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(54) **LIGHTING DEVICE FOR VEHICLES PROVIDED WITH COOLED LIGHTING MODULES**

BELEUCHTUNGSVORRICHTUNG FÜR MIT GEKÜHLTEN BELEUCHTUNGSMODULEN AUSGESTATTETE FAHRZEUGE

DISPOSITIF D'ÉCLAIRAGE POUR VÉHICULES POURVUS DE MODULES D'ÉCLAIRAGE REFROIDIS

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EP 3 428 514 B1

Description

Technical field of the invention

[0001] The present invention relates to a lighting device equipped with one or more lighting modules, preferably using LEDs as a light source and having a cooling system that allow in use the outer lens or transparent cover of the lighting device, which closes frontally the housing body of the lighting device, to be defrosted and/or the eventual condensation to be eliminated.

Technical Background

[0002] Lighting devices for vehicles provided with one or more lighting modules arranged inside a housing body having a frontal inlet opening closed by a lens or a transparent cover are well known. In such devices, especially during winter time and/or depending on the weather conditions, it may happen that some condensation or ice forms on the lens/cover, which may hinder the photometric performances of the lighting device. Moreover, if the condensation forms on the inner side of the lens/cover, this may cause also damages to the electronic components and/or to the reflective surfaces of the lighting modules.

[0003] EP2148133 discloses a lighting device comprising two superimposed lighting modules arranged within an housing body; in the vertical space between the two lighting modules is arranged a radiator including a plurality of parallel fins laterally spaced apart to each other; a fan arranged at the rear of the lighting device and inside the housing body sucks the air present within the housing body from the top and the bottom of the housing body and delivers it through the radiator fins, which are crossed in the direction of their width, and toward the inner surface of a lens or transparent cover closing an inlet opening arranged at the front of the housing body.

[0004] The lighting device disclosed in EP2148133 is far from being satisfactory: first of all, the device is bulky and difficult to be assembled; secondly, the thermal efficiency of the cooling system including the radiator and the fan is quite low, so that the heat taken away from the light source, usually a LED, of the lighting modules and delivered towards the front lens or cover is insufficient to provide a correct defrost in winter. Moreover, also the condensation on the lens/cover is not well removed since the warm air is directed only against a middle section (in the vertical direction) of the lens, so that the upper and lower sections of the lens/cover may remain wet. WO 2012/013601 A1 and WO 2016/110573 A1 disclose further lighting devices of the prior art.

Summary of the invention

[0005] The object of the present invention is to provide a lighting device for vehicles having one or more lighting modules, preferably using LEDs as the light source, that is compact, simple and cost-effective in construction and highly reliable, while ensuring at the same time on one side an optimal dissipation of the heat generated by the LEDs and on the other side, and above all, the complete elimination of any condensation on the front lens/cover and the complete defrost of the same in wintertime.

[0006] According to the invention, therefore, a lighting device for vehicles including at least one cooled lighting module is provided having the features set out in the appended claims.

Brief description of the drawings

[0007] 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 three quarter front perspective view of a lighting device according to the invention;
- figure 2 shows in an enlarged scale, a three quarter rear perspective schematic view of a radiator element of one cooled lighting module of the lighting device of figure 1;
- figure 3 shows schematically and in perspective view from the rear a cooled lighting module of the lighting device of figure 1; and
- figure 4 shows schematically a sectioned side elevation view of the lighting device of figure 1.

Detailed description

[0008] With reference to figures 1 and 4, reference numeral 1 indicates as a whole a lighting device for a vehicle consisting, in the non-limiting embodiment shown, in a vehicle headlight/headlamp, which is only schematically shown. It is however to be intended that what will be described can be applied to any vehicle lighting device.

[0009] 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.

[0010] 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 along a driving direction of the vehicle, closed by a transparent cover 4, which may either be a "terse" lens (i.e. without optical functions - as in the preferred example shown) or an optical lens having optical functions, e.g. prismed.

[0011] According to the present invention, housing body 2 carries at the interior thereof at least one lighting module 5 shown in details in figures 3 and 4. Of course, the housing body 2 may carry within it more than one lighting module 5 or modules similar to module 5 (e.g. two or three, arranged side by side) that may be visible from the outside through the inlet opening 3 and the transparent cover 4.

[0012] In the non-limiting example shown (figure 4) the lighting device 1 is equipped with one single lighting module 5, which is stationary, and with one or more rotating lighting modules 11, known and not shown in details for sake of simplicity.

[0013] The modules 5 and 11 are arranged facing the inlet opening 3 of the cup-shaped housing body 2 and the front transparent screen/cover 4 closing the inlet opening 3.

