



(51) International Patent Classification:
B60R 13/02 (2006.01) **G09F 13/22** (2006.01)

(21) International Application Number:
PCT/US2010/020417

(22) International Filing Date:
8 January 2010 (08.01.2010)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
61/143,578 9 January 2009 (09.01.2009) US

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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

(54) Title: INTERIOR TRIM PANEL, METHOD FOR ILLUMINATING AN INTERIOR TRIM PANEL AND METHOD FOR PRODUCING AN INTERIOR TRIM PANEL

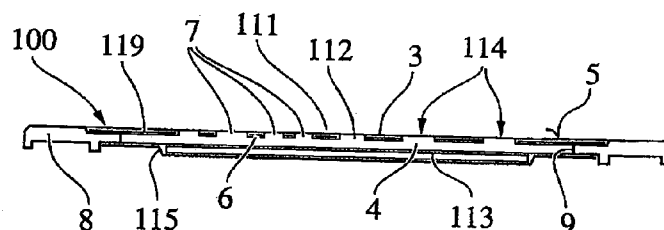


Fig. 3

(57) Abstract: The present invention refers to an interior trim panel (100) of a vehicle interior (2) comprising coverage means (3) and light conducting means (4), wherein the coverage means (3) comprises a visible side (5) and wherein the light conducting means (4) are provided partly on a rear side (6) of the coverage means (3) which is opposite the visible side (5), wherein the coverage means (3) comprises an aperture plate (111) with multiple apertures (114) and wherein the light conducting means (4) comprises a lens plate (112) having a plurality of extensions (7) respectively extending into the apertures (114).

TITLE

**Interior trim panel, method for illuminating an interior trim panel and
method for producing an interior trim panel**

CLAIM OF PRIORITY

[0001] The present application claims the benefit of the filing date of U.S. Provisional Application Serial No. 61/143,578 (filed January 9, 2009), and the entirety of the contents of this application being hereby expressly incorporated by reference.

FIELD OF THE INVENTION

[0002] The present invention refers to an interior trim panel of a vehicle interior comprising coverage means and light conducting means, wherein the coverage means comprises a visible side and wherein the light conducting means are provided partly on a rear side of the coverage means which is opposite the visible side. Furthermore the present invention relates to structures and methods for illuminating an interior trim panel and to methods for producing an interior trim panel.

TECHNOLOGICAL BACKGROUND

[0003] Vehicles are commonly provided with various types of functional and decorative trim portions, such as real wood finishes on door or radio bezels with chrome laminated film trim. However, such trim portions or other interior features may be difficult to perceive in dark or dimly lit conditions. Thus, various methods of lighting have been used to illuminate instrument panels (e.g., speedometer) and auxiliary controls (e.g., climate control systems). For example, electroluminescent materials are commonly used to dimly illuminate various controls, making them easier to see in dark conditions.

[0004] It has long been known that certain transparent plastic materials, including acrylics and polycarbonates, conduct light along their length. It is also known to illuminate sheets or tubes of light-conducting material with the incident light

transmitted to an edge, end, or other surface of the light conducting material which will emit that light.

[0005] Furthermore, a roof liner for the passenger compartment of a motor vehicle is known from the prior art document US 2007 / 0 035 958 A1, wherein the roof liner is provided with a flat light source having a plate-shaped light guide which radiates light in the direction of the visible side of the fitting. The front surface of the plate-shaped light guide protrudes at least partially above the flat side of the interior fitting opposite the visible side and actively cooperates with a source of illumination.

Disadvantageously, the plate-shaped light guide is feasible only for illuminating a certain continuous portion of the roof liner. However, illuminating more complex contours of an interior trim panel or illuminating letterings or logos of the interior trim panel is herewith not possible.

[0006] Accordingly, it would be desirable to provide an interior trim panel which is suitable for illuminating certain contours, structures, letterings or logos of functional or decorative trim portions and which can be manufactured in a visually attractive and simple manner.

SUMMARY

[0007] The present invention relates to an interior trim panel of a vehicle interior comprising coverage means and light conducting means, wherein the coverage means comprises a visible side and wherein the light conducting means are provided partly on a rear side of the coverage means which is opposite the visible side, wherein the coverage means comprises an aperture plate with multiple apertures and wherein the light conducting means comprises a lens plate having a plurality of extensions respectively extending into the apertures.

