

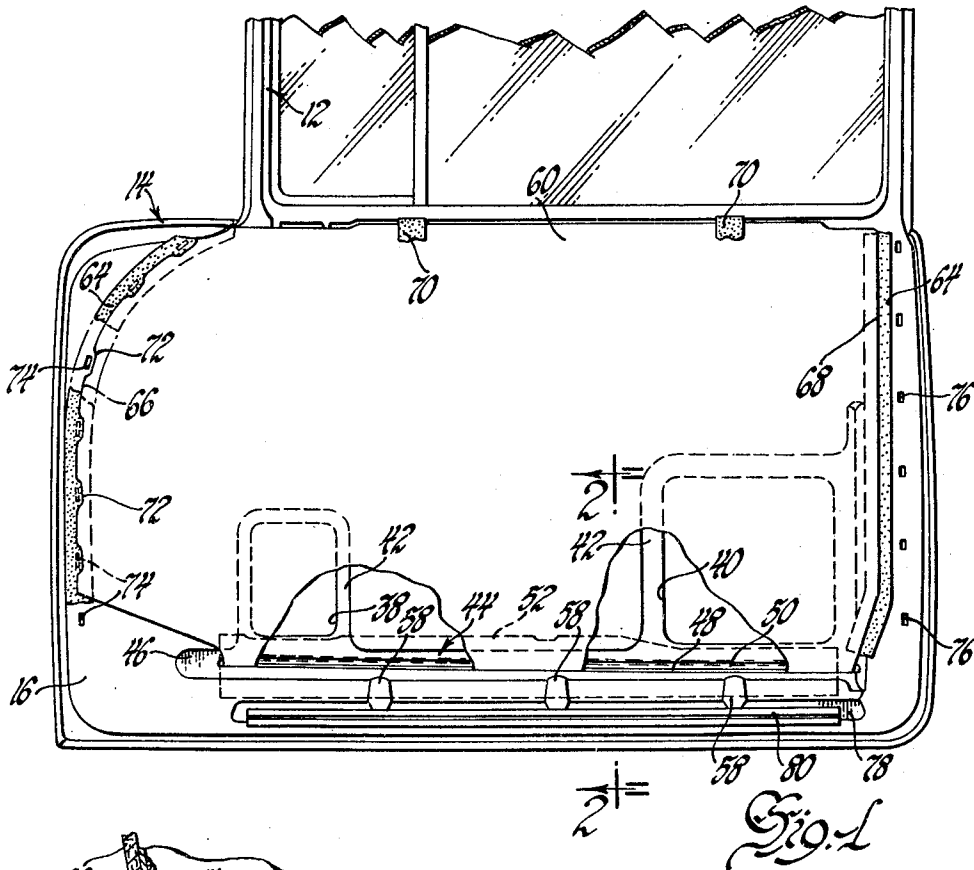
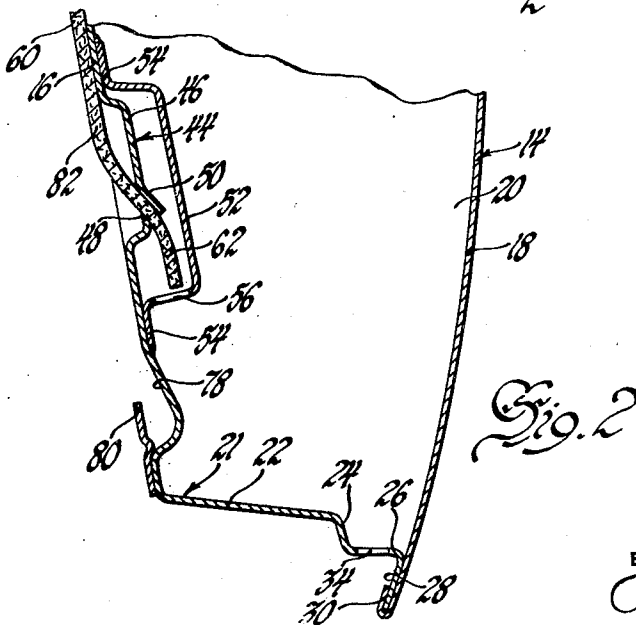
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F. M. GIBSON

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VEHICLE BODY PANEL SEALING MEANS

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INVENTOR
Frank M. Gibson
BY
Paul Hippel
ATTORNEY

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VEHICLE BODY PANEL SEALING MEANS

Frank M. Gibson, Detroit, Mich., assignor to General Motors Corporation, Detroit, Mich., a corporation of Delaware

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This invention relates to the sealing of vehicle body panels and more particularly to the sealing of vehicle door inner panels.