[0014] One lighting module 5 according to the present invention is shown in more details in figure 3 and 4; according to the invention, the lighting module 5 is a cooled lighting module comprising at least one light source 6 and a radiator element 7 better shown in an enlarged scale in figure 2.

[0015] The radiator element 7 is operatively associated to the at least one light source 6 to remove the heat generated in use by the at least one light source 6.

[0016] In the non-limiting, but preferred, embodiment shown the cooled lighting module 5 is provided with two light sources 6, both consisting of LEDs; the LEDs 6 are mounted on a printed circuit board 8 also carrying the necessary electronics. The printed circuit board 8 is mounted rigid against the radiator element 7, in thermal contact thereof, e.g. by means of clipping elements and/or of a thermal adhesive.

[0017] According to one aspect of the present invention, each cooled lighting module 5 further comprises a diverter screen element 10 assembled directly onto the radiator element 7, rigid therewith and spaced apart therefrom.

[0018] The diverter screen element 10 delimits together with the radiator element 7 and within the housing body 2 a non-linear channel 12 arranged substantially immediately at the rear of the at least one light source 6. For "immediately at the rear of the at least one light source 6" it is to be intended that the non-linear channel 12 is divided from the two light sources 6 solely by the printed circuit board 8 to which the light sources 6 are attached and by a substantially flat base plate 13 of the radiator element 7, which constitutes one of the lateral walls of the non-linear channel 12. For "non-linear" it is to be intended that channel 12 is not rectilinear, but describes a turn.

[0019] The non-linear channel 12 has a first and a second open end, opposite to each other, indicated respectively with the reference numbers 14 and 15.

[0020] The second open end 15 faces the transparent cover or lens 4, as well shown in figure 4.

[0021] According to a strongly preferred feature of the invention, each cooled lighting module 5 further comprises a motorized fan 16 of any known and suitable type, operatively associated to the radiator element 7 and designed to generate an air flow F (schematically indicated by the arrows in figure 4) within the housing body 2 to lap against the radiator element 7.

[0022] According to a further feature of the invention, the first open end 14 of the non-linear channel 12 is arranged immediately in front of the fan 16.

[0023] The fan 16 of each cooled lighting module 5 is arranged at the bottom of the housing body 2 and at the rear of the respective at least one light source 6, in the embodiment shown immediately at the rear of the base plate 13 of the radiator element 7, and immediately beneath the first open end 14 of the non-linear channel 12.

[0024] The non-linear channel 12 extends from the bottom upwards so that the second open end 15 of the non-linear channel 12 is arranged above the at least one light source 6.

[0025] In particular, the second open end 15 of the non-linear channel 12 faces an upper portion 18 of the transparent cover or lens 4 (see figure 4).

[0026] The non-linear channel 12 and the transparent cover or lens 4 are designed such that the air flow F generated by the fan 16 laps against the radiator element 7 in a direction of a development in length of the radiator element 7 itself, namely in a substantially vertical direction, from the bottom upwards.

[0027] Moreover, both the non-linear channel 12 and of the cover or lens 4 are designed so that the air flow F generated by the fan 16 laps against an inner surface 19 of the transparent cover or lens 4 from the top downwards.

[0028] As it is well shown in figure 2, the radiator element 7 is provided with a plurality of radiating fins 20 which extend in cantilever manner from the base plate 13 on a side opposite to the at least one (two on the example shown) light source 6 and towards the diverter screen element 10 for almost the full width of the non-linear channel 12. With the expression *"for almost the full width of the non-linear channel 12"* it is intended that the radiating fins 20 project from the base plate 13 and towards the diverter screen element 10 for more than two thirds of the total width of the non-linear channel 12 measured in a direction transverse to, and substantially perpendicular to, the base plate 13, namely in the plane of the sheet in figure 4.

[0029] The radiating fins 20 moreover extend in length (i.e. in a direction substantially perpendicular to that of their extension in cantilever fashion from the base plate 13) along the full length of the radiator element 7, in a direction substantially perpendicular to an optical axis O of the cooled lighting module 5 (figure 4) along which the light generated by the lighting module 5 is delivered in use.

[0030] The diverter screen element is designed such that a cross section of the first open end 14 of the non-linear channel 12 is oriented substantially perpendicular to the optical axis 0 and such that the non-linear channel 12 is curved at right angle in an upper section 21 thereof, so that the cross-section of the second open end 15 of the non-linear channel 12 is oriented substantially parallel to the optical axis O. In particular, the upper section 21 is curves in a continuous manner, according to a radius, since an upper portion 21b of the diverter screen element is shaped curved, according to a substantially

cylindrical geometry having a symmetry axis A parallel to the base plate 13 and perpendicular to the radiating fins 20.

