

**April 3, 1956**

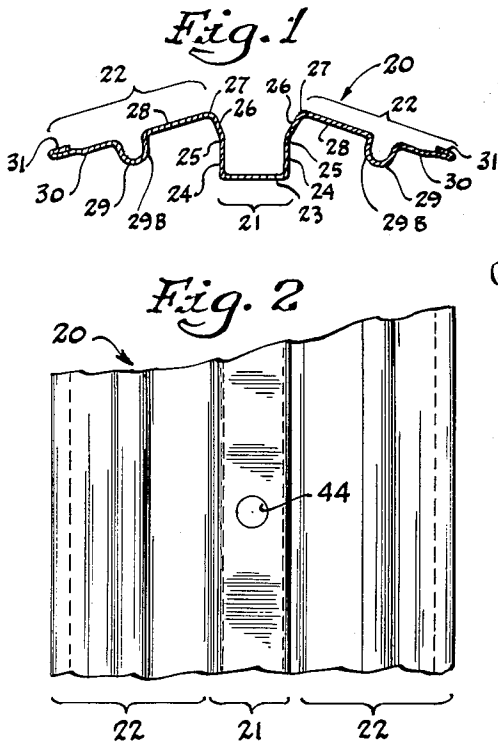
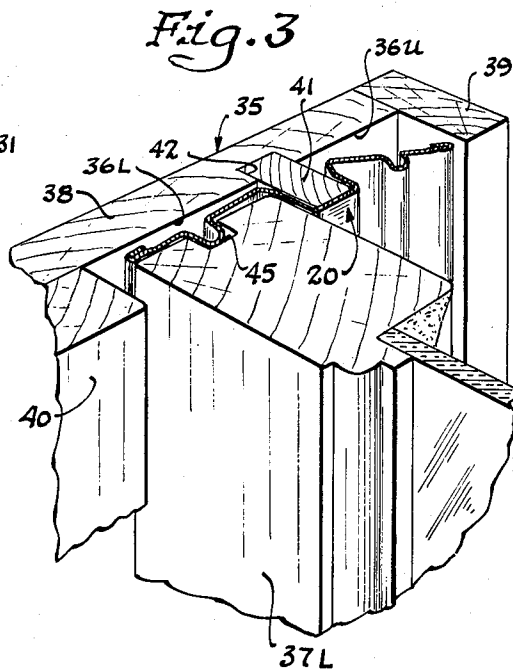
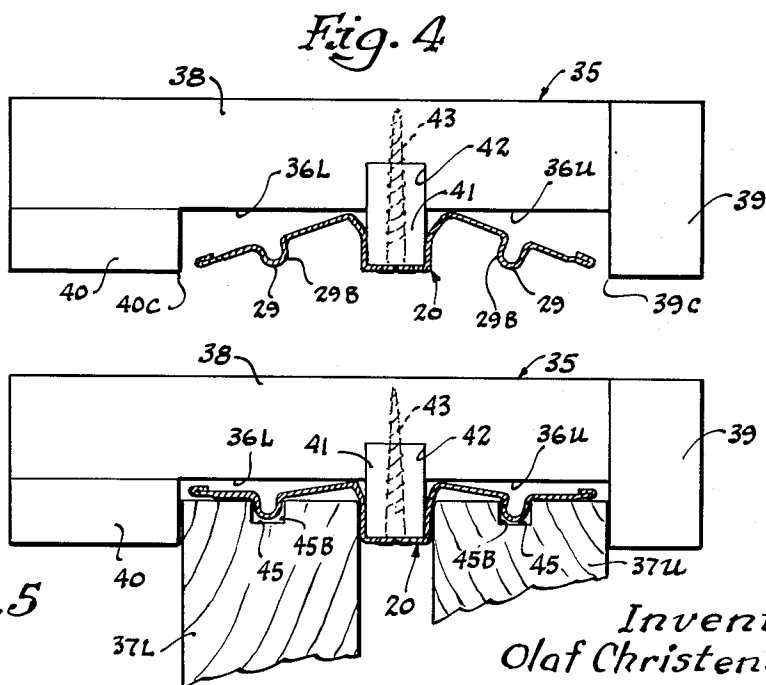
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SASH RETAINING WEATHERSTRIP