In many present production vehicle doors, the lower portion of the door includes spaced door inner and outer panels which are joined by side and bottom door walls to define a door well. The door well houses the locking mechanism and the window regulator mechanism and also houses the vertically moving door window in open position, with the window moving between open and closed positions through the opening between the spaced upper edges of both door panels. The locking mechanism and the window regulator mechanism are assembled within the door well after manufacture of the door. Access openings are provided in the door inner panel to allow for this assembly and also to allow for repair or replacement of the mechanisms.

Water may enter the door well through the opening between the spaced upper edges of the door panels and collect on the bottom wall of the door well. Drain openings are usually provided in the bottom wall to drain off this water. However, these openings often become clogged so that the water which collects on the bottom wall of the door well may splash up through the access openings and thereby spoil the door inner panel trim pad which covers the inner panel and the openings therein and is part of the interior body trim.

In order to seal the access openings in many present production vehicles, separate plates or covers are secured to the door inner panel around each of the openings and a plastic putty or sealer is used around the edge of the plates or covers to further insure an adequate and effective seal. However, the assembly of the covers or plates on the door inner panel and the placing of the putty around the edges of the plates is time consuming and leaks through the access openings are likely to develop after a period of use unless the putty or sealer forms a continuous seal.

This invention provides an easily applied and economical sealing means for access openings in door inner panels without the use of separate covers or plates for each access opening and without the use of any sealer or putty around the plates. In the preferred embodiment of this invention, a slot is cut in the door inner panel adjacent the lower edge thereof and a reinforcing channel member secured to the inner surface of the door inner panel surrounds the slot. A paper or other flexible liner which has been treated so as to be water resistant is cut to substantially the shape of the door inner panel. The lower edge portion of the liner is fitted within the slot in the door inner panel and then the side edges of the liner are secured to the door inner panel by strips of adhesive tape. The upper edge of the paper liner is secured to the door inner panel in the same manner or by means of a number of spaced strips of adhesive tape. When the liner has been assembled in place it will cover both of the access openings and prevent the water which might

collect on the bottom wall of the door well from splashing through these openings to spoil the door inner panel trim pad which is secured to the door inner panel and covers the liner. The liner can be easily assembled in place with a minimum of time and effort and yet provides a very adequate and effective seal.

The primary object of this invention is to provide improved sealing means for an opening in a vehicle body panel. Another object of this invention is to provide improved sealing means for a plurality of openings in a vehicle door inner panel. A further object of this invention is to provide improved sealing means for a plurality of openings in a vehicle door inner panel which includes a flexible sealing member of a size to cover the openings and releasably secured to the door inner panel.

These and other objects of this invention will be readily apparent from the following specification and drawing, in which:

Figure 1 is a partial side elevational view of a vehicle body door having the sealing means of this invention mounted thereon; and

Figure 2 is an enlarged sectional view taken on the plane indicated by line 2—2 of Figure 1.

Referring now to the drawing, a vehicle door includes an upper door portion 12 and a lower door portion 14. The upper door portion 12 forms a door window frame for a vertically moving door window and also supports a ventipane window assembly in the forward portion of the frame. The lower door portion includes inner and outer door panels 16 and 18, respectively. These panels are located in spaced relationship to each other to define a door well 20 which houses the locking mechanism for the door and the window regulator mechanism for the vertically moving door window. Other mechanisms may also be housed within the door well as is well known in the art.