[0031] According to the preferred embodiment shown, the diverter screen element 10 is assembled onto the radiator element 7 by means of removable retaining elements, e.g. by screws 22, housed in seats 23 provided in the diverter screen element 10.

[0032] In particular, the diverter screen element 10 is assembled onto the radiator element 7 directly on a couple of radiating fins 20 arranged adjacent opposite lateral sides 23 of the radiator element 7 and each flanked towards the opposite lateral sides 23 of the radiator element 7 by at least another one radiating fin 20. Such radiating fins 20 bearing the diverter screen element 10 are provided with internally threaded cylindrical embossment 25 to receive the screws 22.

[0033] The radiator element 7 is made of a metal alloy, preferably of an aluminum based light alloy, while the diverter screen element 10 is made of a synthetic plastic material, in particular resistant to heat, for example a thermosetting resin. It has been found that the combination of the above two materials gives rise to the best performances and allow an easy assembly and disassembly of the lighting module 5.

[0034] Preferably, the printed circuit board 8 with the LEDs 6, the radiator element 7 and the diverter screen element 10 form a self-supporting unit which may be assembled and disassembled to/from the rest of the lighting device 5 in one single operation; the fan 16, on the contrary, is supported by a bottom wall 26 of the housing body 2 as a separate and independent element.

[0035] Last but not least, the housing body 2 is designed so as to provide an air flow passage 27 for the air flow F all around each at least one cooled lighting module 5.

[0036] The air flow passage 27 connects the second open end 15 of the non-linear channel 12 to the first open end 14 thereof, and flanks the inner surface 19 of the transparent cover or lens 4 from the top to the bottom thereof.

[0037] Owing to the specific design described above, the heat generated in use by the LEDs 6 is removed immediately and efficiently by means of the radiator element 7 and, above all, by the air flow F which is directed by the diverter screen element 10 directly and solely through the radiating fins 20 and along a curved trajectory in a turbulent motion, which increase the heat exchange coefficient

[0038] Moreover, such heat so efficiently removed is not dispersed within the housing body 2, but is directed by the diverter screen element 10 against the upper section (the top) of the cover/lens 4; owing to the presence of the air flow passage 27, moreover, the hot air flow F is made to lap the whole surface of the cover/lens 4 from the top downwards: such a direction of lapping allows all the eventual drops of humidity to be efficiently removed since they are made to run along the inner surface 19 towards the bottom wall 26, were they are collected, if not evaporated before. The heat distribution obtainable on the lens/cover 4 owing to the diverter screen element 10, finally, has proved experimentally to be able to efficiently defrost the lens/cover 4 even in cold winters.

[0039] All the aims of the invention are therefore accomplished.

Claims

1. A lighting device (1) for a vehicle such as a headlight or a headlamp, comprising a cup-shaped housing body (2) designed to be mounted on a vehicle body and at least one cooled lighting module (5) arranged within the housing body facing a front inlet opening (3) thereof closed by a transparent cover or lens (4); each cooled lighting module comprising at least one light source (6) and a radiator element (7) operatively associated to the at least one light source to remove the heat generated in use by the at least one light source; wherein:

   i)- each cooled lighting module further comprises a diverter screen element (10) assembled directly onto the radiator element (7), rigid therewith and spaced apart therefrom;
   ii)- the diverter screen element delimiting with the radiator element a non-linear channel (12) arranged immediately at the rear of the at least one light source; and
   iii)- the non-linear channel (12) having a first and a second open end (14,15), opposite to each other; **characterized in that**
   iv)- the non-linear channel (12) is delimited by the diverter screen element within the housing body;
   v)- the second open end (15) faces the transparent cover or lens (4);
   vi)- the housing body (2) is designed so as to provide an air flow passage (27) for an air flow (F) all around the at least one cooled lighting module (5),
   vii)- the air flow passage (27) connecting the second open end (15) of the non-linear channel (12) to the first open end (14) thereof, and flanking an inner surface (19) of the transparent cover or lens (4) from the top to the bottom thereof, so that
   viii)- the air flow (F) is made to lap the whole surface of the cover/lens (4) from the top downwards allowing eventual drops of humidity to be efficiently removed.

2. A lighting device (1) according to claim 1, **characterized in that** each cooled lighting module further comprises a fan (16) operatively associated to the radiator element (7) and designed to generate said

air flow (F) within the housing body to lap against the radiator element, the first open end (14) of the non-linear channel being arranged immediately in front of the fan (16).

