(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 982 034 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
13.04.2022 Bulletin 2022/15

(21) Application number: **20200543.5**

(22) Date of filing: **07.10.2020**

(51) International Patent Classification (IPC):
F21S 41/20 *(2018.01)* ***F21S 41/29*** *(2018.01)*
F21S 43/20 *(2018.01)* ***F21S 45/10*** *(2018.01)*

(52) Cooperative Patent Classification (CPC):
F21S 43/14; F21S 43/26; F21S 43/50; F21S 45/10;
F21S 43/51

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

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(54) **LIGHTING ASSEMBLY FOR A VEHICLE**

(57) A lighting assembly (1) for a vehicle is disclosed which comprises a light source (10) accommodated in a housing (5) and configured to emit light; an outer lens (20) corresponding to the light source (10) and being transparent for the emitted light of the respective light source (10) in an outwards direction; a filter (30) being in direct contact with an inner surface of the outer lens (20) and configured to homogenize the emitted light; a black mask member (40) surrounding the filter (30) an internal element (50, 50A, 50B) in the housing (5). The internal element (50, 50A, 50B) and the black mask member (40) are formed to face each other in a manner that a gap (70) is formed between the internal element (50, 50A, 50B) and the black mask member (40), wherein the gap (70) comprises at least one bent portion (72).

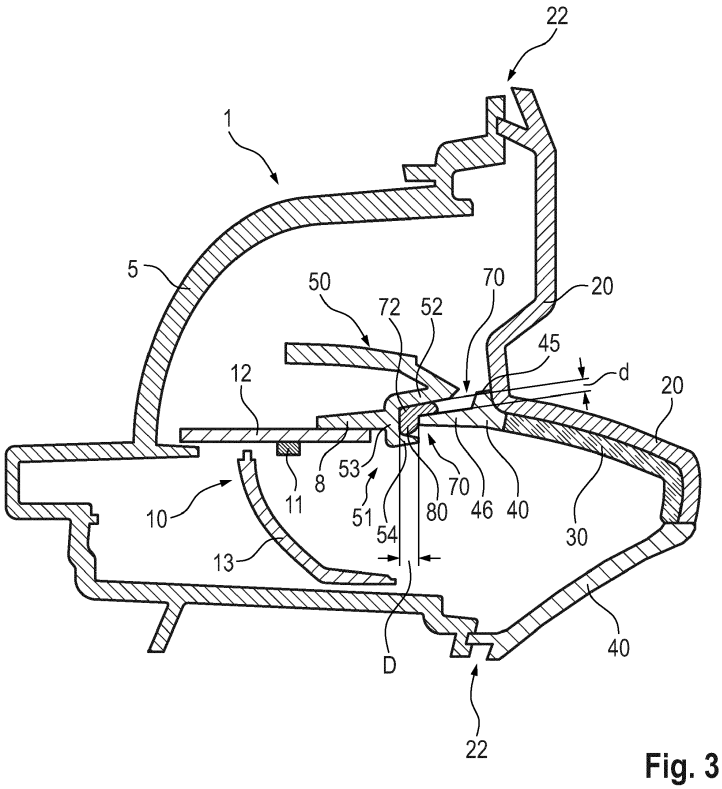

Fig. 3

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Description

[0001] The invention relates to a lighting assembly for a vehicle, in particular a rear-lighting assembly or a head-lighting assembly. A further aspect of the invention relates to a vehicle comprising the lighting assembly.

[0002] A typical lighting assembly for vehicles comprises a light source accommodated in a housing which is covered by an outer lens or cover to protect the light source and which transmits the emitted light from the light source to the outside of the vehicle. This transmitted light provides illumination and indicates information, warnings, driving manoeuvers to observers, other drivers or traffic participants.

[0003] The D10 2012 012 330 A1 discloses a lighting assembly for a vehicle which comprises a cover and a housing with an internal primary light source, wherein a secondary light source is provided which illuminates the coupling edge where the cover is coupled to the housing.

[0004] Internal elements like a bezel member or a printed circuit board may be positioned within the housing. Some internal elements are required to extend to the outer lens as close as possible. However, for assembly reasons, in particular when the outer lens has to be welded e.g. via vibration welding to the housing, a small distance to the outer lens has to be reserved to prevent a damage arising from impacts during the assembly process caused by vibrations.

[0005] This clearance, i.e. very small gap/distance between any internal element and the outer lens, however, may lead to light leakage and thus to a loss of intensity of the light function. The problem of light leakage is increased, when a homogenizing element is further used. Then, light directions are randomized in a manner, that an even larger fraction of light may leak.

[0006] Therefore it is an object of the underlying invention to provide a lighting assembly with a distinct lighting function and reduced light leakage while preventing damage in a manufacturing process. Further aspects solved by the present invention may be become clear in the context of the following disclosure.

[0007] In one aspect of the invention, a lighting assembly for a vehicle is comprised. The lighting assembly comprises a light source accommodated in a housing. The light source is configured to emit light. Further, an outer lens corresponds to the light source and is transparent for the emitted light of the respective light source in an outwards direction. The lighting assembly comprises a filter being in direct contact with an inner surface of the outer lens. The filter is configured to homogenize the emitted light. The lighting assembly comprises a black mask member which surrounds the filter. The lighting assembly further comprises an internal element in the housing. The internal element and the black mask member are formed to face each other in a manner that a gap is formed between the internal element and the black mask member, wherein the gap comprises at least one bent portion.

[0008] An outer lens may be in other words and outer cover or an outside cover. The outer lens may cover the light source to the outside. The outer lens may be coupled to the respective housing to form an enclosure for the light source. The light source may be any source that is capable of irradiating, reflecting or transmitting light. For example, the light source may be an array of LEDs or any other direct or indirect light emitter as for example a light reflector, a light collimator, a light pipe, a lamp or a light surface or the like. The outer lens may be made of plastic, but the invention is not restricted thereto. The outer lens may have a transparent component. For example, the outer lens may be clear or in other words "white" or for example of red colour, but the invention is not restricted thereto. A filter may in other words be a light homogenizer element. The filter may form a layer on the inner surface of the outer lens. The filter may be configured to homogenize the light that is received form the respective light sources. For example, a filter may be a light diffusor. A filter may comprise scattering particles to scatter light in a diffusive way or may comprise a diffusive surface. The filter may have in other words the function to blur or distribute the light that is coming from the respective light source. A black mask member may be a member which absorbs light generated by the light source. The black mask member may have the function to prevent any light to pass or exit to the outside via the black mask member. That is, the black mask member may help to provide a clear and distinct light signature that is only outputted via the filter surrounded by the mask member. The internal element may be in other words an internal structural or functional component. The internal element may for example be a printed circuit board or a bezel member, but the invention is not restricted thereto. The gap may be required for assembly or manufacturing reasons, see below. The bent portion may be bent in a rounded manner or may comprise edged parts to improve light absorption. It is implicit, that the internal element has to be positioned or has to extend in a manner to form the gap with the black mask member according to the invention.