[0008] In an attempt to overcome the problems of the prior art, the subject of the present invention provides an aperture plates having a plurality of apertures each bordering the extensions of the lens plate. Herewith, it is advantageously possible to provide an interior trim panel with arbitrarily formed illuminated functional and/or decorative trim portions. Simultaneously, the manufacturing costs are comparatively

low, as all apertures are illuminated only by the one single lens plate. Preferably, the aperture plate comprises an opaque material and/or the lens plate comprises a translucent material and/or a transparent material. The interior trim panel according to the present invention preferably comprises a door sill plate, a headliner, a door panel, a garnish means, an instrument panel, a seating component, a console and/or a steering wheel.

[0009] In a preferred embodiment of the interior trim panel, the extensions extend from the rear side up to the visible side through the apertures, wherein preferably the extensions are flush with the aperture plate on the visible side. In particular, the extensions are snapped into the apertures and/or in that the lens plate is bonded at least to the rear side of the aperture plate by using adhesive. In another preferred embodiment the interior trim panel comprises an outer cover panel, wherein the covering means and the light conducting means are provided at least partly inside an opening of the outer cover panel. Preferably, the interior trim panel comprises an illuminating panel provided on a backside of the lens plate opposite the aperture plate.

[00010] In another preferred embodiment of the present invention, the interior trim panel comprises a light source providing light to the lens plate and/or the illuminating panel, preferably the light source is attached to the outer cover panel and/or the light source comprises a light emitting diode. In particular, the interior trim panel comprises a light blocker provided to the backside of the lens plate and/or to a backside of the illuminating panel.

[00011] The present invention further refers to a method for illuminating an interior trim, comprising the steps of providing a visible side of a coverage means of the trim panel with at least two apertures; providing a lens plate as a light conducting means behind the at least two apertures; and providing light from a light source to the lens plate. Preferably, the step of providing light from the light source further comprises the steps of providing an illumination panel behind the lens plate; and providing light to the illumination panel from the light source.

[00012] The present invention further refers to a method for producing an interior trim, comprising the steps of providing the visible side of the aperture plate with the multiple apertures and providing the lens plate on the rear side of the aperture plate in such a manner, that the extensions of the lens plate extend into the apertures. Preferably, the interior trim panel is provided with a light source in such a manner, that the lens plate is operatively connected to the light source. In particular, the aperture plate and the lens plate are located in an opening of an outer cover panel, wherein preferably the lens plate and/or an illuminating panel provided on the backside of the lens plate are covered by a light blocker fixed to a backside of the outer cover panel.

[00013] The present invention relates to a method for illuminating a trim panel comprising providing a surface area of the trim panel with at least one aperture, providing a lens behind at least one aperture, and providing a light source to the lens.

[00014] These and other features and advantages of various embodiments of systems and methods according to this invention are described in, or are apparent from, the following detailed description of various exemplary embodiments of various devices, structures, and/or methods according to this invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[00015] Various exemplary embodiments of the systems and methods according to the present disclosure will be described in detail, with reference to the following figures, wherein:

[00016] Figure 1 is a perspective view of the interior of a vehicle as viewed through the driver's door;

[00017] Figure 2 is a top view of an exemplary embodiment of a trim panel according to this invention;

[00018] Figure 3 is a side cross-sectional view of the trim panel of Figure 2 taken along line 10-10;

[00019] Figure 4 is a back perspective view of an exemplary embodiment of a door sill plate according to this invention;

[00020] Figure 5 is a front perspective view of the door sill plate of Figure 4;

[00021] Figure 6 is a front perspective view of the door sill plate of Figure 4 with illumination; and

[00022] Figure 7 is a front perspective view of the door sill plate of Figure 4 with illumination and low ambient illumination.

DETAILED DESCRIPTION

[00023] The present invention relates to trim panels 100 with illuminating features, which may be functional (e.g., an illuminated strip marking the edge of the door sill) or aesthetic (e.g., lettering and/or logo accent lighting). In various exemplary embodiments, a trim panel 100 includes an aperture plate 111 (also referred to as coverage means 3) with apertures 114 corresponding to the desired illumination pattern. A transparent or translucent lens (also referred to as light conducting means 4 or lens plate 112) is placed behind the aperture plate 111 and may extend into the aperture(s) 114 and be level with the surrounding surface of the aperture plate 111. In use, the lens or lens plate 112 is back lit. This may be accomplished with a light source 116 placed behind the lens or lens plate 112 or by transporting light from a remote light source 116 (e.g., using one or more fiber optic devices).

