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### DEFLECTOR DEVICE FOR VEHICLE SUNROOF

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#### Abstract

The deflector device includes a deflector main body that can be folded and deployed, a retained member provided along an upper edge of the deflector main body, a deflector blade provided with a groove extending in a vehicle width direction to receive the retained member therein, and a retaining member that is fixed to the deflector blade to retain the retained member in the groove. The retaining member includes an engaging part having one end that engages the retained member in the groove, and a fixing part extending from another end of the engaging part at an angle to the engaging part and provided with a plurality of insertion holes for a fastening member secured to the deflector blade.

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# Background/Summary

## TECHNICAL FIELD

[0001] The present invention relates to a deflector device for a vehicle sunroof.

## BACKGROUND ART

[0002] A vehicle sunroof that includes a movable sunroof panel fitted to the fixed roof of the vehicle may be additionally provided with a deflector device configured to deploy a deflector extending along the front edge of an opening of the fixed roof upward from the opening when the opening of the fixed roof is opened by sliding the moveable roof panel away from the opening.

[0003] A known deflector device of this type comprises a deployable deflector element made of flexible sheet material, which is connected to a rigid deflector base element mounted to the roof and a deployment bracket (deflector blade) which is pivotable (Patent Document 1). In this deflector device, a groove is formed in each of the deflector base element and the deployment bracket, and a keder (welt/piping) connected to each end of the deflector element (deflector main body) is fitted into the corresponding groove. The keder can be injection molded on the deflector main body and is made of elastically deformable plastic member. Each keder is retained in the corresponding groove by the heads of screw members that are threaded into the deflector base element or the deflector blade.

## PRIOR ART DOCUMENT(S)

Patent Document(s)

[0004] Patent Document 1: DE102006043275B3

## SUMMARY OF THE INVENTION

### Task to be Accomplished by the Invention

[0005] However, in the deflector device disclosed in Patent Document 1, since the keder (or the member to be retained) is retained in the groove by the heads of the screw members, it is possible that the keder may be dislodged from the groove when the screw members are loosened and the retaining action of the heads is thereby impaired. Furthermore, since the tension on the deflector main body is concentrated on the parts of the keder where the heads of the screw members contact the deflector main body, there is a risk that the keder may bend so that the tension may fail to be applied uniformly to the deflector main body.

[0006] In view of the such a problem of the prior art, a primary object of the present invention to prevent detachment of the deflector main body from the deflector blade and slackening of the deflector main body.

### Means to Accomplish the Task

[0007] In order to accomplish such a task, an aspect of the present invention provides a deflector device (10) for a vehicle sunroof, comprising: a deflector main body (11) made of cloth-like material so as to be folded and deployed and positioned along a front edge of an opening (2) formed in a fixed roof (3); a retained member (21) provided along an upper edge of the deflector main body; a deflector blade (14) provided with a groove (22) extending in a vehicle width direction to receive the retained member therein; a pair of arms (16) that support either lateral end of the deflector blade to allow the deflector blade to protrude and retract from and into the opening; and a retaining member (23) that is fixed to the deflector blade to retain the retained member in the groove, wherein the retaining member includes an engaging part (24) having one end (24a) that engages the retained member in the groove, and a fixing part (25) extending from another end (24b) of the engaging part at an angle to the engaging part and provided with a plurality of insertion holes (26) for a fastening member (27) secured to the deflector blade.

[0008] According to this aspect, since the retaining member is fixed to the deflector blade by the fastening members inserted into the insertion holes, the retaining member is unlikely to be detached

from the deflector blade. Further, since the retaining member includes the engaging part and the fixing part inclined or at an angle with respect to the engaging part, the retaining member is resistant to bending. This prevents the deflector main body from slackening.

[0009] In the above aspect, preferably, the retained member (21) is received in the groove in a folded back state at the bottom of the groove (22) so as to interpose the engaging part (24).

[0010] According to this aspect, even if the retained member is not bonded or otherwise fixed to the engaging part, the engaging part is unlikely to be detached. Therefore, the retained member is prevented from being dislodged from the groove of the deflector blade.

[0011] In the above aspect, preferably, parts (31, 32) of the retained member (21) that interpose the engaging part (24) are each provided with a protrusion (35, 34) protruding toward the engaging part.

