

Bracket and Method for Mounting an Imaging Device to a Vehicle

Field of the invention

The invention relates to rear vision systems for vehicles and more particularly to a bracket and method for mounting an imaging device to a rear portion of a vehicle.

5 Background of Invention

It is known to provide an imaging device at a rear portion of a vehicle to capture images of the area rearward of the vehicle so as to assist the driver, for example, during parking manoeuvres.

A conventional rear vision device 10 for a motor vehicle is shown in FIG. 1.
10 The rear vision device 10 comprises an imaging device 12 housed in a cylindrical body 14. The imaging device 12 is connected via a cable 16 to an imaging system (not shown) for processing and displaying captured images. A driver of the vehicle estimates the proximity of an object to a rear of the vehicle based on the size of the image displayed before him: the image becomes larger as the rear of the vehicle
15 draws closer to the object. However, as such rear vision devices 10 are typically flush mounted to a rear bumper of the vehicle, the imaging device 12 only captures images of objects rearwards of the vehicle, but not any portion of the vehicle. The driver has therefore no reference point when estimating the separation between an object and the rear of the vehicle. It is thus difficult for the driver to estimate the proximity of an
20 object to the rear of a vehicle with such rear vision devices 10.

Another conventional rear vision device 20 is shown in FIG. 2. The rear vision device 20 comprises an imaging device 22 mounted on a bracket 24 having an angled stem 26 and a base portion 28 extending in opposite directions away from the stem 26. Holes 30 for receiving screws or other fastening means for securing the rear
25 vision device 20 to a rear portion of a vehicle are formed at respective ends of the base portion 28 of the bracket 24. The imaging device 22 is connected via a cable 32 to an imaging system (not shown) for processing and displaying captured images. Such rear vision devices 20 are typically mounted to the overhang portion of a license

plate recess of a motor vehicle, albeit with some difficulty due to the limited space available along the overhang portion of the license plate recess.

Summary of the Invention

5 The invention aims to mitigate at least one of the aforementioned disadvantages of the prior art.

Accordingly, in a first aspect, the invention provides, a bracket for mounting an imaging device to a vehicle, the bracket comprising: a base portion having an opening formed therein to receive the imaging device; and a sidewall extending from the base portion, the base portion and the sidewall being arranged to define a slot
10 therebetween for engaging a part of the vehicle. During installation, the slot engages a part of the vehicle and holds the bracket to the vehicle prior to application of permanent fixing means. This facilitates easy installation and reduces installation time and labour costs.

The slot may preferably be tapered. This may assist in engagement with
15 vehicular parts of various thicknesses.

A portion of the sidewall defining the slot may preferably be curved. This facilitates adjustment of the imaging device during installation to allow the imaging device to capture a substantially central rear view even when not centrally located on the rear end of the vehicle.

20 In one preferred embodiment, the bracket may include a housing for the imaging device, the housing being received in the opening and cooperating with the sidewall.

Preferably, the sidewall may engage the housing in a snap-fit arrangement. This facilitates easy assembly of the bracket since it negates the need for further
25 attachment means.

Preferably, the bracket may include means for securing the housing to the sidewall. This allows the imaging device to be locked relative to the bracket.

In one preferred embodiment, the securing means may comprise a slot and protrusion arrangement.

Preferably, either the slots or the protrusions in the slot and protrusion arrangement may be formed at various angles relative to a plane in which the base portion lies. This facilitates adjustment of the imaging device such that it captures a part of the vehicle (e.g. the bumper) as a reference point for the driver.

In a second aspect, the invention provides a method of mounting an imaging device to a vehicle, the method comprising: mounting the imaging device to a bracket having an engaging slot; engaging an edge of an opening in the vehicle with the engaging slot of the bracket; pivoting the bracket about the edge of the opening until a base portion of the bracket is flush with a portion of the vehicle; and securing the bracket to the vehicle. Corresponding advantages are obtained in the second aspect as previously described in respect of the first aspect.