Filed Feb. 13, 1953

2 Sheets-Sheet 1



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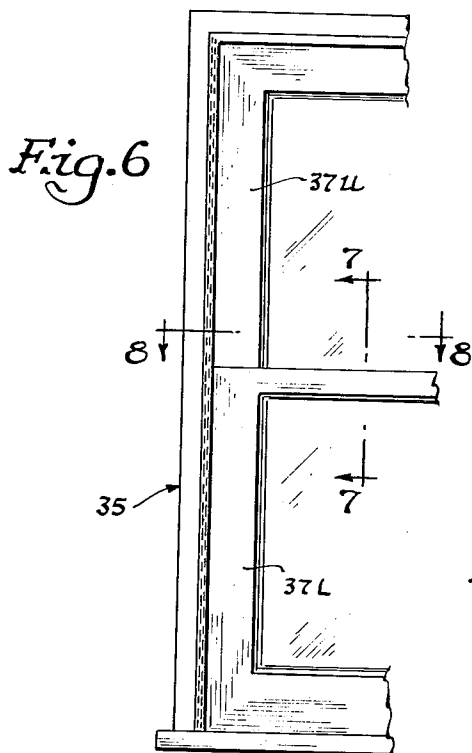
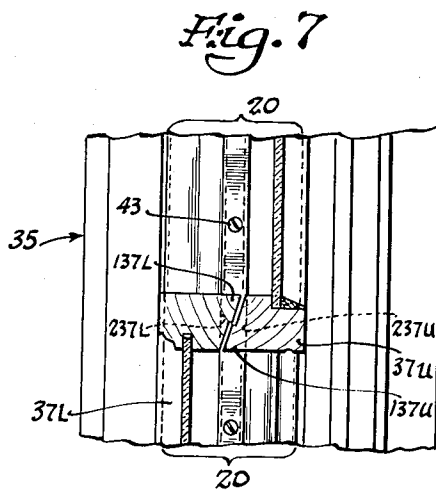
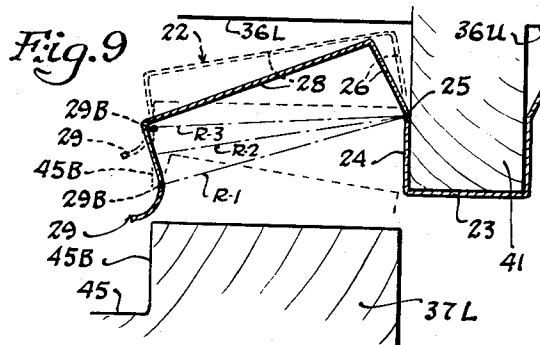
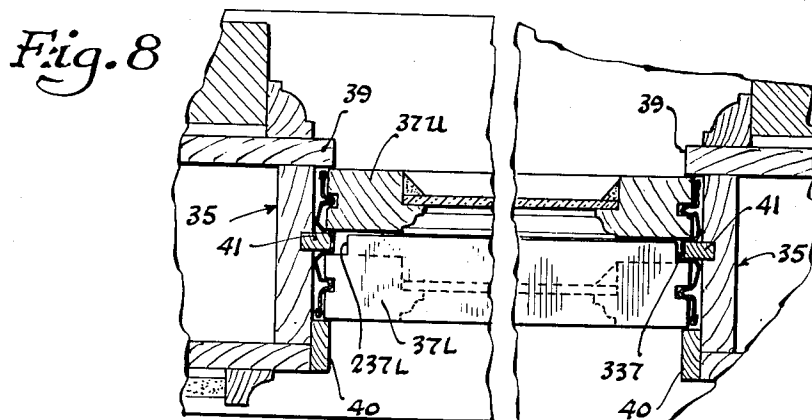
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2 Sheets-Sheet 2



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## SASH RETAINING WEATHERSTRIP

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6 Claims. (Cl. 20—52.4)

This invention relates to sash retaining weatherstripping, and particularly to such weatherstripping that is adapted to engage the sash of a double hung window installation in such a manner as to apply frictional retaining forces to the sash.

