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(54) **LIGHTING DEVICE FOR VEHICLES HAVING ROTATING LIGHTING MODULES**

(57) Lighting device (1) for a vehicle including a cup-shaped housing body (2) having a front inlet opening (3), a transparent cover (4) closing the front inlet opening, a plurality of first and second lighting modules (5,6) arranged side by side inside the housing body spaced apart from the inlet opening (3), and an aesthetic mask (7) to cover a gap (8) between the transparent cover and the light modules; wherein the aesthetic mask includes a first masking element (9) connected integral with an inner surface (10) of the transparent cover and protruding towards the lighting modules (5,6) to cover a first part only of the gap (8) and a second masking element (11) integral with the housing body (2), independent of the transparent cover, overhangingly protruding from the lighting modules (5,6) to hide a second part only of said gap (8); the first and second masking elements (9,11) overlapping over each other such as to completely hide said gap (8).

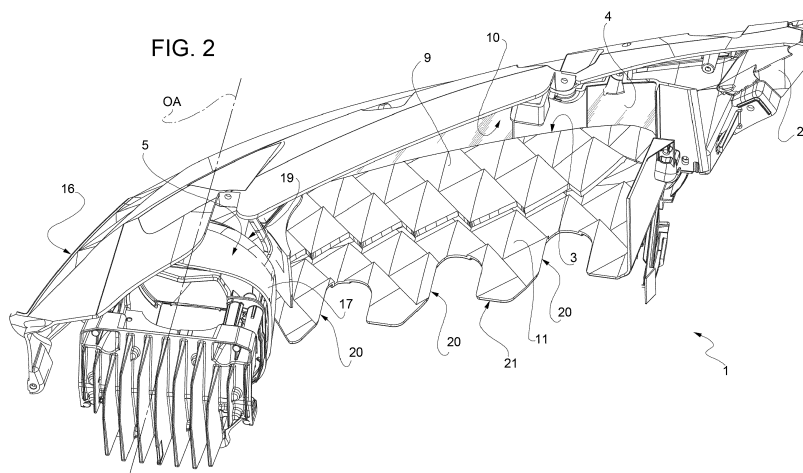
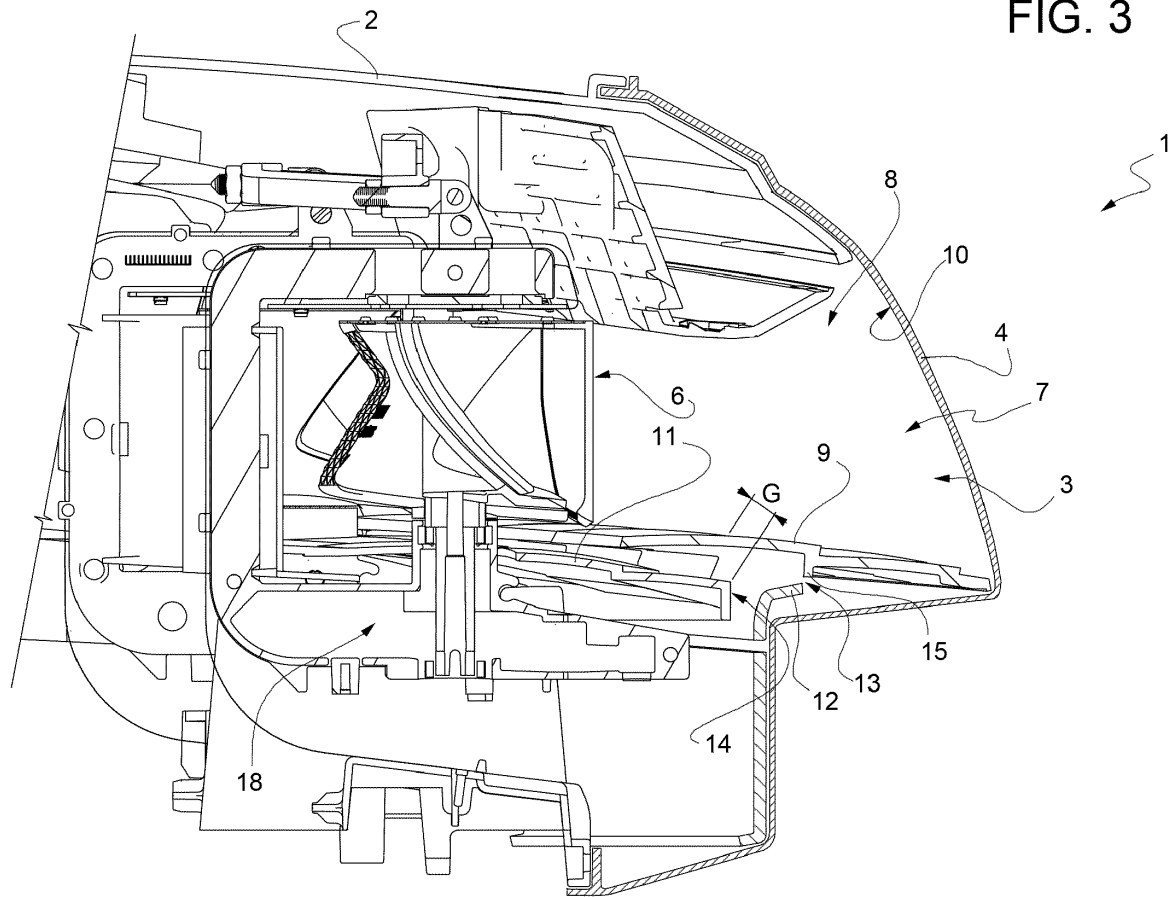


