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(54) Title: MOUNTING ASSEMBLY FOR A VEHICLE DOOR MIRROR

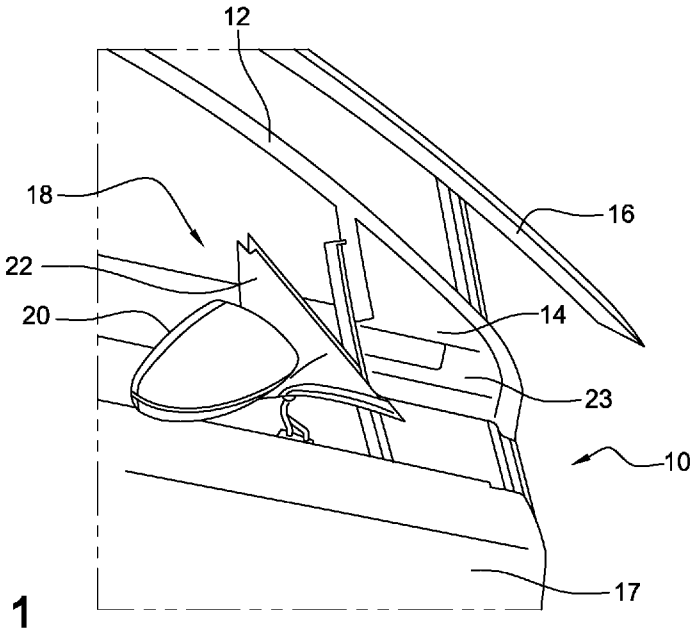


Fig. 1

(57) Abstract: Mounting assembly for a vehicle door mirror (20) comprising a mounting plate (22) adapted to fixedly receive the vehicle door mirror (20), a window frame panel (14) forming part of a vehicle door (10) and adapted to fixedly receive the mounting plate (22), the window frame panel (14) and the mounting plate (22) when mounted thereon defining together a volume (23), and a sealing element (36) having a form generally corresponding to that of the volume, located in said volume (23), the sealing element comprising a first surface (40) which, when the sealing element is located in the volume, is in contact with the mounting plate (22), and a second surface (42), on the opposite side of the sealing element to the first surface (40) and which, when the sealing element is located in the volume, is in contact with the window frame panel (14). According to the invention, at least one surface (42) of the sealing element (36) comprises a sealing rib (52) extending around the periphery of said surface (42), the sealing rib (52) having a section with a diameter which is superior to the height of the rib from the surface of the sealing element (36). The invention is particularly adapted for use in the field of motor vehicles, more especially that of cars.

WO 2019/222933 A1

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MOUNTING ASSEMBLY FOR A VEHICLE DOOR MIRROR

FIELD OF TECHNOLOGY

The present invention relates to a mounting assembly for a vehicle door mirror and, more particularly, to a mounting assembly adapted to attach a mirror to the door at a point adjacent a lowerable window.

BACKGROUND

In addition to the standard interior rear-view mirror that is located in the region of the upper centre of the windscreen of a vehicle, motor vehicles can be provided with door mirrors, generally one on each of the front vehicle doors, so as to ensure that the driver has the most complete view of, for example, other vehicles approaching from the rear.

Door mirrors can be attached to the vehicle door principally in one of two ways. Depending on the structure of the door, the mirror in its housing can be attached, typically by means of bolts, directly to the external door panel. Alternatively, the mirror can be mounted in a generally triangular space which is defined in front (when viewed in the sense of normal forward movement of the vehicle) of the lowerable door window, and by the upper frame of the door.

Whichever type of door mirror is used, it is essential that the mounting be sealed, both to prevent the entry of air or water into the door interior, but also to prevent the undesirable generation of noise. Where a door mirror is mounted directly on the external door panel, it is generally a simple matter to ensure proper sealing. However, where the mirror is mounted in front of the lowerable window, the mounting structure is necessarily more complex and is more subject to leakage and noise generation. In such a case, the mirror in its housing is mounted on a generally triangular mounting plate which is attached to the door structure. Once in place, the mounting plate forms part of the outer surface of the door panel, with a window frame panel forming the interior door surface. In the volume defined between the mounting plate and the window frame panel is inserted a sealing element to prevent the entry of air or water into the door interior, but also to prevent the undesirable generation of noise.

Door mirror housings of modern vehicles are complex structures. In addition to the mirror itself, the housing may contain means to selectively orientate the mirror, means

typically comprising at least two electric motors adapted to operate associated gear mechanisms which are attached to the mirror. Such means allow the vehicle driver to selectively operate the motors and so ensure that the mirror is moved to the optimum angle for a given driving position. The door mirror may also include an electrical heating element intended to remove condensation from the mirror glass and so improve visibility.

