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CN 201881974 U CN 201677811 U
JP 110078693 A US 5956181 A

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(54) Title of the Invention: Vision system for a vehicle and a vehicle comprising a vision system
Abstract Title: Infrared capture and display system for a vehicle

(57) The invention relates to a vision system for a vehicle 1, comprising at least one image capture device 2, 3, (fig. 2, 4), which is sensitive to infrared radiation, intended for capturing an image of an environment of the vehicle and directed rearward of the vehicle. The vision system comprises at least one visual display device 7, 8, 10 for displaying the image. According to the invention the image capture device 2, 3 is arranged at a rear side of a mirror glass 5.1, 6.1 of an outside rear view mirror 5, 6 of the vehicle. At least a part of a front side of the mirror glass forms a display of the visual display device. The invention further relates to a vehicle, comprising such a vision system. The mirror glass may be a one way mirror. The visual display device may be arranged at the rear side of the mirror glass. Activation and deactivation of the vision system may be effected automatically depending on visibility conditions.

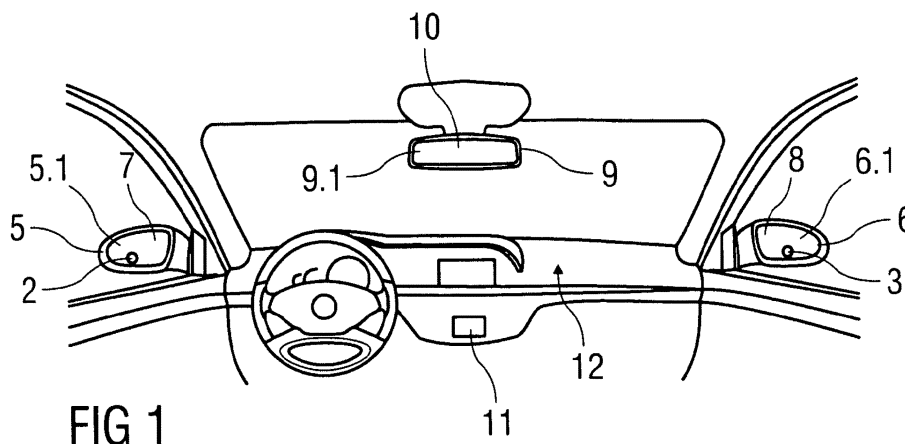


FIG 1

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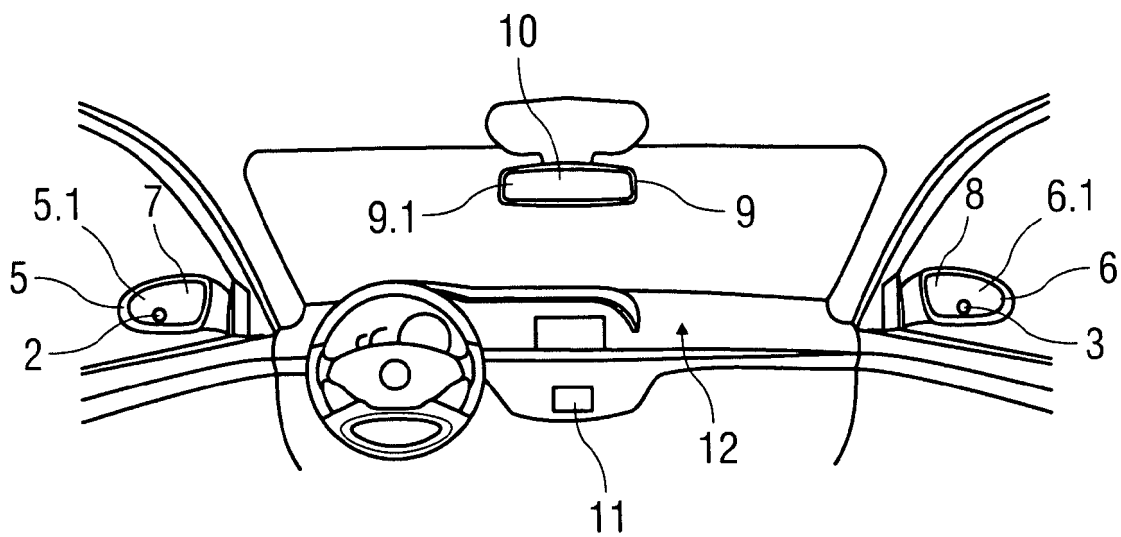


