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(54) **AUTOMOTIVE LUMINOUS DEVICE**

(57) The invention is related to an automotive luminous device (1) which comprises a housing (2), a light source (3, 3') located inside the housing (2), an optical element (4, 4') and a first regulation system. The optical element (4, 4') is arranged to receive light emitted from the light source (3, 3'), and is arranged inside the housing

(2). The first regulation system is attached to the optical element (4, 4') and able to transform a regulation input movement of more than 1 cm or 360 degrees in a movement of the optical element equal or lower than 0.1 mm with respect to the light source (3, 3') in a first direction.

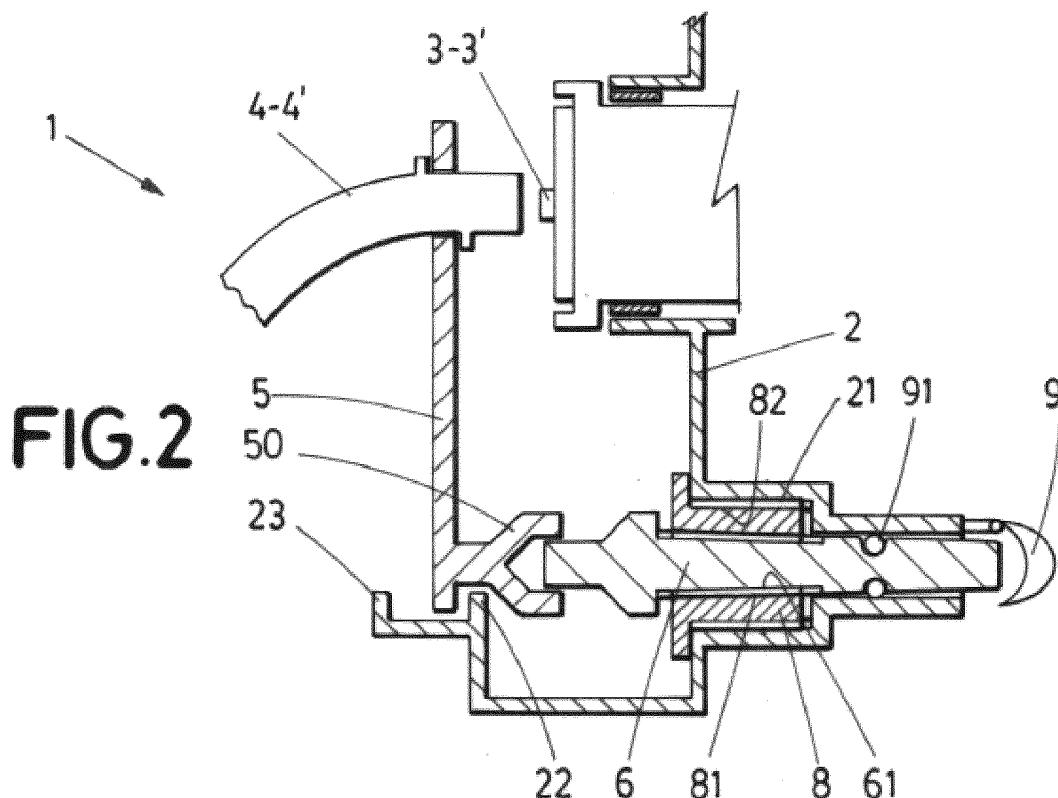


FIG. 2

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Description

TECHNICAL FIELD

[0001] This invention is related to the field of automotive luminous devices.

STATE OF THE ART

[0002] Automotive vehicles lighting is usually based on light emitting diodes (LEDs). These LEDs are sometimes arranged to put light on one of the ends of a light guide. The distance between this LED and the light guide, because if the light guide is too far, defocusing may appear, and if the light guide is too close, it may be over heated by the heat emitted by the LED.

[0003] However, this distance may vary due to dimensional tolerances in the manufacturing of the elements of the luminous device. There is no way of adjusting the relative position between the LEDs and their corresponding light guides.

DESCRIPTION OF THE INVENTION

[0004] The invention provides a solution for this problem by means of an automotive luminous device according to claim 1. Preferred embodiments of the invention are defined in dependent claims.