3. A lighting device (1) according to claim 2, **characterized in that** the fan (16) of each cooled lighting module is arranged at the bottom of the housing body and at the rear of the respective at least one light source (6), immediately beneath the first open end (14) of the non-linear channel; the latter extending upwards, the second open end (15) of the non-linear channel being arranged above the at least one light source (6).

4. A lighting device (1) according to claim 2 or 3, **characterized in that** the second open end (15) of the non-linear channel (12) faces an upper portion (18) of the transparent cover or lens, the non-linear channel (12) and the transparent cover or lens (4) being designed such that the air flow generated by the fan (16) laps against the radiator element (7) in a direction of a development in length of the radiator element, from the bottom upwards and against the inner surface (19) of the transparent cover or lens from the top downwards.

5. A lighting device (1) according to anyone of the preceding claims, **characterized in that** the radiator element (7) is provided with a plurality of radiating fins (20) which extend on a side opposite to the at least one light source and towards the diverter screen element (10) for almost the full width of the non-linear channel; the radiating fins extending in length along the full length of (20) the radiator element in a direction substantially perpendicular to an optical axis (0) of the cooled lighting module.

6. A lighting device (1) according to claim 5, **characterized in that** the diverter screen element (10) is designed such that a cross section of the first open end (14) of the non-linear channel is oriented substantially perpendicular to the optical axis (0) and such that the non-linear channel (12) is curved at right angle in an upper section (21) thereof so that the cross-section of the second open (15) end of the non-linear channel is oriented substantially parallel to the optical axis (0).

7. A lighting device (1) according to claim 5 or 6, **characterized in that** the diverter screen element (10) is assembled by means of removable retaining elements (22) directly on a couple of radiating fins (20) arranged adjacent opposite lateral sides (23) of the radiator element and each flanked towards the opposite lateral sides of the radiator element by at least another one radiating fin (20).

8. A lighting device (1) according to anyone of the preceding claims, **characterized in that** the radiator element (7) is made of a metal alloy, preferably of an aluminum based light alloy, and **in that** the diverter screen element (10) is made of a synthetic plastic material.

9. Vehicle provided with a lighting device (1) according to anyone of the preceding claims.

Patentansprüche

1. Beleuchtungsvorrichtung (1) für ein Fahrzeug, wie etwa ein Fahrscheinwerfer oder ein Hauptscheinwerfer, umfassend einen becherförmigen Gehäusekörper (2), der zur Anbringung an einer Fahrzeugkarosserie konstruiert ist, und mindestens ein gekühltes Beleuchtungsmodul (5), das innerhalb des Gehäusekörpers zu einer vorderen Einlassöffnung (3) desselben weisend angebracht ist, die durch eine transparente Abdeckung oder ein Scheinwerferglas (4) verschlossen ist; wobei jedes gekühlte Beleuchtungsmodul mindestens eine Lichtquelle (6) und ein Kühlelement (7) umfasst, das mit der mindestens einen Lichtquelle wirkverbunden ist, um die im Betrieb von der mindestens einen Lichtquelle erzeugte Wärme abzuführen, wobei:

i) jedes gekühlte Beleuchtungsmodul ferner ein Ablenkschirmelement (10) umfasst, das direkt auf dem Kühlelement (7) von diesem beabstandet und mit diesem starr verbunden montiert ist;
ii) das Ablenkschirmelement mit dem Kühlelement einen nichtlinearen Kanal (12) begrenzt, der unmittelbar an der Rückseite der mindestens einen Lichtquelle angeordnet ist; und
iii) der nichtlineare Kanal (12) ein erstes und ein zweites offenes Ende (14, 15) aufweist, die einander gegenüber liegen;
dadurch gekennzeichnet, dass
iv) der nichtlineare Kanal (12) durch das Ablenkschirmelement innerhalb des Gehäusekörpers begrenzt ist;
v) das zweite offene Ende (15) zu der transparenten Abdeckung oder dem Scheinwerferglas (4) weist;
vi) der Gehäusekörper (2) so konstruiert ist, dass er einen Luftkanal (27) für einen Luftstrom (F) um das gesamte mindestens eine gekühlte Beleuchtungsmodul (5) vorsieht,
vii) der Luftkanal (27) das zweite offene Ende (15) des nichtlinearen Kanals (12) mit seinem ersten offenen Ende (14) verbindet und eine innere Oberfläche (19) der transparenten Abdeckung oder des Scheinwerferglases (4) von der Oberseite bis zur Unterseite desselben flankiert, sodass

viii) der Luftstrom (F) veranlasst wird, die gesamte Oberfläche der Abdeckung/des Scheinwerferglases (4) von oben nach unten zu überstreichen, was es ermöglicht, eventuelle Feuchtigkeitstropfen wirksam zu entfernen.