[0009] A manufacturing process of the lighting assembly typically requires the step of welding, preferably vibration welding, of the outer lens to the housing to complete or finalize the lighting assembly. In other examples, hot gas welding or laser welding may be used. The vibrations, i.e. small displacements typically on a millimetre scale, require a gap between every internal element and the outer lens such that no damage or break occurs during the time window of the welding process. Due to the gap, light leakage may occur which may be even facilitated by the direct contact of the filter with the outer lens. According to the invention, the black mask member is used to generate the required gap together with the internal element to prevent leakage via the filter. Due to the at least one bent portion a light labyrinth is provided. Thus, light emitted by the light source may be absorbed due to the bent portion. The absorption may be reached

due to the bent geometry itself, but also supportive due to the black mask member acting as light-absorbing surface in the gap. Therefore, the assembly process is improved, since damage is avoided, and also the light leakage is improved to make a clearer light function. The design and optical appearance is improved and also the signal transmittance is clearer. The black mask member is used in combination with the internal element wherein the light absorbance of the black mask member is utilized to absorb light passing and reflecting within the gap to prevent light leakage.

[0010] At least one bent portion of the gap may bend more than a right angle, preferably more than 135°. The long turn angle reduces further light leakage. The bent portion forms a light labyrinth with reduced light leakage intensity. Bent angle may be defined with respect to the opening direction or initial direction of the gap.

[0011] One among the black mask member and the internal element may include a channel member forming a channel and the other one among the black mask member and the internal element may include a protruding portion which extends into the channel such that the gap is formed between the protruding portion and the channel member. Channel may also be referred to as a cavity. Bent angles of the bent portion of up to 180° with respect to initial direction can be formed which reduce further the leaked light intensity.

[0012] The channel member may comprise side portions opposing each other, a base portion which connects the side portions, wherein the side portions are formed to extend parallel to corresponding surfaces of the protruding portion. The protruding portion may be formed with equal width along the protruding portion. In other embodiments, the protruding portion may be formed in cone shape narrowing towards the base portion to improve stability. The parallel extension implies constant distance along the surfaces of the protruding portion.

[0013] The spatial distance between the protruding portion and the base portion may be between 2 and 3 mm. When the spatial distance may be below 2 mm, in a successive vibration process as final manufacturing step, the protruding portion may exert impacts due to the displacements caused by vibration on the base portion, which may cause damage or even breakage. When the spatial distance is above 3 mm, the leaked light intensity through the light labyrinth may become too high.

[0014] A spatial distance between the side portions and the protruding portion may be between 2 and 3 mm. When the spatial distance may be below 2 mm, in successive vibration process as a final manufacturing process, the side surfaces of the protruding portion may exert impacts on the side portions, which may cause damage. When the spatial distance is above 3 mm, the leaked light intensity through the light labyrinth may be too high.

[0015] The gap may comprise a plurality of bent portions. For example, there may be two bent portions with opposite rotation direction or in other words with opposite turning direction. The light labyrinth may then even more efficient in terms of preventing light leakage through the gap.

[0016] A light blocking member may be positioned inside the gap. Light leakage is then reduced due to the presence of the light blocking member in the gap.

[0017] The light blocking element may comprise a soft material. When the light blocking member comprises a soft material, the light blocking member may absorb vibrations of a successive welding process to couple the outer lens with the housing. By these vibrations, the light-blocking member may be able to absorb entirely the displacement variations such that no damage or brake takes place. Soft material may mean that the light blocking element is of a material with higher elasticity compared to the elasticity of the black mask member and the internal element.

[0018] The light blocking element may be a foam or a glue. These materials may provide the required elasticity suitable to absorb the vibrations generated in the welding process while light-blocking the gap to reduce light intensity leakage.

[0019] The light blocking element may fill the spatial distance between the protruding portion and the base portion. Light thus has then no free path through the gap. When sufficiently elastic, the vibrations are received by the light blocking member. The critical tip portion of the protruding portion is thus sufficiently protected. The filling may mean continuous filling.

[0020] The light blocking member may continuously fill at least the bent portion. Thus, the complete bending part is sufficiently protected while light leakage is prevented. The filling may mean continuous filling.

[0021] The light-blocking element may comprises an opaque material. Opaque may be non-transparent for the light. The opaque property refers to the wavelength of the generated light of the light source.

[0022] The lighting assembly may comprise a first internal element and a black mask member at a first side of the filter are formed to face each other in a manner that a gap with a bent portion is formed between the first internal element and the black mask member, a second internal element and a black mask member at a second side of the filter are formed to face each other in a manner that a gap with a bent portion is formed between the second internal element and the black mask member. Thus, on both sides of the filter, such a light leakage structure may be formed reducing light leakage und thus lead to well defined and sharp light function outputted by the filter.

[0023] In a further aspect of the invention, a vehicle is disclosed which comprises a lighting assembly.

[0024] Further preferred embodiments of the invention will become clearer in the context of the further features of the dependent claims.

[0025] The various embodiments of the present invention as disclosed in the following are advantageously combinable with each other are unless not explicitly mentioned otherwise.

[0026] The invention is disclosed in the following embodiments in accordance with the corresponding drawings. The drawings show:

Figure 1 a vehicle according to an embodiment of the invention with a lighting assembly according to an inventive concept,

Figure 2 a lighting assembly in a section view according to a first embodiment of the invention,

Figure 3 a lighting assembly in a section view according to a second embodiment of the invention,

Figure 4 a lighting assembly in a section view according to a third embodiment of the invention,

Figure 5 a lighting assembly in a section view according to a fourth embodiment of the invention, and

Figure 6 a vehicle according to an embodiment of the invention with a lighting assembly according to an inventive concept.

[0027] Figure 1 shows a vehicle 100 from a rear view perspective with a lighting assembly 1 according to an inventive concept of the invention. The lighting assembly 1 in this particular example refers to a rear-lighting assembly as illustrated in Fig. 1. The various inventive concepts of the lighting assembly 1 will be explained in more detail in the context of the Figures 2 to 5 and the description thereto.

[0028] As can be seen in particular in the enlarged insert of Fig. 1, the lighting assembly 1 comprises an outer lens 20. The lighting assembly 1 further comprises a light source, which is positioned, in this perspective, behind the outer lens 20 (not shown in this perspective). The outer lens 20, also referred as an outer cover or outside cover, is configured to emit light to the outside or in other words in an outwards direction. The outer lens 20 may be transparent for the emitted light of the respective light source. For example, the outer lens 20 may be clear or coloured, e.g. coloured in red, but the invention is not restricted thereto.

