United States Patent	12391181
Kind Code	B2
Date of Patent	August 19, 2025
Inventor(s)	Scott-Collins; Callum et al.

Base assembly with camera, cleaning system, base frame and base cover, rear view device, vehicle and assembling and dis-assembling method

Abstract

The present disclosure refers to a base assembly of an exterior rear view device. The base assembly is configured to be mounted to a vehicle in a way that moveably supports a head assembly of the exterior rearview device. The base assembly comprises: a camera with a lens, a cleaning system with a nozzle for dispensing cleaning fluid onto the lens, a base frame, a base cover that comprises a plurality of cover pieces, and a camera cradle. The cover pieces provide a first opening for the lens and a second opening for the nozzle. The camera cradle is mounted to the base frame for holding both the camera and the nozzle.

Inventors: **Scott-Collins; Callum (Portchester, GB), Spychala; Jakub (Portchester, GB), Connor; Kane (Portchester, GB), Rehill; Graham (Portchester, GB), Lettis; Andrew (Portchester, GB), Herrmann; Andreas (Stuttgart, DE), Schmierer; Arne (Stuttgart, DE), Field; Simon David (Lonsdale, AU), Charlet; Francis (Dammarie les Lys, FR), Horne; Steve (Portchester, GB)**

Applicant: **Motherson Innovations Company Limited** (London, GB)

Family ID: **1000008768259**

Assignee: **Motherson Innovations Company Limited (London, GB)**

Appl. No.: **17/939247**

Filed: **September 07, 2022**

Prior Publication Data

Document Identifier	Publication Date
US 20230017426 A1	Jan. 19, 2023

Foreign Application Priority Data

DE	102021107597.1	Mar. 25, 2021

Related U.S. Application Data

continuation-in-part parent-doc WO PCT/EP2022/057697 20220323 PENDING child-doc US 17939247

Publication Classification

Int. Cl.: **B60R1/12** (20060101); **B60J10/78** (20160101); **B60Q1/34** (20060101); **B60R1/06** (20060101); **B60R1/074** (20060101); **B60R1/20** (20220101); **B60R11/00** (20060101); **B60R11/04** (20060101); **B60R16/03** (20060101); **B60S1/08** (20060101); **B60S1/52** (20060101); **B60S1/56** (20060101); **G03B11/04** (20210101); **H04N23/51** (20230101); **H04N23/52** (20230101); **H04N23/54** (20230101); **H04N23/57** (20230101); **H04N23/90** (20230101)

U.S. Cl.:

CPC **B60R1/12** (20130101); **B60R1/06** (20130101); **B60R1/074** (20130101); **B60R1/1207** (20130101); **B60R1/20** (20220101); **B60R11/04** (20130101); **B60R16/03** (20130101); **B60S1/0848** (20130101); **B60S1/52** (20130101); **B60S1/56** (20130101); **G03B11/045** (20130101); **H04N23/51** (20230101); **H04N23/52** (20230101); **H04N23/54** (20230101); **H04N23/57** (20230101); **H04N23/90** (20230101); B60J10/78 (20160201); B60Q1/34 (20130101); B60R1/0602 (20130101); B60R2001/1215 (20130101); B60R2001/1253 (20130101); B60R2011/004 (20130101)

Field of Classification Search

CPC: B60R (11/04); B60R (1/12); B60R (1/06); B60R (1/0602); B60R (1/074); B60R (1/1207); B60R (1/20); B60R (16/03); B60R (2001/1215); B60R (2001/1253); B60R (2011/004); B60S (1/02); B60S (1/52); B60S (1/56); B60S (1/0848); G03B (11/045); G03B (17/02); G03B (30/00); G03B (2217/00); G03B (2217/002); H04N (23/50); H04N (23/51); H04N (23/52); H04N (23/54); H04N (23/57); H04N (23/90); B60J (10/78); B60Q (1/34)

References Cited

U.S. PATENT DOCUMENTS

Patent No.	Issued Date	Patentee Name	U.S. Cl.	CPC
10899278	12/2020	Ichimura et al.	N/A	N/A
2017/0253184	12/2016	Nishimoto et al.	N/A	N/A
2019/0068845	12/2018	Krishnan et al.	N/A	N/A
2021/0094474	12/2020	Vetter	N/A	B60S 1/528
2022/0176880	12/2021	Lettis	N/A	H04N 23/50
2022/0191369	12/2021	Ito et al.	N/A	N/A

FOREIGN PATENT DOCUMENTS

Patent No.	Application Date	Country	CPC
3798715	12/2020	EP	N/A
2019/086544	12/2018	WO	N/A

OTHER PUBLICATIONS

UK Intellectual Property Office, Appl. GB2303781.5, Examination Report, Sep. 15, 2023. cited by applicant
European Patent Office; Appl. 23195587.3; Extended European Search Report; Feb. 12, 2024. cited by applicant

---

Primary Examiner: Haskins; Twyler L

Assistant Examiner: Trehan; Akshay

Attorney, Agent or Firm: Jones Day

Background/Summary

CROSS-REFERENCE TO RELATED APPLICATION (1) This application is a continuation-in-part of international application PCT/EP2022/057697 filed on Mar. 23, 2022, which claims priority to German patent application DE 10 2021 107 597.1, filed on Mar. 25, 2021, the entirety of which are incorporated herein by reference.

TECHNICAL FIELD
(1) The present disclosure refers to a base cover of a base assembly of an exterior rear view device to be mounted to a vehicle, a rear view device with a head assembly and a base assembly comprising such a base cover, a vehicle with such a rear view device and a method for assembling as well as dis-assembling such a rear view device.
BACKGROUND
(2) A rear view device typically includes a base assembly to be attached to a vehicle and a head assembly to be moveable relative to the base assembly. Generally the head assembly of a rear view device can be rotated between a driving position and a parking position.
(3) The term “rear view” may refer to a view of the surrounding area, which is not in the field of view of a driver of a vehicle, i.e. the directions opposing, left, right, below and above of the viewing direction, but can also comprise the view in the direction of the viewing direction of the driver and/or any combinations of the directions. The rear view can be achieved via at least one rear view element in form of a reflective element like a mirror and/or an image acquisition means like a camera. The rear view, that is the field of view of the driver, can be adjusted by moving, in particular rotating, the reflective element and/or the image acquisition means. This in turn can be realized by moving the complete head assembly together with the reflective element and/or the image acquisition means such that the head assembly of the rear view device can be rotated also between a plurality of viewing position.
(4) For moving the head assembly, the reflective element and/or the image acquisition means an actuator assembly is comprised by the rear view device, which can be controlled by a first control unit within the vehicle. Also the image acquisition means can be controlled via a second control unit, wherein both control units may be formed together. However, for the purpose of controlling data have to be transferred between the rear view device and the control unit within the vehicle requiring a harness.
(5) For facilitating moving the head assembly together with the reflective element and/or the image acquisition means specific pivot joint systems have been developed, see WO 2018/215599 A1, as well as specific actuator assemblies, see WO 2019/002627 A1.
(6) The structure of the base assembly of an exterior rear view device is important as it provides

means for connecting the device to a vehicle. US 2020/0001791 A1 refers to a base assembly of an exterior rear view device, comprising a base frame; and a base cover housing the base frame and formed in at least two parts connected to each other, wherein the base assembly comprises a first opening at a first end of the base assembly at which the base frame is configured to be attached to a vehicle and a second opening at a second end of the base assembly at which a head assembly of the exterior rear view device is configured to be attached to the base frame, wherein at least one of a first sealing means at the first opening is provided comprising a two-component gasket with a hard component and a soft component, the hard component comprising: at least one first connection element configured to engage at least one first connection element of a first cover part; and at least one first connection element of a second cover part configured to provide a locking connection between the first cover part and the second cover part, and/or a second sealing means at the second opening is comprising a two-component gasket with a hard component and a soft component, the hard component comprising: at least one second connection element configured to engage at least one second connection element of the first cover part; and at least one second connection element of the second cover part to provide a locking connection between the first cover part and the second cover part.

(7) The base frame fulfills a multitude of functions, in particular that of supporting the head assembly and connecting the same as well as electronic components of the exterior rear view device to the vehicle and a central control unit within the vehicle, respectively, with the latter attachment requiring a harness to be safely guided and sealed, electrically as well as with respect to moisture. As the base frame is made of metal, often aluminum, fulfilling said functions is a challenge.

(8) The base frame is covered by one or more pieces to achieve a pleasing appearance and to adapt the exterior rear view device to the vehicle design. Further, the cover pieces have to fulfill technical functions, like water drainage and the like.

(9) DE 10 2018 116 008 A1 discloses a base assembly of an exterior rear view device, comprising a base frame; and a base cover housing the base frame and formed in at least two parts connected to each other, wherein the base assembly comprises a first opening at a first end of the base assembly at which the base frame is configured to be attached to a vehicle and a second opening at a second end of the base assembly at which a head assembly of the exterior rear view device is configured to be attached to the base frame, wherein at least one of a first sealing means at the first opening is provided comprising a two-component gasket with a hard component and a soft component, the hard component comprising: at least one first connection element configured to engage at least one first connection element of a first cover part; and at least one first connection element of a second cover part configured to provide a locking connection between the first cover part and the second cover part, and/or a second sealing means at the second opening is comprising a two-component gasket with a hard component and a soft component, the hard component comprising: at least one second connection element configured to engage at least one second connection element of the first cover part; and at least one second connection element of the second cover part to provide a locking connection between the first cover part and the second cover part.

