

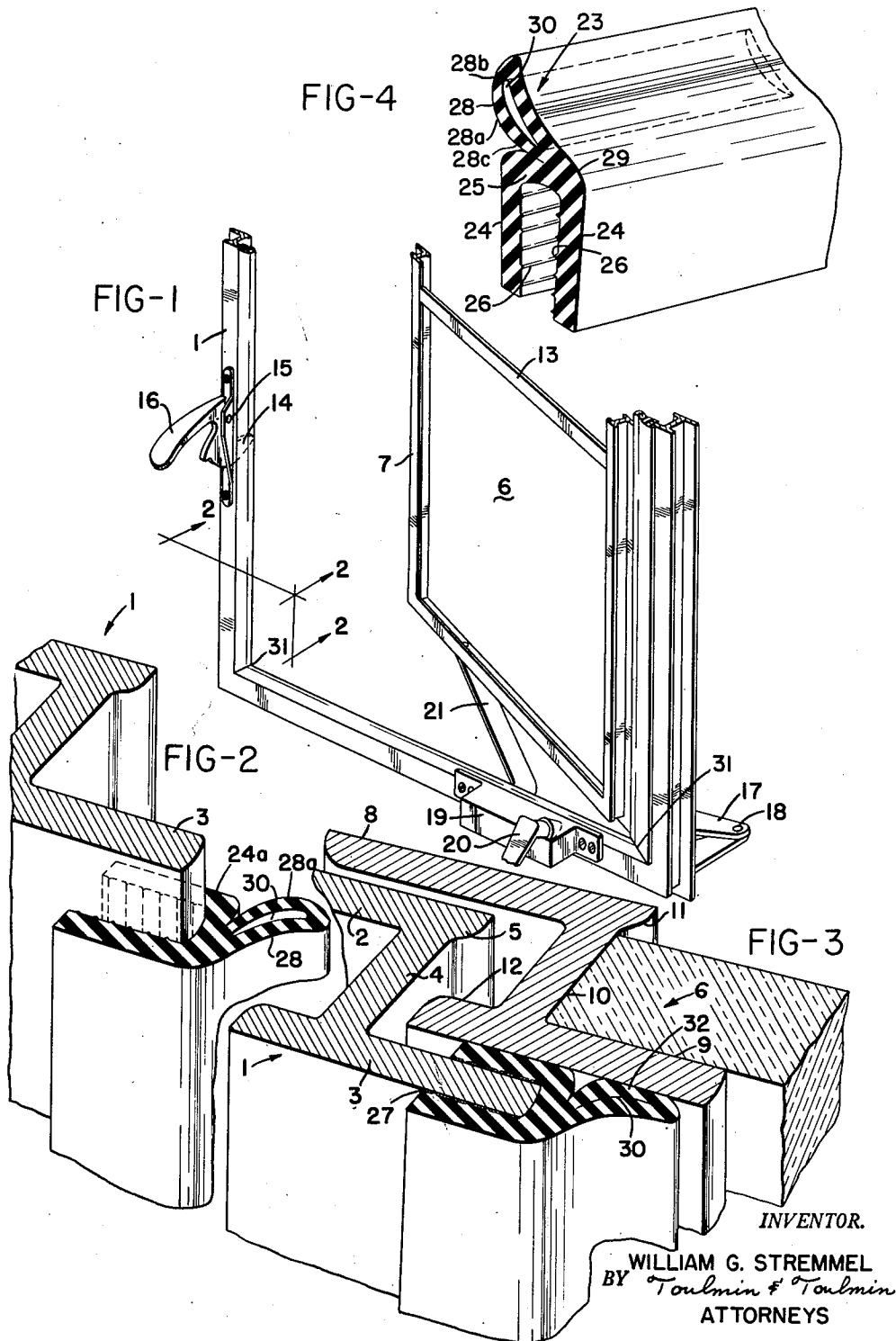
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WINDOW SEAL

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WINDOW SEAL

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The present invention relates to window seals, and more particularly to weather stripping that is inserted between a metal casement window and the frame.