FIG. 3



Description

Technical field of the invention

[0001] The present invention relates to a lighting device equipped with one or more rotating lighting modules as well as with at least one stationary lighting module.

Technical Background

[0002] Lighting devices for vehicles provided with multiple optical functions obtained by using one or more rotating elements are known in the art.

[0003] EP2957822 discloses a lighting device including a rotating module including a fixed reflector, a fixed light source aligned with an axis, and a couple of opposite screens rotating around the axis under the action of a motor actuator; the two screens embody two lenses, e.g. one provided with prisms and one neutral, in order to change the light distribution provided by the light source and the reflector when each of the screens is selectively rotated in front of the reflector.

[0004] EP2902701 discloses a rotating lighting module wherein the light source is a LED and the reflector consists of a rotating support having two opposite faces, one constituting the reflector and the other realizing a second function, e.g. an aspect function; a fixed motor rotates the support with respect to the fixed light source in order to bring selectively the two faces on the front side of the device facing toward the direction of motion of the vehicle; the support also bears at its opposite faces two light guides operatively associated with a second LED.

[0005] The lighting devices of the prior art need actuation mechanisms to operate the rotating modules and to leave the rotating parts to be free to rotate. Unfortunately, those mechanisms may be seen from the outside due to the fact that the modern lighting devices are generally provided with outer transparent covers/lens through which the lighting modules are visible. The lighting devices need therefore to be provided with an aesthetic mask to cover the actuating mechanisms. However, the presence of the aesthetic mask renders the mounting of the lighting device and its maintenance (e.g. to replace the light sources) quite complex and difficult.

Summary of the invention

[0006] The object of the present invention is to provide a lighting device for vehicles provided with lighting modules therein which are visible from the outside that is compact, simple and cost-effective in construction and highly reliable, while ensuring at the same time to hide in an efficient manner the inner mechanisms of the lighting device, e.g. for actuating one or more rotating lighting modules, without interfering with the optical functions of the lighting modules.

[0007] According to the invention, a lighting device for vehicles is provided having the features set out in the

appended claims.

Brief description of the drawings

[0008] Further features and advantages of the present invention will become more apparent from the following description of one non-limiting embodiment thereof, made with reference to the figures in the accompanying drawings, in which:

- figure 1 shows schematically a perspective front elevation view of a lighting device for a vehicle, with parts removed for simplicity, realized according to the invention;
- figure 2 shows schematically a perspective rear elevation view of the lighting device of figure 1; and
- figure 3 shows schematically and in an enlarged scale a sectioned side elevation view of the front part of the lighting device of figures 1 and 2.

Detailed description

[0009] With reference to figures 1 and 2, reference numeral 1 indicates as a whole a lighting device for vehicles consisting, in the non-limiting embodiment shown, in a vehicle headlight, which is only in part and only schematically shown. It is however to be intended that what will be described can be applied to any vehicle lighting device.