[0005] In an inventive aspect, the invention provides an automotive luminous device comprising

a housing;
a light source located inside the housing;
an optical element arranged to receive light emitted from the light source, the optical element being arranged inside the housing;
a first regulation system attached to the optical element and able to transform a regulation input movement of more than 1 cm or 360 degrees in a movement of the optical element equal or lower than 0.1 mm with respect to the light source in a first direction.

[0006] This invention is referred to a housing for a luminous device. This luminous device may be a lighting device or a signalling device, for example a headlamp, a fog lamp, a rear lamp, a DRL (daytime running lamp), a turn indicator, etc.

[0007] The first regulation system comprises a coupling element which causes a gear down factor in the movement of the first regulation system, so that a regulation input movement implies a much lower movement of the optical element.

[0008] This first regulation system advantageously provides the automotive luminous device with a way of fine tuning the position of the optical element with respect to the light source. There are several possibilities to embody this feature, and all of them are contained within the scope of this invention.

[0009] In some particular embodiments, the first regulation system comprises

a vertical link attached to the optical element; and a pushing rod arranged to contact and displace the vertical link, the pushing rod being oriented according to the first direction and being able to transform a regulation input movement of more than 1 cm or 360 degrees in a movement of the optical element equal or lower than 0.1 mm with respect to the light source in a first direction.

[0010] This system of vertical link and pushing rod is a good way of transmitting a movement so that it reaches the optical element. This system does not require many specific conditions and may be implemented in a wide range of automotive luminous devices.

[0011] In some particular embodiments, the vertical link is located inside the housing, and the pushing rod has a portion accessible from outside the housing.

[0012] The pushing rod being accessible eases the tuning procedure, since there is no need to open the luminous device. In fact, some luminous devices do not provide means to access its inner zone.

[0013] In some particular embodiments, the automotive luminous device further comprises a cap suitable for at least partially covering the portion of the pushing rod accessible from outside the housing.

[0014] This cap prevents the pushing rod from being accidentally operated.

[0015] In some particular embodiments, the vertical link comprises a contact portion, the contact portion having a housing intended to host one end of the pushing rod. This housing may be conical, to help the end of the pushing rod be inserted in it. In some particular embodiments, the pushing rod is attached to the housing, either by means of screwing, clipping, gluing or any other suitable joint, thus achieving a solid joint.

[0016] This housing is suitable for receiving the end of the pushing rod and transmit its movement. The end of the pushing rod is therefore precisely located inside the housing.

[0017] In some particular embodiments, the first regulation system further comprises a connector piece having an inner threaded portion and an outer threaded portion;

the pushing rod comprises an outer threaded portion coupled to the inner threaded portion of the connector piece; and

the housing comprising a threaded portion coupled to the outer threaded portion of the connector piece; wherein the connector piece is fixed to the housing by threading of its outer threaded portion, and the inner threaded portion of the connector piece has a lead equal or lower than 0.1 mm.

[0018] This is a way of achieving the transformation of a regulation input movement of more than 1 cm or 360 degrees in a movement of the optical element equal or lower than 0.1 mm with respect to the light source (3) in a first direction. However, other ways of achieving this fine tuning also belong to the scope of this invention, such as the use of gas cylinders with different cross section, worm gears or even electronic control.

[0019] In some particular embodiments, the first regulation system further comprises a first and second stops to limit the movement of the vertical link.

[0020] These stops prevent the user from being worried about if there is an inappropriate position of the vertical link, therefore managing the first regulation system more safely.

[0021] In some particular embodiments, the vertical link has a first hole, so that the optical element is fitted in said first hole.

[0022] This first hole provides a better control for the position of the optical element, since it is solidly attached to the vertical link.

[0023] In some particular embodiments, the vertical link further comprises a second hole, so that a further optical element may be fitted in that second hole.

[0024] This second hole allows the position adjustment of a second optical element which is intended to be placed close to a second lighting source. Since the distance between the first and second light sources is constant, the two optical elements may be adjusted at the same time.

[0025] In some particular embodiments, the automotive luminous device further comprises a seal arranged around the pushing rod and contacting the housing, to ensure watertightness between the pushing rod and the housing.

