



(51) International Patent Classification:

G02B 5/00 (2006.01) G02B 5/02 (2006.01)
F21S 41/275 (2018.01) G02B 19/00 (2006.01)
F21S 43/14 (2018.01) G02B 27/09 (2006.01)
F21S 43/20 (2018.01) H01L 33/58 (2010.01)

(21) International Application Number:

PCT/EP2020/058616

(22) International Filing Date:

26 March 2020 (26.03.2020)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

201910264092.7 02 April 2019 (02.04.2019) CN

(71) Applicant: VALEO VISION [FR/FR]; 34, rue Saint André, 93012 BOBIGNY Cedex (FR).

(72) Inventors: CHEN, Haiquan; Valeo Lighting Systems, 7 Huabaonan Road, Chancheng District, FOSHAN, Guangdong 528000 (CN). LIU, Lixian; Valeo Lighting Systems, 7 Huabaonan Road, Chancheng District, Foshan, Foshan, Guangdong 528000 (CN).

(74) Agent: KHAIRALLAH, Murielle; Valeo Systemes Thermiques, 8, rue Louis Lormand, CS 80517 La Verriere, 78322 LE MESNIL SAINT DENIS (FR).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP,

(54) Title: OPTICAL STRUCTURE, CORRESPONDING VEHICLE LAMP AND VEHICLE, AND ILLUMINATION METHOD

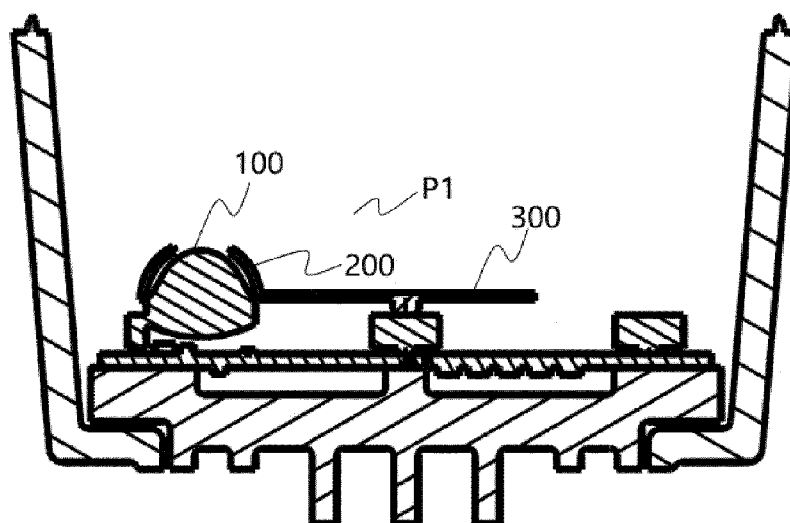


Fig. 1

(57) Abstract: One problem solved by the present invention is the installation position of a light source on a PCB. An optical structure according to the present invention comprises: a lens, and a shading part corresponding to the lens, the shading part comprising: an enveloping part, for enveloping the lens in order to block emitting light of the lens; at least one opening part, allowing an emitting light beam of the lens to emerge. The present invention has the following advantages: the shading part enveloping the lens is used to control the angle and direction of emergence of emitting light of the lens, such that the installation position of the lens need not be directly opposite an illumination position, i.e. the permitted installation positions of the lens are expanded. Furthermore, when not in operation, the optical structure will not affect the illumination effects of other light sources and lenses. Multiple sets of effects can thereby be realized.



KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME,
MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ,
OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA,
SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR,
TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

- (84) Designated States** (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

- *with international search report (Art. 21(3))*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

Description

Optical structure, corresponding vehicle lamp and vehicle, and illumination method

5

Technical field

The present invention relates to the technical field of optics, in particular to an optical structure, a corresponding vehicle lamp and vehicle, and an illumination method.

10

Background art

In general, multiple light sources (such as LEDs) are used in vehicle lamps, in order to realize multiple illumination effects. However, when the illumination effect that needs to be realized is more complex, or it is desired to realize multiple sets of different illumination effects, a greater number of light sources must be installed. However, due to the fact that the area of the vehicle lamp surface itself is limited, it might not be possible to realize complex effects by merely relying on a light source installed on a PCB in a position corresponding to a vehicle lamp light exit face; on the other hand, if the light source is installed in another position on the PCB, and a light guide is used for guiding to a light exit point, then the emission of light beams of other light sources might be affected. Thus, a solution is urgently needed.

15

20

Summary of the invention

In view of the above, one problem solved in an embodiment of the present invention is the installation position of a light source on a PCB.

25

According to an embodiment of the present invention, an optical structure is disclosed, wherein the optical structure comprises:

a lens, and

a shading part corresponding to the lens, the shading part comprising:

30

an enveloping part, for enveloping the lens in order to block emitting light of the lens;

at least one opening part, allowing an emitting light beam of the lens to emerge.

5 According to the solution of this embodiment, the use of the shading part enables light emerging from the lens to emerge via the shading part, so as to control the direction of emergence thereof.

Through the use of the enveloping part and the at least one opening part, the optical structure according to this embodiment enables emitting light of
10 the lens to be emitted only from the at least one opening part, in order to control a light exit position.

In the optical structure according to an embodiment of the present invention, the optical structure comprises:

at least one lens; and

15 at least one shading part respectively corresponding to the at least one lens, wherein each said shading part respectively envelops the lens corresponding thereto, in order to block emitting light of the lens.

