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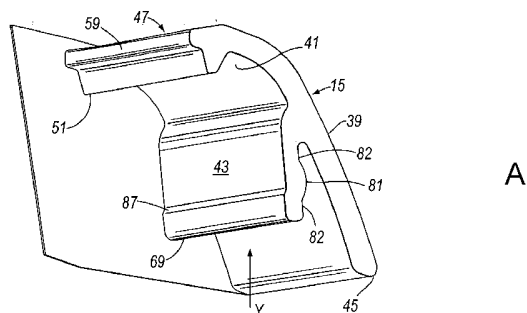
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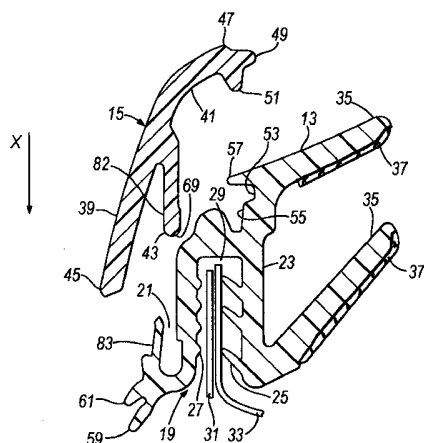
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(54) Title: SEALING, TRIMMING AND FINISHING STRIPS AND VEHICLE DOORS INCORPORATING SUCH STRIPS



A



B

(57) Abstract: A sealing, trimming or finishing strip (13) includes a channel (21) running along the length of the strip for receiving the engagement leg (43) of a decorative strip (15). The channel (21) and the decorative strip leg (43) include respective formations spaced apart along the length of the channel (21) and decorative member leg (43) for mutual mechanical engagement. The formations tend to control relative longitudinal movement between the channel (21) and the decorative strip (15). In particular, relative movement between the decorative strip (15) and the channel (21) due to the difference in the coefficient of thermal expansion of those two parts may be controlled or reduced. The engagement formations of the channel (21) may be formed in the rigid carrier forming part of the channel (21).



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SEALING, TRIMMING AND FINISHING STRIPS AND VEHICLE DOORS INCORPORATING SUCH STRIPS

Field of the Invention

This invention relates to sealing, trimming and finishing strips, vehicle doors incorporating such strips and to a method of forming such a sealing, trimming and finishing strip.

Summary of the Invention

According to a first aspect of the present invention, there is provided a sealing, trimming or finishing strip including a channel running along the strip for receiving an elongate decorative member, the channel and the decorative member having respective formations for mutual mechanical engagement, the arrangement being such that the formations tend to control longitudinal movement of the decorative member within the channel.

According to a second aspect of the invention, there is provided a sealing, trimming or finishing strip including a channel running along the strip for receiving an elongate decorative member, the channel and the decorative member having respective formations for mutual mechanical engagement, the arrangement being such that the formations tend to control longitudinal movement of the decorative member within the channel due to any difference in the coefficient of thermal expansion of the channel and the decorative member.

According to a third aspect of the present invention, there is provided a waist belt assembly for a vehicle door, including a sealing, trimming or finishing strip having first

and second channels running along the strip and extending in generally opposite directions, the first channel being for receiving a flange at the waist of the door, the assembly further including a decorative member for being received by the second channel, wherein the second channel and the decorative member have respective formations for mutual mechanical engagement, the arrangement being such that the formations tend to control relative movement between the channel and the decorative strip along the longitudinal direction of the second channel.

According to a fourth aspect of the present invention, there is provided a method of forming a sealing, trimming or finishing strip, the method including a forming channel running along the strip for receiving an elongate decorative member, the channel and the decorative member having respective formations for mutual mechanical engagement, the arrangement being such that the formations tend to control longitudinal movement of the decorative member within the channel.

According to a fifth aspect of the present invention, there is provided a method of forming a sealing, trimming or finishing strip, the method including a forming channel running along the strip for receiving an elongate decorative member, the channel and the decorative member having respective formations for mutual mechanical engagement, the arrangement being such that the formations tend to control longitudinal movement of the decorative member within the channel due to any difference in the coefficient of thermal expansion of the channel and the decorative member.

