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(54) Title: FLUSH QUARTER GLASS SEAL

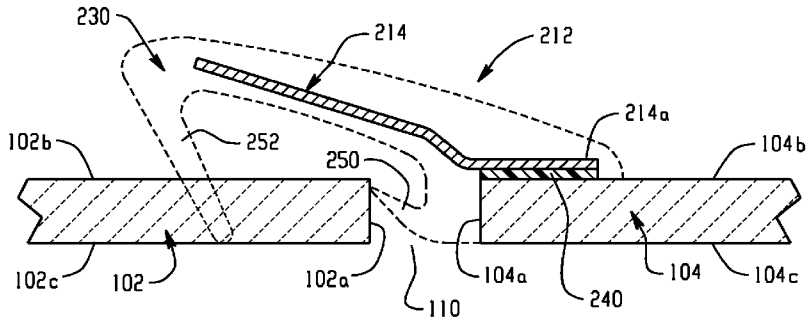

Fig. 3

(57) Abstract: A method and resultant apparatus for a window seal assembly is shown and described. A thin layer of elastomer is introduced between a reinforcement member and a first surface of a window member. The subassembly of the glass member, elastomer, and rigid reinforcement is then introduced into a mold. Preferably, the thin layer of elastomer is provided by an extrusion process, such as on a metal reinforcement member, or as a co-extrusion process when an extruded reinforcement member is formed. A curable, elastomer/plastomer material is then injection molded to provide a flush glass appearance where an outer surface of the window is devoid of any seal material.

FLUSH QUARTER GLASS SEAL

Background of the Disclosure

[0001] This disclosure is directed to a seal assembly, and more particularly, an automotive seal of the type referred to as a glass seal. It finds particular application in association with an interface between adjacent movable front and rear windows. The disclosure is preferably of the type where a thickness or transverse dimension of the seal is preferably minimized, and more preferably does not include any portion extending to an outer surface of the window so as to minimize overall thickness, reduce wind noise, minimize thickness of the sash seal so that wear of the belt strip is reduced, eliminate an unappealing appearance on the outside of the vehicle, and reduce the amount of material and associated expense and component weight associated therewith to the vehicle.

[0002] Thus, a need exists for a new sash seal or flush quarter glass seal, for example, that is mounted over an edge of a window and overcomes the noted problems enumerated above.

Summary of the Disclosure

[0003] A glass seal assembly, particularly an edge seal or sash seal, includes a rigid reinforcement member such as a thin metal or rigid polymer material (e.g., rigid thermoplastic or thermoset material) that is disposed in spaced relation from a first planar surface or interior surface of the window. One of an elastomer or plastomer is provided between the reinforcement member and the inner surface of the window. This material is applied in a very thin, controlled layer thickness on the window surface or on the reinforcement member which are then joined together.

[0004] The reinforcement member is preferably a metal, although alternative materials may be used.

[0005] The reinforcement member has a portion extending in substantially parallel relation to the first planar surface of the window and includes another portion that extends beyond the edge of the window.

[0006] A method of forming a flush edge window seal assembly includes providing a first window member and a rigid reinforcement member, applying a thin layer of elastomer to a portion of one side of the reinforcement member and a first planar surface of the window, positioning at least a portion of the rigid reinforcement

member on the first planar surface, and inserting the first window member, elastomer, and rigid reinforcement member in a mold.

[0007] The method further includes extruding the thin layer of elastomer onto the rigid reinforcement member.

[0008] The applying step may include coextruding the reinforcement member and elastomer together.

[0009] The method further includes introducing a curable material into the mold, wherein at least a portion of the rigid reinforcement member is covered by the curable material.

[0010] The method includes introducing the curable material that is substantially identical to the thin layer of elastomer.

[0011] A primary benefit of the present disclosure is the ability to provide a much thinner weatherseal design.

[0012] Another benefit resides in the reduced wear associated with the belt line seal.

[0013] Still another advantage resides in the reduced component weight.

[0014] Yet another attribute is a more aesthetically pleasing seal assembly.

[0015] Still other features and benefits of the invention will become more apparent from and understanding the following detailed description of the disclosure.