Such additional elements in the mirror housing require the presence of an electrical harness that extends through both the sealing element and the window frame panel which forms the interior door surface. The presence of the harness extending through the sealing element necessitates the presence of an additional seal, mounted around the harness, and attached to the sealing element.

A previously proposed mounting assembly for a vehicle door mirror of the type mounted in a generally triangular space which is defined in front (when viewed in the sense of normal forward movement of the vehicle) of the lowerable door window is described in document EP 1 398 215 B. In this document, a sealing element for the mounting assembly is intended to seal the volume between the base of the door mirror to be mounted on the car body, and the car body itself, without use of additional sealant. The sealing element or gasket is intended to be interposed between a base of a door mirror to be mounted on a car body, and the car body. A flexible sealing lip, extending annularly around the circumferential portion of the gasket, is formed on a surface to be opposed to the car body. The sealing lip is complex in structure as it projects beyond the generally planar surface of the gasket and is inclined thereto.

Despite its advantages, this previously proposed sealing element for a door mirror did not completely guarantee that entry of air or water into the door interior was prevented. Furthermore, even when the flexible sealing lip was partially compressed between the gasket and the vehicle structure, a narrow cavity still remained between the two. This cavity could result in the creation of resonance and thus the undesirable generation of noise. In addition, as it required the presence of sealing lips, the sealing element was complex in structure and required costly mouldings to manufacture.

SUMMARY

It is therefore an object of the present invention to provide a mounting for a vehicle door mirror in which the aforementioned disadvantages are overcome.

According to the invention, there is provided a mounting assembly for a vehicle door mirror comprising a mounting plate adapted to fixedly receive the vehicle door mirror, a window frame panel forming part of a vehicle door and adapted to fixedly receive the mounting plate, the window frame panel and the mounting plate when mounted thereon defining together a volume, and a sealing element having a form generally corresponding to that of the volume, located in said volume, the sealing element comprising a first surface which, when the sealing element is located in the volume, is in contact with the mounting plate, and a second surface, on the opposite side of the sealing element to the first surface and which, when the sealing element is located in the volume, is in contact with the window frame panel characterised in that at least one surface of the sealing element comprises a sealing rib extending around the periphery of said surface, the sealing rib having a section with a diameter which is superior to the height of the rib from the surface of the sealing element.

The use of such a sealing rib makes the sealing element simple and inexpensive to mould while ensuring an optimum sealing of the volume between the window frame panel and the mounting plate.

Preferably, the sealing rib has a generally semi-circular section.

Advantageously, the sealing rib is formed from the same material as the sealing element and preferably the sealing element is formed by moulding expanded plastics foam.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will now be described by way of example with reference to the accompanying drawings, in which:

Figure 1 is a schematic view of a mounting assembly for a vehicle door mirror in accordance with the prior art;

Figure 2 is a section of a mounting assembly for a vehicle door mirror in accordance with the prior art;

Figure 3 is a similar section of a mounting assembly for a vehicle door mirror in accordance with the prior art;

Figures 4a and 4b show two views of a sealing element for a mounting assembly for a vehicle door mirror in accordance with a first aspect of the invention;

Figure 4c shows the sealing element of Figures 4a and 4b in place within the housing;

Figure 5 is a schematic view of a detail of Figure 4b;

Figures 6a and 6b are respectively a schematic view of the vertical channel adapted to receive the forward edge of a lowerable window, and a section through this channel.

DETAILED DESCRIPTION

Figure 1 shows an exploded view of a vehicle door including a mounting assembly for a vehicle door mirror. A vehicle door, generally shown 10 comprises an upper frame 12 of a shape adapted to conform with that of the A pillar of the vehicle (not shown), and a window frame panel 14 forming the interior door surface. A window channel 16 is adapted to receive the upper edge of a lowerable window pane. The door further comprises an outer door panel 17 and a vehicle door mirror assembly 18. The vehicle door mirror assembly 18 comprises a mirror housing 20, a mirror (not shown in the figure) and a generally triangular mounting plate 22. The mounting plate 22 is adapted to be mounted on the vehicle door adjacent the window frame panel 14 and, to this end, had a generally similar form.

When the vehicle door mirror assembly 18 is mounted on the door 10, a generally triangular volume 23 is created between the outer surface (when considering the vehicle interior) of the window frame panel 14 and the inner surface of the mounting plate 22. It is into this volume that a sealing element is inserted to prevent the entry of air or water into the door interior, but also to prevent the undesirable generation of noise. This is shown in Figure 2.

In Figure 2 a sealing element 24 made of moulded plastics foam is located between the window frame panel 14 and the inner surface of the mounting plate 22. The sealing element 24 does not completely fill the volume shown and is held in place against the inner surface of the mounting plate 22 by a bracket 26. In the event that the sealing element shown needs to be used where a wiring harness is present, a separate plastics seal needs to be provided. Typically, such a seal comprises an annular elastomeric element (not shown) arranged around the harness. If the seal with the harness is incomplete, there will be the risk of air leakage into the vehicle with associated undesirable noise. In addition, the empty volume which is formed between the sealing element 24, the bracket 26 and the mounting plate 22 leaves the mounting assembly subject to the entry of water or air and the undesirable generation of noise.