2. Beleuchtungsvorrichtung (1) nach Anspruch 1, **dadurch gekennzeichnet, dass** jedes gekühlte Beleuchtungsmodul ferner ein Gebläse (16) umfasst, das mit dem Kühlelement (7) wirkverbunden ist und so konstruiert ist, dass es den Luftstrom (F) innerhalb des Gehäusekörpers erzeugt, sodass er das Kühlelement überstreicht, wobei das erste offene Ende (14) des nichtlinearen Kanals unmittelbar vor dem Gebläse (16) angeordnet ist.

3. Beleuchtungsvorrichtung (1) nach Anspruch 2, **dadurch gekennzeichnet, dass** das Gebläse (16) jedes gekühlten Beleuchtungsmoduls an der Unterseite des Gehäusekörpers und an der Rückseite der jeweiligen mindestens einen Lichtquelle (6) unmittelbar unter dem ersten offenen Ende (14) des nichtlinearen Kanals angeordnet ist; wobei sich letzterer nach oben erstreckt und das zweite offene Ende (15) des nichtlinearen Kanals oberhalb der mindestens einen Lichtquelle (6) angeordnet ist.

4. Beleuchtungsvorrichtung (1) nach Anspruch 2 oder 3, **dadurch gekennzeichnet, dass** das zweite offene Ende (15) des nichtlinearen Kanals (12) zu einem oberen Teil (18) der transparenten Abdeckung oder des Scheinwerferglases weist, wobei der nichtlineare Kanal (12) und die transparente Abdeckung oder das Scheinwerferglas (4) so konstruiert sind, dass der von dem Gebläse (16) erzeugte Luftstrom das Kühlelement (7) in Richtung einer Abwicklung der Länge des Kühlelements von der Unterseite nach oben und gegen die Innenfläche (19) der transparenten Abdeckung oder des Scheinwerferglas von oben nach unten überstreicht.

5. Beleuchtungsvorrichtung (1) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** das Kühlelement (7) mit einer Vielzahl von Kühlrippen (20) versehen ist, die sich auf einer der mindestens einen Lichtquelle gegenüberliegenden Seite und zu dem Ablenkschirmelement (10) hin über beinahe die gesamte Breite des nichtlinearen Kanals erstrecken; wobei die Kühlrippen sich in der Länge über die gesamte Länge des (20) Kühlelements in einer zu einer optischen Achse (O) des gekühlten Beleuchtungsmoduls im Wesentlichen senkrechten Richtung erstrecken.

6. Beleuchtungsvorrichtung (1) nach Anspruch 5, **dadurch gekennzeichnet, dass** das Ablenkschirmelement (10) so konstruiert ist, dass ein Querschnitt des ersten offenen Endes (14) des nichtlinearen Kanals im Wesentlichen senkrecht zu der optischen Achse (O) ausgerichtet ist, und so, dass der nichtlineare Kanal (12) in seinem oberen Abschnitt (21) im rechten Winkel gekrümmt ist, sodass der Querschnitt des zweiten offenen Endes (15) des nichtlinearen Kanals im Wesentlichen parallel zu der optischen Achse (O) ausgerichtet ist.

7. Beleuchtungsvorrichtung nach Anspruch 5 oder 6, **dadurch gekennzeichnet, dass** das Ablenkschirmelement (10) mittels entfernbarer Halteelemente (22) direkt auf einigen Kühlrippen (20) montiert ist, die einander gegenüberliegenden seitlichen Seiten (23) des Kühlelements benachbart angeordnet sind und jeweils zu den entgegengesetzten seitlichen Seiten des Kühlelements hin durch mindestens eine weitere Kühlrippe (20) flankiert sind.

8. Beleuchtungsvorrichtung (1) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** das Kühlelement (7) aus einer Metalllegierung, vorzugsweise aus einer leichten Legierung auf Aluminiumbasis hergestellt ist, und dass das Ablenkschirmelement (10) aus einem synthetischen Kunststoffmaterial hergestellt ist.