Brief Description of the Drawings

[0016] Figure 1 is an elevational view of a portion of an automotive vehicle, particularly illustrating the interface between front and rear window portions.

[0017] Figure 2 is a cross-sectional view of a conventional sash seal, taken generally along the line A-A of Figure 1.

[0018] Figure 3 is a cross-sectional view along the lines A-A of a portion of the seal assembly, i.e., the initial preparatory step of forming same.

[0019] Figure 4 is a similar cross-sectional view illustrating the completed seal assembly.

Detailed Description of the Preferred Embodiments

[0020] Figure 1 shows a portion of an automotive vehicle **100** and particularly, a front window **102** and a rear window **104**. In this arrangement, it is contemplated

that each of the windows, sometimes referenced to as glass, are moveable relative to a vehicle door or body in which they are received. For example, conventional window moving apparatus such as a regulator may be included and form no part of the present disclosure, so that further discussion herein is deemed unnecessary. The front and rear windows are separated by a gap **110** (Figure 2). In other words, a rear edge **102a** of the front window is spaced from a front edge **104a** of the rear window. Generally, the front and rear windows are substantially co-planar so that first or inner surfaces **102b, 104b** are substantially co-planar and likewise the second or outer surfaces **102c, 104c** are substantially co-planar.

[0021] As shown in Figure 2, a weatherseal assembly is provided at the gap between the windows. This is sometimes referred to as a sash seal or as a division bar between the front and rear windows. The weatherseal assembly **112** includes a rigid reinforcement member **114**, shown here as first and second metal components **116, 118** that are joined together along portions thereof, typically through a spot welding operation. Typically, the reinforcing components **116, 118** are stamped metal that are subsequently spot-welded together. Because of the welding operation, coated metal typically cannot be used since the spot-welding process would adversely impact any coating provided thereon. Subsequently, the metal is coated for protective purposes. The metal reinforcing member includes portions **116a, 118a** that are received on opposite surfaces of the rear window. That is, component **116a** is adjacent the inner surface **104b** of the rear window, while component **118a** is disposed adjacent the outer surface **104c**. This provides desired rigidity and strength to the seal assembly. The metal reinforcement member is then placed in a mold and an elastomer or plastomer material **130** is formed around the metal. This molded material would preferably include at least one seal fin **132** having a low friction coating **134**, for example, thereon. In such an arrangement, the metal with the molded material, once it is cured, is then glued onto the rear window, particularly along edge **104a**. As is evident, even though attempts are made to minimize the amount of material on the outer surface **104c**, this seal assembly still results in material on the outer surface of the window.

[0022] It is also contemplated that the metal reinforcement member can be placed with the glass into a mold and the elastomer/plastomer **130** injected into the mold. Generally, however, this results in an undesired thickness of the elastomer. It

is also difficult to provide for injection of the elastomer between the glass and the metal reinforcement member.

[0023] An improved weatherseal and a method of forming same is shown in Figures 3 and 4. The reference numerals regarding the windows are maintained for purposes of consistency, while new reference numerals are provided for the weatherseal assembly. More particularly, the weatherseal assembly **212** of the present disclosure includes a rigid reinforcement member **214**. As evident in Figures 3 and 4, the reinforcement member is preferably a single-piece structure as opposed to an assembled piece that is formed from a welding operation of two separate components. It is common that the reinforcement member is metal, such as a stamped metal, to form a desired shape or configuration. It is also contemplated that the reinforcement member can be formed of a different material such as a rigid polymer, for example, a rigid thermoplastic or rigid thermoset material. Likewise, if metal is used, the metal can be purchased as a coated material to provide further protection and not encounter additional processing steps or expense as noted above in connection with the prior arrangement of Figure 2. The coating not only protects the meal reinforcement member, but also advantageously enhances the bond with the elastomer/plastomer **230**. More particularly, the metal reinforcement member can be bent to the desired shape for example in an in-line extrusion process. That is, a planar material is introduced at an upstream end of the line and one or more bending operations provide for deformation or progressive deformation of the reinforcement member into its final configuration.