Weather stripping is applied to the edges of the stationary part of the window structure to serve as a flexible abutment for the metal sash or casement. The stripping comes in long lengths and is extruded by dies out of artificial rubber or plastic material. Lips are provided on the stripping to grip the edges of the frame and a sealing member projects outwardly to receive the outer edge of the closed sash or casement.

It has been found that over a period of time, particularly with repeated opening and closing operations of the casement, the cushioning or yielding effect offered by the member becomes less. This is due in some measure to the fact that practically all the cushioning effect is provided by the yieldability of the material at the joint between the sealing member and the body of the stripping and also the resiliency of the sealing member itself, so that as the material deteriorates with age and changes its degree of hardness, the tightness of the seal might be affected.

I have discovered, and in accordance with my invention, that this yielding effect can be maintained over an indefinite period of time, notwithstanding some loss in resiliency of the sealing material, by providing an air passageway or compartment within the material and restrict the flow of air from the compartment as the sealing elements are compressed when the casement is closed against the frame.

Upon opening the casement, air is again allowed to seep or otherwise flow into the narrow compartment ready to be compressed and eventually to flow or leak out of the compartment, when the casement is again closed. Thus, a pneumatic yielding effect is introduced to that provided by the resiliency of the material and this effect remains constant and is always available during the life of the seal.

The sealing material is in the form of strips which extend around the stationary frame of a casement sash and to which the strips are secured. Inasmuch as the frame is rectangular, it becomes necessary to cut the strips on a bias, preferably 45 degrees, and of a length corresponding to the height and width of the frame. There is a portion extending inwardly from each strip and this portion is hermetically closed except at the places where the strips are cut to predetermined lengths to fit the frame. Crevices are therefore left where the ends of the longitudinal strips abut the transverse strips. Air is forced outwardly through these crevices when the hermetic closure is compressed on closing the casement sash and air is sucked into each crevice to fill the closure as the compression is relieved on opening the sash.

The primary object of the invention is to provide a weather stripping made of rubbery or resinous material which retains its weather-sealing qualities over longer periods of time than the stripping on the market.

Another object is to provide weather stripping made of

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resilient material and in which its weather-sealing properties are permanently retained in spite of some deterioration of the material.

Still another object is to provide an improved weather stripping in which a pneumatic cushioning effect is obtained by means of an air chamber or compartment which is completely sealed except for small air escape openings.

A further object is to provide weather stripping of the character described in the immediately foregoing object, but in which the air compartment is co-extensive with the sealing element and is formed simultaneously therewith.

Another object is to provide improved weather stripping in which a column of air is provided lengthwise of the stripping to serve as a cushioning agent.

The final object is to provide improved weather stripping which includes a pneumatic cushioning chamber extending the length of the stripping and in which the chamber can be formed by the same extruding process and at the same time that the stripping as a whole is manufactured.

Other objects and features will be apparent as the specification is perused in connection with the accompanying drawings, in which:

Figure 1 represents a fragmentary perspective view of a metal casement window and frame in open position and showing the location of the improved weather stripping;

Figure 2 is an enlarged view of a portion of the window frame with the stripping in place and not under compression, as when the window is open; this figure is a section taken along line 2—2 in Figure 1;

Figure 3 is a view similar to Figure 2 but showing a casement window abutting the weather stripping and placing the latter under compression, as when the window is closed; and

Figure 4 is an enlarged perspective view of a portion of the improved sealing member.

Referring more particularly to Fig. 1, reference character 1 represents a rectangular metal frame which is provided in window openings of a building, usually of brick. As shown in Figs. 1 and 2, the metal lengths 1 are usually formed in an I-section having legs 2 and 3 with an interconnecting web 4. One of the legs 2 usually extends only a relatively short distance, as indicated at 5, beyond the web 4 so as to leave clearance space for the moving sash or casement of the window proper as the latter is opened and closed. The frame 1 can be secured to the opening in the building in any suitable and well known manner.