9. Fahrzeug, versehen mit einer Beleuchtungsvorrichtung (1) nach einem der vorhergehenden Ansprüche.

Revendications

1. Dispositif d'éclairage (1) pour un véhicule comme un phare ou un projecteur, comprenant un corps de logement cupuliforme (2) conçu pour être monté sur un corps de véhicule et au moins un module d'éclairage refroidi (5) agencé à l'intérieur du corps de logement faisant face à une ouverture d'entrée avant (3) de celui-ci fermée par un couvercle transparent ou une lentille (4) ; chaque module d'éclairage refroidi comprenant au moins une source lumineuse (6) et un élément rayonnant (7) associé opérationnellement à l'au moins une source lumineuse pour enlever la chaleur générée en utilisation par l'au moins une source lumineuse ; dans lequel :

   i)- chaque module d'éclairage refroidi comprend en outre un élément d'écran déflecteur (10) assemblé directement sur l'élément rayonnant (7), rigide avec celui-ci et espacé de celui-ci ;
   ii)- l'élément d'écran déflecteur délimitant avec l'élément rayonnant un canal non linéaire (12) agencé immédiatement à l'arrière de l'au moins une source lumineuse ; et
   iii)- le canal non linéaire (12) comportant des première et seconde extrémités ouvertes (14, 15), à l'opposé l'une de l'autre ;

caractérisé en ce que

iv)- le canal non linéaire (12) est délimité par l'élément d'écran déflecteur à l'intérieur du corps de logement ;

v)- la seconde extrémité ouverte (15) fait face au couvercle transparent ou à la lentille (4) ;

vi)- le corps de logement (2) est conçu de manière à fournir un passage d'écoulement d'air (27) pour un écoulement d'air (F) tout autour de l'au moins un module d'éclairage refroidi (5),

vii)- le passage d'écoulement d'air (27) reliant la seconde extrémité ouverte (15) du canal non linéaire (12) à la première extrémité ouverte (14) de celui-ci, et bordant une surface intérieure (19) du couvercle transparent ou de la lentille (4) depuis le haut jusqu'au bas de celui-ci, de sorte que

viii)- l'écoulement d'air (F) soit constitué pour recouvrir toute la surface du couvercle/de la lentille (4) depuis le haut vers le bas en permettant à d'éventuelles gouttelettes d'humidité d'être efficacement enlevées.

2. Dispositif d'éclairage (1) selon la revendication 1, **caractérisé en ce que** chaque module d'éclairage refroidi comprend en outre un ventilateur (16) associé opérationnellement à l'élément rayonnant (7) et conçu pour générer ledit écoulement d'air (F) à l'intérieur du corps de logement pour effleurer l'élément rayonnant, la première extrémité ouverte (14) du canal non linéaire étant agencée immédiatement devant le ventilateur (16).

3. Dispositif d'éclairage (1) selon la revendication 2, **caractérisé en ce que** le ventilateur (16) de chaque module d'éclairage refroidi est agencé au bas du corps de logement et à l'arrière de l'au moins une source lumineuse (6) respective, immédiatement au-dessous de la première extrémité ouverte (14) du canal non linéaire ; celui-ci s'étendant vers le haut, la seconde extrémité ouverte (15) du canal non linéaire étant agencée au-dessus de l'au moins une source lumineuse (6).

4. Dispositif d'éclairage (1) selon la revendication 2 ou 3, **caractérisé en ce que** la seconde extrémité ouverte (15) du canal non linéaire (12) fait face à une partie supérieure (18) du couvercle transparent ou de la lentille, le canal non linéaire (12) et le couvercle transparent ou la lentille (4) étant conçus de sorte que l'écoulement d'air généré par le ventilateur (16) effleure l'élément rayonnant (7) dans une direction d'un développement dans la longueur de l'élément rayonnant, depuis le bas vers le haut et la surface intérieure (19) du couvercle transparent ou de la lentille depuis le haut vers le bas.

5. Dispositif d'éclairage (1) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** l'élément rayonnant (7) est pourvu d'une pluralité d'ailettes de rayonnement (20) qui s'étendent sur un côté opposé à l'au moins une source lumineuse et vers l'élément d'écran déflecteur (10) sur presque toute la largeur du canal non linéaire ; les ailettes de rayonnement s'étendant en longueur sur toute la longueur de l'élément rayonnant (20) dans une direction sensiblement perpendiculaire à un axe optique (O) du module d'éclairage refroidi.

6. Dispositif d'éclairage (1) selon la revendication 5, **caractérisé en ce que** l'élément d'écran déflecteur (10) est conçu de sorte qu'une coupe transversale de la première extrémité ouverte (14) du canal non linéaire soit orientée sensiblement perpendiculairement à l'axe optique (O) et de sorte que le canal linéaire (12) soit incurvé à angle droit dans une section supérieure (21) de celui-ci de sorte que la coupe transversale de la seconde extrémité ouverte (15) du canal non linéaire soit orientée sensiblement parallèlement à l'axe optique (O).

7. Dispositif d'éclairage (1) selon la revendication 5 ou 6, **caractérisé en ce que** l'élément d'écran déflecteur (10) est assemblé au moyen d'éléments de retenue amovibles (22) directement sur une paire d'ailettes de rayonnement (20) agencées adjacentes à des côtés latéraux opposés (23) de l'élément rayonnant et chacune bordée vers les côtés latéraux opposés de l'élément rayonnant par au moins une autre ailette de rayonnement (20).

