A housing for a mirror actuator, comprising a first housing member (10), provided with at least one first mounting opening (14',15',16',17'), and a second housing member (50), provided with at least one second mounting opening (74,77), while in a mounted condition of the first and second housing member (10,50) the respective mounting openings (14',15',16',17',74',77'), are in line, and in the mounted condition a connecting means (80) is arranged through the two mounting openings (14',15',16',17',74',77'), the first housing member (10) being provided with a first edge (11), and the second housing member (50) being provided with a second edge (51), while the first and second edge (11,51) in mounted condition link up with each other, further provided with a sealing edge (60) which in mounted condition is arranged between the two edges (11,51).
HOUSING FOR A MIRROR ACTUATOR

[0001] The invention relates to a housing for a mirror actuator, and to a method for assembling such housing.

[0002] Such a housing is generally known and is used to protect a hinge actuator. With such an actuator, a mirror housing of a wing mirror is pivotally connected with the body of a car. The mirror housing is pivotable about a substantially vertical axis between an operating position in which the mirror housing projects substantially sideward relative to the body of the car, and an extreme fold-in position, in which the mirror housing extends substantially rearwards along the body of the car. Accordingly, for instance during parking, the mirror housing can be folded in from the operating position, so that the free end of the mirror housing comes to lie closer to the body of the car and the chance of damage can be reduced.

[0003] The actuator mechanism comprises fine-mechanical parts and may easily be damaged through contaminants such as, for instance, water and dust. Because the actuator mechanism view of its function is located close to the mirror and hence outside the protective environment of the body of the vehicle, the actuator mechanism is surrounded by a housing. This housing is to protect the mechanism from contaminants from outside.

[0004] From practice, such housings are known. A drawback of these housings, however, is that they must be made of rather complex, and hence costly, construction to obtain the desired sealing. Further, the complex makeup of the housing has as a consequence that assembly and fitting are time-consuming and hence costly.

[0005] It is therefore an object of the invention to provide a housing for an actuator mechanism, with which a proper sealing for the actuator mechanism can be obtained at lower cost.

[0006] To that end, the invention provides a housing according to claim 1. The housing has a first and a second housing member, each provided with mounting openings. In mounted condition, the housing members are located relative to each other in such a manner that the respective mounting openings are in line, and a connecting means is arranged through the two mounting openings. Preferably, the connecting means is arranged such that it exerts a spring force directed in a radial sense on the mounting openings, so that the housing members are locked relative to each other and the connecting means is confined in axial direction within the housing. As a result, a good sealing of the housing is obtained, while assembly is simple through application of the resilient connecting means.

[0007] In a variant embodiment according to the invention, between the housing members a flexible sealing edge is provided. It provides for an extra reliable sealing, in particular if the two housing members are assembled under a bias.

[0008] In another variant embodiment according to the invention, the connecting means is arranged such that a driving mechanism located within the housing is fixed within the housing in that the connecting means engages in openings in the frame in which the mechanism is received. What is thereby achieved is that no extra parts are needed for the fixation of the frame of the mechanism; further, space within the housing is saved.

[0009] The invention further relates to a method for assembling a housing for a mirror actuator mechanism according to claim 10. Through the assembly of the two housing members by means of a connecting means, such as, for instance, a tubular rivet, a fast and reliable connection is realized. Preferably, the two housing members are assembled under a bias, so that a proper sealing is obtained, in particular if a flexible sealing edge is applied. The invention further relates to a wing mirror unit for a motor vehicle with a mirror provided with a housing.

[0010] Further advantageous embodiments of the invention are set forth in the subclaims. The invention will be further elucidated on the basis of a detailed description of an exemplary embodiment of the invention, with reference to the drawing. In the drawing:

[0011] FIG. 1 shows an exploded view of an assembly according to the invention,

[0012] FIG. 2 shows the assembly of FIG. 1 in mounted condition,

[0013] FIG. 3 shows a connecting means,

[0014] FIG. 4 schematically shows a top plan view of a vehicle with a wing mirror in an operating position, and

[0015] FIG. 5 shows a schematic view of a frame for an adjusting mechanism.

[0016] In FIG. 1, by way of exemplary embodiment according to the invention, a housing 1 is shown. The housing comprises a lower member 10 and an upper member 50. The lower member 10 has a circumferential wall 12 which extends upwards from a floor part 13 (not visible in FIG. 1), thereby defining an inner space. The height of the circumferential wall 12 varies along the circumference. The upper edge 11 of the wall 12 is provided with an elastic sealing ring 60 along the length of the wall. The lower member 10 can be manufactured, or instance, by injection molding from plastic; advantageously, the sealing ring 60 can then be provided on the edge of the lower member 10 by injection molding as well. The lower member 10 is further provided with four coupling parts 14, 15, 16, 17. These coupling parts are arranged in pairs, viz. 14 and 15, 16 and 17, within the circumference of the wall 12, while the coupling parts extend above the edge 11. In the portion of the coupling parts 14, 15, 16, 17 that projects above the edge 11, a respective opening 14, 15, 16, 17 is provided.