[00024] For purposes of this disclosure, a trim panel 100 is a covering for any interior surface or component of a vehicle interior 2. Trim panels 100 may include, but are not limited to, door sill plates 101, headliners, door panels, garnishes 102, instrument panels 103, seating components, consoles 104, steering wheels, and/or

components these elements. Although the disclosed method is illustrated in relation to only a few types of trim panels 100, the methods may be adapted to the illumination of any trim panel 100. As used herein, the term “door sill plate” 101 includes but is not limited to, a kick plate and/or scuff plate.

[00025] Figure 1 illustrates part of the vehicle interior 2 of an exemplary embodiment of a vehicle, including various trim panels 100, such as, for example, a door sill plate 101, a garnish 102, an instrument panel 103, and a center console 104. It may be desirable to modify any of these or other trim panels 100 by adding illuminated features for aesthetic and/or functional reasons.

[00026] In various exemplary embodiments, as illustrated in Figures 2 and 3, a trim panel 100 includes an aperture plate 111 as a coverage means 3, a lens or lens plate 112 as light conducting means 4, and an illumination panel 113. The aperture plate 111 is placed on the front of the trim panel 100 with the lens 112 behind it in such a manner that the aperture plate 111 and respectively the coverage means 3 has a visible side 5 and a rear side 6 opposite to the visible side 5. The lens 112 is provided partly at the rear side 6. In various exemplary embodiments, the aperture plate 111 is formed from an opaque material. One or more apertures 114 are provided in the aperture plate 111 into which extensions 7 of the lens 112 fits. An illumination panel 113 behind the lens 112 is capable of emitting light into the lens 112 through which that light will pass and exit out the front of the trim panel 100 through the apertures 114 in the aperture plate 111. As installed in a vehicle, the trim panel 100 is provided with one or more light sources 116 (not shown in figures 2 and 3) that provide light to the illumination panel 113 (exemplary illustrated in figure 4). However, a light source 116 is not necessarily a part of this invention. In various exemplary embodiments, a light blocker 115 behind the illumination panel 113 may be used to prevent emission of light from the back of the trim panel 100. Figure 3 schematically illustrates a side cross-sectional view of the trim panel of Figure 2 taken along line 10-10. The aperture plate 111 and the lens plate 112 are located inside an opening 9 of an outer cover panel 8.

[00027] In various exemplary embodiments, as shown in Figure 4, a door sill plate 101 according to this invention includes an illumination panel 113, which may

include a matrix or array of light transmitting fibers. The illumination panel 113 may be implemented using any known or later-developed light source 116 or mechanism usable to carry light from any known or later-developed light source 116 to the lens 112. Emission of light from the back of the door sill plate 101 is reduced by covering at least a part of the illumination panel 113 with a light blocker 115.

[00028] In various exemplary embodiments, as shown in Figures 5 to 7, the door sill plate 101 according to this invention includes an aperture plate 111 with apertures 114 in the form of lettering and/or a logo. Figure 5 shows an exemplary embodiment of the door sill plate 101 and a specific aperture plate 111 without illumination. Figure 6 shows the door sill plate 101 and the specific aperture plate 111 illuminated in lit conditions. Figure 7 shows the door sill plate 101 and the specific aperture plate 111 of Figures 5 and 6 illuminated in dimly lit conditions.

[00029] In various exemplary embodiments, the aperture plate 111 is formed by molding, cutting, machining, punching, and/or otherwise forming a piece with one or more apertures therein. In various exemplary embodiments, the illuminated feature of a trim panel 100 may be a logo, one or more alphanumeric characters, and/or one or more geometric shapes such as, for example, lines running along an edge of a trim panel 100. Any opaque material that is appropriate for use in a given trim panel 100 may be used. Examples of possible materials include, but are not limited to, metals, polymeric materials, cloth or fabrics, leathers, woods, and/or decorative films.

[00030] In various exemplary embodiments, the lens or lens plate 112 may be made of any material capable of transmitting and/or emitting light such as, for example, plastics or polymers, glass, resins, epoxies, urethane, silicone, styrene, polycarbonate, acrylic, polypropylene, and/or acrylonitrile butadiene (ABS). In various exemplary embodiments, the lens 112 may be colored or colorless.

[00031] In various exemplary embodiments, the lens 112 is attached to the aperture plate 111. This may be accomplished by any suitable known or later developed attachment device(s) or compositions such as, for example, adhesive 119 and/or snaps.