Brief Description of the Drawings

Sealing, trimming and finishing strips embodying the invention, vehicle doors according to the invention and incorporating such strips, and a method of forming such

a strip, will now be described by way of example only with reference to the accompanying drawings, in which:

Figure 1 shows a perspective side elevational view of a vehicle door;

Figure 2 shows a perspective view of a waist belt assembly for the vehicle door of Figure 1;

Figure 3 shows an enlarged view of the end portion of the decorative strip shown in Figure 2;

Figure 4 shows a cross-sectional view taken along the line A-A of Figure 2 with the decorative strip shown removed from the sealing strip;

Figure 5 shows a cross-sectional view taken along the line A-A of Figure 2 with the decorative strip shown mounted to the sealing strip;

Figure 6 shows a cross-sectional view of the reinforcing carrier;

Figure 7 shows an overhead plan view of the sheet of metal of the reinforcing carrier of Figure 6 prior to formation of the reinforcing carrier of Figure 6;

Figure 8 shows a perspective view of the decorative strip of Figures 2 to 5;

Figure 9 shows an end view of the coupling leg of the decorative strip having a first arrangement of engagement formations;

Figure 10 shows an end view of the coupling leg of the decorative strip showing

engagement formations having a second arrangement;

Figure 11 shows a cross-sectional view corresponding to that of Figures 4 and 5 in which only part of the sealing strip and part of the decorative strip is shown and in which the decorative strip is shown being mounted to the sealing strip;

Figure 12 shows a cross-sectional view of a second embodiment of a waist belt;

Figure 13 shows a perspective view of the decorative strip of the Figure 12 embodiment;

Figure 14 shows a cross-sectional view of a third embodiment of a waist belt assembly; and

Figure 15 shows a cross-sectional view of a fourth embodiment of a waist belt assembly.

In the drawings, like elements are generally designated with the same reference numeral.

Detailed Description of Embodiments of the Invention

Figure 1 shows a motor vehicle passenger door 1 with a lower part 3 carrying a window frame 5 for a window opening 7. In the usual way, a window glass 9 for the opening 7 can be raised from and lowered into the lower part 3 of the door 1. The frame 5 carries a sealing, trimming and guiding strip assembly (not shown in detail in Figure 1) which extends around the window opening 7 in order to provide a noise and weather resistant seal around the window glass 9. This sealing, trimming and guiding assembly may be

formed of a plurality of different parts, which may or may not be connected together before the mounting of those parts to the window frame 7. The sealing, trimming and guiding assembly includes a waist belt assembly 11 which extends along the waist line of the door 1, where the lower part 3 meets the window opening 7. The arrangement of the waist belt assembly 11 is described in more detail below.

Figure 2 shows in more detail the arrangement of the waist belt assembly 11, which comprises an elongate sealing strip 13 and an elongate decorative strip 15. As shown in Figure 3, the decorative strip at each end thereof includes an end cap formation comprising an integral planar surface 17 extending generally transversely to the length of the decorative strip 15 to provide a neat and pleasing visual appearance to the waist belt assembly when viewed from either end thereof (that is, looking along the side of the vehicle from the front of the vehicle or from the rear of the vehicle).

Figures 4 and 5 show cross-sectional views taken along the line A-A of Figure 2. The sealing strip 13 comprises plastics, rubber or similar material, and preferably EPDM. The sealing strip 13 is preferably produced by an extrusion process. The sealing strip includes a first channel 19 and a generally oppositely facing second channel 21. At least partially embedded within the material of the sealing strip 13 is a reinforcing member or carrier 22 made of resiliently deformable material, such as metal. Alternatively, the carrier 23 could be formed from relatively rigid rubber or plastics. The carrier 23 includes a first U-shaped portion extending around the first channel 19 and a second U-shaped portion extending around the second channel 21. The two U-shaped portions of the carrier 23 are integrally formed (the two portions forming a S-shape together). The first channel 19 includes at opposite sides thereof integrally formed sealing lips 25 and 27 for grippingly engaging a flange 29 formed by outer door panel 31 and inner door panel 33 (only partially shown). The panels 31 and 33 are coupled together, for example by spot welding. The resilience of the carrier 23 assists

in securely locating the sealing strip 13 to the flange 29 and thus to the door 1.

Integrally extending from the part of the sealing strip 13 forming the first channel 19 at the opposite side thereof to the second channel 21 are two sealing lips 35 for sealingly engaging the window glass 9 in order to provide a noise and weather resistant seal therewith. The sealing lips 35 include flocked surfaces 37 for contacting the window glass 9.

The decorative strip 15 may comprise any suitable material, and will generally be more rigid than the material of the sealing strip 13. The decorative strip may comprise metal, for example polished metal or chrome-plated metal. However, in this embodiment the decorative strip comprises PMMA plastics material. Such material is considerably cheaper and lighter than metal. The decorative strip includes a main decorative surface 39 which is visible from the exterior of the vehicle door 1. The opposite, inner surface 41 of the decorative strip 15 has a coupling leg 43 integrally extending therefrom approximately mid-way between the lower end 45 of the decorative strip and the upper end 47 of the decorative strip. The coupling leg 43 is configured and oriented to be accommodated within the second channel 21, as shown in Figure 5.