[0012] According to this aspect, the two parts of the retained member interposing the engaging part therebetween can be brought into contact with the engaging part over a long region extending in the vehicle width direction. This prevents any part of the deflector main body from slackening due to displacement of the retained member with respect to the engaging part.

[0013] In the above aspect, preferably, the fixing part (25) extends in the vehicle width direction over a length corresponding to a length of the engaging part (24) in the vehicle width direction, and the retaining member (23) has an L-shape in a cross section orthogonal to the vehicle width direction.

[0014] According to this aspect, the bending rigidity of the retaining member is improved over the entire length thereof in the vehicle width direction. As a result, the retaining member is made resistant to bending, and slackening of the deflector main body is prevented.

[0015] In the above aspect, preferably, the deflector blade (14) is provided with a projection (46) adjacent to a part thereof to which the fastening member (27) is attached, and the fixing part is provided with a positioning hole (44) which engages the projection.

[0016] According to this aspect, the retaining member is correctly positioned with respect to the deflector blade by the engagement of the projection with the positioning hole. This facilitates the assembly work of attaching the fastening member to the deflector blade.

[0017] In the above aspect, preferably, the deflector blade (14) is formed integrally with the arms so as to be continuous with the arms via a pair of curved parts (15) thereof, and the retaining member includes a central member (41) positioned at a center in the vehicle width direction and a pair of curved members (42) positioned on the curved parts, respectively, and each curved member is configured to retain a corresponding end of the retained member (21) in a part of the groove (22) formed in the corresponding arm (16).

[0018] According to this aspect, even if there is a manufacturing error, the end of the retained member can be inserted into the groove formed in the curved part and the arms by the curved members without being affected by the positional error due to the manufacturing error. This prevents slackening of the end part of the deflector main body.

#### Effect of the Invention

[0019] According to the above aspect, it is possible to prevent detachment of the deflector main body from the deflector blade and slackening of the deflector main body.

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## Description

### BRIEF DESCRIPTION OF THE DRAWINGS

[0020] FIG. 1 A perspective view of a vehicle roof to which a deflector device according to an embodiment of the present invention is applied

[0021] FIG. 2 A perspective view of the deflector device

[0022] FIG. 3 A sectional view of the deflector device

[0023] FIG. 4 An enlarged view of an essential part of FIG. 3

[0024] FIG. 5 A bottom view of an upper holder

[0025] FIG. 6 An enlarged view of a part VI of FIG. 5

[0026] FIG. 7 An enlarged view of a part VII of FIG. 5

[0027] FIG. 8 An enlarged view of a part VIII of FIG. 5

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

[0028] An embodiment of the present invention will be described in the following in detail with reference to the appended drawings. In the following description, the longitudinal direction and the lateral direction (vehicle width direction) are defined based on the traveling direction of the vehicle to which the present invention is applied.

[0029] FIG. 1 is a perspective view of a roof 1 of an automobile to which a deflector device 10 of the present embodiment is applied. As shown in FIG. 1, the roof 1 includes a fixed roof 3 having a generally rectangular opening 2 formed in a front part thereof, and a sunroof device 4 provided so as to selectively close this opening 2: the roof 1 is thus formed as a sunroof. The sunroof device 4 includes a front panel 5 that closes a front part of the opening 2 and a rear panel 6 that closes a rear part of the opening 2. The front panel 5 and the rear panel 6 are arranged along the roof 1 such that their upper surfaces are flush with the general upper surface of the roof 1. The front panel 5 is a movable panel that is movable relative to the roof 1, and the rear panel 6 is a fixed panel that is immovable relative to the roof 1. The front panel 5 is provided so as to be slidable in the fore and aft direction with respect to the fixed roof 3. The front panel 5 opens the front part of the opening 2 by sliding rearward, and closes the front part of the opening 2 by sliding forward.

[0030] The front panel 5 and the rear panel 6 are supported by a sunroof frame 7 that is positioned under the fixed roof 3 (on the vehicle interior side). The sunroof frame 7 has a frame structure that includes a pair of side members, a front member 8 (see FIG. 3), and a rear cross member. The side members extend in the fore and aft direction along either side edge of the opening 2. The side members are made of extruded aluminum alloy, for example. The front member 8 extends laterally along the front edge of the opening 2 and connects the front ends of the side members to each other. The rear cross member extends laterally along the rear edge of the opening 2 and connects the rear ends of the side members to each other. The front member 8 and the rear cross member are made of injection molded plastic material, for example.