[0026] In some particular embodiments, the first regulation system further comprises a guide housing for the vertical link, to limit the movement of the vertical link only allowing a movement which is mainly according to the first direction. In a preferred embodiment, the movement is only according to the first direction. The coupling between the guide housing and the vertical link is not always completely tight, there may be a gap between these two elements, and this makes that the movement is not exactly according to the first direction. But this gap, due to manufacturing tolerances or to a specific design, does not alter the main advantage of the guide housing, which is limiting the movement of the vertical link so that it is, mainly, according to the first direction.

[0027] This provides the vertical link with a smoother and safer movement, ensuring that this element performs its function correctly.

[0028] In some particular embodiments, the optical element is a light guide. This is a case where this invention fits perfectly, since light guides require a very precise positioning with respect to the light sources.

[0029] In some particular embodiments, the light source is a semiconductor light source, such as a LED or a laser light source.

[0030] In some particular embodiments, the automotive luminous device further comprises a second regulation system, attached to the optical element or to the vertical link to controllably move the optical element with respect to the light source in a second direction which is perpendicular to the first direction.

[0031] These regulation systems may be used in any

direction, so using two or more allows a more versatile control of the position of the optical element with respect to the light source. In particular embodiments, this second regulation system comprises a further pushing rod which couples with a further contact portion located on the vertical link.

BRIEF DESCRIPTION OF THE DRAWINGS

[0032] To complete the description and in order to provide for a better understanding of the invention, a set of drawings is provided. Said drawings form an integral part of the description and illustrate an embodiment of the invention, which should not be interpreted as restricting the scope of the invention, but just as an example of how the invention can be carried out. The drawings comprise the following figures:

Figure 1 shows a perspective view of a particular embodiment of an automotive luminous device according to the invention.

Figure 2 shows a cross section view of the automotive luminous device of Figure 1.

Figure 3 shows a perspective view of a different embodiment of an automotive luminous device according to the invention.

Figure 4 shows an automotive vehicle with an automotive luminous device according to the invention.

DETAILED DESCRIPTION OF THE INVENTION

[0033] Figure 1 shows a perspective view of an automotive luminous device 1 according to the invention. This automotive luminous device 1 comprises a housing 2; semiconductor light source 3, 3' located inside the housing 2; light guides 4, 4' arranged to receive light emitted from the semiconductor light sources 3, 3', the light guides 4, 4' being arranged inside the housing 2; and a first regulation system.

[0034] Each light guide 4, 4' is arranged in front of a light source 3, 3'. The relative position between each light source 3, 3' and the corresponding light guide 4, 4' is important to ensure the correct operation of the light guide 4, 4'. The first regulation system is therefore intended to adjust small deficiencies in this relative position, or even obtain a different light effect in the light guide 4, 4' by small variations of its relative position with respect to the corresponding light source 3, 3'.

[0035] To achieve this aim, in this particular embodiment, the first regulation system comprises a vertical link 5 attached to the light guides 4, 4' and a pushing rod 6 arranged to contact and displace the vertical link 5. The vertical link 5 comprises a contact portion 50, the contact

portion 50 having a conical housing intended to house one end of the pushing rod 6.

[0036] The pushing rod 6 is oriented according to the first direction, so when the user carries out a regulation input movement, which in this case is a rotation, the pushing rod 6 moves linearly in the first direction.

[0037] The vertical link 5 further comprises a first hole 51 and a second hole 52, so that two light guides 4, 4' may be fitted in these holes, one light guide in each hole.

[0038] The first regulation system further comprises a guide housing 7 for the vertical link 5, to limit the movement of the vertical link 5 by only allowing a movement according to the first direction.

[0039] Fig 2 shows a cross section view of this automotive luminous device 1, for a better understanding of their operation principle.

[0040] The first regulation system further comprises a connector piece 8 having an inner threaded portion 81 and an outer threaded portion 82. In turn, the pushing rod 6 comprises an outer threaded portion 61 coupled to the inner threaded portion 81 of the connector piece 8. Finally, the housing 2 comprises a threaded portion 21 coupled to the outer threaded portion 82 of the connector piece 8.