There have been many attempts to provide means along the side edges of double hung window sash to apply sash retaining forces to the sash so that the sash will be frictionally maintained in any position of vertical adjustment, and in many such arrangements, provision has been made so that the sash may be shifted laterally from their normal positions in an amount sufficient to release the sash from one sash runway, thereby to enable the sash to be quickly and easily removed from or mounted in the sash runways. In such prior efforts to attain removably mounted sash structures, the necessity for relatively large lateral forces on the sash to retain the sash in the desired position of vertical adjustment has rendered the removal of the sash quite difficult, and it is the primary object of the present invention to enable such removable, frictionally retained sash to be readily and easily removed, thereby to simplify the normal upkeep and cleaning of such window sash.

More specifically, it is an object of the present invention to provide a sash weatherstripping and retaining means that is extremely simple in structure, and which may be economically manufactured and installed. It is a further and related object of the present invention to enable the frictional retaining forces to be applied to sash of the aforesaid character in such a way that the swelling or expansion of the sash in certain seasons of the year does not materially or objectionably alter the operating characteristics of the sash. Specifically, it is an object of this invention to obtain this result in such a way that the frictionally retaining forces are applied to the sash in two different ways, and to accomplish this in a manner such that one type of frictional retaining force which is applied parallel to the plane of the sash is augmented by a second frictional force that is applied perpendicular to the plane of the sash. It is a related object to enable this second retaining force that is applied perpendicular to the plane of the sash to be automatically reduced as an incident to lateral swelling of the window sash, thus to reduce this perpendicular force at the same time that the parallel forces are being increased due to swelling of the sash. A more specific object is to attain a frictional retaining force by a resilient clamping action exerted on the border or edge portion of a sash by forces acting perpendicular to the plane of the sash.

Other and further objects of the present invention will be apparent from the following description and claims and are illustrated in the accompanying drawings which, by way of illustration, show a preferred embodiment of the present invention and the principles thereof and what I now consider to be the best mode in which I have contemplated applying these principles. Other embodiments of the invention embodying the same or equivalent principles may be used and structural changes may be made as desired by those skilled in the art without departing from the present invention and the purview of the appended claims.

In the drawings:

Fig. 1 is a transverse sectional view of a weather sealing and sash retaining strip embodying the features of the invention;

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Fig. 2 is a face view of the strip;

Fig. 3 is a horizontal sectional view shown in perspective and illustrating the strip in position in one side stile of a double hung window structure;

Fig. 4 is an enlarged horizontal sectional view of the side stile of such an installation with the strip mounted thereon;

Fig. 5 is a view similar to Fig. 4 with the window sash in place;

Fig. 6 is a fragmentary inside view of a double hung window installation;

Fig. 7 is a fragmentary vertical sectional view taken substantially along the line 7—7 of Fig. 6;

Fig. 8 is a horizontal sectional view taken substantially along the line 8—8 of Fig. 6; and

Fig. 9 is a fragmentary diagrammatic view illustrating the principle of operation of the present strip.

For purposes of disclosure the invention is herein illustrated as embodied in a weather sealing and sash retaining and positioning strip 20 that is shown in detail in Figs. 1 and 2 as being formed from an elongated strip of thin sheet metal which is resilient in character. One type of sheet metal that may be advantageously employed is aluminum in what is known commercially as the spring type or grades, and this material is available in coils so that it may be formed to the somewhat complex cross sectional form shown in Fig. 1 by the fast and economical processes of rolling. Thus, as shown in Fig. 1, the strip 20 is shaped to a cross sectional form that is symmetrical with respect to the longitudinal center plane of the strip, and which provides a generally U-shaped parting stop housing 21 located midway between the edges of the strip, and provides a pair of oppositely directed arms 22 extending from the open side of the U-shaped parting stop housing 21.

The parting stop housing 21, as shown in Fig. 1, comprises a mounting web 23 that has a width equal to or slightly greater than the width of the parting stop which it is to house, and at the edges of the mounting web 23 the material of the strip is bent in the same direction to form side reaction walls or webs 24 that are perpendicular to the mounting web 23. In respect to this relationship, however, it is to be observed that the internal angle between the mounting webs 24 and the reaction webs 24 is preferably slightly less than 90 degrees since this causes the webs 24 to firmly grip the parting stop and aids in stabilizing the strip so as to promote the novel functioning of the strip 20 as will be described in detail hereinafter. The width of the reaction webs 24 is such that these webs 24 will extend along the parallel sides of the parting stop for a substantial distance, and the metal of the strip is then bent outwardly in relatively large radius bends 25 to form diverging webs 26 which serve with the material in the bends 25 to provide the primary sources of the important resilient forces which come into play in the functioning of the strip 20, as will be described.