[00032] In various exemplary embodiments, the light source 116 may be any known or later developed light source 116, such as, for example, light emitting diodes (LED), semi-conductor lasers, fluorescent lights, and incandescent lights. The light source 116 may produce light of any color or may be capable of switching between different colors. This may be accomplished by using a colored light source 116 or by passing light through a light filter.

[00033] It should be noted that references to relative positions (e.g., “top” and “bottom” or “above” and “below”) in this description are merely used to identify various elements as are oriented in the figures. It should be recognized that the orientation of particular components may vary greatly depending on the application in which they are used. It should be understood that the drawings are not necessarily to scale. In certain instances, details that are not necessary to the understanding of the invention or render other details difficult to perceive may have been omitted. It should be understood, of course, that the invention is not necessarily limited to the particular embodiments illustrated herein.

[00034] It is also important to note that the construction and arrangement of the trim panel 100, as shown in the various exemplary embodiments, is illustrative only. While the trim panel 100, according to this invention, has been described in conjunction with the exemplary embodiments outlined above, various alternatives, modifications, variations, improvements, and/or substantial equivalents, whether known or that are or may be presently unforeseen, may become apparent. Accordingly, the exemplary embodiments of the trim panel 100, according to this invention, as set forth above, are intended to be illustrative, not limiting. Various changes may be made without departing from the spirit and scope of the invention. Therefore, the description provided above is intended to embrace all known or later-developed alternatives, modifications, variations, improvements, and/or substantial equivalents.

REFERENCE SIGNS

100	Interior trim panel
101	Door sill plate
102	Garnish means
103	Instrument panel
104	Console
111	Aperture plate
112	Lens or lens plate
113	Illuminating panel
114	Apertures
115	Light blocker
116	Light source
2	Vehicle interior
3	Coverage means
4	Light conducting means
5	Visible side
6	Rear side
7	Extensions
8	Outer cover panel
9	Opening of the outer cover panel

CLAIMS

1. Interior trim panel (100) of a vehicle interior (2) comprising coverage means (3) and light conducting means (4), wherein the coverage means (3) comprises a visible side (5) and wherein the light conducting means (4) are provided partly on a rear side (6) of the coverage means (3) which is opposite the visible side (5), characterized in that the coverage means (3) comprises an aperture plate (111) with multiple apertures (114) and in that the light conducting means (4) comprises a lens plate (112) having a plurality of extensions (7) respectively extending into the apertures (114).
2. Interior trim panel (100) according to claim 1, characterized in that the aperture plate (111) comprises an opaque material.
3. Interior trim panel (100) according to claim 1 or 2, characterized in that the lens plate (112) comprises a translucent material and/or a transparent material.
4. Interior trim panel (100) according to one of the preceding claims, characterized in that the extensions (7) extend from the rear side (6) up to the visible side (5) through the apertures (114), wherein preferably the extensions (7) are flush with the aperture plate (111) on the visible side (5).
5. Interior trim panel (100) according to one of the preceding claims, characterized in that the extensions (7) are snapped into the apertures (14) and/or in that the lens plate (112) is bonded at least to the rear side (6) of the aperture plate (111) by using adhesive (119).
6. Interior trim panel (100) according to one of the preceding claims, characterized in that the interior trim panel (100) comprises an outer cover panel (8), wherein the covering means (3) and the light conducting means (4) are provided at least partly inside an opening (9) of the outer cover panel (8).

7. Interior trim panel (100) according to one of the preceding claims, characterized in that the interior trim panel (100) comprises an illuminating panel (113) provided on a backside of the lens plate (112) opposite the aperture plate (111).
8. Interior trim panel (100) according to one of the preceding claims, characterized in that the interior trim panel (100) comprises a light source (116) providing light to the lens plate (112) and/or the illuminating panel (113), preferably the light source (116) is attached to the outer cover panel (8) and/or the light source (116) comprises a light emitting diode.
9. Interior trim panel (100) according to one of the preceding claims, characterized in that the interior trim panel (110) comprises a light blocker (115) provided to the backside of the lens plate (112) and/or to a backside of the illuminating panel (113).
10. Interior trim panel (100) according to one of the preceding claims, characterized in that the interior trim panel (100) is a door sill plate (101), a headliner, a door panel, a garnish means (102), an instrument panel (103), a seating component, a console (104) and/or a steering wheel.
11. Method for illuminating an interior trim panel (100) according to one of the preceding claims, comprising the steps of:
 - providing a visible side (5) of a coverage means (3) of the trim panel (100) with at least two apertures (114);
 - providing a lens plate (112) as a light conducting means (4) behind the at least two apertures (114); and
 - providing light from a light source (116) to the lens plate (112).
12. Method according to claim 11, characterized in that the step of providing light from the light source (116) further comprises the steps of:
 - providing an illumination panel (113) behind the lens plate (112); and
 - providing light to the illumination panel (113) from the light source (116).