[0031] The sunroof device 4 is of an outer slide type in which the front panel 5, initially in a closed position where the front part of the opening 2 is closed, is tilted up from the closed position, and is then slid backward over the rear panel 6. The front panel 5 is driven by a per se known drive mechanism that performs the tilting and sliding operations of the front panel 5 by sliding a front slider and a rear slider in the fore and aft direction along guide rails formed on the side members. Detailed description of the drive mechanism will be omitted here.

[0032] A deflector device 10 is provided at the front edge of the opening 2. The deflector device 10 projects upward from the opening 2 when the opening 2 is open, and is retracted below the opening 2 when the opening 2 is closed. The deflector device 10 is mounted to the sunroof frame 7 and forms a part of the sunroof device 4. The sunroof device 4 is configured as a unit which is mounted to the roof 1 when the sunroof frame 7 is fixed to the fixed roof 3.

[0033] FIG. 2 is a perspective view of the deflector device 10. The deflector device 10 has a generally laterally symmetrical configuration. The deflector device 10 is positioned along the front edge of the opening 2 and is provided with a deflector main body 11 which is made of cloth that can be folded and deployed. The deflector main body 11 may be made of a fine mesh material made of a flexible cloth. The lower edge of the deflector main body 11 is attached to the front member 8 (FIG. 3) of the sunroof frame 7 via a lower holder 12 (FIG. 3). An upper holder 13 is attached to the upper edge of the deflector main body 11.

[0034] The upper holder 13 is an injection molded plastic product, and is integrally formed with a deflector blade 14 extending in the lateral direction and a pair of arms 16 extending rearward from

a pair of curved parts **15** formed at either side end of the deflector blade **14**. The arms **16** are supported at their rear ends by a pair of support members **17** attached to the sunroof frame **7**, respectively, so as to be pivotable about an axis X extending in the lateral direction. A pair of biasing members **18** (only the right biasing member **18** is shown in FIG. 2) are provided between the upper holder **13** and the sunroof frame **7** to urge the arms **16** upward. In the illustrated example, the biasing members **18** each consist of a torsion coil spring. In other embodiments, the biasing members **18** may consist of other types of springs such as leaf springs, compression coil springs, and tension coil springs. The arms **16** cause the deflector blade **14** to protrude from the opening **2** when the front panel **5** is slid rearward, and to retract into the opening **2** when the front panel **5** is slid forward.

[0035] FIG. 3 is a cross-sectional view of the deflector device **10** in the deployed state. As shown in FIGS. 2 and 3, the lower holder **12** is attached to the lower edge of the deflector main body **11** by, for example, adhesive. The lower holder **12** is, for example, an injection molded plastic product, and has claws **12a** that engage with the front member **8** of the sunroof frame **7** so that the lower holder **12** is detachably attached to the front member **8**. By attaching the lower holder **12** to the front member **8**, the lower edge of the deflector main body **11** is fixed to the front member **8**.

[0036] A retained member **21** is attached to the upper edge of the deflector main body **11** by stitching. The retained member **21** may also be attached to the deflector main body **11** by adhesion or welding. The upper edge of the deflector main body **11** is held by the deflector blade **14** via the retained member **21**. FIG. 4 is an enlarged view of the main part in FIG. 3. As shown in FIGS. 3 and 4, a groove **22** extending in the vehicle width direction is formed on the lower surface of the deflector blade **14**. As shown in FIGS. 3 and 4, the retained member **21** is inserted into the groove **22** and is held inside the groove **22** by a retaining member **23** which is fixed to the deflector blade **14**.

[0037] The retaining member **23** is made of sheet metal and has an L-shaped cross section. More specifically, the retaining member **23** includes an engaging part **24** having an upper end **24a** or one end that engages with the retained member **21** inside the groove **22**, and a fixing part **25** that is continuous to a lower end **24b** or another end of the engaging part **24** and located outside the groove **22**. The fixing part **25** extends from the lower end **24b** of the engaging part **24** at an angle (90 degrees in this embodiment) with respect to the engaging part **24**, and is fixed to the deflector blade **14**. The engaging part **24** and the fixing part **25** both extend in the vehicle width direction. A plurality of through holes **26** are formed in the fixing part **25** at intervals along the vehicle width direction. The fixing part **25** is fixed to the deflector blade **14** by a plurality of screw members **27** inserted through the insertion holes **26**. Each screw member **27** is a fastening member having a shaft portion **28** formed with a male thread and a head **29**, and the shaft portion **28** thereof is inserted through the insertion hole **26** and screwed into a screw hole **30** formed in the deflector blade **14**. Thereby, the fixing part **25** is fixed to the deflector blade **14** by the heads **29** of the screw members **27**.