(10) US 2015/0224930 A1 relates to an exterior rearview mirror assembly configured for mounting at an exterior portion of a vehicle, said exterior rearview mirror assembly comprising: a mounting arm configured for attachment at an exterior portion of a vehicle equipped with said exterior rearview mirror assembly; a mirror head attached at said mounting arm; an attaching element attached at a mirror reflective element; a shroud extending from said attaching element and partially received in said mirror head; a mirror actuator operable to adjust said attaching element and said mirror reflective element relative to said mirror head, wherein said mirror actuator adjusts said mirror reflective element, said attaching element and said shroud in tandem relative to said mirror head; and wherein said mirror reflective element is disposed outside of said mirror head and said shroud spans a gap between said mirror reflective element and said mirror head to

substantially encase said attaching element.
(11) US 2017/0253184 A1 discloses a vehicle side-view mirror comprising: a mirror base, which is fixed to a vehicle body; and a mirror head, which includes a mirror surface, is attached to the mirror base to be rotatable about an axis vertically extending with respect to the mirror base, and is switchable between a folded position and an operative position, wherein a gap is formed between the mirror base and the mirror head, a sleeve, which protrudes upward, is formed on the mirror base, an opening, into which the sleeve is inserted, is formed in a bottom of the mirror head, the sleeve has an outer peripheral surface on which a first outer peripheral surface and a second outer peripheral surface, which is located further in an inward radial direction of the sleeve than the first outer peripheral surface, are formed in a circumferential direction, the second outer peripheral surface is formed so as to extend smoothly in the circumferential direction of the sleeve, and a passage, which guides wind entering the gap into the mirror head, is formed between the second outer peripheral surface and an inner peripheral surface of the opening.

SUMMARY OF THE DISCLOSURE

(12) It is the object of the present disclosure to provide a base cover of a base assembly of an exterior rear view device to be mounted to a vehicle fulfilling esthetic as well as technical functions.
(13) This object is achieved according to a first aspect of the present disclosure by a base cover of a base assembly of an exterior rear view device to be mounted to a vehicle and to moveably support a head assembly, comprising three cover pieces designed to releasably mantle the base frame via clip, snap and/or latch connections, in particular without screw connections.
(14) Embodiments of the base cover can be further defined in that the three cover pieces comprise a lower base cover, a base cover cap and an upper base cover and/or are made from plastic, and/or the three cover pieces isolate the base frame being made from a metal; and/or the three cover pieces cover an arm of the base frame from a door attachment portion to a head attachment portion of the base frame, and/or the three cover pieces are connected by clip, snap and/or latch connections, with said connections preferably being provided between the three cover pieces, or the three cover pieces and a sealing means adapted to be arranged between the door and the base frame, or the three cover pieces and the base frame, or the three cover pieces, the sealing means and the base frame to provide the base assembly.
(15) Other embodiments characterized in that the lower base cover is provided with an opening for a camera attached to the base frame, in particular via a camera cradle, and/or a drain hole, and/or the lower base cover is provided with one or more first attachment means, in particular five clips and a multi-functional assembly projection, for attachment to the base frame; and/or the lower base cover is provided with one or more second attachment means, in particular comprising three hooks, for attachment to the sealing means, in particular a door gasket substrate of the sealing means; and/or the lower base cover has an edge to engage the sealing means, in particular a door seal gasket of the sealing means and/or for an outer sealing; and/or the lower base cover is provided with one or more third attachment means for attachment to the base cover cap, in particular comprising the multi-functional assembly projection and openings, and/or the lower base cover is provided with one or more fourth attachment means for attachment to the upper base cover, in particular comprising a pocket and openings.
(16) Further, the base cover cap may be provided with an opening for a camera attached to the base frame, in particular via a camera cradle; and/or the base cover cap may be provided with one or more fifth attachment means for attachment to the lower base cover, in particular comprising peg like projections and a tab; and/or the base cover cap may be provided with one or more sixth attachment means for attachment to the upper base cover, in particular comprising peg like projections, a slot and two clips, preferably in form of two leaf spring clips adapted to rest on the base frame at the root and end, allowing the middle portion there between to flex downwards; and/or the base cover cap is provided with one or more seventh attachment means for attachment to

the base frame, in particular comprising at least one clip.
(17) Still further, embodiments may be defined in that the upper base cover is provided with an opening for a camera attached to the base frame, in particular via a camera cradle; and/or the upper base cover is provided with one or more eighth attachment means for attachment to the lower base cover, in particular comprising location pegs and/or at least one clip; the base cover cap is provided with one or more ninth attachment means for attachment to with the base cover cap, in particular comprising clip retention extensions and at least one alignment projection, and/or the upper base cover is provided with one or more tenth attachment means, in particular a hoop clip, for engagement with the sealing element, in particular a projection of the door gasket substrate.
(18) Embodiments may also be characterized by a glare shield surrounding a lens of a camera, in particular the lens extending through the opening of the base cover cap, and providing an opening through which the camera can obtain images, wherein preferably the glare shield is configured to be releasably attached to at least one of the three cover pieces and/or a camera cradle of the camera via at least one the via clip, snap and/or latch connection.
(19) It may be that the glare shield is provided with at least one clip, wherein preferably the at least one clip of the glare shield is configured to at least one of engaging the base cover cap or at least one extension or lug of the base cover cap and being supported by the camera cradle or at last one retention tab of the camera cradle.
(20) According to a second aspect of the present disclosure, an exterior rearview device is provided, which comprises a base assembly with a base frame to be attached to a vehicle, a head assembly for supporting at least one reflective element, display element and/or camera, with the head assembly being attached to the base assembly in a moveable manner, and a sealing means adapted to be installed between the base assembly and a door of the vehicle, wherein the base frame is mantled with a base cover according to the present disclosure.
(21) Said exterior rear view device may further comprise at least one camera, preferably positioned in a non-moving area of the moveable head assembly or in the base assembly, in particular attached to the base frame and/or viewing through an opening provided by one of three cover pieces, and/or a camera cradle which is configured to be attached to the base frame, in particular by a friction fit and without any separable attachment element, with the camera cradle preferably being a plastic unit for isolating the camera from the base frame; and/or a retainer means between the base frame and the sealing means, with the retainer means preferably being a plastic unit for sealing and guiding harness.
(22) According to embodiments the exterior rear view device may comprise an articulation assembly for moving the head assembly relative to the base assembly, and/or at least one functional device, comprising a light module, a turn signal indicator module, a blind spot indicator module, or a human machine interface, a Bluetooth module, a sensor module, a temperature sensor, a touch sensor or a contamination sensor, and a cleaning device for cleaning the lens, in particular comprising at least one fluid port or nozzle, and/or a control unit, in particular adapted for controlling at least one of the display element, the articulation assembly and the functional device.
(23) It may be that the display element is configured to be at least one of viewable through the reflective element when activated and activated by at least one of a driver of the vehicle, depending on an output signal of the sensor module, via a vehicle control system and/or via the control unit.
(24) According to a third aspect of the present disclosure a vehicle with the door having a door panel and supporting a window as well as a cheater channel sealed by glass run seal is provided, wherein the door panel also supports the exterior rear view device of the present disclosure.
(25) It is proposed that the glass run seal is arranged within a channel provided by the base frame with the retainer means and the sealing means; and/or a lip of the glass run seal engages the cheater panel and the upper base cover; and/or the glass run seal is at least partly covered by a waist finisher such that the base assembly extends from the waist finisher.
(26) According to a fourth aspect of the present disclosure the same provides a method for

assembling the base cover of the present disclosure, wherein the base cover cap, the lower base cover and the base cover cap are connected by snap, clips and/or latch connections to each other and the base frame, without screws, and the assembly of the base cover cap, the lower base cover and the upper base cover on the base frame is secured by engaging the sealing means.

(27) Said assembling method may further comprise the following steps: comprising the following steps attaching the lower base cover to the sealing means and the base frame, wherein preferably an edge of the lower base cover is brought into engagement with the door gasket seal such that the lower base cover can be rotated until it connects with the base frame and its opening is arranged to allow the camera to view out of the cover, with in particular the hooks the lower base cover being rotated into hook pockets and/or between ribs provided by the door gasket substrate.

(28) Further, it may be that the assembling method may comprise the following step: attaching the base cover cap to the lower base cover, wherein preferably the base cover cap is attached at one end to the lower base cover for creating a rotation point to rotate the base cover cap into its final position with attachment also at its other end, with in particular the tab at the end of the base cover cap, which faces the door attachment portion of the base frame, being entered into the opening of the lower base cover for defining the attachment direction and locks in behind the lower base cover for creating a rotation point, and/or with in particular the base cover cap being forced to flex outboard while being rotated into its final position, and/or with in particular the peg type projection at the end of the base cover cap, which faces the head attachment portion of the base frame, being entered into a first slot in the multi-functional assembly projection of the lower base cover and another peg type projection of the base cover cap being entered into another slot in the multi-functional assembly projection of the lower base cover as well as flexes back into the opening of the lower base cover for controlling the final fit of the base cover cap.

