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VEHICLE SASH DOOR STRUCTURE

Abstract

A vehicle sash door structure comprises a door sash body provided above a side door body for a vehicle, a bracket that is configured to support the door sash body, and is provided between the door sash body and an inner door panel of the side door body, a retainer provided to the door sash body, a weather strip door attached to the inner door panel and the retainer, and a reinforcement support that is provided to the bracket, that projects upward to exceed a height of a waist of the inner door panel, and that is joined to the door sash body. The retainer comprises a plate shaped part that is configured to fill a gap formed, by a thickness of the bracket, between the inner door panel and the door sash body at a position at which the weather strip door passes.

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Background/Summary

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The present application claims priority from Japanese Patent Application No. 2024-019661 filed on Feb. 13, 2024, the entire contents of which are hereby incorporated by reference.

BACKGROUND

[0002] The disclosure relates to a vehicle sash door structure comprising a door sash provided with a retainer for attaching a weather strip door along a window frame.

[0003] Types of vehicle side door include a sash door, a sashless door, and a full door. A sash door comprises a door sash of a frame constituting a window frame above a waist, which serves as the window shoulder of a side door body. A sashless door consists just of a side door body, without a door sash of a window frame. A full door has a configuration resultant from integrally press molding the door sash itself and the door body.

[0004] Among these types of side door, a sash door is sometimes used as a door assembly that is commonly employed for different vehicles for reducing capital investment etc. because the door sash of a sash door can be mass produced through roll forming. For example, Japanese Unexamined Patent Application Publication (JP-A) No. 2016-55704 discloses a technique relating to a vehicle door frame, and particularly to the structure of joint between a door sash forming a window frame and a bracket fixed to a door panel. Also, Japanese Unexamined Patent Application Publication (JP-A) No. 2004-338603 for example discloses a technique relating to a vehicle door with a sash that permits the reduction in the scraping processing (machine processing), which follows the extrusion molding of a vehicle door when forming the vehicle door.

[0005] Incidentally, each type of vehicle employs a sash door differing in specification, design, etc. Some types of vehicle may thus employ a long door sash, leading to reduced rigidity in window frames (sash portions). However, using a thicker sheet metal to increase the rigidity of a door sash prevents the weight saving of the sash door, which is problematic.

[0006] Also, the retainer of a sash door is not disposed up to the waist of the side door body. The retainer is used for attaching a weather strip door, which a general door sash has. Thereby, a sash door involves a concave height difference between the retainer and the inner door panel.

[0007] Accordingly, a sash door commonly includes an EPT-sealer, which is a sealing material for filling a concave height difference at a spot having the seal lip of the weather strip door, on the surface of the door sash. However, an EPT-sealer provided on the surface of the door sash at the concave portion formed between the retainer and the inner door panel of a sash door does not guarantee the pressure bonding of the seal lip of the weather strip door, leading to a risk that the reduced drip-proofness causes water to enter the cabin of the vehicle.

[0008] Further, a door sash to which a retainer has been attached is sometimes subject to so-called electrodeposition secondary dripping at its mating portion with the retainer. Electrodeposition secondary dripping is a phenomenon in which a coating material flows out of a mating portion and adheres to a neighboring portion during electrodeposition coating. There is an issue that the electrodeposition secondary dripping occurring in a retainer is to be treated through polishing followed by recoating, which reduces the yield ratio.

SUMMARY

[0009] An aspect of the disclosure provides a vehicle sash door structure comprising: a door sash body provided above a side door body for a vehicle; a bracket that is configured to support the door sash body, and is provided between the door sash body and an inner door panel of the side door body; a retainer provided to the door sash body; a weather strip door attached to the inner door panel and the retainer; and a reinforcement support that is provided to the bracket, that projects upward to exceed a height of a waist of the inner door panel, and that is joined to the door sash

body, wherein the retainer comprises a plate shaped part that is configured to fill a gap formed, by a thickness of the bracket, between the inner door panel and the door sash body at a position at which the weather strip door passes.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] FIG. **1** is a perspective view illustrating a vehicle;

[0011] FIG. **2** is an exploded perspective view illustrating a configuration of a front side door;

[0012] FIG. **3** is a perspective view illustrating the configuration of the front side door;

[0013] FIG. **4** is an exploded perspective view partially illustrating a joint configuration of a door sash unit;

[0014] FIG. **5** is a perspective view partially illustrating the joint configuration of the door sash unit;

[0015] FIG. **6** is an exploded perspective view partially illustrating a joint configuration of the door sash unit and an inner door panel;

[0016] FIG. **7** is a perspective view partially illustrating the joint configuration of the door sash unit and the inner door panel;

[0017] FIG. **8** is a perspective view partially illustrating a state in which a weather strip door has been attached to a retainer and the inner door panel;

[0018] FIG. **9** is a sectional view along IX-IX of FIG. **8**;

[0019] FIG. **10** is a sectional view along X-X of FIG. **8**;

[0020] FIG. **11** is a sectional view along XI-XI of FIG. **10**; and

[0021] FIG. **12** is a perspective view partially illustrating a state in which the weather strip door comprising a cover for covering a reinforcement support of a bracket has been attached to the retainer and the inner door panel.