Undesirable noise associated with a mounting assembly for a vehicle door mirror may take one of two forms, both of which are generated while the vehicle is moving. Either the entry of air through any narrow opening left between two adjacent components may create a generally high frequency noise, or the presence of a cavity may allow air inside the cavity to resonate and so produce a lower frequency noise. Both these types of undesirable noise may occur simultaneously.

The presence of an empty space or cavity inside the mirror mounting is not the only source of undesirable noise. Figure 3 shows a further such source. In the figure, the edge 28 of the mounting plate 22 extends beyond the end 30 of the sealing element 24 into the vertical window channel 32 which is adapted to receive the forward vertical edge of the lowerable window. This creates a cavity 34. When the vehicle is moving, the air in the cavity 34 can resonate, causing undesirable noise which is perceptible inside the vehicle.

A sealing element 36 for a mounting assembly in accordance with a first aspect of the invention is shown in Figures 4a and 4b. The sealing element 36 is generally triangular and is adapted to be inserted in the generally triangular volume formed between the mounting plate 22 and the window frame panel 14. The shape of the sealing element corresponds to that of the generally triangular volume. Figure 4a shows the side of the sealing element 36 intended to face the mirror housing while Figure 4b shows that intended to face the interior of the vehicle. The sealing element 36 is made from plastics material, preferably expanded plastics foam, for example a heat-curable or thermally activatable polyethylene foam. The sealing element 36 is preferably formed by moulding.

As shown in Figure 4a, the sealing element 36 has a shape which is adapted to correspond to that of the interior of the mounting plate 22, and comprises, notably, openings 38 to receive both elements of the mirror housing and mounting bolts (not shown) to secure the mirror mounting on the door frame. Once in place, a first surface 40 of the sealing element will be in contact with the mirror mounting plate 22 over a large part of its surface, so ensuring a seal between the two components. When in place, the sealing element 36 completely fills the generally triangular volume formed between the mounting plate 22 and the window frame panel 14.

While sealing between the side of the sealing element 36 intended to face the mirror housing is important, more important still is the sealing between the inner surface of

the sealing element and the window frame panel 14 as this is the point where the entry of water or air must be prevented. To this end, and as shown in Figure 4b, the sealing element 36 comprises a generally triangular, substantially planar second surface 42 on the opposite side of the sealing element to the first surface 40. The second surface 42 is limited along the hypotenuse 44 of the triangle by a sloping surface 46 leading to a generally planar edge portion 48. The planar surface 42 comprises openings 50 to receive mounting bolts (not shown) to secure the mirror mounting on the door frame and for the wiring harness (not shown).

In accordance with a first aspect of the invention, a sealing rib 52 is provided and extends continuously generally around the surface 42 of the sealing element 36. The sealing rib 52 comprises a generally linear portion 54 running along the generally planar edge portion 48, leading to a generally triangular portion 56 on the generally triangular, substantially planar surface 42 and which included generally annular sections 58 extending around the openings 38. The sealing rib 52 extends generally around the periphery of the surface 42 of the sealing element 36, preferably continuously. In the event that the sealing rib is not continuous, the ends of the rib must at least overlap to ensure sealing. The sealing rib 52 is preferably formed by moulding when the sealing element 36 is manufactured and is thus formed from the same material as the sealing element.

The sealing rib 52 has a section having a diameter which is superior to the height of the rib from the surface of the sealing element 36. This ensures that the rib is easier and cheaper to mould than previous sealing devices. Preferably, the sealing rib 52 has a generally semi-circular section having a diameter of between 2 and 4 mm, and more particularly 3mm with a height of 1.5 mm although other sections, for example, triangular, could be envisaged.

The sealing rib 52 being formed of expanded plastics foam, the rib is compressible. This means that when the sealing element is in place within the housing and is compressed between the mounting plate 22 and the window frame panel 14, the rib 52 is itself compressed against the window frame panel 14. Under this compression, the rib 52 tends to be flattened and thus allows the sealing element 36 and the rib 52 to closely follow the contours of the window frame panel 14. This reduces to a minimum any cavity formed between the surface of the sealing element 36 and the surface of the window frame panel 14. This situation is shown in Figure 4c where the ribs 52 are

shown in dotted lines and have their original shape, that is, their shape before being compressed against the window frame panel 14. In practice, the ribs being compressed, no cavity is formed between the surface of the sealing element 36 and the surface of the window frame panel 14.

The sealing element 36 further comprises a recess 60 extending partially through the thickness of the element in which is formed a generally annular boss 62 adapted to receive the wiring harness. This is shown more clearly in Figure 5.