[0029] The lighting assembly 1 comprises a filter 30 which is in direct contact with an inner surface of the outer lens 20, which will be explained in more detail in the context of the Figures 2-5. The filter 30 is configured to homogenize the respective emitted light from the light source.

[0030] As can be seen in Fig. 1, a gap 4 may be formed in the outer lens 20. The gap 4 may divide the lighting assembly 1 into a first lighting array 2A and a second lighting array 2B separated by said gap 4. However, the invention is not restricted thereto, and in other embodiments a lighting array may only present on either side of the gap 4. In this example, the first lighting array 2A may be rigidly connected to the vehicle 100. The second lighting array 2B may be part of a trunk lid that is movably, i. e. rotatably, coupled to the vehicle 100. The lighting assembly 1 may also be a front-light assembly, see Fig. 6 below.

[0031] Figure 2 shows a lighting assembly 1 of section A as indicated for illustration in Fig. 1 according to a first embodiment of the present invention. However, this is for mere illustration, i.e. the section A may also be at a position where section B is indicated in Fig. 1.

[0032] The lighting assembly 1 comprises a housing 5 for accommodating internal elements. The housing 5 may be formed of a metal, e.g. aluminium or steel, or of plastic or a combination thereof.

[0033] The lighting assembly 1 may further comprise a light source 10. The light source 10 is accommodated in the housing 5. Further, the light source 10 is configured to emit light. The light source 10 in this example may comprise one or more LEDs 11 as direct light source and a light reflector 13 as indirect light source, which reflects the light of the LED 11 in reflection directions. The LEDs may be arranged in an LED array (not shown in this section view). The LEDs 11 may be positioned on a printed circuit board 12 which may include wirings to connect and control the LEDs. However, the invention is not restricted to a particular type of light source 10. For example, the light source may be another direct or indirect light emitter as for example a light collimator, a light pipe, a lamp or a light surface or the like.

[0034] The light assembly 1 comprises an outer lens 20 or in other words an outer cover. The outer lens 20 may protect the light assembly 1 to the outside direction to prevent the internal elements from e.g. impacts or humidity. Further, the outer lens 20 is transparent for the emitted light of the light source 10. For example, light emitted by the LEDs 11 may be directly or indirectly via the light reflector 13 transmitted through the outer lens 20 to the outside.

[0035] The outer lens 20 may be coupled to the respective housing 5 to form a common enclosure for the light source 10. Preferably, the outer lens 20 may be coupled to the housing 5 by a welding connection 22, i. e. by a welding process like vibration welding. Further, the outer lens 20 may be formed in various profile geometries to generate a desired optical appearance of the light function.

[0036] The light assembly 1 further comprises a filter 30. The filter 30 is, as shown in Figure 2 and also the Figures 3 to 5, in direct contact with an inner surface of the outer lens 20. The filter 30 may form a layer or a coating on the outer lens 20, as shown in the present Figure. The filter 30 homogenizes or blurs the emitted light coming from the light source 10. A filter 30 may be in other words a light homogenization element, for example a diffusor or a surface-treated material. The direct contact is preferably realized by bonding the filter 30 to the outer lens 20. In a preferred embodiment, the bonding to the outer lens 20 may be generated by skin injection

moulding. Preferably, the filter 30 may be in direct contact with a protruding section of the outer lens 20 protruding to the outside. Then, external vision and appearance of the lighting function may be enhanced when viewed from an upper angle, see the present Fig. 2 as example.

[0037] Further, the lighting assembly 1 comprises a black mask member 40. The black mask member 40 may be a light absorber for absorbing the light emitted by the light source 10. The black mask member 40 surrounds the filter 30. Due to the surrounding of the filter 30, light output is restricted to the area of the outer lens 20 which is occupied by the filter 30. The black mask member 40 thus has the effect of providing a sharp and clear definition of the light function. The black mask member 40, in the section view, may comprise an upper part and a lower part. For example, the black mask member 40 may also be in direct contact with an inner surface of the outer lens 20, e.g. skin moulding injected, see the upper part of the black mask member 40 in Fig. 2. However, the black mask member 40 may also form an extension of the outer lens 20 as in the lower part thereof in Fig. 2, e.g. by direct injection as outer lens, but the invention is not restricted thereto, e.g. both parts could be in direct contact with the inner surface of the outer lens 20. Both upper and lower part directly contact with the filter 30 to surround the filter 30, thereby providing a clear and distinct visual boundary for the outputted light function.

[0038] The lighting assembly 1 further comprises at least one internal element 50. The internal element 50 may be in general a structural or functional element accommodated inside the housing 5. In this particular case, the internal element 50 is a bezel member 8. In other embodiments, the internal element 50 may be a printed circuit board or a support member of the housing 5, see Figs. 4 and 5, but the invention is not restricted thereto. In this case, the internal element 50, i.e. the bezel member 8, may be coupled to the printed circuit board 12.

[0039] The internal element 50 and the black mask member 40 are formed to face each other. This requires a positioning or extension of these elements. In particular, the internal element 50 and the black mask member 40 face each other in a manner that a gap 70 is formed between the internal element 50 and the black mask member 40. Further, the internal element 50 and the black mask member 40 are formed such that the gap 70 comprises at least one bent portion 72. In the present example, the gap 70 may be entirely filled with air.

[0040] An assembly process would require the step of welding, preferably vibration welding, of the outer lens 20 to the housing 5, see the welding connections 22 as indicated in the Figures 2 to 4. The vibrations, i.e. small local oscillatory displacements, require a gap between an internal element 50 and the outer lens 20 in order to prevent destruction or damage during the process of welding. Since in the present situation the filter 30 is in direct contact with the outer lens 30, a light leakage via a gap at the filter 30 may be facilitated by the direct contact of the filter 30 with the outer lens 20. In order to prevent such leakage, according to the present invention, the black mask member 40 is used to generate the required gap 70 in between together with the internal element 50.

[0041] Due to the at least one bent portion 72 a light labyrinth is provided. Thus, light emitted by the light source 10 may for example move in the direction to enter the gap 70 and then may be absorbed due to the bent portion 72 formed between the internal element 50 and the black mask member 40. The absorption is reached due to the bent geometry itself, but also due to the supportive involvement of the black mask member 40 as light-absorbing surface inside the gap 70 for absorbing light that has entered the gap 70. Therefore, the assembly process is improved, since damage is avoided, and also the light leakage is reduced to make a clearer light function.

[0042] As can be seen in Fig. 2, the bent portion 72 of the gap 70 may bend more than 90° with respect to the opening direction of the gap 70. In particular, the bending angle maybe preferably more than 135°. In this succession, the light leakage may be more reduced, since the amount of absorbed light intensity may be increased by the bending angle, i.e. the light labyrinth may increase light absorbance and decrease light transmittance through the gap 70.