[0017] The upper member 50 has a circumferential wall 52 extending from a cap portion 53, thereby defining an inner space. The height of the circumferential wall 52 varies along the circumference, such that the shape of the edge of the wall 52 corresponds to the shape of the wall 12. This provides the effect that in assembled condition the respective edges of the walls 12, 52 link up with each other. Further, the wall 52 is provided with holes which in mounted condition are in line with the respective openings 14, 15, 16, 17 in the coupling parts 14, 15, 16, 17 of the lower member 10. Of these, the holes 74 and 77 (respectively corresponding with the openings 14 and 17) are shown in FIG. 1.

[0018] The walls of the upper and lower member 10, 50 form a rounding in the area located remote from the coupling parts and the corresponding openings. In mounted condition, these roundings bound a substantially cylinder-shaped space. In this space, a bearing can be accommodated.
this bearing a mounting part 90 shown in FIGS. 1 and 2 can be included. This mounting part 90 is provided with a flange 91 with mounting holes 92 and a journal 93. The journal 93 in mounted condition is connected with the bearing arranged in the housing. By means of screws through the holes 92, the flange 91 is fixedly connected with a vehicle, such as, for instance, a passenger car or a multipurpose vehicle (MPV). Thus, the housing can be pivoted relative to the flange 91 (and hence the vehicle) in the direction indicated with the arrow A, for instance to adjust the position of a mirror housing connected with the housing.

[0019] When fitting the parts 10 and 50 together, resulting in the assembled condition as shown in FIG. 2, the coupling parts 14, 15, 16, 17 engage the inside of the wall 52. Preferably, the fit between the coupling parts and the inner wall 52 is such as to be slightly cramped. This provides the advantage that the two members 10 and 50 form a coherent whole immediately upon assembly. Preferably, the distance from the openings 14', 15', 16', 17' to the edge 11, and hence, in conjunction, the distance between the edge 51 and the openings 74 and 77 in the wall 52, is selected such that aligning the respective members 10 and 50 some measure of a biasing force must be exerted. This can be achieved, for instance, through compression of the elastic sealing ring 60. For fixing the members 10 and 50 in the condition where the above-described openings have been brought into line, a connecting means is phased through the openings. Thereupon, the biasing force can be removed, and the two parts are mutually fixed, under a bias.

[0020] In the exemplary embodiment shown, use is made of a tubular rivet 80 as connecting means. In FIG. 3 an example of a tubular rivet 80 is shown. The tubular rivet 80 is formed by a strip of steel 81 which has been bent round, with a space 85 left open between the edges. The axial ends of the cylinder are provided with locating edges in the form of bevels 82 and 83. Through this construction, the tubular rivet can spring inwards and outwards in a radial sense. The outer diameter of the tubular rivet is preferably slightly larger than the inner diameter of the openings in which the tubular rivet is to be fitted. For that matter, according to the invention, a tubular rivet with a fully closed circumferential surface can be used.

[0021] What is achieved owing to the tubular rivet in mounted condition pressing in a radial sense against the wall of the opening, is that the tubular rivet is also fixed in an axial sense. This provides the advantage that locking the connecting means requires no supplemental measures to be taken. Further, in mounted condition, the tubular rivet gives further strength to the construction. If desired, the axial ends of the tubular rivet can be provided with sealing means in order to prevent entry of any undesired matter into the housing by way of the tubular rivets. Also, in mounted condition, other fastening means can be passed through the passage formed by the tubular rivet, such as, for instance, a screw or bolt.

[0022] Although in this example use has been made of a tubular rivet, according to the invention use can also be made of other connecting means and preferably a connecting means capable of a clamped self-lock in a radial sense in the respective mounting opening.

[0023] In a favorable variant embodiment according to the invention, the tubular through rivet is used to fix a part of the adjusting mechanism to be placed in the housing. The adjusting mechanism is arranged in a frame; an example of such a frame 40 is shown in FIG. 5. In this example, the frame is manufactured from a sheet of metal bent into a U-shape. Between the sidewalls of the frame formed by the legs of the U, the adjusting mechanism is arranged (not own in FIG. 5). In the sidewall, two pairs of mutually aligned openings are provided, viz. pair 41 and 42, and pair 43 and 44. The pair 41, 42 in mounted condition is in line with the openings 14, 15, 74 of the members 10 and 50, while the pair 43, 44 in mounted condition is in line with the openings 14', 15', 74 of the members 10, 50.