[0010] The lighting device 1 comprises a generally cup-shaped housing body 2 designed to be mounted on a vehicle, known and not shown for sake of simplicity. Housing body 2 is made of synthetic plastic material by injection molding and has a front inlet opening 3 in use facing opposite to the vehicle and towards a driving or march direction of the vehicle, closed by a transparent cover 4, preferably consisting in a transparent lens not provided with optical functions ("terse" lens).

[0011] The housing body 2 carries at the interior thereof at least one (or more) first lighting module 5, which is in the embodiment shown the main lighting module of the lighting device 1, e.g. is a cross-beam light or high beam light, and, in the preferred embodiment shown, a plurality, preferably three, of second lighting modules 6, which are e.g. secondary lighting modules designed to provide additional optical functions, all together or singularly.

[0012] The lighting modules 5,6 are all visible from the outside through the inlet opening 3 and the transparent cover 4, and are arranged side by side facing the inlet opening 3.

[0013] The lighting modules 5,6 are spaced apart from the inlet opening 3 so that the lighting device 1 also comprises an aesthetic mask 7 to cover a first gap 8 between the transparent cover 4 and the lighting modules 5,6.

[0014] The first gap 8 extends in a substantially horizontal direction and along the full width of the inlet opening 3, transverse an optical axis OA (figure 2) of the first

(main) lighting module 5, which optical axis is oriented in use in the driving direction of the vehicle.

[0015] According to one main aspect of the present invention, the aesthetic mask 7 comprises a first masking element 9 which is connected integral to and rigid with an inner surface 10 of the transparent cover 4 facing towards the lighting modules 5,6.

[0016] With reference to figure 3, the first masking element 9 overhangingly protrudes from the inner surface 10 of the transparent cover 3 towards the lighting modules 5,6 to such an extent to cover a first part only of the first gap 8, on the side of the transparent cover 4. The masking element 9 may be rendered integral with the transparent cover 4 in any suitable known manner, which is therefore not shown for sake of simplicity, e.g. can be provided integral in one piece with the transparent cover 4 by molding or co-molding in one piece, or can be glued or welded to the surface 10.

[0017] The aesthetic mask 7 moreover comprises a second masking element 11 which is connected integral and rigid with the housing body 2 in any suitable and known manner, accordingly not shown for sake of simplicity; the masking element 11 is housed fully inside the housing body 2, spaced apart from the inlet opening 3 and is an element separate from and independent of the transparent cover 4 and the first masking element 9 overhanging therefrom.

[0018] The second masking element 11 overhangingly protrudes from the lighting modules 5,6, under and beyond thereto and towards the transparent cover 4 to hide a second part only of the first gap 8, on the side opposite to the transparent cover 4.

[0019] Moreover, according to the invention, the first and second masking elements 9,11 overlaps over each other, as well shown in figures 1-3, such as to completely hide the first gap 8.

[0020] The first and second masking elements 9,11 consist of substantially thin (flat) plates extending along the width of the inlet opening 4 and laying on different and parallel planes. The plates 9,11 may be provide on the upper surface thereof with a coating or a texture, or may be provided with reliefs, e.g. for aesthetic reasons.

[0021] According to a further aspect of the invention, the first masking element 9 covers in part the second masking element 11, overlapping over it, i.e. is arranged above the masking element 11.

[0022] In particular, the first and second masking elements 9,11 are spaced apart in vertical direction so as to define therebetween a second gap G (figure 3) arranged below the lighting modules 5,6 and extending vertically upwards, on the side of the lighting modules 5,6.

[0023] According to a further aspect of the invention, the housing body 2 is integrally provided internally with a baffle element 12 extending upwards at least in part within the second gap G and arranged immediately below the first masking element 9, so as to be arranged between the second masking element 11 and the transparent cover 4 to shield the second masking element 11 towards

the transparent cover 4 and below the first masking element 9.

[0024] The baffle element 12 is designed to intercept the light rays that emitted by one of the lighting modules 6 may pass through the gap G and under the masking element 9 so reaching the cover 4 causing an undesired and uncontrolled illumination thereof.