[0043] In this particular embodiment, the internal element 50 may comprises a channel member 51 for forming a channel. The black mask member 40 may include a protruding portion 46. The protruding portion 46 may extend, or protrude, into the channel of the internal element 50. Then, the gap 70 is formed between the protruding portion 46 and the channel member 51. The channel may also be referred to as a cavity. Nearly bent portions of about 180° may be generated. The protruding portion 46 may be a part of the black mask member 40 which protrudes form the outer lens 20 in an inwards direction away from the outer lens 20. In a further embodiment of the present invention, the internal member may comprise the protruding portion and the black mask member 40 may comprise the channel member, see the lower part in Fig. 4 below and the description thereto.

[0044] The channel member 51 may comprise side portions 52, 54 opposing each other and a base portion 53 which connects the side portions 52, 54. The side portions 52, 54 may be formed to extend parallel to corresponding surfaces of the protruding portion 46. Thus, a turn of more than 135°, or nearly 180° with respect to the opening direction of the gap 70 may be reached. A width of the gap 70 thus may be constant along the protruding portion 46. The protruding portion 46 may have a cone shape, which narrows towards the base portion 53, which may provide more stability. The side portions 52, 54 may overlap with the protruding portion 46.

[0045] The spatial distance D between the protruding portion 46 and the base portion 53 may be between 2 and 3 mm. When the distance D is below 2 mm, vibrations due to welding may damage the internal element 50 at

the base portion 53. When the distance D is above 3 mm, light leakage may be too high. Further, a spatial distance d between the side portions 52, 54 and the protruding portion 46 may be between 2 and 3 mm. Similarly, when the distance d is below 2 mm, vibrations due to welding may damage the internal element 50 at the side portions 52, 54. When the distance d is above 3 mm, light leakage may be too high. For example, the entire gap 70 may be formed to have a width between 2-3 mm to prevent vibrations to damage the internal element 50 or the black mask member 40.

[0046] The gap 70 may further, as indicated by the upper projecting portion 45 of the black mask member 40 at the upper end of the gap 70, comprise a plurality of bent portions 72, for example with opposite turn directions. Then, light leakage may be even more reduced, since the light absorption of the light labyrinth is enhanced.

[0047] Figure 3 shows a section view of a lighting assembly 1 according to a second embodiment of the present invention. In the following, only the differences with respect to the embodiment of Figure 2 are described below and for the other features, it is referred to Figs. 1 and 2 for these features.

[0048] The lighting assembly 1 comprises in this preferred embodiment a light blocking member 80. The light blocking member 80 may be configured to block a light that enters the gap 70. The light blocking element 80 may be positioned inside the gap 70. Due to this positioning, entering light may be absorbed by this element such that light leakage is further reduced.

[0049] Preferably, the light blocking element 80 may be of a soft material. Soft material mean that the light blocking element 80 may be deformable. It is clear to the person skilled in the art, that the other components, e.g. housing, cover or internal element have stiffness. In particular, the soft material may be capable of absorbing the vibrations arising from a subsequent welding process, i. e. a vibration welding process. Thus, the soft material may be a vibration-absorbing material. In particular, the elasticity of the light blocking element 80 may be higher, i.e. substantially higher, compared to the black mask member 40 and the internal element 50. For example, the light blocking element 80 may be a foam or a glue with such soft material property.

[0050] The light blocking element 80 may continuously fill the spatial distance D between the protruding portion 46 and the base portion 53. Due to the soft property, the potential contact between the tip of the protruding portion 46 and the base portion 53 may be protected. Further, this may prevent light leakage through the gap 70.

[0051] The light blocking member 80 may continuously fill at least the bent portion 72. Then, due to the soft property, also the side portions 52, 54 are protected and the light leakage due to a longer blocking length be increased. The light-blocking element 80 may comprise an opaque material as to prevent light from the light source 10 to pass through the gap 70.

[0052] Figure 4 shows a section of a lighting assembly 1 according to embodiments of the invention, e.g. section B as indicated in Fig. 1. Alternatively, the present lighting assembly may be a section A according to Fig. 1. Also here, only the differences with respect to the Figures 2 and 3 are disclosed. However, the features of the present Figure 4 can be combined with the features of Figures 2 or 3, to which it is referred to for the features that the skilled person readily identifies from the previous Figures.

[0053] The present embodiment comprises that a first internal element 50A and the black mask member 40 are formed to face each other in a manner that a gap 70 with a bent portion 72 is formed between the first internal element 50A and the black mask member 40. The first internal element 50A may again be a bezel member 8 similar to Figures 2 and 3. This embodiment has been described in detail in the context of the Figures 2 and 3, see above.

[0054] Further, a second internal element 50B and a black mask member 40 at a second side of the filter 30 are formed to face each other in a manner that a gap 70 with a bent portion 72 is formed between the second internal element 50B and the black mask member 40. Thus, in this embodiment, light leakage is prevented on both sides of the filter 30.

[0055] The lower part will now be described in more detail. In particular, in this embodiment, the roles of the internal element 50B and the black mask member 40 when forming the gap 70 are interchanged. In further embodiments of the light assembly 1, e.g. Figure 2 and 3, the gap 70 may be formed as described in the following. The second internal element 50B may be a printed circuit board 12 on which an LED 11, in particular an LED array, may be positioned and controlled and supplied by wirings. However, the internal element 50B is not restricted thereto and may be realized by a bezel member, for example.

[0056] In this embodiment, the black mask member 40 may comprise a channel member 41 forming a channel and the internal element 50B includes a protruding portion 56 which extends into the channel such that the gap 70 is formed between the protruding portion 56 and the channel member 41. The advantage of this embodiment is that light absorption of light reaching the gap 70 may be increased, since the black mask member 40 may form the channel, i.e. the outer surface of the bend portion 72.

[0057] The channel member 41 may comprise side portions 42, 44 opposing each other and a base portion 43 which connects the side portions 42, 44. The side portions 42, 44 may be formed to extend parallel to corresponding surfaces of the protruding portion 56. The distances d, D may be defined to be between 2-3 mm. Furthermore, a light-blocking element 80 may be placed in the gap 70 in a similar manner as described above. A redundant description is avoided for the sake of conciseness and it is referred to Figures 2 and 3 also for the interchanged or inverse features of the channel member

41, 51.