At the upper end of the decorative strip 15 first and second engagement parts 49 and 51 are integrally formed, extending approximately perpendicularly to one another. A first recess 53 is formed in the sealing strip in the region above the first channel 19 for receiving the first engagement part 49, and a second recess 55 extends therefrom for receiving the second engagement part 51. As the decorative strip 15 is moved in the direction of arrow X the coupling leg 43 enters the second channel 21. At the same time the engagement parts 49 and 51 cause the integral over-lip 57 of the sealing strip 13 to bend to allow the engagement parts 49 and 51 to be accommodated in the recesses 53 and 55 respectively. After engagement of the engagement parts 49 and 51

in the recesses 53 and 55, the over-lip 57 resiles and takes the position shown in Figure 5.

The sealing strip 13 includes an integral first abutment lip 59 extending from the second channel 21 for abutting the outer panel 31 (at a position not shown) and a second integral abutment lip 61 for abutting the inner surface 41 of the decorative strip 15. The engagement lips 59 and 61 assist in securely locating and orienting the sealing strip 13 with respect to the door 1 and the decorative strip 15 with respect to the sealing strip 13, respectively.

An abutment protrusion 63, which partially forms the second recess 55, abuts the interior surface 41 of the decorative strip 15 in the region above the first channel 19, to further securely locate and orient the decorative strip 15 with respect to the sealing strip 13.

Figures 6 and 7 show in more detail the structure and formation of the carrier 23. At the outer part of the second channel 21 the distal end of the carrier 23 may include a curved portion 65 bent away from the channel to provide a curved abutment surface 67 for the domed end 69 of the engagement leg 43 to abut to guide that leg 43 into the channel 21. The carrier 23 may be formed from a rectangular planar sheet of material as shown in Figure 7. To either side of a central, solid (uncut) portion 71 oppositely directed slits 73 and 75 are formed by cutting or stamping the metal sheet. The solid portion 71 forms the base part 76 of the first channel 19, shown hatched in Figure 6. The shorter slits 75 form the leg 77 of the channel 19 from which the sealing lips 35 extend. The longer slits 73 form the opposite leg 79 of the channel 19 and form the remainder of channel 21, including the curved region 65. The slitted planar sheet of material shown in Figure 7 is given the shape shown in Figure 6, for example, by a stamping process.

Prior to fitting the sealing strip 13 to the flange 29, the legs 77 and 79 of the carrier 23 (and thus the parts of the sealing lip 13 in which the carrier 23 is embedded) may be splayed apart so that the channel 19 tapers towards the base 76 thereof (as shown in Figure 6). Such an arrangement may simplify the process of fitting the sealing strip 13 to the flange 29. The sealing strip 13 may then be securely coupled to the flange 29 by bending the legs 77, 79 of the carrier 23 so that they extend generally parallel to one another, as shown in Figures 3 and 4. This procedure may be performed by a tool of the type disclosed in GB-A-2341880, for example.

According to a significant feature of this embodiment, the engagement leg 43 of the decorative strip includes engagement formations 81 extending along the outer surface 82 of the engagement leg 43 towards the leg 83 of channel 21. These engagement formations 81 can be seen in Figures 8, 9 and 10. Figure 8 is a perspective view of part of the decorative strip 15. Figures 9 and 10 show respective arrangements of engagement parts 81 extending from the wall 82 of the engagement leg 43 when viewed in the direction of arrow Y of Figure 8. In Figure 9 the engagement formations 81 comprise a plurality of equi-spaced generally triangular (in cross section) protrusions integrally extending from the wall 82. These protrusions extend along only part of the length of the engagement leg 43. Figure 10 shows an alternative arrangement of engagement formation 81 in which the formations are generally trapezium-shaped. However, the shape, number and spacing of the engagement formations 81 may be selected in accordance with the circumstances. The engagement formations 81 are arranged to mechanically engage the space at each of the slits 73 in the leg 83 of the carrier 23. Rather than being protrusions, the engagement formations 81 could be in the form of notches or indentations for engaging the leg 83 of the carrier 23.

Figure 11 shows the carrier 23 and part only of the sealing strip 13. Part only of the engagement leg 43 is shown in three positions as it is progressively further inserted into the channel 21, labelled A, B and C respectively. The distal end of the engagement leg 43 includes an enlarged head portion 85, which forms a ridge 87 which abuts against the termination 89 of the material of the sealing strip 13 towards the base 91 of the second channel 21 when the engagement leg 43 is fully inserted within the channel 21. A corresponding indentation 93 is formed at the opposite side of the leg 43 to the ridge 87. The enlarged head portion terminates in the domed end 69.

The engagement of the engagement formations 81 with the spaces formed by slits 73 reduces or controls movement of the decorative strip 15 along the length of the sealing strip 13. Such relative longitudinal movement may occur when the ambient temperature changes if the decorative strip 13 and the sealing strip 15 (and particularly the carrier 23 thereof) have a different coefficient of thermal expansion. A significantly different coefficient of thermal expansion may be present when the carrier 23 is formed of metal and the decorative strip 15 is formed of PMMA. The engagement of the engagement formations 81 with the spaces formed by the slit 73 of the carrier 23 will tend to make the sealing strip 13 and the decorative strip 15 expand or contract at a similar rate despite the differences of the coefficient of thermal expansion - for example, by causing expansion or compression of the sealing strip 13 and/or decorative strip 15 in response to expansion or compression of the decorative strip 15 and/or sealing strip is due to thermal expansion or contraction thereof.