The window proper 6, comprising a sheet of glass, is fitted within a sash or casement indicated at 7, of which a typical section is shown in Fig. 3. The casement 7 may comprise a section similar to the frame in that it is formed of legs 8, 9 joined together by an intermediate web 10. One of the legs indicated at 11 is of shorter distance than the other leg 8, and similarly, one of the opposite legs, as indicated at 12, is of shorter length than the corresponding leg 9.

A sheet of glass 6 is fitted in the large rectangular recess formed by the surfaces 9, 10 and 11 and held therein in any suitable manner by means of metal fasteners, or even putty. Transverse metal strips 13 which serve as reinforcing members may extend along the width of the glass at any intermediate position or positions so as to give the effect of separate panes. A window latch 14, pivoted at 15, may be provided on the frame 1, having a handle 16, which upon pressing down, will force the latch 14 into an opening (not shown) in the casement 7.

The window is swivelly supported on two sets of brackets of which one set is indicated at 17, the bracket set being secured to the leg 9 of the casement, while the other end of the bracket set is secured to the frame, thus permitting the window to open outwardly on the swivels

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18. A hand operator 19 is screwed to the lower part of the frame, having a handle 20 and an operating arm 21 that terminates in a pivot or rivet. The latter is adapted to slide in a groove formed in the lower leg of the casement 7. Thus, by turning the handle 20, which slides the arm outwardly or inwardly along the casement, the window can be moved from its open to its closed position or vice-versa after opening the latch 14.

In view of the difficulty of obtaining a tight fit between the lengths of the metal casement and the lengths of the metal frame, it is most difficult to obtain a sealing effect between the moving and stationary portions of the window structure even when the operator 20 is moved to tightly close the window, and indeed, even when the latch handle 16 is operated to lock the window. This is due to some distortion of the window elements and also inaccuracies in the manner in which the window or its casement is mounted within the frame. It therefore becomes necessary to provide a sealing element between the moving and stationary portions, this element being most conveniently applied in strip form.

Description of the improved weather stripping

In accordance with my invention, I provide a weather stripping of unique and most effective character in furnishing a sealing effect over long periods of time. The strip itself is shown in Fig. 4, while the application and operation of the strip can be seen by comparing Fig. 1 which represents the open window arrangement, to Fig. 3 which shows the operation of the strip when the window is closed.

As shown in Fig. 4, the body 22 of the improved weather stripping comprises a U-shaped member made of any suitable rubber or plastic material that can be readily extruded, and a seal element indicated generally at 23. The body portion comprises a pair of legs 24, bridged at the top by a transverse strip 25. The legs 24 taper inwardly a little and the interior surfaces are provided with ridges 26 in order more tightly to grip and to be secured by the leg 3 of the window frame as indicated in Figs. 2 and 3. Preferably, the body 22 is secured to the leg 3 by means of a suitable adhesive 27. But on occasion the gripping effect of the legs 24, particularly the fact that they taper inwardly, is often sufficient to furnish the necessary gripping force.

The seal portion 23 (Fig. 4) comprises a wing element 28 having an overall thickness somewhat wider at the center portion indicated at 28A, which tapers down at the top, as indicated at 28B, and also at the bottom, as indicated at 28C, where it joins the transverse strip 25.

The entire lower surface of the sealing member 28, as seen in Fig. 4, takes on a general convex shape of variously curved portions, and rounded off at the top, while the upper surface of the member 28 is given a concave configuration which merges as a reverse curve with the convexly curved corner 29 of the strip 25.

The wing or sealing element 28 at its greatest thickness is somewhat thicker than the legs 24 of the body, and the strip or bridging member 25 of the body is also a trifle thicker than the legs 24.

In accordance with one of the aspects of my invention, there is provided within the wing element 28 a long, narrow compartment or chamber 30 which has walls corresponding to the contour of the wing element and is as high and as wide as the dimensions of the wing element will permit to still leave sufficient thickness of wall on both sides and the top of the compartment.