Other aspects and advantages of the invention will become apparent from the following detailed description, taken in conjunction with the accompanying drawings, illustrating by way of example the principles of the invention.

Brief Description of the Figures

The following detailed description of embodiments of the invention will be better understood when read in conjunction with the appended drawings. The present invention is illustrated by way of example and is not limited by the accompanying figures, in which like references indicate similar elements.

FIG. 1 is a perspective view of a conventional rear vision device for a motor vehicle;

FIG. 2 is a perspective view of another conventional rear vision device;

FIG. 3 is a perspective view of a bracket for mounting an imaging device to a vehicle in accordance with one embodiment of the present invention;

FIG. 4 is a perspective view of the bracket of FIG. 3 without a housing for the imaging device;

FIG. 5 is a perspective view of a housing for the imaging device in the bracket of FIG. 3;

FIG. 6 is a bottom perspective view of an overhang portion of a rear license plate recess of a motor vehicle with an imaging device mounted thereto in accordance with one embodiment of the present invention;

FIG. 7 is a top perspective view of the rear license plate recess of the motor vehicle shown in FIG. 6;

FIG. 8 is a perspective view of a bracket for mounting an imaging device to a vehicle in accordance with another embodiment of the present invention;

FIG. 9 is a perspective view of the bracket of FIG. 8 without a housing for the imaging device; and

FIG. 10 is a perspective view of a housing for the imaging device in the bracket of FIG. 8.

Detailed Description of the Embodiments

The detailed description set forth below in connection with the appended drawings is intended as a description of embodiments of the invention, and is not intended to represent the only form in which the present invention may be practiced. It is to be understood that the same or equivalent functions may be accomplished by different embodiments that are intended to be encompassed within the scope of the invention. In the drawings, like numerals are used to indicate like elements throughout.

Referring now to FIG. 3, a bracket 50 for mounting an imaging device such as a video camera to a vehicle is shown. The bracket 50 comprises a base portion 52 having a rectangular-shaped opening 54 formed therein to receive the imaging device (not shown) and a pair of sidewalls 56 extending transversely from opposite edges of the opening 54. The base portion 52 and the sidewalls 56 are arranged to define a slot 58 therebetween for engaging a part of the vehicle. A housing 60 for the imaging device is received in the opening 54 and cooperates with the sidewalls 56. The

bracket 50 is shown without the housing 60 in FIG. 4. The housing 60 is shown separately in FIG. 5.

Referring first to FIG. 4, the slot 58 for engaging a part of the vehicle is defined between the base portion 52 and a pair of protrusions 62 extending rearwardly from base portions of the sidewalls 56. A lower edge of each protrusion 62 defining the slot 58 is inclined. Consequently, the slot 58 is tapered. Advantageously, the tapered slot 58 allows engagement with vehicular parts of various thicknesses. First holes 64 for receiving screws or other fastening means for securing the bracket 50 to the vehicle are formed in corner portions of the base portion 52 at an opposite end from the slot 58. Second holes 66 of elongated cross-section are formed in top front corner portions of the sidewalls 56, the second holes 66 extending rearwardly and downwardly, generally in a direction towards the slot 58.

Referring next to FIG. 5, a bore 68 for receiving the imaging device (not shown) is formed in the housing 60, the bore 68 extending from a front portion 70 to a rear portion 72 of the housing 60. The front portion 70 of the housing 60 is of a square cross-section. The rear portion 72 of the housing 60 includes a trapezoidal portion 74 extending away from the axis of the bore 68. A hole 76 of elongated cross-section is formed through the trapezoidal portion 74 of the housing 60. The elongated cross-section of the hole 76 is inclined at an angle from a base of the trapezoidal portion 74 of the housing 60. A slot 78 is formed in the trapezoidal portion 74 of the housing 60 such that it bisects the trapezoidal portion 74 in half across its length L_{tp} . The slot 78 serves as a guide means for adjusting the view of the imaging device during installation.