In addition to reducing the generation of undesirable noise by the presence of the sealing element 36 in the generally triangular volume formed between the mounting plate 22 and the window frame panel 14, a second aspect of the invention set out to reduce the undesirable noise generated by the presence of the cavity 34 – see Figure 3 - formed in the window channel 32 which is adapted to receive the forward vertical edge of the lowerable window.

The location of the cavity 34 formed in the window channel 32 of a previously proposed mounting assembly is further shown in Figure 6a. Figure 6b is a section through the window channel 32 adapted to receive the forward edge of a lowerable window in accordance with a further aspect of the invention. As shown in the figure, the window channel 32 comprises a generally U-shaped profile 64 having a short external arm 66 and a longer internal arm 68. The internal arm 68 is formed with longitudinally extending lips 70 and 72 adapted to ensure sealing with the forward edge of a lowerable window (not shown). The profile 64 is received within a generally U-shaped metal section 74. A generally U-shaped retaining section 76 is mounted around the distal edge of the short external arm 66 and the external arm 78 of the U-shaped metal section 74.The external arm 80 of the retaining section 76 is resiliently applied against the internal face of the mounting plate 22. In order to avoid the creation of undesirable noise, the edge of the U-shaped retaining section 76 extends beyond the edge of the mounting plate 22. Preferably, the edge of the U-shaped retaining section 76 extends beyond the edge of the mounting plate 22 a distance L as shown in Figure 6b. This distance L lies between 1mm and 4mm and is preferably 2mm.

The arrangement shown in Figure 6b further reduces the undesirable noise that is generated when the vehicle is in movement.

WHAT IS CLAIMED IS:

1. Mounting assembly for a vehicle door mirror (20) comprising a mounting plate (22) adapted to fixedly receive the vehicle door mirror (20), a window frame panel (14) forming part of a vehicle door (10) and adapted to fixedly receive the mounting plate (22), the window frame panel (14) and the mounting plate (22) when mounted thereon defining together a volume (23), and a sealing element (36) having a form generally corresponding to that of the volume, located in said volume (23), the sealing element comprising a first surface (40) which, when the sealing element is located in the volume, is in contact with the mounting plate (22), and a second surface (42), on the opposite side of the sealing element to the first surface (40) and which, when the sealing element is located in the volume, is in contact with the window frame panel (14) characterised in that at least one surface (42) of the sealing element (36) comprises a sealing rib (52) extending around the periphery of said surface (42), the sealing rib 52 having a section with a diameter which is superior to the height of the rib from the surface of the sealing element (36).

2. Mounting assembly according to Claim 1 characterised in that the sealing rib (52) has a generally semi-circular section.

3. Mounting assembly according to Claim 1 or 2 characterised in that the sealing rib (52) is formed from the same material as the sealing element (36).

4. Mounting assembly according to any one of claims 1 to 3 characterised in that the sealing element (36) is formed by moulding expanded plastics foam.

5. Mounting assembly according to Claim 4 characterised in that the sealing element (36) is formed from a heat-curable or thermally activatable polyethylene foam.