Figure 12 shows a second embodiment of the invention showing a waist belt assembly for a fixed window pane 100 - such as a fixed quarterlight window. The window pane 100 is attached to a relatively hard PVC part 102 by adhesive or other bonding means. The relatively hard PVC part is fixed to the vehicle body 104 by any suitable means. The decorative strip 106 has an engagement leg 108 extending generally

perpendicularly from and mid-way along the main decorative part of the decorative strip 106. The engagement leg 108 is accommodated in generally U-shaped channel 112 formed in the relatively hard PVC component 102. To assist in locating and fixing the decorative strip 106 and to provide a weather-resistant seal, relatively soft PVC components 114 and 116 may be provided which engage opposite ends of the main decorative part 110 of the decorative strip 106. The relatively soft PVC part 114 is fixed to the relatively hard PVC part 102 and the window pane 100 by any suitable means. Relatively soft PVC part 116 is fixed to the vehicle body 104 and the relatively hard PVC part 102 by any suitable means.

Figure 13 shows a perspective view of the underside of the decorative strip 106. The engagement leg 108 has a plurality of equi-spaced engagement formations 114 integrally formed therewith. The engagement formations 114 comprise generally rectangular (in cross section) parts extending along the length of the leg 108 but tapering it in height towards the distal end 116 of the leg 108 to ease mounting of the leg 108 into the channel 112. A recess 118 is formed between each of the engagement formations 114 in the leg 108.

The channel 112 is provided with engagement formations 120 for mechanically engaging the engagement formations 114 of the leg 108. The engagement formations 120 of the channel 112 are sized and arranged to fit within the recesses 118. The engagement formations 114 and 120 will tend to prevent relative longitudinal movement between the hard PVC component 102 and the decorative strip 106, in a similar manner to the engagement formations 81 and the spaces of the slits 73 of the first embodiment.

Figure 14 shows a third embodiment, which is a modification of the second embodiment. In the third embodiment at the opposite side of the leg 108 to the

engagement formations 114 are further relatively small engagement formations 122 for engagement with a corresponding recess 124 formed in the relatively hard part 102. Between the recess 124 and the outer surface 126 to the relatively hard part 102 a clamping lip 128 is formed. The clamping lip 128 and/or the formation 122 is resiliently deformed as the leg 108 is pushed into the channel 112, whereafter the relevant part or parts resile, thereby tending to resist pull-off forces applied generally along the length of the leg 108. The formation 122 therefore generally resists transverse movement and the formations 114 generally resist longitudinal movement of the decorative strip 106 relative to the hard part 102. The hard part 102 may include a recess 130 that is aligned with the small engagement formations 122 to reduce the force required to clip the decorative part 110 to the hard part 102 (the recesses 130 allow easier flexing of the hard material 102).

Figure 15 shows a fourth embodiment, which is similar to the second embodiment shown in Figure 12 and 13.

In the fourth embodiment the relatively soft material 116 is extended so that it runs along the vehicle body 104 and is bonded to the window pane 100. The relatively hard part 102 does therefore not directly contact the vehicle body 104 but is spaced apart from it by the relatively soft part 116. The relatively soft part 114 is enlarged also. The relatively hard part 102 is bonded to the relatively soft parts 114, 116 by any suitable means.

Although the embodiments of the invention have been described in relation to a waist assembly for a vehicle door, the present invention is also applicable to assemblies for mounting on other parts of car door frames (such as the A pillar, B pillar or C pillar. The invention is also applicable generally to the mounting of elongate decorative strips to support strips.

CLAIMS

1. A sealing, trimming or finishing strip including a channel (21) running along the strip (13) for receiving an elongate decorative member (15), the channel (21) and the decorative member (15) having respective formations (73,81) for mutual mechanical engagement, the arrangement being such that the formations (73,81) tend to control longitudinal movement of the decorative member (15) within the channel (21).
2. A sealing, trimming or finishing strip including a channel (21) running along the strip (13) for receiving an elongate decorative member (15), the channel (21) and the decorative member having respective formations (73,81) for mutual mechanical engagement, the arrangement being such that the formations (73,81) tend to control longitudinal movement of the decorative member (15) within the channel (21) due to any difference in the coefficient of thermal expansion of the channel (21) and the decorative member (15).
3. The strip of claim 1 or 2, wherein the channel includes a reinforcing member.
4. The strip of claim 3, wherein the reinforcing member is generally U-shaped.
5. The strip of claim 3 or 4, wherein the reinforcing member has a greater rigidity than the strip.
6. The strip of claim 3,4 or 5, wherein the reinforcing member comprises metal.
7. The strip of any one of claims 3 to 6, wherein the reinforcing member includes said engagement formations of the channel.