[0024] Of particular note with respect to the reinforcement structure is that portion **214a** is preferably substantially planar. This portion is substantially planar and disposed in substantially planar relation with the inner surface **104b** of the rear window. A thin layer of material such as an elastomer **240** is applied to one of the reinforcement member or the inner surface **104b** of the glass. In a preferred arrangement, the thin layer is an elastomer that is preferably extruded onto the metal reinforcement member. However, it is also contemplated that if the rigid reinforcement member is a non-metal and can be formed from an extrudable material, then the thin layer of elastomer **240** can be coextruded with the rigid reinforcement member. The thin layer is preferably provided on one surface of portion **214a** that is disposed in facing relation with the inner surface **104b** of the rear

window. By extruding or co-extruding the elastomer, one can be assured that a controlled, thin elastomer layer is achieved between the reinforcement member and the window glass. This is to be contrasted with the arrangement of the prior art where careful control could not be effectively achieved. The reinforcement member with this uncured, thin layer of elastomer is introduced into a mold and after which a moldable material **230** is next introduced into the mold to at least partially encompass the reinforcement member. The thin layer **240** and the plastomer **230** do not have to be but could be the same material. The manufacturer need not be concerned with applying too much pressure against the reinforcement member or metal and, if desired, an elastomer- or rubber-to-metal adhesive may be provided on the metal to enhance the bond between the thin layer and the reinforcement member. Even under high pressures, the thin layer is maintained between the metal reinforcement member and the window glass.

[0025] As shown in Figure 3, the elastomer/plastomer material **230** is represented in dotted line to indicate that this material is added in a subsequent step of the process. That is, the thin layer of elastomer/plastomer **240** is sandwiched between the reinforcement member **214** and the inner surface of the rear window **104**. That sub-assembly is then placed in a mold and the elastomer material **230** is next injected into the mold. This assures that a flush interface is achieved, i.e., the outer surface **104c** of the rear window (and likewise the outer surface **102c** of the front window) is devoid of any seal material. As shown here, edge **104a** of the rear window is encased in the elastomer **230**, and a first seal fin **250** extends into sealing engagement with edge **102a** of the front window. Likewise, a second seal fin **252** is formed in the molding operation. The second seal fin **252** is shown in an undeformed state in Figures 3 and 4, although one skilled in the art will recognize that seal fins **250, 252** are preferably biased into sealing engagement with the respective surfaces **102a, 102b** of the front window.

[0026] Once cured, the seal assembly advantageously forms a strong bond with the rear window, while the reinforcement member provides the desired rigidity and strength to the seal assembly.

[0027] By this structure, the thickness of the seal is substantially reduced. This advantageously reduces undesired wear on the belt strip, such as when the rear window is raised and lowered relative to the door. The structure also improves

the aesthetics or appearance on the outside of the vehicle because of the flush nature of the seal. Manufacture in accordance with the teachings of this disclosure also reduces the amount of material required and substantially reduces the component weight by approximately thirty percent (30%) or more. The improved manufacturing process is highly desirable since the process provides an extruded or co-extruded preform of elastomer on the reinforcement member. The manufacturer can carefully control the provision of a very thin layer of elastomer to reduce the overall thickness, and particularly reduce the thickness of the material between the glass and the reinforcement member, which is virtually impossible via an insert injection molding process.

[0028] The reinforcement member is preferably a thin metal, such as a stamped metal, or roll-formed metal, or even a combination of those forming processes. As noted above, reinforcement is not limited to metal and could be made of a thermoplastic or a thermosetting material, if desired. This will find particular application for example in a rear movable window glass in a hard-top vehicle, as well as the windows associated with convertible vehicles.

[0029] The invention has been described with reference to the preferred embodiment. Modifications and alterations will occur to others upon reading and understanding this specification. It is intended to include all such modifications and alterations in so far as they come within the scope of the appended claims or the equivalents thereof

Having thus described the invention, it is now claimed:

1. A flush edge of glass seal assembly comprising:

a first glass member having first and second opposed planar surfaces interconnected along an edge;

a rigid reinforcement member spaced from the first planar surface of the glass;

an elastomer interposed between at least the reinforcement member and the first planar surface of the glass, and the elastomer also extending along the glass edge while the second planar surface is devoid of elastomer.