The optical structure according to this embodiment comprises multiple lenses and shading parts respectively corresponding thereto, and is thereby
20 able to realize multiple illumination effects.

In the optical structure according to an embodiment of the present invention, relative positions of the at least one opening part of each said shading part of the at least one shading part, and the lens respectively corresponding thereto, may be different.

25 In the optical structure according to this embodiment, the position of the opening part of each shading part relative to the lens is different, such that the direction of emitting light of each lens in the optical structure is different, in order to realize the required illumination effect.

The optical structure according to an embodiment of the present invention

further comprises:

a connection part, for connecting the at least one shading part and/or the at least one lens.

In the optical structure according to an embodiment of the present invention, the lens is a condenser lens.

The condenser lens is used to adjust a light beam from a light source so as to be focused at a certain point, or so as to be collimated light.

According to an embodiment of the present invention, the use of the condenser lens enables a light beam emerging from the opening part of the shading part to be focused at a predetermined position, such that the illumination effect is better.

The optical structure according to an embodiment of the present invention further comprises:

a light diffusion layer, for causing an incident light beam to emerge uniformly after being diffused in the layer.

The use of the light diffusion layer enables a visual effect of the light beam after emergence to be optimized, such that it is softer.

In the optical structure according to an embodiment of the present invention, the condenser lens may focus an emitting light beam onto the light diffusion layer.

The focusing of emitting light onto the light diffusion layer avoids problems such as bright points resulting from focusing being too dazzling, so has a better visual effect.

The optical structure according to an embodiment of the present invention is a one-piece member.

Clearly, implementation as a one-piece member can significantly improve the efficiency of production and installation.

The optical structure according to an embodiment of the present invention is realized by overmoulding; the lens employs a light-transmitting material

and the shading part employs an opaque material.

Overmoulding enables production to be carried out conveniently, with improved efficiency.

According to an embodiment of the present invention, a vehicle lamp is
5 also disclosed, the vehicle lamp comprising at least one said optical structure.

The vehicle lamp according to an embodiment of the present invention comprises the optical structure and at least one other optical structure.

The vehicle lamp according to an embodiment of the present invention further comprises a corresponding light source.

10 The vehicle lamp according to an embodiment of the present invention is a vehicle logo lamp.

According to an embodiment of the present invention, a vehicle is also disclosed, the vehicle comprising the vehicle lamp.

According to an embodiment of the present invention, an illumination
15 method is also disclosed, wherein the illumination method comprises:

causing light from a light source to be emitted after passing through the optical structure.

Compared with the prior art, the present invention has the following advantages: the shading part enveloping the lens is used to control the angle
20 and direction of emergence of emitting light of the lens, such that the installation position of the lens need not be directly face an illumination position, i.e. the permitted installation positions of the lens are expanded. Furthermore, when not in operation, the optical structure will not affect the illumination effects of other light sources and lenses. Multiple sets of effects
25 can thereby be realized.

Brief description of the drawings

Other features, objects and advantages of the present invention will become more obvious through perusal of a detailed description of non-limiting

embodiments which makes reference to the accompanying drawings below:

Fig. 1 shows a sectional structural schematic drawing of an optical structure according to an embodiment of the present invention.

Fig. 2 shows a sectional structural schematic drawing of a vehicle lamp having an optical structure according to another embodiment of the present invention.

Fig. 3 shows a sectional structural schematic drawing of a vehicle lamp having an optical structure according to another embodiment of the present invention.

Fig. 4 shows a structural schematic drawing of an optical structure according to another embodiment of the present invention.

Fig. 5 shows a structural schematic drawing of an optical structure according to another embodiment of the present invention.

Fig. 6 shows a schematic drawing of a structure having both an optical structure according to an embodiment of the present invention and another optical structure.

Fig. 7 shows a schematic drawing of a vehicle lamp surface.

Figs. 8a and 8b respectively show schematic drawings of effects resulting from the illumination of the vehicle lamp surface as shown in fig. 7 using the optical structure according to the present invention.

List of labels:

P1	optical structure	100	lens
200	shading part	210	enveloping part
220	light exit part	300	connection part
400	light diffusion layer	P2	other optical structure
P3	light source	P4	vehicle lamp surface
F	focus	LP	vehicle lamp surface bright point

Particular embodiments

Preferred embodiments of the present invention are described in greater detail below with reference to the drawings. Although preferred embodiments of the present invention are shown in the drawings, it should be understood that the present invention may be realized in various forms, and should not be restricted by the embodiments expounded here. On the contrary, these embodiments are provided in order to make the present invention more thorough and complete, and to enable the scope of the present invention to be conveyed to those skilled in the art in a complete fashion.

According to embodiments of the present invention, an optical structure and a corresponding vehicle lamp and vehicle are disclosed.

According to a preferred embodiment of the present invention, the vehicle lamp according to the present invention is a vehicle logo lamp, i.e. a lamp that is arranged behind a logo of a vehicle, and used to illuminate the logo in order to realize a specific display effect.

Preferably, the vehicle lamp according to the present invention comprises a light source P3, and at least one optical structure P1 according to the present invention.

More preferably, the vehicle lamp according to the present invention may further comprise at least one other optical structure P2.

Referring to fig. 1, the optical structure P1 according to the present invention comprises a lens 100, and a shading part 200 corresponding to the lens 100; the shading part 200 envelops the lens 100, in order to block emitting light of the lens 100.