8. The strip of claim 7, wherein the engagement formations comprise apertures or recesses in the reinforcing member.
9. The strip of any one of claims 1 to 8, including a further channel for receiving a flange of a body portion for mounting the strip to the body portion.
10. The strip of claim 9, wherein said channel and said further channel generally face in opposite directions.
11. The strip of any one of claims 3 to 10, wherein the reinforcing member includes a further U-shaped part extending around said further channel.
12. The strip of any one of claims 1 to 11, including one or more sealing lips for sealing against a closure member.
13. The strip of any one of the preceding claims for forming a waist belt of a vehicle door.
14. The strip of claim 13, when dependent upon claim 9 or 10, wherein the body portion comprises a vehicle door.
15. The strip of claim 12, wherein the movable closure member comprises a window of a vehicle door.
16. A decorative member for mounting on the strip of any one of claims 1 to 15, including formations for mutual mechanical engagement with said corresponding formations of said channel.

17. In combination, the strip of any one of claims 1 to 15 and the decorative member of claim 16.

18. A vehicle door including the strip of any one of claims 1 to 16 and the decorative member of claim 17.

19. A waist belt assembly for a vehicle door, including a sealing, trimming or finishing strip (13) having first (19) and second (21) channels running along the strip (13) and extending in generally opposite directions, the first channel (19) being for receiving a flange at the waist of the door, the assembly further including a decorative member (15) for being received by the second channel (21), wherein the second channel (21) and the decorative member (15) have respective formations (73,81) for mutual mechanical engagement, the arrangement being such that the formations (73,81) tend to control relative movement between the channel (19) and the decorative strip (13) along the longitudinal direction of the second channel (21).

20. A method of forming a sealing, trimming or finishing strip, the method including a forming channel running along the strip for receiving an elongate decorative member, the channel and the decorative member having respective formations for mutual mechanical engagement, the arrangement being such that the formations tend to control longitudinal movement of the decorative member within the channel.

21. A method of forming a sealing, trimming or finishing strip, the method including a forming channel running along the strip for receiving an elongate decorative member, the channel and the decorative member having respective formations for mutual mechanical engagement, the arrangement being such that the formations tend to control longitudinal movement of the decorative member within the channel due to any

difference in the coefficient of thermal expansion of the channel and the decorative member.

22. The method of claim 20 or 21, wherein the channel includes a reinforcing member.

23. The method of claim 22, wherein the reinforcing member is generally U-shaped.

24. The method of claim 22 or 23, wherein the reinforcing member has a greater rigidity than the strip.

25. The method of claim 22, 23 or 24, wherein the reinforcing member comprises metal.

26. The method of any one of claims 22 to 25, wherein the reinforcing member includes said engagement formations of the channel.

27. The method of claim 26, wherein the engagement formations comprise apertures or recesses in the reinforcing member.

28. The method of any one of claims 20 to 27, including forming a further channel for receiving a flange of a body portion for mounting the strip to the body portion.

29. The method of claim 28, wherein said channel and said further channel generally face in opposite directions.

30. The method of any one of claims 22 to 29, wherein the reinforcing member includes a further U-shaped part extending around said further channel.

31. The method of any one of claims 20 to 30, including forming one or more sealing lips for sealing against a closure member.
32. The method of any one of claims 20 to 31, wherein the strip is formed by extrusion.
33. The strip or method of any one of the preceding claims, wherein the strip comprises EPDM.
34. The strip or method of any one of the preceding claims, wherein the decorative member comprises PMMA.