In practice, and assuming that the weather stripping as a whole is extruded from any suitable rubbery or plastic material, the compartment 30 can be simultaneously formed by proper modifications of the extruding die.

Whereas in the absence of the compartment 30, I have found that the cushioning and sealing effects are dependent solely upon the resiliency of the material out of which the weather stripping is made, and also on the

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hinge effect obtained at the location 28C, the presence of the compartment 30, or rather the column of air contained within that compartment, is such as to introduce an additional cushioning effect which is quite independent of any resilient property of the material.

Referring to Figs. 2 and 3, and assuming that the leg 24 of the stripping has gripped the leg 3 of the frame, the "at rest" or uncompressed position of the stripping shows that there is air contained in the compartment 30. This air is admitted to the compartment through any crevice present in the structure, such as at the corners 31.

The wing or sealing element 28 projects outwardly, as seen in Fig. 2, to a position beyond the surface 24a of the leg 24 so as initially to receive the oncoming surface of the casement at about the mid-point position 28a of the wing as the casement is being closed.

Referring to Fig. 3, there is shown the closed position of the casement window and it will be noted that by the time the leg 12 of the casement contacts the surface 24a of the body of the stripping, the leg 9 will have caused the walls of the wing element 28 to be pressed together as indicated by the curved line to force the air out of the compartment.

Inasmuch as the air can be exhausted only with difficulty and then through cracks such as exist at the diagonal corners 31, and these cracks may be considerable distances apart with long columns of air therebetween, the air offers a certain amount of resistance to flow. Thus, a natural cushioning effect is produced by this column of air, the thickness of which is caused to decrease in an abrupt manner by the compression effect of the leg 9 of the window. The faster the window is closed, calling for a greater escape of air through any available crevice, the more resistance that will be set up by the narrow column of air, and thus the more cushioning effect will be obtained. This effect is present regardless of any additional resiliency offered by the character of the material out of which the stripping is made, and regardless of any tendency of the wing element 28 to return to its normal position as exercised at the hinge 28C.

The result is that in comparing the operation of the wing element 28 from the open window position, as shown in Fig. 2, to the closed window position, shown in Fig. 3, the wing 28 continues to exercise a strong pressure against the leg 9 of the window casement and thus provides an effective seal against all kinds of weather at that point.

The presence of the compartment 30, or the space it represents, also provides a flat contact surface 32 (Fig. 3) where it abuts the leg 9 to offer considerable depth to the sealing surface.

It is obvious that when the operator 20 is rotated to open the window and pressure is relieved at the leg 9 of the casement, air will again seep through the crevices or cracks in the stripping to fill or blow out the compartment 30, ready for the next closure of the window.

Inasmuch as the compartment 30 can be formed during the same extruding process at which the weather stripping as a whole is made, by extrusion or any other suitable manner, the addition of the compartment causes very little, if any, added cost to the yardage cost of the stripping as a whole.

While I have described my invention more particularly in connection with weather stripping for windows, and particularly for metal casement windows, it will be understood that the stripping can be equally used for wooden casement windows and also as sealing elements for doors or for any other use in which a movable member is caused to abut a stationary member and it is desired to form a seal therebetween.

It will be understood that various modifications and arrangements in structure could be made without departing from the spirit of my invention and, accordingly, I desire to comprehend such modifications and substi-

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tutions of equivalents as may be considered to come within the scope of the appended claims.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. A weather stripping adapted to provide a seal between a rectangular stationary frame and a movable casement, said stripping having spaced crevices being adapted to extend around the rectangular joint between the frame and casement, said stripping being continuous and complete except for the crevices left at the corners, said stripping comprising a body portion of extrudible weather-proof material and formed of two spaced portions adapted to receive the stationary frame between them, and a wing portion of similar material integrally secured to said body portion, said wing portion including a substantially closed hollow chamber containing air and which extends along the perimetrical length of the stripping, said wing portion being adapted to be compressed when the casement is closed to cause the chamber completely but slowly to collapse and to expel the air to the atmosphere through the corner crevices.