(29) Still further, said assembling method may comprise the following steps: attaching the upper base cover to the base cover cap and the lower base cover, wherein preferably the attachment of the upper base cover is assisted by the base cover cap being assembled to the base frame by providing a ramp guiding a rotational movement of the upper base cover with in particular the upper base cover being attached at one end to the lower base cover and the base cover cap for creating a rotation point to rotate upper base cover into its final position with attachment also at its other end, and/or with in particular the two location pegs at the end of the upper base cover, which faces the head attachment portion of the base frame, being fitted into two corresponding slots, one being provided by the opening in lower base cover and the other by the slot being formed in the projection of the base cover cap, and/or with in particular the outermost location peg pulling the base cover cap into its final position and defining a rotation axis; and/or with in particular rotating the upper base cover until the four location projections position the upper base cover on the lower base cover, and/or with in particular the ramp is provided by the two clips next to the end of the upper base cover, which faces the head attachment portion of the base frame, by said two clips resting on the base frame at their roots and ends, allowing the middle portions to flex downwards, and/or with in particular the projections align the upper base cover and lead the clip retention extensions onto the corresponding clips of the base cover cap, and/or with in particular the clip at the end of the upper base cover, which faces the door attachment portion of the base frame, being entered into the pocket in the lower base cover, and/or with in particular the hoop clip at the end of the upper base cover, which faces the door attachment portion of the base frame, engaging with the projection of the door gasket substrate.

(30) According to an embodiment, the following step may be comprised: connecting the glare shield for the camera, preferably by pushing the same between the base cover cap and the cradle of said camera, with in particular pushing the at least one clip in engagement with the at least one extension or lug of the base cover cap and the at last one retention tab of the camera cradle, and/or with in particular the connecting step of the glare shield being the last step of assembling the base cover.

(31) According to a fifth aspect of the present disclosure the same provides a method for dis-assembling the base cover of the present disclosure, in particular after assembling the base cover with a method of the present disclosure, wherein the base cover cap, the lower base cover and the base cover cap are dis-mantled with a single tool by dis-lodging the snap, clips and/or latch connections and/or with the base frame being mounted to the vehicle.
(32) The dis-assembling method can be further defined in that the tool is a metal piece, preferably made out of aluminum, and/or the tool has a maximum diameter of 4 mm, preferably is in form of a cylinder or pin; and/or the tool locks the mirror head assembly in a knock forward position to gain access to a camera connector and/or the camera when the base cover cap, the lower base cover and the base cover cap have been dis-mantled from the base frame; and/or the tool dis-engages at least one of the snap, clips and/or latch connections.
(33) In addition, said dis-assembling method may comprise the following steps, when the base cover has been assembled with the method of the present disclosure: accessing the hoop clip of the upper base cover through a slot in door panel to loosen the engagement with the projection of the door gasket substrate, and/or passing through the drain hole of the lower base cover to loosen the engagement of the clip of the upper base cover with the pocket of the lower base cover, and/or removing the upper base cover by pulling its clip retention extensions out of the two clips of the base cover cap, and/or dis-mounting the base cover cap by dis-engaging its clip from the location projection of the base frame, preferably by using the tool, and its peg projections from the multi-functional assembly projection of the lower base cover, preferably by pushing them out of position, such that the base cover cap can rotate out, and/or dis-engaging the five clips of the lower base cover from the base frame such that the lower base cover can be removed.
(34) The dis-assembling method can also comprise the following step: locking the mirror head assembly in the knock forward position by inserting the tool into a recess or hole of the base frame to access a mechanical stop of a case frame of the head assembly from the bottom of the base assembly; wherein preferably all parts the tool interfaces with are made from aluminum.
(35) According to an embodiment, the following step may be comprised: the glare shield is dis-mantled, preferably with the tool, by dis-lodging the snap, clips and/or latch connections, with in particular the dis-mantling of the glare shield being the first dis-mantling step.

Description

BRIEF DESCRIPTION OF THE DRAWINGS
(1) The foregoing summary, as well as the following detailed description, will be better understood when read in conjunction with the appended drawings. For the purpose of illustration, certain examples of the present disclosure are shown in the drawings. It should be understood, however, that the present disclosure is not limited to the precise arrangements and instrumentalities shown. The accompanying drawings, which are incorporated in and constitute a part of this specification, illustrate an implementation of system, apparatuses, and methods consistent with the present disclosure and, together with the detailed description, serve to explain advantages and principles consistent with the present disclosure, wherein:
(2) FIG. **1***a* is a perspective view of a lower base cover of a base assembly of a first exterior rear view device of the present disclosure;
(3) FIG. **1***b* is a perspective view of a base frame to which the lower base cover of FIG. **1***a* is to be attached;
(4) FIG. **1***c* is a perspective view of a sealing means, to be attached to both the lower base cover of FIG. **1***a* and the base frame of FIG. **1***b;*
(5) FIG. **1***d* is a part view of the sealing means of FIG. **1***c;*
(6) FIG. **1***e* is a perspective part view of a connection between the sealing means of FIG. **1***c* with

the base frame of FIG. **1***b;*
(7) FIG. **1***f* is a perspective part view of a connection of the lower base cover of FIG. **1***a* to the sealing means of FIG. **1***c;*
(8) FIG. **2***a* is a perspective view of a part of the base frame of FIG. **1***b* as well as a retainer means of a retainer assembly to be interposed between the base assembly and a vehicle (not shown);
(9) FIG. **2***b* is a perspective view of the retainer means of FIG. **2***a* attached to the base frame of FIG. **2***a;*
(10) FIG. **2***c* is a cross-section of the retainer means and the base frame of FIG. **2***b* along line A-A;
(11) FIG. **2***d* is a perspective view of the lower end of the base frame in FIG. **2***a* from the opposite side compared to FIG. **2***a;*
(12) FIG. **2***e* is a perspective view of the lower end of the base frame in FIG. **2***a* from the same side as FIG. **2***a;*
(13) FIG. **3***a* is a perspective view of a part of the base frame of FIG. **2***a;*
(14) FIG. **3***b* is a perspective view of the retainer means of FIG. **2***a;*
(15) FIG. **3***c* is a perspective view of retainer means of FIG. **3***b* attached to the base frame of FIG. **3***a;*
(16) FIG. **3***d* is a perspective view on the retainer means and the base frame attached to a vehicle, from the side of a door panel;
(17) FIGS. **4***a* to **4***f* are perspective views demonstrating the assembly of the base frame with the retainer means firstly to a lower case of a head assembly of an exterior rear view device of the present disclosure and secondly to the sealing means of FIG. **1***c;*
(18) FIGS. **5***a* to **5***c* are perspective views demonstrating attachment features of the sealing means of FIG. **1***c;*
(19) FIGS. **6***a* to **6***c* are perspective views demonstrating the attachment of the lower base cover of FIG. **1***a* to the base frame shown in FIG. **1***b* to which in particular the retainer assembly of FIG. **5***a* is attached;
(20) FIG. **6***d* is another view of the sub-assembly of FIG. **6***c*, attached to the door;
(21) FIG. **6***e* is a cross-section taken along the line A-A of FIG. **6***d;*
(22) FIG. **7***a* is a top view on the sub-assembly of FIG. **6***c;*
(23) FIG. **7***b* is a cross-section of the sub-assembly of FIG. **7***a* taken along the line A-A;
(24) FIG. **7***c* is a cross-section of the sub-assembly of FIG. **7***a* taken along the line B-B;
(25) FIG. **8***a* is a perspective view of a camera cradle assembled in the base frame of FIG. **1***b;*
(26) FIG. **8***b* is a cross-sectional view of the camera cradle as assembled in the base frame along the cross sectional line A-A shown in FIG. **8***a;*
(27) FIG. **8***c* is a perspective view of the camera cradle of FIGS. **8***a* and **8***b;*
(28) FIG. **9***a* is a perspective view of the sub-assembly of FIG. **7***a* attached to the vehicle;
(29) FIG. **9***b* is a perspective view of an exterior rear view device of the present disclosure and attached to a vehicle of the present disclosure;
(30) FIGS. **10***a* and **10***b* are perspective views demonstrating the assembly of a base cover cap to the sub-assembly shown in FIG. **7***a;*
(31) FIGS. **11***a* to **11***e* are perspective part views of the lower base cover of FIG. **1***a*, the base cover cap shown in FIGS. **10***a* and **10***b* and an upper base cover, demonstrating the attachment of those 3 cover pieces to each other;
(32) FIGS. **12***a* to **12***f* are perspective views demonstrating the assembly of a glass run seal, a cheater panel, the base frame, an base cap and the upper base cover with respect to the door panel and a window;
(33) FIG. **13***a* is a perspective view of the upper base cover of FIG. **12***e*; and
(34) FIGS. **13***b* to **13***i* are perspective views demonstrating the attachment of the upper base cover of FIG. **13***a* with the lower base cover of FIG. **1***a* as well as the base cover cap of FIGS. **10***a* and **10***b;*