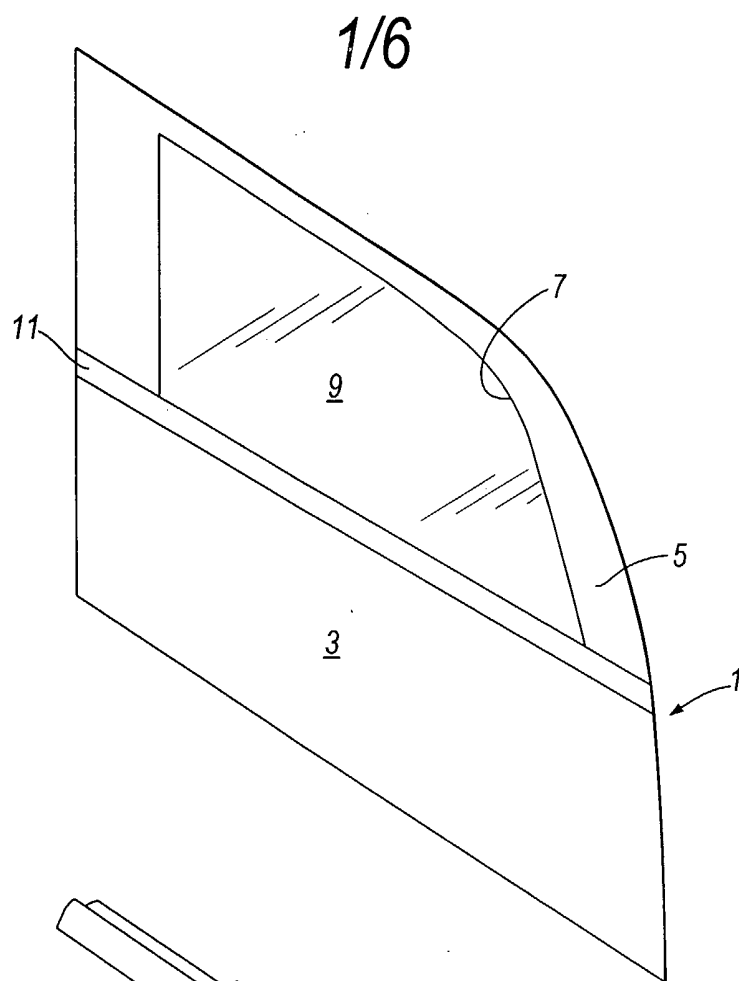


Fig. 1

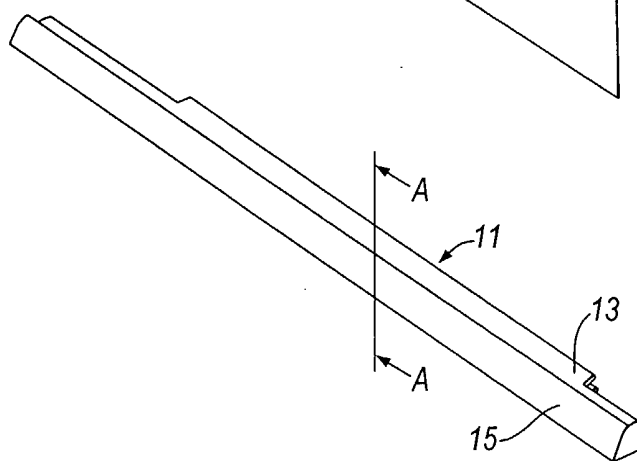


Fig. 2

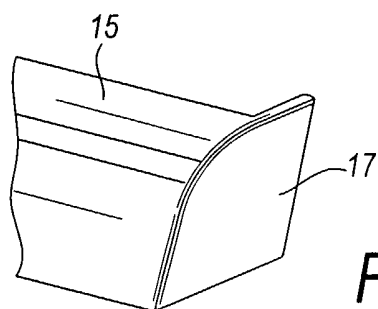


Fig. 3

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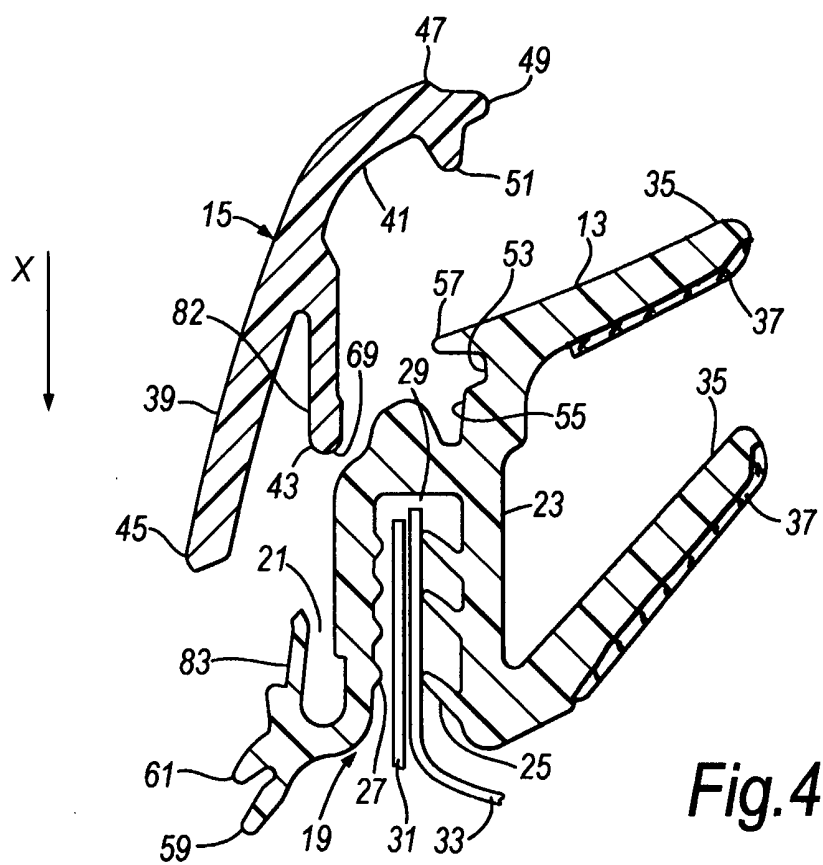