Referring now particularly to Figure 2, the door inner panel 16 includes a laterally outwardly extending continuous flange 21 which extends around the panel and is secured to the door outer panel 18 along the bottom and side edges thereto to define the bottom and side walls of the door well 20. Flange 21 terminates short of the door outer panel along the upper edge thereof to provide an opening in the door well for the vertically moving door window. The bottom wall of the door well defined by flange 21 includes flange portion 22, flange portion 24 offset from flange portion 22, flange portion 26 offset from flange portion 24, and terminal flange portion 28. An edge portion 30 of the door outer panel 18 is folded back upon itself over the terminal flange portion 28 to secure the flange 21 to the door outer panel. Flange portions 22 and 28 are continuous with flange 21, while flange portions 24 and 26 may only be used along the bottom wall of the door well. The edge portion 30 of the door outer panel is continuous with flange portion 28.

The opening between flange 21 and the door outer panel at the upper edges of the door panels is partially sealed by the usual weather strips engaging opposite sides of the vertically moving door window. However, it is still possible for water to pass into the door well 20 through the opening. As can be seen in Figure 2, the water will collect along the lower wall of the door well particularly in the channel defined by flange portions 24 and 26 and the door outer panel since this is the lowest portion of the bottom wall of the door well and flange portion 22 slopes toward the channel. To drain off this water, a number of spaced openings 34 are provided in flange portion 26.

Also provided in the door inner panel are openings 38 and 40 which are blanked out portions of the panel.

Since the door locking mechanism and the window regulator mechanism are assembled in the door well after manufacture of the door, these openings are necessary in order to provide a manner of inserting the mechanisms within the door well. As previously described, the water which passes into the door well through the opening between flange 21 and the upper edge of the door outer panel collects in the channel defined by flange portions 24 and 26 and the door outer panel and is drained by openings 34. However, these openings often become clogged by debris or other material and all of the water which collects in the channel in the bottom wall of the door well may not be drained. Therefore, it is possible for the water which is not drained to splash outwardly through openings 38 and 40 upon movement of the door or of the vehicle.

Although not shown in the drawings, a door inner panel trim pad fits over the door inner panel and is part of the interior body trim. This trim pad is usually made of paper or otherwise backed fabric and conceals the door inner panel and openings 38 and 40 when it is assembled in place. If water is allowed to splash out through openings 38 and 40, it will spoil the inner panel trim pad and require the replacement thereof. Thus, in order to insure that the inner panel trim pad will not be spoiled by water which splashes through openings 38 and 40 some means of sealing these openings must be provided.

In present production, separate plates or covers are provided for each of the openings and these covers are secured to the inner door panel around the openings. To further insure an effective seal, a plastic putty or sealer is also used around the edges of the plates or covers. However, it often happens that the sealer does not form a continuous seal and some water is apt to leak from between the plates and the door inner panel and spoil the inner panel trim pad. Further, the assembly of the plates and the application of the sealer requires a considerable expenditure of production time and also adds to the cost of the door assembly. This invention provides an improved sealing means for the openings in the door inner panel without the use of such covers or plates and without the use of any plastic sealer or putty. Further, both openings are sealed in a single assembly operation and the sealing means is easily and quickly applied to the door inner panel with a minimum expenditure of time and at a minimum cost.

As can be seen in Figure 1, the door inner panel is embossed inwardly at 42 around each of the openings 38 and 40 and also includes a longitudinal inwardly embossed channel portion 44 which is integral with embossed portions 42. The base wall 46 of the embossed channel portion 44 is provided with an opening 48, and the material of the opening is folded inwardly at 50 to act as a guide as will be explained. A channel-shaped member 52 surrounds the embossed channel portion 44 in spaced relationship thereto and includes flanges 54 which are welded to the inner surface of the door inner panel. Member 52 reinforces the door inner panel in the area of opening 48 since the opening weakens the panel. The reinforcing member 52 extends substantially the full length of the embossed channel portion 44 as shown in dotted lines in Figure 1, and the ends of the reinforcing member are open. A number of spaced drain openings 56 are provided in the lower side wall of the reinforcing member 52. The door inner panel and the lower flange 54 of the reinforcing member are embossed inwardly at spaced points 58 after the reinforcing member has been welded to the door inner panel to provide strengthening ribs and further reinforce the door inner panel in the area of opening 48.