8. Dispositif d'éclairage (1) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** l'élément rayonnant (7) est constitué d'un alliage métallique, de préférence d'un alliage léger d'aluminium, et **en ce que** l'élément d'écran déflecteur (10) est constitué d'une matière plastique synthétique.

9. Véhicule pourvu d'un dispositif d'éclairage (1) selon l'une quelconque des revendications précédentes.

FIG. 1

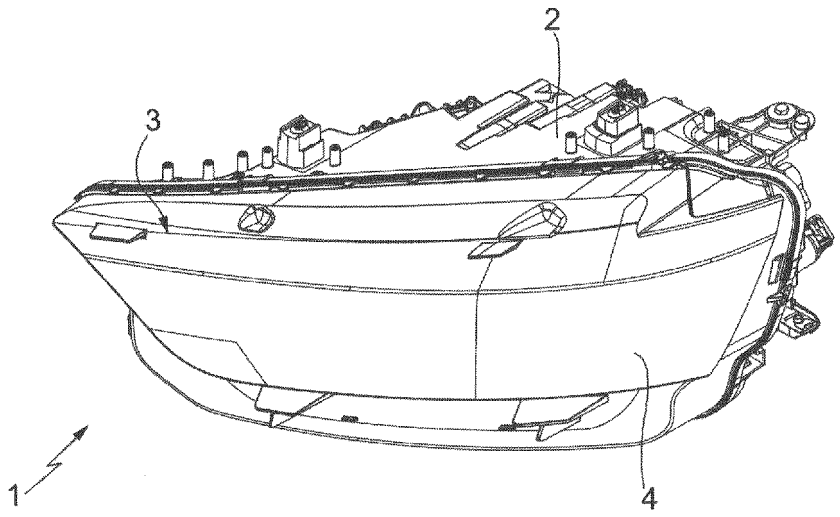
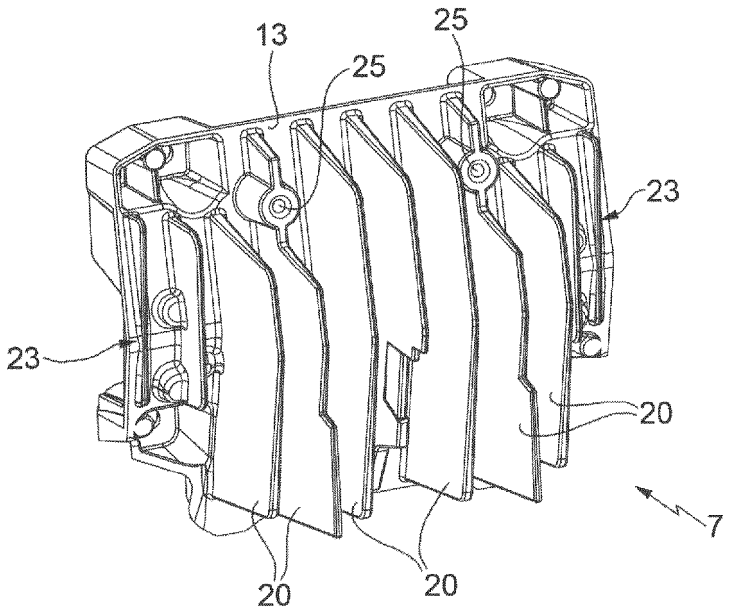