[0058] Figure 5 shows a section of yet another embodiment of a lighting assembly 1 according to the present invention. In this embodiment, the internal element 50 which forms the gap 70 together with the black mask member 40 may be a structural support member 6 which is directly coupled to the housing 5, here for example by a mechanical connection 7, i.e. by a screwed connection or in other embodiments by a welding connection. The gap 70 is formed in a similar manner as described in the Figures 2 and 3. Further, the light source 10 may be realized by a light guide 14. In this example, the outer lens 20 may be coupled to the housing 5 via a glued connection 28. The housing 5 may comprise a channel member 27 forming a channel which may be filled with an adhesive 26. A part of the outer lens 20, i.e. a tip part, may protrude into the adhesive 26 to be glued to the housing 5 via the adhesive 26. This may be seen in the glued connection 28 in the lower connection. In another example, the mask member 40 may protrude with a tip part thereof into the adhesive 26 to form a glued connection 28 with the housing 5. This may for example be seen in the upper glued connection 28, however, in other examples, both upper and lower connections may connect the outer lens 20, i. e. a part thereof, to the housing 5. The present lighting assembly 1 may be preferably used for a front-lighting assembly as indicated in the following Fig. 6. For further common features, it is referred to Figs. 1-4.

[0059] Figure 6 shows a vehicle 100 from a front view perspective with a lighting assembly 1 according to an embodiment of the invention. In consequence, the lighting assembly 1 in this particular example refers to a front-lighting assembly. The various inventive concepts of the lighting assembly 1 as they have been explained in more detail in the context of the detailed embodiments of the Figures 2 to 4 can be also applied to the present situation. Preferably, the embodiment of Figure 5 may be used at section C indicated in Fig. 6.

[0060] The details of the lighting assembly 1 may be taken from one of the previous embodiment, in particular e.g. from Fig. 5 for this embodiment.

[0061] The lighting assembly 1 as disclosed in various embodiments according to the present invention provides a contrast-clear light signature with limited light leakage and limits the risks of damage due to vibrations exerted e.g. by welding processes in a subsequent assembly.

Reference signs

[0062]

1 lighting assembly

2A first lighting array
2B second lighting array
4 gap
5 housing
6 support member
7 mechanical connection

8 bezel member

10 light source
11 LED
12 printed circuit board
13 light reflector
14 light guide

20 outer lens
22 welding connection
26 adhesive
27 channel member
28 glued connection

30 filter

40 black mask member
41 channel member
42 first side portion
43 base portion
44 second side portion
45 upper projecting portion
46 protruding portion

50 internal element
50A first internal element
50B second internal element

51 channel member
52 first side portion
53 base portion
54 second side portion

56 protruding portion

70 gap
72 bent portion

80 light blocking element

D spatial distance
d spatial distance

100 vehicle

Claims

1. Lighting assembly (1) for a vehicle, comprising:

- a light source (10) accommodated in a housing (5) and configured to emit light;
- an outer lens (20) corresponding to the light source (10) and being transparent for the emit-

ted light of the respective light source (10) in an outwards direction;
- a filter (30) being in direct contact with an inner surface of the outer lens (20) and configured to homogenize the emitted light;
- a black mask member (40) surrounding the filter (30);
- an internal element (50, 50A, 50B) in the housing (5);

characterized in that,
the internal element (50, 50A, 50B) and the black mask member (40) are formed to face each other in a manner that a gap (70) is formed between the internal element (50, 50A, 50B) and the black mask member (40), wherein the gap (70) comprises at least one bent portion (72).

2. Lighting assembly (1) of claim 1, **characterized in that** the at least one bent portion (72) of the gap (70) is bends more than a 90°, preferably more than 135°.

3. Lighting assembly (1) of one of the claims 1 to 3, **characterized in that** one among the black mask member (40) and the internal element (50, 50A, 50B) includes a channel member (41, 51) forming a channel and the other one among the black mask member (40) and the internal element (50, 50A, 50B) includes a protruding portion (46, 56) which extends into the channel such that the gap (70) is formed between the protruding portion (46, 56) and the channel member (41, 51).

4. Lighting assembly (1) of claim 3, **characterized in that** the channel member (41, 51) comprises side portions (42, 44, 52, 54) opposing each other, a base portion (43, 53) which connects the side portions (43, 53), wherein the side portions (42, 44, 52, 54) are formed to extend parallel to corresponding surfaces of the protruding portion (46, 56).

5. Lighting assembly (1) of claim 4, wherein the spatial distance (D) between the protruding portion (46, 56) and the base portion (43, 53) is between 2 and 3 mm.

6. Lighting assembly (1) of one of the claims 4 to 5, **characterized in that** a spatial distance (a) between the side portions (42, 44, 52, 54) and the protruding portion (46, 56) is between 2 and 3 mm.

7. Lighting assembly (1) of one of the claims 1 to 6, **characterized in that** the gap (70) comprises a plurality of bent portions (72).

8. Lighting assembly (1) of one of the claims 1 to 7, **characterized in that** a light blocking member (80) is positioned inside the gap (70).

9. Lighting assembly (1) of claim 8, **characterized in that** the light blocking element (80) is a soft material.

10. Lighting assembly (1) of claim 8, **characterized in that** the light blocking element (80) is a foam or a glue.

11. Lighting assembly (1) of claims 8 to 10, when dependent on claim 3, **characterized in that** the light blocking element (80) fills the spatial distance (D) between the protruding portion (46, 56) and the base portion (43, 53).

12. Lighting assembly (1) of claim 11, **characterized in that** the light blocking member (80) fills at least the bent portion (72).

13. Lighting assembly (1) of one of the claims 8 to 12, **characterized in that** the light-blocking element (80) comprises an opaque material.

14. Lighting assembly (1) of one of the claims 1 to 13, **characterized in that** a first internal element (50A) and a black mask member (40) at a first side of the filter (30) are formed to face each other in a manner that a gap (70) with a bent portion (72) is formed between the first internal element (50A) and the black mask member (40), a second internal element (50B) and a black mask member (40) at a second side of the filter (30) are formed to face each other in a manner that a gap (70) with a bent portion (72) is formed between the second internal element (50B) and the black mask member (40).