[0024] During assembly, these through openings 41-44 are aligned with the respective mounting openings in the upper and the lower member. Thereafter, the tubular rivet is passed through the aligned openings, thereby fig the fame of the adjusting mechanism in the assembled housing. This provides the advantage that no additional parts are needed for the fixation; further, space within the housing is saved. In addition, forces from the adjusting mechanism are efficiently transmitted to the housing via the frame and the tubular rivet.

[0025] Although in the example use is made of a through fastener which in each case passes through two openings of both the upper and the lower member 10, 50, the invention is not so limited and, according to the invention, it is possible to choose, for instance, a connecting means which in each case connects a single hole of the upper and lower members with each other. Preferably, this connecting means is also designed so as to be capable of a clamped self-lock in radial direction in the mounting opening, so that at the same time axial fixation takes place.

[0026] Although in the example shown the housing consists of two housing members, according to the invention more than two housing members can be applied.

[0027] The invention further relates to a wing mirror unit for a motor vehicle (such as, for instance, a passenger car or an MPV), provided with a housing for a mirror actuator as shown in the foregoing. FIG. 4 schematically shows a front view of a sidewall of a vehicle 200, on which a substantially horizontally extending support 202 is mounted. Attached to the support 202 is a mirror housing 203, pivotable about the 204 extending substantially vertically. Arranged in the mirror housing 203 is a mirror plate with a mirror adjusting mechanism, known per se and not shown.

[0028] FIG. 4 further shows schematically that the mirror housing 208 comprises a hinge actuator 201. This mirror actuator comprises a housing 1 with a mounting part 90, as shown in the foregoing example. The flange 91 of the mounting part 90 is attached to the support 202, while the housing 1 is attached to the mirror housing 208. The housing 1 with the mirror housing 203 is pivotable in the direction A about the line 204, which coincides with the centerline of the shaft 93. Thus, the or housing 203 can be pivoted between an operating position and a fold-in position.

1. A housing for a mirror actuator, comprising
a first housing member (10), provided with at least one first mounting opening (14, 15, 16, 17), and
a second housing member (50), provided with at least one second 6 mounting opening (74, 77), while in a
mounted condition of the first and second housing member (10, 50) the respective mounting openings (14', 15', 16', 17, 74, 77) are in line, and in the mounted condition a connecting means (80) is arranged through the two mounting openings (14, 15, 16, 17, 74, 77), characterized in that the first housing member (10) is provided with a first edge (11), that the second housing member (50) is provided with a second edge (51), while the first and second edge (11, 51) in mounted condition line up with each other and cooperate to surround an adjusting mechanism to be placed in the housing, and in that the housing is further provided with a sealing edge (60) of elastic design which in mounted condition is arranged between the two edges (11, 51), such that in mounted condition the two housing members (10, 50) are mounted under a mutual bias through the sealing edge (60).

2. A device according to claim 1, wherein the sealing edge (60) is provided on one of the two edges (11).

3. A device according to any one of the preceding claims, wherein the connecting means (80) in mounted condition exerts a spring force directed in a radial sense on the mounting openings (14, 15, 16, 17).

4. A device according to any one of the preceding claims, wherein the connecting means (80) is a tubular rivet.

5. A device according to claim 4, wherein the tubular rivet (80) in an outwardly sprung condition has an outside diameter greater than an inside diameter of the mounting openings (14, 15, 16, 17, 74, 77).

6. A device according to any one of the preceding claims, further comprising a driving mechanism mounted in a frame (40), the frame being provided with at least one through opening (41, 42, 43, 44), which through opening (41, 42, 43, 44) is in line with the respective mounting openings (14', 15', 16', 17, 74, 77), while in the mounted condition the connecting means (80) extends through the through opening (41, 42, 43, 44) of the frame (46).

7. A wing mirror unit for a motor vehicle, provided with a housing (1) for a mirror actuator according to any one of the preceding claims.

8. A method for assembling a housing according to any one of claims 1-6, comprising the steps of:

   - aligning respective mounting openings (14, 15, 16, 17, 74, 77) in a first and a second housing member (10, 50), and
   - arranging a connecting means (80) in the aligned mounting openings (14, 15, 16, 17, 74, 77) to join the two housing members (10, 50) relative to each other.

9. A method according to claim 9, wherein arranging the connecting means (80) comprises introducing a tubular rivet (80) into the aligned mounting openings (14, 15, 16, 17, 74, 77), which tubular rivet (80) in outwardly sprung condition has an outside diameter greater than an inside diameter of the mounting openings (14, 15, 16, 17, 74, 77), while the tubular rivet (80) in mounted condition exerts a spring force directed in a radial sense on the respective mounting openings (14, 15, 16, 17, 74, 77).