FIG 1

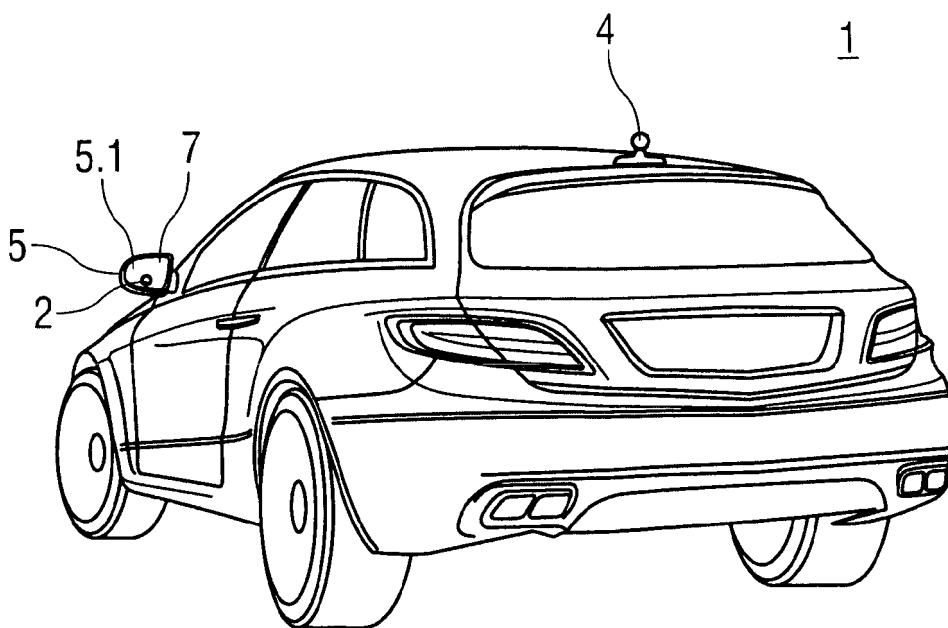
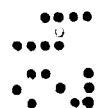
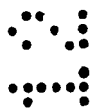


FIG 2



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Vision system for a vehicle and a vehicle, comprising a vision system

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Technical Field

The invention relates to a vision system for a vehicle, comprising at least one image capture device, which is sensitive to infrared radiation, intended for capturing an image of an environment of the vehicle and directed rearwardly of the vehicle, and comprising at least one visual display device for displaying the image.

The invention further relates to a vehicle, comprising such a vision system.

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Background of the Invention

US 7,537,400 B2 describes a camera system for a vehicle, comprising one camera unit detachably coupled to the vehicle. The camera unit is used for one camera-based driver-supporting function of the vehicle. The camera system further comprises a plurality of coupling stations fixed to the vehicle that are operable to couple to the camera unit. The cameras which are used with the camera system are suitable for receiving infrared light. To provide a rearview camera function a coupling station is arranged on a headliner close to a rear window of the vehicle.

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US 2002/0017985 A1 describes a vision system for a vehicle that comprises a vehicle equipped with image capture devices. The image capture devices capture an image external of the vehicle. The image is displayed on a screen so as to be viewable by an occupant of the vehicle. The image capture devices are sensitive to near or far infrared radiation and are positioned on opposite sides of the vehicle near to outside rear view

mirrors and on a lateral centerline on the roof of the vehicle. All image capture devices are directed generally rearwardly of the vehicle.

5 US 2006/0186347 A1 discloses a vehicle night vision system, comprising an infrared camera mounted on a part of a vehicle body, an onboard display unit for displaying an image captured by the infrared camera and an illumination sensor adapted to detect an illumination level exterior of the vehicle body. The night vision system further comprises a control unit for displaying an image captured by the infrared camera on the display unit and controlling the display unit according to an output signal from the illumination sensor.
10 The control unit activates the display unit when an illumination level detected by the illumination sensor has persisted to be below a prescribed level for a prescribed period of time.

Summary of the Invention

15 It is an object of the present invention to provide an improved vision system for a vehicle and an improved vehicle, comprising a vision system.

20 The object is achieved by a vision system according to claim 1 and a vehicle according to claim 10.

Preferred embodiments of the invention are given in the dependent claims.

25 The vision system for a vehicle comprises at least one image capture device, which is sensitive to infrared radiation, intended for capturing an image of an environment of the vehicle and directed rearwardly of the vehicle. The vision system further comprises at least one visual display device for displaying the image. According to the invention the image capture device is arranged at a rear side of a mirror glass of an outside rear view mirror of the vehicle, wherein at least a part of a front side of the mirror glass forms a
30 display of the visual display device.