A flexible liner 60 of substantially the shape of the door inner panel is made of paper or other suitable material which has been impregnated so as to make the liner water repellent. The lower edge portion 62 of the liner fits within opening 48 as shown in Figure 2 to releasably

secure the liner to the door inner panel. Strips of tape 64, which are adhesive on both sides are applied between the door inner panel and the liner in order to secure the front and rear edge portions 66 and 68 of the liner to the inner panel. Strips of tape 70 which are adhesive on only one side are also used to secure the upper edge portion of the liner to flange 21 adjacent the opening for the door window. As can be seen particularly in Figure 1 the forward edge of the liner is scalloped at 72 in order to provide clearance for a number of spaced openings 74 adjacent the forward edge of the door inner panel. Openings 74 and a similar number of spaced openings 76 adjacent the rear edge of the door inner panel are adapted to receive spring clips which secure the inner panel trim pad to the door inner panel. Although openings 74 are covered by tape 64, the spring clips of the inner panel trim pad are easily pushed through the tape. A portion of the inner panel is longitudinally embossed inwardly at 78 along the lower edge thereof below opening 48 and a metal strip 80 partially covers the embossed portion 78. The metal strip and the embossed portion 78 provide a further manner of securing the inner panel trim pad to the door inner panel.

It should be noted that a tape 64 which is adhesive on only one side may be used as well as tape 64 which is adhesive on both sides. If the tape 64 is adhesive on only one side, it is partially applied to the door inner panel and to the liner along the front and rear edges of the liner to secure the liner to the inner panel. If such tape is used, openings 76 may be covered by the tape, depending on the width thereof, but the spring clips of the inner panel trim pad can be easily pushed through the tape at the rear edge of the liner as well as along the front edge of the liner as previously described. In certain installations the strips of tape 70 may not be needed and can be dispensed with. The upper edge of the liner can also be secured to the inner panel by a strip of tape which is adhesive on both sides and applied between the liner and the inner panel, or a strip of tape which is adhesive on only one side and which is partially applied to the liner and to the inner panel. The strip of tape which is adhesive on one side or on both sides may extend either the full length of the upper edge of the liner or only a portion of the length of the upper edge, as desired.

The liner 60 is flexible but will not crumple of its own weight if supported on any one of its edges. The embossed channel 44 provided in the door inner panel around opening 48 insures that the fold 82 of the liner will lie substantially within the plane of the remainder of the liner and will not project outwardly therefrom. If any water which has collected in the channel in the lower wall of the door well happens to splash through openings 38 or 40, this water will drain down the outer surface of the door inner panel between the panel and the liner. The water will then drain into the reinforcing member 52 between the inwardly bent portion 50 of embossed channel 44 and the liner will drain back to the door well through openings 56. If any of the openings 56 happen to become clogged, the water can still drain out the ends of the reinforcing member so as to return to the door well. Thus, the liner seals both openings 38 and 40 and also prevents water which might splash through these openings from spoiling the inner panel trim pad.

It can be seen that the liner provides a very adequate and effective seal for openings in door inner panels. The liner is easily assembled, since all that has to be done is to insert the lower edge portion 62 of the liner into the opening 48 and then secure the side edges of the liner to the door inner panel by means of the tape 64 which is adhesive on both sides. The inwardly bent portion 50 of channel 44 acts as a guide when the lower edge portion 62 of the liner is inserted within the opening 48 to further aid in assembly of the liner. The liner is assembled in place in a relatively short time and will provide an ade-

quate and effective seal for the life of the vehicle. If it is desired to obtain access to the door well through openings 38 and 40 the adhesive strips 64 and 70 are disengaged from the door inner panel and then the liner with the adhesive strips 64 and 70 is lifted out of opening 48. The liner can also be removed by first disengaging the strips of tape 70 from flange 21 along the upper edge of the door inner panel and then disengaging the front and rear edges of the liner from the strips of tape 64 so that the liner with the strips 70 can be removed to obtain access to openings 38 and 40, while the strips of tape 64 remain in place on the inner panel. Either manner of removing the liner can be used. Thus, access can be gained to the door well in a relatively short time.

Other openings may also be provided in the door inner panel to allow for assembly of other mechanisms, such as the ventipane window regulator mechanism, or to gain access to various parts of mechanisms for adjustment purposes. Although the invention has been shown and described in conjunction with the front door of an automobile, it is obvious that it may also be used on rear doors of automobiles or on other body panels where similar problems arise with respect to openings in the panel and water drainage.