At the edges of the diverging webs 26, the strip is formed with substantially right angle bends 27 so as to provide the arms 22 of the strip, and each of these arms 22 has an overall width somewhat less than the width of the sash guideway so that the arms 22 may be positioned within such guideways and may be freely flexed or moved as required and as will be described. Each arm 22 comprises an inner web 28 extended outwardly from the bend 27, a rib 29 integral with the outer edge of the web 28, and an outer web 30 lying substantially in the same plane as the web 28 and integrally extended from the rib 29 and preferably hemmed along its outer edge as at 31. Further details and advantages of the strip 20 as thus formed will be set forth in the following description of its manner of installation and use.

Thus as shown in Figs. 3 to 5, the strip 20 is adapted for convenient mounting in a conventional side stile 35 of a window frame so as to afford weather sealing and sash retaining means for the two adjacent and parallel sash runways 36L and 37U that are afforded in such a stile for upper and lower sash 37L and 37U of the kind normally used in double hung sash installations. The stile 35 is formed in the present instance by a plank type member 38 having an outer stop 39, and inner stop 40 and an intermediate parting stop 41 set in a locating groove 42 midway between the stops 39 and 40 so that these elements form the aforesaid runways 36L and 36U. The housing portion 21 of the strip 20 embraces and houses the outer portion of the parting stop 41 with the mounting web 23 against the outer face of stop 41 and the reaction webs 24 engaging the opposite side faces of the stop 41, and the strip is secured in position by fastening elements which may take the form of relatively long screws 43 extended through openings 44 formed in the mounting web 23 and passing entirely through the parting stop 41 and into the member 38 so as to serve the additional function of holding the stop 41 in place. When the strip 20 is thus mounted the bends 27 of the strip are spaced somewhat from the bottoms of the runways 36L and 36U, and the arms 22 extend across the runways and outwardly away from the bottoms of the runways so that the hemmed edges 31 are disposed at substantially the outer plane of the guideways relatively near the corners 39C and 40C of the stops 39 and 40. The beads 29 are thus disposed substantially midway between the stops 39 and 40 and the parting stop 41, and are adapted to engage with grooves 45 formed in the vertical edges of the sash. When the sash are in their normal operating relation in the runways, the arms 22 of the strip 20 are bent inwardly as shown in Fig. 5, and the edges 31 bear against the side edges of the sash to provide a first weather seal, the beads 29 engage along a line 29B with the side surfaces 45B of the grooves 45 to provide a second weather seal, and the faces of the sash engage the reaction webs 24 to provide a third weather seal, and as will be described in detail hereinafter, the novel resilient action of the strip 20 is such that there is a substantial clamping force exerted by the rib 29 along the line 29B against the face 45B perpendicular to such face 45B and toward the parting strip so that the sash is gripped with a vise-like or clamp-like action between the bead 29 and the web 24.

The fundamental structural relationships of the elements of the strip 20 which cause it to attain this novel and advantageous gripping action are schematically illustrated on an enlarged scale in Fig. 9 of the drawings. Thus, with the strip in position it is found that substantially the entire bending action that occurs when the arm 22 is flexed toward the bottom of the runway takes place at the bend or point 25 so that movement of the point 29B of the rib is on a radius connecting the points 25 and 29B, as indicated at R-1, R-2 and R-3. The radius R-1 shows the point 29B in its normal position, while the radii R-2 and R-3 show the point 29B in successive positions to which it is moved as the arm 22 is bent toward the bottom of the sash runway. It will be observed that in such progressive rearward movement or tensioning of the arm 22, the point 29B moves progressively farther away from the plane of the web 24; and conversely, that the spring tension on the arm 22 tending to return the same to its normal position, urges the point 29B toward the plane of the web 24, thus to attain the aforesaid clamping action on the sash.

The fundamental structural relationship which results in this novel and desirable clamping action in the strip 20 is the relative normal locations of the contact point 29B and the primary bending line 25 with respect to the bottom of the sash runway. Thus it will be observed that in the strip 20 the contact point 29B is normally located at a greater distance from the bottom of the run-

way than the primary bending line 25, and because of this relation, the contact point 29B moves farther away from the parting stop as the arm 22 of the strip is flexed toward the bottom of the runway.