Fig. 4

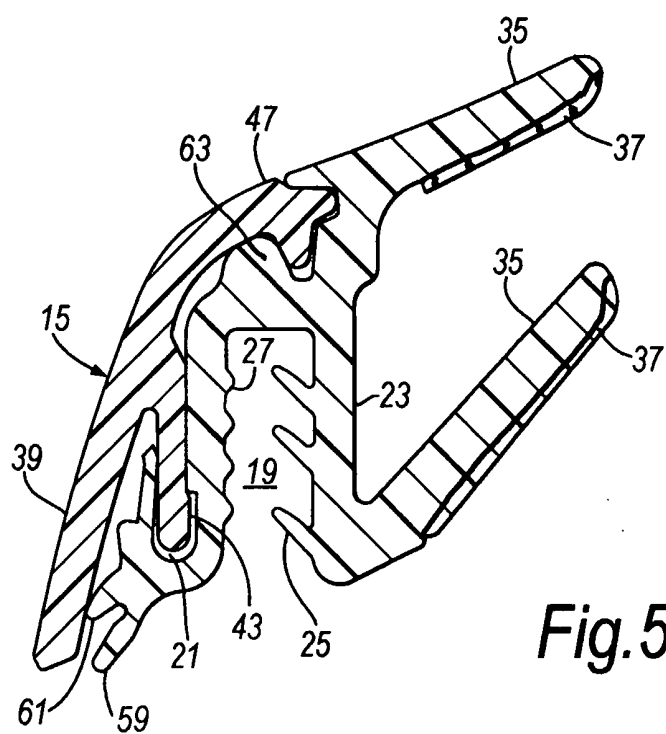


Fig. 5

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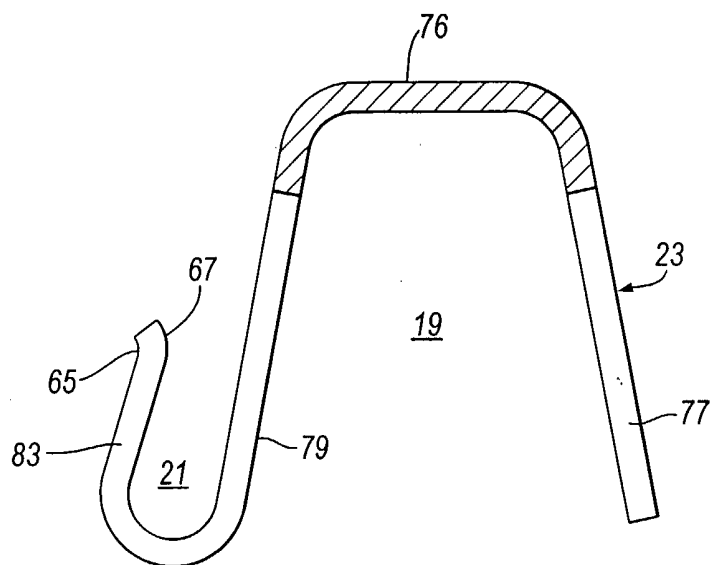


Fig. 6

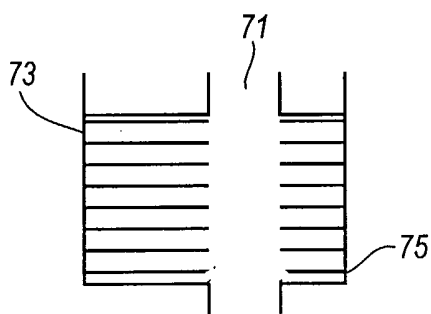


Fig. 7

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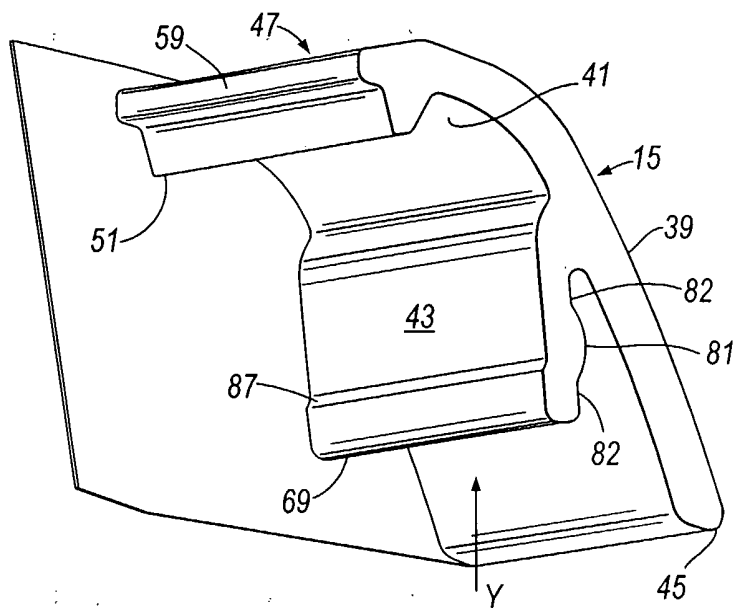