13. Method for producing an interior trim panel (100) according to one of the claims 1 to 10, comprising the steps of:

- providing the visible side (5) of the aperture plate (111) with the multiple apertures (114) and
- providing the lens plate (112) on the rear side (6) of the aperture plate (11) in such a manner, that the extensions (7) of the lens plate (112) extend into the apertures (114).

14. Method according to claim 13, characterized in that the interior trim panel (100) is provided with a light source (116) in such a manner, that the lens plate (112) is operatively connected to the light source (116).

15. Method according to one of the claims 13 or 14, characterized in that the aperture plate (111) and the lens plate (112) are located in an opening (9) of an outer cover panel (8), wherein preferably the lens plate (112) and/or an illuminating panel (113) provided on the backside of the lens plate (112) are covered by a light blocker (115) fixed to a backside of the outer cover panel (8).

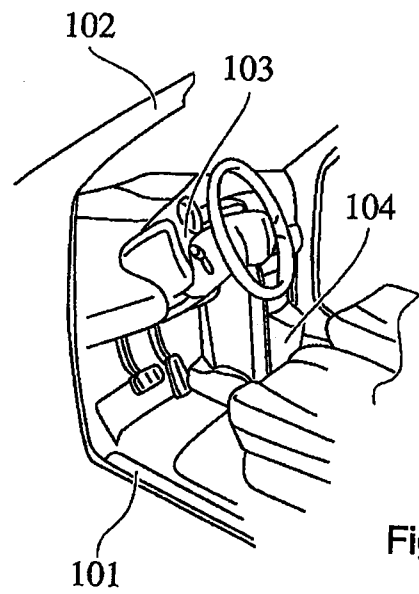


Fig. 1

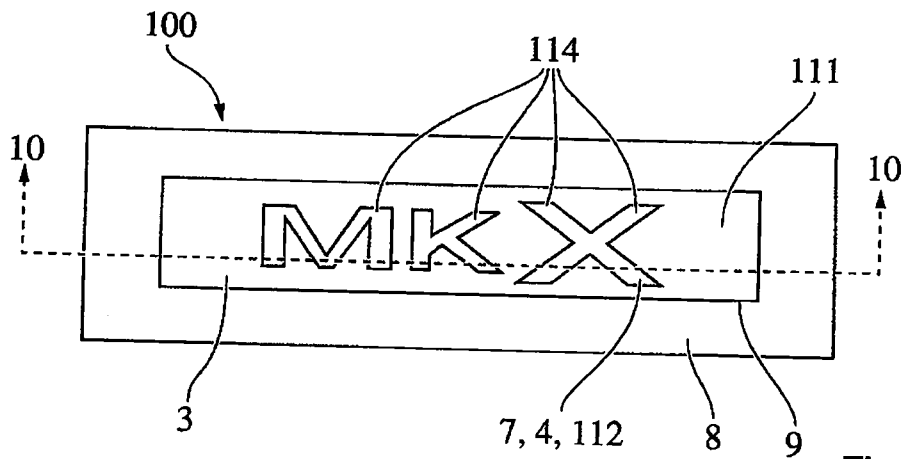


Fig. 2

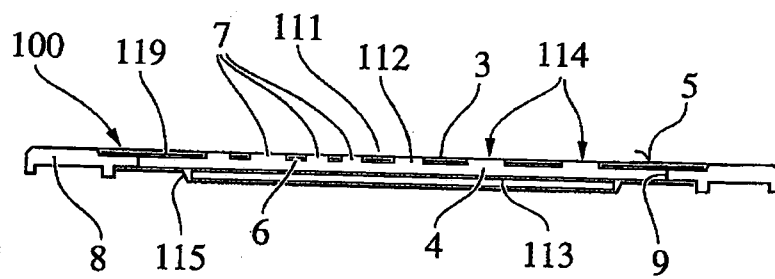
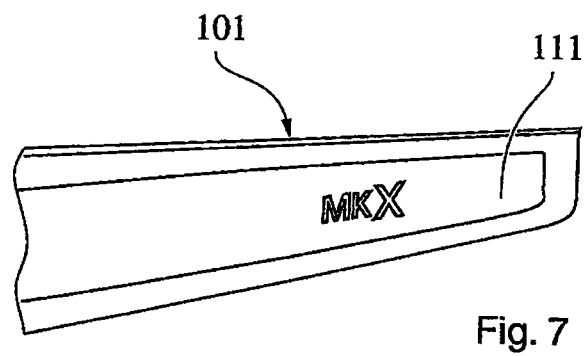
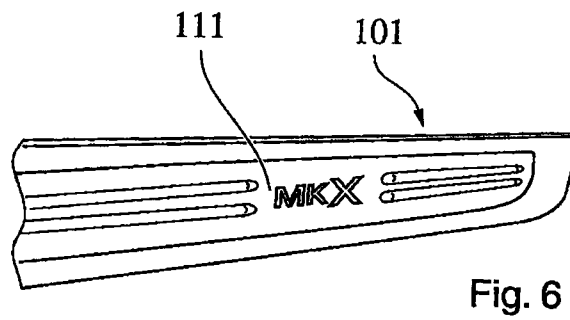
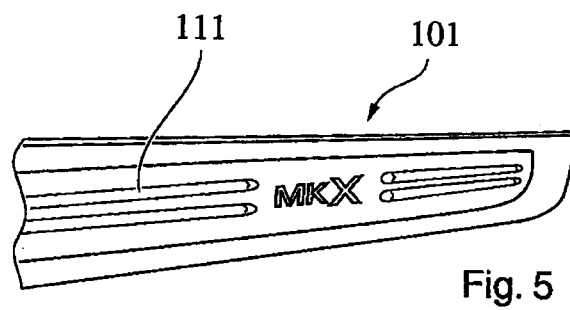
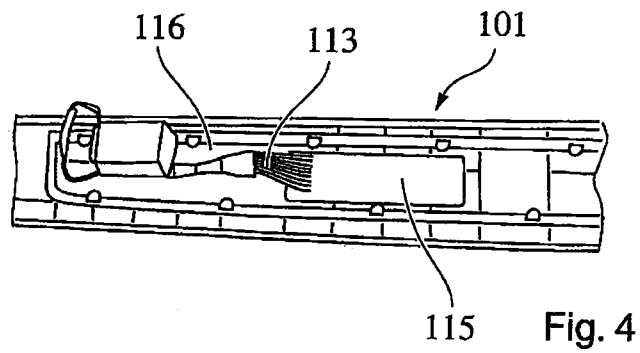


Fig. 3



INTERNATIONAL SEARCH REPORT

International application No
PCT/US2010/020417

A. CLASSIFICATION OF SUBJECT MATTER
INV. B60R13/02 G09F13/22

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)
B60R G09F B60Q