2. The glass seal assembly of claim 1 wherein the rigid reinforcement member is metal.

3. The glass seal assembly of claim 1 wherein the elastomer is a rubber.

4. The glass seal assembly of claim 1 wherein the elastomer includes a seal lip formed therealong contoured for sealing engagement with an adjacent, second glass member.

5. The glass seal assembly of claim 1 wherein the reinforcement member extends in substantially parallel relation to the first planar surface of the glass member and includes a portion that extends beyond the glass edge.

6. The glass seal assembly of claim 1 further comprising a second glass member disposed in substantially planar relation with the first glass member.

7. The glass seal assembly of claim 6 wherein the first glass member is a rear quarter glass panel and the second glass member is a front glass window of an automotive vehicle.

8. The glass seal assembly of claim 7 wherein the reinforcement member overlaps at least portions of each of the front and rear glass members.

9. A method of forming a flush edge window seal assembly comprising:

providing a first window member having first and second opposed planar surfaces interconnected along an edge;

providing a rigid reinforcement member;

applying a thin layer of elastomer to a portion of one of the reinforcement member and the first planar surface;

positioning at least a portion of a rigid reinforcement member on the first planar surface with the thin layer of elastomer therebetween; and

inserting the first glass member, elastomer, and rigid reinforcement member in a mold.

10. The method of claim 9 wherein the applying step includes extruding the thin layer of elastomer onto the rigid reinforcement member.

11. The method of claim 10 wherein the applying step includes coextruding the reinforcement member and the elastomer.

12. The method of claim 9 of using an elastomer to metal adhesive on the reinforcement member to enhance a bond between the elastomer and the reinforcement member.

13. The method of claim 9 wherein the elastomer is uncured at the time of the inserting step.

14. The method of claim 9 further comprising coating the reinforcement member with a protective material.

15. The method of claim 9 further comprising applying an elastomer to metal adhesive to the reinforcement member.

16. The method of claim 9 further comprising introducing a curable material into the mold wherein at least a portion of the rigid reinforcement member is covered by the curable material.

17. The method of claim 15 wherein the curable material is substantially identical to the thin layer of elastomer.

18. The method of claim 15 wherein the curable material is an elastomer that covers the reinforcement member and a portion of the first surface of the glass.