15. Vehicle (100), comprising a lighting assembly (1) of one of the claims 1 to 14.

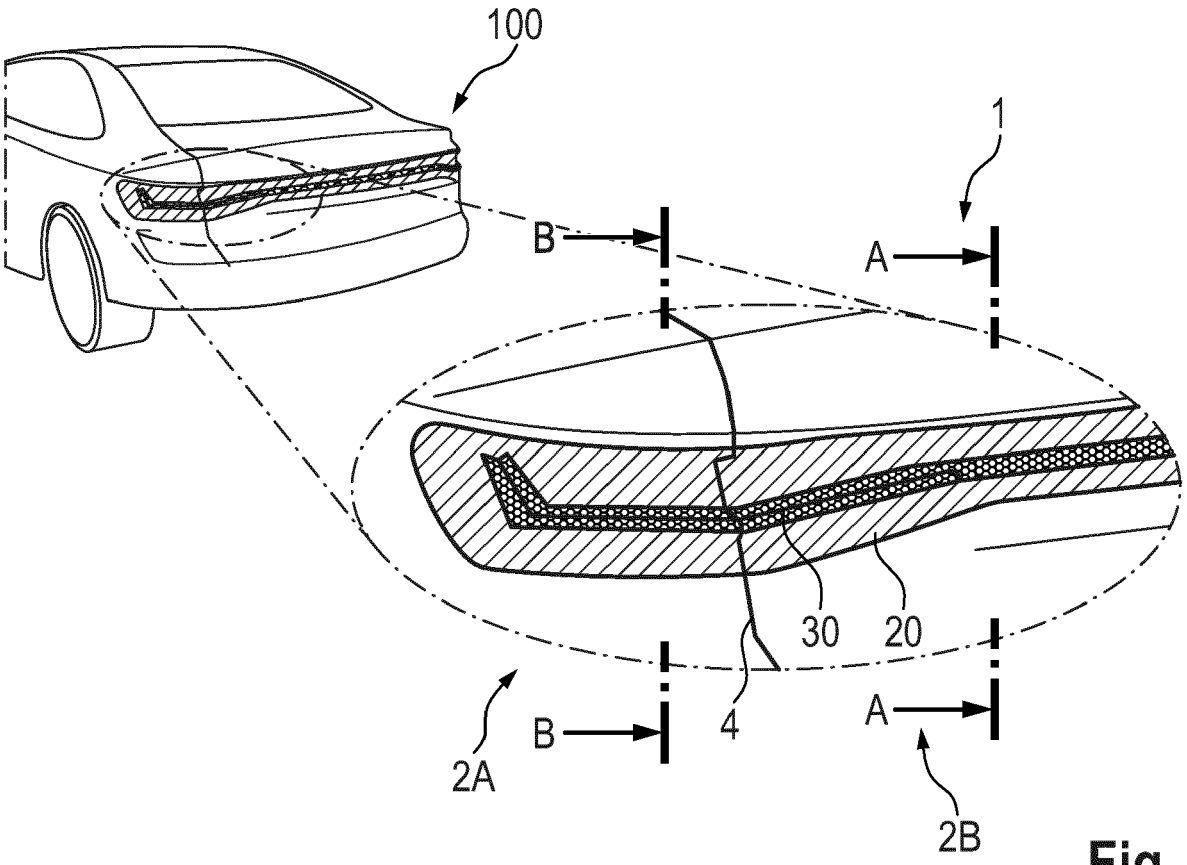


Fig. 1