[0038] Since the retaining member **23** is fixed to the deflector blade **14** by the screw members **27** inserted into the insertion holes **26**, the retaining member **23** is unlikely to be dislodged from the deflector blade **14**. Further, since the retaining member **23** is made of metal and includes the engaging part **24** and the fixing part **25** at an angle with respect to the engaging part **24**, it is resistant to bending. Therefore, the deflector main body **11** is prevented from coming loose.

[0039] The retained member **21** is folded back at the bottom of the groove **22** so as to have an inverted J-shape when viewed from a side. The retained member **21** is an extruded plastic product, and is made of a softer material than the deflector blade **14**. The retained member **21** includes a base part **31** connected to the deflector main body **11**, a tip part **32** opposing the base part **31**, and a connecting part **33** connecting the base part **31** and the tip part **32** to each other. The connecting part **33** is located at the bottom of the groove **22** and forms a folded portion causing the tip part **32** to oppose the base part **31**. The retained member **21** is received in the groove **22** with the engaging

part **24** of the retaining member **23** interposed between the two parts of the retained member **21**. The engaging part **24** of the retaining member **23** abuts against the folded portion of the retained member **21** located at the bottom of the groove **22** to be engaged thereby. By fixing the fixing part **25** to the deflector blade **14** with the screw members **27**, the retained member **21** is held inside the groove **22** by the engaging part **24**.

[0040] In this way, the retained member **21** is folded back at the bottom of the groove **22** and accommodated in the groove **22** with the engaging part **24** interposed between the two parts of the retained member **21**, so that the retained member **21** can be kept engaged even if it is not bonded or otherwise connected to the engaging part **24**. Therefore, the retained member **21** is prevented from being detached from the groove **22** of the deflector blade **14**.

[0041] The tip part **32** of the retained member **21** is formed thinner than the base part **31** and the connecting part **33** thereof. A pair of lips **34** extending in the vehicle width direction are integrally formed on the surface of the tip part **32** facing the base part **31**. A ridge **35** extending in the vehicle width direction is integrally formed on the surface of the base part **31** so as to oppose the tip part **32**. The ridge **35** is positioned so as to correspond to the lips **34** and comes into contact with the front surface of the engaging part **24**. The two lips **34** abut against the rear surface of the engaging part **24**. More specifically, the lips **34** and the ridge **35** are formed on the base part **31** and the tip part **32** of the retained member **21**, respectively, which sandwich the engaging part **24** therebetween so as to project toward the engaging part **24**. Therefore, the two parts of the retained member **21** that interpose the engaging part **24** therebetween abut against the engaging part **24** over a long region extending along the lateral direction. This prevents any part of the deflector main body **11** from slackening due to displacement of the retained member **21** with respect to the engaging part **24**.

[0042] FIG. 5 is a bottom view of the upper holder **13**. As shown in FIG. 5, the retaining member **23** is divided into five parts in the lateral direction or the vehicle width direction. More specifically, the retaining member **23** includes a central member **41** positioned at the laterally central part of the deflector blade **14**, a pair of curved members **42** positioned at the curved parts **15** of the deflector blade **14**, respectively, and a pair of intermediate members **43** positioned between the central member **41** and the curved members **42**, respectively. Each curved member **42** extends rearward from the curved part **15** and is attached to the corresponding arm **16**. More specifically, each arm **16** is formed such that the groove **22** formed in the deflector blade **14** further extends through the curved part **15** and the arm **16**. As shown in FIG. 2 also, each end portion of the retained member **21** extends in the fore and aft direction and is held within the groove **22** formed in the corresponding arm **16**.

