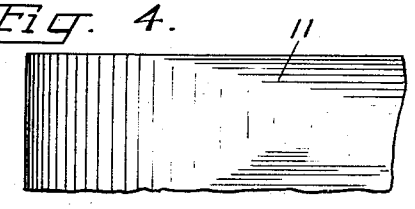


Fig. 4.



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COMPOSITE WEATHERSTRIP

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2 Claims. (Cl. 20—69)

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My invention is directed to an improved weatherstrip material and relates particularly to such material which is to be configurated to irregular contours by curving the same therearound.

It is an important object of my invention to provide such a material so that when it is configurated to irregular objects the bending thereof will not result in undesired distortion thereof, particularly with regard to lateral expansion of compressed parts.

In bending material of the above character for the purposes above set forth, one of the difficulties encountered arises from the fact that the inner layer or portion thereof is compressed during the bending action while the outer portion is stretched or elongated. As a result of this action an undesirable weather sealing arrangement is attained since the compressed inner part at the curve tends also to be expressed laterally outside of the normal confines of the side of the weathershrip. This results in the strip assuming an uneven curvature around the object to which it is attached and also results in undesirable effects since the laterally outwardly expressed parts interfere with efficient operation.

It is an important object of the present invention to provide a weatherstrip having graded density and compressibility throughout the depth thereof to avoid the above mentioned difficulties.

It is another object of the present invention to provide an improved weatherstrip material which has a principal body portion characterized by the presence of interstices and yet which is so constructed that moisture and the like cannot penetrate these interstices, thus to enhance the deterioration thereof.

It is still another object of the present invention to provide an improved weatherstripping material which, when formed in elongated strips may be bent, the part thereof which is normally compressed during the bending operation being formed so that it will compress longitudinally of the strip without expanding laterally thereof during the compressing and bending action.

It is still another object of the present invention to provide a weatherstrip construction having a main body portion formed from a resilient material having a plurality of interstices therein, this material being of graded density throughout its depth so that it is in effect made up of such material having relative density on one side and being progressively less dense throughout the depth thereof.

It is still another object of my invention to provide an improved weatherstrip material which

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is protected from the elements and strengthened in use by the provision of a protective, impervious, resilient skin on the outer surface thereof.

In accordance with the general features of my invention there is provided herein an improved weatherstrip material adaptable to be cut into elongated form, having a main body portion made up of sponge rubber or the like, this body portion being of greater density on one side than on the opposite side and the intermediate portion being of graded density to afford a structure having one extreme portion thereof formed with a given density and the depth thereof being of graded density to provide for progressively increased compressibility, this weatherstrip being also provided with an impervious, protective, strengthening skin which may be in the form of a latex coating and may also, if desired, include an intermediate flexible fabric layer for reinforcing the entire structure.

Other objects and advantages of the invention will become apparent from the following description and accompanying drawings in which:

Figure 1 is a longitudinal cross-sectional view of a form of weatherstrip embodying my invention;

Figure 2 is a view similar to Figure 1 except that the weatherstrip is shown in bent condition to conform to the edge of a door or the like;

Figure 3 is a view similar to Figure 1 showing a modified form of my invention;

Figure 4 is a plan view of the curved portion shown in Figure 2; and

Figure 5 is a cross-sectional view of weatherstrip such as that shown in Figure 1, bent to form a bead or roll type weatherstrip.

In the form of the invention shown in Figure 1, the weatherstrip includes a main body portion 10 having a moisture impervious skin or coating 11 thereon. This skin is preferably of rubber and is applied in any suitable manner such as by dipping or spraying. Thus it will be seen that the mere application of the rubber skin to the face or body portion 10 results in a strongly adherent coating which can withstand considerable abuse and will completely protect the body 10 against the entrance of moisture and dirt.

While it will be understood that the present invention may be applied to many varying kinds of material such as felt or the like, the embodiment herein comprises weatherstripping having a body formed from sponge rubber. The sponge rubber is so formed that it is of graded density throughout its depth. Preferably the side to which the skin or coating 11 is applied is the out-

side of the weatherstrip and is thus exposed to the atmosphere. The body 10 is so formed that the portion thereof in the vicinity of the skin 11 is comparatively dense as at 12 and thus contains a larger proportion of rubber per unit volume. The intermediate portion of the body 10 as shown at 13 is provided with larger interstices and is less dense than the outer stratum 12 while the inner portion 14 is quite loose and thus much more compressible than the portions 12 and 13. In this regard it will be noted that for illustrative purposes the densest portion 12 of the body 10 is shown on the drawings by denser markings while the less dense portions 13 and 14 are represented as lighter in the shading use.

Weatherstripping of the type here disclosed is ordinarily formed or cut into elongated strips which are then attached to the edges of closure members such as windows and doors, these strips normally following the contour of the edges and it being thus necessary to bend the strip when it is so used. In the past it has been found that when weatherstripping of this character is bent around corners of the closure member the inner portions at the bends tends to be expressed outwardly from the sides of the strip whereby inefficient weather sealing is obtained and whereby the general appearance of the resulting assembly is unsightly. Accordingly, to the end that these disadvantages may be avoided I have provided the above described structure.