2. A weather stripping adapted to provide a seal between a rectangular stationary frame and a movable casement, said stripping having corner crevices and being adapted to extend around the rectangular joint between the window and casement, said stripping being continuous and complete except for the crevices left at the corners, said stripping comprising a U-shaped body portion of the extrudible material, and a wing portion of similar material integrally secured to said body portion at a position between the legs of the U, said wing portion extending to a position as to be intercepted by the movable casement, and having a hollow interior containing air and in communication with said crevices whereby as the wing portion is collapsed when the frame and casement abut one another, the air in said interior is caused slowly to be expelled to the atmosphere through the corner crevices.

3. A weather stripping adapted to provide a seal between a rectangular stationary frame of a casement sash and a movable casement, said stripping having corner crevices and being adapted to extend around the rectangular joint between the frame and casement, said stripping being continuous and complete except for the crevices left at the corners, said stripping comprising a body portion having spaced side walls and a bridging wall, said side walls being adapted to grip the stationary frame, a wing portion extending outwardly from said bridging wall into the path of the movable member and adapted to be compressed between the stationary frame and the movable casement, said wing portion including a closed hollow chamber containing air which extends along the perimetrical length of the stripping as far as the crevices, said wing portions upon being compressed when the casement is closed, are adapted completely but slowly to cause the chamber to collapse and to expel the air through the corner crevices.

4. A cushioning abutment adapted to provide a seal between a rectangular stationary frame and a movable casement, said abutment extending perimetrically completely about the frame and casement except for corner crevices, said abutment having a U-shape and being made of extrudible material, a wing portion extending angularly from the bridging leg of said U-shaped abutment and adapted to contact the movable casement as it swings into closing position against the frame, said wing portion being made of extrudible material and being formed simul-

taneously with the abutment portion to leave a neck between the wing and abutment portions where they are joined together, said neck serving effectively as a hinge between the wing and abutment portions when the wing is pressed by the moving casement, and a narrow compartment within said wing portion and formed simultaneously with the formation of the wing portion, said compartment extending the entire length of the wing and abutment portions as far as said crevices and containing air, said wing portion, upon being compressed when the casement is closed, being adapted completely but slowly to cause the compartment to collapse and to expel the air through the corner crevices to the atmosphere.

5. A seal member for use between a rectangular stationary frame of a casement sash and a movable casement, said member being adapted to be secured to and extending perimetrically completely about one of said frame and casement members except for corner crevices, said member comprising body and wing portions, said body portion being formed of two spaced members adapted to receive the stationary frame between them, said wing portion extending outwardly from the body portion into the path of the movable member and adapted to be compressed between the stationary and movable members upon closure of the casement, said wing portion having curvilinear surfaces and a rounded tip, and a chamber contained within the wing portion conforming to the shape of the wing portion to leave walls of uniform thickness, and a gaseous material in said chamber, said wing portion upon being compressed when the casement is closed being adapted completely but slowly to cause said chamber to collapse and to expel the air through the corner crevices to the atmosphere.

6. A weather stripping adapted to provide a seal between a rectangular stationary frame and a movable casement, said seal including body and wing portions extending around the rectangular joint between the window and casement, said seal being continuous and complete except for crevices left at the corners, said body portion being formed of two spaced members adapted to receive one of the stationary frame and casement sash between them and the wing portion extending outwardly from the body portion into a path to be contacted by the movable casement upon closure of the casement, said wing portion having an air chamber therein completely enclosed except at the ends of the seal, said chamber being adapted to be collapsed throughout its entire length to expel the air therefrom to the atmosphere through the corner crevices when the casement is closed, the cross-sectional area of said chamber at the ends of the seal and at the crevices being sufficient to provide a throttling effect on the air being expelled from the chamber when the wing is collapsed.

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