In Figs. 6, 7 and 8 the strip 20 is illustrated as embodied in a complete double hung window installation having right and left hand stiles 35 as hereinbefore described and with strips 20 mounted in association with both of these stiles as hereinbefore described. It should be noted in this respect that the strips 20 are extended from top to bottom of the sash runways on both of the stiles 35 so that these strips will have a uniform weather-sealing and frictional retaining action upon the sash in any vertical position of such sash.

It will be observed in Fig. 8 and in Fig. 5 of the drawings that the side edges of the sash are so spaced from each other that the edges of the sash project into the runways only about one-half of the distance to the bottom of such runways, and the sash are held in centered position relative to the runways on opposite sides thereof by the action of the two arms 22 that act on such opposite edges of such particular sash. With this arrangement, the sash may be shifted laterally or parallel to the plane of the sash so as to further compress one of the arms 22 acting thereon, and this may be carried to such an extent as to release the opposite edge from the sash guideway and permit inward withdrawal of this released edge. In the present instance it should be noted, however, that the upper and lower sash have meeting rails 137L and 137U that are arranged to span the space across between the two sash. The installation shown in Fig. 8 of the drawings is arranged so that the releasing movement that is applied to the sash is in a left hand direction, and to enable this movement to take place, the meeting rails 137L and 137U have their left hand end notches 237L and 237U somewhat deeper than the notches 337 that are formed at the right hand end, this relationship being best shown in Fig. 8 of the drawings. This open space at the notches 237L and 237U is preferably closed by a conventional felt plug located on the parting bead at the position that is opposite the meeting rails when the sash are closed. In this connection, it is noted that the sash removing operations are performed when the sash are displaced from their closed positions, and hence such plug does not interfere with such removal of the sash.

The strip 20 of the present invention serves, of course, to apply frictional retaining forces to the opposite edges of the sash by engagement of the edges 31 of the strips with the side edges of the sash, and these forces applied by the strips on opposite edges of the sash oppose each other and act in a plane that is parallel to the plane of the sash. In addition, the strips 20 exert a clamping action on the sash between the rib 29 and the web 24, and these forces are applied in a direction that is perpendicular to the plane of the window. Because of the gripping action between the bead 29 and the web 24, it has been found that the forces that need to be applied parallel to the plane of the window may be relatively small, and as a result the sash may be removed much more easily than in windows heretofore mounted for releasing movement in this same general way. The total of the two types of forces applied to the sash is, however, sufficient to retain the sash in any desired position of vertical adjustment.

Another advantageous characteristic of the strip of the present invention is that swelling of the window does not materially alter the operating characteristics of the installation. Such swelling takes place primarily parallel to the plane of the window so that such swelling tends to force the arms of the weatherstrips toward the bottoms of the runways, thus to increase the spring tension that is applied to the opposite sides of the sash. Considered apart from the clamping or gripping action that is attained in the present strip, this increase in the lateral forces applied parallel to the plane of the sash would tend to make it overly difficult to operate the sash when it is in a

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swelled condition, and this is what happens in the prior devices of which I am aware. Under the present invention, however, this increase in the forces applied by the edges 31 to the swelled window takes place concurrently with a compensating action that results from the particular way in which the gripping action is applied to the sash. Thus, it will be noted that when the arm of the weatherstrip is thus flexed by the swelling of the sash, the pivoting of the arm 22 about the point 25 tends to shift the contact point 29B somewhat further away from the web 24 of the strip, thus to reduce the resilient clamping action that is applied by opposed forces acting perpendicular to the plane of the sash. It has been found that this compensating action results in substantially the same operating characteristics in the window installation regardless of whether or not the sash has swelled from its normal dimensions.

From the foregoing description it will be apparent that the present invention enables window sash to be held frictionally in the desired position of adjustment by forcing that may readily and easily be overcome in a dismounting operation, and it will also be apparent that the strip of the present invention applies the forces to the sash in a novel and improved manner which renders the present strip more advantageous than devices of this kind that have been heretofore used.

Thus, while I have illustrated and described the preferred embodiment of my invention, it is to be understood that this is capable of variation and modification, and I therefore do not wish to be limited to the precise details set forth, but desire to avail myself of such changes and alterations as fall within the purview of the following claims.

The Dunham Patent No. 2,263,872, patented November 11, 1941, is hereby made of record in this application.