[0041] The thread coupling between the connector piece 8 and the housing 2 is used to fix the connector piece 8 to the housing 2. On the other hand, the thread coupling between the connector piece 8 and the pushing rod 6 is used to transform a regulation input movement of 360 degrees in a movement of the pushing rod 6 lower than 0.1 mm with respect to the semiconductor light source 3 in a first direction. This movement is transmitted to the vertical link 5, and in turn transmitted to the light guide 4.

[0042] This transformation is achieved by the lead of the inner threaded portion 81 of the connector piece 8 being lower than 0.1 mm.

[0043] The first regulation system further comprises a first 22 and second 23 stops to limit the movement of the vertical link 5.

[0044] The vertical link 5 is located inside the housing 2, and the pushing rod 6 has a portion which is accessible from outside the housing 2, so that the position of an inner element, such as the light guides 4, 4', may be adjusted from a user outside the housing 2 by adjusting the portion of the pushing rod 6 which is accessible from outside the housing 2.

[0045] In order to protect this portion of the pushing rod 6 from an accidental operation, the first regulation system further comprises a cap 9, which is suitable for covering this portion of the pushing rod 6. This cap 9 may be configured in two different positions: a first position covering the pushing rod 6 and a second position uncovering the pushing rod 6, so that it may be operated by a user.

[0046] The first regulation system further comprises a seal 91 which is arranged around the pushing rod 6 and contacts the housing 2. This seal 91 ensures watertight-

ness between the pushing rod 6 and the housing 2, and at the same time allows both circular and linear movements of the pushing rod 6 with respect to the housing 2.

[0047] Figure 3 shows a different embodiment of a luminous device according to the invention, comprising a second regulation system.

[0048] This second regulation system comprises a further pushing rod 6'. The vertical link 5 also comprises a further contact portion 50', this further contact portion 50' having a conical housing intended to house one end of the further pushing rod 6'.

[0049] This further pushing rod 6' is oriented according to a second direction which is perpendicular to the first direction, so when the user carries out a regulation input movement, which in this case is a rotation of the further pushing rod 6', the further pushing rod 6' moves linearly in the second direction, thus achieving the adjusting of the vertical link 5 in this second direction.

[0050] Figure 4 shows an automotive luminous device 1 according to the invention installed in an automotive vehicle 100.

[0051] Light sources 3, 3' are oriented in the advancing direction of the automotive vehicle 100, and may be adjusted finely due to the elements comprised in the luminous device, thus achieving proper focalization of the light sources to the light guides 4, 4' and/or avoiding over heating of the same. The tuning of the light guide is very fine, defocusing may be avoided without significantly affecting to the final positioning of the light emitted by the luminous device.

Claims

1. Automotive luminous device (1) comprising
 - a housing (2);
 - a light source (3, 3') located inside the housing (2);
 - an optical element (4, 4') arranged to receive light emitted from the light source (3, 3'), the optical element (4, 4') being arranged inside the housing (2);
 - a first regulation system attached to the optical element (4, 4') and able to transform a regulation input movement of more than 1 cm or 360 degrees in a movement of the optical element (4, 4') equal or lower than 0.1 mm with respect to the light source (3, 3') in a first direction.
2. Automotive luminous device (1) according to claim 1, wherein the first regulation system comprises
 - a vertical link (5) attached to the optical element (4);
 - and
 - a pushing rod (6) arranged to contact and displace the vertical link (5), the pushing rod being (6) oriented according to the first direction and being able to transform a regulation input movement of more than 1 cm or 360 degrees in a movement of the optical element (4, 4') equal or lower than 0.1 mm with respect to the light source (3) in a first direction.