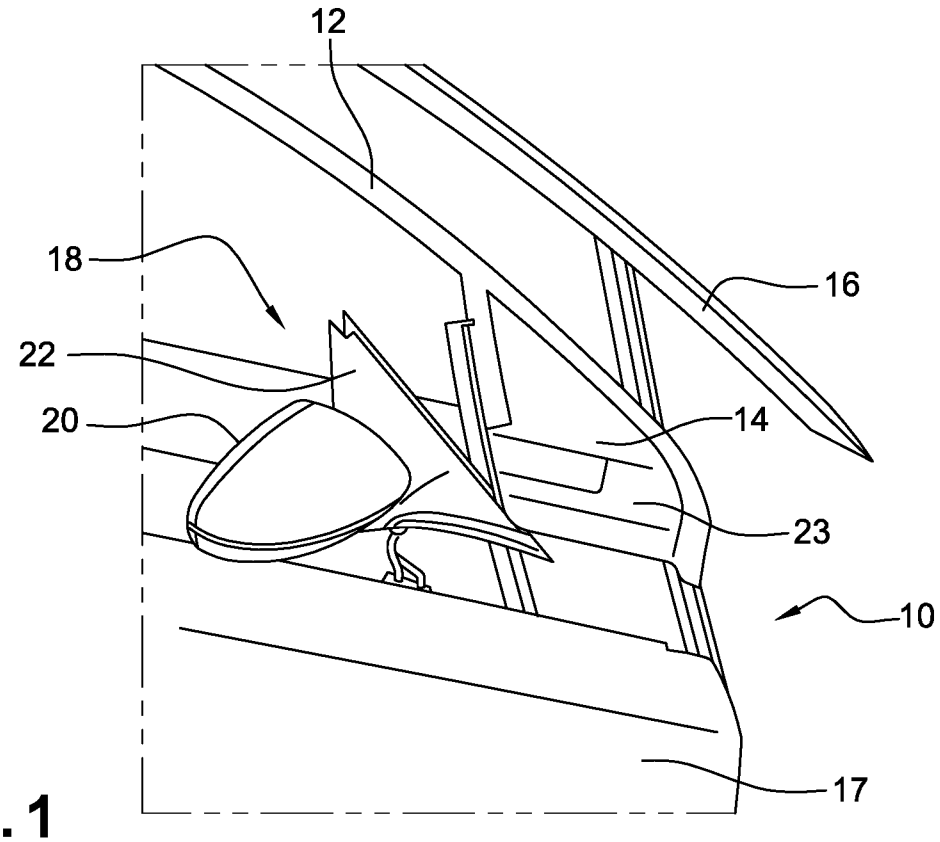


Fig. 1

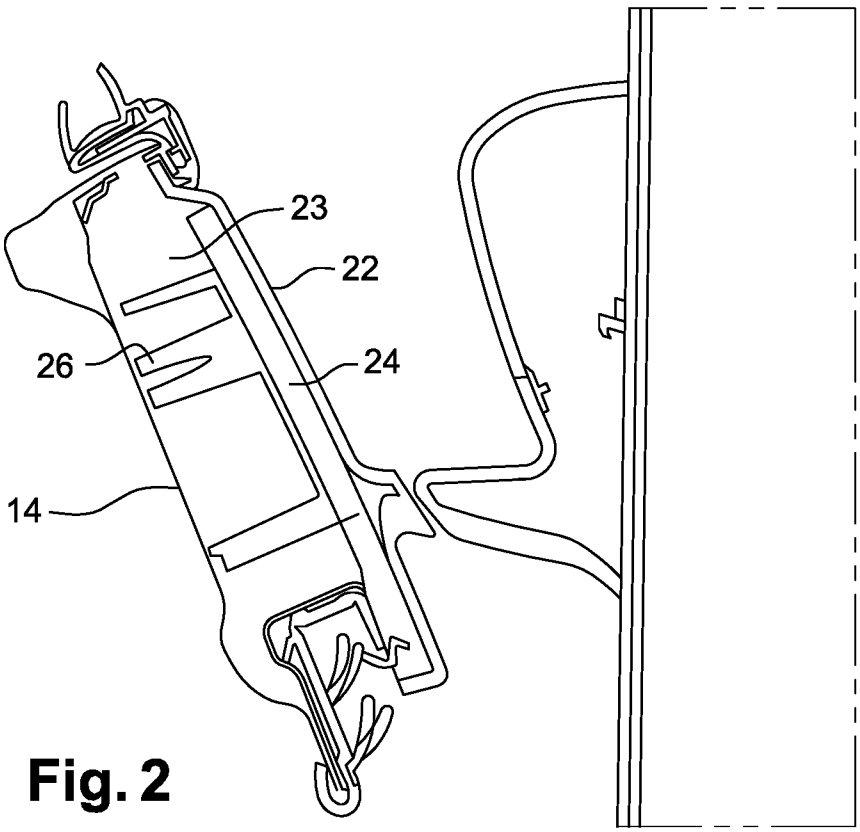


Fig. 2

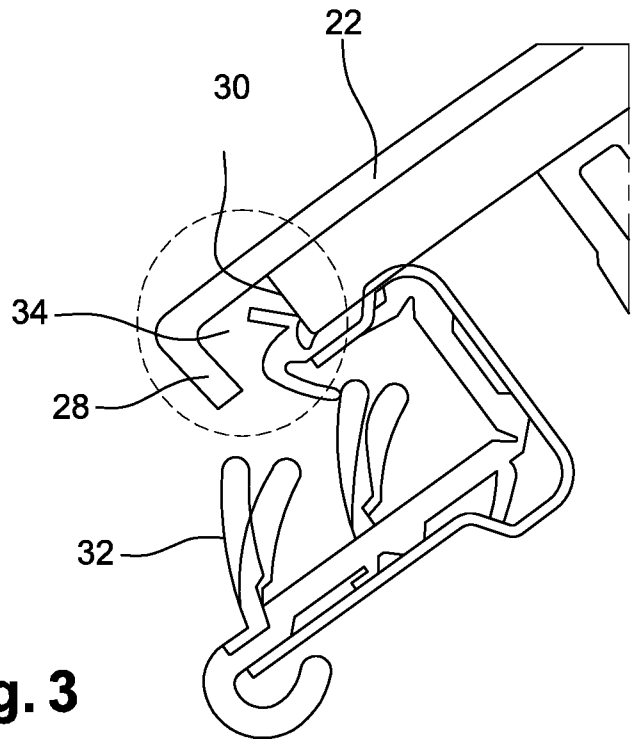


Fig. 3

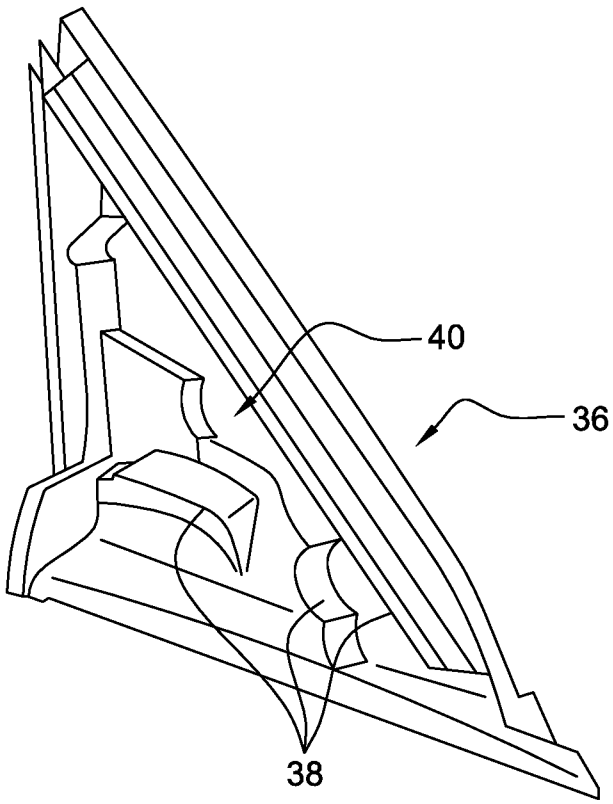


Fig. 4a

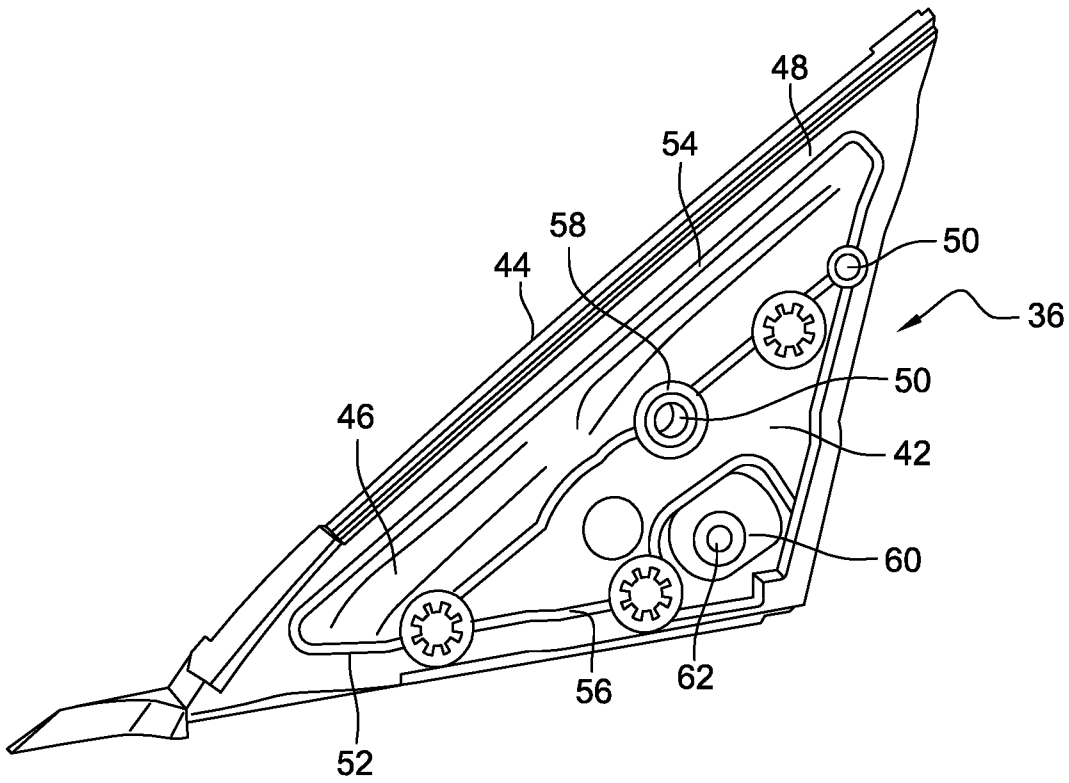


Fig. 4b

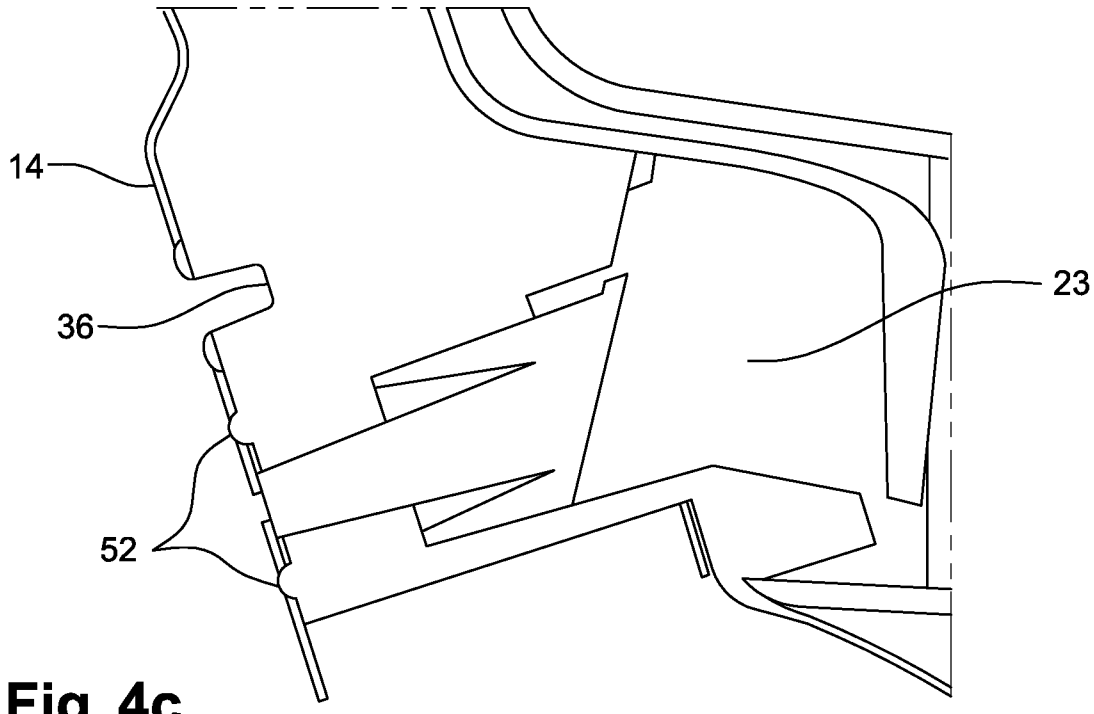


Fig. 4c

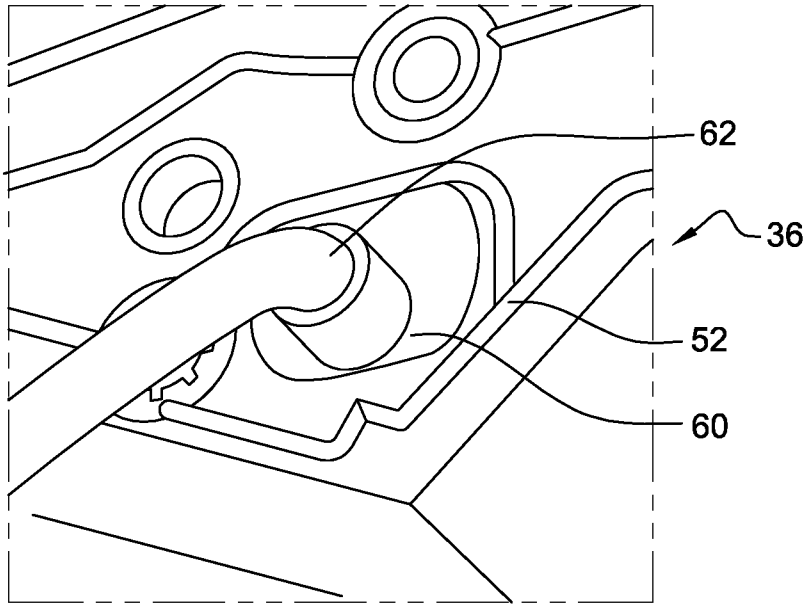


Fig. 5

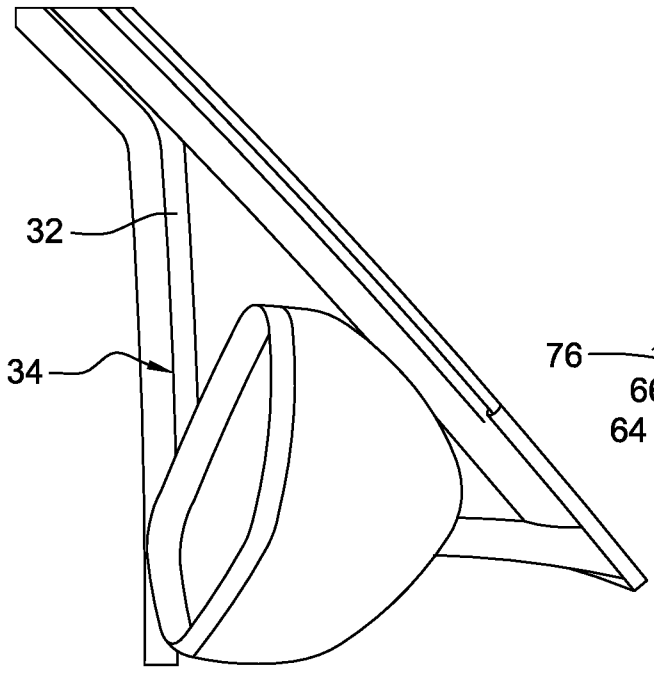


Fig. 6a

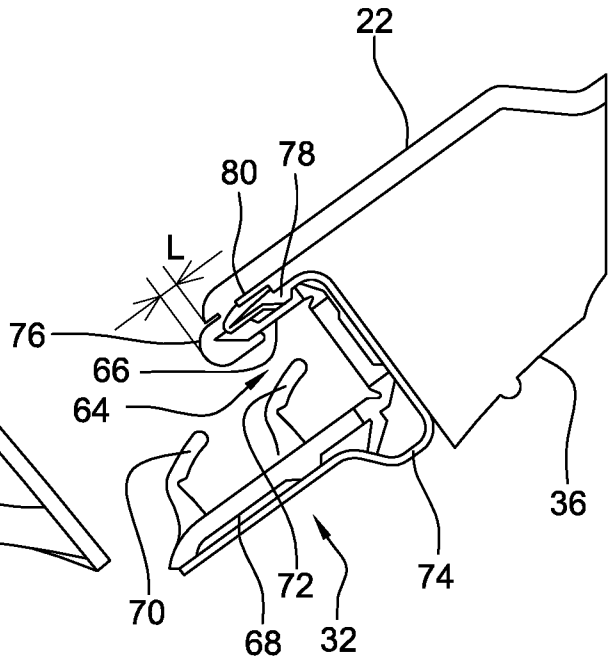


Fig. 6b

INTERNATIONAL SEARCH REPORT

International application No.
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A. CLASSIFICATION OF SUBJECT MATTER

B60R 1/06(2006.01)i; B60J 10/80(2016.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B60R1/,B60J10/