When a strip of material is bent it will be found that the portion thereof closest to the center about which the bending occurs, is compressed while the portion thereof farthest from this center of bending is stressed or elongated. It is this phenomenon which causes the inner surface of elongated weatherstripping to compress laterally outwardly thus to provide an inefficient and untightly sealing assembly. As indicated previously, the portion 14 of the weatherstrip embodying my invention and which is that closest to the center of bending as shown in Figure 2, is formed to be highly compressible to a greater degree than the portions 12 and 13 thereof. This being the case, it is found that when the weatherstripping shown in Figure 1 is bent as shown in Figure 2, the portion 15 thereof at the bend, which is that closest to the center of bending and that which would normally be extruded, is merely compressed in a direction longitudinally of the strip while the adjacent outer portion 16 is slightly stretched to accommodate the curvature. It will be understood, of course, that the skin-like cover 11 also stretches with this outer portion 16. Since the portion 15 when in its normal condition is highly compressible, it will be seen that the bending action is accomplished without any undue lateral expansion of this portion as a result of the bending operation. On the other hand, the denser outer portion 12 and the solid latex cover 16 are less compressible and thus less expansible than the portion 14 and thus are slightly stretched as a cover over the portion 15, thus to provide a neat, tight, efficient fit around the corner of the object to which the weatherstrip is attached.

From Figure 2 this stressing action of the rubber skin coating and the outer portion 12 will be clearly seen. From this figure it will be noted that the section of the weatherstripping 10 which overlies a straight side of the object to which it is attached is in the normal condition shown in Figure 1. However, at the bent portion it will be seen that the outer portion 12 has now been

stretched, as described above, over the compressed zone 15.

From the foregoing it will be seen that there is provided herein a weatherstrip construction comprising a main body portion which is graded as to density throughout the depth thereof, the less dense portion 14 being disposed closest to the center of bending and that the outer portion 12, together with the solid sheeting 16 serves to bind or tightly hold the under parts of the weatherstripping tightly to the door or window frame at the portions which are bent around curvatures in the frame. Furthermore, the moisture impervious coating serves admirably to prevent moisture or dirt penetrating into the interstices of the body 10 be it formed from felt or sponge rubber.

As will be seen from Figure 4, which is a plan view looking down upon the curved portion of the weatherstripping shown in Figure 2, the under portion of the body 10 maintains itself within the confines of the lateral extremities thereof during the bending operation.

In the construction shown in Figure 3, the body portion 17 is constructed similarly to that shown at 10 in Figures 1 and 2 in that it is provided with portions of different density as at 18, 19 and 20. There may be also provided on the denser side 18 of the body 17 a water and dirt impervious skin covering 21. However, in this construction, in order that the strip may be reinforced, a layer of fabric 22 is first disposed over the denser side of the body 17. The fabric may be secured to the body 17 in any suitable manner such as by the use of a suitable adhesive or the like. Thereafter the cover 21 is applied over the fabric 22 by any suitable process such as by spraying or dipping or the like. If desired, the fabric 22 may be impregnated with rubber and then adhered directly to the body 17.

When the construction of Figure 3 is bent as shown in Figure 2, the portions of different density in the body are subject to the same conditions as described in conjunction with Figure 2. Here again, due to the graded construction of the body 17, the inner portion 20 does not expand laterally at the point of curvature since in this construction also the portion 20 is highly compressible and may be compressed longitudinally to shorten the distance of the inner side of the weatherstrip to accommodate the curvature.

From the foregoing it will be seen that there is provided herein an improved weatherstrip construction which is of a graded formation with respect to density whereby curvature of the weatherstrip around closure frames is facilitated. Furthermore, there is provided on the outer side of the strip a dirt and moisture impervious coating which increases the life thereof and also aids in hugging the weatherstrip to the frame on which it is attached, particularly at the curved parts thereof.

In the form of the invention shown in Figure 5, the stock used is constructed substantially similarly to that shown in Figure 1. In other words, the outer part 23 of the main body of the weatherstrip is initially formed to be denser than the inner regions 24 and 25 respectively, the innermost region 25, being considerably more compressible and less dense than the regions 23 and 24. Preferably the outermost, denser region 23 of the body is again provided with the moisture and dirt impervious coating 26.

In this construction it will be seen that the weatherstrip has been subjected to a somewhat severe bending operation to provide an outer bead

and a radially extending flange part 27. Here again the initially loose, inner portion 25, when bent, forms a portion of greater density while the outer portions 23 and 24 have been stretched therearound. The portion of the weatherstrip forming the flange 27 may be of any desired length, depending on the initial width of the strip and is made up of the two edges thereof disposed in face to face abutment and retained in this position either by mechanical means which secure the strip to the structure desired or by adhering the faces of the two sides together.

Another attribute of my invention as particularly exemplified in the construction of Figure 5 resides in the fact that the high degree compressibility of the inner portion 25 enables the weatherstripping to be distorted into the form shown without impressing undue stresses upon the outer region of the strip. In other words, it will be seen that due to the high degree of compressibility of the inner portion 25, undue forces of expansion are not impressed upon the resilient coating 26 or upon the outer portions 23 during the bending operation. It will be understood, of course, that in constructing weatherstripping as shown in Figure 5 elongated means may be made simply by deforming the strip transversely as distinguished from longitudinal distortion as shown in Figure 2.

I claim as follows:

1. As an article of manufacture, a weatherstrip including a beaded part and a radially extending flange thereon for attaching the beaded part to an article to be weatherstripped, said weatherstrip

comprising a body strip of a resilient material of a consistency to provide a relatively loose, highly compressible portion on one side of the body strip and to be progressively less compressible and denser toward the other side of the strip, said strip being bent back upon itself to form the bead and the flange with the loose relatively highly compressible portion of the material at the inner side of the bead and the flange.

2. As an article of manufacture, a weatherstrip including a beaded part and a radially extending flange thereon for attaching the beaded part to an article to be weatherstripped, said weatherstrip comprising a body strip of a resilient material of a consistency to provide a relatively loose, highly compressible portion on one side of the body strip and to be progressively less compressible and denser toward the other side of the strip, said strip being bent back upon itself to form the bead and the flange with the loose relatively highly compressible portion of the material at the inner side of the bead and the flange, there being a dirt and moisture impervious resilient skin on the outer denser side of the body strip.

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