(35) FIG. **14***a* is a perspective view of the base assembly, without the upper base cover;
(36) FIG. **14***b* is a perspective view demonstrating the attachment of the upper base cover, without the base frame;
(37) FIG. **14***c* is a cross-sectional view along the line A-A of FIG. **14***a*, with attached upper base cover;
(38) FIGS. **15***a* to **15***f* are perspective views demonstrating the dis-assembly of the 3 cover pieces for the camera repair;
(39) FIGS. **16***a* to **16***l* are perspective views demonstrating details of the dis-assembly of all 3 cover pieces;
(40) FIGS. **17***a* to **17***c* are perspective views demonstrating locking the head assembly during dis-assembly of the camera as shown in FIGS. **15***d* and **15***f;*
(41) FIG. **18***a* is a perspective view of a second exterior rear view device of the present disclosure, for carrying a mirror glass, which is at least partly translucent, and a display, and having a further camera arranged within the base assembly;
(42) FIG. **18***b* is a cross-sectional view of the rearview device of FIG. **18***a;*
(43) FIG. **18***c* is a perspective view of the external end of the base assembly of the rearview device of FIG. **18***a*, prior to attachment of a glare shield;
(44) FIG. **18***d* is a perspective view of the external end of the base assembly of the rearview device of FIG. **18***a*, with the attached glare shield;
(45) FIG. **18***e* is a cross-sectional view along the line AA shown in FIG. **18***d*; and
(46) FIG. **19***a* is a perspective view of a base assembly of a third exterior rear view device of the present disclosure.
(47) FIG. **19***b* is another perspective view of a base assembly of a third exterior rear view device of the present disclosure.
(48) FIGS. **19***c* and **19***d* are cross sectional views of the rear view device of FIGS. **19***a* and **19***b*.
DETAILED DESCRIPTION
(49) FIGS. **1***a* to **1***f* show a base cover lower or lower base cover **170** and a base frame **110** of a base assembly **100** of a first exterior rear view device **1** of the present disclosure, The exterior rear view device **1** is adapted to be mounted to a vehicle **2** as shown in particular in FIG. **9***b*. Further, FIGS. **1***c* and **1***d* show a sealing means **800**. The sealing means **800** is to be attached to both, the lower base cover **170** and the base frame **110** and to be arranged between the base assembly **100** and the vehicle **2**. Before describing the attachment of the lower base cover **170**, the base frame **110** and sealing means **800** to each other, the structural features of each one of these three elements is described.
(50) The lower base cover **170** of FIG. **1***a* is a single plastic piece with a multi-functional assembly projection **171**, several hooks **172** to **174**, several clips **175** to **179**, a pocket **160**, several openings **161**, **162**, **164** and **165** and a wall **163**. Further, the lower base cover **170** provides an opening **702** for a camera **700**, see FIG. **6***b*, and a drain hole **166**.
(51) The base frame **110** of FIG. **1***b* is provided in form of an aluminum unit with a plurality of clips **102** to **107** and three hook apertures **108**, **109** and **118**. The unit can be divided into three portions, i.e. a door attachment portion **115**, an arm **116** and a head attachment portion **117**, with the door attachment portion **115** running substantially parallelly to a door **600** of the vehicle **1** shown in FIGS. **9***a* and **9***b*, whereas the arm **116** extends substantially perpendicularly away from the door attachment portion **115** and the head attachment portion **117** is provided at the end of the arm **116** opposite the one merging with the door attachment portion **115**. In the head attachment portion **117** a hole **111** for a tool (not shown) used when dis-assembling cover pieces of the base frame **110**. But first, the assembly of said cover pieces is described.
(52) The sealing means **800** of FIG. **1***c* is provided in form of a 2K door gasket with a door gasket seal **802** and a door gasket substrate **804**. The door gasket substrate **804** is formed with several clips **840** (only one being shown in FIG. **1***c*), two hook pockets **860** and **862**, two location ribs **870** and

872 and one attachment projection **866** discussed in detail below.
(53) FIGS. **1***d* and **1***e* demonstrate the attachment of the lower base cover **170** of FIG. **1***a*, being one of three cover pieces of the base frame **110**, to the base frame **110** shown in FIG. **1***b*. The combination of the base frame **110**, the sealing means **800** and the lower base cover **170** is shown in FIG. **1***f* providing a locking system without the need of screws and accommodating a location as well as assembly method.
(54) The lower base cover assembly method allows a secure mounting of the components without using screws, as the lower base cover **170** is provided with the three hooks **172** to **174**, the five clips **175** to **179** and the multi-functional assembly projection **171**, the base frame **110** is provided with the two hook apertures **108** and **109**, the 5 clips **103** to **107** and a recess or an aperture **118** for the multi-functional assembly projection **171**, and the sealing means **800** is provided with the two hook pockets **860** and **862** and two hook ribs **870** and **871**.
(55) In detail, the hook pockets **860** and **862**, provided by the door gasket substrate **804** and shown in region A in FIG. **1** *d*, are door gasket location features with multiple functions. They provide location and positional control whilst assembling the sealing means **800** to the base frame **110**, with the hook pockets **860** and **862** of the sealing means **800** passing through the hook apertures **108** and **109** of the base frame **110** as soon as the sealing means **800** is attached to the base frame **110**, see FIG. **1***e*. Along with the two ribs **870** and **872**, shown in region B in FIG. **1***d*, the hook pockets **860** and **862** are used to assemble the lower base cover **170**. As shown in FIG. **1***f*, the hooks **173** and **174** of the lower base cover **170** are engaged within the hook pockets **860** and **862** of the sealing means **800**. Further the third hook **172** of the lower base cover **170** is located between the two ribs **870** and **872** of the sealing means **800**. Thus, the hook pockets **860** and **862** and the ribs **870** and **872** of the sealing means **800** lock and locate the door gasket seal in all X+Y+Z directions. Critically the Z direction is locked which allows an accurate positional location for the sealing strategy.
(56) Before further describing said sealing strategy, the assembly of the base frame **110** with a retainer means **301** and to a door panel **605** is described with reference to FIGS. **2***a* to **3***d*.
(57) The retainer means **301**, best seen in FIGS. **2***b* and **3***b*, may be manufactured from a plastic material and it provides a retainer assembly **300**, together with the sealing means **800**, to be arranged between the base frame **110** of the base assembly **100** of the exterior rear view device **1** and the door panel **605** of the door **600** of the vehicle **2**.
(58) The FIGS. **2***a* to **2***e* also show a harness **400** for electrically connecting in particular a power source and a control unit within the vehicle (not shown) with electric components of the exterior rear view device. Such electric components may comprise, as e.g. shown in FIGS. **4***a* to **4***f*, an actuator assembly **210** suitable for moving a head assembly **200** together with a reflective element (not shown) relative to the base frame **110** supporting the head assembly **200**, and a camera **700** as well as an indicator means like a turn signal indicator **710** shown in particular in FIG. **9***b*. Said harness **400** may comprise a camera harness **410**.
(59) The retainer means **301** is a multi-function component. The different functions will be described with respect to the other components of the exterior rear view device **1** as well as the vehicle **2** in the following.
(60) An important function of the retainer means **301** is harness sealing, managing harness routing and accommodating variation in the camera harness **410** and cleaning systems (not shown), as described in the following.
(61) The door attachment portion **115** of the base frame **110** is provided with an opening **124** for a harness holder **500** at its lower, free end, as best seen in FIGS. **2***d* and **2***e*. Said harness holder **500** is formed with a fixing tie **510** for holding the harness **400** and a clip **520** for connecting the holder **500** to said door attachment portion **115** by passing through the opening **124**.
(62) The base frame harness locator opening feature governs harness position length the door side and the rear view device side, and provides a strong retention eliminating risk of the harness **400**