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 practical, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2 290 651 A (PORSCHE AG [DE]) 3 January 1996 (1996-01-03) page 2 - page 4; figures 1,2 -----	1-15
A	DE 199 09 472 A1 (BAYERISCHE MOTOREN WERKE AG [DE]; DELPHI TECH INC [US]) 7 September 2000 (2000-09-07) figure 1 -----	1,10,11
A	DE 202 19 391 U1 (CD DESIGN GMBH [DE]) 22 April 2004 (2004-04-22) paragraph [0020] - paragraph [0031]; figures 1-3 -----	1,11
A	US 2008/037266 A1 (CUNNIEN COLE J [US]) 14 February 2008 (2008-02-14) the whole document ----- -/--	1,11

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

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Date of the actual completion of the international search

4 February 2010

Date of mailing of the international search report

01/03/2010

Name and mailing address of the ISA/

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Topolski, Jan

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2010/020417

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 20 2006 015900 U1 (VAUTH SAGEL HOLDING GMBH & CO [DE]) 21 December 2006 (2006-12-21) the whole document -----	1,11

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2010/020417

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
GB 2290651	A	03-01-1996	DE 4421942 A1 FR 2721568 A1 JP 8002320 A US 5641221 A	11-01-1996 29-12-1995 09-01-1996 24-06-1997
DE 19909472	A1	07-09-2000	WO 0051843 A1 EP 1159157 A1 ES 2323746 T3	08-09-2000 05-12-2001 24-07-2009
DE 20219391	U1	22-04-2004	NONE	
US 2008037266	A1	14-02-2008	NONE	
DE 202006015900	U1	21-12-2006	NONE	