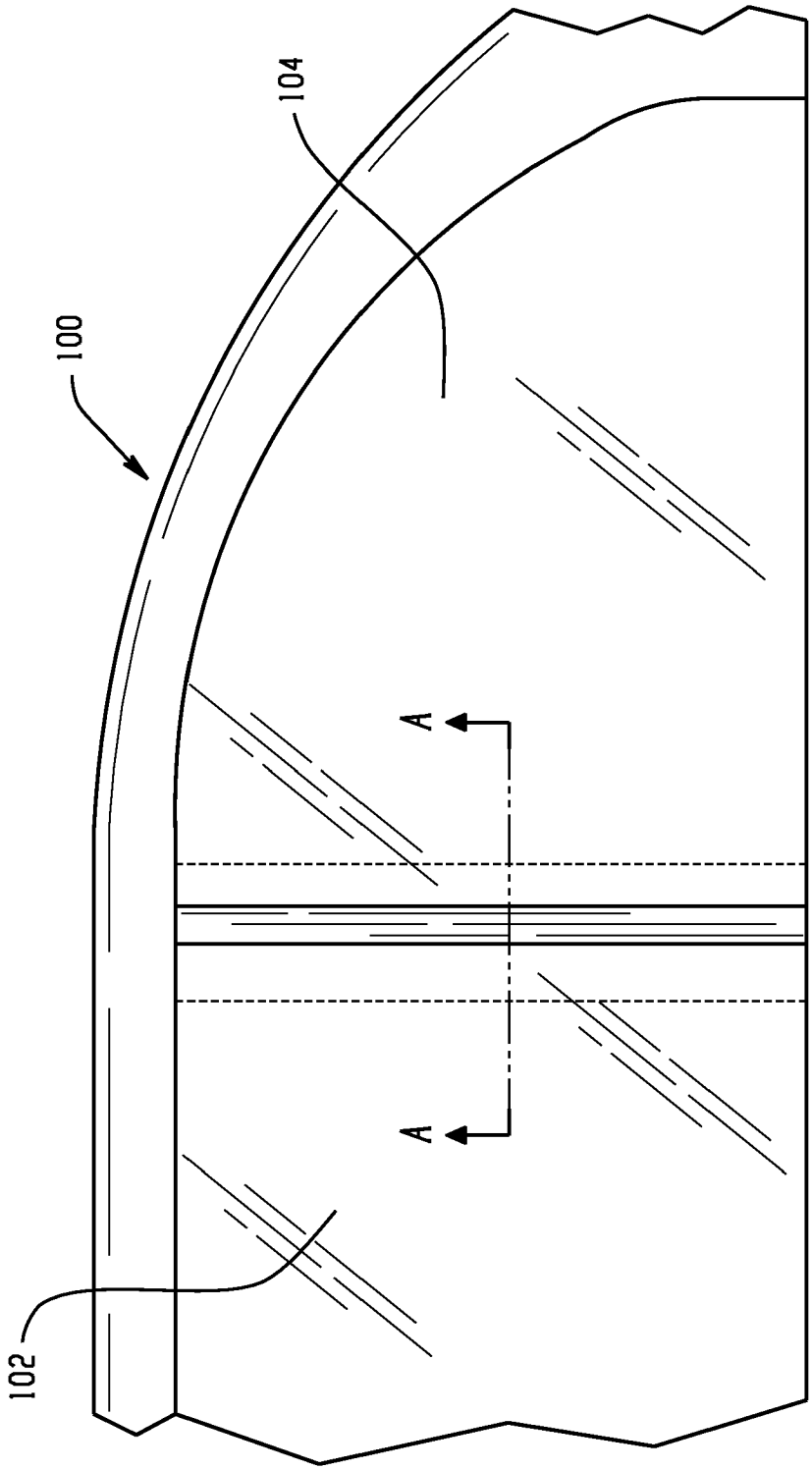

Fig. 1

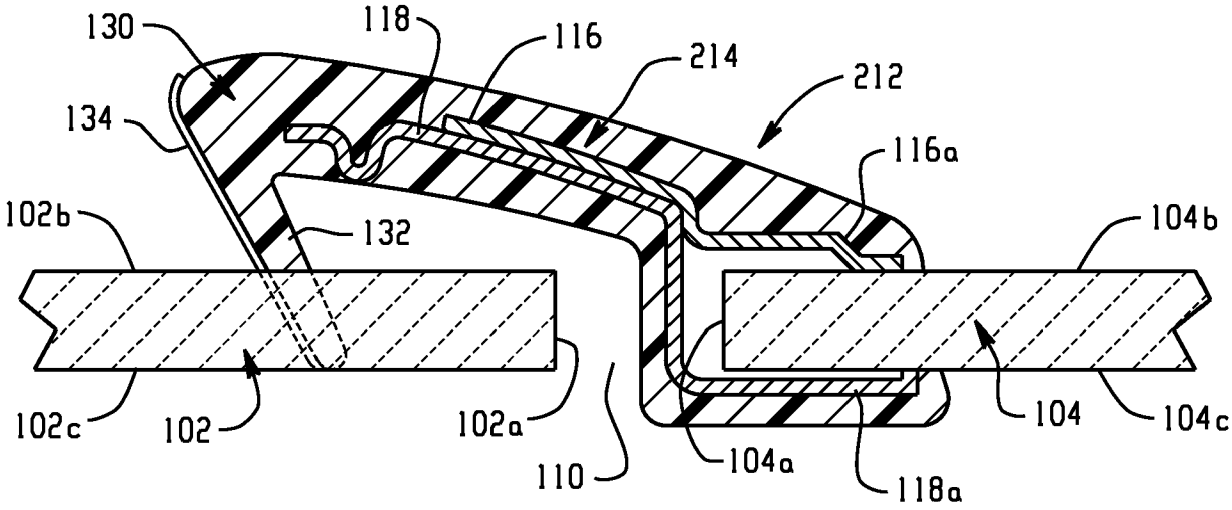

Fig. 2