3. Automotive luminous device (1) according to claim 2, wherein the vertical link (5) is located inside the housing (2), and the pushing rod (6) has a portion accessible from outside the housing (2). 5
4. Automotive luminous device (1) according to claim 3, further comprising a cap (9) suitable for at least partially covering the portion of the pushing rod (6) accessible from outside the housing (2). 10
5. Automotive luminous device (1) according to any of claims 2 to 4, wherein the vertical link (5) comprises a contact portion (50), the contact portion (50) having a housing intended to house one end of the pushing rod (6). 15
6. Automotive luminous device (1) according to any of claims 2 to 5, wherein
the first regulation system further comprises a connector piece (8) having an inner threaded portion (81) and an outer threaded portion (82);
the pushing rod (6) comprises an outer threaded portion (61) coupled to the inner threaded portion (81) of the connector piece (8);
the housing (2) comprising a threaded portion (21) coupled to the outer threaded portion (82) of the connector piece (8);
wherein the connector piece (8) is fixed to the housing by threading of its outer threaded portion (82), and the inner threaded portion (81) of the connector piece (8) has a lead equal or lower than 0.1 mm. 20 25 30
7. Automotive luminous device (1) according to any of claims 2 to 6, wherein the first regulation system further comprises a first (22) and second (23) stops to limit the movement of the vertical link (5). 35
8. Automotive luminous device (1) according to any of claims 2 to 7, wherein the vertical link has a first hole (51), so that the optical element (4) is fitted in said first hole (51). 40
9. Automotive luminous device (1) according to claim 8, wherein the vertical link further comprises a second hole (52), so that a further optical element (4') may be fitted in that second hole (52). 45
10. Automotive luminous device (1) according to any of claims 2 to 9, further comprising a seal (91) arranged around the pushing rod (6) and contacting the housing (2), to ensure watertightness between the pushing rod (6) and the housing (2). 50
11. Automotive luminous device (1) according to any of claims 2 to 10, wherein the first regulation system further comprises a guide housing (7) for the vertical link (5), to limit the movement of the vertical link (5), only allowing a movement which is mainly according to the first direction and preferably only according to the first direction. 55
12. Automotive luminous device (1) according to any of the preceding claims, wherein the optical element (4) is a light guide.
13. Automotive luminous device (1) according to any of the preceding claims, wherein the light source is a semiconductor light source, such as a LED or a laser light source.
14. Automotive luminous device (1) according to any of the preceding claims, further comprising a second regulation system, attached to the optical element (4) or to the vertical link (5) to controllably move the optical element with respect to the light source (3) in a second direction which is perpendicular to the first direction.
15. Automotive luminous device (1) according to claim 14, wherein the second regulation system comprises a further pushing rod (6') which couples with a further contact portion (50') located on the vertical link (5).