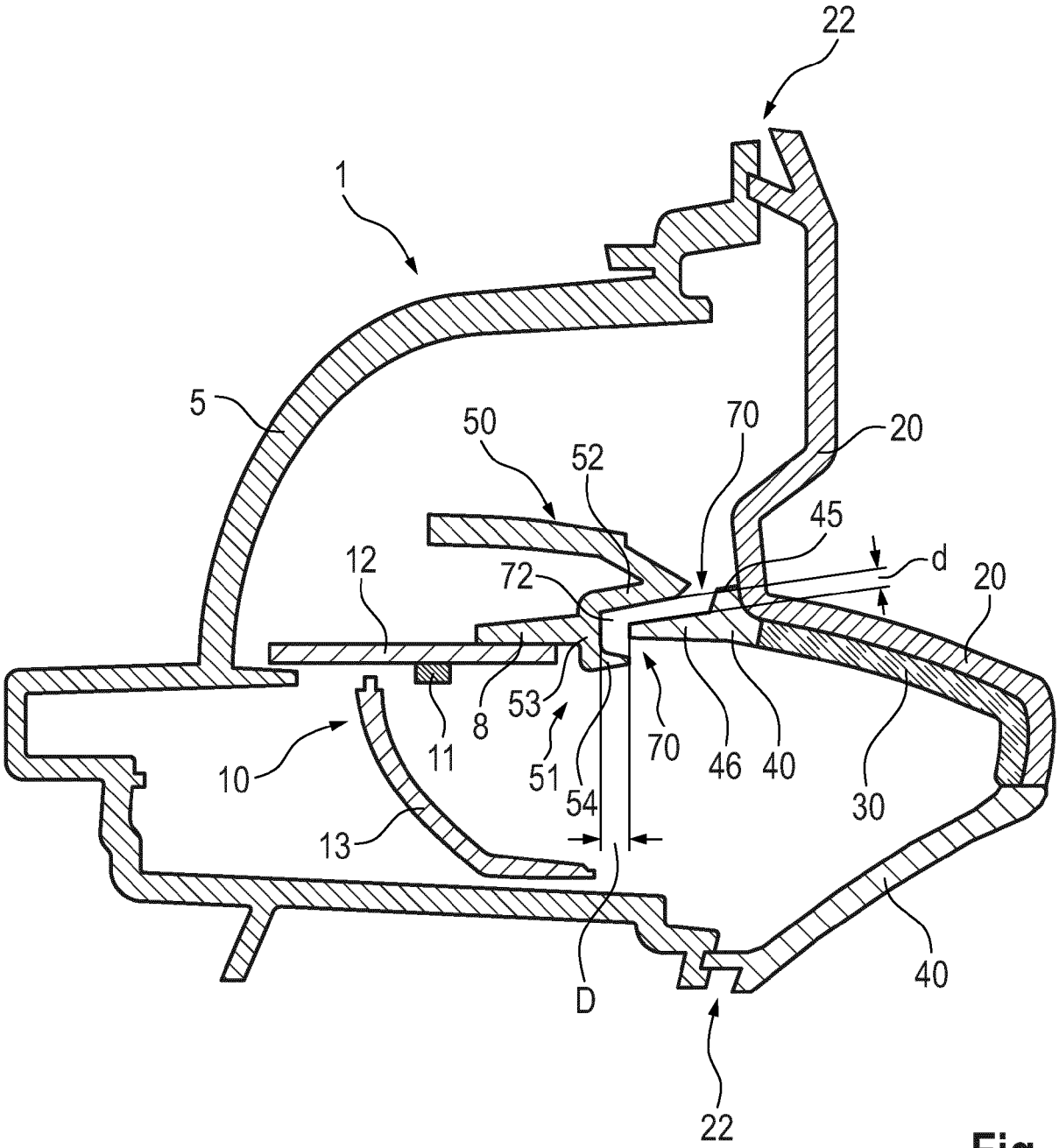


Fig. 2

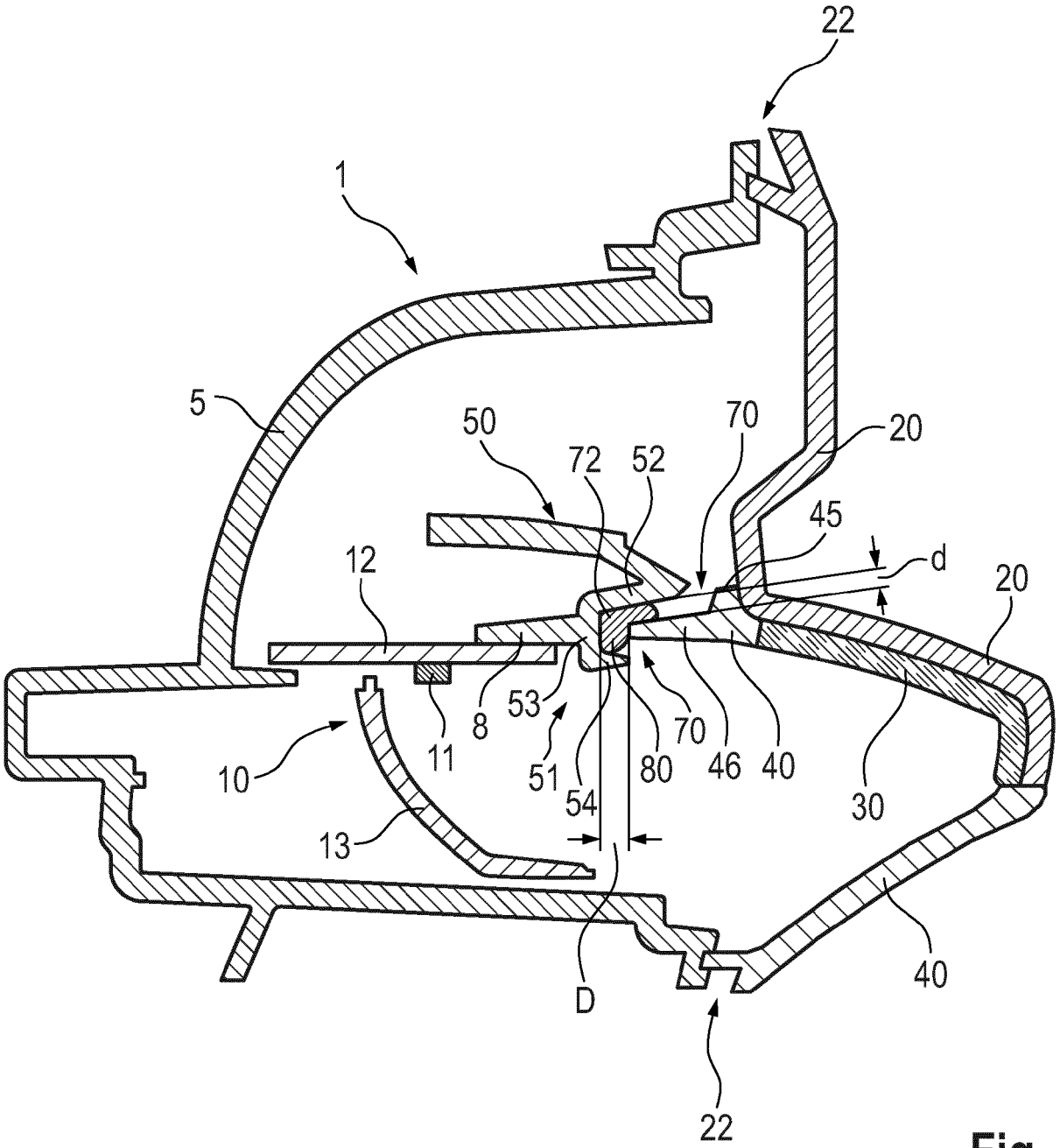
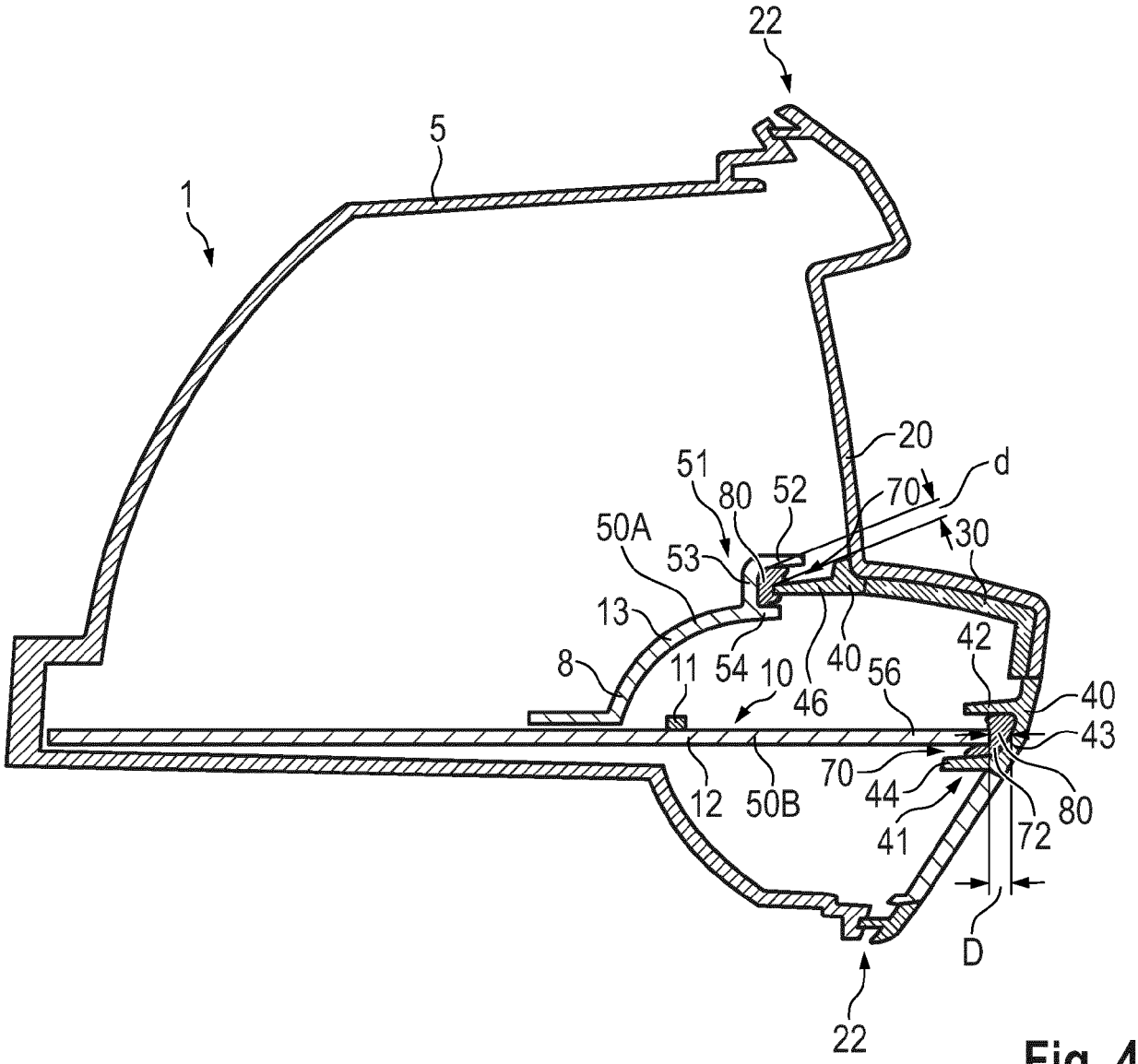