being misplaced e.g. by being pulled through during handling. Further, the locating feature leads to reduced tolerance of fit-to-door. In other words, the harness **400** is firmly located to the base frame **110** in all directions allowing a solid datum strategy for harness lengths and provides the ability to hold as well as transport the exterior rear view device **1** whilst holding on to the harness **400**.
(63) The harness **400** as well as the camera harness **410** divided therefrom above the harness holder **500** extend between the door attachment portion **115** of the base frame **110** and a holding portion **320** of the retainer means **301** to an upper end of the door attachment portion **115**, which turns into the arm **116** of the base frame **110**.
(64) The retainer means **301** is provided with guiding means for guiding the camera harness **410** to a sealing portion **310** of the retainer means **301** extending substantially perpendicularly to the holding portion **320** to cover the camera harness **410** at its bending region at the transition between the door attachment portion **115** and the arm **116**, see region A in FIG. **2***b*.
(65) While the base frame **110** is provided with a harness guiding channel portion **140** for guiding the harness **400** and a camera harness guiding channel portion **123** for guiding the camera harness **410**, the holding portion **320** of the retainer means **301** also provides a camera harness guiding channel portion **340** to substantially close a channel **420** for the camera harness **410**, as shown in FIG. **2***c*.
(66) As the retainer means **301** is not metallic, the sealing of the harness **400**, together with the camera harness **410**, as well as the attachment of the metallic base frame **110** to the door panel **605** becomes safer. The design of the retainer means **301** allows to accommodate different sets of harness and cleaning system for all variations of mirror trim level. Further, the retainer means **301** ensures an easy assembly to seal in particular the camera harness **410** after being mounted and to manage its routing along the base frame door attachment portion **115**, without departing from the commonly used datum system between the base frame **110** and the door panel **605**.
(67) The base frame **110** is provided with a location pin **120** as well as a T shaped location projection **121** belonging to the datum system ensuring a correct assembly of the components of the exterior rear view device **1** and a correct attachment of the exterior rear view device **1** to the vehicle **2**. The location pin **120** and the T shaped location projection **121** extend substantially perpendicularly to the plane of the door panel **605**, as can be best seen in FIGS. **3***a* and **3***d*. The retainer means **301** is provided with an opening **322** for the location pin **120** and a hook **350** with openings **351** for the arms of T shaped location projection **121**, as can be best seen in FIG. **3***b*. FIG. **3***d* illustrates that the location pin **120** as well as the T shaped location projection **121** pass through the respective openings **322**, **351** of the retainer means **301** to also pass respective openings **610**, **620** within the door panel **605** to engage the same, with the hook **350** of the retainer means **301** ensuring the respective engagement.
(68) The base frame T shaped location projection **121** and the location pin **120** provide the primary and secondary datum strategy to the door datum system in X+Z directions, while the Y direction is controlled by using screws. The door panel **605** in FIG. **3***d* shows two screw openings **631** and **632** aligned to two screw openings **131** and **132** of the base frame **110**, respectively, which in turn pass openings **371** and **372** of the retainer means **301**.
(69) Thus, the corresponding locating features of the base frame **110** and the retainer means **301** allow the base frame datum features to interface with the door **600** minimizing tolerance of datum strategy.
(70) Further location projections **125** and **126** are provided by the door attachment portion **115**.
(71) The retainer means **301** along with the location pin **120** and the T shaped location projection **121** not only provides an accurate assembly to the door panel datum system, but also facilitates the assembly as it provides a robust 3rd hand clip/hanger function.
(72) The retainer means **301** provides a first clip **315**, which serves the attachment to the base frame **110** as best seen in FIGS. **2***a* and **2***b*. The hook **350** primarily serves to hold the exterior rear view device **1** in Y direction to assist assembly of the screws (not shown), while the second clip

360 is on secondary location keyway to highlight when the exterior rear view device **1** is in its final assembly Z position, as best seen in FIG. **3***d*.

(73) Next, the assembly of the base frame **110** and the retainer means **301** with a case lower or lower case **220** of the head assembly **200** of the exterior rear view device **1** and the sealing means **800** is described with reference to FIGS. **4***a* to **4***f*.

(74) The slim design of the base frame **110** allows the lower case **220** of the head assembly **200** to be assembled over the door attachment portion **115** and the arm **116** of the base frame **110** to reach the region of the head assembly **200** with the actuator assembly **210**, as shown in FIGS. **4***a* to **4***d*. In this respect it is to be noted that it is critical to assemble high gloss components like the lower case **220** late in the assembly sequence to minimize risk of damage. For that purpose the lower case **220** is provided with an opening **222**, preferably being substantially circular, through which the base frame **110** together with the retainer means **301** can pass.

(75) The sealing means **800** is mounted after the lower case **220**, as shown in FIGS. **4***e* and **4***f* The sealing means location strategy is critical as it dictates the datum strategy for the corresponding base cover components.

(76) As already mentioned above, the smaller base frame geometry and the provision of a separate 2K door gasket provided by the sealing means **800** permit the lower case **220** to be assembled over the base frame **110**. In the following the attachment of the sealing means **800** to the base frame **110** with the retainer means **301** is described with reference to FIGS. **5***a* to **5***c*.

(77) Clips **810**, **830** and **840** as well as clip opening **820** allow to attach the sealing means **800** to the base frame **110** which is provided with complementary steps **135** and **136** and openings **137** and **138**. The base frame **110** also is provided with the location projections **125** to **126**, with two of said location projections **125** and **125** extending through the retainer means **301** as well as the sealing means **800** attached on top of the retainer means **301**, see FIG. **5***a*.

(78) FIG. **5***b* also shows a clip **316** of the retainer means **301** engaging a respective opening **137** provided by the base frame **110**.

(79) The sealing means **800** provides a datum area **850** for an upper base cover **190** as described with respect to FIG. **13***i*, with T-slots **391**, **851** built into both the retainer means **301** and the sealing means **800**, see FIG. **5***c*, to maximize and gain strength from the base frame into the area for upper base cover assembly.

(80) Two screw positions determined by two screw openings **881** and **882** in the sealing means **800**, best seen in FIG. **5***a*, and the two screw openings **131** and **132** of the base frame **110** shown in FIG. **3***a*, allow to secure the sealing means **800** together with the retainer means **301** to the base frame **110**. These are package protections only if more strength is required.

(81) The assembly process of the lower base cover **170** to the sub-assembly of FIG. **4***f* is designed in such a way that the camera hole **702** in the lower base cover **170** avoids scratching or fowling the camera lens whilst rotating into final assembled condition, by first approaching the lower base cover **170** to the base frame **110** (FIG. **6***a*), then attaching the lower base cover **170** to the base frame **110** at the door attachments portion **115** (FIG. **6***b*), and finally rotating the lower base cover **170** on the arm **116** (FIG. **6***c*).

(82) The sub-assembly of the base frame **110**, the retainer means **301**, the sealing means **800** and the lower base cover **170** is shown in FIG. **6***d*, attached to the door panel **605**. FIG. **6***e* shows a cross-section taken along the line A-A in FIG. **6***d*. From FIG. **6***e* the functions of the sealing means **800** as a 2K door gasket, including an integrated 2-way simultaneous sealing function as well as providing datum, location and positional controls for matching the lower base cover **170**, can be best seen.

(83) In detail, the 2-way simultaneous sealing is achieved due to the more or less S shape cross-sectional geometry of the door gasket seal **802**, which may be a rubber part formed together with the door gasket substrate **802**, to allow sealing in three areas with only one cavity in a 2K tool. The three sealing areas are marked with I, II and III in FIG. **6***d:* sealing area I provides an inner sealing

to the base frame **110**, sealing area II provides an outer sealing to the lower base cover **170**, and sealing area III provides an outer sealing to the door panel **605**.
(84) The sealing means geometry between the exterior rear view device **1** and vehicle door **600** provides a tolerant and accurate sealing strategy when considering the assembly direction. The tolerance between door panel **605** and door datum system may be large as sealing lip of the door gasket seal **802** of the sealing means **800** accommodates for such variations
(85) The sub-assembly shown in FIG. **6***d* is also shown in FIG. **7***a*, whereas FIGS. **7***b* and **7***c* show details of the rotational attachment of the lower base cover **170**, referred to above with respect to FIGS. **6***a* to **6***c:* At the beginning, at the door attachments portion **115** in FIG. **7***b*, the edge of the lower base cover **170** engages the door gasket seal **802** such that the hook **173** can rotate into the hook pocket **862** provided by the door gasket substrate **804**, and at the end, at the head attachments portion **117** in FIG. **7***c*, the camera hole **702** is embracing the camera **700**.
(86) The rotational attachment of the lower base cover **170** ensures that the camera, in particular its lens, remains untouched by the lower base cover **170**.
(87) FIGS. **8***a* to **8***c* illustrate a camera cradle **704** for assembling in the base frame **110** for holding the camera **700** securely within the base assembly **100** of the exterior rear view device **1**. Thus, the camera **700** is installed in the base frame **110** using the camera cradle **704**, as shown in FIG. **8***a*. The camera cradle **704** is symmetrical along at least one axis and no screws are needed to attach the camera cradle **704** to the base frame **110**. Further the body of the camera **700** is protected from contacting the metallic base frame **110** as the camera cradle **740** is made out of a plastic material in order to isolate the camera housing. The camera cradle **704** as shown in FIG. **8***c* is a one-piece element which is preferably formed by a molding process.
(88) The camera cradle **704** include one or more location ribs **742** inside the interior surface of the cradle **704** which hold the camera **700** securely in place to provide an accurate and tuneable positioning of the camera along the X, Y, and Z axes. In the example shown in FIG. **8***c*, the location ribs **742** include six ribs formed as two pairs of ribs on three interior walls of the camera cradle **704**; however, any number of ribs **742** may be used.
(89) It can be seen in FIGS. **8***b* and **8***c* that the camera cradle **704** also includes one or more anti-backout projections **746** and one or more clips **744**. The anti-backout projections **746** are frictionally fit into the walls of the base frame **110** when the cradle **740** is inserted. When the walls of the base frame **110** push against the projections **746** and the cradle **704** is inserted, this also “locks” the clips **744** to tighten the attachment of the camera **700** to the camera cradle **704**.
(90) In the shown example, there are two anti-backout projections **746** and two clips **744** which are formed closer to a bottom edge of the cradle **704**, i.e. the edge of the cradle **704** closer to the camera lens. However, any number of anti-backout projections **746** and clips **744** may be used in a variety of different positions. This ensures a tight lock of the camera **700** and stops the camera body from contacting the base frame **110**.
(91) The sub-assembly of FIG. **6***c* is also shown in FIG. **9***a*, but mounted to the vehicle **2** and with the completed head assembly **200** attached, as well as from another perspective. FIG. **9***a* shows further details of the vehicle **2** in the region of the door **600**, namely a cheater panel **640** as well as a window **1000**, with a glass run seal **920** as well as a waist finisher **940**. In FIG. **9***b* the final rear view device **1** attached to the vehicle **2** can be seen. Accordingly, the exterior rear view device **1** holds the glass run seal **920** in a solid position and, thereby, provides a very pleasing overall appearance suggesting that the exterior rear view device **1** extends or rather grows out of the waist finisher **940** covering a part of the glass run seal **920**.
(92) In the following it is described how to finalize the exterior rear view device **1**. Next, starting from the sub-assembly of FIG. **7***a*, the assembly of a base cover cap **180**, being another one of the three cover pieces of the base frame **110** and being formed with projections **150**, **153** and clips **184**, **185** and **186** is described with respect to FIGS. **10***a* and **10***b*. Said assembly process of the base cover cap **180** is designed in such a way that the base cover cap **180** slides in along a ramp on the