Preferably, in the optical structure P1 according to the present invention, the shading part 200 thereof comprises: an enveloping part 210, for enveloping the lens 100 in order to block emitting light of the lens 100; and at least one opening part 220, allowing an emitting light beam of the lens 100 to emerge.

That is to say, the shading part 200 corresponding to the lens may

comprise one opening part 220, or may comprise multiple opening parts 220, so that emitting light of the lens emerges in multiple directions via the multiple opening parts 220.

The enveloping part 210 may be in closely fitting contact with a surface of the lens 100, or be separated from a surface of the lens 100 by a certain gap.

Preferably, the lens 100 according to the present invention is a condenser lens 100'.

According to a preferred embodiment of the present invention, the optical structure P1 further comprises a light diffusion layer 400, for causing an incident light beam to emerge after being diffused in the light diffusion layer 400.

According to a preferred solution of the preferred embodiment, the condenser lens 100' in the optical structure P1 may focus an emitting light beam onto the light diffusion layer 400.

Specifically, referring to fig. 3, fig. 3 shows schematically a sectional drawing of a vehicle lamp having an optical structure P1 according to an embodiment of the present invention.

The vehicle lamp as shown in fig. 3 comprises the optical structure P1, a light source P3 and a vehicle lamp surface P4. The optical structure P1 comprises a condenser lens 100', a shading part 200 and a light diffusion layer 400. As shown in fig. 3, the light source P3 is located below the condenser lens 100'; light rays thereof are emitted via an opening of the shading part 200 after being focused by the condenser lens 100', and are focused at a point F of the light diffusion layer 400.

At this time, a bright point can be seen through the vehicle lamp surface P4 at a position corresponding to point F. Since the bright point is formed by diffusion via the light diffusion layer, exiting light thereof is more uniform and soft.

In this embodiment, there is a certain transverse distance H between the

position of the light source P3 and the final focusing point F of emitting light rays. It can be seen therefrom that through the solution of the present invention, it is possible to expand installation regions of a light source and a lens which a position of emergence (e.g. point F) can correspond to; at the same time, when multiple sets of illumination solutions are used, one position of emergence (e.g. point F) can correspond to multiple light sources and lenses.

According to a preferred embodiment of the present invention, the optical structure P1 is a one-piece member. That is to say, the lens 100 and shading part 200 contained therein are a one-piece member.

More preferably, the optical structure P1 is realized by overmoulding, wherein the lens 100 employs a light-transmitting material and the shading part 200 employs an opaque material.

According to a preferred embodiment of the present invention, the optical structure P1 comprises at least one lens 100, and at least one shading part 200 respectively corresponding to the at least one lens 100. Each said shading part 200 respectively envelops the lens 100 corresponding thereto, in order to block emitting light of the lens 100.

Specifically, the optical structure P1 may comprise one lens 100 and a corresponding shading part 200; or the optical structure P1 may comprise multiple lenses 100, and shading parts 200 respectively corresponding to each lens 100 of the multiple lenses 100.

Reference is made to figs. 4 – 6. Optical structures P1 having multiple lenses 100 and multiple corresponding shading parts 200 are shown schematically in figs. 4 – 6 respectively.

The positions of the opening parts 220 of the shading parts 200 respectively corresponding to the multiple lenses 100 in one optical structure P1 may be different. For example, the opening part 220 of one lens 100 may be located at a side of the lens 100, the opening part 220 of another lens 100 being located at a top end of the lens 100, etc.

By configuring the opening parts 220 in different positions, multiple light exit points corresponding to the optical structure P1 can be arranged more flexibly, to obtain a greater number of illumination effects.

According to another preferred embodiment of the present invention, the optical structure P1 according to the present invention further comprises a connection part 300. The connection part 300 is used for connecting the at least one shading part 200 and/or the at least one lens 100.

Specifically, the connection part 300 comprises a structure which extends among all of the shading parts 200 in order to connect multiple shading parts 200; or comprises a structure which extends among all of the lenses 100 in order to connect multiple lenses 100; or a structure which extends among at least a portion of the lenses 100 and at least a portion of the shading parts 200 in order to connect multiple lenses 100 and multiple shading parts 200 contained in the optical structure P1.

According to another preferred embodiment of the present invention, the optical structure P1 is a one-piece member; moreover, the at least one lens 100, at least one shading part 200 and connection part 300 contained in the optical structure P1 are a one-piece member.

The connection part 300 may be realized using the same material as the lens 100 or shading part 200; or may be realized using a third, different material.

More preferably, the connection part 300 may be realized using a light-transmitting material or an opaque material.

According to an embodiment of the present invention, the vehicle lamp according to the present invention comprises at least one optical structure P1, at least one other optical structure P2, and a light source P3. The other optical structure P2 realizes transmission of a light beam using a structure of any form.

Referring to fig. 6, it can be seen that the optical structure P1 based on this aspect can realize its own corresponding illumination effect without

interfering with an illumination effect of the other optical structure P2.

An illumination method according to an embodiment of the present invention comprises the following step:

causing light from a light source P3 to be emitted after passing through
5 the optical structure P1 according to the present invention.

Reference is now made to figs. 7, 8a and 8b; fig. 7 shows a schematic drawing of a vehicle lamp surface; figs. 8a and 8b respectively show schematic drawings of effects resulting from the illumination of the vehicle lamp surface as shown in fig. 7 using the optical structure according to the present invention.