Fig. 3


22
5
1
20
51
80
52
70
d
50A
53
30
13
42
8
11
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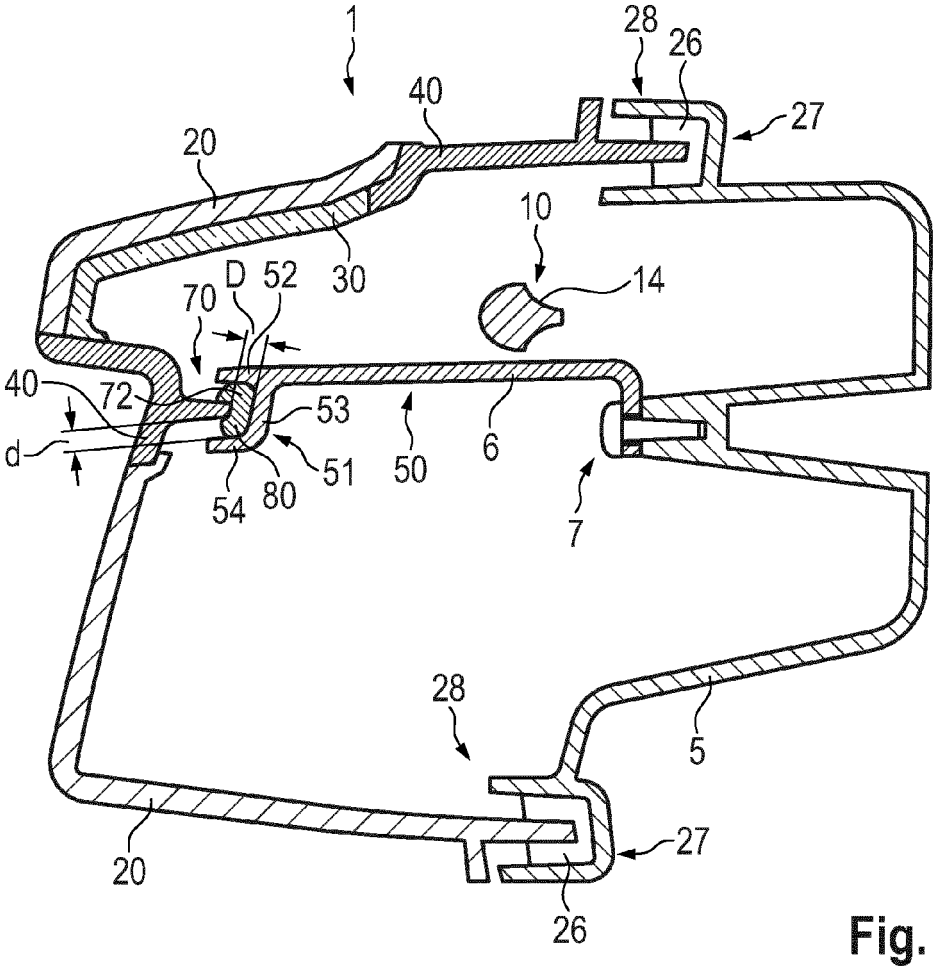
10
40
56
40
46
43
70
44
80
12
50B
41
72
D
22

Fig. 4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28
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40
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26

Fig. 5

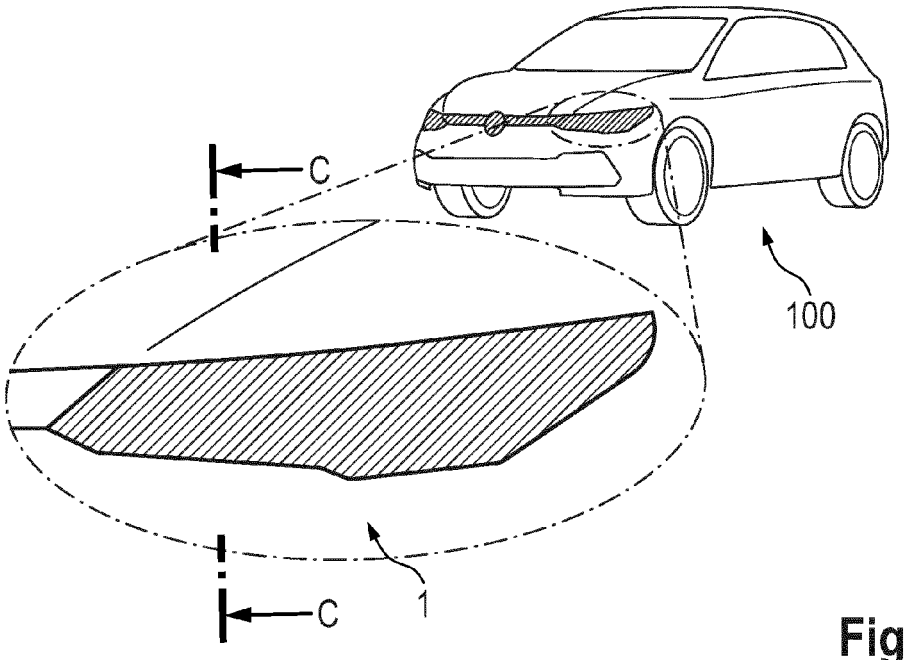
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Fig. 6

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EUROPEAN SEARCH REPORT

Application Number
EP 20 20 0543

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 2005/146887 A1 (CALDERAS JEFFREY J [US]) 7 July 2005 (2005-07-07) * abstract; figures 7,9 * * paragraph [0031] - paragraph [0037]; figures 4,5 * * column 9, line 39 - column 10, line 44 *	1-15	INV. F21S41/20 F21S41/29 F21S43/20 F21S45/10
A	US 2018/118986 A1 (YOO MIN KEUN [KR] ET AL) 3 May 2018 (2018-05-03) * abstract; figures 4,5 * * paragraph [0005] - paragraph [0017] * * paragraph [0077] - paragraph [0079] *	1-15	

TECHNICAL FIELDS SEARCHED (IPC)

F21S

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	8 March 2021	Jakober, François

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08-03-2021

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