Referring again to FIG. 3, the housing 60 may be secured to the sidewalls 56 by passing a screw (not shown) or other fastening means through the holes 66 in the sidewalls 56 and the hole 76 in the housing 60 and securing the screw with a nut (not shown). The elongated cross-sections of the holes 66 and 76 provide allowance for adjusting the position of the housing 60 relative to the plane of the base portion 52, and consequently, the view of the imaging device. The provision of the slot 78 in the housing 60 allows tightening of the grip of the bracket 50 on the imaging device. The bracket 50 may be made of polycarbonate by mould casting.

Referring now to FIG. 6, a bottom perspective view of an overhang portion 90 of a rear license plate recess 92 of a motor vehicle 94 with an imaging device 96 centrally mounted thereto is shown. The imaging device 96 is mounted to the bracket 50 of FIG. 3. As shown in FIG. 6, the bracket 50 is mounted to the overhang portion 90 of the rear license plate recess 92 such that only the base portion 52 of the bracket 50 and a portion of the housing 60 projecting beyond the base portion 52 of the bracket 50 are visible once mounted; the sidewalls 56 and the portion of the housing 60 above the base portion 52 of the bracket 50 are concealed.

Referring now to FIG. 7, a top perspective view of the rear license plate recess 92 of the motor vehicle 94 of FIG. 6 is shown. The imaging device 96 captures a generally central, rearward and downward field of view and is easily installed into the motor vehicle 94 by forming an opening having dimensions of, for example, about 25 millimetres (mm) by about 32 mm in the overhang portion 90 of the rear license plate recess 92, engaging an edge of the opening in the overhang portion 90 with the slot 58, pivoting the bracket 50 about the edge of the opening until the base portion 52 of the bracket 50 is flush with the overhang portion 90 of the vehicle 94, and securing the bracket 50 to the overhang portion 90 via the first holes 64 using, for example, rivets, screws or other permanent fixing means.

Referring now to FIG. 8, a bracket 100 for mounting an imaging device 102 to a vehicle in accordance with another embodiment of the invention is shown. The bracket 100 comprises a base portion 104 having a substantially elliptical-shaped opening 106 formed therein to receive the imaging device 102 and a pair of sidewalls 108 extending from the base portion 104 and partially encircling the opening 106. The base portion 104 and the sidewalls 108 are arranged to define a slot 110 therebetween for engaging a part of the vehicle. A housing 112 for the imaging device 102 is received in the opening 106 and cooperates with the sidewalls 108. A fixing member 114 is affixed to the sidewalls 108 of the bracket 100, the fixing member 114 connecting the sidewalls 108 and bridging the gap between the sidewalls 108. The bracket 100 is shown without the housing 112 in FIG. 9. The housing 112 is separately shown in FIG. 10.

Referring first to FIG. 9, the sidewalls 108 have a concave inner surface 116. A slot 118 is formed in the concave inner surface 116 of each sidewall 108. The slots 118 are formed at an angle of about 45° relative to the plane of the base portion 104. The portion of the sidewalls 108 defining the slot 110 is curved. This facilitates rotational adjustment of the imaging device in the plane of the base portion 104 during installation. This is advantageous since due to space constraints along the overhang portion of the rear license plate recess, it is not always possible to install the imaging device squarely in the centre of the overhang portion to capture a central rear view. However, with rotational adjustment capability, the imaging device, even if not centrally located along the overhang portion, can simply be rotated during installation to a direction where it can capture a substantially central rear view. The edge of the sidewall 108 defining the slot 110 is formed at an incline. Consequently, the slot 110 is tapered. This facilitates engagement of the slot 110 with vehicular parts of various thicknesses. A pair of protrusions 120 is formed on the uppermost surfaces of the sidewalls 108 to engage corresponding openings 122 in the fixing member 114 (see FIG. 8). Holes 124 for receiving screws or other fastening means for securing the bracket 100 to the vehicle are formed in corner portions of the base portion 104 at an opposite end from the slot 110.