I claim:

1. In a sash retaining weatherstrip, an elongated member of uniform transverse cross sectional form made from a single strip of resilient sheet metal to provide, in cross section, a parting stop housing comprising a mounting web having reaction webs extended from opposite edges thereof in the same direction and substantially at right angles to said mounting web, diverging webs integrally joined to the respective reaction webs along sharp bend lines and diverging in opposite directions away from the planes of said reaction webs at acute angles with respect to such planes, arms extending from said diverging webs at substantially right angles thereto and terminating in weather sealing edges disposed substantially in the plane of the mounting web, said arms each having a clamping and weather sealing rib formed longitudinally of the strip between the sealing edge of the arm and the point of connection of such arm with the related diverging web.

2. In a sash retaining weatherstrip adapted for mounting on a parting stop of predetermined height, an elongated member of uniform transverse cross sectional form made from a single strip of resilient sheet metal to provide, in cross section, a parting stop housing comprising a mounting web having reaction webs of a width equal to about one half of said predetermined height and extended from opposite edges thereof in the same direction and substantially at right angles to said mounting web, diverging webs integrally joined to the respective reaction webs along sharp bend lines and diverging in opposite directions away from the planes of said reaction webs at acute angles with respect to such planes, arms extending from said diverging webs at substantially right angles thereto and terminating in weather sealing edges disposed substantially in the plane of the mounting web, said arms each having a clamping and weather sealing rib formed longitudinally of the strip between the sealing edge of the arm and the point of connection of such arm with the related diverging web.

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3. In a sash retaining weatherstrip adapted for mounting on a parting stop of predetermined height, an elongated member of uniform transverse cross sectional form made from a single strip of resilient sheet metal to provide, in cross section, a parting stop housing comprising a mounting web having reaction webs of a width equal to about one-half of said predetermined height and extended from opposite edges thereof in the same direction and substantially at right angles to said mounting web, diverging webs integrally joined to the respective reaction webs along sharp bend lines and diverging in opposite directions away from the planes of said reaction webs at acute angles with respect to such planes, arms extending from said diverging webs at substantially right angles thereto, said arms each having a clamping and weather sealing rib formed longitudinally of the strip in spaced relation to said reaction web and having a bearing surface facing said reaction web.

4. In a weatherstrip, an elongated member made from resilient sheet metal to afford a reaction web of a width equal to one-half the depth of a sash runway and adapted to be disposed against the side face of one of the stops of a sash runway with one edge disposed adjacent the outer edge of such a stop, an integral mounting web connected to said one edge of said reaction web for securing the same in such a relation to such a stop, the other edge of said reaction web having a connecting web extended integrally therefrom at an angle such that it will diverge at an acute angle from such a side face of such a stop, a further web joined integrally to said connecting web along a sharp bend line and extending therefrom at substantially right angles, and a rib formed along the other edge of said further web to provide a weather sealing and force applying surface facing toward said reaction web.

5. In a weatherstrip, an elongated member made from resilient sheet metal to provide a reaction web of a width equal to one-half the depth of a sash runway and adapted to be disposed against the side face of one of the stops of a sash runway with one edge disposed adjacent the outer edge of such a stop, means connected to said one edge of said reaction web for securing the same in such a relation to such a stop, the other edge of said reaction web having a connecting web extended integrally therefrom at an angle such that it will diverge at an acute angle from such a side face of such a stop, a further web joined integrally to said connecting web along a sharp bend line and extending therefrom at substantially right angles, and a rib formed along the other edge of said further web to provide a weather sealing and force applying surface facing toward said reaction web.

6. In a weatherstrip, an elongated member made from resilient sheet metal to provide a reaction web of a width equal to one-half the depth of a sash runway and adapted to be disposed against the side face of one of the stops of a sash runway with one edge disposed adjacent the outer edge of such a stop, means connected to said one edge of said reaction web for securing the same in such a relation to such a stop, the other edge of said reaction web having a connecting web extended integrally therefrom at an angle such that it will diverge at an acute angle from such a side face of such a stop, a further web joined integrally to said connecting web along a sharp bend line and extending therefrom at substantially right angles, a rib formed along the other edge of said further web to provide a weather sealing and force applying surface facing toward said reaction web, and a final weather sealing web extending from the other side of said rib and terminating in a weather sealing edge.

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