35 The vision system forms a driver assistance system for assisting a driver of a vehicle when reversing the vehicle and allows a better visibility under poor visibility conditions like in darkness, rain, snow and fog. Thus, the safety for passengers of the vehicle and the road safety are improved.

Brief Description of the Drawings

The present invention will become more fully understood from the detailed description
5 given hereinbelow and the accompanying drawings which are given by way of illustration
only, and thus, are not limitive of the present invention, and wherein:

Figure 1 is a perspective view of an interior of a vehicle and
10 Figure 2 is a perspective view of the vehicle shown in figure 1.

Corresponding parts are marked with the same reference symbols in all figures.

Detailed Description of Preferred Embodiments

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Figure 1 shows a perspective view of an interior of a vehicle 1 and figure 2 shows a
perspective view of the vehicle 1. In the following embodiments of the invention are
described on the basis of both figures.

20

The vehicle 1 comprises a vision system which forms a driver assistance system for
assisting a driver of a vehicle when reversing the vehicle 1. In the exemplary embodiment
shown in figures 1 and 2 the vision system contains three image capture devices 2, 3, 4,
wherein all image capture devices 2, 3, 4 are intended for capturing an image of an
environment of the vehicle and directed rearwardly of the vehicle 1. The image capture
25 devices 2, 3, 4 are sensitive to infrared and visible radiation.

A first image capture device 2 is arranged at a rear side of a mirror glass 5.1 inside a
housing of a left outside rear view mirror 5 of the vehicle 1. A second image capture
device 3 is arranged at a rear side of a mirror glass 6.1 inside a housing of a right outside
30 rear view mirror 6 of the vehicle 1. Both image capture devices 2, 3 are arranged in such
a manner that they are invisible for the human eye.

In order to make the mirror glasses 5.1, 6.1 transparent for the image capture
devices 2, 3, the mirror glasses 5.1, 6.1 are one-way mirrors.

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Both image capture devices 2, 3 are connected respectively with one visual display device 7, 8. The visual display devices 7, 8 are intended for displaying the respective captured image of the environment, so that the driver is able to see the rearward environment of the vehicle 1.

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Thereby a front side of each mirror glass 5.1, 6.1 forms a display of the visual display device 7, 8, wherein the visual display devices 7, 8 are arranged at the rear side of the mirror glass 5.1 inside the housing of each outside rear view mirror 5, 6 too. The visual display devices 7, 8 are liquid crystal displays (= LCD) or thin film transistor displays (= TFT-displays).

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The further image capture device 4 is arranged at a rear area of a roof outside of the vehicle 1 on an antenna. In alternative or additional embodiments (not illustrated) the further image capture device 4 and/or more further image capture devices are arranged at a rear of the vehicle 1, for example at a boot lid or a rear bumper, and/or at a rear area of a roof lining of the vehicle 1 and/or at a rear side of a mirror glass 9.1 of an inside rear view mirror 9.

15

The further image capture device 4 is connected with a further visual display device 10, which is arranged at a rear side of the mirror glass 9.1 inside a housing of the inside rear view mirror 9. Thus, a front side of the mirror glass 9.1 forms a display of the further visual display device 10. The further visual display device 10 is a liquid crystal display or a thin film transistor display.

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In order to make the mirror glass 9.1 transparent for the further image capture device 4, the mirror glass 9.1 is a one-way mirror.

25

The activation and deactivation of the vision system is effected automatically depending on visibility conditions, wherein the activation and deactivation of the vision system comprise activation and deactivation of the image capture devices 2, 3, 4 and of the visual display devices 7, 8, 10. The vision system is deactivated under poor visibility conditions like in darkness, rain, snow and fog. Also it is deactivated under conditions with a potential for glare, for example due to vehicles approaching from rear. The visibility conditions maybe detected by the image capture devices 2, 3, 4 themselves, such that no additional detectors are required.

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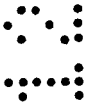
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In addition an actuating element 11, for example a switch, is intended for manual activation and deactivation of the vision system. The actuating element 11 is arranged in the interior of the vehicle 1, particularly at an instrument panel 12 of the vehicle 1.