lower base cover **170** to lock in behind the base cover cap **180** creating a rotation point to rotate the base cover cap **180** into its final position.
(93) Said sliding will be discussed in further detail with respect to FIGS. **14***a* to **14***c*. But next, in order to better understand the assembly of the base cover cap **180** as part of the base cover, FIGS. **11***a* to **11***e* illustrate its attachment step by step, by starting in FIG. **11***a* with a part view of the sub-assembly of FIG. **7***a* attached to the door panel in order to be arranged next to the glass run seal **920**, and showing attachment features of the base cover cap **180** in FIG. **11***b*. Accordingly, the base cover cap **180** is provided with a tab **152** in addition to the clips **184** to **186**.
(94) The tab **152** of the base cover cap **180** is to be entered into an opening **168** of the lower base cover **170** provided on one side of the clip **179**, shown in FIG. **1***a*. Said tab **152** defines the attachment direction and locks in behind the lower base cover **170**, as illustrated in FIG. **11***c*, for creating said rotation point.
(95) The next step is to rotate the base cover cap **180** into final position. The rotation has been created such that no surrounding parts are scratched, by the outboard area of the base cover cap **180** being forced to flex outboard while rotating, as indicated in FIG. **11***d*.
(96) FIG. **11***e* shows the peg type projection **150** of the base cover cap **180** entering into a slot in the multi-functional assembly projection **171** of the lower base cover **170**, while the other peg type projection **153** of the base cover cap **180** enters into another slot in the multi-functional assembly projection **171** of the lower base cover **170** as well as flexing back into the opening **161** of the lower base cover **170** for controlling the final fit of the base cover cap **180**.
(97) The sub-assembly of the base frame **110**, the retainer means **301** and the sealing means **800** shown in FIG. **7***a* also forms a channel **900**, see FIGS. **12***a* and **12***b*, for positioning as well as locating the glass run seal **920** in particular allocated to the cheater panel **640** as shown e.g. in FIG. **12***c*.
(98) In the following the attachment of the base cover cap **180** and the base cover upper or upper base cover **190** are described with reference to FIGS. **12***d* to **12***f*.
(99) The combination the base frame **110**, the retainer means **301** and the sealing means **800** forms the channel **900** which locates the glass run seal **920** on to the exterior rear view device **1**. The glass run seal **920** runs along the cheater panel **640** and is an extension of the glass run seal running along the window **1000** and being covered by the waist finisher **940** as shown in FIGS. **9***b*, **12***c* and **12***d*.
(100) The base cover cap **180** clips to the base frame **110**, see FIG. **12***d*, and also the upper base cover **190**, providing the last and third cover piece of the base frame **110**, is attached by clip connection, see FIG. **12***e*. The clip connection may be located behind a chrome waist finisher (not shown) and will be described below with respect to FIGS. **13***a* to **13***i*.
(101) The cheater panel **640** pushes the glass run seal **920** into the correct position inside the channel **900** while being assembled. The base cover **180** and the upper base cover **190** assemble in such a way that when rotating into their position a sealing lip **922** of the glass run seal **920** is pushed against the cheater panel **640** sealing the gap between the base cover cap **180** and the upper base cover **190** on the one side and the cheater panel **640** on the other side, see FIG. **12***f*.
(102) FIGS. **13***a* to **13***i* illustrate details of the attachment of the upper base cover **190** with the lower base cover **170** and the base cover cap **180** to assemble the cover of the base frame **110**. For that purpose, FIG. **13***a* shows the different attachment features of the upper base cover **190** with four location projections **192** to **195**, a clip **198**, a hoop clip **199**, two location pegs **691**, **692**, two clip retention extensions **694** and **695** as well as three aligns projections **696** to **698**.
(103) To assemble the upper base cover **190**, the two location pegs **691** and **692** need to be fitted into two corresponding slots, one being provided by the opening **162** in lower base cover **170** and the other by a slot **151** being formed in the projection **150** of the base cover cap **180**, see FIG. **13***c*. The peg **691** pulls the base cover cap **180** into the final position and defines the rotation axis for the components. Rotating the components results in engagement of the four location projections **192** to

194 and **198** to position the upper base cover **190**, see FIGS. **13***d* to **13***f*.
(104) Three alignment features are provided by the upper base cover **190** in form of the projections **696** to **698** to align and lead two clip retention features in form of the clip retention extensions **694** and **695** onto the corresponding clips **185** and **186** of the base cover cap **180**, see FIG. **13***g*.
(105) The bottom clip **198** of the upper base cover **190** goes into the pocket **160** in the lower base cover **170** and locates the bottom parts of the components **190** and **170**, as shown in FIG. **13***h*.
(106) The last cover engagement feature is the hoop clip **199** of the upper base cover **190** which is shown in FIG. **13***i* and secures the whole assembly by engaging the projection **866** of the door gasket substrate **804**.
(107) Accordingly, the sealing means **800** plays a central role due to in particular including integrated two way simultaneous sealing function with three sealing areas, i.e. the sealing area I providing an inner sealing to the base frame **110**, the sealing area II providing an outer sealing to the lower base cover **170**, and the sealing area II providing an outer sealing to the door panel **605**; having a geometry which permits the case lower **220** of the head assembly **200** to be assembled over the base frame **110**, providing a datum area **850** with a T section support structure for the upper base cover **190** permitting simple clip together assembly, allowing a locking system, no screw assembly, of the lower base cover **170** rotating over the camera **700**, and providing the channel **900** for the glass run seal **920** together with the base frame **110** and the retainer means **301**, with said channel **900** allowing to position and locate the glass run seal **920**, such that the exterior rear view device **1** holds the glass run seal **920** in a solid position and, thereby, provides a very pleasing overall appearance suggesting that the exterior rear view device **1** extends or rather grows out of the waist finisher **940** covering part of the glass run seal **920**.
(108) FIGS. **14***a* to **14***c* demonstrate the attachment of the upper base cover **190** assisted by the base cover cap **180** while being assembled to the base frame **110** by providing a ramp guiding the rotational movement of the upper base cover **190**. The ramp is provided by the two clips **185** and **186** the base cover cap **180** which also fulfill location and clips functions, simultaneously. Said clips **185** and **186** are arranged closer to the door attachment portion **115** of the base frame **110** than the third clip **184**. The two integrated leaf spring features provided by the clips **185** and **186**, acting on the base frame **110**, align and pre load the cover assembly.
(109) As best seen in FIG. **14***c*, the base cover cap leaf spring clips **185** and **186** rest on the base frame **110** at the root and end of each clip **185** and **186**, allowing the middle portion of each clip **185** and **186** to flex downwards. Such a downward flex of the leaf spring clips **185** and **186** allows the upper base cover **190** to assemble and clip into position by rotating in the direction of the arrow B in FIG. **14***b*. The leaf spring interface with the upper base cover **190** allows pre load and tolerant fit of the three cover pieces **170**, **180** and **190**.
(110) With respect to the FIGS. **15***a* to **17***c* the realization of the camera service requirement is described.
(111) In FIG. **15***a* the assembled exterior rear view device **1** mounted to the vehicle **2** is shown. To access the camera **700**, all the three cover pieces are easily removable while the exterior rear view device **1** remains mounted to the door **600**, see FIGS. **15***b* to **15***f*.
(112) To gain access to a camera connector **705** at the end of the camera harness **410**, the head assembly **200** must be set into a knock forward position and locked into place so two hands can be used to remove the camera **700** and its connector **705**, with FIGS. **15***c* and **15***b* demonstrating the rotation of the head assembly **200** into said knock forward position, and details of the camera connector access is shown in the enlarged illustrations of FIGS. **15***e* and **15***f* of parts of FIGS. **15***c* and **15***d*, respectively.
(113) To dis-assemble all three cover pieces **170**, **180** and **190** only one tool is needed for dis-lodging or dis-engaging clip connections, as explained in the following with respect to FIGS. **16***a* to **16***l*. In FIG. **16***a* the assembled exterior rear view device **1** mounted to the vehicle **2** is shown, in another perspective compared to FIG. **15***a* and the following five steps as required for the dis-