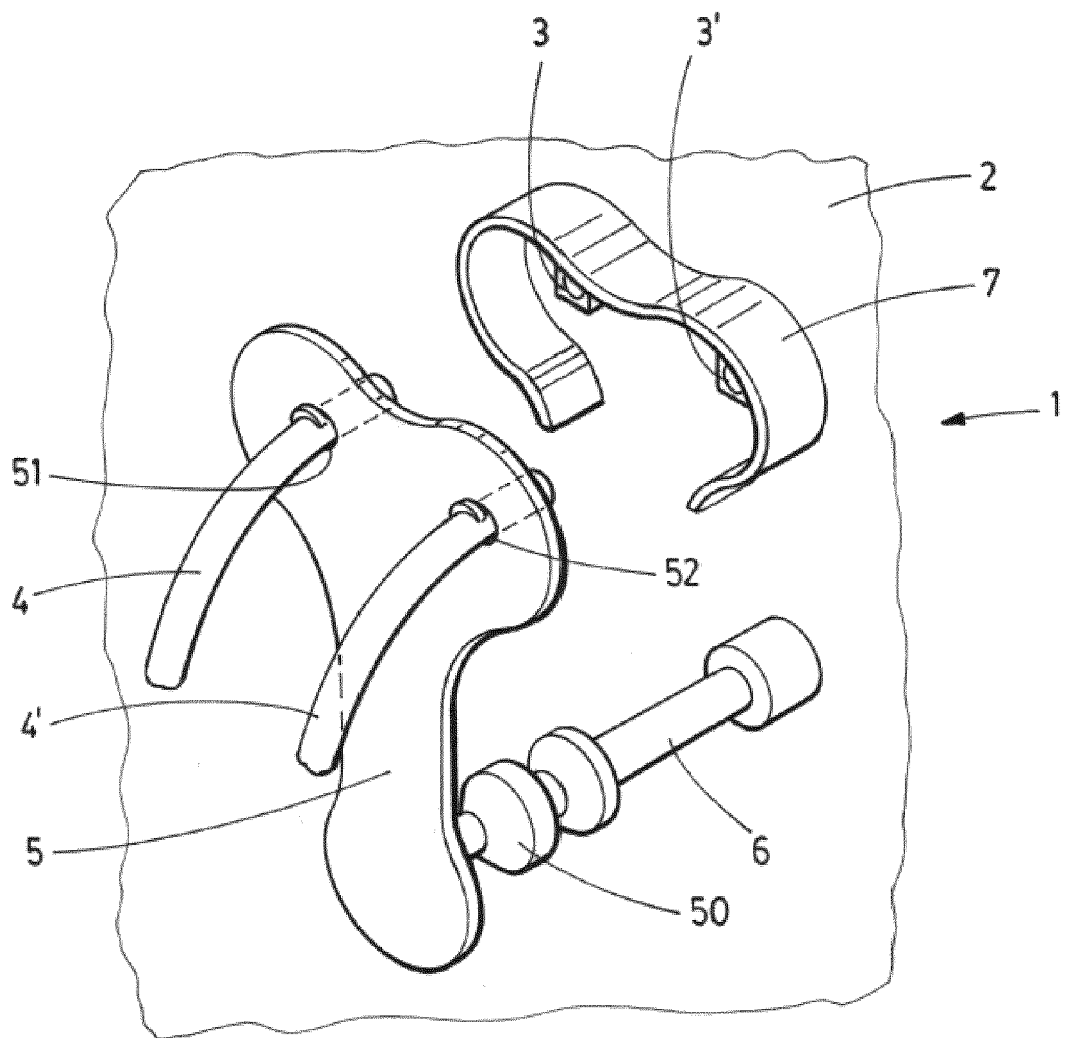
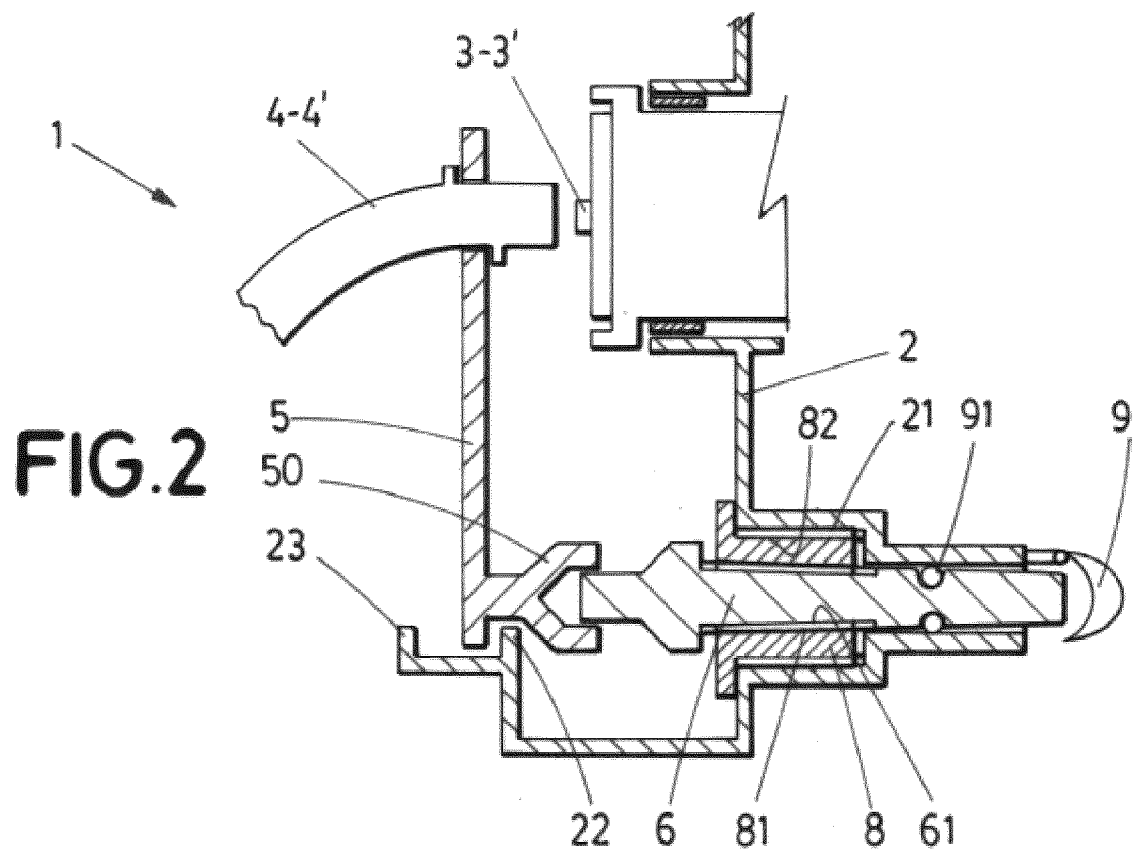