PRIOR ART

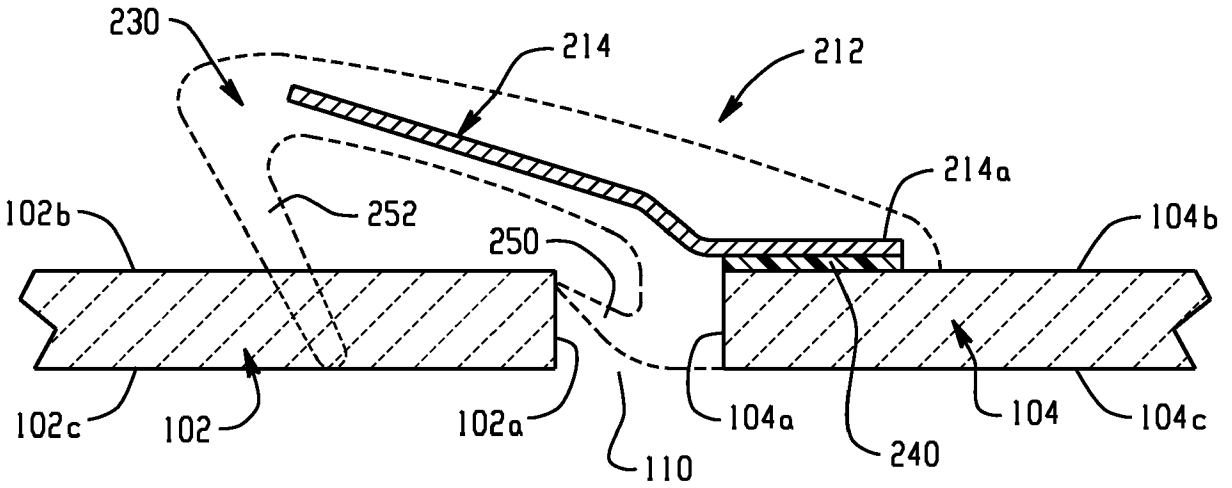

Fig. 3

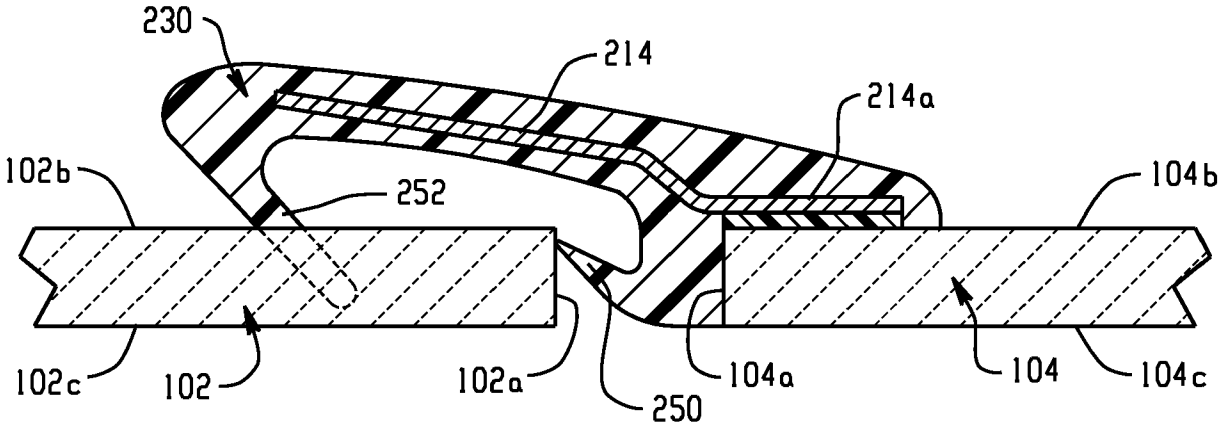

Fig. 4