[0025] For this reasons, the baffle element 12 is preferably shaped inclined forward towards the transparent cover 4 and is provided with a sharp upper edge 13 which is arranged between a step-shaped upper edge 14 of masking element 11 and a step-shaped portion 15 of the masking element 9 projecting downwards on the side opposite to the lighting modules 5,6.

[0026] Finally, the first masking element 9 is wider than the second masking element 11 as measured in a direction parallel to the optical axis OA.

[0027] The at least one first lighting module 5 is arranged stationary and rigid within the housing body 2, at one first lateral end 16 thereof, while a plurality of second lighting modules 6 are arranged rotatable within the housing body 2, on one first side 17 of the first lighting module 5 opposite to the lateral end 16 of the housing body 2.

[0028] The second masking element 11 extends horizontally up to the first side 17 of the first lighting module 5 and immediately below the second lighting modules 6 to cover an actuation device 18 thereof (figure 3).

[0029] The first masking element 9 is longer than the second masking element 11 in the direction of the width of the inlet opening 3 and extends up to cover one peripheral framing portion 19 (figure 1) of the first lighting module 5.

[0030] The second masking element 11 is moreover provided with housing seats 20 (figure 2) for the second lighting modules 6 arranged at one rear edge 21 thereof opposite to the first masking element 9; the housing seats 20 interrupt the continuity of the rear edge 21 so that the second masking element 11 can be slid directly below the second lighting modules 6 from the outside inward.

[0031] In this manner the construction and assembly of the lighting device 1 is greatly facilitated, the actuating mechanism of the rotating modules is completely hidden, the inner structure if the lighting device 1 is kept straight and simple and any "leakage" of light rays along undesired trajectories, e.g. below the aesthetic mask 7 is avoided.

[0032] All the aims of the invention are therefore accomplished.

Claims

1. Lighting device (1) for a vehicle comprising a cup-shaped housing body (2) designed to be mounted on a vehicle body and having a front inlet opening (3) facing in use a forward march direction of the vehicle, a transparent cover (4) closing the front inlet opening, a plurality of first (5) and second (6) lighting

- modules arranged side by side inside the housing body facing the inlet opening and spaced apart from the inlet opening (3), the lighting modules (5,6) being visible from the outside through the transparent cover (4), and an aesthetic mask (7) to cover a first gap (8) between the transparent cover and the light modules, the first gap (8) extending in a substantially horizontal direction; **characterized in that** the aesthetic mask (7) comprises: a first masking element (9) which is connected integral and rigid with an inner surface (10) of the transparent cover (4) facing towards the lighting modules and overhangingly protrudes from the inner surface (10) of the transparent cover towards the lighting modules (5,6) to such an extent to cover a first part only of the first gap (8), on the side of the transparent cover (4); and a second masking element (11) which is connected integral and rigid with the housing body (2) and is separate from and independent of the transparent cover (4) and the first masking element (9) overhanging therefrom; the second masking element (11) overhangingly protruding from the lighting modules (5,6), under and beyond thereto and towards the transparent cover (4) to hide a second part only of the first gap (8), on the side opposite to said transparent cover (4); the first and second masking elements (9,11) overlapping over each other such as to completely hide said first gap (8).
2. Lighting device (1) according to claim 1, **characterized in that** the first and second masking elements (9,11) consist of substantially thin plates extending along the width of the inlet opening (4) and laying on different and parallel planes.
 3. Lighting device according to claim 1 or 2, **characterized in that** the first masking element (9) covers in part the second masking element (11), overlapping over it.
 4. Lighting device according to anyone of the preceding claims, **characterized in that** the first and second masking elements (9,11) are spaced apart in vertical direction so as to define therebetween a second gap (G) arranged below the lighting modules (5,6) and extending vertically upwards, on the side of the lighting modules.
 5. Lighting device according to claim 4, **characterized in that** the housing body (2) is integrally provided internally with a baffle element (12) extending upwards at least in part within the second gap (G) and immediately below the first masking element (9), so as to be arranged between the second masking element (11) and the transparent cover (4) to shield the second masking element (11) towards the transparent cover (4) and below the first masking element (9).
 6. Lighting device according to anyone of the preceding claims, **characterized in that** the first masking element (9) is wider than the second masking element (11).
 7. Lighting device according to anyone of the preceding claims, **characterized in that** at least one first lighting module (5) is arranged stationary and rigid within the housing body (2), at one first lateral end (16) thereof, while a plurality of second lighting modules (6) are arranged rotatable within the housing body (2), on one first side (17) of the first lighting module (5) opposite to said first lateral end (16) of the housing body (2); the second masking element (11) extending horizontally up to the first side (17) of the first lighting module (5) and immediately below the second lighting modules (6) to cover an actuation device (18) thereof; and the first masking element (9) being longer than the second masking element (11) in the direction of the width of the inlet opening (4) and extending up to cover one peripheral framing portion (19) of the first lighting module (5).
 8. Lighting device according to claim 7, **characterized in that** the second masking element (11) is provided with housing seats (20) for the second lighting modules arranged at one rear edge (21) thereof opposite to the first masking element; the housing seats (20) interrupting the continuity of the rear edge (21) so that the second masking element (11) can be slid directly below the second lighting modules (6) from the outside inward.
 9. Vehicle provided with a lighting device (1) according to claim 1.