assembly: In a first step, the hoop clip **199** shown in FIG. **13***i* is accessed through a slot **611** in the door panel **605** to loosen the engagement with the projection **866** of the door gasket substrate **804**, see FIGS. **16***b* and **16***c* In a second step, shown in FIGS. **16***d* and **16***e*, the clip **198** of the upper base cover **190** engaging the pocket **16** of the lower base cover **170**, see FIG. **13***h*, is loosen by passing through the drain hole **166** located in the lower base cover **170**, with the drain hole **166**. In a third step, shown in FIG. **16***f*, the upper base cover **190** is removed by a compound movement, namely an upward movement in Z-direction and a rotation out along the arrow R. To allow said compound movement of the upper base cover **190**, the same must be pulled up to dis-engage the two clips **185** and **186** of the base cover cap **180**, i.e. to loosen the engagement shown in FIG. **13***g*. The location of the respective clip connections are indicated by C**1** and C**2** in FIGS. **16***f* and **16***g*. In a fourth step, shown in FIGS. **16***h* to **16***j*, to dismount the base cover cap **180**, its clip **184** positioned by a projection **127** of the base frame **110** (FIG. **16***i*) and its peg projections **153** positioned by the lower base cover **170** (FIG. **6***j*) must be dis-engaged. The clip dis-engagement of FIG. **16***i* will require the tool, while the peg projections dis-engagement of FIG. **16***j* simply needs to be pushed out of position, such that the base cover cap **180** will rotate out. In a fifth step, the five clips **175** to **179** of the lower base cover **170** shown in FIGS. **16***k* and **16***l* have to be dis-engaged from the base frame **110** such that the lower base cover **170** will naturally fall down in the Z-direction and can be removed.

(114) The tool **2000** needed for dis-lodging or dis-engaging the clip connections to dis-assemble all three cover pieces **170**, **180** and **190** is explained in the following with respect to FIGS. **17***a* to **17***c*.

(115) To avoid the mirror head assembly **200** rotating back into its nominal position, that is from the position shown e.g. in FIGS. **15***d*, **15***f* and **17***a* into the position shown e.g. in FIGS. **15***c* and **15***e*, due to a self-return spring mechanism (not shown) and via a pivot joint **230**, the tool **2000** with a maximum diameter of 4 mm may be used to lock the base frame **110** relative to the head assembly **200**. For that purpose the recess or hole **111** is designed into the base frame **110**, which provides easy access to a mechanical stop **216** of a case frame **215** from the bottom of the base assembly **100**, after removing the three cover pieces **170**, **180** and **190**.

(116) All parts the tool **2000** interfaces with are made from aluminum for maximal strength and security. Also the tool **2000** itself may be made out of aluminum.

(117) In summary, the three cover pieces of the present disclosure, namely the lower base cover **170**, the base cover cap **180** and the upper base cover **190** are designed to easily mantle the base frame **110** without screw connections, but only via clip, snap and/or latch connections amongst themselves as well as the retainer assembly **300**, in particular the sealing means **800**, and the base frame **110**, for providing an aesthetically pleasing appearance as well as accident-proof by avoiding sharp edges and, in addition, for allowing an adaption of the base assembly design to the vehicle design in an easy manner; to provide an opening **702** for the camera **700** attached to the base frame **110** via the camera cradle **704**, without scratching the camera lens during assembly; and to easily dis-mantle the base frame **110** due to said clip, snap and/or latch connections, in particular making usage of only one tool, especially for camera service.

(118) FIGS. **18***a* and **18***b* depict a second external rear view device **1**′ of the present disclosure. It comprises a base assembly **100**′ onto which a moveable head assembly **200**′ is attached, i.e. at a head attachment portion **117**′ shown in FIGS. **18***c* and **18***d*. The base assembly **100**′ is configured to be mounted to a vehicle at a door attachment portion **115**′ as described with respect to the first embodiment.

(119) The head assembly **200**′ comprises a reflective element **250**′ in form of an at least partly translucent mirror glass and a display element **260**′ integrated in the head assembly **200**′ by being arranged behind the at least partly translucent mirror glass in the view direction of a drive as indicated by the arrow A in FIG. **18***b*. This allows to present to a driver of a vehicle, to which the external rear view device is attached, a rear view either by reflections on the at least partly translucent mirror glass as indicated by the arrows B in FIG. **18***b* or on the display element **260**′.

(120) The base assembly **100′** comprises a camera **700′**. The display element **260′** may be activated to present a rear view obtained by the camera **700′**. Such an activation may be achieved by the driver for example by pressing a button on a dashboard, via a voice command, by a gesture or the like and/or depending on the output of a sensor (not shown). Such a sensor may be connected to a control unit **280′** for controlling the display element **260′** and maybe also an articulation assembly **210′** for moving the head assembly **200′**. Said control unit **280′** may be arranged within the head assembly **200′** as shown in FIG. **18***b*, but may also be arranged within the vehicle.
(121) A sensor signal characteristic for contamination of a lens **720′** of the camera **700′** may be used to switch off the display unit **260′**, whereas another sensor signal characteristic for high traffic situations and/or high speed may be used to switch on the display element **260′**, but many alternatives are within the teaching of the present disclosure.
(122) The camera unit **700′** is arranged in the base assembly **100′** such that the lens **720′** may obtain a rear view image through an opening **702′** provided by the base assembly **100′**, see FIG. **18***c*. In detail, the camera **700′** may be attached to a base frame **110′**, via a camera cradle **704′**, as best seen in FIG. **18***e*, and the opening **702′** may be provided by cover pieces of the base frame **110′**. Said cover pieces may comprise three pieces as described with respect to the first embodiment with respect to the FIGS. **1** to **17***c*, namely a base cover cap **180′**, a lower base cover **170′** and an upper base cover **190′**. Said three base covers **170′**, **180′** and **190′** releasably mantle the base frame **110′** by being attached via clip, snap and/or latch connections.
(123) Still further, the cover of the base frame **110′** may comprise a glare shield **750′**, which is described in further detail with respect to FIGS. **18***c* to **18***e*.
(124) As can be seen in FIGS. **18***c* and **18***e*, the glare shield **750′** is provided with two clips **750′***a*, **750′***b* to be attached to the base cover cap **180′** as well as to the camera cradle **704′**, which serves to attach the camera **700′** to the base frame **110′**. This attachment may be the last assembly step on a customer line by sliding the glare shield **750′** along the arrow C as indicated in FIG. **18***c*.
(125) FIG. **18***d* shows the assembled glare shield **750′** and details thereof can be seen in the cross-section taken along line A-A in FIG. **18***e*. Accordingly, each clip **750′***a*, **750′***b* or the like of the glare shield **750′** engages the base cover cap **180′**, in particular an extension, lug **180′***a* or the like thereof. The free end of the clip **750′***b* is shown in FIG. **18***e* to be holed by a retention tab **704′***a* of the camera cradle **704′**. This arrangement allows to maintain a small tolerance stack between the different components, with integrity of the glare shield **750′** being protected. Further, serviceability is facilitated by this arrangement.
(126) FIG. **18***e* also shows that an outer-rim **730′** of the camera unit **700′** extends beyond the camera cradle **704′** as well as the base cap cover **180′**, but is shielded by the glare shield **750′**. The rim **730′** encompasses the lens **720′**.
(127) The releasable mantling of the base frame by cover pieces as described for the first and second embodiment, allow for many more alternatives. FIG. **19***a* shows such a further alternative in form of a base assembling **100″** of a third rear view device of the present disclosure making usage of a base assembly **100″** equipped with two cameras **700″**, **700‴**, which may be arranged substantially perpendicular to each other and an axis of a head attachment portion **117″**.
(128) A first camera **700″** may extend through an opening **702″** in a base cover cap **180″** with its lens **720″** as described with respect to FIGS. **18***a* to **18***e*. A glare shield as described above may be attached. A second camera **700‴** may be arranged such that its lens **720‴** extends through an opening **702″** in the lower base cover **170‴**. A cleaning system may be associated with the second camera **700‴**, which may comprise a nozzle **760‴** attached to and/or extending through the lower base cover **170″**. The cleaning system may be controlled by a control unit in dependency of the output of a sensor sensing contamination. For example, the cleaning system may be activated when the sensor's output indicates that there is contamination on the lens.
(129) FIG. **19***b* shows another view of the base assembling **100″** of a third rear view device of the present disclosure making usage of a base assembly **100″**. The first camera **700″** is arranged such

that it is protected by a glare shield **750**′. The second camera **700**″′ is arranged next to the cleaning system that comprises a cleaning nozzle such that the second camera may be cleaned by a cleaning fluid dispensed by cleaning nozzle **760**″′.

(130) FIGS. **19***c* and **19***d* show the cleaning nozzle **760**″′, the second camera **700**″′ and the lens of the second camera **720**″′, and a cradle **704**″ These figures show that cradle **704**″ holds both the second camera **700**″′ and cleaning nozzle **760**″′. The cradle is attached to the lower base cover **170**″. The cradle **704**″ may be a plastic unit that is provided for isolating the second camera **700**″′ from the base frame. And the cradle **704**″ may be configured to be attached to the base frame by a friction fit and without any separable attachment element.