While a specific embodiment of this invention has been shown and described, various changes and modifications may be made within the scope and spirit of this invention.

I claim:

1. The combination comprising, a vehicle door having door inner and outer panels defining a door well, an opening in said door inner panel to provide access to said door well, embossed channel means located adjacent the lower edge of said inner panel and projecting inwardly within said door well, slot means in a wall of said channel means, a flexible member of substantially the size of said inner panel to close said opening, said member having its lower edge portion slidably received within said slot means and being bent laterally to said lower edge portion to lie substantially flush with the plane of said inner panel, and adhesive means releasably securing opposite side edges of said flexible member to said panel to either side of said opening.

2. The combination comprising, a vehicle body door having inner and outer door panels defining a door well, an opening in said inner panel to provide access to said door well, embossed channel means located adjacent the lower edge of said door to one side of said opening, slot means in a wall of said channel means opening to said door well, a reinforcement member secured to said inner panel within said door well and surrounding said slot means, drain means in said member opening to said well, a flexible member of substantially the size of said inner panel to close said opening, the lower edge portion of said flexible member being received within said slot means and projecting within the space defined by said inner panel and said reinforcement member, said flexible member being bent laterally to said lower edge portion thereof so as to lie substantially flush with the plane of the surface of said inner panel, adhesive means releasably securing opposite edges of said member to said panel to either side of said opening, and means releasably securing the edge portion of said flexible member opposite said lower edge portion thereof to said inner panel.

3. The combination comprising, a vehicle body including inner and outer panels defining a body well subject to moisture collection, a first opening through one of said panels, a second opening through said one of said panels below said first opening, and a flexible moisture proof member of a size to cover said first opening and having an edge portion thereof projecting through said second opening into said well, said member fitting closely adjacent the outer surface of said one of said panels and defining therewith a drain means for collecting moisture

passing through said first opening from said well and draining said moisture through said second opening to said well.

4. The combination comprising, a vehicle body including inner and outer panels defining a body well subject to moisture collection, a first opening through one of said panels, a second opening through said one of said panels below said first opening, a flexible moisture proof member of a size to cover said first opening and having a lower edge portion thereof projecting through said second opening into said well, said member fitting closely adjacent the outer surface of said one of said panels and defining therewith a drain means for collecting moisture passing through said first opening from said well and draining said moisture through said second opening to said well, and means releasably securing the side edge portions of said member to said one of said panels.

5. The combination comprising, a vehicle body including inner and outer panels defining a body well subject to moisture collection, a first opening through one of said panels, a second elongated opening through said one of said panels below said first opening, a flexible moisture proof member of a size to cover said first opening and having an edge portion thereof projecting through said second opening into said well, said member fitting closely adjacent the outer surface of said one of said panels and defining therewith a drain means for collecting moisture passing through said first opening from said well and draining said moisture through said second opening to said well, a reinforcing member secured to said one of panels and surrounding said second opening, and drain means in said reinforcing member opening to said well.

6. The combination comprising, a vehicle body including inner and outer panels defining a body well, a first opening through one of said panels, a second elongated opening through said one of said panels below said first opening, with the material of said opening being bent inwardly of said panel from one edge of said opening to provide a guide means, and a flexible member of a size to cover said first opening and having an edge portion thereof guided through said second opening into said well by said guide means, said member fitting closely adjacent the outer surface of said one of said panels, and means securing at least one other edge portion of said member to said one of said panels to maintain said member in close adjacency to said one of said panels.

7. The combination comprising, a vehicle body including inner and outer panels defining a body well subject to moisture collection, an opening through one of said panels, a slot through said one of said panels below said first opening, with the material of said opening being bent inwardly of said panel from the upper edge of said opening to provide a guide means, a flexible moisture proof member of a size to cover said first opening and having a lower edge portion thereof projecting through said slot into said well between said guide means and the lower edge of said opening, said member fitting closely adjacent the outer surface of said one of said panels and defining therewith a drain means for collecting moisture passing through said first opening from said well and draining said moisture through said second opening to said well between said member and said guide means, a reinforcing member within said well surrounding said slot and secured to said one of said panels, and drain means in said reinforcing member opening to said well.

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