Fig. 8

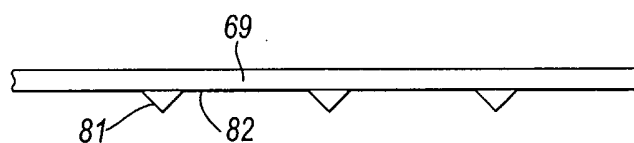


Fig. 9

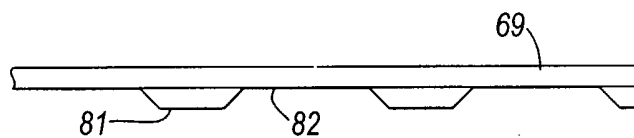


Fig. 10

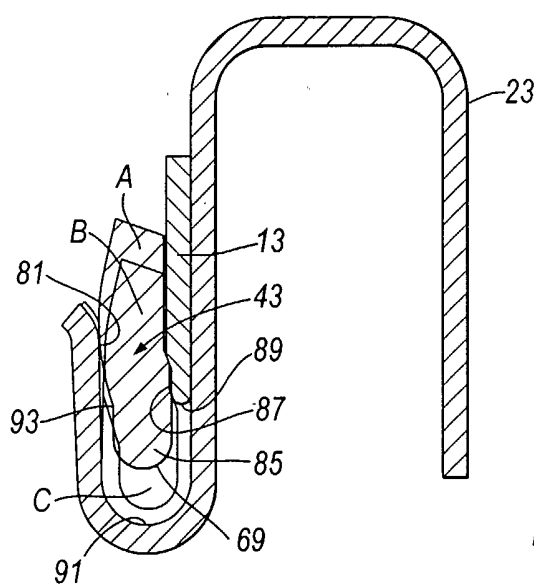


Fig. 11

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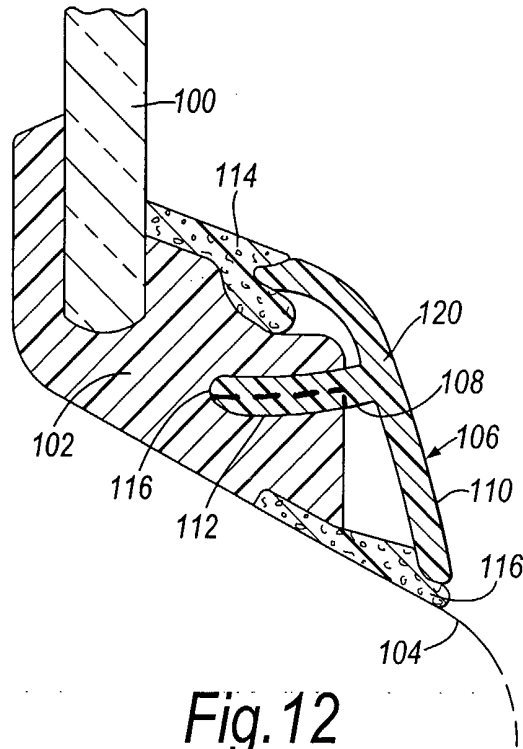


Fig. 12

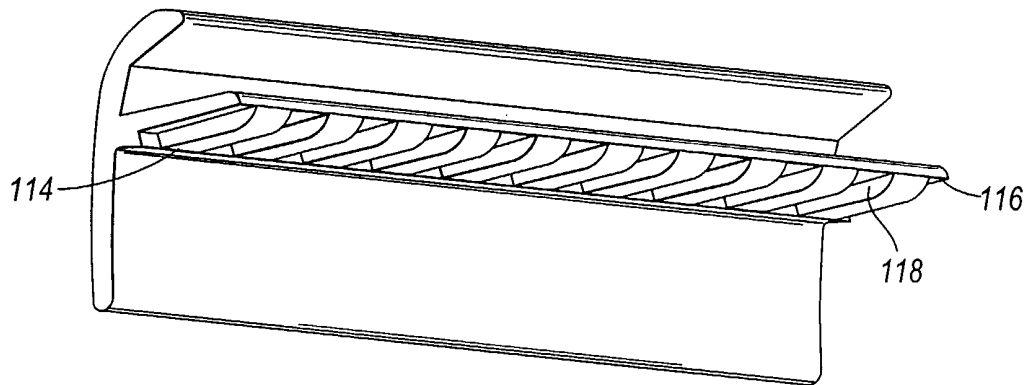


Fig. 13

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