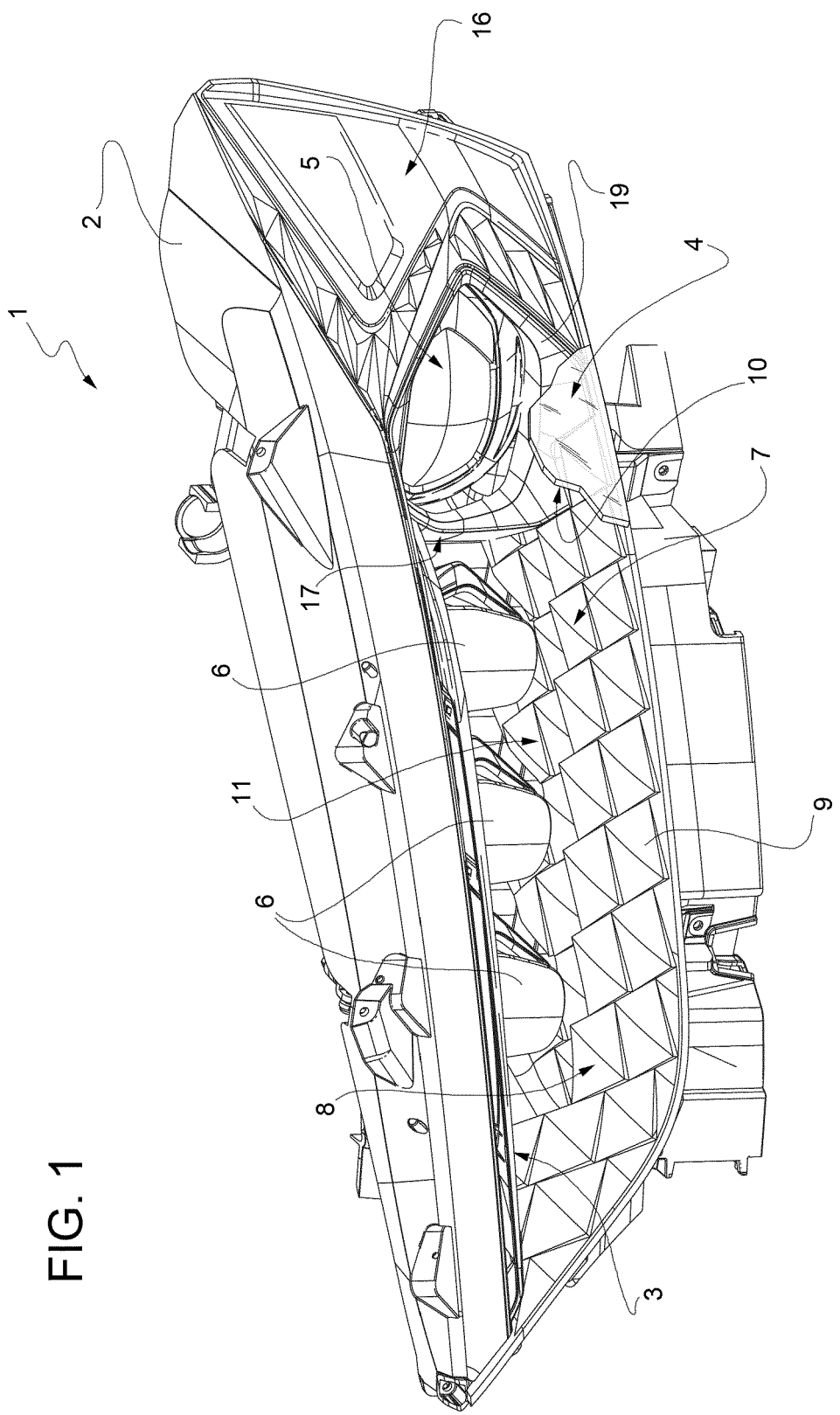
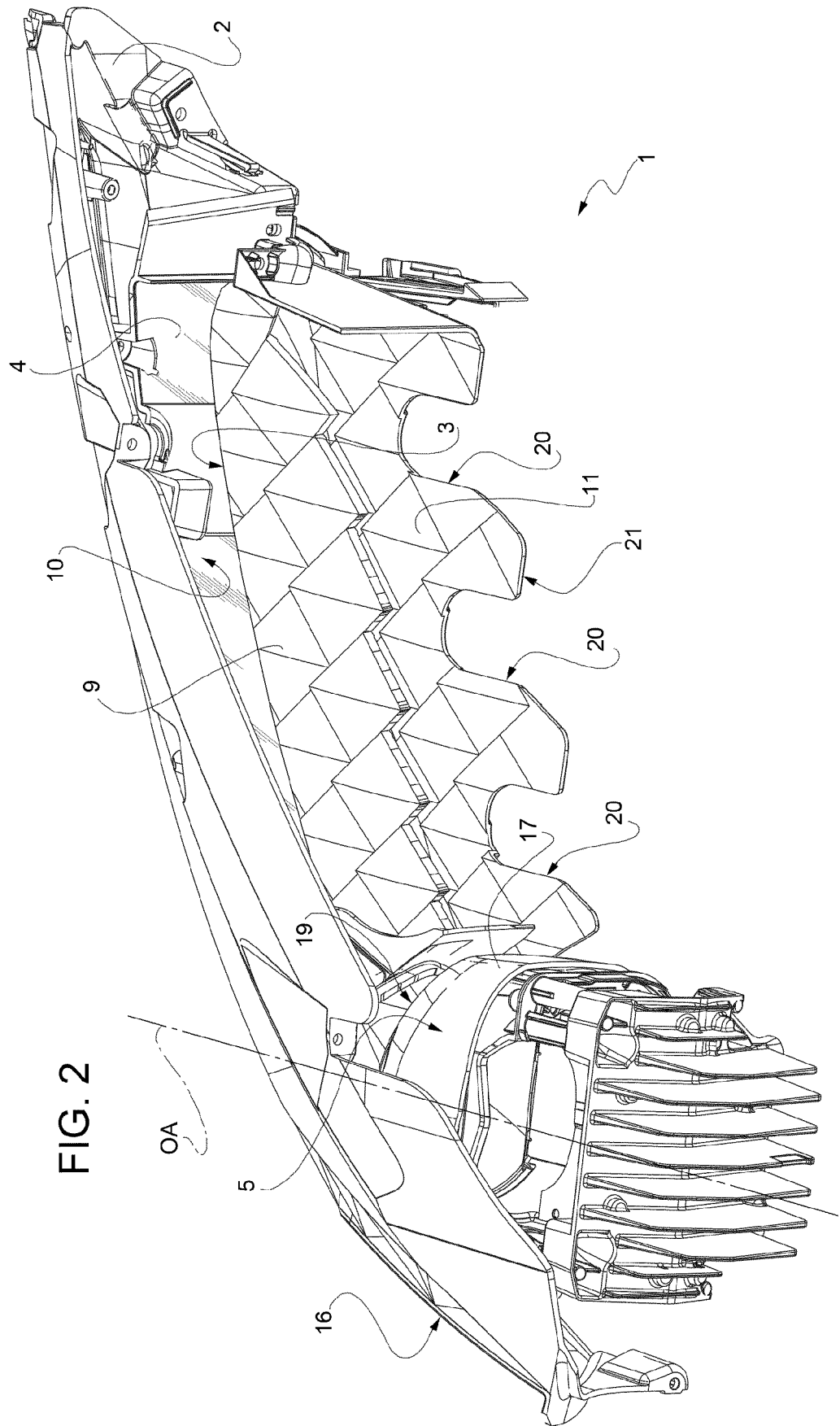
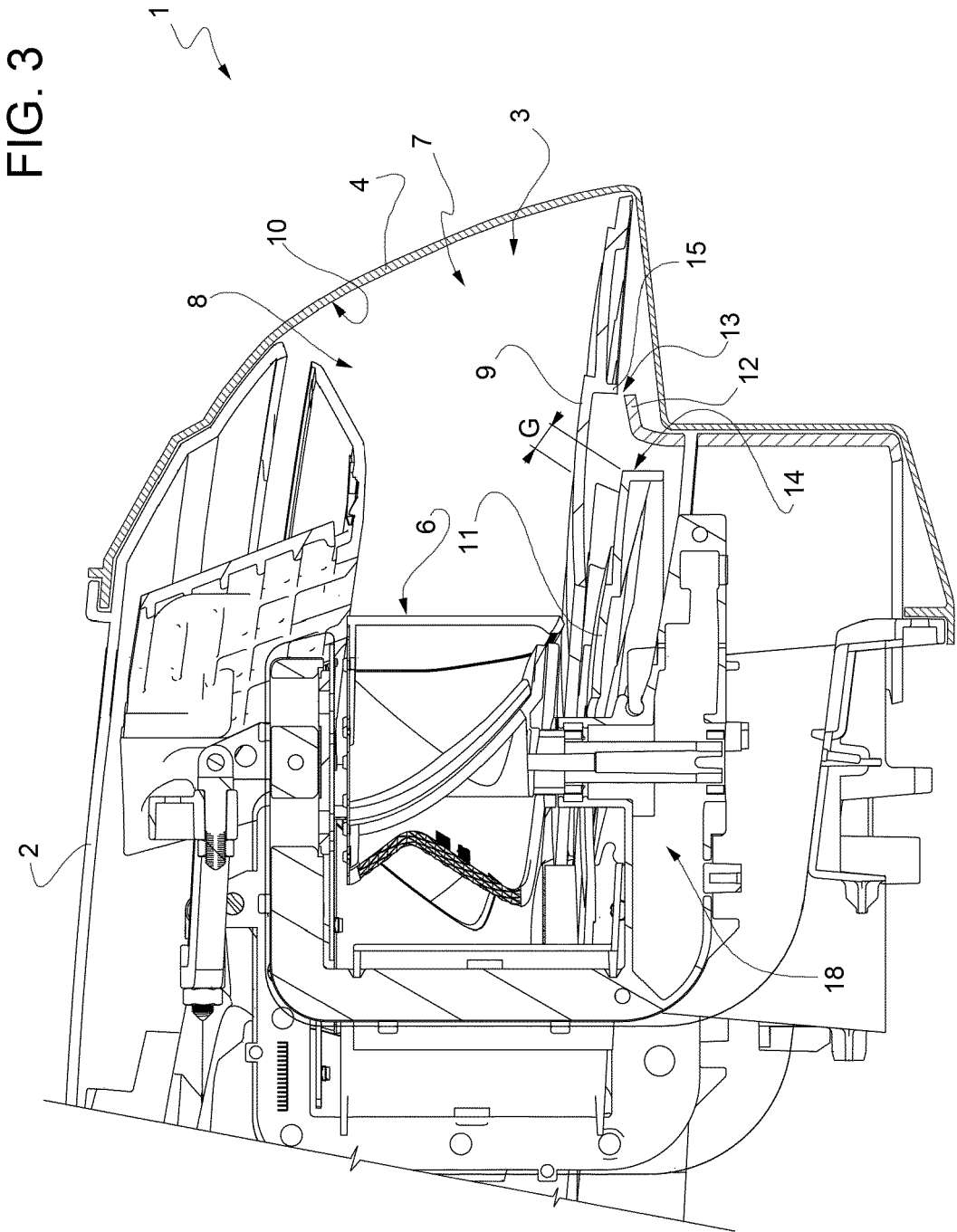


FIG. 1







EUROPEAN SEARCH REPORT

Application Number
EP 17 15 4079

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Place of search		Date of completion of the search	Examiner
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