10 In fig. 7, the grey part shows schematically a vehicle logo structural region, and the oblique stripes show schematically a structural region which uses a shading material to highlight the vehicle logo. Those skilled in the art should be able to understand that figs. 7, 8a and 8b are merely used for demonstrative purposes here. In practice, a vehicle logo part, a frame and a
15 shading part may be of any required shape, colour or structure, without any limitation to the shape, colour or structure shown in the drawings accompanying this Description.

When the optical structure according to the present invention is used to illuminate the vehicle logo lamp, a bright point may be positioned as required
20 in a certain place on the vehicle logo (as in fig. 8a), or in a certain place on the frame (as in fig. 8b). Those skilled in the art should be able to understand that the position of illumination thereof may be determined according to actual circumstances and requirements, and illumination may be performed simultaneously at multiple positions.

25 Clearly, the use of the optical structure of the present invention enables combination with features of the vehicle lamp surface such as shape or structure, to realize better illumination effects. Furthermore, when the vehicle lamp surface is illuminated using another optical structure, the use of the optical structure according to the present invention will not affect the

illumination effect of the other optical structure. Thus, a greater diversity of visual effects are obtained.

To a person skilled in the art, it is obvious that the present invention is not limited to the details of the demonstrative embodiments above, and could be implemented in other specific forms without deviating from the spirit or basic features of the present invention. Thus, regardless of which viewpoint is taken, the embodiments should be regarded as being demonstrative and non-limiting; the scope of the present invention is defined by the attached claims and not by the explanation above, hence it is intended that all changes falling within the meaning and scope of equivalent key elements of the claims be included in the present invention. No reference labels in the claims should be regarded as limiting the claims concerned. In addition, it is obvious that the word “comprises” does not exclude other units or steps, and the singular does not exclude the plural. Multiple units or apparatuses presented in system claims may also be realized by one unit or apparatus by means of software or hardware. Words such as first and second are used to indicate designations, and do not indicate any specific order.

Claims

1. Optical structure (P1), wherein the optical structure (P1) comprises:
a lens (100), and
a shading part (200) corresponding to the lens (100), the shading part (200)
5 comprising:

an enveloping part (210), for enveloping the lens (100) in order to
block emitting light of the lens (100);

at least one opening part (220), allowing an emitting light beam of
the lens (100) to emerge.

10 2. Optical structure (P1) according to Claim 1, wherein the optical
structure (P1) comprises:

at least one lens (100); and

at least one shading part (200) respectively corresponding to said at least
one lens (100), wherein each said shading part (200) respectively envelops the
15 lens (100) corresponding thereto, in order to block emitting light of the lens
(100).

3. Optical structure (P1) according to Claim 2, wherein relative positions
of the at least one opening part (220) of each said shading part (200) of the at
least one shading part (200), and the lens (100) respectively corresponding
20 thereto, may be different.

4. Optical structure (P1) according to any one of Claims 1 - 3, wherein
the optical structure (P1) further comprises:

a connection part (300), for connecting the at least one shading part (200)
and/or the at least one lens (100).

25 5. Optical structure (P1) according to any one of Claims 1 - 4, wherein
the lens (100) is a condenser lens (100').

6. Optical structure (P1) according to any one of Claims 1 - 5, wherein
the optical structure (P1) further comprises:

a light diffusion layer (400), for causing an incident light beam to emerge uniformly after being diffused in the layer.

7. Optical structure (P1) according to Claim 6, wherein in the optical structure (P1), the condenser lens (100') may focus an emitting light beam
5 onto the light diffusion layer (400).

8. Optical structure (P1) according to any one of Claims 1 - 7, wherein the optical structure (P1) is a one-piece member.

9. Optical structure (P1) according to any one of Claims 1 - 8, wherein the optical structure (P1) is realized by overmoulding; the lens (100) employs
10 a light-transmitting material and the shading part (200) employs an opaque material.

10. Vehicle lamp, comprising at least one optical structure (P1) according to any one of Claims 1 - 9.

11. Vehicle lamp according to Claim 10, comprising the optical structure
15 (P1) and at least one other optical structure (P2).

12. Vehicle lamp according to Claim 10 or 11, further comprising a corresponding light source (P3).

13. Vehicle lamp according to any one of Claims 10 - 12, wherein the vehicle lamp is a vehicle logo lamp.

20 14. Vehicle, comprising the vehicle lamp according to any one of Claims 10 - 13.

15. Illumination method, wherein the illumination method comprises:
causing light from a light source (P3) to be emitted after passing through the optical structure (P1) according to any one of Claims 1 - 9.