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In the deactivated state of the vision system, the visual display devices 7, 8, 10 are deactivated and the driver can use the outside rear view mirrors 5, 6 and the inside rear view mirror 9 in the conventional way to capture the rearward environment of the vehicle 1. Consequently in case of any technical problem, for example due to software failure of component failures, the conventional operation of the outside rear view mirrors 5, 6 and the inside rear view mirror 9 will not be affected.

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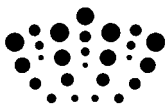
List of References

- 1 vehicle
- 2 image capture device
- 3 image capture device
- 4 further image capture device
- 5 outside rear view mirror
 - 5.1 mirror glass
- 6 outside rear view mirror
 - 6.1 mirror glass
- 7 visual display device
- 8 visual display device
- 9 inside rear view mirror
 - 9.1 mirror glass
- 10 further visual display device
- 11 actuating element
- 12 instrument panel

Claims

1. Vision system for a vehicle (1), comprising at least one image capture device (2, 3, 4), which is sensitive to infrared radiation, intended for capturing an image of an environment of the vehicle (1) and directed rearwardly of the vehicle (1), and comprising at least one visual display device (7, 8, 10) for displaying the image,
characterized in that the image capture device (2, 3) is arranged at a rear side of a mirror glass (5.1, 6.1) of an outside rear view mirror (5, 6) of the vehicle (1), wherein at least a part of a front side of the mirror glass (5.1, 6.1) forms a display of the visual display device (7, 8).
2. Vision system according to claim 1,
characterized in that the mirror glass (5.1, 6.1) is a one-way mirror.
3. Vision system according to claim 1 or 2,
characterized in that the visual display device (7, 8) is arranged at the rear side of the mirror glass (5.1, 6.1).
4. Vision system according to one of the preceding claims,
characterized in that activation and deactivation of the vision system is effected automatically depending on visibility conditions.
5. Vision system according to one of the preceding claims,
characterized in that the image capture device (2, 3) is arranged inside a housing of the outside rear view mirror (5, 6).

6. Vision system according to one of the preceding claims, characterized in that at least one further image capture device (4) is connected with at least one further visual display device (10), wherein at least a part of a front side of a mirror glass (9.1) of an inside rear view mirror (9) of the vehicle (1) forms a display of the further visual display device (4).
7. Vision system according to claim 6, characterized in that the further image capture device (4) is arranged at a rear of the vehicle (1) or at a rear area of the roof of the vehicle (1) or at a rear area of a roof lining of the vehicle (1) or at a rear side of the mirror glass (9.1) of the inside rear view mirror (9).
8. Vision system according to one of the preceding claims, characterized in that at an actuating element (11) for manual activation and deactivation of the vision system is arranged in the interior of the vehicle (1).
9. Vision system according to one of the preceding claims, characterized in that the image capture device (2, 3) and/or a further image capture device (4) are or is sensitive to visible radiation.
10. Vehicle (1), comprising a vision system according to one of the preceding claims.



Application No: GB1207342.5

Examiner: Mr Sean O'Connor

Claims searched: 1-10

Date of search: 9 October 2012

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

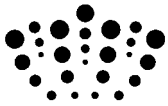
Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X,Y	X: 1, 3-5, 8-10 Y:6, 7	WO 2008/026842 A1 (LG INNOTEK) See abstract, figures and paragraphs [27]-[30], [38] and [56].
Y	6, 7	US 5956181 A (LIN) See abstract and figures; note images picked up by camera 18 is displayed on display monitor 2 or rear view mirror 1.
Y	6, 7	JP 11078693 A (NILES) See abstract and figures; note images picked up by camera 4 is displayed on mirror 1.
Y	6	WO 02/18174 A1 (BOSCH) See abstract and figures.
A	-	GB 2479121 A (LIU) See abstract and figures.
A	-	CN 201881974 U (ZEXIN) See EPODOC abstract, WPI abstract accession number 2011-J67891 [52] and figures.
A	-	CN201677811 U (KUNZHEN) See EPODOC abstract, WPI abstract accession number 2011-A76183 [17] and figures.
A	-	EP2025556 A2 (MURAKAMI) See abstract and figures.

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^X :



Worldwide search of patent documents classified in the following areas of the IPC

B60Q; B60R

The following online and other databases have been used in the preparation of this search report

WPI, EPODOC

International Classification:

Subclass	Subgroup	Valid From
B60R	0001/08	01/01/2006
B60Q	0009/00	01/01/2006
B60R	0001/06	01/01/2006
B60R	0001/12	01/01/2006