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNABS; CNTXT; CNKI; SIPOABS; VEN; panel, vehicle, plate, door, mirror, seal+, mount+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2014185154 A1 (GM GLOBAL TECH OPERATIONS INC) 03 July 2014 (2014-07-03) claims 1-16, description page 4, figures 1-6	1-5
X	CN 206124893 U (BAIC MOTOR CORP LTD) 26 April 2017 (2017-04-26) description pages 3-4, figures 1-6	1-5
X	JP 5935084 B2 (TOYOTA JIDOSHA KK ET AL.) 15 June 2016 (2016-06-15) paragraghs 11-16, figures 1-5	1-5
X	US 2002083648 A1 (NISSAN MOTOR) 04 July 2002 (2002-07-04) paragraphs 17-31, figures 1-3	1-5
X	CN 206968552 U (QOROS AUTOMOBILE CO LTD) 06 February 2018 (2018-02-06) paragraphs 31-49, figures 1-5	1-5
X	CN 1490199 A (MURAKAMI CORP) 21 April 2004 (2004-04-21) description pages 3-5, figures 1-8	1-5

☐ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

* Special categories of cited documents:

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
31 January 2019	**15 February 2019**
Name and mailing address of the ISA/CN **National Intellectual Property Administration, PRC** **6, Xitucheng Rd., Jimen Bridge, Haidian District, Beijing 100088** **China** Facsimile No. **(86-10)62019451**	Authorized officer **ZHU,Xuhui** Telephone No. **62085482**

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2018/087937

Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)			Publication date (day/month/year)
US	2014185154	A1	03 July 2014	GB	201319847	D0	25 December 2013
				GB	2510663	A	13 August 2014
				CN	103847642	B	25 August 2017
				CN	103847642	A	11 June 2014
				DE	102012023269	A1	05 June 2014
CN	206124893	U	26 April 2017		None		
JP	5935084	B2	15 June 2016	JP	2014144675	A	14 August 2014
US	2002083648	A1	04 July 2002	JP	2002200923	A	16 July 2002
				JP	3608509	B2	12 January 2005
				US	6824279	B2	30 November 2004
CN	206968552	U	06 February 2018		None		
CN	1490199	A	21 April 2004	US	2004104539	A1	03 June 2004
				JP	2004098790	A	02 April 2004
				US	7690615	B2	06 April 2010
				DE	60306053	T2	18 January 2007
				EP	1398215	B1	14 June 2006
				JP	4083518	B2	30 April 2008
				US	2006163895	A1	27 July 2006
				DE	60306053	D1	27 July 2006
				TW	I261035	B	01 September 2006
				EP	1398215	A1	17 March 2004
				TW	200404036	A	16 March 2004
				CN	100337852	C	19 September 2007