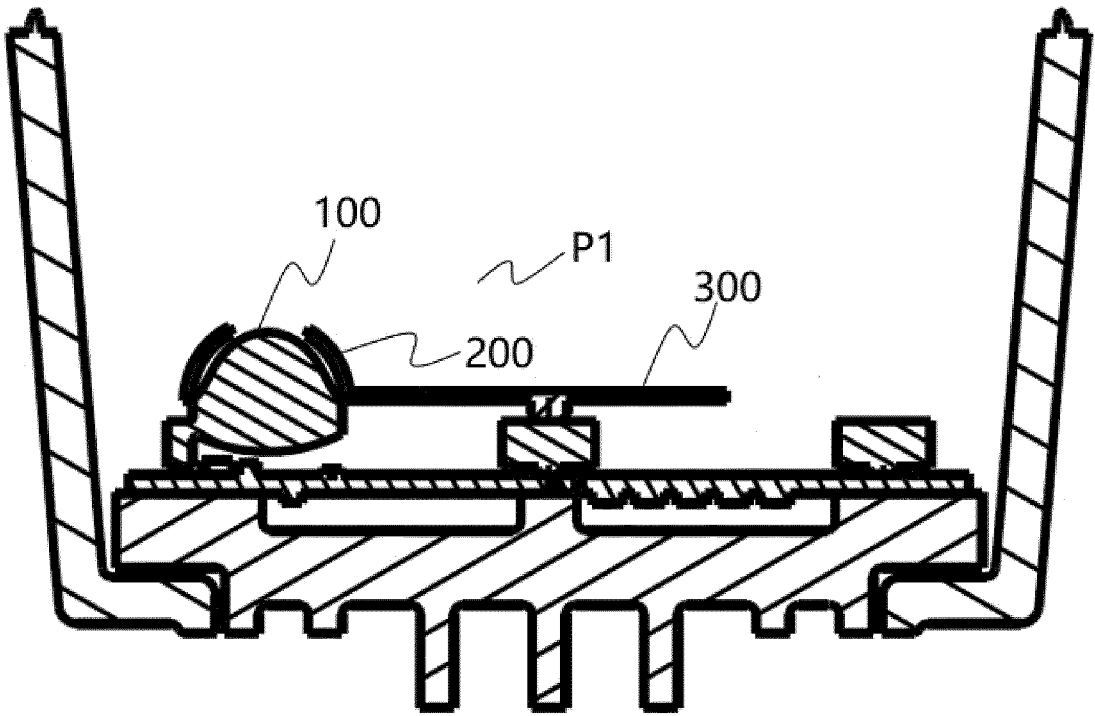


Fig. 1

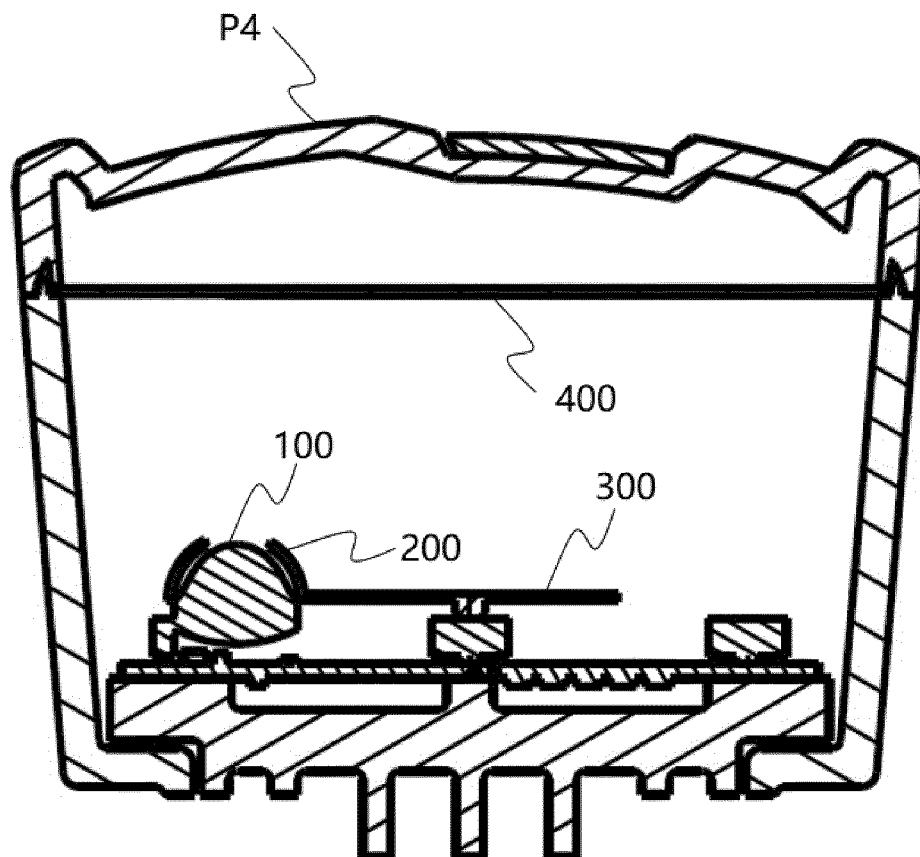


Fig. 2

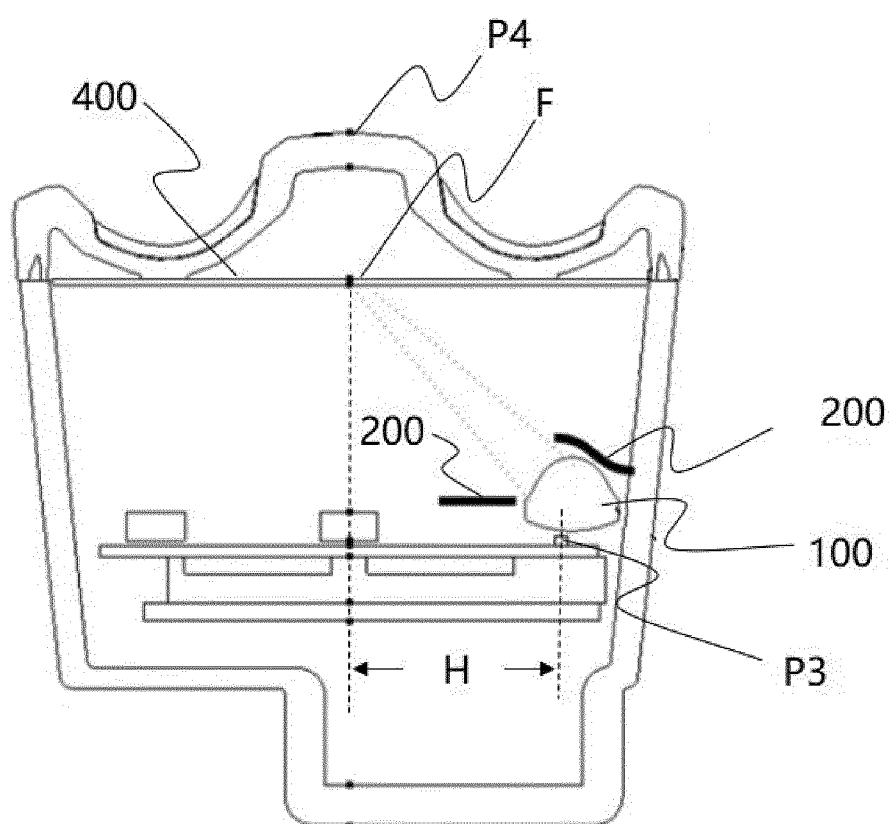


Fig. 3

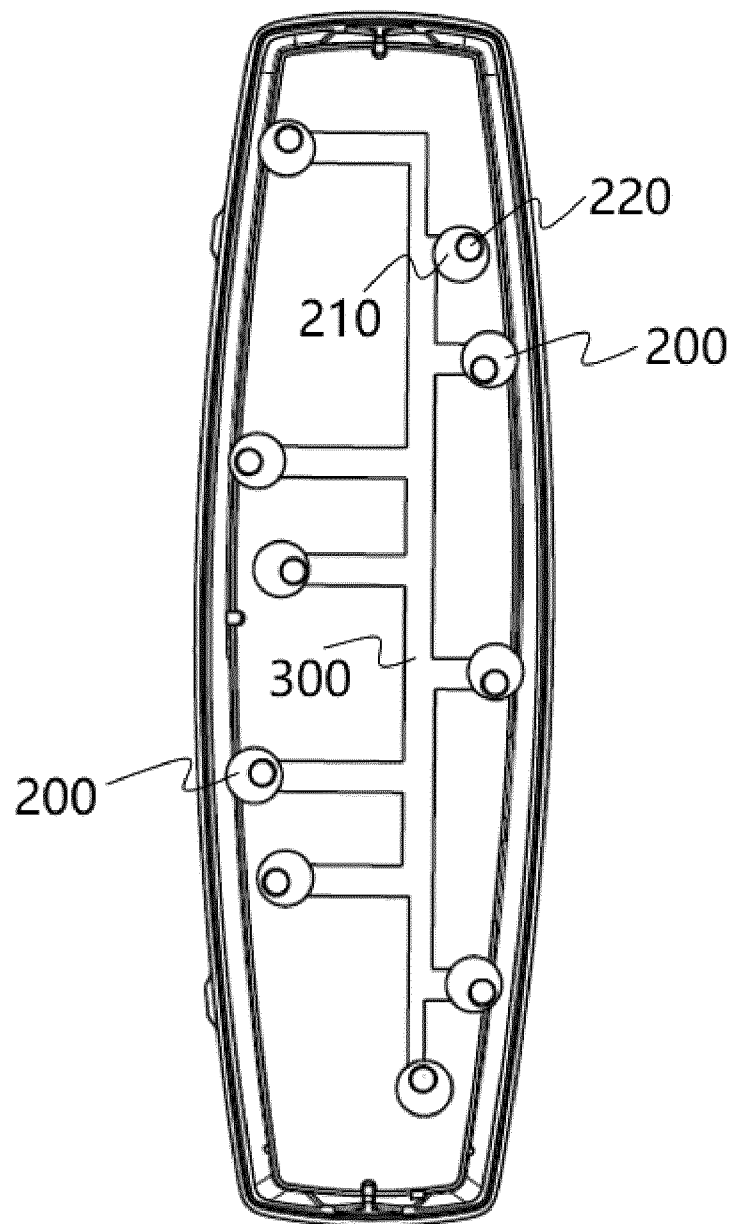


Fig. 4

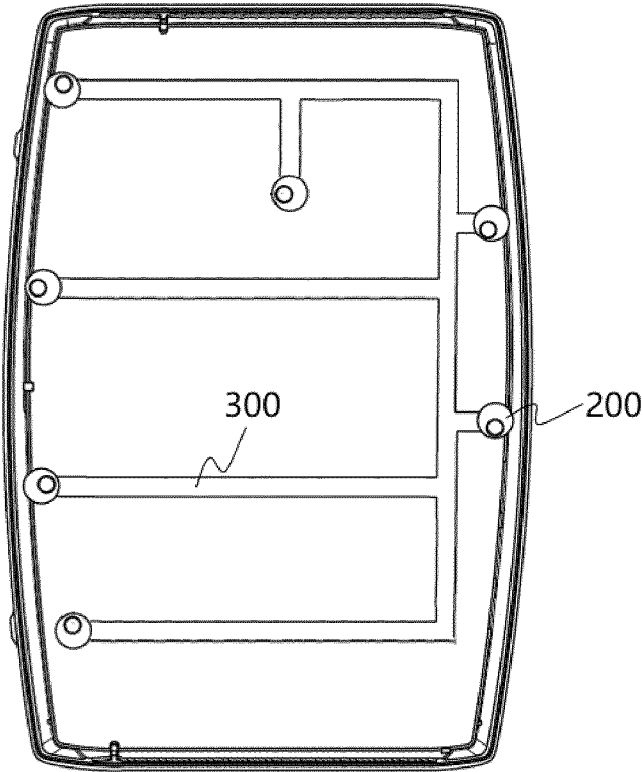


Fig. 5

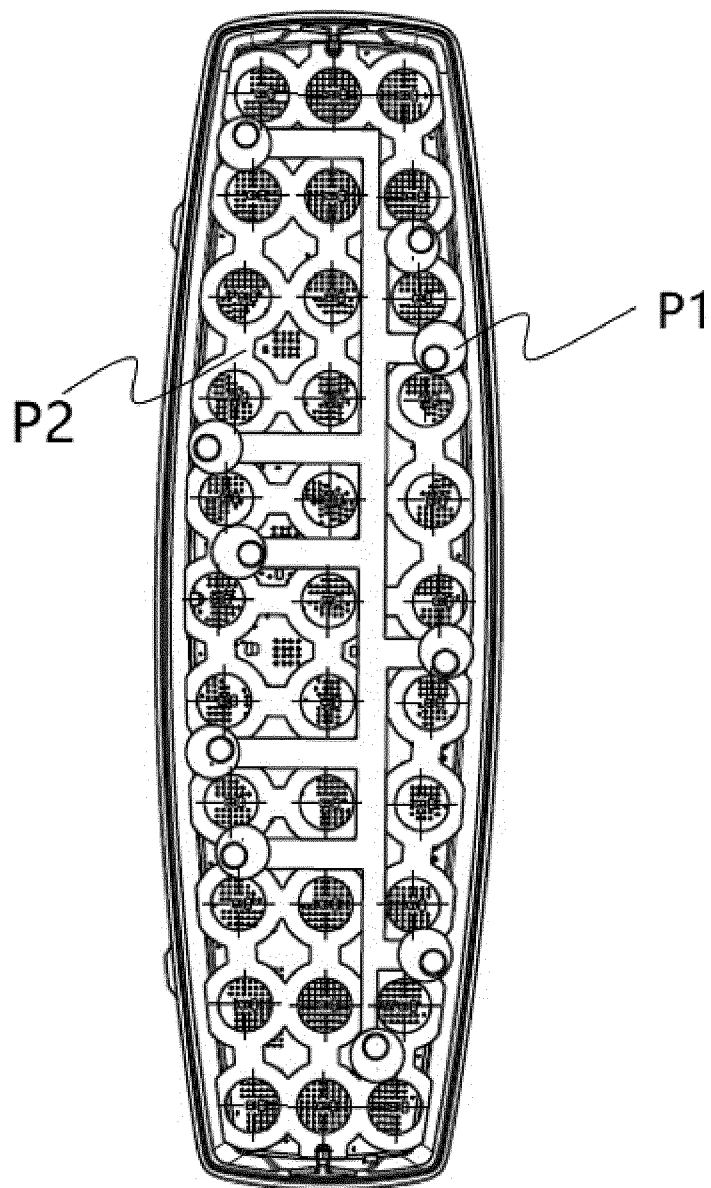


Fig. 6

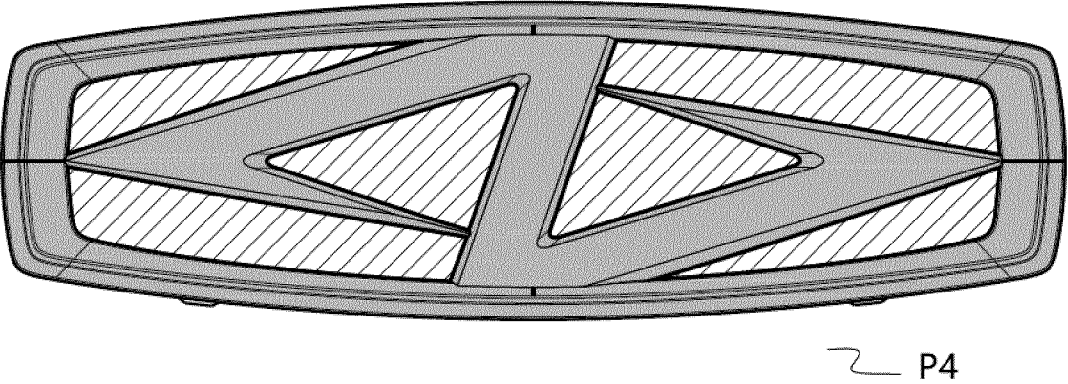


Fig. 7

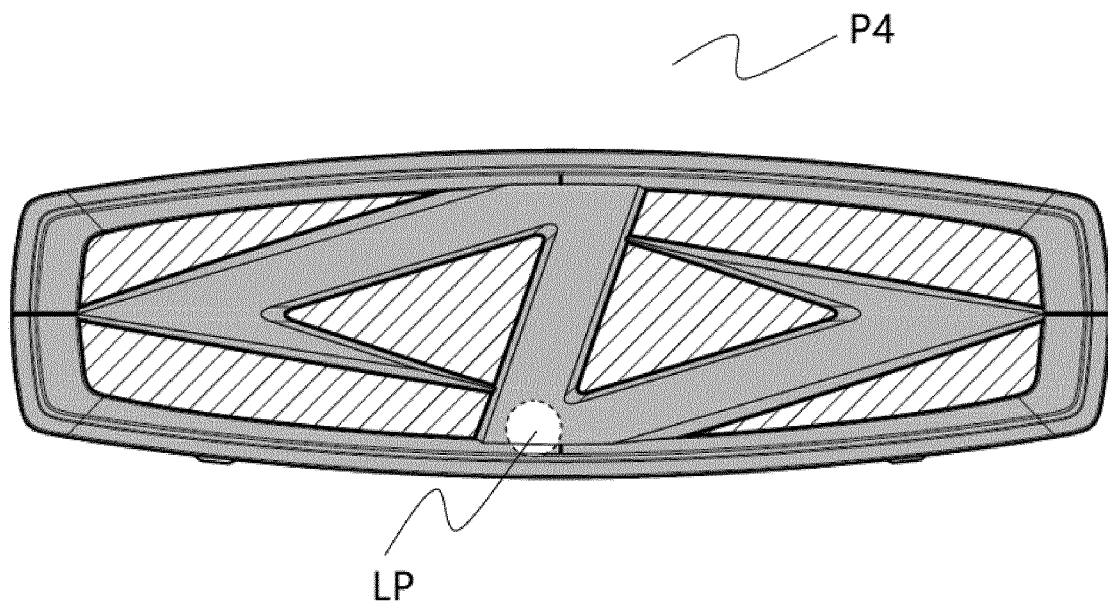


Fig. 8a

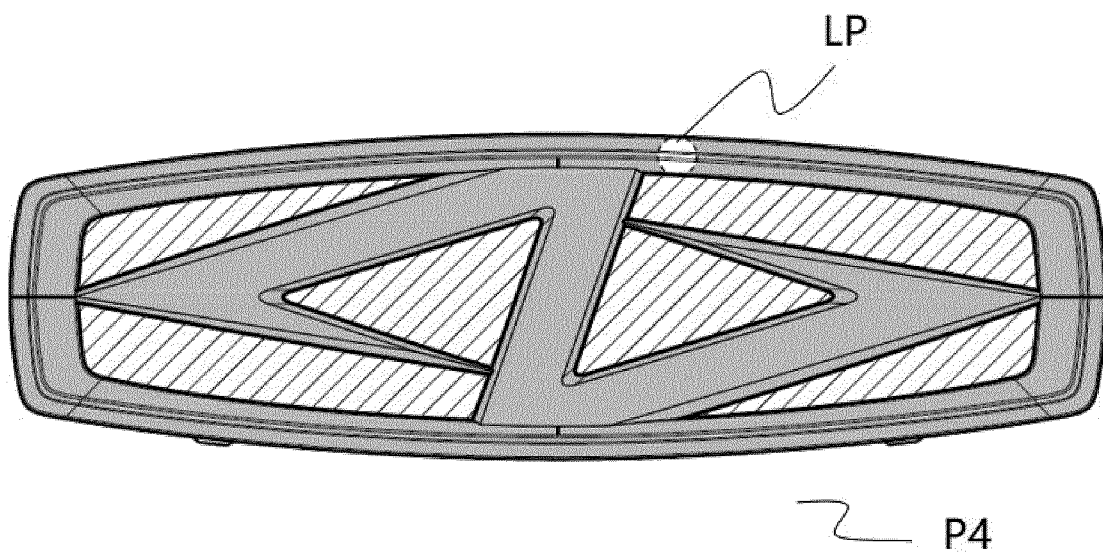


Fig. 8b