FIG.1



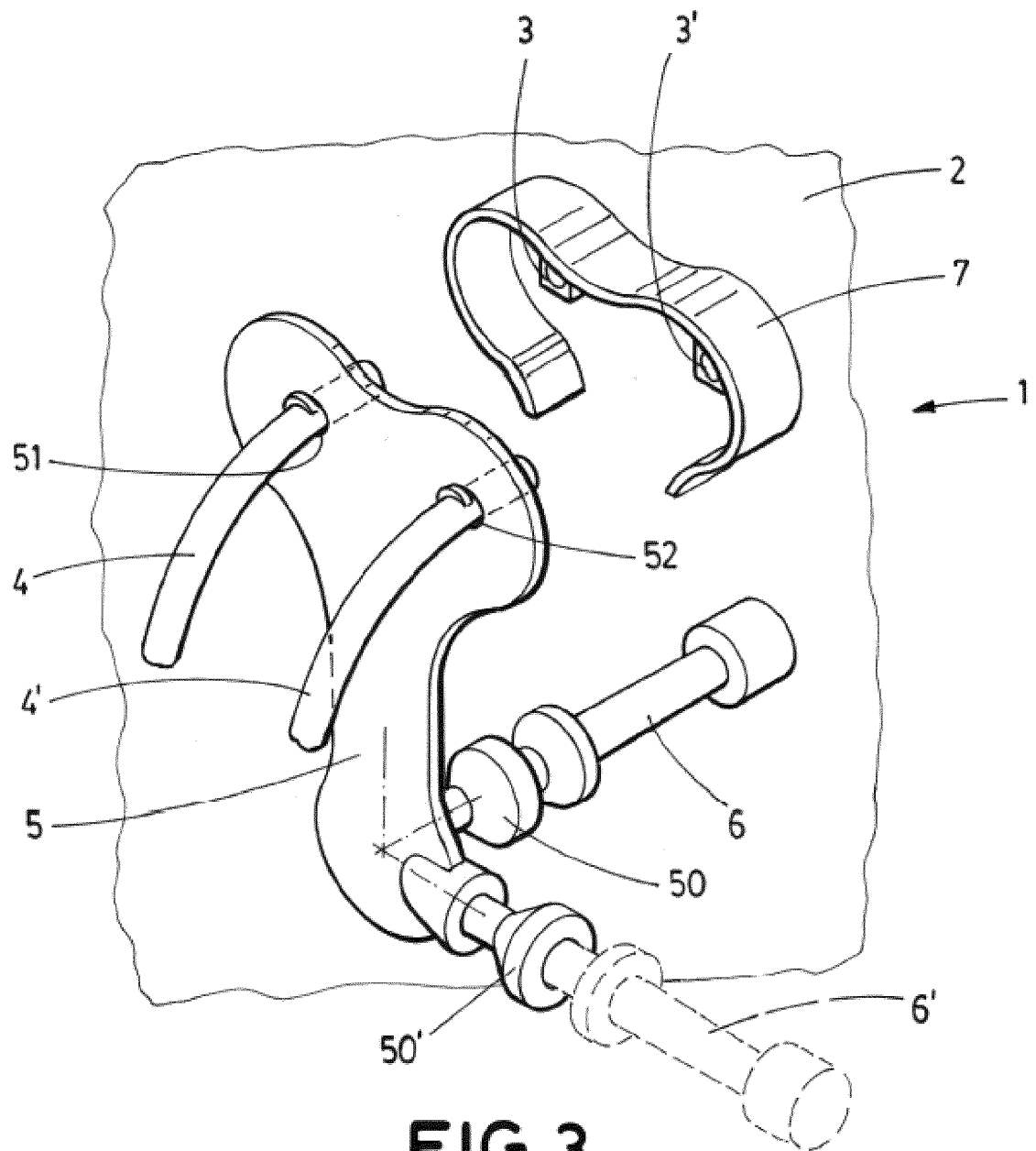


FIG.3

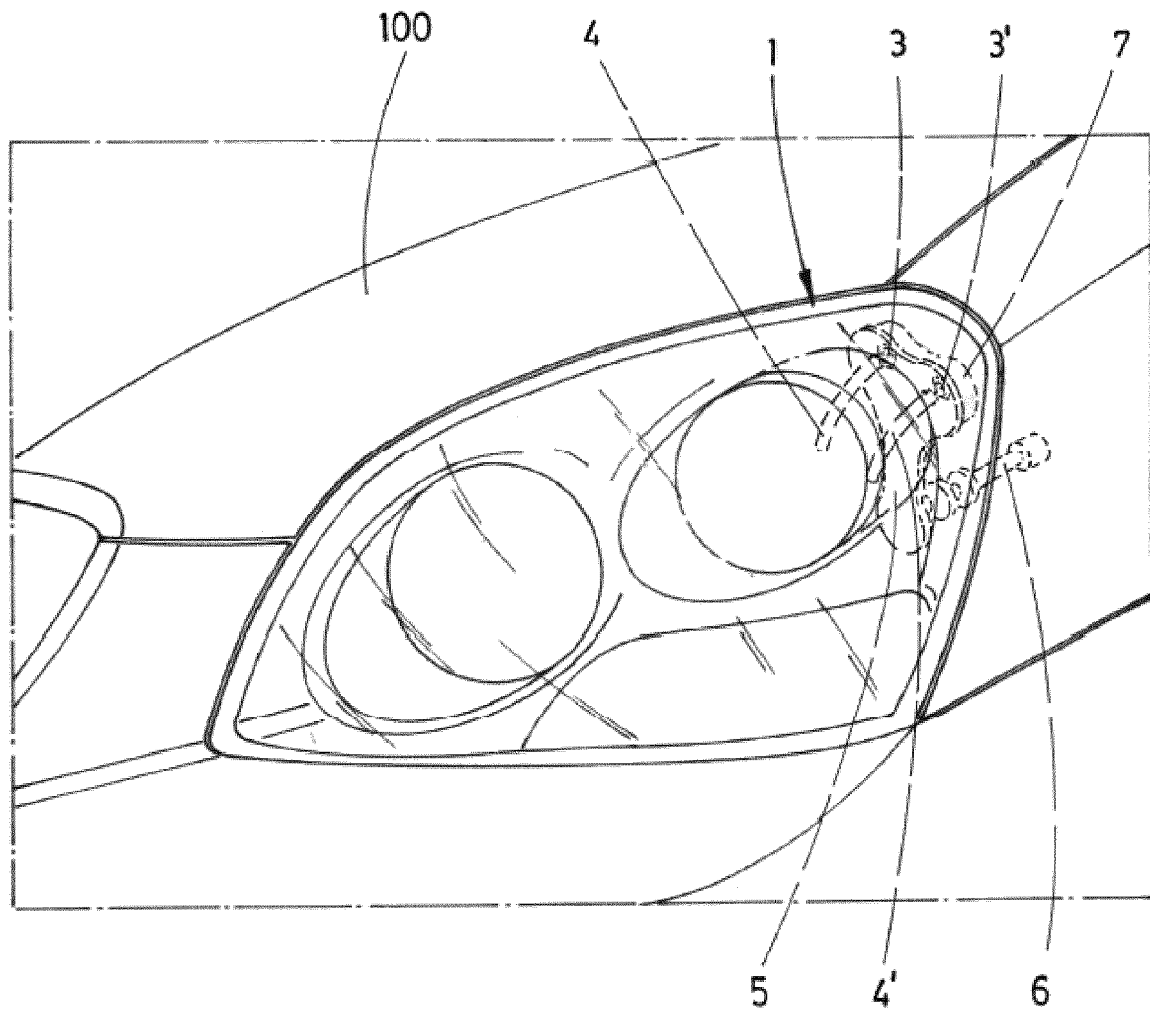


FIG. 4



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 Application Number
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