Referring next to FIG. 10, the housing 112 has a convex outer surface 126 with a curvature corresponding to that of the concave inner surface 116 of the sidewalls 108 of the bracket 100. A cylindrical bore 128 for receiving the imaging device (not shown) is formed through the housing 112. First and second pairs of protrusions 130A and 130B for engaging corresponding slots 118 in the sidewalls 108 of the bracket 100 are formed at intervals on the convex outer surface 126 of the housing 112. The first pair of protrusions 130A extends in a direction parallel to the axis of the bore 128. The second pair of protrusions 130B extends generally in the same direction as the first pair 130A, but is offset from the axis of the bore 128 by about 3 degrees (°).

Referring again to FIG. 8, the concave inner surface 116 of the sidewalls 108 engages the corresponding convex outer surface 126 of the housing 112 in a snap-fit arrangement. The housing 112 is secured to the sidewalls 108 when one of the pairs of protrusions 130A and 130B on the housing 112 engages the corresponding pair of

slots 118 in the sidewalls 108 of the bracket 100. This locks the angle of inclination of the imaging device 102 relative to the base portion 104 of the bracket 100. As the pairs of protrusions 130A and 130B are formed at different angles relative to the plane of the base portion 104, the angle of inclination of the imaging device 102 may simply
5 be adjusted by rotating the housing 112 in a different direction such that a different pair of protrusions 130 engages the slots 118 in the sidewalls 108. The protrusions 120 on the uppermost surfaces of the sidewalls 108 are received in the corresponding openings 122 formed in the fixing member 114. A soldering iron is used to melt excess portions of the protrusions 120 extending beyond the openings 122 in the
10 fixing member 114. The fixing member 114 serves to enhance the engagement between the sidewalls 108 and the housing 112.

The description of the preferred embodiments of the present invention have been presented for purposes of illustration and description, but are not intended to be exhaustive or to limit the invention to the forms disclosed. It will be appreciated by
15 those skilled in the art that changes could be made to the embodiments described above without departing from the broad inventive concept thereof. For example, protrusions may be provided on the inner surfaces of the sidewalls of the bracket to engage corresponding grooves in the outer surface of the housing instead. As a further example, additional pairs of protrusions at varying angles may be provided on
20 the housing. In an alternative exemplary embodiment, the bracket may comprise a single sidewall. It is understood, therefore, that this invention is not limited to the particular embodiments disclosed, but covers modifications within the spirit and scope of the present invention as defined by the appended claims.

Claims

1. A bracket for mounting an imaging device to a vehicle, the bracket comprising:
 - a base portion having an opening formed therein to receive the imaging device;
 - a sidewall extending from the base portion, the base portion and the sidewall being arranged to define a slot therebetween for engaging a part of the vehicle; and
 - a housing for the imaging device, the housing being received in the opening and cooperating with the sidewall.
2. The bracket of claim 1, wherein the slot is tapered.
3. The bracket of claim 1 or 2, wherein a portion of the sidewall defining the slot is curved.
4. The bracket of any one of the preceding claims, wherein the sidewall engages the housing in a snap-fit arrangement.
5. The bracket of any one of the preceding claims, further comprising means for securing the housing to the sidewall.
6. The bracket of claim 5, wherein the securing means comprises a slot and protrusion arrangement.
7. The bracket of claim 6, wherein either the slots or the protrusions in the slot and protrusion arrangement are formed at various angles relative to a plane in which the base portion lies.

8. A method of mounting an imaging device to a vehicle, the method comprising:

mounting the imaging device to a bracket having an engaging slot;

engaging an edge of an opening in the vehicle with the engaging slot of the bracket;

pivoting the bracket about the edge of the opening until a base portion of the bracket is flush with a portion of the vehicle; and

securing the bracket to the vehicle.