FIG. 2



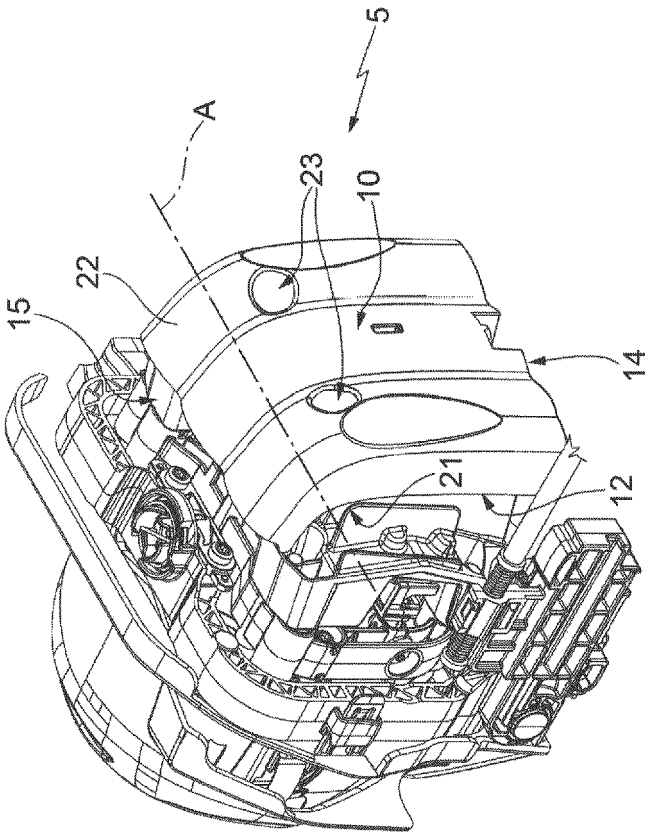


FIG. 3

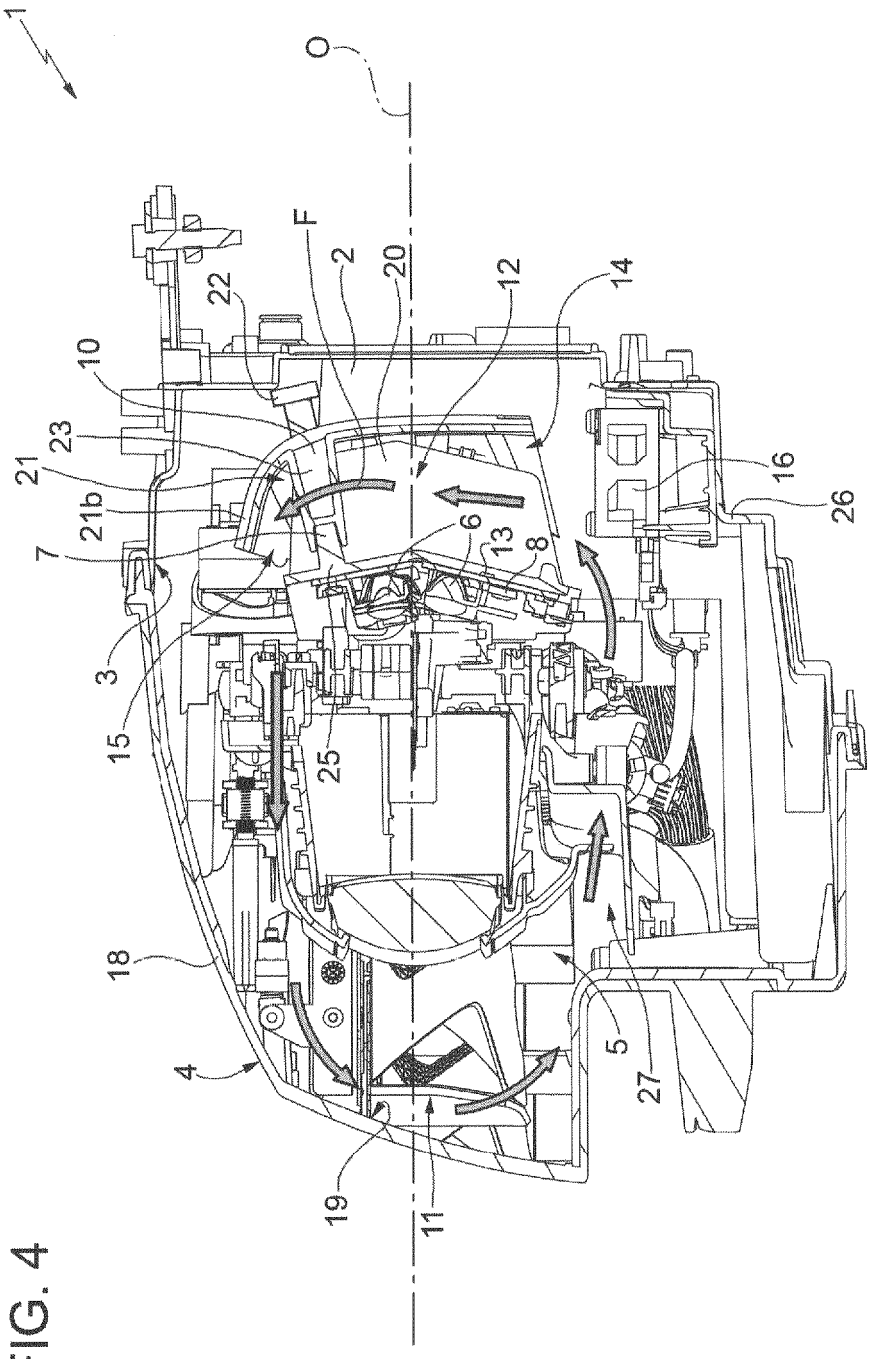


FIG. 4

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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