[0043] FIG. 6 is an enlarged view of the part VI of FIG. 5, showing the central member **41**. As shown in FIG. 6, the right end of the central member **41** is provided with a pair of circular holes **44** serving as a positioning hole and an insertion hole **26** (FIG. 4) for the corresponding screw member **27** (one of the circular holes **44** is concealed by the screw member **27**). At the left end of the central member **41**, a pair of slots **45**, which serve as an insertion hole **26** and a positioning hole, are formed. Circular projections **46** are formed in the parts of the upper holder **13** corresponding to the two positioning holes. The circular hole **44** and the slot **45** with which the projections **46** engage function as positioning holes for positioning the central member **41**. A pair of screw hole **30** (FIG. 4) are formed in the parts of the upper holder **13** corresponding to the two insertion holes **26**, and the central member **41** is fixed to the upper holder **13** by the screw members **27** that are threaded into the screw holes **30**.

[0044] FIG. 7 is an enlarged view of the part VII of FIG. 5, showing the intermediate member **43** on the right side. As shown in FIG. 7, the intermediate member **43** is positioned so as to create a gap between the intermediate member **43** and the central member **41**. At the left end of the intermediate member **43**, a pair of circular holes **44** serving as an insertion hole for the corresponding screw member **27** (FIG. 4) and a positioning hole are formed (one of the circular

holes **44** is concealed by the screw member **27**). At the right end of the intermediate member **43**, a pair of slots **45** serving as an insertion hole **26** for the corresponding screw member **27** and a positioning hole are formed. Another insertion hole **26** is formed in an intermediate position of the intermediate member **43** (concealed by the screw member **27**). A pair of circular projections **46** are formed in the parts of the upper holder **13** corresponding to the two positioning holes. The parts of the upper holder **13** corresponding to the three insertion holes **26** are formed with screw holes **30** (FIG. **4**), and the intermediate member **43** is fixed to the upper holder **13** by the screw members **27** that are threaded into the screw holes **30**.

[0045] FIG. **8** is an enlarged view of the part VIII of FIG. **5**, showing the curved member **42** on the right side. As shown in FIG. **8**, the curved member **42** is positioned so as to create a gap between the curved member **42** and the intermediate member **43**. At the front end of the curved member **42**, a circular hole **44** (concealed by the screw member **27**) forming an insertion hole **26** for the corresponding screw member **27** and a notch **47** for positioning purpose are formed. The rear end of the curved member **42** is provided only with the engaging part **24** and does not have the fixing part **25**. A slot **45** serving as a positioning hole is formed in a part of the fixing part **25** near the rear end of the curved member **42**. A pair of circular projections **46** are formed in parts of the upper holder **13** corresponding to the notch **47** and the positioning hole. A screw hole **30** (FIG. **4**) is formed at the front end of the curved member **42** at a part corresponding to the insertion hole **26** and another screw hole **30** is formed at the rear end of the curved member **42** on the laterally inner side of the engaging part **24**. The curved member **42** is fixed to the upper holder **13** by the screw members **27** that are threaded into the screw holes **30**. The screw member **27** located at the rear end of the curved member **42** locks the end surface of the engaging part **24** with the radially extending part of the head **29**.

[0046] As shown in FIGS. **2** and **3**, each curved member **42** is configured such that the end part of the retained member **21** is retained inside the groove **22** formed in the corresponding arm **16**. Therefore, even if there is a manufacturing error in the dimensions of the upper holder **13** and the retaining member **23**, the end of the retained member **21** can be retained in the groove **22** formed in the curved part **15** and the arm **16** of the holder **13** by the two curved members **42** so as to overcome the positioning error due to manufacturing error. As a result, slackening of the end portion of the deflector main body **11** is suppressed.

[0047] Furthermore, even if there is no manufacturing error since the upper holder **13** is made of plastic material and the retaining member **23** is made of metal, there is a possibility that the retaining member **23** may not fit into the groove **22** due to the difference in thermal expansion coefficient. In this embodiment, the retaining member **23** includes the central member **41** and the curved members **42**, which define gaps relative to the adjoining intermediate members **43**. Therefore, even if a dimensional difference occurs due to a difference in the coefficient of thermal expansion, the ends of the retained member **21** are retained in the groove **22** formed in the curved part **15** of the upper holder **13** and the arm **16** by the two curved members **42** so as to suppress positional errors.