(131) Additionally, shown in FIGS. **19***c* and **19***d* is a cleaning fluid conduit **780**″′ that delivers cleaning fluid to the cleaning nozzle. Additionally, these figures show a cable **770**″′ that is connected to the second camera **700**″′. Cable **770**″′ may, for example, provide power and/or a data exchange to the second camera. The cleaning fluid conduit **780**″′ and the cable **770**″′ may both extend between the base frame and the base cover, and may be at least partly substantially parallel to each other.

(132) The embodiment shown in FIGS. **19***a*-**19***d* may be connected to an exterior rearview device of a vehicle. The exterior rear view device may include a head assembly for supporting at least one of: a reflective element, a display element, and a third camera. The head assembly may be attached to the base assembly in a moveable manner. In embodiments, the external rear view device may further comprise at least one of an articulation assembly for moving the head assembly relative to the base assembly, and at least one functional device, comprising a light module, a turn signal indicator module, a blind spot indicator module, or a human machine interface, a Bluetooth module, a sensor module, a temperature sensor, a touch sensor or a contamination sensor, and a control unit. The control unit may particularly be adapted for controlling at least one of the cleaning system, the first camera, the second camera, the display element, the articulation assembly and the functional device. In embodiments, the display element of the external rearview device is configured to be at least one of, viewable through the reflective element when activated, activated by at least one of a driver of the vehicle depending on an output signal of the sensor module, via a vehicle control system and via the control unit and displaying images obtained from at least one of the first camera, the second camera and the third camera. A vehicle with a door having a door panel and supporting a window as well as a cheater panel sealed by a glass run seal, may include a door panel that supports the exterior rearview device described herein.

(133) It will be appreciated by those skilled in the art that changes could be made to the embodiments described above without departing from the broad inventive concept thereof. It is understood, therefore, that the invention disclosed herein is not limited to the particular embodiments disclosed, and is intended to cover modifications within the spirit and scope of the present invention.

REFERENCE SIGNS

(134) **1**, **1**′ exterior rear view device **2** vehicle **100**, **100**′, **100**″ base assembly **101** clip **102** clip **103** clip **104** clip **105** clip **106** clip **107** clip **108** hook aperture **109** hook aperture **110**, **110**′ base frame **111** hole **115**, **115**′ door attachment portion **116** arm **117**, **117**′, **117**″ head attachment portion **118** hook aperture **120** location pin **121** T shaped location projection **122** camera guiding wall **123** camera harness guiding channel portion **124** opening for harness holder **125** location projection **126** location projection **127** location projection **131** screw opening **132** screw opening **135** step for sealing means clip **136** step for sealing means clip **137** opening for retainer means clip **138** opening for sealing means clip **140** harness guiding channel portion **141** harness guiding channel portion **150** projection **151** slot **152** tab **153** projection **160** pocket **161** opening **162** opening **163** wall **164** opening **165** opening **166** drain hole **167** opening **168** opening **170**, **170**′, **170**″ lower base cover **171** multi-functional assembly projection **172** hook **173** hook **174** hook **175** clip **176** clip **177** clip **178** clip **179** clip **180**, **180**′ base cover cap **180**′*a* lug **184** clip **185** clip **186** clip **190**, **190**′, **190**″

upper base cover **192** location projection **193** location projection **194** location projection **195** location projection **198** clip **199** hoop clip **200**, **200′** head assembly **210**, **210′** actuator assembly **215** case frame **216** mechanical stop **220** lower case **222** opening of lower case **230** pivot joint **250′** reflective element **260′** display element **280′** control unit **300** retainer assembly **301** retainer means **310** sealing portion **315** clip **316** clip **320** holding portion **322** opening for location pin **340** camera harness guiding channel portion **350** hook **351** opening for arm of T shaped location projection **360** clip **371** opening **372** opening **380** opening for sealing means clip **391** T-slot **400** harness **410** camera harness **420** guiding channel **500** harness holder **510** fixing tie **520** clip **600** door **605** door panel **610** opening for hook **611** slot **620** opening for location pin **631** screw opening **632** screw opening **640** cheater panel **691** location peg **692** location peg **694** clip retention extension **695** clip retention extension **696** alignment projection **697** alignment projection **698** alignment projection **700**, **700′**, **700″**, **700‴** camera **702**, **702′**, **702″**, **702‴** opening **704**, **704′**, **704″** camera cradle **704′*a*** tab **705** camera connector **710** turn signal indicator **720′**, **720″**, **720‴** lens **730′** rim **750′** glare shield **750′*a***, **750′*b*** clip **742** location rib **744** clip **746** anti-backout projections **760‴** cleaning nozzle **770‴** cable **780‴** cleaning fluid conduit **800** sealing means/2K door gasket **802** door gasket seal **804** door gasket substrate **810** clip **820** clip opening **830** clip **840** clip **850** datum area for upper case **851** T-slot **860** hook pocket **862** hook pocket **866** projection **870** rib **872** rib **881** screw opening **882** screw opening **900** channel **920** glass run seal **922** sealing lip **940** waist finisher **1000** window **2000** tool

Claims

1. A base assembly of an exterior rear view device configured to be mounted to a vehicle for moveably supporting a head assembly of the exterior rear view device, comprising: a camera with a lens; a cleaning system with a nozzle for dispensing a cleaning fluid onto the lens; a base frame; a base cover, comprising a plurality of cover pieces, which provide a first opening for the lens and a second opening for the nozzle; and a camera cradle for holding both the camera and the nozzle, wherein a cleaning fluid conduit that is connected to the nozzle and at least one cable that is connected to the camera extend between the base frame and the base cover, wherein the cleaning fluid conduit and the at least one cable are at least partly substantially parallel to each other.
2. The base assembly of claim 1, wherein the plurality of cover pieces comprises: a base cover cap; a lower base cover; and an upper base cover, wherein the base cover cap, the lower base cover and the upper base cover together are designed to releasably mantle the base frame by attaching to the base frame via one or more of a clip, a snap, or a latch connection.
3. The base assembly of claim 2, wherein at least one of the nozzle and the lens extends through the lower base cover.
4. The base assembly of claim 2, wherein the camera cradle attaches the camera and the nozzle to the lower base cover.
5. The base assembly of claim 1, wherein the cleaning system is controlled by a control unit that activates the cleaning system when an output of a sensor indicates that contamination exists on the second lens.
6. The base assembly of claim 1, further comprising a second camera, wherein the second camera is orientated substantially perpendicular to the camera.
7. The base assembly of claim 6, wherein the second camera or a lens of the second camera extends through an opening in the base cover cap.
8. The base assembly of claim 6, wherein the plurality of cover pieces comprises a glare shield for the second camera.
9. The base assembly of claim 8, wherein the glare shield comprises a first clip and a second clip, and the first clip and the second clip connect the glare shield to the base cover cap and a second camera cradle for attaching the second camera.
10. The base assembly of claim 1, wherein a cleaning fluid conduit is connected to the nozzle and

is configured to supply cleaning fluid to the nozzle.
11. The base assembly of claim 1, wherein at least one cable connects to and provides power for the camera and allows for a data exchange.
12. The base assembly of claim 1, wherein the camera cradle is a plastic unit for isolating the camera from the base frame.
13. The base assembly of claim 1, wherein the cradle is configured to be attached to the base frame by a friction fit and without any separable attachment element.
14. The base assembly of claim 1, where the camera cradle is mounted to the base frame for holding both the camera and the nozzle.
15. An exterior rearview device comprising: a base assembly configured to be mounted to a vehicle for moveably supporting a head assembly of the exterior rear view device, the base assembly comprising: a camera with a lens; a cleaning system with a nozzle for dispensing a cleaning fluid onto the lens; a base frame; a base cover, comprising a plurality of cover pieces, which provide a first opening for the lens and a second opening for the nozzle; and a camera cradle mounted to the base frame for holding both the camera and the nozzle, wherein a cleaning fluid conduit that is connected to the nozzle and at least one cable that is connected to the camera extend between the base frame and the base cover, wherein the cleaning fluid conduit and the at least one cable are at least partly substantially parallel to each other.
16. An exterior rear view device comprising the base assembly of claim 15, wherein the head assembly is configured to support at least one of a reflective element, a display element, or a third camera; and wherein the head assembly is attached to the base assembly in a moveable manner.
17. The external rear view device of claim 16, further comprising at least one of: an articulation assembly for moving the head assembly relative to the base assembly at least one functional device, comprising at least one of a light module, a turn signal indicator module, a blind spot indicator module, a human machine interface, a Bluetooth module, a sensor module, a temperature sensor, a touch sensor or a contamination sensor; or a control unit.
18. The external rear view device of claim 17, wherein the control unit is adapted for controlling at least one of the cleaning system, the camera, a second camera, the third camera, the display element, the articulation assembly, or the at least one functional device.
19. The external rear view device of claim 17, wherein the display element is configured to be at least one of: viewable through the reflective element when activated; activated by at least one of: a driver of the vehicle, depending on an output signal of the sensor module, via a vehicle control system, or via the control unit; or displaying images obtained from at least one of the camera, a second camera, or the third camera.
20. A vehicle with a door having a door panel and supporting a window as well as a cheater panel sealed by a glass run seal, wherein the door panel also supports the exterior rearview device of claim 15.