DETAILED DESCRIPTION

[0022] It is desirable to provide a vehicle sash door structure that can increase the rigidity without preventing the weight saving, can increase the drip-proofness, and can suppress the reduction in the yield ratio.

[0023] Detailed explanations will hereinafter be given to embodiments of a vehicle sash door structure according to an aspect of the disclosure, with reference to the drawings. The drawings referred to in the following description illustrate their constituents with different scales such that each of the constituents has a size that allows understanding in the drawings.

[0024] Accordingly, the embodiments of the disclosure are not limited solely to the numbers, shapes, ratios in size, or relative positional relationships of the constituents illustrated in the drawings. In addition, the right and left directions in the following explanations and the drawings are with respect to the direction in which the front of a vehicle is seen from the cabin of the vehicle.

[0025] A vehicle **1** such as an automobile etc. illustrated in FIG. **1** generally comprises front side doors **2** and rear side doors **3** on its lateral sides in this example when it is a four-door car (or a five-door car with a rear gate). If the vehicle **1** is a two-door car, it generally comprises just front side doors **2** on the lateral sides.

[0026] While the front side door **2** is exemplified in the explanations for a vehicle sash door structure according to embodiments of the disclosure, a similar configuration can apply to the rear side door **3**. FIG. **2** illustrates the front side door **2** on the right side of the vehicle **1**, and FIG. **3** illustrates the front side door **2** on the left side of the vehicle **1**.

[0027] As illustrated in FIG. **2** and FIG. **3**, the front side door **2** comprises a door sash unit **10**, a weather strip door **20**, and a side door body **30**. The door sash unit **10** comprises a door sash body **11**, a retainer **12**, and a bracket **13**.

[0028] The door sash body **11** is provided above the side door body **30**, and constitutes the window frame of the front side door **2**. The door sash body **11** is a metalworking component resulting from applying stepwise curving on a long sheet metal through roll forming. The door sash body **11** in this example has a shape resulting from tracing the sides of a trapezoid except the bottom side.
[0029] The retainer **12** is joined to the door sash body **11** at a prescribed interval through welding such as roll spot welding. The retainer **12** is a retainment component that attaches the weather strip door **20** to the door sash body **11**. The retainer **12** is also a metalworking component resulting from roll forming. In addition, the retainer **12** in this example also has a shape, substantially similar to the door sash body **11**, resulting from tracing the sides of a trapezoid except the bottom side.
[0030] The retainer **12** comprises hooks **15***a* and **15***b*, each of which has its both widthwise edges curved toward a surface part **15** (see FIG. **4**). The hooks **15***a* and **15***b* are locking members that lock and retain the weather strip door **20**. Also, the retainer **12** comprises, below the hooks **15***a* and **15***b*, a plate shaped part **16** extending over a prescribed length.
[0031] The bracket **13** is a metal part for causing the lower end part of the door sash body **11** to be fixed to and supported on the side door body **30**. The bracket **13** is a metal component having a substantially-crank-shaped section. The bracket **13** comprises a reinforcement support **18** that has a substantially-L-shaped section projecting upward from the corner of a bracket body **17** (see FIG. **4**).
[0032] The present embodiment is exemplifying a configuration in which the door sash body **11** has its rear-side lower end part alone fixed to and supported on the side door body **30** through the bracket **13**. However, the disclosure is not limited to this embodiment, and the door sash body **11** may also have its front-side lower end part fixed to and supported on the side door body **30** through the bracket **13**.
[0033] The weather strip door **20** is formed of for example a resin such as polyvinyl chloride, polyvinyl chloride (PVC), polypropylene (PP), etc., and a rubber material etc. The weather strip door **20** in this example has a looped shape.
[0034] The weather strip door **20** is locked and retained by the retainer **12** attached to the door sash body **11**. The weather strip door **20** is held on the side door body **30** at multiple positions through clips (not illustrated). Thereby, the weather strip door **20** is attached to the front side door **2**.
[0035] This weather strip door **20** prevents rain water and dust from entering the cabin with the front side door **2** closed. The weather strip door **20** is an elastic member that promotes absorption of impact accompanying the closing and opening of the front side door **2** and increases the sound insulating property in the cabin.
[0036] The side door body **30** comprises an inner door panel **31** on the inner side of the vehicle and an outer door panel **32** on the outer side of the vehicle. The inner door panel **31** and the outer door panel **32** are formed by applying press working on a thin cold-rolled steel sheet. The inner door panel **31** and the outer door panel **32** of the side door body **30** have their edges finished with a hemming process etc.
[0037] Hereinafter, the vehicle sash door structure according to the present embodiment will be explained in detail. The vehicle sash door structure is the portion of area A enclosed by the dashed-dotted line in FIG. **3** in the rear-side part at which the side door body **30** and the door sash body **11** are joined to each other. In addition, the vehicle sash door structure can apply also to the front-side part at which the side door body **30** and door sash body **11** are joined to each other.
[0038] First, the retainer **12** and the door sash body **11** are joined along a surface part **14** through roll spot welding etc. as illustrated in FIG. **4**. Then, the rear-side lower side of the door sash body **11** with the retainer **12** joined to it is joined to the upper side of the bracket **13** through arc welding etc. as illustrated in FIG. **5**.
[0039] For this joint, the bracket **13** is joined to the door sash body **11** through arc welding etc. such that the reinforcement support **18** does not overlap with the retainer **12**. In other words, the joint is achieved such that the reinforcement support **18** of the bracket **13** and the plate shaped part