[0048] As shown in FIGS. **5** to **8**, in the central member **41**, intermediate member **43**, and curved member **42**, the fixing part **25** extends along the length of the engaging part **24** in the lateral direction of the vehicle. In other words, the retaining member **23** has an L-shaped cross section in the part thereof extending in the vehicle width direction. Therefore, the bending rigidity of the retaining member **23** is improved over the entire length in the vehicle width direction. Thereby, the bending of the retaining member **23** is suppressed, and slackening of the deflector main body **11** is suppressed.

[0049] As described above, the projections **46** are provided in the deflector blade **14** near the screw holes **30** (FIG. **4**) into which the screw members **27** are threaded, and the circular holes **44** and the slots **45** serving as the positioning holes for the projections **46** to engaged with are provided in the fixing part **25** of the retaining member **23**. In other words, the retaining member **23** can be

positioned with respect to the deflector blade **14** by the engagement between the projections **46** and the positioning holes. This facilitates the fitting of the screw members **27** into the deflector blade **14**. Moreover, since the positioning holes includes the slots **45**, it is possible to tolerate a dimensional error between the upper holder **13** and the retaining member **23** when assembling them.

[0050] The present invention has been described above in terms of a specific embodiment of the present invention, but is not limited by such an embodiment, and can be modified in a wide range of ways. For example, in the above embodiment, the deflector device **10** was applied to the roof **1** of an automobile as an example, but it can also be widely applied to other vehicles such as trailers and railway cars. Further, in the above embodiment, each arm **16** was directly urged upward by the biasing member **18**, but the biasing member **18** may also indirectly bias the arm **16** to urge the deflector blade **14** upward. In addition, the specific configuration, arrangement, quantity, material, angle, etc. of each member or part can be changed as appropriate without departing from the scope of the present invention. Further, all of the constituent elements shown in the above embodiment are not necessarily essential to the present invention and can be selected as appropriate.

TABLE-US-00001 LIST OF REFERENCE NUMERALS 1: roof 2: opening 3: fixed roof 4: sunroof device 5: front panel 6: rear panel 10: deflector device 11: deflector main body 13: upper holder 14: deflector blade 15: curved part 16: arm 21: retained member 22: groove 23: retaining member 24: engaging part 24a: upper end (one end) 24b: lower end (other end) 25: fixing part 26: insertion hole 27: screw member (fastening member) 31: base part 32: tip part 33: connecting part 34: lip (projection) 35: ridge (projection) 41: central member 42: curved member 43: intermediate member 44: circular hole (insertion hole, positioning hole) 45: slot (insertion hole, positioning hole) 46: projection

## Claims

1. A deflector device for a vehicle sunroof, comprising: a deflector main body made of cloth-like material so as to be folded and deployed and positioned along a front edge of an opening formed in a fixed roof; a retained member provided along an upper edge of the deflector main body; a deflector blade provided with a groove extending in a vehicle width direction to receive the retained member therein; a pair of arms that support either lateral end of the deflector blade to allow the deflector blade to protrude and retract from and into the opening; and a retaining member that is fixed to the deflector blade to retain the retained member in the groove, wherein the retaining member includes an engaging part having one end that engages the retained member in the groove, and a fixing part extending from another end of the engaging part at an angle to the engaging part and provided with a plurality of insertion holes for a fastening member secured to the deflector blade.
2. The deflector device for a vehicle sunroof according to claim 1, wherein the retained member is received in the groove in a folded back state at the bottom of the groove so as to interpose the engaging part.
3. The deflector device for a vehicle sunroof according to claim 2, wherein parts of the retained member that interpose the engaging part are each provided with a protrusion protruding toward the engaging part.
4. The deflector device for a vehicle sunroof according to claim 1, wherein the fixing part extends in the vehicle width direction over a length corresponding to a length of the engaging part in the vehicle width direction, and the retaining member has an L-shape in a cross section orthogonal to the vehicle width direction.
5. The deflector device for a vehicle sunroof according to claim 1, wherein the deflector blade is provided with a projection adjacent to a part thereof to which the fastening member is attached, and the fixing part is provided with a positioning hole which engages the projection.



**6.** The deflector device for a vehicle sunroof according to claim 1, wherein the deflector blade is formed integrally with the arms so as to be continuous with the arms via a pair of curved parts thereof, and the retaining member includes a central member positioned at a center in the vehicle width direction and a pair of curved members positioned on the curved parts, respectively, and each curved member is configured to retain a corresponding end of the retained member in a part of the groove formed in the corresponding arm.

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