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2020/058616

A. CLASSIFICATION OF SUBJECT MATTER

INV. G02B5/00 F21S41/275 F21S43/14 F21S43/20 G02B5/02
G02B19/00 G02B27/09 H01L33/58

ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

G02B F21S H01L G09F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 2 491 297 A1 (MAES MARCEL PETER GERARD [NL]) 29 August 2012 (2012-08-29)	1-5,8-15
Y	figures 1b, 6	6,7
X	----- KR 2011 0051070 A (LG INNOTEK CO LTD [KR]) 17 May 2011 (2011-05-17)	1-5,11, 12,15
Y	figure 10	6,7
X	----- US 2018/281666 A1 (SALTER STUART C [US] ET AL) 4 October 2018 (2018-10-04)	1-5, 10-15
Y	figure 5A	
	----- US 4 733 335 A (SERIZAWA HIROYUKI [JP] ET AL) 22 March 1988 (1988-03-22)	6,7
	figures 2, 4	



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

16 July 2020

Date of mailing of the international search report

24/07/2020

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Serbin, Jesper

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2020/058616

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 2491297	A1	29-08-2012	CA 2777773 A1 28-04-2011
			CN 102971580 A 13-03-2013
			EP 2491297 A1 29-08-2012
			RU 2012116035 A 27-11-2013
			US 2012218754 A1 30-08-2012
			WO 2011047739 A1 28-04-2011

KR 20110051070	A	17-05-2011	NONE

US 2018281666	A1	04-10-2018	CN 108692284 A 23-10-2018
			DE 102018107685 A1 04-10-2018
			US 2018281666 A1 04-10-2018

US 4733335	A	22-03-1988	NONE