16 of the retainer **12** are disposed side by side in the lateral direction of the surface part **14** of the door sash body **11** in order to avoid overlapping between them.

[0040] The front side door **2** comprises the plate shaped part **16** joined to an outer side of the door sash body **11** in a widthwise direction of the vehicle **1** and comprises the reinforcement support **18** joined to an inner side of inner side of the door sash body **11** in the widthwise direction of the vehicle **1**.

[0041] As illustrated in FIG. **6** and FIG. **7**, the bracket **13** is joined to the inner door panel **31** through arc welding etc. in the door sash unit **10** to which the door sash body **11**, the retainer **12** and the bracket **13** are joined. In other words, the bracket **13** is provided between the door sash body **11** and the inner door panel **31** to cause the door sash body **11** to be fixed to and supported on the inner door panel **31**.

[0042] In this state, the door sash unit **10** is joined such that a lower end part **16***a*, which is a prescribed part of the plate shaped part **16** of the retainer **12**, is covered by the inner door panel **31**. Also, the door sash unit **10** is joined to the inner door panel **31** such that the reinforcement support **18** of the bracket **13** projects upward to exceed the height of a waist **35** of the inner door panel **31**, which serves as the window shoulder of the side door body **30**.

[0043] In other words, the lower end part **16***a* of the retainer **12** of the door sash unit **10** is covered by the inner door panel **31** such that the lower end part **16***a* is positioned below the waist **35** of the inner door panel **31** in order to be concealed. Also, in the door sash unit **10**, the reinforcement support **18** of the bracket **13** is positioned and exposed above the waist **35** of the inner door panel **31**.

[0044] The front side door **2** receives electrodeposition coating after receiving a paint sealer process (not illustrated) on its boundaries of the door sash unit **10** and the inner door panel **31**, etc. The paint sealer process is for rust prevention, prevention of entry of water, etc.

[0045] In the front side door **2**, the weather strip door **20** is attached to the door sash unit **10** and the inner door panel **31** as illustrated in FIG. **8**. As illustrated in FIG. **9**, the weather strip door **20** is locked and retained, with each of a left convex **21***a* and a right convex **21***b* of the seal lip **21** engaged with the hooks **15***a* and **15***b* of the retainer **12**, respectively.

[0046] The door sash body **11** is provided with a door glass run **25** on the side opposite to the weather strip door **20**. This door glass run **25** is attached to the sliding part (not illustrated) of the window glass.

[0047] Also, the weather strip door **20** is held with multiple clips (not illustrated) inserted into holes formed at multiple positions on the inner door panel **31**.

[0048] As described above, in the vehicle sash door structure according to the present embodiment, the lower end part **16***a* of the retainer **12** is inserted into gap C formed by the thickness of the bracket **13** between the surface part **14** of the door sash body **11** and a back-side surface part **33** of the inner door panel **31** as illustrated in FIG. **10** and FIG. **11**.

[0049] In other words, the retainer **12** is disposed such that the lower end part **16***a* of the plate shaped part **16** fills gap C at the position at which the weather strip door **20** passes. In some embodiments, the plate shaped part **16** of the retainer **12** and the bracket **13** have an equal thickness such that no gap occurs between the door sash body **11** and the inner door panel **31**.

[0050] The weather strip door **20** is pressure bonded to the surface part **15** of the retainer **12**, with each of the convexes **21***a* and **21***b* of a seal lip **21** engaged with the hooks **15***a* and **15***b* of the retainer **12**, respectively.

[0051] The weather strip door **20** is disposed along the plate shaped part **16** of the retainer **12**, and is held on the inner door panel **31** and clips (not illustrated). Thereby, the weather strip door **20** tightly fits with a surface part **34** of the inner door panel **31**.

[0052] As described above, in the vehicle sash door structure, the lower end part **16***a* of the retainer **12** is disposed such as to fill gap C of the inner door panel **31** and the door sash body **11**. The vehicle sash door structure thus has a configuration having no concave height difference in the area

from the retainer **12** to the inner door panel **31** through which the seal lip **21** of the weather strip door **20** passes. Thereby, the vehicle sash door structure does not need an EPT-sealer, which is a sealing material for filling a concave height difference and which was conventionally been provided to the door sash body **11**.

[0053] Also, the vehicle sash door structure has its seal lip **21** of the weather strip door **20** in contact with an area from the plate shaped part **16** of the retainer **12** to the surface part **34** of the inner door panel **31**, thereby preventing floating that causes insufficient contact. Thus, the vehicle sash door structure can increase drip-proofness, and can prevent water from entering the cabin.

[0054] Further, the vehicle sash door structure employs a configuration in which the retainer **12** has its lower end part **16***a* under the inner door panel **31**. Accordingly, even when electrodeposition coating involves electrodeposition secondary dripping at the lower end part **16***a* from a mating portion between the door sash body **11** and the retainer **12**, the drip is under the side door body **30** such that the drip is concealed.

[0055] This eliminates the necessity of performing maintenance such as polishing followed by recoating on the vehicle sash door structure when electrodeposition secondary dripping occurs between the door sash body **11** and the retainer **12**. Thereby, the vehicle sash door structure can suppress the reduction in the yield ratio.

[0056] Also, the vehicle sash door structure employs a configuration comprising the reinforcement support **18**, which is an upward extension of the bracket **13** exceeding the height of the waist **35** of the inner door panel **31** serving as the window shoulder of the side door body **30**. This results in a longer span over which the bracket **13** supports the door sash body **11**, thereby increasing the rigidity of the door sash unit **10** in the vehicle sash door structure.

[0057] In other words, the span becomes shorter over which the door sash body **11** is supported on the bracket **13**, thereby increasing the rigidity of the door sash unit **10**. This eliminates the necessity for a large thickness of the door sash body **11**, thereby achieving an increased rigidity of the door sash unit **10** without preventing the weight saving.

[0058] As described above, the vehicle sash door structure according to the present embodiment can increase the rigidity and the drip-proofness without preventing the weight saving and can suppress the reduction in the yield ratio.

[0059] In addition, a cover **24** that covers the reinforcement support **18** of the bracket **13** may be provided as illustrated in FIG. **12**. This cover **24** may be formed of a resin, a rubber material, etc. integrally with the weather strip door **20**.

[0060] The disclosure described in the above embodiments is not limited to the embodiments, and various modifications can be made within a scope not departing from the spirit of the disclosure when implementing the disclosure. Further, the above embodiments encompass disclosure at various stages, and various disclosure can be extracted from appropriate combinations of the disclosed constituents. For example, when the above stated problem can be solved and the above stated effect can be achieved even if some constituents are omitted from among all the constituents disclosed in the above embodiments, a configuration resulting from such omission of the constituents can be extracted as disclosure.

[0061] According to the disclosure, it is possible to provide a vehicle sash door structure that can increase the rigidity without preventing the weight saving, can increase the drip-proofness, and can suppress the reduction in the yield ratio.

Claims

1. A vehicle sash door structure comprising: a door sash body provided above a side door body for a vehicle; a bracket that is configured to support the door sash body, and is provided between the door sash body and an inner door panel of the side door body; a retainer provided to the door sash body; a weather strip door attached to the inner door panel and the retainer; and a reinforcement

support that is provided to the bracket, that projects upward to exceed a height of a waist of the inner door panel, and that is joined to the door sash body, wherein the retainer comprises a plate shaped part that is configured to fill a gap formed, by a thickness of the bracket, between the inner door panel and the door sash body at a position at which the weather strip door passes.

2. The vehicle sash door structure according to claim 1, wherein the retainer and the reinforcement support are disposed side by side on a surface part of the door sash body such that the retainer and the reinforcement support do not overlap each other.

3. The vehicle sash door structure according to claim 1, wherein the retainer and the bracket have an equal thickness.

4. The vehicle sash door structure according to claim 2, wherein the retainer and the bracket have an equal thickness.